Practical Wireless
PW
amateur radio & more!

IT'S MAGIC! BUILD THE 'LITTLE IMP' COIL WINDER

THREE TIMES THE FUN! WITH STANDARD

PLUS – ALL YOUR REGULAR FAVOURITES!

April 2000 £2.50

9 770141 085044

FIRST IN Amateur Radio

Waters & Stanton PLC

22,Main Road, Hockley, Essex, SS5 4QS

Fax:01702 205843
Enquires:01702 206835
01702 204965

All OFFERS subject to availability

Orders only
Freephone 0500 73 73 88

For the very best Bargains & Secondhand Listings,
Visit: Our large Web Site www.waters-and-stanton.co.uk

MasterCard VISA

Secure e-mail order: Via our web site
General e-mail: Info@wsplc.demon.co.uk.

Retail Mon-Sat
9.00 - 5.30pm

ICOM R-75 Receiver

160m -2m!

£699.95

Exclusive Offer

This package gives you coverage from 300KHz to 60MHz plus 144-146MHz. Included in the package is Datong's latest high performance 2m converter allowing you to receive 2m all-mode. Includes FREE receiver AC power supply.

TEN-TEC 40/20m CW TRANSCEIVER KITS

Build yourself a new transceiver over the weekend. Everything you need, including case and all controls.

- 3W RF output
- VFO tuning any 50KHz
- Full break-in keying (QSK)
- 4-pole crystal IF Filter (3dB at 1KHz)
- Rx sidetone
- RIT adjustment
- Supply 12V at 800mA (Tx)
- 69 x 152 x 152mm
- Case and all hardware included
- Absolutely nothing else to buy
- 50 page step-by-step manual with circuits

£94.95

YAESU FT-100

160m - 70cm All Mode

Crazy Price

~~£1249~~

SAVE £400!

£849!

Europe's Lowest Price! These are Brand New with full UK 2-Year Warranty from Yaesu.

This rig is the smallest all-bander available. 100 Watts on HF plus useful power on the VHF and UHF bands makes this rig ideal for base or mobile operation. We have used it extensively and it is absolutely great. Read Radcom's in-depth review and then come to us for the best deal around.

ICOM 1.8 - 52MHz 100W Auto ATU/51 Bandwidths

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

Phone

IC-756PRO

Real-Time Spectrum Scope

19.4% APR Available

This feature packed radio sets a new standard in HF operation and convenience and for the first time you can send and receive RTTY on the LCD screen. A new mode with no external boxes. Make no mistake, this is a very advanced transceiver, one that needs top dealer support that only comes from W & S. So give us a call and we'll send you the latest information.

ICOM IC-706IIG

160 - 70cm All Mode

Pay 10% Deposit and balance in 6 months Interest FREE

19.4% APR Available

£1069 with switch mode power supply

£989

FREE IC-T81E 4-Bander Handy with IC-706IIG

Shown above with PSU

Next Day Delivery £7.00

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

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

KENWOOD TS-570DG 160 - 10m All Mode

£849.95

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

19.4% APR Available

ICOM IC-746

160m - 2m All-mode

£1349

FREE IC-2100H 2m 50W mobile with IC-746

SP-20 Speaker

With filters. HALF PRICE

£69.95

The IC-746 offers 100 Watts of RF out on all bands from 160m to 2m. We rate it as one of the best value-for-money packages around.

FT-90R Can you believe the size?

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.

£325

SAVE

YAESU FT-847

160m - 70cm All Mode

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

SAVE

£1349

£1379 with switch mode power supply

Next Day Delivery £7.00

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!!

YAESU FT-1000MP

160 - 10m All Mode

Super Discount Phone!

19.4% APR Available

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. AC and DC versions in stock.

We Will Beat Competitor's Prices
On genuine UK Stock

By up to £100

wsplc.com is coming

CHECK IT OUT!

www.wsplc.com

ADI AT-600
Dual Bander
Airband Rx

£199

* 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
NEW

£459

2m / 70cm Data Mobile

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 Decoding Software

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

C-150 2m Handy

£99.95

* 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

~~£330~~

* 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

£220

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

SAVE

C-408
70cms Handy

Normally £89.95

£69.95

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

NEW

Offer Extended

CD-100 MULTICOUNTER

£379.95

Reads Frequency & Codes

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

KENWOOD TH-D7E

~~£299~~

* 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

ICOM IC-T81E

~~£399~~ Phone

* 6m / 2m / 70cm / 23cm Handy
* 5W Output on 13.8V DC (1w23cm)
* CTCSS & 1750Hz Tone
* 12.5 / 25kHz Switched
* 124 Alphanumeric Memories
* Wideband RX. FM WFM & AM
* Ni-MH Cells & AC charger

ADI AR-147

AM Airband Receive

£199

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

KENWOOD TM-V7E

£369

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

GARMIN. In-Car
GPS Street Pilot

£419

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**.

GARMIN. In-Car
GPS-III Plus

£349

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

~~£549~~

In Full Colour!

Price Down

£349

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

Includes FREE Remote head cable.

ICOM IC-207H

~~£369~~

Price Down

£279

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

KENWOOD TM-G707E

£279

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

YAESU FT-8100R

Phone

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

ICOM IC-2100H

~~£299~~ Phone

* 2m Mobile 55 Watts Output
* 50 Alphanumeric Memories
* Switched 12.5kHz and 25kHz Filters
* CTCSS and 1750Hz Tone

Number ONE in Amateur Radio — Waters & Stanton

Order Details on Inside Front Cover

NEW from Cushcraft

R8 8-Band Antenna
40m to 6m 1500 Watts — £399.95

The R8 is a robust vertical designed to take full US power limits. It has a very broad bandwidth, effectively working to the edges at 2:1 VSWR. Only two traps are used, so reducing the losses. At around 30ft tall, it is designed to give high performance, even on the lowest bands. A true DX-ers antenna in a very small space. Uses very short rigid base radials similar to R-6000.

NEW MA5B Mini - Beam
5 Band Compact Beam From Cushcraft

£289.95

10 - 20m Inc WARC bands 1.2KW, 50 Ohm feed, 2 Elements on 10, 15, 20m, Dipole on 12m & 17m, Max element length 5.2m, Boom Length 2.2m, Turning Radius 2.7m, Weight 12Kg.

FB1 - 9 Skin Coloured Earpiece — £9.95

The FBI-9 is a brand new design that is skin coloured to make it far less obvious when worn. Its curly lead means it is much easier to wear neatly. And it is very tough indeed. The cable exits will take a strain of 12kg so it won't break in commercial applications. And finally, it is exactly the same unit as supplied to the FBI, hence its code!

144/ 430MHz Dual Band Yagi.

DBY-2759

142-146,428-442MHz
Single feed
SO-239, 50 Ohms
100W max power
VSWR 1.1 -1.5:1
Gain 10 dBi 2m
Gain 13 dBi 70cm
Boom length 114cm
5 elements 2m
9 elements 70cm
Gamma match
Weight 2.3kg

£79.95

Extremely well engineered 2m/70cm dual band Yagi. Can be mounted either vertically or horizontally. Each band has separate gamma match but single coaxial feed.

Watson Off-Air Frequency Counters

£59.95

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

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

Compact 10 Amp Switch Mode PSU

£49.95

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.

UBC-3000XLT
25MHz - 1.3GHz

£189.95

One of our most popular scanners, it has 400 channel memories, Automatic store and automatic sorting, Ultra fast scan rate, LCD backlight, 300ch per sec. scan rate, Data skip function, Supplied with AC adapter/charger and AA ni-cads.

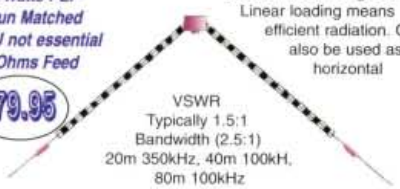
80/40/20m Dipole 50ft Long!

G3OJV 80-Plus-2

SpaceSaver

Approx 50ft long (Horizontal)
400 Watts PEP
Balun Matched
ATU not essential
50 Ohms Feed

£79.95



No soldering, just assemble the elements, check the dimensions and fine tune as per instructions. Unlike the G5RV, it self-resonates with low VSWR on all three bands. A unique design that offers LF operation from your back garden.

Power Supplies

SEC-1223
13.8V PSU

£99.95

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 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

Handheld Scanner
UBC - 220XLT

£119.95

Ideal for general listening, this scanner covers all the major bands from 66MHz - 956MHz AM and FM. 200 memories and a very fast scanning speed make this a very attractive buy. You also get the flexible short antenna, AC charger and batteries. Very popular with Airband listeners.

Watson WAT-3 Receiver
Antenna Tuning Unit

£69.95

* Frequency 500KHz - 30MHz
* 6 band positions
* 50 Ohm to Rx
* Variable 'Q' control
* Connectors 2 x SO-239
* Wire & earth connections
* Size 165 x 75 x 90mm
* Weight 850g approx

The WAT-3 Deluxe Antenna Tuning Unit with variable 'Q' control has been designed specifically for SW listeners who require a quality ATU. Six frequency bands are provided covering from 500KHz to 30MHz. The variable capacitors in this unit are air-spaced and normally reserved for transmitting ATUs. It has separate high impedance and low impedance inputs, with low Z via an internal balun for HF.

Antenna Rotators

£49.95

AR-300XL Lightweight

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

YS-130 Medium Weight VHF

£79.95

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

New Create RC5-1 Rotator

NEW — £299.95

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

Yaesu Rotators for HF Systems

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

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

UK's Largest GPS Stockist

£429.95

The New Street Pilot in Stock

GARMIN

Just part of our stock

E-Map	GPS Moving Map	£189.95
E-TREX	GPS for Walking	£119.95
Street Pilot Colour	GPS Receiver	£629.95
010-10264-00	UK Street CD ROM	£99.95
GPS-III Plus	GPS Receiver	£349.95
010-10263-00	UK Street CD ROM	£69.95
010-10215-01	World CD ROM	£69.95
GPS-3 Pilot	Aviation model	£429.95
GPS-12MAP	GPS Receiver	£329.95
GPS-12CX	GPS Receiver	£239.95
GPS-12XL	GPS Receiver	£189.95
GPS-12	GPS Receiver	£129.95
DC Cable	GPS 2/3/12/45	£17.95

ATS-818A Short -Wave Portable

SSB AM & Broadcast

£129.95

A compact portable station that will pull in signals from around the world. SSB reception will let you hear radio amateurs and aircraft from the far corners of the world. On AM you will be able to tune into the latest world news as it happens, from the BBC in London to Radio Australia. There are 54 memories in which to store your favourite stations, you can even listen to stereo if you use headphones. You also get digital frequency entry, direct or via keypad and comprehensive scanning. Power is via 6 AA cells (not supplied).

APRIL 2000
(ON SALE MARCH 9)
VOL. 76 NO 4 ISSUE 1117
NEXT ISSUE (MAY)
ON SALE APRIL 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

☎ 0171-731 6222
FAX: 0171-384 1031
Mobile: (0585) 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**

APRIL 2000 CONTENTS

Antennas which have to cope with bad weather... Page 40

Steve Mahony VK5AIM's Post War Memories... Page 36

60 RadioScene

Ed N0ED returns this month with his quarterly report on Amateur Radio 'across the pond' in 'Scene 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.

STANDARD

Standard C510

A full featured, pocket sized handheld that can be transformed into a powerful mobile too! The C510 and accessories provide a top performance mobile with the convenience of a high specification handheld.

£99 inc VAT

Dual band !

Dual band - 144 & 430MHz
1Watt high power 300mW low power
CTCSS encode/decode
1750Hz tone burst
Wideband receiver with AM
200 memories
Extensive scan functions
DTMF paging function
Cross band operation
Large backlit LCD display
Powered by 3 AA batteries
Size 58mm(w) x 104mm(H) x 27mm(D)
Extensive range of accessories including the CPB510 50Watt mobile booster

£100 inc VAT

CPB510 50 Watt booster
50 Watt booster
Size:150mm(W)x31mm(H)x170mm(D)

C568 Tri band handheld

A high specification handheld with **23 cms** transmit and receive twin frequency display amazing performance and lots lots more...

Tri band - 144MHz, 430MHz & 1200MHz
Up to 5 Watt output (2.5Watts with CNB171 NiCad supplied)
35mW on 1200MHz
CTCSS encode/decode
1750Hz tone burst
Wideband receiver with AM
Receives on 2 frequencies simultaneously
Cross band repeater for RAYNET use
40 memories
Extensive scan functions
BNC antenna connector
Full duplex operation
Large backlit LCD display
Supplied with CNB171 NiCad battery & charger
Size 47mm(w) x 131mm(H) x 34mm(D)
Extensive range of accessories available

Tri Band !

£239 inc VAT

C558 Twin band handheld

A twin band VHF/UHF handheld with dual display

£169 inc VAT

Dual band !

Dual band - 144MHz & 430MHz
Up to 5 Watt output (2Watts with CNB151 NiCad supplied)
CTCSS encode/decode
1750Hz tone burst
Wideband receiver with AM
Receives on 2 frequencies simultaneously
Cross band repeater for RAYNET use
40 memories
Extensive scan functions
BNC antenna connector
Full duplex operation
Large backlit LCD display
Supplied with CNB151 NiCad battery, charger & mobile adapter
Size 55mm(w) x 130mm(H) x 31mm(D)
Extensive range of accessories available

STANDARD

C156 VHF Handheld

Without doubt the best selling VHF handheld on the market. The C156 offers good performance, outstanding features & top quality construction for an unbeatable price.

£69 inc VAT

144-145.995 MHz transmit
Wideband receiver
5 Watt output (1.8 Watt with CBT156)
CTCSS encode (decoder optional)
1750Hz tone burst
100 memories
BNC antenna connector
Extensive scan functions
DTMF paging function
Large backlit LCD dot matrix display
Size 58mm(w) x 100mm(H) x 26mm(D)
Supplied with CBT156 AA battery case
Extensive range of accessories available

C178 VHF Handheld (low power transmit on UHF)

A remarkable radio at a remarkable price

Transmit 144-145.995MHz & 430-439.995MHz
Up to 5 Watt output (2Watts with CNB171 NiCad supplied)
50mW on 430MHz
CTCSS encode/decode
1750Hz tone burst
Wideband receiver with AM
40 memories
Extensive scan functions
BNC antenna connector
Large backlit LCD display
Supplied with CNB171 NiCad battery & charger
Size 56mm(w) x 125mm(H) x 31mm(D)
Extensive range of accessories available

Dual band !

£99 inc VAT

C508 Dual band Miniature Handheld

80mm

58mm

£129 inc VAT

Dual band - 144MHz & 430MHz
280mW output
CTCSS encode/decode
1750Hz tone burst
Wideband receiver with AM
60 memories
Up to 45 hours battery life
Powered by 2 AA batteries
Battery saver function
BNC antenna connector
Cross band operation
Clear backlit LCD display
Size 58mm(w) x 80mm(H) x 25mm(D)
Weighs only 160g
Extensive range of accessories available

Dual band !

ALL EQUIPMENT HAS A 1 YEAR PARTS AND LABOUR WARRANTY COMPLETE WITH TECHNICAL SUPPORT

- CLUB DISCOUNTS AVAILABLE, PHONE FOR DETAILS -

www.standard-comms.co.uk/amateur **Telephone sales on:- 0181 236 0032**

ICOM

MAD MA

IC-746 HF/VHF transceiver features...

- 1.8MHz~144MHz multimode coverage
- 100W output for HF, 50MHz and 144MHz bands
- DSP fitted as standard
- Continually adjustable noise reduction
- Selectable APF with 3 passband widths
- Twin PBT, first in a mid-range radio
- Auto antenna tuner with preset memories
- Compact size 287 x 120 x 317 (mm)

Buy an IC-746 and get an IC-2100H FREE!

IC-706MKIIG

- Now includes 430
- 144MHz output po
- Illuminated functio

Plus... Improved o use, as a base or UT-106 DSP unit s ing noise reductio Narrow FM is ava call channels for edge channel pai

FREE IC-2100H when you buy an IC-746!

- Powerful 55 watts RF output
- Improved inteference rejection characteristics
- Tone squelch with pocket-beep and tone scan functions as standard
- Simplified operation - no function switch!
- Compact size: 140x40x180 (mm)
- Wired cloning from your PC

25 YEARS

RCH SALE

IT'S HARE-RAISING!!!

ıtures...

(70cm).
increased to 50 watts.
ys.
ition for local and DX
ile. Easy installation.
lied as standard, provid-
d auto-notch functions.
e on ALL bands. Separate
nd 70cm. More scan

FREE IC-T81E when you buy an IC-706MKIIG!

- 6M + 2M + 70CM + 23CM all-in-one compact handheld .
- 'Joy-stick' multi-control for intuitive operation.
- Water-resistant, commercial-grade construction for reliability and durability.
- Multiband receiver with FM, WFM and AM modes.
- Up to 5 watts on 6m, 2m and 70cm, with 1 watt on 23cm.
- Tone squelch as standard • Automatic squelch mode.
- RIT & VXO for 23cm.

RING FOR SALE DETAILS:

01227 741741

Icom (UK) Ltd. Sea Street Herne Bay Kent CT6 8LD. Tel: +44 (0)1227 741741. Fax: +44 (0)1227 741742. URL: www.icomuk.co.uk e-mail: info@icomuk.co.uk

Count on us!

ROB MANNION G3XFD DISCUSSES THE INTEGRITY OF EDITORIAL REVIEW POLICY

KEYLINES

I'm now well into my *PW* 'Club Visit' schedule and, as usual, this is taking me to interesting parts of our beautiful group of Islands. However, I'm afraid that I've got to make one very public (and abject) apology in this respect - that due to a very unfortunate series of events in late January - including a death in my family (my brother-in-law), a house move and the death and funeral of a well respected Radio Amateur - I totally overlooked a long-scheduled visit to the **West Somerset Club in Minehead, Somerset**.

I hope the West Somerset Club **will forgive me** - especially as I'm sure that everyone who reads *PW* knows just how important I regard club visits to be. I've written to the club to apologise and re-arrange the visit later in the Spring, but I know my non-appearance must have seemed very rude. But take it from me - it was the culmination of a very uncomfortable few weeks. So, I look forward to meeting the Minehead members later!

Otley Radio Society

The very first 'New Millenium' Club visit for me was to the **Otley Radio Society** in West Yorkshire on Tuesday 25th of January. Just north of Leeds, this club provided a typically warm 'Yorkshire' welcome and I thoroughly enjoyed the company, the visit itself and meeting old friends and making new ones.

The Otley visit was also the first 'outing' for several dozen copies of 1930s vintage *PWs* - kindly donated for the purpose (obviously, I cannot take the cherished 'official' archives out of the office). **Tex Swann G1TEX** (Honorary Archivist and very much in charge - would see to that!) by reader **Alan Afford**. I feel sure that if Alan - who lives in Cheshire - had seen how interesting the Otley Society member found the magazines - he would have been delighted. **Thank you Alan** - I know how much your kind gesture will be appreciated by every club I visit in the future.

Among the various 'regular' items I take with me to clubs is the *PW* 'Comments Book'. This is provided so people can make comments, suggestions and otherwise provide valuable 'feedback' for the Editorial team. And, I'm pleased to say, several popular series of articles in *PW* have started in this way - directly due to reader's requests.

However, as his letter (under the heading 'Reviews In *Practical Wireless*') intimates - **Nigel Smith G0NIG** (I like the callsign Nig'!) the comment caused me some concern. It read "A very good read, but, are reviews biased for fear of losing advertising"?

Once back in the office I immediately wrote to Nigel, expressing my dismay - not because he'd written the comment but because he had not taken the opportunity to raise the point during the 'Questions & Answers' session after the talk. It would have been the ideal opportunity to discuss the matter face-to-face and perhaps I could have satisfied Nigel - and others - of my honest attempts to provide unbiased, honest and (as far as possible) the most valuable opinions we can in our published reviews.

Editorial Review Policy

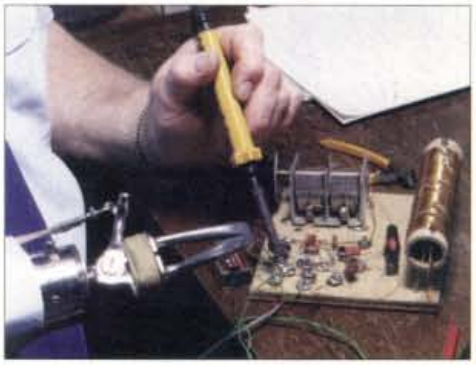
Now in my 11th year as Editor of *PW*, I've been constantly striving to assure anyone who reads *PW* of the following policy: Firstly, although we aren't able (as American magazines can) to buy review equipment, the suppliers/manufacturers aren't permitted (and have never tried!) to tell us what to write in the reviews, although out of courtesy we do show them a pre-publication copy and occasionally, a 'Reply Panel' can be provided for any comments the supplier/manufacturer wishes to make. And of course, in reality they tell us what we can have and when we can have it.

Neither can reviewers be chosen by suppliers/manufacturers. In fact, I select the reviewer and any of our review authors who makes contact with a supplier/manufacturer regarding equipment for review is automatically disqualified from working on that review. **Unsolicited reviews are never accepted** (for obvious reasons) and anyone 'working in the trade' is also disqualified because I could not vouch for their integrity or unbiased opinion.

Often said to be 'overly sensitive' I'm always disappointed when I find out there's doubt expressed on a particular review. And although we do our very best to be 'squeaky clean' - it's becoming very difficult to be critical when reviewing equipment - and I'll explain why I think this is so.

High Standards & Specifications

For the reviewer - modern Amateur Radio equipment is becoming very difficult to criticise at times ... mainly due to the high standards and equally high specifications of the equipment. Often, unless a fully certificated and approved 'Test House' is available to the reviewer (and I don't include those reviews published with disclaimers in very small print proving 'laboratory results' aren't 'approved' or certificated) the reviewer can only provide an opinion backed by experience.



However, although there have been occasions when my reviews have been subject to comments such as 'did you really think it's that good'?, I've also occasionally been told by readers (in no uncertain terms!) that my reviews have been "unfair" to certain manufacturers. It seems as though I can't win. But you (the reader) can be assured of this fact: **Reviews in *PW* are the honest opinion of the reviewer** and as long as I'm the Editor of *PW* I'll guard their integrity - that of the *PW* team and my own - jealously.

It's said that "Everyone has a price". In return I'll say mine is "Priceless" because without the integrity and your support - my opinion and that of our reviewers would be worthless. And both *PW* and our hobby are worth caring about aren't they?

Rob Goes Electronic!

Fed up with the increasing 'typos' my artificial arm is creating when I'm replying to letters using my typing 'gadget' (readers who get E-mails will notice this particularly because for the sake of a speedy reply I don't 'spell check' for this informal way of communicating) I've decided to go 'fully electronic'.

My new artificial arm (the prototype was clockwork - with a miniature typewriter like keyboard) will have a complex built-in microprocessor and special electronic 'fingers'. So, instead of typing with the equivalent of one 'mechanical finger' - I'll have five (they don't bother with a thumb) which will type at 200 words per minute.

All I'll have to do is to dictate what I want typed - while holding the artificial arm above the keyboard! One or two little 'snags' have been eliminated already (such as the electronic prototype trying to interpret a 'sneeze' into typed words) but I really think it has a future. Let's hope I don't have to wait until next April until I get delivery and hope it's 'first time lucky eh'?

Rob G3XFD

LETTERS

COMPILED BY ROB MANNION

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

Jargon-Busting

Dear Sir

Firstly, congratulations on a great magazine! Yourself and the team do an excellent job. I find most of the articles very interesting and look forward to the magazine arriving in my local newsagent every month.

I am not a licensed amateur, nor do I sit listening to the s.w. bands for hours on end (not through choice, but with a young and demanding family, it's hard to hear the radio)! However, I am keen on radio in general and try to spend as much time possible listening and learning about the hobby.

I read with interest many of your readers' thoughts about the dwindling numbers of entrants for the RAE computers/Internet, mobile phones and even the great Morse debate are cited as the main culprits. I ask any licensed amateur to take a step back and look at the hobby as if they were once again starting out.

Most schools don't have radio clubs nowadays, radio club numbers have also diminished over the years, so where do potential amateurs turn to for information? *Practical Wireless* - that's where!

Fortunately, the magazine is by far the best available with regard to the hobby, unfortunately it tends to forget about the many unlicensed and non-technical readers it has. The main problem I find is some of the terminology used, what is simplex/duplex for instance? How are dBs and Watts related, etc.

Many people can't afford to buy books on a hobby they're not sure about taking up seriously. I wonder if you are aware of the "jargonbuster" format used in the magazine *Computer Active*, it runs a column down the side of a few pages with a brief description of certain terminologies used within the magazine and is very useful for beginners.

Please don't "dumb down" a great publication, but could you give us, slightly less-educated, technophobes a helping hand with some of the abbreviations, etc.?

Yours hoping ... 73 to all,

Gary Taylor
Plymouth

Editor's comment: A good point Gary! Your letter supports several comments in the 'Comments Book' I take with me on 'Club Visits'. I will include as many relevant 'jargon busting' explanation 'panels' as I can in 'Radio Basics' from now on.

Radio & Pacemakers

Dear Sir

Thank you for publishing my letter seeking to share the experiences of other Radio Amateurs with Pacemakers still pursuing this hobby. My thanks too, to everyone who responded for their advice and encouragement.

I endeavoured to reply individually by telephone, but if I have omitted anyone, my apologies and likewise for the delay (had the 'flu) in expressing publicly my appreciation for the support and friendship which has always been associated with Amateur Radio.

In addition, I received information from **Vitatron**, the manufacturer of my personal pacemaker and learned that they are only made in the USA, Germany and Holland. When provided with details of my set-up they estimated that the field strength at a distance of 30ft from the antenna is likely to be around 6V/meter and, since Vitatron pacemakers are tested up to 20V/meter (at nominal pacemaker settings) no problems are expected. They made contact with my pacemaker clinic in Bournemouth and in fact deal with each enquiry individually. My thanks to them too for their thoroughness, which restores much of my lost confidence.

Hopefully, when the weather improves and a few necessary modification are made to my antennas I can be back on the air. In the meantime, if my experience can reassure other amateurs, the purpose of my original letter has been served. I would be happy to communicate further at any time. Yours sincerely,

Les Ward G4XGC
Dorset

Radio Amateurs?

Dear Sir

One of my favourite bands as a rather new short wave listener (s.w.l.) is the 3.5MHz (80m) band listening keenly to both the 'local' and DX signals there. However, I've recently come across what appears to be Radio Amateurs operating just below the band on 3.4MHz. Their callsigns are unfamiliar although quite similar to some of the amateur prefixes. For example, GB25, GM49, GB0NB and GW19 are typical of some I've heard and they sound very much like Radio Amateurs in the way they operate.

Most of the stations there come from Wales, England, Scotland, Ireland and the Netherlands and they are heard there regularly, including some French speaking stations from time to time.

However, despite asking about them at a local Amateur Radio Club, none of the amateurs there had any idea what they were. Are these stations part of some other radio service, not connected to Amateur Radio?

I have also heard them discussing operating on frequencies around 6.6, 13.9 and 26MHz and have heard stations there at differing times of the day and night. Can you tell me what these stations are and are they part of the Amateur Radio system?

Yours sincerely,

Stuart Jones
Aberdare, Wales

Editor's comment: The 6.6MHz frequency suggests 'pirate' operation to me - but can you shed a little light on Stuart's question? If so we look forward to your letter!

Radio Basics - Practical Advice & Tips

Dear Sir

Regarding all your 'Radio Basics' projects in *PW*, may I add a basic bit of practical advice on how to get them 'singing and dancing'? A great deal of dedicated components are purchased at rallies, etc., most have found their way by being "industry rejects", in other words, "not up to spec". Therefore, any circuit constructed 'to spec' may not work, owing to the biasing of transistors and any other semi-conductors being wrong.

May I suggest a quick check across an emitter resistor with a DVM and a calculation using Ohm's Law to ascertain the loading on a semi-conductor to enable the circuit to oscillate. Also use a voltage regulated supply with all circuits, some batteries take a dive when a load is applied.

Sandy Pimlott G8IDE
Devon

Editor's comment: Interesting tips Sandy! Incidentally, Sandy's observation on 'non standard' or 'not up to spec' components highlights a problem some readers of 'Radio Basics' have pointed out to me (please see 'Radio Basics').

Washing Line Antennas

Dear Sir

I'm writing regarding **Mel Gardiner's** letter in the February issue. I have been using a washing line antenna now for over five years, operating on the 7, 14, 21, and 28MHz bands being at clothing post height approximately 7ft through an a.t.u. It works well on all the bands having worked over 120 countries in all continents. It winds round the garden of random length. Reason for operating this way is because I had a five band vertical stolen from the back garden! So, no sign of an Amateur Radio antenna anywhere! So I advise anyone who wants a low profile antenna to do the same. Best wishes to you and the magazine.

A Shillito G2FRY
Nottingham

Clandestine Radio (February)

Dear Sir

My own letter has been provoked a little by the Editor's comment (inviting

more memories) at the foot of **Mr MacKenzie's** 'Star Letter' in the February *PW*.

The circumstances of Mr MacKenzie's first meeting with the 121 sort of rings bells even as to dates. Like him, in 1955 I attended my last Territorial Army (TA) as the Radio Mechanic Sgt. My then new wife had decreed that it would be my last and it was doubtful if the Post Office (my employers) would agree any extension of my contract.

Working from the wedding date of the 4th June 1955, it was about ten days later that I went with the advance party to Signal Hill, Poundon. I was almost totally involved with the bigger stuff like the base station equipment 10 × 813 valves in total! I was shown 121s by the operator Sgt. and perhaps by civilian staff of the Diplomatic Wireless Service (DWS).

As I write I can just recall a few National Service (NS) operators from the West who came to that camp. It might have been that these were Colonel Sharpes' people?

My NS was October 1949 to October 1951 with TA commitment from 51-55, i.e. three and a half years NS converted to four years as a volunteer.

The No.1 Special Communications Regiment was my TA unit but associated were the Artists Rifles who also used 119, 121 and parachutes.

D L Lisney
Middlesex

Editor's comment: I remember the DWS 'recruiting' at Amateur Radio shows many years ago. It would be interesting to hear from anyone who 'joined up' with the DWS and is able (Official Secrets Act permitting) to write about the service. I was also amused to read that the 'Artists Rifles' used the 119, 121 and parachutes (I can imagine large radio sets packed with 813 valves being 'dropped' and the unfortunate repairmen trying to get them to work!).

Reviews - My New Yaesu

Dear Sir

After carrying around the standard 'house brick' sized hand-held transceiver for many years (something which those of us who don't like parting with hard earned cash tend to!), I thought that the time had come to look at the new technology on the market, by looking at the *PW* adverts, etc. Up popped the Yaesu VX-5R review in the February *PW* written by **Richard Newton G0RSN**.

I had heard the comments many times before, quote: "I've never read a bad review yet" and "does the reviewer work for the company"? unquote. However, putting these comments to the back of my mind, I carried on reading.

The comment about the small keypad bothered me, as I'm on the good side of 50 years old (but not having eyes like the proverbial 'outhouse rat') could I hack it? But 'Two hours with instruction book' ... must need an A'level for this one ... and 5W of output power from its own battery, I had to see and try this rig!

Then came the next problem, convincing my wife that I needed a radio and would find it hard to live without it! (I got over that one by informing her that she could listen to Radio 1 and Radio 2. Not only that, if we were on the road and couldn't get to a TV ... she could also listen to her favourite soap using the TV band!

Permission granted, I drove to the shop and looked at this tiny rig in the showcase (Richard Newton was not kidding about the size!), I was very impressed and bought one. After charging the battery for six hours, I was on air, the radio did everything it was supposed to do ... and did it very well.

The moral being, that everyone should understand that a review is the author's own opinion and is given as a **guide** to operation, technical specifications and field tests. However, there can be no substitute for viewing and testing something yourself, the old saying "one man's meat ..." comes to mind. But well done to Richard Newton for this 'down to basics' and honest review.

Mel Gardiner
Suffolk

Editor's comment: Thank you for your letter Mel and I take this opportunity to invite readers to join me on the 'Keylines' page where the subject of reviews is this month's main topic.

Reviews in Practical Wireless

Dear Sir

I have a number of points/apologies to make concerning the comment I placed in your 'comments' book when you visited the Otley Club, West Yorkshire, in January when I suggested that reviews in *PW* might be presented so as to please advertisers/dealers. I'm sorry for the upset it may have caused, with hindsight, this would have been better presented verbally during the presentation as you pointed out. I hope (via this letter) that I may constructively clarify the true nature of the comment.

At work I have the arduous task of reviewing equipment supplied by various manufacturers and developers and my policy, like yours, is to ignore what they say it is capable of doing and actually discover for myself whether or not the device meets our requirements. This often includes 'testing to destruction'

To use this kind of approach when reviewing Amateur Radio equipment which has been presented to the magazine on loan is, in all honesty, a touch on the overkill! But another technique I use is, if I haven't destroyed the device, I then enlist the help of a colleague to conduct his own testing methods to ensure that I haven't missed any flaws and also to obtain a more independent view. It's a method, I think, that would be very easy to implement in your magazine and would give the readers a broader idea of the information being portrayed. In fact, this I noticed that the Editor (G3XFD) did when reviewing the SGC-2020. Rob commented that he "wasn't taken" by the 'LED/POWER' indicator but then your Technical Projects Sub-editor (**Tex - G1TEX**) found it to be quite effective. I have had experience of this set and my conclusions were again different from yours, but all due to personal preference. I also believe it would be of more benefit to the reader if a number of different people with different interests were to review the same equipment.

I have quite an extensive collection of back issues (I never throw anything away much to my wife's annoyance) and, overall, the policy that yourself and the rest of the staff at *PW* employ is by far the most just and the overall content of the publication is of a very high quality.

I have been a regular reader of *PW* for about 20 years (since I was 14 and convinced the school I attended to subscribe for the benefit of our library) and your recent visit and presentation at the **Otley Amateur Radio Society** and the letter I received from you (regarding my note on reviews) only goes to substantiate the high quality and commitment to the hobby that you and your staff have contributed to over the years.

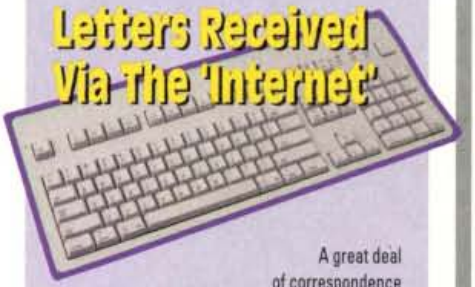
I look forward to annoying my wife still further as future issues of *PW* are archived in any available space in my house and I thank you for responding on a personal level to someone who probably appeared to be a bit of a trouble maker!

I have no reservations about the contents of this E-mail including my name and callsign appearing in *PW* and I apologise for any justifiable anger I may have caused you and your staff by my sweeping comment. With Greatest Respect.

Nigel Smith G0NIG
West Yorkshire

Editor's comment: Nigel and I have spoken on the telephone at length about his original comment on reviews in *PW* which he'd written in the 'Comments Book'. However, I made it clear to him that I was only dismayed that he'd not taken the opportunity to ask me during the '*PW* talk' about the Editorial 'honesty' stance on reviews. (Please see 'Keylines' for further comment).

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). **Editor**

NEWS

COMPILED BY JOANNA WILLIAMS

Headline News

Amateur Retail Division Closed At SMC

Barry Gardner G8MNN of **South Midlands Communications (SMC)** has been in touch with *Practical Wireless* to announce the closure of their retail division. In the E-mail announcing this closure, Barry states that SMC has now become "one of the world's leading manufacturers and suppliers of antennas, masts and radio systems, supplying major names, such as Marconi, Racal, Cable & Wireless, Thomson, Harris and Datron, in addition to aid agencies, defence, national guard and police forces world-wide".

It is as a result of the growth of their "in-house manufacturing", that SMC have decided to concentrate upon these growing markets and hence close down their amateur retail division. Barry says that there will be closing down sales at both shops in Southampton and Axminster and all remaining stocks will be sold at near cost, cost or below cost price.

Barry states that they will "continue to support and guarantee the equipment we have supplied and shall continue to manufacture the Fairhaven and Lowe range which will be available from local dealers". In closing, Barry states that they will "deeply miss our many friends and loyal customers, whom we have served since 1958. SMC has appreciated your friendship and custom and trust that we have in turn served the amateur fraternity to the best of our abilities".

South Midlands Communications have also told *PW* about a recently completed radio communications coverage survey which they did on behalf of the Saudi Saline Water Conversion Company (SWCC). To ensure uninterrupted supply of water, SMC state in their E-mail, it is essential to quickly identify problems along the supply pipeline which is located in a remote area.

The plan, SMC state, is to provide communication links between maintenance teams along the supply pipeline and control centres in Madinha and Yanbu. South Midlands Communications tell us that they are working alongside in-country installation and support teams to maximise local involvement.

For further details, SMC can be contacted on **Tel: 0238-024 6200, FAX: 0238-024 6206, SM House, School Close, Chandlers Ford Industrial Estate, Eastleigh, Hampshire SO53 4BY. E-mail: sales@smc-comms.com** Alternatively, you can visit their **Web site: www.smc-comms.com**

Northern Ireland Society

The **Lagan ARS** meets every second Wednesday of the month at Harmony Hill Art Centre, Lisburn, County Antrim, however, there will be no meetings in July and August of this year. If you're interested in joining up, further details can be obtained from **Reid MI0BOT** on **Tel: (01232) 258403** or you can **E-mail: gi4gty@qsl.net** Alternatively, you can visit their **Web site: www.qsl.net/gi4gty**

Timestep @ Picketts Lock 2000

Practical Wireless received an interesting press release from **Timestep**, producers of weather satellite equipment since 1984. This news release was all about the new **Colour High Resolution Picture Transmission (CHRPT)** system.

Dave Cawley, Managing Director of Timestep, says that it hasn't always been easy to get good colour images from weather satellites in the winter, as most amateurs receive *NOAA APT* - a two channel transmission, visible and infrared. In order to get colour, Dave goes on to say in the press release, "a clever mix of the two channels is used, but because the visible channel is so dark in winter, it is impossible to get good colour".

With the arrival of the new Chinese CHRPT satellite with ten channels - four of them dedicated visible channels, "good colour can be obtained all the year round". Timestep's new CHRPT system, as their newest product, will be on show at the London Amateur Radio & Computer Show at Picketts Lock this March.

Visitors to the stand will be able to see images on screen such as the one shown here. This image was taken, Timestep tell *PW*, on the 7th December 1999 at 0820 and is "vibrant" in colour.

"Valleys are clearly visible in the mountains in Spain and the effect of rivers flowing into the sea can clearly be seen". Dave goes on to say that "this new system plugs into a USB port allowing even notebook computers to be used".

Other equipment which will be on offer on the Timestep stand at the Picketts Lock show include the Timestep LC and "i" serial interfaces with the latest 32bit software, preamplifiers and antennas for both polar and geostationary satellites, including the "revolutionary" 9inch Micropatch square antenna for *Meteosat*. So, why not visit the Timestep stand at Picketts Lock? They will be in the **Red Hall** on **Stand K**.

Alternatively, Timestep can be contacted on **Tel: (01440) 820040, FAX: (01440) 820281**. Or why not visit their **Web site: www.Time-step.com** You can also E-mail them on **information@Time-step.com**

Further Contract Awarded

The **Radiocommunications Agency (RA)** has been in contact with *PW* to tells us that a further contract has been awarded to **Subscription Services Ltd (SSL)** for the distribution of Amateur and Citizens Band Radio Licences. This new contract is effective from 01 April 2000 to 31 March 2003 - "with an option to extend for a further two years" - from the 01 April 2000, SSL will also issue Ship Radio Licences under this new contract.

Practical Wireless would like to remind readers that SSL have changed their

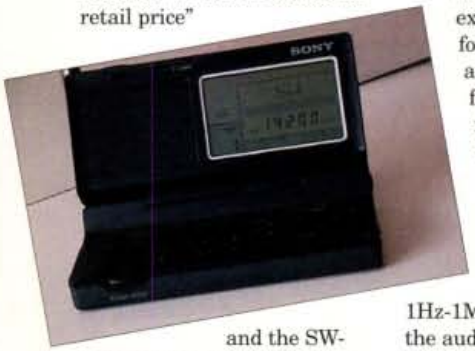
name and the new company name is **Post Office Customer Management** - please see last month's news pages. Telephone numbers and addresses remain the same but a new E-mail address will be made available shortly, the RA tells *PW*.

For further details of this news item, please contact the RA direct on **Tel: 0207 211 0211, FAX: 0207 211 0507. Wyndham House, 189 Marsh Wall, London E14 9SX**.

Sony SW-100E Sale

Mike Haydon of **Haydon Communications** tells *PW* that they have just taken delivery of a large quantity of **Sony SW-100E short wave portables** from **Sony (UK)** themselves. Mike tells us that they have negotiated a special price and can offer a limited quantity of brand new SW-100Es for **£129.95 (including VAT)** that's £100 off of the recommended retail price of £229.95!

This particular receiver has a "front end performance equal to that of desktop receivers which are double its retail price"



and the SW-100E is very small (100 × 24 × 73mm - equal to an audio tape), as you can probably tell from the picture. It has single side band and synchronous a.m. detection which, Mike says, "lives up to Sony's unmistakable reputation for quality".

Other features of the SW-100E includes 50 presets (with station namings), multi-function l.c.d. display, built-in speaker and stereo via headphones which are supplied), sleep/alarm function with timers, record output jack. It covers 150kHz-30MHz and 76-108MHz, with a.m./s.s.b/c.w./f.m. modes, includes case, pullout wire antenna/telescopic antenna/short wave handbook/earphones and is powered by two AA batteries or external d.c.

The unit is available from Haydon Communications at this special price (£10 next day delivery) and Mike says that they "guarantee you will not find the same model (UK version - Sony supplied) cheaper anywhere in the UK - and that's a promise". Contact Haydon Communications direct on **Tel: (01708) 862524, FAX: (01708) 868441, Unit 1, Thurrock Commercial Park, Purfleet Industrial Estate, London Rd, Aveley, Essex RM15 4YA**.

New Grundig Generator

Tim Coates at **Vann Draper Electronics** (the exclusive UK agent for Grundig Test Instruments) has been in touch with the *PW* news desk this month with news of a new Low Distortion Generator from Grundig - the **TG100**. This low distortion sine/square wave generator "offers exceptional performance for low frequency applications and is fully controllable via its standard RS 232 interface".

Measuring 225 × 85 × 200mm and weighing 1.9kg, the TG100 has a frequency range of 1Hz-1MHz, encompassing the audio spectrum. Hence, Tim states, it is "ideal" in audio applications or where a stable low distortion signal source is required.

The TG100 has a 16 × 2 back-lit l.c.d. which shows the reading of frequency, level, measuring units as well as measuring functions and system information and Tim goes on to say that output levels can be selected to read mV, dBm and dBV. Control of the TG100, which is microprocessor managed, "is by soft keys and a digital rotary control".

For full details of the TG100, please contact Vann Draper Electronics direct on **Tel: (01283) 704706, FAX: (01283) 704707, Stenson House, Stenson, Derby DE73 1HL. E-mail: sales@vanndraper.co.uk or visit their Web site: www.vanndraper.co.uk**

Rugged & Reliable R-8

Jeff Stanton of **Waters & Stanton PLC** has written to tell *PW* that the **Cushcraft Corporation** have announced the release of a new multi-band h.f. vertical antenna - the **R-8** - which covers eight bands from 7 through to 50MHz. Jeff states that Cushcraft promise a "rugged and reliable slim vertical antenna able to handle high power up to 1.5kW and also mismatches up to 3:1 v.s.w.r.".

The specifications state that the R-8 includes many features of the R7000 and the R6000 and is "designed especially for the rigors of use with high power and auto-tuners". Jeff says that the retail price of the R-8 will be **£399.95**.

Another new antenna which is now available from Waters & Stanton is a dual-band Yagi antenna covering 144 and 430MHz which, Jeff says, is of a "high quality, great strength". The literature sent out with the press release regarding this new Yagi states that it will "fulfil a wide-felt need for a compact antenna that offers realistic gain and performance when used with today's dual-band transceivers".

This new Yagi has nine elements on 430MHz (10.5dB) and five on 144MHz (7.5dB) and is able to provide directional gain with a low profile installation. These elements are all mounted on the same boom "resulting in lower wind loading and enabling even the most modest of TV rotators to turn it" - this new dual-band Yagi antenna is priced at as little as **£79.95**.

For more information on either of these two antennas, please contact Waters & Stanton direct on **Tel: (01702) 206835/204965, FAX: (01702) 205843. Spa House, 22 Main Rd, Hockley, Essex SS5 4QS. E-mail: sales@wsplc.demon.co.uk**

Scottish Thistle Convention

The **Scottish Thistle Amateur Radio Convention** (formerly the Magnum Rally) will be taking place on the **26th March** this year, although the rally has been renamed, it will still be held at the usual venue - the Magnum Leisure Centre, Harbourside, Irvine - as in previous years. This year the rally will be open to the general public from 1100 in the morning and any traders who have booked tables will be allowed to set up their tables from 0800 on the morning of the rally.

Amongst all the usual regular activities, *Practical Wireless* was told that the organisers hope to have arranged Morse tests and a Talk-in. For more firm details on exactly what you can expect to see at this year's event, please contact the organisers direct on the number at the bottom of this news item.

If you have family who aren't as keen on Amateur Radio as you - don't worry! There are plenty of activities available at the Magnum

NEWS

COMPILED BY JOANNA WILLIAMS

Leisure Centre to keep them amused. These include the following: swimming, skating, a cinema and a soft play area for the younger children and there is also a bar and restaurant on site so refreshments aren't a problem!

So, for further details: including how to book a table (and how much they cost) or if you would like to know a bit more about what to expect at this year's rally, then please contact one of the organisers - **Helen Mason** on **Tel: (01294) 550688**.

Scottish Activity Weekend 2000

More Scottish Amateur Radio news for you now and the **GM DX Group** - Scotland's DX Association - have told *PW* that they would like to remind amateurs around the world that the **GM Activity Weekend 2000** will be taking place on the **15/16th April**. They say that they hope a number of GMs will take part in the event and some might also activate Islands.

Activity should be taking place on all bands using as many modes as possible. At a recent committee meeting, donations to several forthcoming DXpeditions were also agreed: Clipperton ON4WW - £150; Tromelin F5NOD - £150 and Agalega G3KHZ - £100.

Tom Wylie GM4FDM (Honorary Secretary of the GM DX Group), who sent *PW* the E-mail regarding this news item, also states that the **GM DX Convention and Annual Dinner** will take place at **The King Robert Hotel, Bannockburn** on the **16th September 2000** and preparations are already well underway for that. Over 70 amateurs attended last year's dinner and the main speakers last year included **VK9NS**, **EI6FR** and **G3SXW**.

The GM DX Group also sponsor the Islands of Scotland Award and, to date, over 400 award booklets have been sold world-wide. Anybody who is interested in applying for an award or who wishes to take part in the scheme should contact GM4UZY (QTHR) and information on the GM DX Group as a whole can be obtained from **Tom Wylie GM4FDM (QTHR)**.

Titanic Receiver On Show

Practical Wireless received a very interesting press release from the **'National Vintage Communications Fair'** in Devon telling us all about a "unique and valuable Edwardian crystal receiver which has recently been unearthed by a Midlands antique dealer" and which, subsequently, has been acquired for a major private wireless collection in this country.

Made in England in 1910, other radios of the same period are rare enough, the press release states, but this set has something else which makes it "especially unique". This is the fact that its maker, **Mr George Leadbetter**, while listening in on the set's earphones on the morning of the 15th April 1912, tuned into the sinking *Titanic's* CQD/SOS Morse distress signals.

At the time of the *Titanic's* demise, these same distress signals were picked up by ships that were fairly close by and over 700 lives were saved as a result. "Such a pivotal role did wireless play in saving many hundreds of lives on board the stricken ship that its value was dramatically demonstrated and acknowledged around the world" the press release says.

This particular receiver (as shown here) is "the only surviving radio receiver documented to have heard the distress cries from the *Titanic*" and is, therefore, a very important and historic relic. It will be on show at the next 'National Vintage Communications Fair' which will be held at the **NEC** in Birmingham on the **30th April 2000**.

Other exhibitions at the show will include a collection of Second World War spy radio transmitters and receivers, a Horophone time-signal receiver and a display depicting the history of recorded sound. The exhibition is open from 1030-1600 on the Sunday and entrance will be **£5**.

For more information on the show, please contact the 'National Vintage Communications Fair' **Tel: (01392) 411565, Spice House, 13 Belmont Rd, Exeter, Devon EX1 2HF**. Or you could visit their **Web site: http://www.angelfire.com/tx/sunpress/index.html** or, alternatively, you can **E-mail: sunpress@eurobell.co.uk**

Steamboat Special Station

Roy Walker G0TAK has been in touch with *PW* to tell us about some news from **Windermere Steamboat Museum** in Cumbria who say that on the weekend of the **10th and 11th June 2000**, an Amateur Radio Special Event station staffed by "local enthusiasts" will be operating from Windermere Steamboat Museum. Their Special Event callsign will be **GB0DBP** (GB0 "Dolly's Birthday Party") and the QSL card for the event will be based around the postcard pictured here. (Kindly sent along with the press release and shows "*Dolly* c 1850" - who celebrates her 150th birthday this year).

Visitors are welcome to see and hear the station in action and local Radio Amateurs will be available to explain what's happening and to answer any questions. The press release states that, a similar event previously saw over 400 Amateur Radio stations making contact with the Windermere Steamboat Museum!

Steam Launch *Dolly* celebrates her 150th birthday this year and her "official birthday" will take place at the museum on the 21st June. The Amateur Radio station will be returning to join in the celebrations. For more information please contact Windermere Steamboat Museum **Tel: (01539) 445565, FAX: (01539) 448769, Rayrigg Rd, Windermere, Cumbria LA23 1BN**. Alternatively, you can visit their **Web site: www.steamboat.co.uk**

New RSGB Title

Ian Poole G3YWX, *PW*'s regular 'What Is A' author, has been in touch with us to tell us about his most recent book: ***Amateur Radio - The First 100 Years***. Published by the RSGB, this new book "tells the story of Amateur Radio", Ian tells us and is also "lavishly illustrated", "limited edition".

Ian goes on to say in his E-mail, that *Amateur Radio - The First 100 Years* is a hard back book containing many photographs - some of which have never been published. It starts with the first amateur station which was set up in Woolwich Arsenal in London in 1898, Ian says, and tells the story of its development.

For more information on this, or any other RSGB titles, please contact them direct on **Tel: (01707) 659015, Lambda House, Cranbourne Rd, Potters Bar, Herts EN6 3JE**.

Are you interested in radio controlled clocks?

Why not try this Web site:

http://freespace.virgin.net/martin.peters1

RADIO DIARY

***March 11/12:** The London Amateur Radio & Computer Show. There will be the usual mix of exhibitors at this two-day event, including: computer software providers, special interest groups, a large Bring & Buy, local clubs, large and small Amateur Radio equipment dealers, electronic component vendors and lots more. In addition there will be free parking, family attractions (sport, cinema, swimming, golf, etc.), bar and restaurants, lectures, on-demand Morse tests, disabled facilities and a talk-in. Further information is available from **RadioSport** on **(01923) 893929**.

March 12: The Lagan Valley ARS will be holding its annual rally at the Lagan Valley Hospital conference centre, Lisburn, Northern Ireland. Doors will open at 1200, further details can be obtained from **Reid MI0BOT** on **(01232) 268403** or you can E-mail: **gi4gty@qsl.net** or check out the Web site: **www.qsl.net/gi4gty**

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

March 18: The 7th West Wales Amateur Radio & Computer Rally will be held at Penparcau School, Aberystwyth. Doors open 1000 till 1530 and admission is just £1. Good parking facilities with easy access for disabled and traders for all stalls. Demonstrations of h.f., v.h.f., packet on the air. Amateur Radio and Computer Traders, Bring & Buy, clubs and special interest groups. Catering facilities also. Talk-in on S22. **Ray GW7AGG** on **(01686) 628778** or home QTH.

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

March 19: Bournemouth Radio Society's 13th annual sale is to be held at Kinson Community Centre, Pelhams Park, Millhams Rd, Kinson, Bournemouth. Doors open 1030 and close at 1630. Talk-in from G1BRS on 144MHz/S22. Amateur Radio and computer traders, clubs and specialised groups, excellent refreshments, admission £1. Details from **Olive** or **Frank Goodger, 66 Selkirk Close, Merley, Wimborne, Dorset BH21 1TP** or Tel: **(01202) 887721**.

March 26: The Scottish Thistle Amateur Radio Convention (formerly the Magnum Rally) will be held at the Magnum Leisure Centre, Harbourside, Irvine - as in previous years. The rally will be open to the general public from 1100 in the morning and any traders who have booked tables will be allowed to set up their tables from 0800 on the morning of the rally. Apart from other usual events, the organisers hope to have arranged Morse tests and a Talk-in. If you have family who aren't as keen on Amateur Radio as you - don't worry! There are plenty of activities available at the Magnum Leisure Centre to keep them amused such as: swimming, skating, a cinema and a soft play area for the younger children and there is a bar and restaurant on site. For further details on how to book a table (and how much they cost) please contact **Helen Mason** on Tel: **(01294) 550688**.

March 26: The Barry Amateur Radio Rally has been renamed and is now known as 'The Welsh Amateur Radio Exhibition Incorporating Computing & Internet '. This year's will be the best yet, featuring a 'Multimedia Shack' presentation with live demonstrations of computer aided station management, computer rig control, scale models of *AMSAT* satellites, 'live' fast scan TV and many digital modes including 'live' APRS presented by Kenwood UK. Returning to the original venue: the newly refurbished Memorial Hall, Barry, South Glamorgan, with ample parking and licensed bar and catering, the exhibition opens at 1000 for the disabled, 1030 to the general public and 'officially' opened at 1130. Further information from **Brian Brown** on **(01222) 832253**.

March 26: The Limerick Radio Club is holding its annual rally and Radio, Electronics & Computer Fair in the Limerick Inn Hotel, commencing at 1200. This is our 'Millennium special' show which will have a much larger than usual floor area within the hotel. We have attracted Yaesu UK for the first time to the Republic of Ireland to exhibit their wares. All the usual traders have been given extra space and promise to have a much larger range of items on display.

April 9: The West Manchester Radio Club are holding their Red Rose Rally at the Horwich Leisure Centre, Horwich, Bolton, Lancs, off Jnc6 M61. Doors open 1100 (1030 for disabled visitors). Admission by programme which costs £1.50, £1 for OAP on the door. There will be the usual stands, refreshments, Bring & Buy - any one item cost £2 to enter, no sales, no fees. **Don Aitchison G3BSA**, Rally Secretary, on **(01942) 871620**.

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

RADIO BASICS

This month Rob Mannion G3XFD introduces valves into the series ... something which it seems many readers have been waiting for! So, the waiting is over - it's time to get those filaments 'a glowing'!

Ever since I first promised to (eventually) introduce valves into this series I've been asked by readers "When are you going to do it Rob"? Well, now I can say "the time has come"! And even though there are many radio enthusiasts who think that the time of the valve has actually passed - I honestly believe that, in fact, the valve has still very much to offer the radio constructor.

One of the main objections - from those 'not in the know' - regarding the use of valves concerns the power supply. Valves? High voltages ... too dangerous (so say the dissenters), don't touch them! But of course they're wrong, because many valves will work quite happily down to very low voltages. So, that's it ... objection over-ruled!

Another objection to the use of valves can often be the the difficulty in finding metal chassis, valve holders and valves. However, there are many ways round these very minor problems and, personally, I think that the modern alternatives to older techniques make life easier and will help the keen experimenter to enjoy the use of valve techniques. And of course ... that's what it's all about isn't it?

Modern Alternatives

Nowadays, I have to use the 'modern alternatives' to the old-fashioned metal 'chassis' when working with any form of radio construction. Arthritis and the decreasing 'mobility' of my five remaining fingers mean that 'chassis bashing' is a thing of the past for me - but the alternatives are not only easier for me, they're also achievable on an ordinary table-top rather than a massive bench.

Instead of aluminium chassis, I use modern printed circuit board (p.c.b.) material. The copper clad board is very easy to work with and the valve holders can be mounted directly on the laminate and - depending on the valve holder type used - they can be secured to the board by soldering.

I'm rather fortunate in that I've still got a complete set of chassis punches suitable for cutting valve-holder holes for International Octal (IO), B9A and B7G types (see **Fig. 1**). These 'punches' are the type that you use in conjunction with a spanner: the 'punch' (with cutting edge) is attached one side of a pre-drilled bolt-locating hole, and the top part of the two-piece assembly is then placed so that the spanner can be employed to tighten the assembly.

Using the type of 'punch' I'm describing - a very neat hole can be cut in aluminium and light gauge steel plate. However, one of the best results, fortunately for me, is the fact that they also make extremely neatly finished holes in that old favourite of mine - Synthetic Resin Paper Board (SRPB). And, of course, chassis punches can also make neat holes in standard modern p.c.b. material ... which as you'll soon realise ... helps out a great deal.

Fig. 1: Various valves and their bases. There are some fascinating valves around and the EF50 (left) was a pioneer used in Radar and has a remarkable history. Second from left is a B9A base ECL86 type, centre (top) is the famous 807 valve, and centre right a B7G based (incredibly versatile) EF91. Far right is a valve which uses the International Octal (IO) base. The diminutive valve below the 807 is a miniature type which found uses in everything from hearing aids to early 'hand-held' transceivers.

Using p.c.b. material - whether it's modern resin boards or older SRPB types - rather than aluminium 'chassis' leaves us with many advantages. Firstly, it's much easier and lighter to work with, secondly it can be soldered with ease. The soldering can also form part of the fabrication process ... even completely screened boxes can be made up in this way.

The second big advantage in this busy world of ours is the saving of time! It's possible to fabricate a p.c.b. 'chassis' and be ready to assemble and wire it up in an afternoon. Thus, at one stroke you can save much time and frustration of trying to 'metal' or 'chassis bash' with (perhaps) limited facilities and actually enjoy building the electronic aspect.

Finally, another advantage with the p.c.b. 'chassis' approach is that you can actually etch the necessary wiring needed directly onto the board you're using. The best of both worlds ... after all it is p.c.b. material we're using isn't it?

In the past I've even incorporated simple coil connecting p.c.b. 'pads' onto the

Basics Board

As promised in the 'Letters' page, each month from now on in 'Radio Basics' I will include a short summary explaining the terms and 'Jargon' you're likely to come across. The 'Basics Board' will always be relevant to the current month's topic. I hope you find it useful!

International Octal (IO): This term is usually employed to describe the 8 pin valve base (usually Bakelite) which was commonly used in the 1940s. Please note 'Mazda Octal' (MO) based valves will not fit into IO sockets as there's a slight difference in the spigot size. (An IO based-valve can be seen on the far right in Fig. 1).

B7G Base: This miniature configuration uses 7-pins and is normally found on 'all glass' valves (i.e. no separate 'base') where the pins pass through the glass immediately onto the valve's internal assembly. (A B7G based valve is shown second from the right in Fig. 1). It's a very useful size and still commonly available and will feature in 'Radio Basics' project.

B9A Base: This nine pin sub-miniature 'all glass' valve base format (very popular in the 1950s to the present day) is perhaps best known for the large numbers used in television receivers. But watch out - many of the B9A valves are designed for 'series chain' heater working. Most useful for the hobbyist are the E type heater (6.3V nominal, ECL82, EF80, etc.).

Valve Holders & Valves

Various *PW* advertisers advertise the 1T4 and DF91 valves, and if you come across (increasingly rare nowadays unfortunately) a battered, non-working 90V/1.5V type valved 'All Dry' (so-called because they did not use accumulators for the filament supply) portable receiver ... hang on to it as they are really useful for spares. But, as they are so rare nowadays it's just as well to keep them for posterity. The choice is yours!

Valve holders (B7G p.t.f.e. types) are available for 50p each plus P&P from **John Birkett, 25 The Strait, Lincoln LN2 1JF. Telephone (01522) 520767.**

etched tracks I've made. And with a little ingenuity it's quite easy to make your own little plug and socket arrangements using p.c.b. tracks. Together with the p.c.b. printed 'wiring' that you can also incorporate - it's ends up with being a very versatile technique.

Power Supplies

Not so long ago, any relatively inexperienced constructor keen to use valves for projects, faced what seemed to be a major problem ... obtaining the necessary high voltages. This aspect has discouraged many constructors but to be quite frank ... it's shouldn't because 'high' voltages aren't needed for many projects!

There's no need to use valves requiring hundreds of volts ... especially when there are many types still available which will work quite happily at anywhere between 25 and 90V. And, in fact, I've had much experience using the B7G based 1.5 and 90V DF91 valve (and its various 'stablemates' - once very popular for 'portable' radio use immediately before 'transistor' receivers became available) with 36V supplies.

The 36V 'high tension' supply is a convenient source as all you have to do is connect four PP3 batteries in series, as in **Fig. 2**. The resultant 36V (even better if you decide to make up a battery unit of five PP3, providing a nominal 45V) is adequate for a simple receiver although the peak current demands (up to 50mA) can mean a relatively short battery life.

To get over the available current limitations problem, perhaps it might be a good time to invest in some re-chargeable PP3 batteries? You would soon recoup the cost of the batteries and charger, especially as the non-rechargeable types are so expensive nowadays.

The 1.5V filament supply is (most simply and conveniently) provided by ordinary A-sized cells (the old U2 for us 'Old Greybeards'!) or

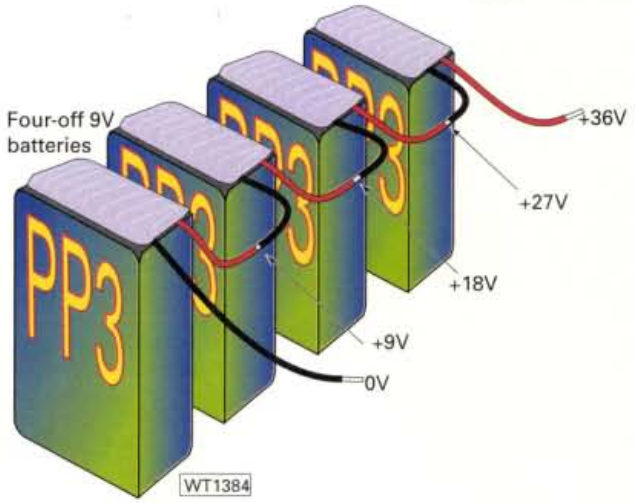


Fig. 2: A simple 'high tension' supply for use with the B7G based 1.5V filament/90V h.t. valves can be made up from four PP3 batteries in series to provide a 36V supply. If space and finances (see text) are available G3XFD suggests that a 45V 'h.t.' (five 9V batteries in series) is a better compromise and offers increased flexibility. Four 'snap-on' PP3 connectors are required, connected in series, as shown.

AA types. You can use a mains driven 1.5V supply but **it must be electronically 'smoothed' and well regulated** because the 1.5V (to be pedantic, they're usually arranged and referred to as being '1.4V' filaments) as the filaments or 'heaters' **are very sensitive** to over-voltage. Incidentally - the 1.5V filaments are 'dull emitter' types and even in a very dark room they can be difficult to see - a very clever piece of engineering!

The reason why the filament supply must be extremely well 'smoothed' (as near to 'pure' d.c. as possible) is because the DF91 (and its other battery powered cousins) have very low current consumption 'directly heated' filaments. The actual chemical coating (designed to provide copious quantities of electrons when heated) is applied directly to the filament itself.

The techniques used in a 'mains' valve - radio enthusiasts tend to use the 6.3V a.c. 'heater' type - is totally different. In this application the 'heater' is just that ... as it's mounted inside a tube (usually you can see this glowing brightly - when viewed from the top of the valve) and the tube - referred to as the 'cathode' then provides the necessary copious quantities of electrons from the chemical coating.

Incidentally, this coating is usually one of the 'rare earths' and elements such as thorium and barium have been used. They're easy to spot - just look for the grey (or off-white) powdery looking coating on the 'cathode' tube of a mains filament valve.

Finally - now that I've finished the (necessary) diversion into valve filament heating techniques I can tell you just why you have to avoid using 'unsmoothed' power supplies on the 1.5V valves. The answer is simple - it's because the filaments are also the cathode of the valve.

Any 'ripple' or variation in the current (don't forget an alternating or a.c. supply is a supply that can 'modulate' the current passing through the valve. In other words ... if there's a 'hum' on the filament supply - it will be reproduced at the output of the valve ... probably being heard along with the signal you want to hear!

So, my advice is, that unless you have access to a very stable 1.5V supply ... stick to using 1.5V cells. No need to worry about 'smoothing - it's done for you!

Next month I'll be describing our first valved project. In the meantime start collecting B7G valve holders and DF91 or 1T4 valves ... they'll come in handy very soon! Cheerio for now. *PW*

Components For Radio Basics Projects

The letter from **Sandy G8IDE's** (under the heading 'Practical Advice & Tips') in 'Letters' on page 10, provides an opportunity for me to remind readers of possible problems when building projects. The problems I have in mind, already drawn to my attention by readers who have experienced difficulties (particularly with the BC184 amplifier transistor used with the MK484 receiver featured in February's *PW*) are those associated with different 'pin outs' for semiconductors. In this case, it appears that the BC184 transistors - ordered from a source other than that I suggest in the article - have a different 'pin out' configuration. Unfortunately differences of this sort can often occur and although to the more experienced constructor it wouldn't be very difficult to sort out - for the beginner it's a different matter!

My advice is that - as far as possible - for the specified major components (transistors, field effect transistors and others I specify) you use the component sources I suggest. I say this because I buy, build and test all projects using the sources mentioned, usually at the end of the article. So, although I do my level best to ensure projects will work ... until you're confident enough to sort out problems such as those outlined ... please take care in case you end up with components which need to be connected up differently due to manufacturing differences or (as is most likely) the components had been originally 'specially ordered' with a different 'pin out'. By getting the transistors, etc., from the sources I suggest - you can (almost!) eliminate any possible confusion although, I'd be foolish to try and give a 'cast iron' guarantee a 'Gremlin free' project every time! But, by working together carefully we can eliminate most of the trouble sources. **G3XFD**

IAN POOLE G3YWX IS BACK THIS MONTH AND THIS TIME HE ANSWERS THE QUESTION: 'WHAT IS A ... HEMT?'

WHAT IS A ... HEMT?

Ian Poole G3YWX returns this month with the latest in his ongoing series - 'What Is A'? This time he takes a look at 'What Is A ... HEMT'?

Over the past few months I've been taking a look at different types of field effect transistor (f.e.t.). This month, however, I'm going to be looking at a device that is used to give very high levels of performance at microwave frequencies.

Known as an **High Electron Mobility Transistor - h.e.m.t.** for short - it can also be found under a number of other names. The most common of these names is the **Modulation Doped Field Effect Transistor (m.o.d.f.e.t.)**.

The devices are quite expensive, but they offer lower noise levels than Gallium Arsenide f.e.t.s (GaAsf.e.t.s) and, as such, they're widely used in applications where noise is of paramount importance. They also exhibit a particularly good high frequency performance and when combined with their low noise figure which makes them a very attractive proposition for many applications despite their cost.

The development of the h.e.m.t. took a number of years and they didn't appear on the market for many years after the first f.e.t.s were available. The specific mode of carrier transport used in h.e.m.t.s was first investigated in 1969, but it wasn't until 1980 that the first experimental devices were available.

The devices began to be used during the 1980s but, in view of their initial very high cost, their use was considerably limited. Now that they cost somewhat less, they are more widely used - even finding uses in the mobile hand-set markets.

Key Feature

The key feature of h.e.m.t.s is that they possess what is termed a hetero-junction. This is a *pn*-junction which has different materials either side of the junction itself.

The most common materials used in the hetero-junction are **Aluminium Gallium Arsenide (AlGaAs)** and **Gallium Arsenide (GaAs)**. Gallium Arsenide is generally used because it provides a high level of basic electron mobility which is crucial to the operation of the device. Silicon has a much lower level of electron mobility and as a result, is never used in an h.e.m.t.

Although there are a number of structures that can be used for h.e.m.t.s, they generally all use the same basic manufacturing process. Initially an intrinsic layer of Gallium Arsenide, about one micron thick, is set down on the semi-insulating Gallium Arsenide layer.

On top of the Gallium Arsenide layer a very thin layer of intrinsic Aluminium Gallium Arsenide is set down. This is between 30 and 60 Angstroms thick and ensures the separation of the of the hetero-interface from the doped Aluminium Gallium Arsenide region which is critical if the high electron mobility is to be achieved.

The doped layer of Aluminium Gallium Arsenide, about 500 Angstroms thick, is set down above this as shown in the diagrams on this page. Precise control of the thickness of this layer is required and special techniques are required for the control of this. (See **Fig. 1a & b**).

In the case of the **self-aligned ion implanted structure** (Fig. 1a), the gate, drain and source are set down as shown. These are generally metallic contacts, although source and drain contacts may sometimes be made from germanium. The gate is generally made from titanium and it forms a minute reverse biased junction similar to that of the GaAsf.e.t.

For the **recess gate version** (Fig. 1b), another layer of *n*-type Gallium Arsenide is set down to enable the drain and source contacts to be made. Areas are etched as shown in the diagram.

The thickness under the gate is also very critical since the threshold voltage of the f.e.t. is determined by this. The size of the gate - and hence the channel - is very small. Typically the gate is only 0.25 microns or less, enabling the device to have a very good high frequency performance.

High Speed Applications

The operation of the h.e.m.t. is somewhat different to other types of f.e.t. Electrons from the *n*-type AlGaAs region move through the crystal lattice and some remain close to the hetero-junction. These electrons form a very thin layer which is only one electron thick. This is known as a two dimensional (2D) electron gas and as there are no donor electrons present in this area, the number of collisions is much reduced and this gives a high level of electron mobility.

A bias applied to the Schottky barrier gate is used to modulate the number of electrons in the channel formed from the 2D electron gas and, in turn, this controls the conductivity of the device. This can be compared to the more traditional types of f.e.t. where the width of the channel is changed by the gate bias

Applications

The h.e.m.t. was originally developed for high speed applications. It was only when the first devices were fabricated that it was discovered they exhibited a very low noise figure.

This is related to the nature of the two dimensional electron gas and the fact that there are less electron collisions. However, the exact reason for the improved performance is still not fully understood.

As a result of their noise performance, they are widely used in low noise small signal amplifiers, power amplifiers, oscillators and mixers, operating at frequencies up to 60GHz and more and it is anticipated that ultimately devices will be widely available for frequencies up to about 100GHz.

More information about semiconductor technology and many other aspects of radio, Amateur Radio and electronics can be found on my Web site at: **http://website.lineone.net/~ian_poole**

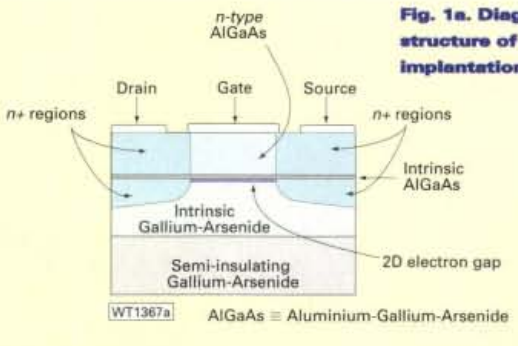


Fig. 1a. Diagram showing the structure of a self-aligned ion implantation version.

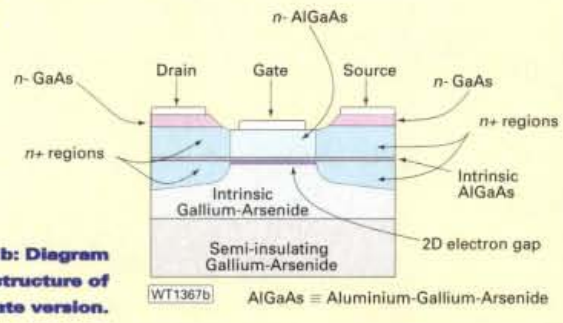


Fig. 1b: Diagram showing the structure of a recess gate version.

HAYDON COMMUNICATIONS

MasterCard · Switch · Visa

NEXT DAY DELIVERY TO MOST AREAS, £10.00.

MAIL ORDER: 01708 862524

AUTHORISED DEALER FOR:- YAESU ● ICOM ● KENWOOD ● ALINCO

ICOM IC-706IIG

Buy IC-706IIG this month and we'll give you a free IC-T81E worth £420.00

£939.00

Icom IC-746	+ free IC-2100H worth £269	£1295.00
Icom IC-756PRO		PHONE FOR UK's BEST PRICE
Kenwood TS-870S	HF transceiver	£1449.00
Kenwood TS-570DG	HF transceiver	£829.00
Kenwood MC-80	Desk mic	£49.95
Kenwood SP-31	Extention speaker	£79.95
Kenwood MC-60	Deluxe mic & pre-amp	£75.00
Yaesu FT-847	HF, 6, 4, 2, 70cm trcvr	£1269.00
Yaesu FT-100	HF, 6, 2, + 70 trcvr	£849.00
Alinco DX-70TH	HF + 6m trcvr	£599.00

KENWOOD TM-V7E

True dual-band mobile transceiver. 2m, 70cm, FM operational dual receiver on same band ★ 50/35W output ★ CTCSS + DTMF H Optional extended Rx available. (108-950MHz).

ONLY **£349.95**

Kenwood TM-G707	2m, 70cm mobile trcv	£279.95
Kenwood DFK-3C	Remote front panel kit	£34.95
Kenwood DFK-4C	Remote front panel kit	£59.95
Kenwood HS-5	Deluxe headphones	£52.95
Kenwood HS-6	Lightweight headphones	£35.95
PG-5ME	Mic extension lead	£4.99
Yaesu FT-8100R	Dual-band mobile	£349.95
Yaesu FT-90R	Miniature dual-band mobile	£319.95
Alinco DR-430	70cm mobile	£199.95

YAESU VX-5R

The toughest full performance 5W tribander ever (6-2-70). The VX-5R's ruggedness and durability are assured thanks to the die-cast aluminum housing. Ultra-wide frequency coverage (0.5-1GHz).

ONLY **£279.95**

Yaesu SU-1	Barometric pressure sensor for VX-5R	£32.95
Yaesu MH-34	Speaker microphone	£27.95
Yaesu EDC-6	DC adaptor	£7.95
Yaesu EDC-5B	Cigarette lighter DC adaptor	£22.95
Kenwood TH-G71E	2m + 70cm hand-held	£199.95
Kenwood TH-D7	2m + 70cm h/h with packet modem	£279.95
Kenwood PB-39	High power nicad for D7/G71	£45.95
Kenwood SC-45	Soft case for G-71	£14.95
Kenwood SMC-34	Speaker microphone	£38.95
Alinco DJ-G5	Dual-band hand-held	£279.95

SANGEAN ATS-909

Sythesized world receiver with RDS and 306 memories. Covers SW/MW/LW & FM stereo incl's free PSU.

ONLY **£129.95**

Sony SW-55 SW portable £239.00

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**

FRG-100 Communications receiver £369.00

AR5000

The ultimate wide-band receiver. Covers 10kHz-2600MHz.

SPECIAL OFFER

With Spectrum Master Software worth £130.00 **£1269.00**

ICOM PCR-1000

Computer radio system 100kHz-1300MHz (all mode).

Includes S.S.B

OUR PRICE **£249.00**

UT-106 DSP option for above £79.95

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 hand-held scanner 0.5-1650MHz (all mode).

ONLY **£195.00**

MVT-9000MkII Our price £319.95

Soft case for MVT-9000/7100 (specify) ..£19.99

AR8200

The latest all mode innovation in handies. Covers 0.5-2GHz all mode. Buy one this month and we'll give you a free case worth £20.

OUR PRICE **£339.95**

AR8000 Our price £279.00

Soft case for 8200/8000 (specify) £19.95

★★★★★★★★★★★★★★★★★★ STAR BUY ★★★★★★★★★★★★★★★★★★

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/stero earphones/carrying case/comprehensiveshort wave handbook. Due to over stocing 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

PMR-446 TAKES UK BY STORM

Haven't you ever wanted to play radio? Now you can! - No license required - Yes, anyone can buy and use this two way radio system with absolutely no running cost! Are you going on holiday and need some for the family - need communications for your work or leisure - then look no further. PMR-446 solves the problem. We've even seen families using them at fun parks to stay in touch and, don't forget, you can use them as much as you like - it will not cost you a penny.

MOTOROLA TA-200

★ Typically up to 3Km range dependent upon terrain
★ Large, easy to read LCD screen with user-friendly icons
★ You choose who to talk to and select from 300 channel settings
★ Rugged and stylish design - choose from yellow or blue
★ One button operation - easy for adults and children to use, simply push to talk.

ONLY **£69.95** *or 2 for £129.00*

NISSEI EP-300 TM

Over the ear earpiece with lapel mic & PTT Fits Motorola TA-200.

ONLY **£24.95**

MOTOROLA TA-288

Licence free PMR-446 radio with nicad and charger. ● No need for a walkie-talkie licence and there are no airtime charges. Just pick up your new Motorola Talkabout TA288 walkie-talkie and start using it. ● Your Motorola Talkabout TA288 is supplied with a rechargeable NiMH battery for up to 1 hour of continours talktime or 13 hours of standby time. ● With up to a 3km range out of sight does not mean out of touch. This dependable little walkie-talkie will help keep your group together.

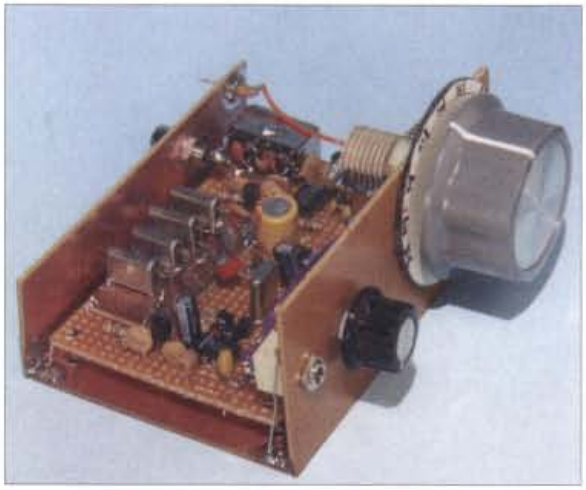
ONLY **£109.95** *or 2 for £199.00*

MOTOROLA HANDIE PRO

★ Up to a mile in range (depending on terrain)
★ 38 channels
★ Rapid one-hour drop in charger
★ Internal vox with user sensitivity
★ Large, easy to read LCD screen

ONLY **£179.95**

Carrying on the Practical Way



This month's project is called the 'FBRX' and is a superhet receiver for the 3.5MHz band.

This month the Rev. George Dobbs G3RJV describes the 'FBRX' - a superhet receiver for the 3.5MHz band. But - before you start ... don't forget to read the appropriate quotation George has managed to unearth!

One of the great advantages of building your own Amateur Radio equipment is being beholden to no one. Buy an expensive piece of equipment and you are soon dissatisfied by what it cannot do. Build a piece of equipment and you are delighted by what it will do, however modest its function. Home constructors satisfy themselves and are often happiest when going off on a whim to do what they want.

The little receiver I'm about to describe here was an accidental project which came out of coincidences and was built on a whim. The story goes like this...

"Chance governs all".

John Milton - Paradise Lost

Bag Of Crystals

Towards the end of last year, **JAB Electronics** sent me a bag of crystals all on a frequency of 8.863256MHz, which is twice the PAL colour TV 'colour burst' reference frequency (the well known 4.43MHz frequency). It seems that JAB had lots of them and asked if they were of any use to me!

Just after Christmas 1999 a group of G-QRP Club members met together at my house for a social evening. Amongst the company was **David Stockton GM4ZNX**, a well known G-QRP Club RF Design Engineer. David suggested that the bag of crystals might form the basis of a simple 'Ladder' filter.

A few calculator pokes later, four crystals and three capacitors were strung together as a crystal filter. A check on the Spectrum Analyser showed we had a filter with a bandwidth of around 1.5kHz; a useful compromise for amateur band c.w. and s.s.b. working.

The calculated input and output impedance of the filter was around 600Ω (a usable impedance for an i.f. circuit). The resultant crystal filter is shown in the centre of the circuit in **Fig. 1.**

David, having played his part, the next contribution was from the late **Doug DeMaw W1FB**. Before his untimely death, Doug and I used the same schematic and printed circuit software.

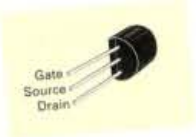
For some time we had shared ideas on creating new symbols and methods of printing by exchanging floppy disks. Because of this co-operation, resting on my computer hard drive are several circuits, which came from Doug in the course of these transatlantic exchanges.

The complete drawing in Fig. 1. is based on one of the 'exchange' circuits for a simple i.f. amplifier, modified to take the 8.863256MHz crystal filter. The circuit used MPF102 f.e.t. devices before and after the crystal filter.

I quickly 'bread-boarded' the circuit and ran a signal generator across it to see how it sounded. And I'm pleased to say it behaved like a very reasonable i.f. amplifier circuit.

Having gone that far - why stop? So, about an hour later I had built up a complete 3.5MHz superhet receiver. The rest of the receiver being a very conventional NE602 based superhet.

Note: The NE602 is no longer a current device but the NE612, a direct replacement is easily available. Either will work in these circuits.



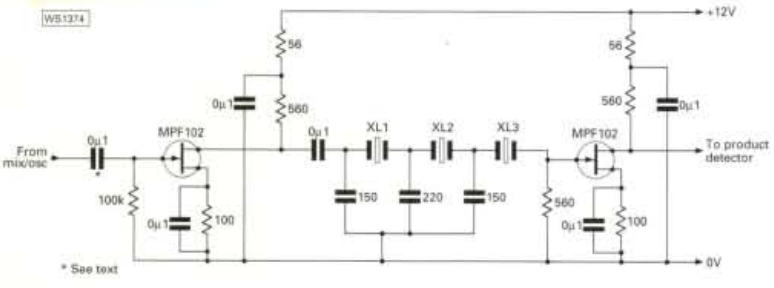


Fig. 1: Towards the end of last year George G3RJV was sent a bag of crystals, all on a frequency of 8.863256MHz, twice the PAL colour TV 'colour burst' reference frequency (the well known 4.43MHz frequency). The crystal filter shown here was the result (see text). Pin-out details of the MPF102 are also shown (inset).

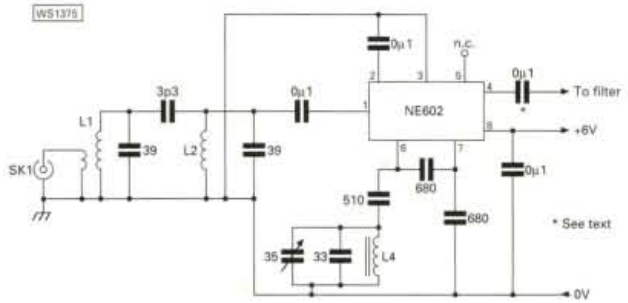
Oscillator & First Mixer

The diagram, **Fig. 2**, shows the receiver front-end. This is an input band-pass filter feeding a single NE602 (or NE612) acting as a local oscillator and first mixer.

The band-pass filter is double-tuned using Toko 10K inductors, the low impedance winding on the first inductor provides a suitable 50Ω input port. (A single input is used to the NE602).

A more fastidious constructor may like to attempt a double balanced input. This can, perhaps, be achieved by using the link winding on the Toko inductor via a balun.

The local oscillator uses the internal oscillator of



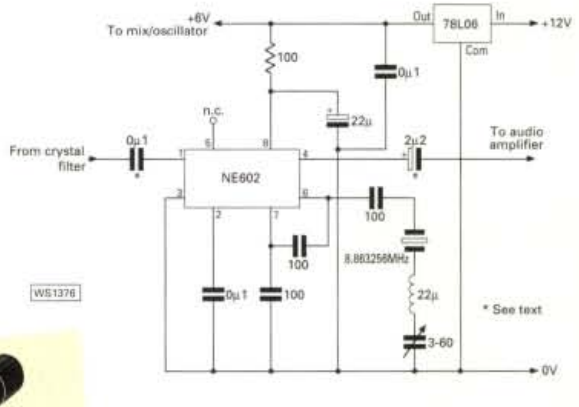


Fig. 2: The diagram shows the receiver front-end. This is an input band-pass filter feeding a single NE602 (or NE612) acting as a local oscillator and first mixer (see text).

the NE602 and a tuned circuit based on another Toko inductor. The values given allow the receiver to tune from 3.5 to 3.8MHz using a local oscillator range of 5.06 to 5.36MHz.

The variable tuning capacitor I used was a junk box item. Other constructors lacking this value may like to try a larger value variable capacitor and pull off vanes until the desired coverage is obtained.

For more limited band coverage, varactor tuning may work well. The output from the mixer goes directly to the first MPF102 amplifier in the i.f. circuit of Fig. 1.

Product Detector & BFO

The diagram, **Fig. 3**, shows a typical NE602 (or NE612) product detector and mixer circuit. (In effect it's a duplication of Fig. 1). The NE602 is used as both mixer and oscillator.

The internal oscillator, located at pins 6 and 7, once again uses a Colpitts configuration but this time with a variable crystal oscillator (VXO). Another 8.863256MHz crystal is used for the frequency reference, its frequency being shifted by use of a fixed inductor and a variable capacitor. This allows enough frequency shift of the crystal to put the b.f.o. on the correct side of the i.f. frequency for the reception of s.s.b. signals.

The 22μH inductor is a small axial lead type of moulded inductor. This drawing also shows the 6V regulator used to supply the NE602. (The 6V source is used for both of the NE602 devices).

Audio Stage

The receiver is completed with the audio stage shown in **Fig. 4**. Here I used the well known LM380 chip. Many NE602 'generic receivers' use the LM386. (However, an alternative, the LM380 provides a little more audio output and is probably less prone to r.f. instability problems). The circuit will drive a modest loudspeaker for average amateur band listening.

My method of building the receiver is illustrated in the photograph. The i.f. filter was built, 'ugly style', on a small piece of blank printed circuit board.

Note: It is important to ground ('earth') the metal crystal cases. To do this, you should remove the plastic covering from the case and carefully tin one edge of the case with a hot soldering iron and solder. The case can be directly soldered to the copper groundplane offered by the printed circuit board (p.c.b.) material. Keep the wiring of the capacitors as short as possible and keep the input away from the output. (I used polystyrene capacitors).

The rest of the receiver was built on Perfboard; the insulated board with a 0.1 inch matrix of holes. Leaded components go through the board as they would on a conventional p.c.b. and the excess lead lengths are used for the under-board wiring. The three Toko inductors are mounted on their sides with the cases grounded.

The local oscillator is 'pulled' on to frequency using the core of the Toko inductor. Frequency coverage may be checked by any one of three ways: by using a sensitive frequency counter connected to pin 6 on the NE602, by using a signal generator to locate the receiver listening frequency, or by connecting a short wave antenna to a receiver tuned to the local oscillator range then draping this over the circuit and adjusting until the signal is detected.

Fig. 3: A typical NE602 (or NE612) product detector and mixer circuit. In this application the NE602 is used as both mixer and oscillator (see text). Pin-out details of the regulator i.c. are shown (inset).

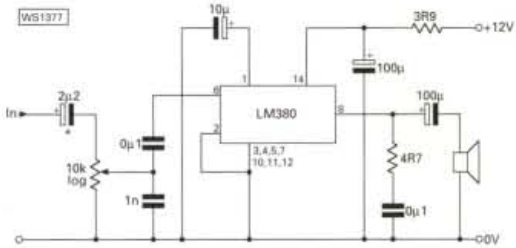


Fig. 4: The receiver is completed with an audio stage using the well-known LM380 chip. (An alternative, the LM380 provides a little more audio output and is probably less prone to r.f. instability problems). The circuit will drive a moderately sized loudspeaker (see text).

Better Than Expected!

The little receiver worked rather better than I expected and has proved to be a useful little monitor receiver for 3.5MHz. To acknowledge the contribution of Doug DeMaw, I called mine "The FBRX". So, off you go - plug that soldering iron in and start building your own ladder filter, They don't come much cheaper or more practical! *PW*

Suitable crystals: The 8.863256MHz crystals are available from: **JAB Electronic Components, PO Box 5774, Birmingham B44 8PJ @ six for £6 including P&P.**

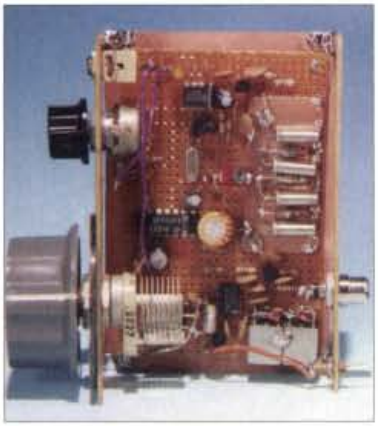


Fig. 5: George G3RJV's project this month was built using a combination of perf board and p.c.b. material. (See text).

Three Times The Fun With ...

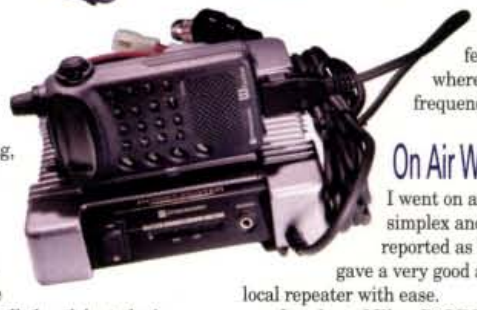
The C156, C510 & The CPB510

Richard Newton G0RSN was given three pieces of equipment from Standard to review this month - a C156 v.h.f. f.m. hand-held transceiver, a C510 v.h.f./u.h.f. dual-band hand-held and a CPB510 dual-band linear amplifier to go with the C510 to turn it into a base or mobile station. Read on to find out how he got on with all three.

I always think it's fun to experience using different equipment and I've not had the pleasure of using Standard equipment in the past. So, I was most interested when the team at *Practical Wireless* asked me to have a look at three pieces of equipment courtesy of Standard.

The three pieces of kit in question are the **Standard C156 v.h.f. f.m. hand-held transceiver** - operating on the 144MHz amateur band. The **Standard C510 v.h.f./u.h.f. dual-band hand-held transceiver** covering the amateur 144MHz and 433MHz bands.

Finally, the last bit of hardware was the **CPB510** - as the model number suggests, it is a companion to the C510. It's a **dual-band linear amplifier** designed to be used with the C510 to turn this little hand-held into a base or mobile station.



First Impressions Of The C156

The first radio I looked at was the C156 and first impressions were very good indeed. The C156 is a good looking, professionally finished radio and is a good manageable size.

The hand-held is large enough and heavy enough to give you the confidence it will do the job, but not so large and heavy to be unwieldy (unlike some). The C156's controls are well labelled and, by today's standards, the buttons are relatively large and well spaced. (See **Fig. 1**).

The radio has the capacity to take the normal 13.8V d.c. external power (see **Fig. 2**) and is supplied with a battery pack in which you have to place four AA cells. I used normal alkaline batteries, ('cheapies' actually).

The 'cheapie' batteries (see **Fig. 3**) gave me about 1.8W of output and kept me on air for the whole review time. With external power or a larger battery pack this initial output can be increased up to a maximum of 5W.

The Standard C156 is certainly a radio that you can pick up and use immediately. On turning the radio on with the small push button on the top panel, the user can see the two line, l.c.d. display. The display is very clear but, as with most modern kit, some of the characters may cause difficulty for those whose eyesight isn't so good.

The C156's display can also be very effectively backlit with a green light and I thought that it was good to see this as a primary function on one of the front panel keys. (The keys themselves aren't backlit).

A rotary knob on top of the C156 hand-held navigates the v.f.o. and memories, plus the extended menu options. (See **Fig. 4**). I found this rig very easy to use indeed and within a short amount of time I was on the air and had programmed in the local repeater and some simplex frequencies.

The Standard C156 offers an **impressive array of 100 memories** that can be easily stored, edited and deleted and, in addition to this, a favourite frequency can be selected as the 'Call' frequency which can be retrieved easily with a single button push. The memories can even be assigned an alphanumeric designation.

The C156 also offers a **diverse scan facility** - you can scan the whole v.f.o. range, a 1MHz section or you can set programmable scan limits. As far as the memories are concerned I was impressed with the scan features - one can scan all memories, selected memories only or scan in blocks of ten memories.

The CTCSS tone squelch is a standard feature on the Standard C156 and is available for accessing repeaters. To obtain the option, a module is purchased separately and installed using a slot on the side of the radio. This will then give a full range of CTCSS options.

The C156 hand-held does, however, come with a **full range of Dual Tone Multi Frequency (DTMF) facilities**, including paging and squelch control. Messages can be sent and received and even stored, so if a friend has a radio with a similar function you can have your own personal **free** message paging service!

This little transceiver offers advanced features such as **auto repeater select** - when you tune to a repeater frequency it automatically selects the offset, I find this a very useful feature. Another advanced feature is the **dual watch facility** where you can effectively monitor two frequencies simultaneously.

On Air With The C156

I went on air with the C156 and used it simplex and spoke to **Terry G7VJJ** who reported as being, "Very good audio". The radio gave a very good account of itself and I accessed my local repeater with ease.

I spoke to **Miles G0ODS/M** in Broadstone who said that I was "breaking" slightly. This didn't surprise me, as the batteries were coming to the end of their life and I was 'foot mobile' with the helical antenna (see **Fig. 5**) about ten kilometres across town from the repeater site on low power.

A few weeks earlier, when the batteries were new I had spoken to **Steve G1YNY** in Mudeford, again through GB3SC, he gave the C156 and the transmitted audio a good report. **Terry 2E1EJC** also gave the transmitted audio an excellent report when I spoke to him simplex whilst mobile in his hometown of Blandford.

I tried the C156 on an external antenna, the connector is a BNC type (see Fig. 4). Unfortunately, though, in my 'neck of the woods' there are a fair few pagers and this little radio got swamped.

The specifications of the C156 v.h.f. f.m. transceiver say that it covers 144.000 to 145.995MHz and I noticed, however, that the v.f.o. range went from 100MHz to 199MHz. I did try and receive Air and Marine band but I found that the C156 wouldn't receive either, even on an external antenna.

As a hand-held for 144-146MHz, the C156 is excellent, the received audio is of a good quality and the reports I received on the transmitted audio were favourable. The radio seems to be sensitive and, although slightly prone to pager interference, (what radios aren't these days?) it performed very well indeed.

Considering the cost of the radio, at a mere **£69 including VAT**, and the kind of facilities it offers, I consider the Standard C156 to represent **excellent value for money!**

The Dual-Band C510

Next on my list was the twin band hand-held - the **Standard C510**. (See **Fig. 6**). This is a one-band-at-a-time, dual band

amateur transceiver which covers the 144 and 433MHz band. The review radio also had extended receive coverage.

This dual-band radio is low power, operating at under 1W! The Standard C510 I had for review wasn't supplied with a battery pack, instead it took three AA cell batteries. (See **Fig. 7**).

When using the C510 for review purposes, I used alkaline AA cells and the batteries were still going strong after a month! Obviously the length of battery life will depend on how much you use the radio, especially on transmit.

There's no facility for external power on the C510 but, having said that, if you use re-chargeable batteries you can re-charge them using an optional 'drop in' charger without having to take them out of the radio. Using the C510 with the optional linear amplifier, the CPB510, enhances it somewhat, but more about that later.

The C510 is, in my opinion, a good-looking radio. The controls are well labelled. It is smaller than the C156 and therefore the buttons are a little smaller, however they're well-designed and I didn't find them difficult to use.

The whole finish of this little unit is superb – the display is an l.c.d. and the read-out is actually larger than that of the C156. One of the things I particularly liked about this hand-held radio was that the keys were backlit along with the display - very smart and very useful - when I was operating in the passenger seat of the car at night the fact that the buttons and the display were backlit was great!

There's provision for a speaker microphone on the top of the radio, I used an Icom unit and it worked well. The antenna connection on the Standard C510 is an SMA type. (See Fig. 7).

Having been very impressed with how the C510 looked, I decided it might be a good idea to see how it worked and what it had to offer. I found that had an interesting little feature on the squelch menu.

The squelch on the C510 transceiver is automatic, but the operator can set the level. The radio also offers r.f. squelch. (This is where the squelch can be set to only open of there is a received signal above a certain 'S' meter reading. The threshold being set by the C510's on display 'S' meter).

Fig. 1: The C156 v.h.f. f.m. hand-held transceiver. Richard thinks that it is a good looking, professionally finished radio. The buttons are also well labelled, large and well-spaced.

Fig. 2: The Standard C156 has the capacity to take the normal 13.8V d.c. external power and here you can see the connection on the left-hand side of the radio: 'DC IN'.

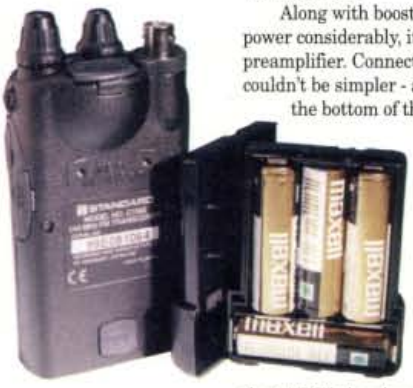


Fig. 3: The C156 v.h.f. f.m. hand-held Richard had for review was supplied with this battery pack in which he placed four AA cells. Richard said that he used normal alkaline batteries - 'cheapies' actually.

Very Easy To Use

The C510 is a very easy radio to use, this statement also applies for programming in the memories as well. It has 200 memories and two 'Call' memories and as if this wasn't enough, this twin band transceiver also gives you the option of programming up to 20 programmable band scan limits!

Like the C156, the Standard C510 offers a veritable array of scan functions. It will scan a 1MHz segment of the v.f.o. range, an entire band and one of the 20 programmable scan ranges. In memory mode it will scan all memories, selected memories only or memories in blocks of ten memories.

Apart from having the DTMF paging facility that the C156 has, the C510 also comes supplied with **full CTCSS capability** and will also scan incoming signals for a CTCSS tone. This, like the other extended functions of the C510, is easily accessed via a menu that is activated by a single button press.

The C510 I was given to review had an **extended receive capability** and the radio was able to receive a.m. signals on the Air Band and would also tune to the Marine Band as well as covering u.h.f. and v.h.f. p.m.r. frequencies. I listened on Air band and, **I have to say that the radio performed extremely well**, the performance was excellent even on the helical whip - I found that the C510 from Standard was just as good as a dedicated Air Band receiver.

I also got good results on the Marine Band. However, I did have to connect it to an external antenna for this and it did suffer a bit of pager break-through.

I then decided to see what the rig was like on the air, so I tied up with Terry G7VJJ on a local simplex contact and got a good report from him on the transmitted audio. The radio also accessed the local v.h.f. repeater, GB3SC, from my house on the outskirts of Bournemouth - no mean feat for the little QRP hand-held!

Specifications Of The C156

General	
Frequency range	144.000-145.995MHz
Transmission type	F2, F3
Microphone input impedance	1500Ω
Speaker impedance	8Ω
Operating voltage	4.0-15.0V d.c. (using battery terminal) 4.5-16.0V d.c. (using external supply terminal)
Rated voltage	6.0V d.c.
Current consumption (transmitted in 13.8V)	(Hi 5W) approx. 1.3A (Mid 2.5W) approx. 1.1A
Current consumption (transmitted in 6.0V)	(Hi 2.8W) approx. 1.2A (Mid 2.5W) approx. 1.1
Dimensions main body (no projections)	56(w) × 125(h) × 26(d)mm
Weight (incl. battery and antenna)	Approx. 290g
Receiver	
Reception system	Double superheterodyne
Intermediate frequency	1st i.f. 21.8MHz/2nd i.f. 450kHz
Reception sensitivity	0.158μV
Squelch open sensitivity	0.1μV
Audio output	250mW (8Ω, 10% distortion)
Transmitter	
Transmission output	1.8W approx.(with CBT156 battery case (supplied with review model) 5W with 13.8V d.c.
Modulation system	Reactance modulation
Max. Frequency deviation	±5kHz
Spurious ratio	60dB more
Built-in microphone	Electret Condenser Microphone

Fig. 5: The C156 complete with helical antenna.

Fig. 6: The C510 v.h.f./u.h.f. dual-band hand-held transceiver, complete with antenna.

The CPB510 'Power Booster'

Having had some encouraging results using the C510 in hand-held form, I decided to give the **CPB510 linear amplifier or 'Power Booster'** (to give it it's advertised title) a try. The CPB510 is an impressive looking bit of kit that's designed for use exclusively with the C510.

Along with boosting the output power considerably, it also offers a preamplifier. Connecting the two units couldn't be simpler - a wander lead from the amplifier plugs into the bottom of the C510 hand-held and the C510 takes its power from the CPB510 which, in turn, is connected to a 13.8V d.c. power source by a standard plug. (See **Fig. 8**).

The 'Power Booster' also has a 'wander type' coaxial lead terminating in an SO239 connector which has a built in duplexer (see **Fig. 9**). The helical antenna isn't used when the C510 is connected to the 'Power Booster' and can be left on or taken off.

The add-on unit will put out 50W on the 144MHz band and 35W on the 433MHz band from one or other of the two amplifier "bricks" shown in Fig. 10. It's possible to reduce this to a low power setting of 5W on each band and I was eager to see how well the whole set-up would work.

I took the whole combination to a club meeting at Blandford Forum in Dorset. Here I connected the C510 transceiver to the 'Power Booster' and then connected the whole lot to the external 144MHz antenna on the mast.

A CQ call brought a response **Stephen G7EXZ** in Salisbury and **Derek M1EGW** in Gillingham. Unfortunately, the club is situated near a pager site and the QSO was unworkable due to pager interference.

Because of this, we had to continue using the club's old (and

Fig. 7: The C510 wasn't supplied with a battery pack, instead it took three AA cell batteries and here you can see the batteries 'in situ' in the back of the transceiver.

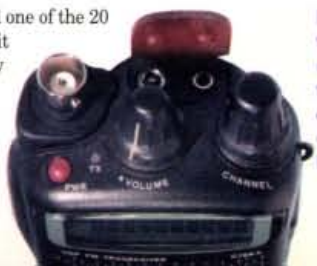


Fig. 4: Top of the C156. Here you can see the rotary knob (far right) which navigates the v.f.o. and memories, plus the extended menu options. Also you can see the 'VOLUME' rotary knob (middle) and the BNC connector for the helical antenna (left).

Continued on page 28...

RADIOWORLD

(WEST MIDLANDS)

42 BROOK LANE
GREAT WYRLEY, WALSALL
WEST MIDLANDS WS6 6BQ
WE ARE 5 MINS AWAY FROM J11 M6

TEL SALES & SERVICE: 01922 414796
FAX: 01922 417829
MOBILE TEL: 0850 099244

Main dealers for Alinco, Icom, Yaesu & Kenwood

Manufacturers warranty on all new equipment

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!

ICOM

Most of the Icom range will carry unbelievable discounts. Ring for details

IC-706G
HF 6m, 2m, 70cm
£999

IC-746
HF, 6m, 2m 100W, 100W, 100W with tuner built in.
£1395

NEW IC-756 PRO
Needs no introduction. Simply fabulous.
£2099

PCR 1000
Computer driven receiver.

ICOM IC-R75
Latest Icom receiver. 0-30 + 6m. Outstanding receive with DSP. **£629**

YAESU

FT-920AF
HF & 6m built-in tuner with FM & FREE AM/FM Filter. ~~£1199~~

FT-1000MP AC
Dual Receiver. Digital 100W Competition radio.
~~£2199~~

FT-VX 1R
VHF/UHF Handie. Micro small.
£POA

FT-847
The new mobile-base. DSP HF 2m-70cm 50MHz.
~~£1499~~

FT-100
HF 6m/2m/70cm extra small mobile. Information to follow.

KENWOOD

TS-870
Still the only true DSP radio with TX,EQ N/R.
£1499

TS-570DG
Dedicated HF mobile-base DSP with built-in tuner. **£899**

TH-G71E
Full 5 Watts power. Wide band receive.
£239

TM-G707
The new mobile package with features: High visability display, 5-in-1 programme memory, memory name function, multiscan facility & built-in CTCSS. **£299**

ALINCO

DX-70TH
HF +6M **£599**

DR-MO6
6M MOBILE 20W
£215

DR-140
2M mobile 50W
£220

DR-430
Mobile 70cm
£220

DJ-G5
2M/70CM handie
£237

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

WE STOCK ALL ACCESSORIES FOR THE MAIN BRANDS DISCOUNTED BY 10%

Microphones - Icom

SM6 ohm, 8 pin, desk mic £59
SM8 1.3/600 ohm selectable, 8 pin desk mic £100
SM20 600ohm, 8 pin, deluxe desk mic £108

Speakers - Icom

SP20 base station loudspeaker with audio filter £125
SP21 base station loudspeaker £65

Microphones - Kenwood

C-60A dual impedance desk mic internal pre-amp £106
MC-80 electret desk mic with pre-amp £65
MC-85 electret desk mic with pre-amp & compressor £125
MC-90 desk mic for DSP transceivers £169

Speakers - Kenwood

SP-23 station loudspeaker for TS-450/690S/570D £62
SP-31 station loudspeaker for TS-850/870S £74.50
SP-950 station loudspeaker for TS-950SDX £96

Yaesu FT-847 options

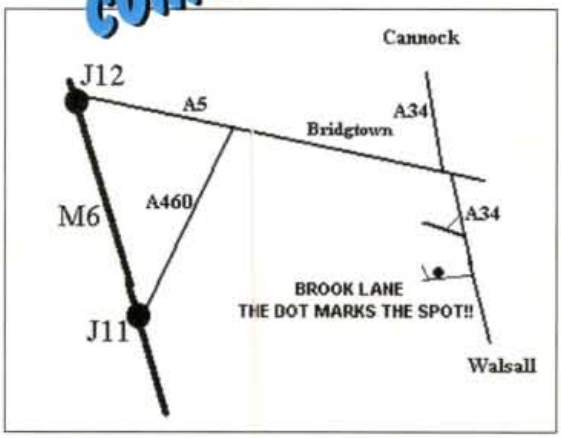
ATAS-100 active tuning ant system £224
FC-20 automatic ant tuner £197
MD-100 A8X desk top mic £99
YF-115C 455kHz/500Hz Collins Mechanical filter £89
YF-1158 02 2.7kHZ SSB filter Collins Mechanical £89

***We also stock all makes of antennas:-* Cushcraft, Diamond, Sirio, Watson, Pro-Am, etc.**

RADIOWORLD

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

Specifications Of The C510

General	
Frequency range	144.000-145.995MHz 430.000-439.995MHz
Transmission type	F2, F3
Microphone input impedance	2kΩ
Speaker impedance	8Ω
Antenna impedance	50Ω
Antenna connector	SMA
Operating voltage	3.3-8.4V d.c.
Rated voltage	4.5V d.c.
Current consumption (13.8V)	TX High approx. 850mA (v.h.f.) TX High approx. 950mA (u.h.f.) RX approx. 29mA (v.h.f.) RX approx. 33mA (u.h.f.) RX (save function on one second) approx. 11mA
Dimensions main body (no projections)	58(w) × 104(h) × 27(d)mm
Weight (incl. battery and antenna)	approx. 210g
Receiver	
Reception system	Double superheterodyne
Intermediate freq.	1st i.f. 23.05MHz/2nd i.f. 450kHz
Receive sensitivity (12dB SINAD)	Less than 0.2μV (v.h.f.) Less than 0.22μV (u.h.f.)
Squelch open sensitivity	Less than 0.2μV
Audio output	100mW (8Ω, 10% distortion)
Transmitter	
Transmitter output	HI approx. 1W when using alkaline LOW approx. 0.3W
Modulation system	Reactance modulation
Max. frequency deviation	±5kHz
Spurious radiation	-60dB more
Built-in microphone	Electret Condenser Microphone

Fig. 8: Connecting the CPB510 to the C510 couldn't be simpler - a wander lead from the amplifier plugs into the bottom of the C510 hand-held and the C510 takes its power from the CPB510 which, in turn, is connected to a 13.8V d.c. power source by a standard plug.

...continued from page 25

I mean old!) dedicated 144MHz transceiver which didn't suffer so badly, but breakthrough was still present. It did show, however, that the C510 and the Power Booster were putting out a decent signal.

Spurred on by this I tried again and this time from my own shack in Bournemouth. Again I got a reply from the Salisbury area, this time a mobile station, **Jamie M0CLI/M** on the Devizes Road heading out of Salisbury.

Jamie told me that he was having difficulty resolving the audio and that something sounded wrong. So I switched to my normal hand-held which is connected to a cheap and cheerful 30W r.f. amplifier and Jamie reported a massive improvement in the received audio his end.

Using an antenna switch, I switched the two radios between the same antenna. The C510 and its Power Booster were wonderful on receive, easily comparable with the old TH-78E I was using, but there was still this problem with the audio at Jamie's end.

Jamie then came up with a theory. He was using a converted p.m.r. rig and wondered if the problem was caused by the rather critical filtering his end and kindly called to see if there was another station that could help with a report.

Without hesitation, **Hugh G4TMO** from Wilton called in and he gave me a 5 and 2 report and said the audio was "OK - I've heard better and I've heard worse!" Hugh told me. He went on to say that had he not been asked to be critical he wouldn't have noticed anything untoward but the audio did lack a little punch.

My thanks to both Jamie and Hugh as both were happy to stay with the tests and comparisons for the duration, so thanks gents! To actually contact a mobile station in Jamie's location from my QTH was impressive enough!

Fig. 9: The 'Power Booster' has a 'wander-type' coaxial lead terminating in an SO239 connector which has a built in duplexer (left).

Fig. 10: Inside of the CPB510 'Power Booster'. (Top chassis view).

Specifications Of The CPB510

General	
Frequency range	144.000-145.995MHz 430.000-439.995MHz
Transmission type	F2, F3
Speaker impedance	4Ω
Antenna impedance	50Ω
Antenna connector	SO239 type with cable
Grounding method	Negative ground
Rated voltage	13.8V d.c. ±15%
Current consumption (13.8v)	TX High approx. 10.0A (v.h.f.) TX High approx. 8.0A (u.h.f.) TX Low approx. 3.0A RX approx. 0.15A
Dimensions main body (no projections)	150(w) × 31(h) × 170(d)mm
Weight	Approx. 1.3kg
Receiver	
Preamplifier Gain	approx. 2.0dB
Preamplifier NF	less than 5.5dB
Preamplifier image ratio (-46MHz)	more than 50dB (v.h.f.) more than 30dB (u.h.f.)
Audio output	more than 2W (at 10% distortion)
Transmitter	
Transmission power	HI 50W (v.h.f.) HI 35W (u.h.f.) LOW 5W
Spurious radiation	less than -60dB

Very Impressed With All Three

I have to say that, in general, I was very impressed with all three bits of kit. The C156 v.h.f. f.m. hand-held represents **superb value for money** as a straightforward 144MHz hand-held.

The C510 dual-band transceiver had an excellent receiver on its own helical antenna and I could hear quite distant signals on v.h.f. and u.h.f. both on the amateur bands and on the extended receive v.f.o. ranges. The low output power may be a little restrictive but it still has loads to offer and again represents excellent value for money.

When used with the Power Booster, the C510 becomes a microphone that can be detached and used as a hand-held radio! I think the idea is wonderful.

The two units together (along with the 'Power Booster' with the C510) add up to superb value and, having taken a close look, I don't think that there's anything 'standard' about Standard equipment! It's innovative, well built and performs well!

My thanks go to Entel UK Ltd, 4th floor, Allied Dunbar House, Elstree Way, Borehamwood, Herts WD6 1JH for the loan of the Standard C156, C510 and the CPB510. The **C156 costs £69 including VAT**, the **C510 costs £99 including VAT**. The **CPB510 costs £100 including VAT**.

For further information on these or any other Standard products please contact them direct at the address given or on **Tel: 0181-236 0032** or **FAX: 0181-236 0082**. Or you can **E-mail: sales@standard-comms.co.uk** *PW*

Entel's Response

We FAXed a copy of this review of the Standard C156, C510 and CPB510 to **Jim Rimington** at **Entel UK Ltd**, as it is our policy to let manufacturers/ dealers who supply equipment for review the chance to read any review and comment on it. In his FAXed reply Jim said the following:

Referring to Richard's comments on the C156: "The article says that the v.f.o. range went from 100MHz-199MHz but Air Band and Marine Band signals could not be received. The C156 does have a receive coverage with good sensitivity from 135 to over 165MHz and this does, of course, include the Marine Band but not Air Band".

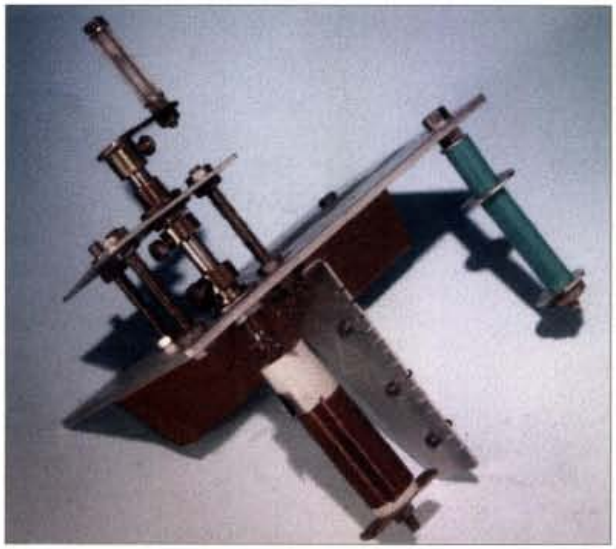
On Richard's comments about the C510, Jim replies: "The radio supplied for review had been factory set for the new 12.5kHz channel spacing on the 144MHz band. The deviation of the transmitter is set to ±2.5kHz for use with repeaters and other radios operating to this new specification. As a result, the audio would sound thin and 'lacking punch' if received using an old or unmodified radio".

Our thanks go to Jim for arranging for us to be able to review these three pieces of Standard equipment and also for taking the time to read the review and FAX his comments on it to us. **Editor**

It's Magically Simple - The 'Little Imp' Coil Winder

Barrie Rogers G0SQR

describes how you can introduce a little 'miracle maker' into your shack ... and make the winding of those coils that much easier!



Winding home-made coils seems to most constructors to be a most difficult problem and is the most disheartening task of any project. Indeed, I often wonder how many projects fail to materialise as soon as coil winding appears on the agenda and the whole idea is dropped!

I was reminded of the problem when I read in **Rob Mannion G3XFD's article** 'Radio Basics' (*PW* September 1998 page 17) where he tells of "feedback from readers of the difficulties and confusion arising from coil winding".

The 'Little Imp' coil winder originally came about due to an article in *PW* April 1992 'Building A Dip Meter' by the **Rev. George Dobbs G3RJV**. In the article George says: "In the past, when I have written articles on projects using home-wound coils, more problems seem to come from these components than anything else but you aren't going to let me down are you"? I too have had coil winding difficulties in the past and the inspiration arose from wanting to build the 'dip meter' as a project.

The Coil Winder

The 'Little Imp' coil winder is not difficult to make and is constructed mainly from scrap metal with tools from your normal workshop. However, construction should be approached with the right attitude!

Don't forget you're making a simple practical coil winder. **You're not making an entry for the Model Makers' Prize of the Year at the Model Engineers' Society Annual Exhibition!**

Start by cutting the **Main plate, Fig. 1** from 3mm aluminium (this is important! as the rigidity in the finished winder really depends on this); any thinner it will be 'Waffy' in use*.

***Editorial note:** We think that 'Waffy' is a Yorkshire term for 'Wobbly'. Southerners please note!*

The Main plate is cut with a hacksaw or preferably with a jigsaw with the plate clamped to the bench with a 'G' clamp with the cutting line clear of the bench edge. If you haven't got a 3mm piece in your scrap box, I suggest you visit the local scrap merchant and ask if you can look in the aluminium pile. (Mine was cut from a piece of old 19in rack panel front).

Note: It doesn't matter if the aluminium sheet you've chosen (or found) has any random holes in it from switch, meter or sockets. So long as you can drill new holes around any existing ones, there won't be any problems. Next cut out the **Front plate, Fig. 2**, from a piece of 'hard' aluminium 1.5 mm thick.

The **Securing plate, Fig. 3,** can be 'soft' aluminium and is cut and bent before drilling out and filing the slot. The Front plate, Fig. 2, is now marked out for drilling and is given an extra heavy 'belt' (translated: 'blow' or 'thump'!) from the 'centre-pop' (marking punch) so the drill doesn't wander off centre' - a particular problem in aluminium.

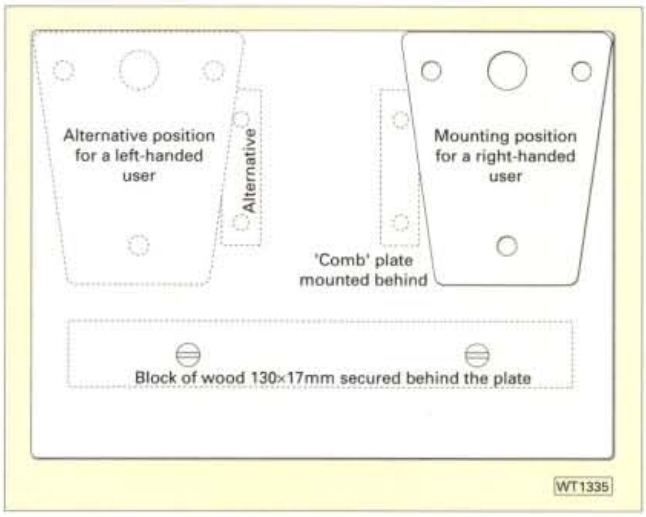


Fig. 1: The Main plate is cut from 3mm aluminium – this is important as the rigidity in the finished winder really depends on this (see text).

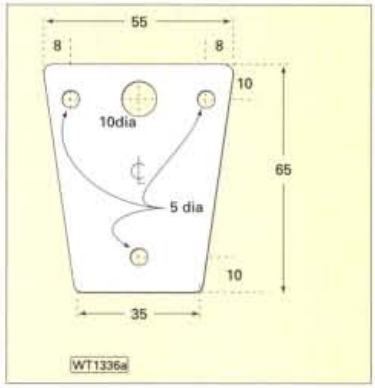


Fig. 2: The Front plate, is cut or fabricated from a piece of 'hard' aluminium 1.5mm thick (see text).

Left Or Right Handed

Now comes the versatility of the design - it is adaptable for right or left handed use according to your needs!

The Front plate is now placed on the Main plate

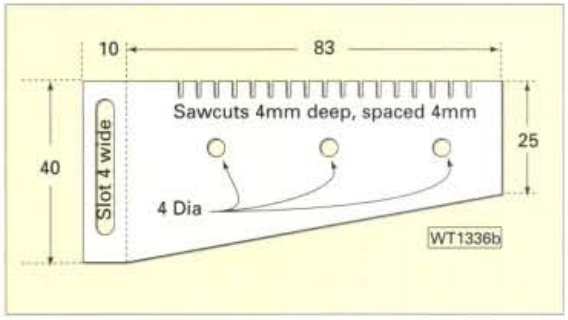


Fig. 3: The Securing plate, can be made from 'soft' aluminium and is cut and bent before drilling out and filing the slot (see text).

(See Fig. 1, left or right position) and clamped tight in your vice/jig so you can drill all holes at the same time without the drill chuck fouling the vice jaws. This ensures that all holes are perfectly in line in both plates to make assembly much easier.

All cut edges should be cleaned of all burrs and filed straight and square. Burrs on drilled holes can be removed by rotating a larger size drill in them by hand, allowing all nuts to sit square. Drilling of holes is best done with a cordless drill at a slower speed, rather than with a mains-powered drill screaming away at full bore and drifting off-centre!

Preparing The Brasswork

The two pairs of end cheeks should be cut from hard brass 1.6mm thick (0.64in). You may find it easier to lightly sand this before marking out, cutting to size, removing burrs and filing to shape. Holes are then drilled at centres in all four plates to clear a 4BA screw or a short piece (25mm) of studding.

A 4BA brass nut is then cleaned up with a fine file on all sides and the bottom face, to enable you to make a good soldered joint. However, you'll find it almost impossible to solder the nut to the cheek with a normal 25-40W iron.

Instead, you should clamp about 5mm of the end cheek in a vice with cleaned side upwards, poke a short 25mm screw or bit of 4BA studding from below and run the nut down the thread. Then, using a gas 'micro' torch (I used a full size blowtorch with the 'wick' turned down a bit), the flame should be played on the brass cheek. At the same time solder is 'dabbed' onto the brass until it's seen to flow. Solder is then fed in until a fillet builds up on the cheek-piece.

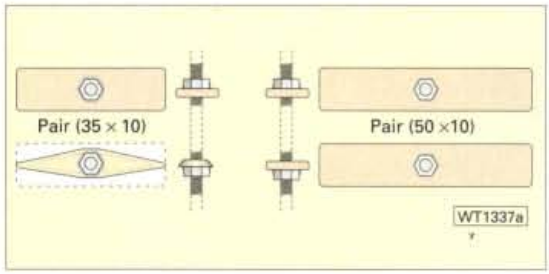


Fig. 4: One of the small pair of cheeks is then clamped into the vice and filed down to the 'diamond' shape (in the diagram, the dotted lines show the outline of the metal which has to be removed by filing, with the resultant 'diamond' shape shown coloured) at 5mm wide at the centre and pointed ends and the inside face is chamfered on all edges to allow easy passage of wire through without catching on 15mm formers (see text).

The point of using a small bolt through the hole to steady the nut, is that the 'pendulum effect' holds the nut flat on the brass. With this technique you don't end up trying to chase the nut across the piece of brass!

Extreme care must now be taken to allow the metal to cool fully before removing it from the vice. This is because, even with the heat sink effect of the bench vice jaws, brass still retains a lot of heat and it could cause some very nasty burns. Take care!

One of the small pair of cheeks is then clamped into the vice and filed down to the 'diamond' shape as shown in **Fig. 4** (in the diagram, the dotted lines show the outline of the metal which has to be removed by filing, with the resultant 'diamond' shape shown coloured) at 5mm wide at the centre and pointed ends and the inside face is chamfered on all edges to allow easy passage of wire through without catching on 15mm formers.

The winding handle, **Fig. 5**, is now clamped in the vice and the piece of spindle coupler soldered as before, before filing to shape and fitting a short piece of 4BA studding for the handle which is a section of ball pen casing with lock nuts and washers to secure so it rotates freely.

Main Bearings

The two main bearings are made from the bearings of two old volume controls, broken out of the Bakelite cased types (Colvern) or sawn out of metal examples. Alternatively you can buy new ones from Maplins!

As I mentioned earlier, the 'Little Imp' is made mostly from scrap. The only new materials you are likely to have to buy are the 6.35mm rod with some 4BA and 2BA studding with nuts, washers, etc.

The two shaft spacers are made from a 6.35mm shaft couplers (brass) sawn in half. However, if you can drill and tap 4BA it should be cut into three equal pieces, with the centre section used on the winding handle. Alternatively ... buy two couplers and saw each in half (blow the expense!).

I remove the grub screws from shaft couplers and replace them with short 'cheese head' screws. This is because when I try to tighten them up, the grub screw heads shear off.

Cutting The Studding

The 2BA studding is now cut into three pieces about 45-50mm long for the Front plate to Main plate fixing and the bobbin support (at about 90mm long) with two spacers from a ball 'Pentel' case to fit over the studding with large washers. The 4BA studding is cut at about 85mm for the winding spindle, and a short piece about 40mm with a 25-30mm piece of 'biro' case for the rotating handle with required lock nuts and washers.

The most difficult part of the whole project is the winding shaft, **Fig. 6**. For this you have to cut a piece of 6.35mm steel axle rod 70mm long, drill a 3mm hole about 25mm deep, then tap it with a 4BA thread. This can only be done in a lathe and I was fortunate in having a pal who did mine.

But, do not despair! A visit to the local library will reveal the secretary of the local model engineers club who will be able to tell you of someone who will do this for you. He could be asked "How much?" or rewarded with a can of his favourite lager (this is a must) to show your appreciation!

Editor's note: *I approached a small engineering company who operate from a nearby industrial estate to enquire how much such a job would cost. They told me that they would charge around £10 plus VAT - plus the cost of the material if this wasn't supplied. So, don't be put off this project if you can't manage a certain section ... there's always a way around the problem!* ***G3XFD***.

Assembly Stage

All being well, you should now be ready to start the assembly stages and to help, the fully assembled prototype 'Little Imp' is shown in **Fig. 7**. And to start the process, the two bushes are fixed to the **Front plate** and **Main plate** and tightened up.

Next, the three pieces of 2BA of 50mm long studding are put into holes 'A' 'B' and 'C' and the nuts tightened up and three 2BA nuts 'run on' to about 10mm. The main shaft (with handle mounted) is then inserted through the **Front plate** with the two spacers loose on shaft and then put through the **Main plate** with nuts run on to the ends of studding to hold everything in position.

Now comes the most important section of the assembly stages! Spacer 'A' should be tightened up: **and by alternately tightening down the nuts on spacers 'B' and 'C'**, the **Front plate** is made to distort, so as to 'nip' the winding shaft in the bearings

and make rotation very stiff. (The point of this is so that when you do release the winding handle ... it doesn't spin back, and the winding stays tight against the pull from your wire holding thumb and forefinger).

The two spacers are then tightened up to stop **end float** in the winding shaft. **Again, I stress the importance of this adjustment as the whole success of your coil winder depends on this adjustment**.

The section of 2BA studding for the bobbin holder is put on the **Main plate** and tightened up. Suitably sized pieces of Pentel pen case are then cut and put on with large washers to hold the wire bobbin in position whilst rotating freely.

At this late stage in the article, I would suggest that if you're not contemplating winding coils as small as 4.7mm, you could ignore the **Securing plate** with its adjusting slot associated nuts and bolts.

Winding Coils

Let's now look at the actual process of winding coils on the 'Little Imp'. To this end, instructions or specification of coils in any article usually consist of the outside diameter (OD) of the former, wire diameter in s.w.g. or metric equivalent and number of turns, and whether close wound or spaced over a specific length on the former.

The 'Little Imp' will wind any coil from the smallest 4.7mm to 50mm with equal ease. (Depending on the size of end cheeks used).

With 4.7mm size no end cheeks are used and the former is slotted on the studding and secured with a 4BA nut. On my prototype most American old type plug-in coils were wound on 1in (32mm) Bakelite formers.

Newer type circuits use 15mm formers, the G3RJV dip meter is one example and suggest plumber's 15mm plastic pipe. Despite this, I prefer 15mm till roll centres.

Most of today's till roll tubes and office equipment use the same size but of various lengths, and are 'binned' when empty. I asked the supervisor at my local Safeway's customer service counter if she would save some for me and on the next weekly visit received a large number in a carrier bag free of charge!

Most copper wire for coil winding comes on 50g or 2oz reels. Mostly these are of 41mm diameter, 31mm long and 11.5mm bore.

A point to mention at this time is that the UK s.w.g. and American Wire Gauges (AWG) are **NOT** the same and should be checked against a set of copper wire tables (as in *The ARRL Handbook*). If s.w.g. is quoted, this is the 'normal' gauge and can be used without reference to tables.

If you have some copper wire to hand (i.e. wire from the scanning coils from a scrap TV set) it should be measured with a micrometer and checked against a set of copper wire tables. But if bought on 50g reels you'll find that the metric equivalent or the s.w.g. is printed on the label ... so no bother!

To start winding coils you'll need a reel of wire, a former and a 1.5mm drill in a pin vice to drill holes at required positions (this should be kept close to hand when winding). The former is placed on the winding spindle with 'diamond' cheek inside and the outer cheek is tightened up.

Please note: It is important to carefully centralise the former on the spindle so it rotates without any wobble, and it also makes it so much easier for the wire to be fed on neatly. A 1.5mm hole is drilled about 5mm from the outer edge and when cleared, the pin vice is kept turning.

The angle of the drill should be slowly tilted over to put a 'chamfer' towards the 'diamond' cheek at the bottom of the former. About 80mm of wire is then pushed through this hole and a couple of turns wound round the pointed end to secure it firmly.

Material Sources

Metals	Catalogue from Hobby's model shops W Hobby Ltd. Knights Hill Square London SE27 OHH Tel. (0181) 761 4244	
Studding	2 BA - 305mm long 4 BA - 305 mm long	Part No. 12036 Part No. 12037
Nuts & Washers	2 BA hex nuts (Pkts 10) 4 BA hex nuts (Pkts 10)	Part No. 12039 Part No. 12040
Brass Strip	0.064in (1.62 mm) Part No. MS/246	
Steel Rod (Axles)	6.35mm long	Part No. TA4
Copper Wire	All 50gm reels 16s.w.g. to 40s.w.g.	

Wire from the bobbin is then fed on through thumb and forefinger to the former and if it goes out of line ... just reverse the handle and carefully rewind. Set up the winding handle at the bottom point for reference and start counting, **every time the handle reaches the bottom you'll have completed one turn**.

When the instructions tell you to wind on 60 turns - and make a tapping - then wind on 12 more turns. In this case I think it's best to stop one turn short (this is where you can let go of the winding handle as due to its stiffness it won't unwind) and holding the wound turns tight to the former with the thumb and forefinger a 1.5mm hole is drilled, also another alongside it. (Again, tilting the drill sideways).

The end is then cut at about 80mm long, fed through the hole, pulled tight and two turns wound round the 'diamond' cheek end point. An 80mm end of wire is now put through the adjacent hole, secured on the 'diamond' plate, the final 12 turns wound on and drilled and secured as before.

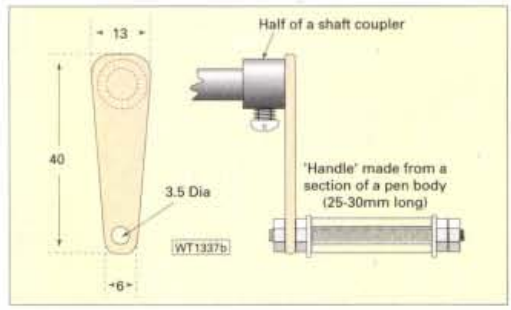


Fig. 5: The winding handle is now clamped in the vice and the piece of spindle coupler soldered as before, before filing to shape and fitting a short piece of 4BA studding for the handle which is a section of ball pen casing with lock nuts and washers to secure so it rotates freely (see text).

A dab of 'Superglue' is then placed on each wire hole and left to set and harden. The former is then removed from the spindle end cheeks and unwound from the 'diamond' end and wires are straightened out for 'tinning'.

The start and finish of each winding can be checked by looking down the centre of the former. Next, the end of 60 turns and start of the 12 turns are cleaned

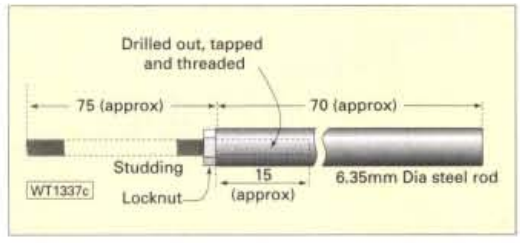


Fig. 6: The most difficult part of the whole project is the winding shaft. For this a piece of 6.35mm steel axle rod 70mm long, drill a 3mm hole about 25mm deep has to be cut and tapped with a 4BA thread. This can only be done in a lathe (see text for advice on this matter).

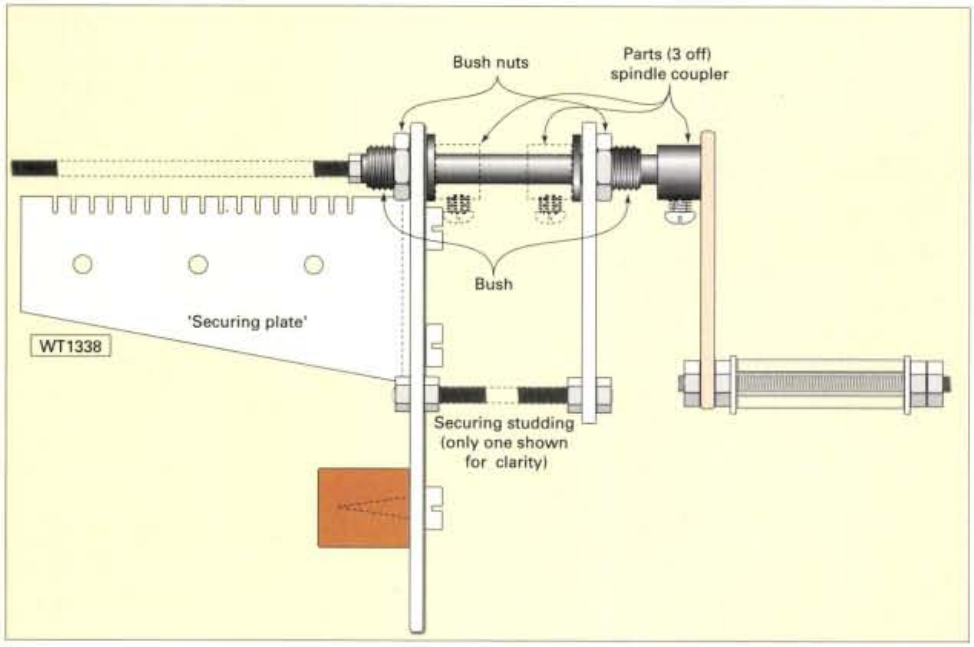


Fig. 7: The fully assembled prototype 'Little Imp' - shown for guidance to help with assembly (please also see heading photograph).

and soldered together for the tapping point. For ease of cleaning and tinning, I use a piece of wood 30mm wide, 150mm long by about 10mm thick clamped on to my bench with a 'G' clamp sticking outwards at right angles.

Using my method, the wire end to be cleaned is then laid on the wood and the wire is slowly turned and scraped with a sharp knife. The coil is then ready for soldering to the DIN plug (if you're making coils for the G3RJV dip meter) and gluing to the former with Araldite.

Some coils are suggested to be wound on 35mm plastic film canisters. If you're using these, they should be drilled out at the closed end for mounting on the 4BA spindle with suitable end cheeks.

Winding Small Coils

Using the 'Little Imp', small coils can be wound as easily as large ones. But they do require a little more patience in setting up, plus the waiting time for the adhesive to set and harden. Additionally, to wind coils on 4.7mm formers you'll need to have the **Securing plate** (Fig. 3) in position.

A long 4BA solder tag is put on the winding shaft next to the lock nut followed by the former and held tight by one of the small cheeks. (I use a large nut from an old 4.5V 'Bell' battery).

The end of wire, about 60mm is passed through the solder tag hole with a couple of turns wound in and around the hole (so it doesn't slip) with the solder tag bent to the point you want the winding to start.

Next, you should wind on the required number of turns. Where the wire finishes on the former it should be laid at right angles in the nearest slot on the 'securing' plate and is then cut (leaving about 60mm 'tail' to wind round the nearest 6BA screw).

Adhesives On Start & Finish

So, the winding is now on the former ... but it needs some adhesive on the start and finish point where the wire leaves the former before you even think about attempting to remove it! I have used various adhesives to secure windings, and help you ... here they are:

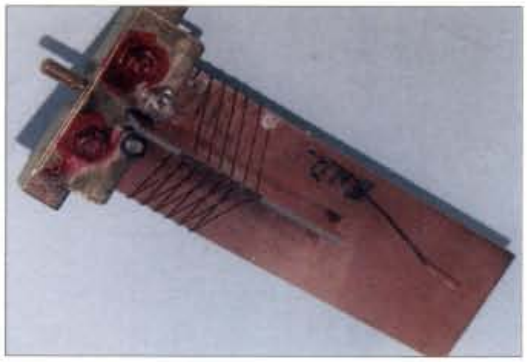


Fig. 9: Adapter made by the author to enable winding 'Cruciform' type coil formers as used in the 'Radio Basics' 'Tinny Dipper' project.

1: Nail varnish

2: Balsa cement

3: Evostick

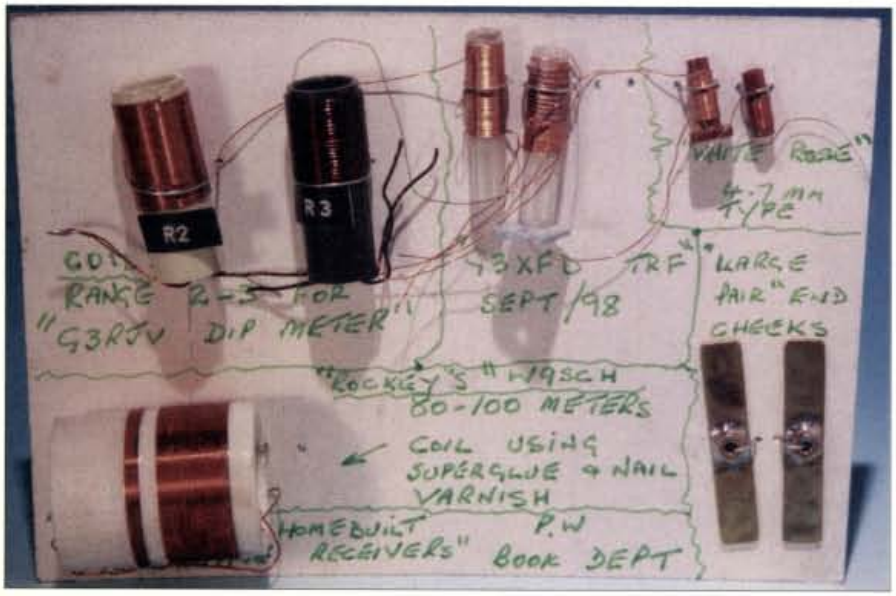


Fig. 8: Author's photograph and annotations showing various coils wound on the 'Little Imp' coil winding machine (see text).

Whatever you use, a blob must be applied to start and finish and left in position until set and hardened. A second blob must be applied over the ends and also left to set and harden.

All of the adhesives I've mentioned shrink to a very thin film on drying, hence the need to apply two coats or, in my case, I use at least three thus making sure the turns stay firm at the anchor point when removing from the spindle.

Evostick is very good and sets a bit more quickly. However, you have to apply the blob with a small screwdriver and you can also get long 'strings' of the solution from the can to screwdriver ... but it doesn't shrink so much on drying.

The choice of adhesive is up to you. I suggest you wind a couple of coils to become familiar with the 'Little Imp' before using and trying the properties of different adhesives.

So, that's how I built my coil winder. I hope you enjoyed the article and I hope it makes it quite clear how you can wind any coil, large or small on your own 'Little Imp'. Happy winding! PW

NEVADA® GROWING BIGG

USED EQUIPMENT

ALL SAFETY TESTED & GUARANTEED FOR 3 MONTHS

ADI AT400	70CM HANDIE TRANSCEIVER	75.00
ALINCO ALM-203E	2M MTR HANDHELD TRANSCEIVER	99.00
ALINCO DJ-180 + EDC46 Q.C.	2MTR HANDHELD TX	99.00
ALINCO DJ-C1E	2M MINI HANDIE	79.00
ALINCO DJ-C5	2M/70CM MICRO HANDIE	125.00
ALINCO DJ-480E	70CM HANDIE	99.00
ALINCO DJ-G1E	2MTR HANDHELD TX + AIR RX	139.00
ALINCO DR-610E	2M/70CM MOBILE TRANSCEIVER	225.00
ALINCO DR-MO6DX	6M, 20W FM MOBILE	189.00
DENPA MZ22	2M FM MOBILE TRANSCEIVER	125.00
ICOM IC207H	2M FM MOBILE	225.00
ICOM ICT8E	6M/2M/70CM HANDIE	225.00
KENPRO KT-22	2M HANDHELD TRANSCEIVER	59.00
KENWOOD TM-201	2M FM MOBILE TRANSCEIVER	159.00
KENWOOD TM-451E	70CM MOBILE TRANSCEIVER	199.00
KENWOOD TM733E	2M/70CM MOBILE	295.00
STANDARD C-5200	2MTR/70CMS MOBILE TX	299.00
STANDARD C-8900	2MTR MOBILE TRANSCEIVER	159.00
TRIO TR2200GX	2MTR MOBILE TRANSCEIVER	75.00
TRIO TS700	2M MULTIMODE BASE	250.00
TRIO TS711E	2M MULTIMODE BASE	395.00
YAESU FT411	2M HANDIE TRANSCEIVER	125.00
YAESU FT290R	2M MULTIMODE + ACCESSORIES	195.00
YAESU FT290 MK2	2MTR MULTIMODE TX	275.00
YAESU FT2500M	2M 50W FM MOBILE	189.00
YAESU FT690R	6M MULTIMODE PORTABLE	175.00
YAESU FT77DRH	2M FM MOBILE	125.00
YAESU FT726R	2M/70CM/HF BASE STATION	599.00
YAESU FTL2014	VHF PMR TRANSCEIVER	75.00
AOR AR1300	MULTIMODE SCANNER	125.00
COMMTEL 510	HANDHELD SCANNER	145.00
FAIRMATE HP2000	HANDHELD SCANNER	115.00
TRIDENT TR2400	HANDHELD SCANNER	149.00
YUPITERU MVT3300	HANDHELD SCANNER	110.00
YUPITERU MVT7100	HANDHELD SCANNER	145.00
YUPITERU MVT9000	HANDHELD SCANNER	249.00
GRUNDIG YB500	SHORTWAVE RECEIVER	99.00
KENWOOD R5000VHF	HF RECEIVER + UHF + FILTERS	699.00
JRC NRD545	HF RX + CHE119E NVA319	1299.00
REALISTIC PRO2042	1000 CHANNEL BASE SCANNER	145.00
SANGEAN ATS-803A	SHORTWAVE RECEIVER	99.00
TRIO R1000	HF RECEIVER	125.00
ICOM IC706 MKII DSP	HF + 6M 100W + 2M 20W TX	799.00
KENWOOD TS-680	HF 100W TX + CTCSS	549.00
TRIO TS-940S	100W HF TRANSCEIVER	795.00
YAESU FRG-7700	HF RECEIVER	169.00
YAESU FT990/DC	HF 100W TRANSCEIVER	899.00
ADONIS AM503	DESK MICROPHONE	45.00
AEA SWR121	HF ANTENNA ANALYSER	199.00
AMDAT ADC-60	FREQUENCY STANDARD CLOCK	99.00
COMET CF-706	HF + 6M + 2M DUPLEXER	29.00
CTE BS-25E	VHF AMPLIFIER/DOCKING BOOSTER	59.00
DATONG FL3	AUDIO FILTER	59.00
GOLDLINE	ANTENNA MATCHER	9.00
HI-MOUND BK100	BUG KEY	49.00
ICOM PS-15	POWER SUPPLY (20AMP)	95.00
ICS AMT-2	RTTY/CW/AMTOR UNIT	29.00
KENWOOD AT200	ANTENNA TUNER	125.00
KENWOOD AT250	AUTO ANTENNA TUNER	189.00
KENWOOD PS430	POWER SUPPLY (12 AMPS)	80.00
LESON TW232	BASE MIC	29.00
MIDLAND 10 FM	10M FM MOBILE	49.00
MW MODS MM4001KB	MWMODS RTTY RX/TX INC KB	49.00
MW MODULES 432/50	70CM LINEAR AMP	99.00
'N' TYPE SWITCH	ANTENNA SWITCH	15.00
NEC SPEAKER/CLOCK	SPEAKER/CLOCK	35.00
PALSTAR PS-04	2/4 AMP POWER SUPPLY	14.00
TOKYO HL100B	21MHZ - 28MHZ 100W AMP	129.00
TRIO 80-9	BASE UNIT - TR9130 ETC	35.00
TRIO MC-50	DESK MIC	39.00
TRIO TM-220	MONITOR SCOPE	179.00
TRIO VB-2200GX	10W AMP FOR TR2200GX	49.00
YAESU AT767	FT767 INTERNAL ATU	79.00
YAESU FRA7700	ACTIVE ANTENNA	39.00
YAESU FRV7700	VHF CONVERTER	145.00
YAESU FRT 7700	ANTENNA TUNER	39.00
YAESU FT517	CTCSS UNIT FT411/FT811 ECT	39.00
YAESU MH-26E8	MIC TO SUIT YAESU MOBILES	30.00
YAESU MM821	MOBILE ADAPTOR	5.00
YAESU NC1828U	WALL CHARGER	6.00
YAESU PA3	MOBILE DC ADAPTOR	12.00
YAESU YM48	DTMF MIC 8 PIN	19.95

NEW ITEMS ARRIVING DAILY - CALL!

CUSHCRAFT

VERTICALS

R6000	6, 10, 12, 15, 17, 20m	£299.95
R7000	10,12,15,17,20,30,40m	£369.95
NEW R8	6-40m 8.7m(H) auto band change	£399.95

HF MULTIBAND BEAMS

MA5B	New Mini Beam	£289.95
X7	10,15,20m 7 el.Yagi	£499.95
A3S	10,15,20m 3 el.Yagi	£389.95
A3WS	12, 17m 3 el. Yagi	£299.95

p&p £10 on each item * £12 p&p on each item

HF ROTARY DIPOLES

D3W	12,17,30m Dipole	£199.95
D40	40m Dipole	£229.95 £199.95

6 METRE ANTENNAS

A505S	6m 5 el.Yagi 10.5 dBi	£149.95
A506S	6m 6 el.Yagi 10.5 dBi	£249.95
ARX6	6m Ringo ranger 7.3m 5.5 dBi	£199.95
AR6	6m Ringo 3.1m 3 dBi	£59.95

p&p £8 on each item

GOODMANS TRACKER

2 WAY BUSINESS & PERSONAL COMMUNICATIONS SYSTEM

PMR 446 LICENCE FREE RADIOS!

Now you can keep in touch with -

NO LICENCE FEE
NO CALL CHARGES
NO LINE RENTAL
Typical range: up to 3km

COMPLETE PACK
- PAIR TRACKER RADIOS
- DROP IN CHARGER
- NiCad BATTERIES

ALINCO DJ-SR1

Lightweight and small enough to fit in a shirt pocket! It has the performance to achieve max range on the new PMR 446 allocation with outstanding clarity on both received & transmitted signals.

- 8 channels
- 39 CTCSS codes/ch
- 20 memories
- Memory scan
- Battery level indicator
- Switchable hi/low pwr
- Speaker/Mic jack
- Monitor (open squelch) key
- Selectable pwr output

ZX Yagi

• POWER
• PERFORMANCE
• QUALITY

Mini Beam

A mini beam with just 2 metre boom length, and 5 mtr elements, that really performs. Low profile elements so it won't upset the neighbours!

	28MHz	21MHz	14MHz
Gain	4.35dBD	3.61dBD	3.35dBD
Front/Back	18.4dB	16.3dB	16.1dB

Boom 2 mtrs Element 5 mtrs
Max Power 1500 Watt

MINI 2000 ..... £193.00 £12 P&P

Low Cost Verticals

Two lightweight multiband verticals that really work well. Supplied complete with radials - *and just look at the price!*

MODEL	BANDS	LENGTH
GP3	10/15/20 mtrs	3.9 mtrs
GP4	12/17 mtrs	4.3 mtrs

GP3 ..... £59.95 £8 P&P
GP4 ..... £59.95 £8 P&P

ZX Yagis are probably one of Europe's best kept secrets. Ron Eberson of ZX has been quietly manufacturing top class antennas for the leading European DX'ers for some years in Holland. Now he has turned his attention to the UK and come up with a cracking range of affordable and practical antennas for the average size garden.

Mono Band Yagis

ALL FEATURE

- Strong Aluminium (2004 Titanan+6061 T6)
- 3KW Gamma Match
- Customisation - *if required*

BAND	ELEMENTS	BOOM(M)	GAIN(DB)	PRICE
10MHz	2	2.35	6.3	£165.00
10MHz	3	8.55	9.1	£184.50
14MHz	2	1.7	6.3	£146.40
14MHz	3	6.2	9.1	£197.95
14MHz	4	9.4	11.4	£255.95
18MHz	2	1.45	6.3	£123.95
18MHz	3	4.9	9.1	£156.95
18MHz	4	7.5	11.4	£189.95
21MHz	3	4.15	9.1	£115.95
21MHz	4	6.4	11.4	£182.00
24MHz	2	1.1	6.3	£99.25
24MHz	3	3.5	9.1	£123.95
24MHz	4	5.5	11.4	£156.95
28MHz	3	3	9.1	£115.95
28MHz	4	5	11.4	£149.00
28MHz	5	7.5	12.1	£181.50
28MHz	5DX	8.0	12.7	£215.00
50MHz	2	0.60	6.2	£48.95
50MHz	3	1.75	9.1	£81.95
50MHz	4	2.75	11.4	
50MHz	5	4.35	12.1	£114.95
50MHz	6	6.40	12.5	£147.85

£12 P&P ON ALL ANTENNAS ABOVE

Palstar Wire Antennas

G5RV/E Half Size Economy model. 40 - 10 metres 1kW	£24.95	£3.75 P&P
G5RVF/4 Full Size Economy model. 80 - 10 metres 1kW	£27.95	£3.75 P&P
Windom Full Size 80 - 10 metres 500W	£49.95	£3.75 P&P
Windom Half Size 40 - 10 metres 500W	£59.95	£3.75 P&P

Palstar Power Supplies

PS50 50A 13.8V Supply 13.8V DC 40-50 Amp w/meters	£169.95	£8 P&P
PS30M 30A Variable Voltage 13.8V Variable with meters	£99.00	£8 P&P
PS15 15A 13.8V Supply 13.8V Bench Supply	£59.95	£8 P&P
PS06 6A 13.8V Supply DC cigar socket & short CCT protection	£29.95	£8 P&P
PS04 4A 13.8V Supply 220pf 4kV for Amps & ATU's	£19.95	£8 P&P

Palstar Tuners

AT300 150W Tuner 1.8 - 30MHz W/Balun	£99.95	£8 P&P
AT300LCN 180W Tuner 1.8 - 30MHz X needle mtr w/balun	£139.95	£8 P&P

Palstar Meters & Accessories

WM150 SWR/PWR Meter 1.8 - 150MHz 3kW X Needle	£89.95	£6 P&P
WM150M SWR/PWR Meter 1.8 - 150MHz 3kW X Needle	£79.95	£6 P&P
VC350 Hi Pwr Variable Capacitor 350pf 6kV for Big Amps/ATU's	£69.95	£6 P&P
DL1500 Dummy Load 1.5Kw 50Ω Dummy Load	£59.95	£6 P&P

for the most up-to-date info
NEVADA ONLINE
www.nevada.co.uk

WHILE OTHERS CLOSE DOWN WE HAVE EXPANDED INTO A MASSIVE NEW 11,500 SQ FT WAREHOUSE AND SHOWROOMS. WE GUARANTEE YOU BIGGER

Hotline 023 9231 3090
fax: 023 9237 6565
e-mail: info@nevada.co.uk
• Unit 1• Fitzherbert Spur • Farlington • Portsmouth • PO6 1TT

USE YOUR CREDIT CARD FOR SAME DAY DESPATCH!

ER - BY BEING BETTER!

CHEQUE SPREAD

- NO HASSLE
- NO CATCH
- NO PROBLEM!

Buy the radio of your choice at the best price and pay by three cheques - INTEREST FREE! or part exchange your old radio & pay the balance by CHEQUESPREAD - EASY ISN'T IT!

Price match
CALL -
WE MATCH PRICES ON THE SPOT!
PART EX -
BEST PRICES OFFERED!

LOW LOSS COAX SPECIALS!

SIVA R-H100
Semi airspaced double screened low loss 50 Ω cable

FREQ	LOSS PER 10 METRES LOSS
28MHz	0.20dB
50MHz	0.25dB
100MHz	0.35dB
400MHz	0.82dB

PRICE PER METRE £0.95
100 METRE DRUM CLEARANCE PRICE ~~£95~~ £59 £8 p&p

SIVA RG-213U
Popular low loss 50 Ω cable

FREQ	LOSS PER 10 METRES LOSS
28MHz	0.36dB
50MHz	0.45dB
100MHz	0.67dB
400MHz	1.47dB

PRICE PER METRE £0.73
100 METRE DRUM CLEARANCE PRICE ~~£75~~ £45 £8 p&p

SIVA RG-58CU
Popular lightweight coax cable

FREQ	LOSS PER 10 METRES LOSS
28MHz	0.78dB
50MHz	0.97dB
100MHz	1.4dB
400MHz	3.0dB

PRICE PER METRE £0.38
100 METRE DRUM CLEARANCE PRICE ~~£38~~ £18 £5 p&p

SIVA MINI RG-8
Low loss small diameter cable

FREQ	LOSS PER 10 METRES LOSS
28MHz	0.69dB
50MHz	0.86dB
100MHz	1.28dB
400MHz	2.82dB

PRICE PER METRE £0.45
100 METRE DRUM CLEARANCE PRICE ~~£45~~ £29 £6 p&p

PALSTAR KH-6

- 50 - 54MHz
- 4W RF out (12V) 2W RF out (9V)
- UK Repeater offsets
- Intelligent Power Save circuit
- CTCSS Encode/Decode
- Scan functions • Memory recall
- C/w 8 cell AA battery case (batteries not incl)

~~£159~~ **£99** £8 p&p

NEW LOW PRICE!

OPTIONAL EXTRAS
KH6/BC...Empty Battery Case.....£8.95
KH6/DA...Slide on DC Adaptor.....£7.95
KH6/HF...Flexi Hi-Gain Antenna.....£12.95
KH6/NP...NiCad Battery Pack.....£29.95
KH6/CP...Cigar Adaptor PWR Lead £8.95

YAESU Rotators

G1000C HEAVY DUTY
C/W Control Box & 25 Cable **£559***

G650C MEDIUM DUTY
C/W Control Box & 25 Cable **£499***

G450C LIGHT DUTY
C/W Control Box & 25 Cable **£379***

*£10 p&p on all Yaesu rotators

SGC

PRICE MATCH

SG-230 HF SmartTuner	£329 £8 p&p
500W Mobile Power Amp	~~£849~~ £799 £8 p&p
SG-231 HF-50MHz SmartTuner	£349 £8 p&p
SG-237 HF - 60MHz SmarTuner	£289.95 £8 p&p
SG-237 PCB Unit	£219.95 £8 p&p

YAESU FT-1000MP

LATEST STOCK
STILL THE TOP DX'S CHOICE
£1999 £8 p&p

ICOM IC-756 PRO

NEW! ICOM'S LATEST SUPER RIG

~~£2459~~ **£2099** £8 p&p

YAESU FT-847

70cm - Top Band All Mode

~~£1459~~ **£1349** £8 p&p

YAESU FT-100

NEW! 20cms - Top Band

~~£1259~~ **£999** £8 p&p

ICOM IC-746

100W 160M - 2M

~~£1455~~ **£1395** £8 p&p

ICOM IC-706 MkIIG

100W HF/6 + 50W 2M + 20W 70cms

~~£1135~~ **£989** £8 p&p

YAESU FT-920 AF

100W HF+100W 6M Base

~~£1159~~ **£1249** £8 p&p

KENWOOD TS-570 DGE

Brilliant 100W HF

£899 £8 p&p

KENWOOD TM-707E

Dual Band Mobile Wide RX function

£299 £8 p&p

YAESU FT-90

NEW! Micro-sized Twinbander wide RX inc AM Airband

~~£399~~ **£369** £8 p&p

YAESU FT-8100

Dual band high power mobile + wideband receive

£399 £8 p&p

KENWOOD TM-D700E

NEW! Dual band DATA mobile radio

ITS GOT THE LOT!
£469 £8 p&p

YAESU FT-2600M

NEW! Heavy duty 2 metre mobile - 60W output!

~~£269~~ **£249** £8 p&p

SGC 2020

Portable HF Transceiver

£599 £8 p&p

ICOM IC-R2

- 500kHz -1310MHz
- AM/FM/WFM
- 400 memories • 10dB Attenuation
- Auto Squelch
- Tone Squelch

~~£149.99~~ **£139.90** £6 p&p

AOR AR5000

10kH - 2.6GHz
All mode top class receiver & scanner

~~£1445~~ **£1395** £8 p&p

AOR AR3000A

100kH - 2036MHz - Classic receiver as used by Government, Military etc

~~£799~~ **£749** £8 p&p

YAESU VR500

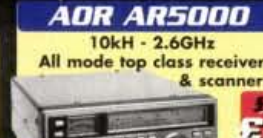
Multi Mode Wideband Scanner

- 100kHz - 1300MHz
- All Modes
- Packed with features!

£299 £8 p&p

ICOM IC-R75

0.03-60MHz Synchro AM Detector



£699 £8 p&p

ICOM IC R8500

Covers 100kHz - 2GHz and lots of features including computer control

£1599 £8 p&p

YAESU FRG-100

Covers 50kHz - 30MHz FM Option + LOTS MORE!

~~£429~~ **£399** £8 p&p

ICOM T81E

6M - 23cm HANDIE
- Ultra Wide RX
- Alphanumeric Display

~~£419~~ **£369** £8 p&p

YAESU VX-5R

50-144-430MHz Wide Band Receiver Ultra Rugged Construction

~~£259~~ **£299** £8 p&p

KENWOOD THD7E

Dual Band HANDIE
Up to 6W Output
Built in TNC!

£299 £8 p&p

GER STOCKS, BETTER SERVICE, FASTER DELIVERIES THAN EVER BEFORE!

CHEQUE SPREAD

IT'S EASY TO PAY!

- by three post dated cheques
minimum order: £99

- Simply divide the price (including carriage) into 3 equal payments.
- Write 3 cheques dated in consecutive months starting with today's date.
- Write your telephone number, cheque card No & expiry date on the back of each cheque.
- Post them to us, enclosing your name & address & we will (subject to status) send your goods immediately.

"From Pirates to Penitents"...

Post War Amateur Radio Memories

Steve Mahony VK5AIM has some memories which he feels that the readers of *Practical Wireless* will enjoy reading about - perhaps they ring a bell with you? Join him as he looks back on how Amateur Radio was enjoyed by the masses after the end of the Second World War when surplus equipment and surplus skills gave rise to a new breed of 'pirate'!

After the Second World War, once the amateurs were allowed to go back on the air again, there were many who possessed the skills and knowledge, that could be put to good use in the Amateur Radio hobby. There was also plenty of equipment available which was suitable for modification for use on the amateur bands on the disposals market - one of these was the SCR-522, a v.h.f. a.m. transceiver once used in aircraft communications.

The SCR-522 covered the 144MHz band and many of the amateurs had gained experience with it whilst in the services and knew how to modify them for the amateur bands. They put out about 10W of amplitude modulation (a.m.).

Once things settled down, the Australian amateurs were allocated some new v.h.f./u.h.f. bands. One of these was the 288MHz band - harmonically related to the 144MHz band. This 288MHz band was known as 1m.

It was this new 288MHz band that encouraged many new young amateurs to start up the hobby. With plenty of military surplus equipment still available, it was easy to modify or build new gear for this band.

I can still remember seeing the first 288MHz amateur station in about 1948/49. The availability of disposals equipment and the enthusiasm of the new breed of up and coming amateurs, along with the inability of the post office authorities to police the spectrum only encouraged the "pirates" on this band (as we didn't have TV or f.m. in Australia then, they weren't hurting anyone). The station I saw in 1948 was one of these.

The author himself, Steve Mahony VK5AIM at a JOTA station portable at a Girl Guide camp, 'Wongalere', in the Barossa ranges, in the famed Barossa wine growing area of Australia.

Similar Opportunities In UK?

Did the UK amateurs have similar opportunities, or were the authorities too strict? The pirate transmitter I spoke about consisted of a three foot plank of flooring board. There was a metal bracket which had two sockets with valves parallel to the board which was mounted at about the half-way point.

The valves were octal based 7193 triodes, which were true v.h.f. types as they had their anodes and grids brought out as top caps. On seeing them many years later my wife said that they looked like little 'Daleks'.

From the anodes there were two quarter inch copper tube lines about 610mm long. These were joined where the h.t. (about 250V) was supplied and there was a small shorting clip/clamp which could be adjusted for tuning.

The cathode pins of the sockets had similar copper lines with the heaters/filaments fed down through the copper tube. The grids were joined and went to earth via a resistor, the value of which I have long forgotten. If you were real keen you could have a meter shunt resistor to measure grid current!

The r.f. was taken off the anode lines with a long loop of about enamelled wire, about 1.6mm diameter, to the antenna system via open wire line. It was nothing more than a tuned cathode/tuned anode oscillator which was amplitude modulated via the h.t. by a couple of 6V6s, a driver valve and a carbon microphone.

If I remember correctly, you could manage about 5W of r.f. if you didn't push it too hard and blow up the valves - a blue glow around the plates was a sign of modulation. Another display was to hold a 40W flouro-tube along the "Lecher lines", as they were known, and see it light up with modulation - always impressed the visitors!

The receiver was a "super-regenerative" receiver, again using tuned lines and 150mm of quarter inch copper tube. This was shorted at one end but with a small split stator or butterfly capacitor connected across the lines for tuning. The valve was an 955 Acorn type - an American valve designed for v.h.f./u.h.f.

As the element connections came out from the side of the acorn shaped envelope, a special ceramic, doughnut-like socket was required and it had small clips to allow the valve pins to clip into. Again it always impressed the visitors!

The audio was taken off via a plate to grid audio transformer, to a 6J7 and a 6V6 to drive a speaker. The regeneration was controlled by varying the

STEVE VK5AIM EXPLAINS HOW AI

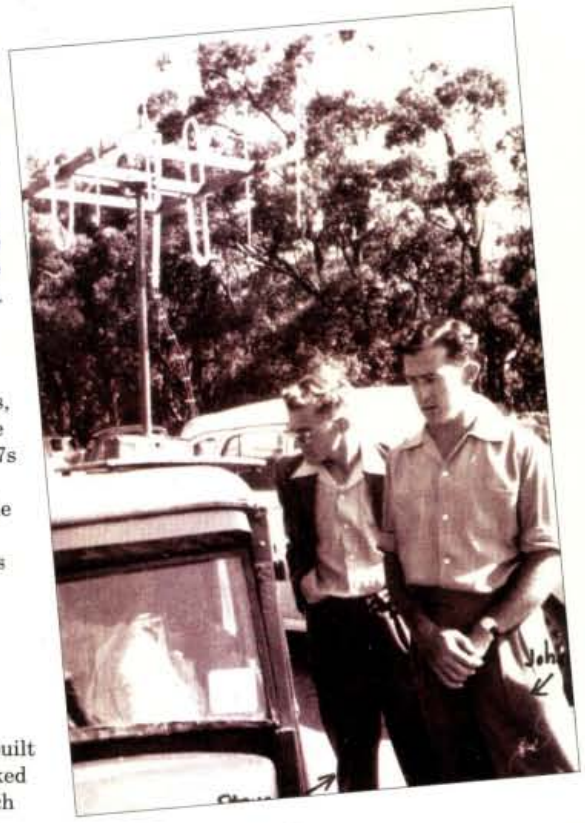


Fig. 1: Some 288MHz activity in VK5 in the 1950s caught on camera! The author, Steve Mahony VK5AIM (the fair haired man, middle) along with his partner in crime, the late John VK5JQ, with a licensed amateur operating the portable from Mount Lofty summit - the highest point on the ranges close to Adelaide. They're working some 80 miles - yes we had miles in those days - to another station at Kulpurra - located at the top of Yorke Peninsula, a site close to a range of hills called the Hummocks, where there's now a 144MHz repeater with marvellous coverage.

voltage to the plate of the 955 via a voltage divider potentiometer on the front panel. Too much voltage and the super-regenerative radiated enough to be heard miles away!

Antennas Used

The antennas used were mainly multi-dipole collinears with chicken wire reflectors, fed with a home-made open wire line - 300Ω ribbon hadn't come to Australia yet. I can well remember making my own open wire line, drilling little holes in perspex strip (plenty of that available via disposals), cutting it up into little spacers and patiently threading it onto a pair of wires to make nine metres of open wire line.

Later on in the 1950s, the multi-element Yagi type antenna became popular. It is interesting that this antenna wasn't popular with the Americans until much later, as it was invented by the two Japanese, namely Uda and Yagi!

In the early 1950s, I was an Electrical Apprentice and because of this I had more pocket money. As a result, I soon had my very own "Pirate" 288MHz station and allocated myself the callsign: 'VK5ZS'.

My station was a big improvement over the flooring board transmitter I first saw. It was all built on a metal chassis and in a rack type cabinet and I had a crystal microphone, antenna changeover relays, with open wire line feeding a pair of bayed 6-element Yagis. (This could be rotated with a rotator made from windscreen wiper motor and direction indicated by 12 switched torch globes)!

With the availability of the little 6J6 twin triode and other small valves like the 6AU6 and 6AQ5, small, portable transceivers running from vibrator supplies from 6V car batteries and portable and mobile operation was made possible. Surprising distances were covered with such equipment and we were just beginning to understand ducting and over the horizon contacts!

Stations Similar

There were many stations similar to mine throughout Australia. Each state, i.e. VK1, VK2, VK3, VK4, VK5, VK6, VK7 and bigger towns and cities had their groups - some licensed, some pirates. They would all talk to each other (although the law stated that the licensed were not legally able to communicate with the pirates)!

Some of the licensed operators added amplifiers to the oscillators, modulated these with 6L6s or 807s and with 20W started to see the possibilities of v.h.f. DX! Others tried crystal control with strings of multipliers.

Super-heterodyne receivers were built with crystal locked converters, which were OK for the crystal type transmitters, but no good for the modulated oscillators. We all knew that 288MHz was a lost cause with the coming of TV.

I also believe that this pirate operation was the reason that Australia eventually got the 'no code' limited type licence, with operation only on 50MHz and above. We also lost part of 50MHz band for many years.

The allocation of 52-54MHz, well outside the international allocation, prevented 50MHz (6m) DX. Many a Radio Amateur abandoned 50MHz because of the TVI trouble with adjacent low band TV channels.

Pirate operation all came to a quick end with the advent of TV in Australia in about 1957 as the frequency was right in the middle of the TV band. There weren't a lot of "prosecutions" of pirates by the Post Office during those years - as long as you behaved yourself.

I had a visit from a Radio Inspector once, but my good Mum showed him the wrong bedroom! If you did get caught the Inspector usually stood by and watched you dig a big hole in the back garden and bury the offending transmitter along with plenty of water to ensure that it wouldn't work if resurrected!

A pat on the shoulder and the comment: "How about sitting for the next exam, if you can build all that gear you should have no trouble with the theory". The Morse test was, however, up to you.

I believe that many of the pirates of those days, with their practical grounding in radio, became the technicians, servicemen and electronic engineers of the 1960s and 1970s. They, like me, are ready to retire or have already retired and are once again enjoying Amateur Radio.

PW

MATEUR RADIO WAS ENJOYED DOWN UNDER AFTER THE SECOND WORLD WAR

An Experimental Ferrite R

Richard Marris G2BZQ

describes his experiments of pushing out a transmission on 3.5MHz using ferrite rods to reduce the size of the antenna.

Ferrite rod loop antennas, or 'loopsticks', found in many domestic radios, first appeared about five decades ago. Like all 'new' inventions presented to the public, they were initially endowed with a certain amount of 'mystique'. In the 1950s, a friend of mine purchased a new, expensive, all-valve domestic radio, in its glossy polished wood cabinet and fitted with such an internal antenna. A few weeks later it was badly damaged in a domestic fire and the remains were given to me to salvage any surviving useful components.

The ferrite rod/coil assembly, fitted with medium and longwave coils, had survived. Between the main coils was a third winding used for connecting the radio to an external antenna and ground. On connecting this new 'antenna', with a 500pF variable capacitor in parallel with the m.w. winding to my own receiver, I heard radio stations from all over Europe. Soon, after removing a few turns until it resonated over the 160m (1.8MHz) band, 'Top-Band' c.w. signals were received from many European countries.

I started a series of ongoing experiments and investigations into ferrite receiving antennas from v.l.f. to v.h.f. Transmitting experiments were carried out and useful practical and conclusions arrived at. It has always seemed logical that any antenna which gave good results on 'receive' could be 'persuaded' to radiate power from a transmitter and, in most cases, this is true. It soon became obvious that life would not be as simple as that!

Obviously over more than 45 years, the ferrite antenna was being investigated elsewhere and rumours were heard to that effect, but very little has ever been published on the subject. A few mentions appeared in issues of the *ARRL Antenna Book*, but there was no mention of an IEE paper by De Vore & Bohley (1972) entitled '*The Electrically Small Magnetically Loaded Multi-turn Loop Antenna*'.

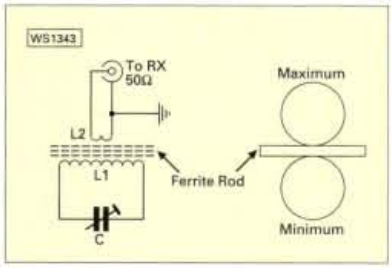


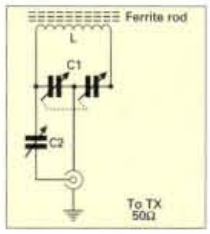
Fig. 1: A tuned ferrite rod antenna circuit suitable to feed into the 50Ω input of a modern receiver. (It has problems on transmit).

I obtained a copy of the IEE paper in February 1992, by which time my practical experiments had already been proceeding over many years. Experiments that were largely by trial and error methods and common-sense, but not supported by extensive laboratory equipment.

Over the years, ferrite rods have improved and have been made available in alternative dimensions. A variety of ferrite materials now exist which can be used in receiving loop antennas in excess of 200MHz. Of the variety of ferrite rod materials now available, only two types really concern the enthusiast for use in ferrite loops. These are Manganese Zinc materials which are, in general, used for antenna rods from v.l.f. to maybe 1000kHz. For higher frequency work, there are Nickel Zinc materials which can be used on l.f., h.f., v.h.f. and up to around 200MHz depending on the mixture.

However, there is a considerable overlap between various mixtures, to the point where performance gradually falls off. Also, to make life a little more difficult, or maybe easier, the rod characteristics appear to change considerably, when used for transmission purposes.

Therefore, for ferrite transmitting antenna experiments, I have mainly used Amidon Type-61 rods 190×12mm (7.5×0.5in) rods, which are readily available from Amidon. An alternative has been the MMG types F14 or F16 rods, which are more difficult to come by in small quantities.



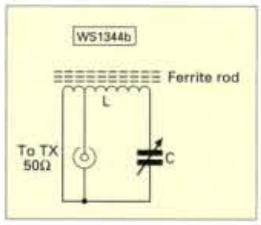


Fig. 2: Two variations of matching used by G2BZQ to try to overcome the inadequacies of the circuit of Fig. 1.

Practical Approach

On a more practical approach the immediate problem is to find a method of coupling the r.f. power to the ferrite loop. Or, more precisely, how to feed the TX power into the loop *and* persuade it to radiate over acceptable distances. The most serious problem is core saturation. As power fed into the loop gradually increases, a point will be suddenly reached where the whole thing appears to go haywire! This appears as heating up of the ferrite core, a sudden fall-off of radiated output, instability, harmonic generation and so on.

The saturation problem can be overcome to a large extent, by using a very long rod (or rods end-to-end) or a bunch of rods side-by-side. Either method will increase the sensitivity on receive and increased radiated power.

The conventional circuit used for an external receiving ferrite loop antenna is shown in **Fig. 1**. Attempts to load this on transmit, have always been disappointing. Modifications, as shown in **Fig. 2** circuits, have proved to be successful. Fig. 2b is the preferred type because it is quite simple to match by tapping the coaxial feed line along the coil. Also, when using long rods, it is much easier to construct and the extra capacitor, C2, in Fig. 2a, is eliminated, resulting in a simpler operation.

The presented antenna design, is a modified and easier to match version of Fig. 2b, as shown in **Fig. 3**. It consists of a coil L1 wound on a 380 (or 410)mm long Nickel-Zinc ferrite rod (61 material). Resonated at one end by C1, it has a simple matching/loading coil, L2, at the other end of L1. The low impedance coaxial feed line is tapped up L2 **until maximum radiated power has been achieved** (see later).

A Neon (NE2) is tapped onto L1 with one lead only and acts as a crude but effective keying monitor as an early warning if the unexpected happens. The whole antenna assembly is mounted on a copper base plate. It is important that C1 and the coaxial socket are mounted exactly as shown in the longitudinal line of L1, coinciding with the directional null on the radiation meter.

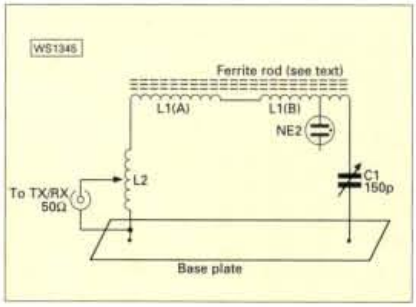


Fig. 3: The circuit of the more effective antenna matching and loading circuit.

Profile, Layout and Construction

The antenna layout is shown in **Fig. 4**. It consists of a 25mm thick hardwood baseboard onto which is glued and screwed, a piece of 410×100mm single sided copper board. Onto this is fitted a 'T' coil form assembly made from white pvc tubing. The rod is held securely in the tubing with thin card packing (**Fig. 4a**). This enables the rod to be easily removed for use in other projects and also to try other rod material types if/when they become available.

On the right hand end, C1 is mounted and fitted with a 3 inch diameter instrument knob and insulated shaft coupler. At

od Transmitting Antenna

RICHARD MARRIS G2BZO DESCRIBES HIS EXPERIMENTS WITH FERRITE RODS

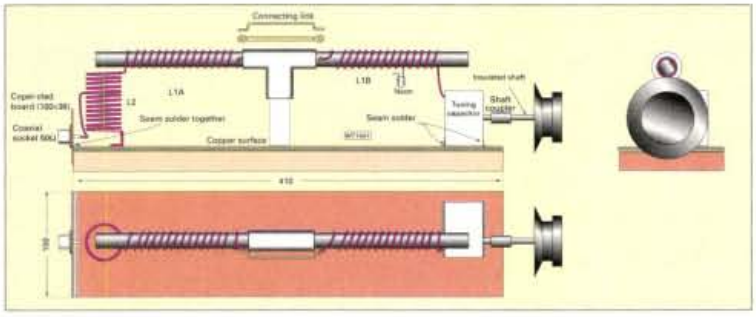


Fig. 4: The physical layout of the circuit shown in Fig. 3:

the 'feed' end is screwed a small vertical piece of copper clad board onto which the coaxial socket is fitted. This small board should be seam soldered to the base plate copper surface.

C1 is a 150pF variable capacitor and must be of highest quality, preferably with wide spacing and ceramic insulation. In the prototype an older Jackson type 'E' was used, being fitted with mounted feet screwed and soldered to the base plate copper clad board. Any other good quality variable will do and can, if necessary, be mounted on a small piece of copper clad board screwed onto the baseboard vertically and seam soldered to the copper clad base plate.

L1 is made in two parts, L1A and L1B in series with a connecting link as shown. Each consists of fourteen and three quarter turns of 1.63mm (16s.w.g.) tinned copper wire spaced to 6mm per turn. The left hand end of L1B drops down and is soldered to the top end of L2, the other end of which is soldered to the copper clad base plate.

L2 is an airspaced self-supporting coil (25mm diameter) consisting of 13 turns of 1.63mm tinned copper wire wound to cover a length of about 55mm. The 'tails' are about 30mm , one tail is soldered to the copper plate the other to L1A. On the prototype the 50Ω impedance tap (to coaxial socket) is soldered at 8 turns from the bottom of the coil and this is a good start point.

The shortest possible length (do not exceed 3m) of RG58 coaxial line connects the antenna to the transceiver. **It is essential that all connections are securely soldered and no reliance placed on mechanical connections**.

Testing & Setup

A simple r.f. radiation monitor will be required and a simple circuit is shown in **Fig. 5**. It can be built into a small plastic box with a pick-up whip of about 150mm. As shown, it will suffice for a 10W r.f. output. Sensitivity, for other powers, can be changed by a different length whip and/or changing the value of resistor. A small Neon lamp is soldered to the fifth turn from the end of L1B to act as a simple keying monitor. The tapping point is not critical.

For initial operating tests, I used separate transmitter and receiver. I matched the transmitter into a 50Ω load at the selected frequency. With the receiver tuned to the same frequency, the variable capacitor, C1 (loop tune) should be adjusted to maximise the transmitter's signal on the receiver. Power from the transmitter may now be applied to the loop and the capacitor, C1, adjusted again as necessary. The antenna is essentially a low power device used with an 80m 10W output c.w. transmitter. It should be satisfactory up to about 20W before saturation occurs.

If you have a combined transmitter/receiver, then adjust C1 on the loop for maximum noise, before trying a low power transmission. Adjust C1 for maximum radiated power indicated on the radiation monitor (placed about 300mm from L1). The Neon should be illuminated. **Readjust the variable capacitor on the loop, C1, minutely, to secure maximum radiated signal).**

On receive, the loop should be checked between 3500 and 4000kHz by tuning to several signals over the band. Rotate the loop slowly through 90° horizontally to check the field pattern. A small turntable would be an advantage. The radiation monitor should now be placed 500 to 600mm away from the loop.

On the prototype (on transmit) the bandwidth seemed to be approximately 15kHz before there was any indicated drop off in meter reading on the radiation monitor. In practice, this is the maximum usable bandwidth before minor adjustments to the loop tuning capacitor are needed. Although somewhat different from the usual tuning procedure, it will quickly become routine with a little practice.

In the event of loading problems, the tap on L2 should be moved down a half turn at a time. The loop should be mounted on a wood table within reach of the operator's hand for retuning, but it should be well away from a.c. mains wiring.

A careful check during transmission, has shown no measurable harmonic radiation and no interference to a nearby TV using a set-top antenna. On receive, the directional properties of the antenna can give a dramatic reduction in QRM/QRN.

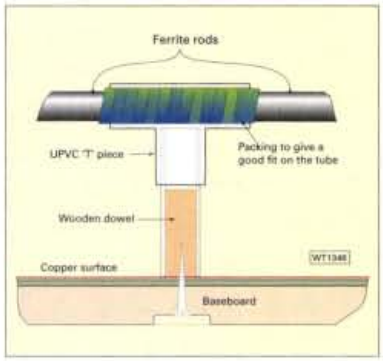


Fig. 4a: More detail of the 'T' piece support shown in Fig. 4.

My Conclusion

In conclusion, as practically nothing appears to have been published on the subject of ferrite transmitting loops the following are my own findings and summary.

The device fulfils the criteria for all transmitting antennas - it can be loaded by a TX and radiates the TX signal. It's relatively simple to make can be loaded and radiate a substantial r.f. component. It should be considered to be a low power table top device and anyone making it should, initially, restrict the output power to 10W, until experience has been gained. It has been used on 3.5MHz c.w. and performs in an encouraging way. Single side-band (s.s.b.) has not been used.

'On air' results have been somewhat confusing and spasmodic, often not repeatable. The loop has sometimes been 'switched in' without warning during early morning c.w. QSOs with a friend in Germany. Sometimes he hasn't noticed any change in signal, sometimes the signal has disappeared. So far QSOs haven't been made with UK stations - the only QSOs achieved being with European stations. Why? (I don't know!).

From the above it will be seen that there is much work to be done to perfect ferrite loop designs. It is therefore hoped that others will experiment with new ideas and eventually publish their results and ideas. The same applies, of course, to those amateurs who have already been conducting experiments. So, go to it! *PW*

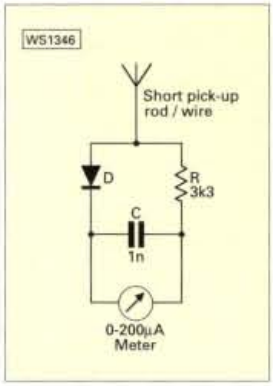


Fig. 5: The circuit of a small r.f. meter suitable for close field work.

Useful addresses

Amidon Associates Inc: PO Box 25867, Santa Anna, CA92799, USA.
MMG (North America): 126 Pennsylvania Ave, NJ07503, USA.
MMG (England): Icknield Way (West), Letchworth, Herts SG6 4AS.

Attention all Radio Amateurs in these areas...

Fastnet, Lundy & Irish Sea

Are you a Radio Amateur who has to deal with bad weather and fed up with constantly having to repair your antennas? If so, then Patrick Allely could save you a lot of wasted time and hence leave you more time to make those contacts!

Do you ever listen to the shipping forecast? Do you know or care where - or what - Fastnet is and were you at all surprised when a high wind caused some amount of damage to your precious antenna system. Which also caused further damage when it landed in a neighbour's garden and, coincidentally, that same neighbour who was already upset about the metal you had in the air.

The author, Patrick Allely GW3KJW.

In the gentle airs, antennas can be erected with safety as long as certain precautions are taken. Such things as guy lines, heavy duty alloy and self-amalgamating tape should be at hand. Above all, a recent check of the weather forecast for the immediate area should be sought - and that's just in the period between May and September.

For those of us who live in western Britain and who like to indulge in Amateur Radio from the rarer squares, precautions are highly desirable. For instance, I live on a peninsula on a ridge of a hill at 213m, with the sea on three sides of me (which is, at the closest, about one and a half kilometres away - see **Fig. 1**).

Superb VHF Location!

As a v.h.f. location, my home is superb - the next parish to the west is Wicklow (in Ireland!) and I have an 80km sea path to the south east. On h.f. it's just as good, there's nothing between me and the Falkland Islands but sea, however the location does catch the wind.

As I write, this house is being buffeted by a gale force wind with gusts exceeding 50 knots and this weather has been going on for nearly two weeks! Although the wind speed has reduced from severe gale with gusts of 80 knots.

The windows of my house are coated with salt from spray carried by the wind from the sea. Imagine what this salt coating is doing to the aluminium elements of my antennas and what's probably happening to all the coaxial connections associated with the antenna system!

I have a steel telescopic tilt-over mast concreted into my back garden which, when fully extended, is ten metres high. On this is bolted a rotator and above this is a 1.5m length of alloy tubing.

Just above the rotator is a 3-element mono band Yagi for 28MHz and above this, at the top of the tubing, is a 5λ/8 collinear for 144MHz. Below the rotator is a G5RV antenna made from flexi-weave and heavy duty 300Ω line - this antenna is brought down either side of the mast as an inverted 'V'. This system is the one which I have refined over the years and the one which I think is most likely to last longest.

My present collinear is the second one which I've used - the first one was not up to the job. I found this out when I awoke one morning, looked at the mast and saw that the vertical was now horizontal! The wind had actually bent the alloy through 90° just above the base of the antenna and the wind hadn't even been exceptionally fierce that night!

A heavier duty collinear was acquired (my present one) and before erecting, I placed a 12.7mm jubilee clip at the appropriate spot, sealed it with self-amalgamating tape and hoped for the best. Some years later I found that this joint was loose. (See **Fig. 2**).

Further examination showed that the two self-tapping screws holding the alloy tubing to the base had worn away - the alloy was white with aluminium oxide. This was all well-made and has so far survived.

Original G5RV Antenna

The original G5RV antenna I used was made with solid copper wire and lightweight 300Ω ribbon. Now, a strange thing occurred with my first G5RV - the ribbon disintegrated after a while, nothing to do with the wind or the rain, just ultra-violet radiation. There's relatively no air pollution where I live and

Fig. 1 Patrick Allely GW3KJW's "superb" v.h.f. location which, although good for v.h.f. and h.f. contacts, is nevertheless very exposed to all the bad weather.

cheap plastic objects such as watering cans tend to fall apart after a short time in the sunlight.

The replacement G5RV I had (a proprietary brand with 'unbreakable' flexi-weave), had much better ribbon but salt air has a strong effect on woven copper which, over the course of my hobby, I've found out. I've had to repair various breaks in the flexi-weave from time-to-time.

After six months in the air, my 3-element beam antenna was checked. Even though it was fitted with spring lock washers and stainless steel nuts, some of the sections had been shaken loose by the action of the wind but luckily no damage had been caused.

Precautions Taken

Now, what precautions can be taken to preserve the antennas I so heartlessly exposed to the balmy Welsh climate? Starting again at the top, the collinear is sealed at every joint with the ubiquitous self-amalgamating tape. Jubilee clips have been placed over every self tapped joint as extra strength and again sealed.

The feed point is totally waterproof so I didn't have water problems in the coaxial feed and the feed-line itself is held to the mast by cable ties. I have found that these last longer than simply binding with insulation tape and can be quickly and neatly cut away when making repairs or adjustments.

Fig. 3: It's hard to believe, looking at this picture, that Patrick GW3KJW's home sees so much bad weather isn't it?

The beam is checked regularly, every nut and bolt is secured then covered with a thin layer of grease. The feed point socket is protected with silicon grease and when connected to the feed line, the whole joint is then sealed.

Again the feed-line is cable clipped to the mast remembering to make a great loop in order that the antenna may rotate without the feed lines tightening up around the rotator. (I learnt the hard way).

My G5RV antenna is protected at the top end by silicon sealant and at the junction of the 300Ω ribbon and the 50Ω coaxial, the connector is again sealed with tape. The ribbon is strained against a support to prevent it whipping about the wind.

The shack end of the three coaxial feed lines are regularly checked to ensure that no moisture has got into them, for there's nothing worse than a torrent of water flowing out of a coaxial lead and a surprising amount of water can be found in a 20m length of cable.

I've found that with this set-up and the mast fully extended, the antenna system will ride out wind speed gusts up to 30 knots quite happily. The mast, although self supporting, has four guys at five metres and another four at roughly ten metres. Again, the nylon lines have to be regularly checked as, being plastic, they are corroded by ultra-violet radiation.

Should the wind speed exceed 30 knots for a short while, I lower the mast to half height, but ensure that the 3-element beam has its boom sideways on to the wind. This gives much less wind resistance than the other way round.

Wind Forecast

Should the wind forecast be such that an average wind speed in excess of 35 knots is expected, then I lower the whole system down to ground level, forget about Amateur Radio and sleep content that even though the roof tiles may fly away, they won't be joined by any of my antennas. An average wind speed of 35 knots means gusts exceeding 70 knots and that's not nice.

On the morning of Christmas Eve 1997, I was surprised to make contact with a W6 in California on 7MHz at 1100UTC . That was the last Amateur Radio contact I had for a week as that same afternoon a storm force gale hit the western side of Britain and at 1630UTC we were expecting gusts of up to 112 knots!

Fig. 2: The second (and present) collinear, built and used by Patrick GW3KJW at his home in north Wales. You can also see the second G5RV antenna used by Patrick.

A barn in the field at the rear of my property virtually exploded with 20ft long balks of timber flying through the air accompanied by various lengths of galvanised iron roofing, most of which ended up some around 200m down wind. A nearby static caravan was blown out of a field into a lane and totally destroyed, whilst another one was blown out over the sea.

My antenna system survived intact - why? Well, it survived because it was already down, not only that, it was tied down. It was a case of getting back to 'Fastnet, Lundy and Irish Sea'.

Back To Fastnet ...

So, let's get back to 'Fastnet, Lundy and Irish Sea'. Every day, BBC radio gives out the shipping forecast with interesting details such as barometric pressure, visibility and wind speeds. Whenever I hear the words 'gale', 'strong gale' and 'storm force' I become particularly interested.

If these words apply to Fisher, German Bight and North Sea I relax, but 'Fastnet, Lundy and Irish Sea' have a galvanising effect on me. The next point of worry is the TV weather forecasts. The BBC, again, gives more details, showing the lines of barometric pressure and whenever I see the menacing dart boards travelling across the Atlantic and heading my way I tend to pay close attention to what is being displayed.

Although the presenters do have an annoying habit of standing to the left of the display pointing vaguely in the direction of England and unwittingly hiding the 'nasties' with their backs, I do my best to judge the weather and wind direction. In this manner I can decide whether it's necessary to lower the antennas to half-height or to bring them down totally. It's very bracing living near 'Fastnet, Lundy and Irish Sea'! PW

ndS.co.uk ● e-mail: sales@MLandS.co.uk

://www.HAMRADIO.CO.UK" www.HAMRADIO.CO.UK.

returns. So there. Full UK manufacturers warranty with all items sold.

am Radio...

ML&S

MARTIN LYNCH & SONS

140-142 NORTHFIELD AVENUE,
EALING, LONDON W13 9SB

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

Kenwood TM-D700E

At last! Stock! Apologies for the delay. You know what these distributors are like. For full details of the first part of the Kenwood new range for 2000, see our web site or call for a brochure.

RRP. £529 ML&S £469
AND PAY US IN AUGUST, INTEREST FREE.

TS-870S

It started the DSP trend going and is still one of the finest HF transceivers available today. Reliability? Once again, Kenwood set the rules here.

RRP £1999 ML&S £1499 WITH NOWT TO PAY FOR SIX WHOLE MONTHS, INTEREST FREE.

Kenwood TS-570DGE

If all HF transceivers were as reliable as the TS-570 then we would probably close our workshops. An excellent DSP HF Transceiver with Auto ATU.

RRP £999 ML&S £899 WITH NOTHING TO PAY UNTIL AUGUST 2000,
INTEREST FREE.

Yaesu Corner

YAESU FT1000MP/AC
RRP £2499 **ML&S £1999,**
nothing until August interest free.

YAESU FT-920AF
RRP £1499 **ML&S £1249**

YAESU FT-847
RRP £1699 **ML&S £1229**

YAESU FT-100
RRP £1249 **ML&S CALL!**

YAESU FT-90
RRP £419 **ML&S £325**

YAESU VX-5R
RRP £359 **ML&S £299**

STOP PRESS
The main range of Waters & Stanton 'catalogue' items now available from stock

- MFJ
- WATSON
- CUSHCRAFT
- TONNA
- AVAIR
- DIAMOND
- RADIOWORKS
- SGC
- SSB ELECTRONICS
- SAMLEX
- ADONIS
- AMERITRON
- HIMOUND

Call or see the web site for listings

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

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

...How LOW can we go?!

CALL: 0208 566 1120

EWHERE GIVE US A CALL

ELECTRONICS IN ACTION

Hello and welcome to the April 2000 Electronics-in-Action (EiA) column. This month, again I have no books for you due to space limitations. However, this time you'll find my proposals for the future projects I hope to bring you, a review of the Kanga MB4 receiver kit and a discussion about rechargeable batteries and their chargers. And finally, there's an offer to save you money on a set of four Pure Energy rechargeable batteries and charger.

As I mentioned in the introduction I have been considering some projects that I could show you. And the first is one that I've had in mind for some time and actually follows on from the discussion about ripple-current ratings for capacitors that I discussed in the February column. I've had an E-mail from **John Marter**, who asked about a simple power supply suitable for a complete beginner or novice enthusiast.

John went on to suggest variable output and meters showing both output voltage and current. Consider it about to be done John, I actually had it in mind anyhow, having been asked by a non-technical friend to look at his p.s.u. that he bought at a car boot sale. (I should hopefully start that in the next issue of the column. Another project, although somewhat further in the future should be a simple - yet effective h.f. spectrum analyser. So, watch this space. But first that receiver kit from Kanga.

Pouched radio

A regenerative radio based on a design by **Keith Ranger G0KJK**, originally published in *Sprat* (the magazine of the G-QRP Club), the Kanga MD4 is a small four-transistor radio covering approximately 3.4-7.5MHz. The radio features an adjustable regeneration control that allows the reception of a.m., s.s.b. and Morse transmissions over the complete reception range.

The full kit to build costs just under £20, is extremely well presented and has an excellent set of instructions included. The description of the workings of the MB4 are on one A4-sized sheet of paper with a well presented and drawn circuit diagram on another sheet. The description and diagram are both easy to follow although, a degree of knowledge will be needed to completely understand the circuit.

The building instructions for the Kanga MB4 radio consist of a 24 page A5 sized booklet , which consists of a description and accompanying drawings presented on each open double page spread. There are 10 'stages' to completing the MB4 radio in a logical set of steps, each with its own labelled sealed polythene bag containing all the parts needed at that stage. So, let me look at those steps in a little more detail.

Stage One

Stage one consists of putting the stand-off pillars on the board. Interestingly, the suggestion given is to put the stand-offs on 'wrong-way' up to facilitate easier construction during the next few stages. Also stage one deals with putting the solder pins into the correct holes on the p.c.b. On the right-hand page are three drawings to help identify the correct holes for the pins, how to put the stand-off pillars on the board and how to solder the pins correctly to the board.

Stage two consists of putting all the fixed value resistors into the correct places on the p.c.b. Again there are two drawings on the right-hand page showing both locations and techniques to be used. All the required resistors are identified by both value and colour coding, making them a little easier to identify for those less sure of colour coding.

I'll deal with the next two stages together, although they are separate in the manual. Stages three and four consist of fitting all capacitors, both electrolytic (stage 4) and all other capacitors (Stage 3). Again all components are identified by value and marking, but you might need a good magnifying glass at this stage, as some of the markings are very small, as are the components themselves.

Stage Five

Stage five involves fitting a rather unusual component, in the form of a small audio transformer and the 3.5mm stereo audio jack socket. As with previous stages, the components to be fitted are shown on a full-sized drawing of the p.c.b. as it should look at that stage, with the actual components added at that stage having a bold outline.

Stage six is the section that will cause many people the most difficulty I would imagine. This stage deals with winding the toriodal r.f. transformer. But, by carefully following the description and the ten drawings on the right-hand page, it should be possible to complete this section in an hour or less depending on the nimbleness of finger and the manipulative skills the builder possesses. Its imperative for the working of the radio that the transformer is created exactly as described!

Now we come to stages seven and eight of the construction, fitting the variable resistors and fitting and soldering the front board to the p.c.b. This was quite simple to complete but accuracy is needed to make fitting the pre-drilled font-panel an easy task. I have to be honest, in that I felt that these two stages should logically follow stage nine, as I feel that this made the present stage nine easier to complete.

Stage nine consists of fitting all semiconductors to the p.c.b. Once again two drawings illustrate the method of fitting and the location and orientation of the required components. Simple to follow instructions make this stage almost foolproof. It's this stage that I feel might be easier to complete, if carried out before the two previous stages. I found that trying to place the Zener diode D2 and transistor TR2 and the varicap diode D1 could have been easier if fitting the variable controls had been left to last.

Other than my personal preference for the order of putting all the components on the p.c.b., the booklet was easy to follow, was well laid out, and made the task of assembling the Kanga MD4 radio both easy and problem free. As you 'move' through the stages all the p.c.b. diagrams show what components should be on the board at this stage. Well thought out in my opinion!

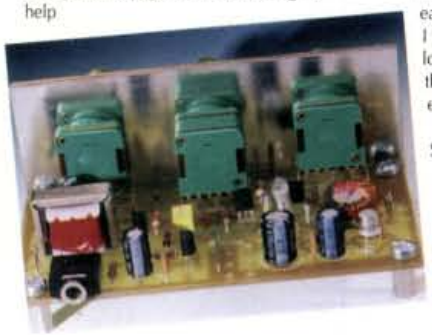
Now for the real test. How does it work? Well, after fitting the supplied 4m antenna wire and connecting a nine volt battery (there's no switch by the way - as it relies merely on disconnecting the battery to remove power), what was the reception like? Again, following the section in the handbook about using the MB4 I found that I could receive both broadcast and amateur transmissions over the range covered by the radio.

I found that occasionally the reaction control could be a little 'savage' at times, needing careful adjustment for best operation. The amount of regeneration varies over the the frequency range, which is understandable. It wasn't possible to leave the control at one position and tune through the range, although when tuning around one part of the band only minimal adjustment of the reaction control was needed.

Conclusions

The Kanga MB4 receiver is a splendid kit and would be suitable for any level of constructor, although absolute beginners might need an 'Elmer' to answer questions at times. With a cost of only £19.95 the kit is well presented, with the stage components bagged together and marked with the stage number. The set also worked straight from the construction bench after following the instructions so this is a good selling point for individual constructors.

Finally should the built MB4 not work immediately, there's a short troubleshooting guide as well as more information for experimenters on the final pages of the handbook. All in all, a nice kit, well presented that works well as supplied. Well done Kanga!



Needing just the battery lead to be fitted to complete the Kanga MB4 kit. A nice clean well laid out kit.

Looking at the front panel of the completed Kanga MB4 receiver.

Stages one to five completed as shown here.

WHAT'S THAT RECHARGEABLE BATTERY?

Rechargeable batteries are to be found in our radio equipment and other portable gear, but how much do you understand about the various type of rechargeable batteries that are found in our rigs. **Colin Debnam**, a director of **Allied Battery Technologies**, wrote in to *PW* to give a simple overview of the various rechargeable batteries available, and to give a warning about not mixing chargers for the different types of battery.

Portable power has been a necessity for mobile communications equipment for well over 60 years and embraced all known battery technologies from wet lead-acid accumulators, various single-use 'dry' batteries to the latest Lithium Ion cells.

The manufacturers and designers of batteries have all been striving for a common end result, which is a small powerful, rechargeable high capacity system which is affordable. The question now is, have these aims been met? The answer is **not yet** - but we are getting there, slowly. Current technologies (forgive the pun!) in use with rechargeable battery systems include the following:

The latest in rechargeable batteries - they have a terminal voltage of 1.5V and so need a

Lead-Acid

In the rechargeable field the lead-acid battery is still with us in a much improved form, with products which require no regular maintenance other than charging. The main problem with this type of product is the size and weight. Nevertheless, it works well with a very high reliability, provided that the user remembers to recharge regularly, even when the battery is not being used. This recharging, from a constant voltage source of around 2.25V per cell, prevents internal degradation of the plates.

Nickel Cadmium

The Nickel Cadmium (NiCad) battery has long been a trusty workhorse and is much loved by all users who treat them with a certain amount of respect. The NiCad has proved to be the ideal power source for cordless power tools because of its ability to deliver high current and long cycle life (1000 full charge/discharge cycles). Using cheap constant current chargers is simple and the option of fast charge in less than an hour is now commonplace.

There is though a dark cloud on the horizon for the NiCad which is the disposal of the spent batteries because of the environmental problems associated with the metal Cadmium. Cadmium, a very heavy toxic metal, forms the negative electrode of the cell. Up to now, there has been little recycling within the UK. The normal disposal method has been in domestic waste, or in deep landfill sites.

We are lagging behind the rest of European our approach to recycling, with only a handful of companies paying due attention to the environmental issues. An European directive exists which deals with the disposal and recycling of spent NiCad batteries. And when this is finally enforced in the UK there will have to be a recycling premium added to the price of NiCad batteries to cover the costs, or some other method of financing the necessary recycling costs.

It certainly looks as though the days of NiCad batteries are numbered. This is despite all the performance improvements in the last five years by companies like Sanyo and Panasonic.

Nickel Metal Hydride

The Nickel Metal Hydride (NiMH) battery was invented in the USA by the Ovonics Corporation in the early 1980s. Licences to cover manufacture were granted to many of the NiCad battery producers. The main difference between the earlier NiCad and the NiMH batteries is that in the NiMH battery, an alloy is used to make the negative plate of the battery, performing a similar function to the Cadmium in the NiCad battery.

The terminal voltage of the NiMH battery, like the NiCad, is a nominal 1.2V and, with an initial performance of practically twice the capacity of a similar sized NiCad, the initial performance was impressive. For example an 'AA' sized NiCad with around 700mAh capacity could be replaced with an 'AA' sized NiMH with some 12-1300mAh capacity.

The only real downfall of the NiMH battery, certainly the early types at least, was a higher self-discharge when they're not used. This could be as high as 4% per day in the original design batteries. This aspect has been addressed by most manufacturers, and has now been brought down to a more acceptable level.

The ability to supply a high current from NiMH cells has also been improved so, that the product is now approaching the performance of the NiCad battery. With a few more years development, we should see the NiMH battery replacing the NiCad in most applications, reducing the environmental impact, since the NiMH batteries do not contain the toxic Cadmium metal.

AN OFFER

For all readers of *PW* who would like to try out these new batteries, we have arranged a special offer with **Argosy Components Ltd.**, who can supply a complete starter pack of four 'Pure Energy' Rechargeable Alkaline Manganese AA-sized batteries and the 'Pure Energy' Envirocharger for **£13.49 to include both P&P and VAT.**

Save money on the 'Pure Energy' Batteries and Charger.

To order your batteries and charger, send a cheque for £13.49 to **Argosy Components Ltd. (Dept PW), Unit 14 CR Bates industrial estate, Wycombe Road, Stokenchurch, Bucks HP14 3RJ.** The batteries and charger will be despatched to you within three working days.

Lithium Ion

A new 'battery on the block' is the Lithium Ion battery, again a very new technology, as yet not found as single batteries for general use. But it is suitable for low to medium drain applications such as radios and video equipment and some mobile telephones. The Lithium ion battery has a very high energy density and has a very large capacity for size and weight. It does, however, require a somewhat more sophisticated charger and so these tend to be rather expensive at present.

Rechargeable Alkaline Manganese

Another drawback of both the NiCad and NiMH batteries, is that they have terminal voltages of 1.2V. There is a real need for batteries with a terminal voltage of 1.5V like 'dry' cells, for use in the many portable appliances which have been designed around these batteries. The Rechargeable Alkaline Manganese (RAM) battery can offer a suitable replacement in these cases.

At Battery Technologies Inc. of Toronto Canada, **Dr Karl Kordesh** was involved in the development of the original alkaline battery (now available as Duracell, Energizer etc.) and has since developed the rechargeable version, taking the concept one stage further. This new product has slightly less capacity than the Duracell version, but it can be recharged many times to make it a very cost-effective method of running electronic equipment.

The RAM battery has many virtues, not least that it can be 'Top-up' recharged at any time, it has a higher initial capacity than a NiMH battery (typically 1900mAh) and it is environmentally friendly since it does not contain any toxic heavy metals such as Cadmium or Mercury. But as with all new inventions there have to be an element of compromise and in the case of RAM batteries it's 'cycle life'.

The cycle life of of a RAM battery is less than either NICAD or NIMH battery because the active materials are consumed during use. As the active materials are consumed the capacity effectively reduces as the battery is cycled. In most applications this does not cause any problems as the fall in capacity is gradual. Another plus point is that the self discharge is far less than NiCad or NiMH batteries, being about 5% (or less) per year of storage in normal conditions.

Charge Regime

The charge regime for a NiCad or NiMH is well known, being a timed period of constant current, but the RAM battery charge regime is more like the lead-acid battery with a constant voltage. The maximum upper voltage limit for charging RAM batteries a a supply with a maximum upper voltage limit of 1.62 to 1.68V. Because of these differences of charging methods it's important not to use the wrong charger for each set of batteries.

In the UK the rechargeable Alkaline Manganese batteries are available under the 'Pure Energy' brand name from several sources such as **Water & Stanton**, **Maplin** and many others. The 'Pure Energy" name also applies to the charger itself, and in many instances is supplied with the batteries. But please **do not use the 'Pure Energy' charger for your NiCad batteries**, you're asking for trouble if you do!

Strides Forward

There have been many strides forward in battery technology and the pressure is on all manufacturers to produce the 'ideal' battery which will embody all the merits of the technologies outlined above, and yet still be cheap. Only time will tell! The RAM battery can, at present at least, offer an extremely good value for money option, being rechargeable and yet offering a 'full' 1.5V per cell output.

TEX

Antenna Workshop

You should get out more!

Dick Pascoe G0BPS says summer is approaching and encourages you to get out into the fresh air for a session on the air in the open.

Now that summer is approaching, it's the traditional time to get out into the open and work the DX from mobile and portable stations. In many cases the station will be the car and a mobile whip for h.f. operating. Manufacturers have created many antennas for this form of operation. I have used many of the commercial mobile antennas available including the 'G-Whip', the Hustler (which I rated highly) and later the huge 'Texas Bugcatcher' (which is even better).

Whilst many of the commercial mobile antennas are quite good, none will compare with lots of wire, high up in the air. I have used kites on camp sites, poles to get long wires up in the air on demo stations and of course trees in the middle of caravan sites, as far apart as one on the outskirts of Paris and another in Liechtenstein (although not at the same time of course)!

One of my favourite antennas for several years at my last house was a group of three simple dipoles, often called a 'Nest of dipoles'. The three-story house with its fairly long garden was ideal for such an antenna layout. In fact, I remember one commercial antenna maker at that time who used simple medium-weight household wire to make his antennas, cutting one wire to length for 28MHz operation, another wire cut to resonate on 21MHz and the earth wire for 14MHz.

Of course the simple single-cored household wire failed after the first night and the first puff of wind; but the idea was good. I soon adapted the technique for my portable antenna too.

Plastic Bottles

The first thing is to collect several large plastic bottles and cut strips of about 150×50mm. By using a sharp drill put a row of four holes in each spaced neatly. The drawing of **Fig. 1** shows the overall idea of the layout of this antenna. This is an antenna that's easy to use and to build. Each length of wire is usable on a single band. Whilst I only used lengths for 14, 21 and 28MHz, 7MHz can easily be added as well. Cutting and trimming each leg to resonance will remove the need for an antenna tuning unit (a.t.u.)!

All three (or four) wires are joined together at the centre and insulated at their far end. One easy way to ensure this centre joint is insulated is to use a plastic film can as shown in the basic layout drawing of **Fig. 2**. After the joints are made, the coaxial cable is secured inside the canister, and the whole this is filled with hot melt glue.

I try to use two trees or other support poles to get both ends of the antenna as high as possible into the air. But often only one pole is available so, the antenna can be used as an inverted 'V' as shown in the illustration of **Fig. 3**.

The main difficulty encountered in using an inverted 'V' as a portable antenna is getting the centre point high in the air. I used sections of alloy tubing, each with one end swaged down so that they slot together. The sections I use are each just one metre long so fit into the boot of my wife's Corsa car easily. Rob G3XFD, the editor, told me he uses a broom handle slotted together as a central support.

Whether you need four bands or not, even a

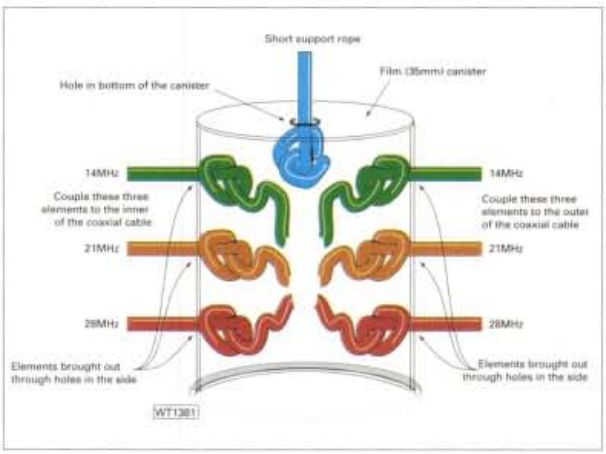


Fig. 2: A simple and cheap dipole centre made from a single 35mm film canister. The coaxial cable enters from underneath and should be secured to the support rope before the canister is filled with hot-melt glue or other non conducting filler.

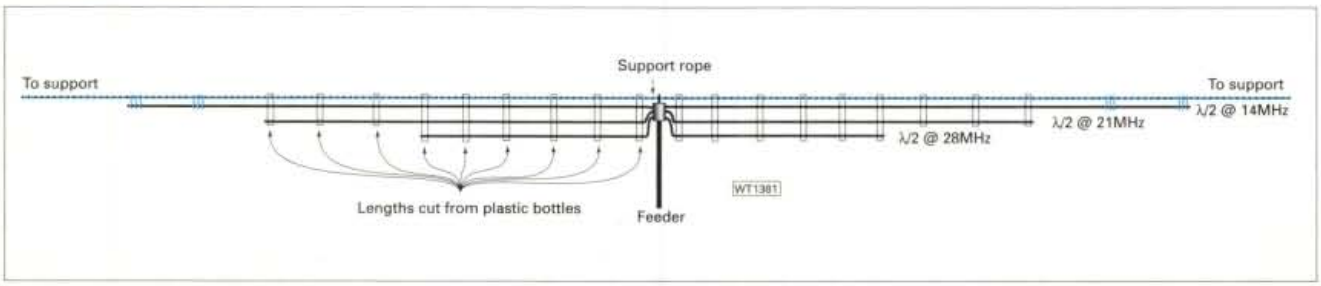


Fig. 1: One 'dipole' three bands, all halfwave length long. A simple idea but, if each element is adjusted for the band of interest, then no a.t.u. is needed in operation.

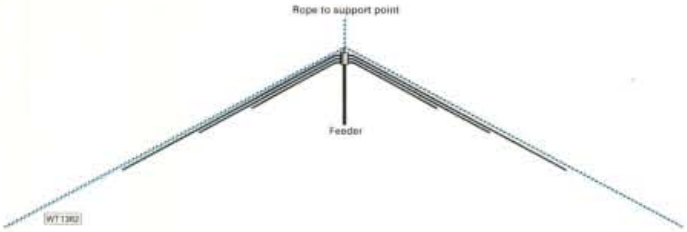


Fig. 3: The same 'Nest of dipoles' as featured in Fig. 1, may be used as an inverted 'V' system if only a single support is available.

single dipole can be used in this way. Guys will be needed if the mast is to be self-supporting, although not use your car for the support. The weight of the car can be used to keep the mast upright by using a metal bracket. By positioning the car wheel on the base the mast will be kept in place easily.

The *PW* Tenna Tourer base (**Fig. 4**) was designed along these lines, and was on offer in the September 1999 issue of *PW* is ideal for this type of operation (a unit that is still available - please contact the *PW* office for more details).

There are many other ways of getting antennas up in the air whilst out and about. In a previous workshop we looked at the use of kites. These can be an excellent method to use. Trees are also useful! If you have two trees available don't just think dipole or long wire how about a delta loop? The 'gain' off the sides of a loop can be used to advantage by turning it.

Fig. 4: The *PW* Tenna-Tourer mobile antenna base, with its hinged socket for the mast makes single-handed antenna erection a simple operation. There were two different sizes available in the offer of September 1999's issue of *PW*. (A unit that is still available - please contact the *PW* office for more details)

During one demonstration event the Dover Radio club was putting up a long wire antenna. The trees had been selected and the branches chosen, all we had to do was get the wire over the tree. Some may try to throw a weight over; some would rather use a bow and arrow. My preferred method is a fishing rod with fairly heavy line. (I don't use a lead weight either).

Fruit Powered

Instead of a lead weight at the end of a line, I use fruit power! An apple or orange as the weight will do the job just as well and if it hits anyone is unlikely to do a great deal of harm. Practice will ensure that the weight drops over the required bough first time. The fruit is removed and the wire attached and the line recovered.

Warning Do NOT hold the wire at any time whilst it is running out. I saw an amateur almost lose a finger doing this; only a rapid trip to the hospital saved his finger.

I've also found that ex-service equipment can be used to great advantage, I have a bag full of ex-army copper rods in my garage each about 1m long that screw together. They make a good vertical antenna when mounted on an insulated base. They are fairly cheap too!

Even the simple ground plane antenna can be used to advantage. A quarter wavelength of metal bolted to (but insulated from) the ground mounting bracket can be used. The mast used to raise the dipole can be brought into use as an antenna if it is insulated from ground.

Ground Base

Using a metal plate ground base with bolts in each corner, as shown in **Fig. 5**, then one or more counterpoises can be laid out on the ground. A short length of wood at the base of the mast insulates it from ground. Now all that is needed are the connections to the pole and the ground base. The counterpoise lengths will be around five metres long for the 14MHz band version, but of course the same one can be easily made up for 21 or 28MHz operation.

The feed-point in this case is at the base of the mast with the inner of a length of 75Ω coaxial cable coupled to the mast and the outer shield to the ground plate. To make a good match to this you should use a quarter wavelength of 50Ω coaxial cable, as a matching transformer to couple this to the a.t.u.

The more radials you put out the better it will work. I remember a contest group using a simple scaffold pole as a quarter wave vertical on 7MHz. There were no radials but the sea (salt water) was just a metre or so from the base of the antenna. Rumour has it that they won their section of the contest.

When I was first licensed I used a roof rack on my elderly estate car with a scaffold pole on a base plate just out side the passenger door attached to the roof rack. Twisting the pole easily rotated the 144MHz beam at the top. The beauty of this is that it all packed away neatly on the roof rack for transport.

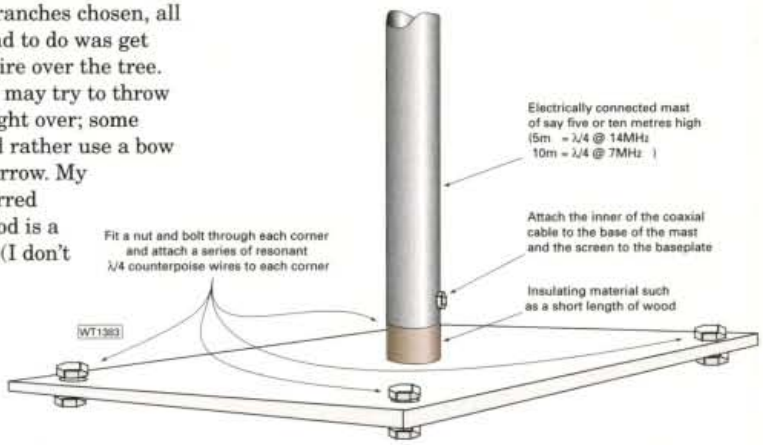


Fig. 5: A metal ground plate with radials under a metal mast can form the basis of an excellent vertical antenna on the h.f. bands as well as supporting v.h.f./u.h.f. beam antennas.

Whatever method you choose; try to remember that there can be high voltages on the line if high power is to be used. Make sure everything is insulated and well way from any possible sticky fingers. Especially those whose owner shouts 'what's that mister?' while holding it.

Over the summer months I plan to get a three-band quad on the tower, which will also hold a 144MHz beam and a couple of verticals. I hope to be able to report on our success in another 'Antenna Workshop'. Cheerio until then! *PW*

SRP TRADING

1686 Bristol Road South, Rednal, Birmingham B45 9TZ

★ ★ **TRADE AND EXPORT ENQUIRIES WELCOME** ★ ★

- 10 programmable memories
- 30kHz to 30MHz
- USB, AM, LSB
- Fully synthesised
- Signal strength meter
- Headphone output
- Connect to your computer with the data lead supplied and receive WEATHERFAX, SYNOPTIC RTTY, SLOWSCAN TV, etc

AKD HF-3S SHORTWAVE RECEIVER

£159.95 + P&P

FREE!! FERRELLS CONFIDENTIAL FREQUENCY LIST
11th edition worth £19.95

SANGEAN ATS-909

Quality Portable Shortwave Receiver.

153kHz to 30MHz (AM / SSB)
87.5MHz to 108MHz (FM)
Features:
(RDS) Radio Data System
307 Memory Channels
World Clock
3 Timers
LCD Display
Signal Strength Meter etc.

£129.95 + P&P

FREE Headphones and SW Antenna

COBRA UK 25LTD ST SOUNDTRACKER

Cobra Classic 80 Channel CB radio.

The new 'Sound Tracker' system cuts background noise giving better signal to noise ratio.

Fully featured:
Triple Dimmer Control
Variable Tone Control
Illuminated RF/Signal Strength Meter etc.
With Heavy Duty Dynamic Microphone Engraved with Cobra Emblem.

£109.95 + P&P

Sound Tracker system cuts up to 90% noise.

COBRA UK 29LTD ST SOUNDTRACKER

Cobra Nightwatch Classic 80 Channel CB radio.

The new 'Sound Tracker' system cuts background noise giving better signal to noise ratio.

Fully featured:
Fully Illuminated Display
Built-in SWR Calibration Meter
Delta Tune
PA System etc.
With Heavy Duty Dynamic Microphone Engraved with Cobra Emblem.

£129.95 + P&P

Sound tracker system cuts up to 90% noise.

SANGEAN ATS-505

Full SSB
FM-Stereo/MW/LW/SW PLL Synthesized Radio

Professional Digital Multi-band World Receiver

- Continuous AM Coverage 150 - 29999kHz
- Five Tuning Methods
- 45 Presets
- ATS
- SSB
- Short Wave Dual Conversion
- 1kHz/Step Fine Tune
- Memory Scan
- Tone Control
- Clock with 2 Alarm Timers
- Adjustable Sleep Timer
- 214x128x 38.5mm
- Weight: 840g without batteries

£99.00 + P&P

SILVER DIAMOND

Four band discone. TX 6m, 2m, 70cm & 23cm, 200W, RX25-1300MHz. Stainless steel construction.

~~£49.95~~

£29.95 + £5 P&P

SRP 3BR

Extension speaker. Quality filtered speaker with noise filter. **£12.95** + P&P

WIDEBAND PRE-AMP

Variable gain and bypass facility. Boosts weak signals adding clarity to let you listen with ease. ~~£49.95~~.

£39.95 + P&P

SRP 2/70 BASE ANTENNA

Dual band collinear. Constructed using good quality fibreglass with stainless steel to withstand the weather. Complete with mounting equipment.

£29.95 +P&P

DC INVETORS 12V DC IN 240V AC OUT

150W	(for notebook computers etc.)	**£29.95** + P&P
300W	(for small power tools etc.)	**£49.95** + P&P
600W	(for medium power tool etc.)	**£99.95** + P&P
1000W	(for large power tools etc.)	**£129.95** + P&P
2500W	(for most purposes etc.)	**£419.95** + P&P

RECHARGEABLE NI-MH BATTERIES

"No memory effect".

Over twice the capacity of Nicads.

AA cell	1500mAh @	1.2V.....£2.00 each
AAA cell	550mAh @	1.2V.....£2.40 each
C cell	2200mAh @	1.2V.....£3.99 each
D cell	2200mAh @	1.2V.....£3.99 each
PP3 cell	150mAh @	1.2V.....£3.99 each

CHARGERS FOR ALL SIZES AVAILABLE

WM-918 ELECTRONIC WEATHER STATION

Allows the measurement and display of weather data. Indoor/outdoor temperature, relative humidity, dew point, wind speed, wind direction, wind chill, barometric pressure, rainfall, etc. Includes PC software and lead.

£179.00 + P&P

COAX BARGAINS

100 meter roll of RG-213 coax.
ONLY **£69.95** Free P&P

100 meter roll of RG-58 military spec. coax.
ONLY **£35.00** Free P&P

Opening times: Mon-Sat 9.30am to 5.15pm.

Call Mary (M0BMH) or Dave on

TEL: 0121-460 1581, 0121-457 7788 FAX: 0121-457 9009

CDS

CDS are a friendly, independent and progressive company with a strong reputation for field measurement services in the mobile telecommunications and digital broadcasting industry.

A NEW CAREER

We have an immediate requirement for the following:

Northern Europe
PROJECT MANAGERS

Europe & The Middle East
FIELD SURVEY ENGINEERS

UK & Mainland Europe
GSM-R ENGINEERS

UK
DIGITAL BROADCAST ENGINEERS

POST PROCESSING ENGINEERS

FIELD TECHNICIANS

OFFICE TECHNICIAN

These positions are open to candidates with experience or willing to be trained.

CDS can offer a comprehensive training programme to give you a thorough understanding of cellular systems and technologies together with digital broad-casting technologies.

For the right people we can offer attractive, competitive salaries and an overall package commensurate with position and experience.

To find out more, please submit your detailed CV to:

DAVID PEARSON
TECHNICAL DIRECTOR
CELLULAR DESIGN SERVICES LTD
GRAYLANDS
LANGHURSTWOOD ROAD
WARNHAM
WEST SUSSEX RH12 4QD
FAX: 01403 248597
Email:d.pearson@cell-des.com

CELLULAR DESIGN SERVICES LIMITED

RADIO SOLUTIONS FOR THE WIRELESS WORLD

FS40498
ISO 9002

VALVE & VINTAGE

Charles Miller is looking after the 'wireless shop' this month and in between customers he's leafing through his memoirs to continue the story of how he started in wireless.

It's nice to be back with you again, so I can continue with my 'wireless memories'! And I'm restarting the story from the time when the Second World War finally ground to a halt in August, 1945.

Even before the sounds of public celebration had died down, civil servants in the War Ministry were desperately trying to find a way of dealing with the huge over-ordering of military equipment that they had instigated.

Orders couldn't be cancelled at a moment's notice and so virtually every item imaginable continued to pour out of factories. For instance, when the British Army finally pulled out of Egypt, supplies of horseshoe nails sufficient for 50 years were abandoned, whilst elsewhere in Africa aero engines worth many thousands of pounds were dumped in the sea.

More to the point, as far as radio enthusiasts were concerned, vast amounts of radio and radar equipment had to be disposed of. Only two months after the war ended, ex-Government stores were offering mountains of ex-RAF bargains, including brand-new R1155 receivers, for £5 - a fraction of what they had cost the taxpayer.

As with the aero-engines, what couldn't be sold had to be dumped. In one well-documented episode hundreds of aircraft radio sets, including the now highly sought-after TR9 transmitter-receivers, were thrown into an abandoned, part flooded mine shaft near Cheadle in Staffordshire.

A few years later, an enterprising dealer acquired the mineral rights for the mine and recovered the sets, which were in surprisingly good condition. He made a small fortune by selling them at just under a pound a go!

Disposals on a smaller scale (fortunately less difficult to retrieve) took place from an RAF Maintenance Unit near where I lived. These concerned surplus valves and initially they simply were thrown on the local rubbish dump which became a mecca for scores of youthful radio fans.

Nearly all the valves were American metal octals, singularly well able to withstand the rigours of being shovelled out by the lorry-load and then trampled into the soft ground. Some of the valves were usable and this is one of the reasons why I retain an affection for metal octals to this day.

Lisle Street

Meanwhile, the large-scale auctions that were being set up around the country lead to the mushrooming of scores of 'Government surplus' stores, especially around the Lisle Street area of London. Mention this thoroughfare to any old radio enthusiast and a dreamy far-away look will come into their eyes!

In my case, although the price of an R1155 or a PCR receiver at a £1 or so less was way beyond my means, you could buy component parts for the latter at a few shillings each. It was with such bits, including the dial, that I made my very first superhet receiver.

It was an ambitious, battery-powered project with a VP2B r.f. amplifier, TH2 frequency-changer, VP2B i.f. amplifier, TDD2A detector/a.v.c. rectifier/first a.f. amplifier and PM22A output.

Against what I now recognise as all the odds of bad design, a poor chassis (plywood!) and chronically inept wiring, it actually worked to the extent that I could 'listen to the world' as they used to say in the radio makers' advertisements.

My aerial was attached to a telephone distribution pole in the garden, with the inner end terminating just above my bedroom window. The stranded cable used for this was again ex-Government (hands up anyone who remembers 'Don 8' wire!).

The ubiquitous Don 8 wire consisted of seven strands of thin steel wire and one of same-gauge copper. The resultant cable was sheathed in an extremely tough material resembling waxed canvas.

Although almost impossible to 'strip' and bend around a small radius ... once Don 8 was up you could have done tight-rope walking on it! It was made for Army field telephone work and could be bought in half-mile drums for around £1.

Leaving School

Two and a half years after the end of the Second World War, I celebrated the happiest day of my school life - the final one. At the end of the Autumn term I quitted my (alleged) minor public school for the last time, which doubtless gave my mentors as much cause for good cheer as it gave me.

I left devoid of the formal qualification known as the School Certificate, which in those days was issued (or not as the case might be), by an examining board set up by Oxford and Cambridge Universities. There was an immutable list of subjects to be taken, with a certificate awarded only if a certain minimum number of passes were obtained.

One of the passes was in mathematics, which scuppered my chances right from the start! It mattered not if a candidate excelled in other fields, without maths they were automatically 'given the bird'. Thus the fact that I could write and draw well and had a reasonable grasp of physics, where they impinged on my radio interests, meant nothing and the certificate was withheld. (However, I cannot say that I have ever suffered from the lack of it).

In any case, I was already basking in the delightful prospect of instant employment in the service department of a local radio dealer at a wage of twenty-five shillings per week. This came about because he and my father were both members of the same billiards club.

So, on the first day of 1948 I presented myself at the shop full of eager expectations about getting to grips with real radio sets. But it didn't quite work out like that.

Apart from selling and repairing radio sets, my employer - like every dealer in those days - had another source of income ... charging accumulators. This was enormously profitable because the standard price to the customer was 3d for a small accumulator and 6d for a large one and by wiring strings of either in series, it was possible to charge several dozen at a time for about a pennyworth of electricity.

The actual process was extremely unpleasant. It was carried out in a cellar that could have come straight out of a 1930s horror film, where dwelt a rubber-aproned troglodyte who apparently had become immune to the noxious fumes generated by bubbling sulphuric acid.

Local customers brought in their accumulators by hand, or had their children perform the chore. But my employer had so many customers with battery sets in outlying areas that he operated a six-days a week collection and delivery service.

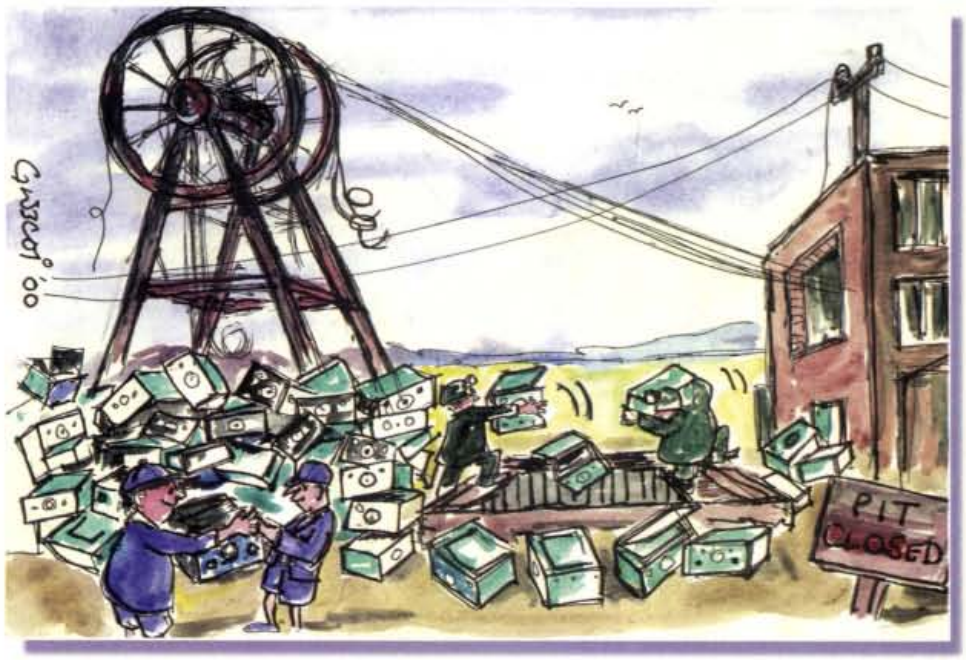
Each day was devoted to a different locality and involved up to 60 calls. That meant that an awful lot of accumulators had to be carted back and forth by an unskilled driver and me, who was considered just about competent enough to couple and uncouple them at the customers' houses.

The only relief from the monotony of humping accumulators came when we were required to erect aerials. (Yes, radio listeners really did still use outside aerials in those days).

My employer had devised a quick and relatively easy method of erecting aerials which eliminated climbing onto roofs and fitting chimney brackets. Instead, we used foot-long rods, screwed at one end and with a circular china insulator at the other, which were driven into the soffit board just below gutter level at either end of one side of the building, the aerial wire being strung between them and then down to a third insulator fitted above a window, handy for the siting of the receiver.

Technically speaking, running the aerial so close to the gutter was not to be recommended, but the things seemed to work well enough. We also used to drill the window-frame and insert something known as a lead-in tube, which was made of Ebonite (the trade name for a brittle rubber material which was chemically-hardened using sulphur) with a copper or brass inner rod, screwed at each end to take terminal nuts.

Provided that you made the window-frame hole just the right size, the simple Ebonite device took the signals in and kept moisture out. However, ten years later, one of them featured in one of the most spectacular incidents I've encountered.



It came about when I'd long been self-employed and was making an honest crust by converting old BBC-only TV sets for ITV programmes. I used to fit the actual converter (usually a 'Sterling') on the back of the set whilst the chap who worked for me clipped a three-element Band III aerial to the existing Band I array and then ran a second coaxial cable down the wall and in through hole in the window frame, which I drilled ready for the job. Price? "Ten guineas, sir or madam ... thank you very much".

On this particular occasion we were working at an old lady's house, but had forgotten to bring the drill. She had a big coal fire roaring away in the room, so I used the end of the poker red-hot and burning a hole through the wood-work. It seemed, as they say, a good idea at the time!

Under the watchful eyes of my customer I withdrew the glowing poker from the flames and applied it to what looked like a wooden peg driven into the bottom corner of the frame. It was, in fact, the remains of an Ebonite lead-in-tube which had been sawn off and painted over!

As the poker went home, the lead-in tube erupted, belching out billowing clouds of acrid black smoke and completely blotting out the light in that room. All I could see was the whites of the old lady's eyes and I couldn't open the window to let the smoke out because the damn fool who had painted the lead-in-tube had also painted around the sash and welded it solid to the frame.

It took about 20 minutes for the atmosphere to clear and I braced myself for comments from the old lady. To my astonishment she said nothing and just carried on with her knitting with a contented expression! I could only imagine that she assumed that blacking out a room with dense smoke was a routine part of the ITV conversion procedure.

Return To 1947

To return to 1947, after a month or two of non-stop accumulators I began to get restive. Fortunately, just at this point my employer decided that his existing service department wasn't large enough so he rented another shop near the centre of the town.

The 'new' shop had long been defunct and no one could recall what it had sold in the past. The windows had been painted over and the whole floor space was available for workshop use. Benches and storage racks were installed and I was posted there as assistant to an extremely competent engineer called Arthur.

Not long 'demobbed' from the RAF, Arthur seemed very mature to me; I suppose now that he must have been in his mid-20s. Fortunately he possessed great patience and didn't mind me watching his every move and asking incessant questions. My time with Arthur only lasted about six months, but it laid solid foundations for my future career and I owe him an enormous debt.

Mains Operated

It was during this period that I made my first mains-operated receiver. Our 210V d.c. supply was due at some time to be changed to 230V a.c. so the set had to be of the a.c./d.c. type.

I ought to admit that I didn't actually build it but converted my father's just-pre-war HMV 3-valve battery t.r.f. Its original line-up was a W21 r.f. amplifier, S21 detector and KT2 output, which I desired to alter respectively to a 9D2, an 8D2 and a Pen36C, plus a UR1C rectifier.

The choice of valves was, as usual, dictated by what was available for little or nothing. The same applied to other essential components such as a mains dropping resistor, a hefty smoothing choke and some electrolytic smoothing condensers, the scrap box in the workshop providing a fruitful source.

I suspect that my father had given up his prized set as lost forever. He was almost as surprised as I was when it burst into life on the first test and continued to give good service for two years or more until I replaced it with something a little more sophisticated.

What was particularly pleasing was that when our mains were eventually changed to a.c. (which happened whilst I was at work one morning) I returned home at lunchtime to find it playing away as well as ever, unaffected by the alteration in supply.

Sheltered Workshop

Arthur and I led a sheltered life in that workshop, with all the repair jobs being brought in and subsequently taken away by the van driver and with the tremendous advantage of our never having to come into personal contact with the customers. Arthur, with such limited help as I could give him, got through a good deal of work in these near-ideal conditions but not enough, apparently, to satisfy our employer!

Our employer must have suspected us of slacking, for whenever he visited us he never drove up to the door but parked up the street and sneaked up on us, presumably hoping to find us drinking tea or otherwise wasting time. He never did (we were too smart for that), but our days there were numbered anyway.

Looking back, I imagine that the rent and rates must have been extortionate in that central position and eventually the boss pulled the plug. And I was discarded along with the premises.

Unfortunately I was not out of work for long, for then followed my short and undistinguished involvement in high finance. Another of my father's friends was the manager of a local building society and for some reason, defying all logic, I found myself an unwilling candidate for a job at the firm. (Despite the fact I was totally unsuited both academically and temperamentally for such a position!).

I only went along with the idea to avoid a row at home but the first morning in the office taught me that under no circumstances could I endure the job any longer. At one o'clock I left, ostensibly for lunch but, in fact, never to return.

I simply walked across the street to the head office of the largest radio dealer in town and asked him if there was a job available. It proved to be a classic case of being in the right place at the right time. This man - I'll call him Smith, although that wasn't his name - had a shop and a very large showroom in the heart of this town plus branches in two others and the number of radio sets coming in for repair was prodigious.

All repairs were handled in two cramped workshops, partitioned off from the showroom, by one full time engineer about four years my senior and one part-timer and saturation point had been reached. So, I was greeted with open arms and taken on as second full-time service engineer at 48 shillings (less than £2.50) per week, almost double my previous wage.

I started that afternoon, thrown in at the deep end and about to commence the most hectic crash course in radio repairing that anyone could imagine...! PW

".....in one well-documented episode hundreds of aircraft radio sets, including the now highly sought-after TR9 transmitter-receivers, were thrown into an abandoned, partly flooded mine shaft near Cheadle in Staffordshire".

The PW Personal Order Form

Roger Hall G4TNT – PW's Advertising Manager – describes how we're launching the PW Personal Order Form service to help readers buy with extra confidence from advertisements in this magazine.

Many readers will have noticed how the battle for their custom has become more intense as the popularity of the hobby has declined. Fewer amateurs buying less equipment means there are now some great deals to be had but it also means that some dealers may try to cut corners when it comes to honouring their commitments. Also, as the real cost of Amateur Radio equipment has fallen and the competition for your custom has increased, some of the smaller shops have either gone out of business or been swallowed up by the bigger companies. In some areas, it's almost impossible to find a local shop and now the trend is towards mail order purchasing.

This, in itself, is not a bad thing but it does mean you'll probably be buying from a shop you've never visited and from a salesperson you've never met. So, how do you know who to trust with your money? You could go on air and ask about the dealer you're thinking about buying from, but the risk is that there may be one or two vociferous individuals who will be happy to tell the world about their grievances while the majority of satisfied customers just keep quiet. The same is true of the Internet. The various radio related newsgroups are a good place to ask but, again, you may not get a representative (or honest) selection of answers.

The truth is, there is no real way of telling beforehand how your transaction will be handled, how well the equipment will perform or whether it will go wrong. All you can do is to take reasonable precautions before you buy and know what to do if the worst happens. This is where we aim to help. First of all, take a look at the Top Ten Tips in the Buyer's Guide box. If you follow those guidelines before you buy, you'll have minimised the chance of something unforeseen cropping up and you'll be prepared should the worst happen and you have to return the goods.

Top 10 Tips

1: Telephone first to confirm the price and details are as in the advertisement. Dealers often have to send in copy up to 8 weeks before the magazine is published and prices and availability can change in that time.

2: Ask if it's a parallel/grey import or if it came from the authorised UK importer.

3: Ask if it is the full UK specification and if it has CE approval.

4: Ask about extra charges (delivery, VAT etc.) and find out the final, all-inclusive price.

5: Ask about their return/refund/repair policy for faulty goods and if they have a restocking fee for the return of non-faulty items.

6: Ask for a written quotation if it's a large order.

7: Make a note of all calls and who you spoke to and keep copies of all paperwork.

8: Pay by personal credit card whenever possible as the card company has insurance to cover all transactions above £100 and you will almost certainly get your money back from them should something go wrong.

9: Check everything as soon as it arrives. Open all the boxes and check that you have been sent everything exactly as ordered. If there is a problem, contact the supplier immediately.

10: If a problem develops later, write the supplier a concise and accurate letter outlining the problem and asking them how they intend to rectify it. If that fails, write to us with copies of all relevant paperwork and we'll take it from there.

THE *PW* PERSONAL ORDER FORM

Use this form when ordering by mail, FAX or for telephone order confirmation

TO THE ADVERTISER

Company

Sales contact

Address

Postcode

Date & time of telephone order

Order reference number (if quoted)

Despatch reference number

CUSTOMER DETAILS

Name

Address

Postcode

Daytime telephone number

FAX number

DELIVERY DETAILS

Delivery address

Postcode

Agreed delivery date

Terms of warranty/money back/returns policy

PAYMENT DETAILS

- Tick method of payment

☐ Credit card

☐ Cheque

☐ Debit card

☐ Postal Order

CREDIT CARD DETAILS

Credit card company

Card number

Start date

Expiry date

Signed

Date

PLEASE SUPPLY THE FOLLOWING ITEMS:

QUANTITY	DESCRIPTION	UNIT COST	TOTAL £

PW

ADVERTISEMENT APPEARED IN *Practical Wireless*

ISSUE NO.	PAGE NO.

SUB TOTAL	
DISCOUNT	
CARRIAGE	
SURCHARGES	
VAT	
TOTAL	

PLEASE ACKNOWLEDGE RECEIPT OF THIS ORDER

Don't forget to keep a photocopy

Book PROFILES

All the books in this month's 'Book Profiles' were hand-picked by Rob Mannion G3XFD and Tex Swann G1TEX as texts that they have found to be extremely useful during their Amateur Radio hobby. They are all American Radio Relay League (ARRL) publications and are, therefore, American in origin, but they are among some of the most popular books used by Radio Amateurs world-wide. Both Tex and Rob agree that both present and future Radio Amateurs would find all of this month's 'Book Profiles' extremely useful additions to their Amateur Radio Library!

TELEPHONE, FAX, E-MAIL OR USE THE ORDER FORM ON PAGE 82

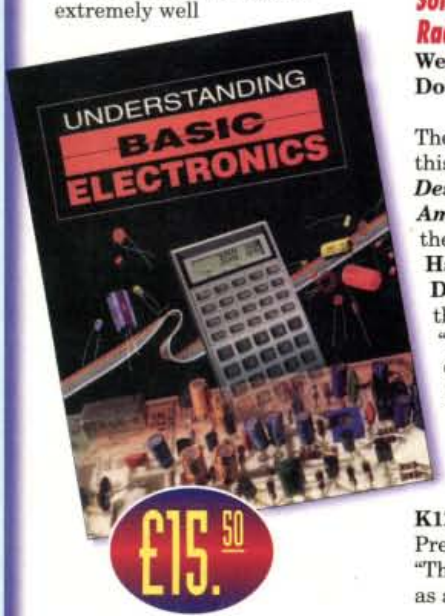
Understanding Basic Electronics

Larry D. Wolfgang WR1B

The author, **Larry Wolfgang WR1B**, claims in the Preface to ***Understanding Basic Electronics*** that "Readers with little or no previous electronics knowledge will be able to understand the text". Everything from 'Some Needed Math Skills' through to 'Vacuum Tubes' is covered.

If you would like "a stepping-stone to learning electronics", or if you're someone who has no idea of where to start when studying electronics, then this could be the book for you. Not an advanced text, however, *Understanding Basic Electronics* is a book about just that - basic electronics. If you're already a whiz with electronics and wish to learn about more complicated electronics then you might be a bit disappointed.

This American book is extremely well illustrated with numerous diagrams and cartoons which help to get the various 'lessons' across. There is also a 20 page glossary of terms at the back of the book which should aid the reader in understanding the text (and a page which explains 'Schematic-Diagram Symbols').



£15.50

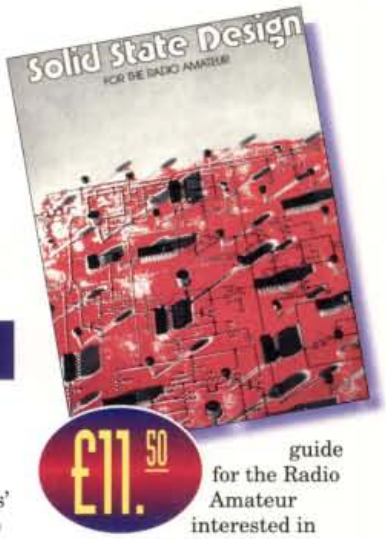
With such helpful chapters as: 'Tricks For Manipulating Equations'; 'The Metric System Of Measure'; 'Basic Trigonometry'; 'Voltage - The Pressure Of Electricity'; 'Current - The Flow Of Electricity'; 'Ohm's Law'; 'Kirchhoff's Law'; 'Frequency And Wavelength'; 'Resonant Circuits'; 'Diodes'; 'Bipolar Transistors' and many more, this book would be a very useful addition to the beginner's (or Novices) bookshelf and is the book that Rob G3XFD often refers to in his 'Radio Basics' series. **Highly Recommended**.

Solid State Design For The Radio Amateur

Wes Hayward W7ZOI & Doug DeMaw W1FB

The second of our ARRL books this month is ***Solid State Design For The Radio Amateur*** and is written by the well-known **Wes Hayward W7ZOI** and **Doug DeMaw W1FB**. According to the back of the book, it has "sold more than 50 000 copies" and is among only a select few technical books which have sold that amount.

In the Foreword to the book, **David Sumner K1ZZ** (Executive Vice President of the ARRL) states: "This book was first released as a theoretical and practical



£11.50

guide for the Radio Amateur interested in using solid-state devices in r.f. design work". Also it is "chock full of good, basic information - circuit receivers, transmitters, power supplies and test equipment".

So, if you aren't one of the 50 000 people who have already bought this book - why not? *Solid State Design For The Radio Amateur* is an essential addition to your book shelf if you're a Radio Amateur with an interest in: 'Semiconductors and the Amateur'; 'Basics of Transmitter Design'; 'Power Amplifiers and Matching Networks'; 'Receiver Design Basics'; 'Advanced Receiver Concepts'; 'Test Equipment and Accessories'; 'Field Operation, Portable Gear and Integrated Stations'.

Once again, this American book is well illustrated with circuit diagrams and pictures (although some of the pictures could do with being a bit clearer). **Highly Recommended**.

ARRL's Wire Antenna Classics

Compiled by Chuck Hutchinson K8CH

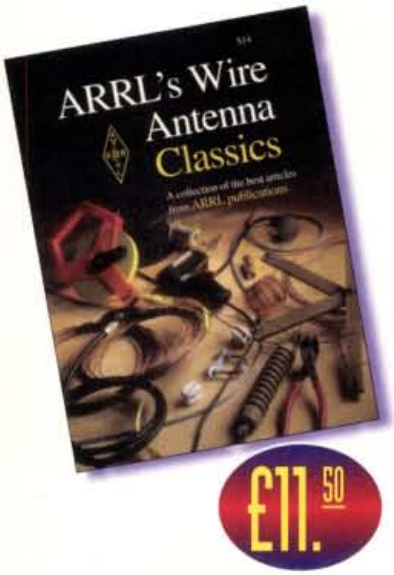
"A collection of the best articles from ARRL publications" stares out at you from the front cover of ***ARRL's Wire Antenna Classics*** and it's there to remind you when you open the book to its first page. Compiled by **Chuck Hutchinson K8CH**, the articles selected include ones taken mainly from *QST* - the ARRL's Amateur Radio magazine, but there are also some articles from *The ARRL*

Compendium Volumes One, Three and Four, *The ARRL Antenna Book* 1st and 18th Editions, and *The ARRL Handbook*.

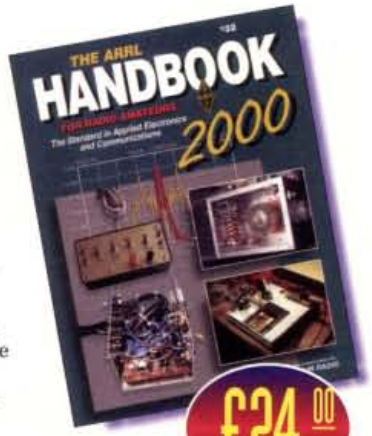
Wire antennas have proven very popular with Radio Amateurs who have tried and tested various different types and according to this American book, "Experienced hams who have built their own know that wire antennas can give top-notch performance". Perhaps you've never tried wire antennas before, or perhaps you have but haven't found them all that successful, either way, this book should help you to build that successful wire antenna.

Dipoles, multi-band dipoles, loops, collinears, V and rhombic, wire beams and vertically polarised antennas are all featured in *ARRL's Wire Antenna Classics*. Some examples of the articles in this book include: 'The Loop Skywire' by Dave Fischer W0MHS (from *QST* Nov 1985); 'The Inverted V-Shaped Dipole' by Ken Glanzer K7GCO (from *QST*, Aug 1960); 'The G5RV Multi-Band Antenna ... Up-to-Date' by Louis Varney G5RV (from *The ARRL Antenna Compendium*, Vol One) and 'The Inverted-L Antenna' by Richard A Lodwig W2KK, ex W2IHJ, ex W3GNK, ex-K2ODT (from *QST* April 1977).

This book is also clearly illustrated with diagrams and pictures and comes **Recommended**.



£11.50



£24.00

The ARRL Handbook For Radio Amateurs 2000

ARRL

The ARRL Handbook For Radio Amateurs 2000 is the latest copy of this well-known book to hit the market. The **American Radio Relay League (ARRL)** handbooks are very popular and the 2000 edition contains some interesting new items.

These new items include 'A 1500W linear amplifier for 6m using the 4CX1600B tetrode' by W1QWJ, 'An extremely versatile two-radio computer-controlled switchbox' by N6BV, 'Sophisticated output filters for power amplifiers' by W3NQN and W0IYH, 'An expanded section on h.f. mobile antennas' by KE2QJ, 'Solid coverage of PSK31' and a clever home-brew 'vacuum' operated pick-and-place SMD component handler.

If you're in need of a handbook for the new century then this is as good a place to start as any. Or, you might know someone who needs one and, if that's the case then *The ARRL Handbook For Radio Amateurs 2000* would make an excellent gift for any enthusiast and comes **Recommended**.

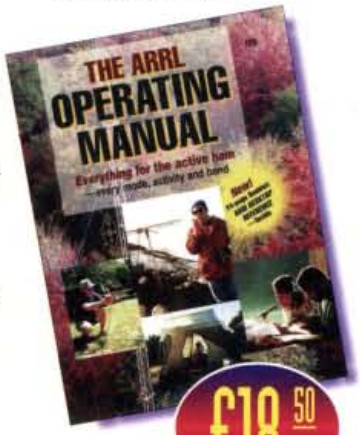
The ARRL Operating Manual

Edited by Paul Danzer N1II

The front cover of ***The ARRL Operating Manual*** states that this book has "Everything for the active ham - every mode, activity and band" and also in this 1997 (Sixth) edition is a "New! 24-page Booklet: 'Ham Desktop Reference' - Inside". Quite hefty, this American book claims that "As the scope of ham radio has widened, so has the coverage of this book".

The free 24 page booklet given away with this edition of the handbook contains "all the charts and tables hams refer to most often - band plans, beam headings, WAS map, third party traffic countries, Q signals, c.w. abbreviations, W1AW schedule, QSL bureaus, and more". So, if you would like a book which claims to cover everything the Radio Amateur needs this could be worth a second glance - always bearing in mind, of course, its American origins.

Some of the chapters included in this operating manual include:



£18.50

'Shortwave Listening' by Curt Phillips W4CP; 'The Amateur Radio Spectrum' by Paul L Rinaldo W4RI; 'Antenna Orientation' by Chuck Hutchinson K8CH; 'DXing' by Bill Kennamer K5FUV; 'The Internet' by Stan Horzepa WA1LOU; 'Packet Radio' also by Stan Horzepa WA1LOU; 'FM and Repeaters' by Brian Battles WS10 and much more.

The ARRL Operating Manual is a well illustrated book and although a little too hefty for shack use, the free booklet is a very handy freebie to this edition. This book would be a useful addition to any shack and comes **Recommended**.

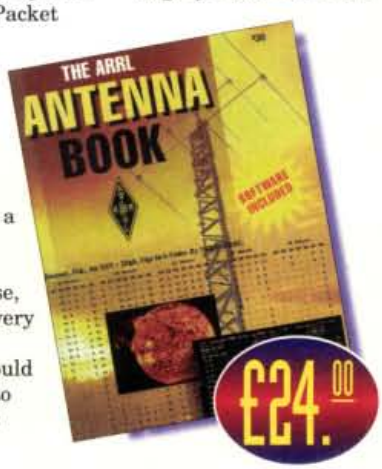
The ARRL Antenna Book

Edited by R Dean Straw N6BV

The 18th Edition of ***The ARRL Antenna Book*** comes with 'Software Included', consisting of a floppy disk which is "a high-quality antenna-related software diskette for the IBM PC". According to this American book the disk includes "a sophisticated Yagi Analysis program by Brian Beezley K6STI, plus three programs by Dean Straw N6BV: a full-fledged transmission-line program, an antenna tuner analysis program and an h.f. terrain-analysis program that includes the effect of diffraction".

The book itself would be a welcome addition to the Radio Amateurs book shelf - especially if you have a particular interest in antennas and would like to expand your knowledge of "feed lines and propagation" and with chapters such as 'Antenna Fundamentals', 'Antenna System Planning and Practical Considerations'. 'Portable Antennas', 'Mobile and Maritime Systems', 'Repeater Antenna Systems', 'VHF and UHF Antenna Systems', 'Antenna Systems for Space Communications' this book would help those of you wishing to improve (or branch out) in these areas.

Once again, this book is well illustrated with diagrams and pictures and is also a fairly hefty book consisting of 700 pages making it quite difficult to thumb through. But readers will probably get to know chapters that they find most useful be able to go straight to them. **Highly recommended**.



£24.00

DAVID BUTLER G4ASR RETURNS THIS MONTH WITH MORE NEWS OF DX ACTIVITY ON THE VHF BANDS

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

Packet Radio @ GB7MAD

UK DX Cluster @ GB7DXC

E-MAIL: g4asr@btinternet.com

THIS MONTH DAVID BUTLER G4ASR TAKES A LOOK AT YOUR RECENT ACTIVITY REPORTS.

A number of operators have recently remarked about the lack of any substantial DX activity on the 50MHz band. Despite heightened expectations and a solar flux that exceeded 200 for several days, there was little progress in F2-propagation during December 1999 and January 2000. Hopefully the spring equinox period in March will spring a few surprises.

Andrew Edgcombe G6TOI (IO80) informs me that he worked many hundreds of stations on the 50MHz band during 1999. Among his better contacts during July were QSOs with CU8AU (Azores), WA1OUB (USA) and 5B4AFS (Cyprus).

During October, Andrew also made contacts with the stations of LU3EMK (Argentina), PY0FM (Fernando De Noronha), PY5CC (Brazil), TZ6VV (Mali), ZS6PJS (South Africa) and 3C5I (Equatorial Guinea). His station runs 400W to a 7-element Yagi at 12m above ground and he also uses a solid-state amplifier capable of 200W output, which is great for those very brief openings when there's no time to heat the cathode to working temperature!

At the QTH of **Mark Procter G1PIE** (IO83), a meteor scatter contact was made with LA4LN (JP50) during the Leonids shower on November 18 - a new country for him. Later in the month, on November 24, Mark participated in his first opening to North America.

At 1423UTC he contacted the station of VE1YX (Canada) followed by WA1OUB, WA1ECF, W1LP and K1WHS, the opening lasted for about one hour. Mark mentions that he uses a Yaesu FT-920 transceiver running 50W into a Chelcom 3-element Yagi located 3m above the house roof.

John Hilton GM1ZVJ (IO86) informs me that he also caught the opening to North America on November 24. Between 1430-1450UTC he made s.s.b. contacts with VE1YX, AF1T, K1WHS, WA1ECF, W1EN and W1LP - two new countries and four new locator squares - not bad for a casual trip into the shack! John is using an Alinco DX-70TH transceiver running 100W into a Tonna 5-element Yagi.

WHAT'S ON 70MHz?

Now I'll take a look at what's been happening on the 70MHz band and **Tomasz Babut SP5XMU** passes on the news that some Polish radio stations still retain authorisation to use the 70MHz band for broadcast purposes. The Polish Radiocommunications Office continues to look for suitable allocations in the 88-108MHz band. This has inevitably put back the issuing of Amateur Radio permits by at least six months and none are now expected to be allocated before the middle of this year.

David Dodds GM4WLL reports being active during the recent 70MHz cumulative contests and on Sunday 16 January, he operated during the first leg of the contest from his portable QTH (IO85). A total of 13 contacts were made in a two hour period from this northerly location.

The best DX (longest distance) was with the Flight Refuelling Radio Club G4RFR (IO90) in Dorset. He was also pleased to work G3XDY (JO02), G4ZAP (IO81) and GW0GEI (IO73) for his 26th locator square.

Unfortunately, there don't appear to be many GW stations active on the 70MHz band and David thought that conditions seemed reasonable. Further to that, I should add that contacts will normally be made via tropospheric propagation and this will be dictated by the local UK weather conditions.

Other modes may occur, such as Sporadic-E (Sp-E) during the summer and aurora at other times but, generally speaking, the predominant mode on the 70MHz band is tropo. David uses a Trio TR-9130 transceiver, Spectrum transverter and two Pye A200 solid-state amplifiers phased together to producing 90W into a Sandpiper 6-element Yagi.

As well as participating in the 70MHz contest, David was also QRV on the 1.3GHz band and was encouraged to work two stations: G0EHV (IO94) and GM6CMQ (IO86), during the morning of the contest period. In a few months of portable activity he has now worked five stations, three squares and two countries running just 2W into either a 27-element quadloop Yagi or a 30-element Yagi.

SMALL AURORAL OPENING

A small auroral opening occurred on January 11, which allowed UK stations to make contacts on the 50MHz band with operators in Scandinavia and the Baltic countries. I've had no reports of contacts being made on the 144MHz band and it appeared you needed to be located in mainland Europe to make contacts on this and higher frequencies.

Andy Durrant G7OEC (JO01) reports that the 50MHz band was already well open when he took a listen to the band. The doppler shift was one of the largest he had ever experienced and it made listening to s.s.b. signals very difficult.

Between 1850-1930UTC, Andy successfully made 12 s.s.b. contacts with stations located in Scotland (GM), Estonia (ES), Norway (LA), Finland (OH), Denmark (OZ) and Sweden (SM). Signals strengths varied between S4 to S9+ and were worked on a beam-heading (QTF) of 2°.

This event brought Andy's locator square total up to 255 for the 50MHz band. His equipment consists of a Yaesu FT-650 transceiver driving a Linear Amp UK Hunter amplifier to 400W output into a Cushcraft 6-element Yagi at 15m above ground.

Eltje PA3CEE (JO33) operated on the 144MHz band and reported making seven c.w. contacts between 1758-1927UTC. He mentioned that it was good to see that c.w. had survived into the new millennium!

Eltje's contacts, on a QTF between 10-30°, included the stations of LA2PHA (JO38), LA6OJ (JO28), OH2BNH (KP20), SM5KQS (JO87), SM6ENG (JO67) and SM7TOG (JO77). The best DX of the event was RW1AW (KP50) 57A both ways over a path of 1606km.

The auroral opening was sufficiently strong to allow contacts to be made on the 430MHz band. At the station of **Norbert DL1SUN** (JO53) strong signals were heard on the 144MHz band from operators in Finland (OH) and Russia (UA1, UA3).

As the opening occurred on the second Thursday of the month, Norbert was hopeful that there would be increased activity during the 430MHz Nordic Activity Contest scheduled that evening. At 1800UTC he heard SK4BX (JO79) on 432.190MHz calling CQ and was able to make a quick contest exchange.

Running 100W in a 9-wavelength M2 Yagi he also made c.w. contacts with the stations of LA3DV (JO49), SM0DFP (JO89) and 7S4F (JP70). The doppler shift on the

Fig. 1: UT6X - Ukraine meteor scatter expedition.

430MHz band is much higher than that observed on the 144MHz band and because of this, it's sometimes necessary to use a secondary v.f.o. to find stations replying to you.

The r.i.t. control on my Kenwood TS-790E has a range of ±2kHz, insufficient to accommodate some of the doppler shifts experienced on the 430MHz band. One must assume that if Japan had been located nearer to an auroral zone, this point wouldn't have gone un-noticed!

Vidas LY2SA (KO14) reported that the doppler shift at his QTH was bouncing around anywhere between 1.5 and 2.0kHz and between 1800-1900UTC he made c.w. contacts on the 430MHz band with SM0DFP, SM3AKW, SM3BEI, SK4BX and 7S4F. Vidas uses an Icom IC-821H, an external low-noise pre-amplifier, 175W amplifier and a 30-element KLM Yagi.

WHAT'S POSSIBLE?

Although the following report is a few months old it does serve to illustrate what is possible on v.h.f. with a small antenna and lots of dedication. **Conrad Farlow G0RUZ** and **John Muzyka G4RCG** have been doing some very interesting work on earth-moon-earth (e.m.e.) communication at the **North Wakefield Radio Club**.

Using the club call sign, **GX4NOK**, two contacts were made on the 144MHz band with stations in North America. The first of these contacts was with the station of **David Blaschke W5UN** located in Texas, USA.

David has one of the world's largest e.m.e. stations. It's called the MBA - or mighty big array. Here are the instructions for building one in your back garden.

Take three 15m tall towers and space them 23m apart, obtain 46m of tower section and place it horizontally at the top of the three towers. Design an elevation drive system so that the horizontal tower can rotate up to 70° or so.

Build a circular concrete track 46m in diameter and place the two outermost towers on top of two Ford pick-up truck chassis'. Arrange the centre 15m tower so that it can rotate through 360°.

Meanwhile, build and interface d.c. motor drives into both pick-up trucks. When you apply a d.c. voltage to the drives the two outermost towers will be driven around the circular track rotating, of course, the 46m horizontal tower.

Now obtain 12 mast sections each measuring 13m long and attach these vertically and with equal spacing along the 46m horizontal tower. Now go out and buy 48, yes that's 48 Yagis! Each Yagi will have 19-elements and the boom length will be 12m long.

Attach four Yagis, equally spaced, to each of the 12 smaller mast sections. Now phase all Yagis together with huge quantities of LDF5-50 heliax and a multitude of power combiners and that's how you build an e.m.e. antenna system - Texas style!

If your 144MHz station can run around 100W output to a good 16-element Yagi and your receiver front-end is reasonably low noise you should be able to work W5UN via moonbounce. Tune your receiver to 144.028MHz and point your antenna at the horizon at moonset. Of course, you need to know if W5UN has a common moon window but these calculations can easily be carried out with suitable moontracking software.

The North Wakefield Radio Club members were using a single 10-element Yagi without any elevation. They therefore had to wait until moonset to work W5UN and the moon was actually 15° above the horizon when they contacted him.

The length of coaxial feeder cable was quite long and possessed a measured 3dB loss. This meant that half the power was not getting to the antenna and to achieve 375W at the feedpoint some 750W of r.f. needed to be generated in the shack.

The group also had the receive pre-amplifier in the shack, which makes a pretty deaf receiver by e.m.e. standards as the 3dB attenuation would be added directly to the overall receive noise figure. The contact was made using c.w. as is the normal practice for moonbounce communication.

The signal report initially was O/RO, meaning both calls fully copied and report copied. The use of RST reports is usually meaningless, as signals are normally very weak - however, later in the QSO they exchanged 429/419 reports.

For a complete e.m.e. contact you must have copied both callsigns and a report and received confirming "rogers". The convention is to use timed transmit/receive periods of two minutes but when working mega-stations, such as W5UN, this can be reduced to one minute periods.

The contact between GX4NOK and W5UN was pre-arranged and went exactly like this: At 2000UTC W5UN transmitted "GX4NOK DE W5UN" for the whole minute. At 2001UTC the club station transmitted "W5UN DE GX4NOK" for 45 seconds and "OOO" (both callsigns fully copied) for the remaining 15 seconds.

At 2002UTC, W5UN transmitted both call signs for 45 seconds and "RORORO" (confirmation that he has copied both call signs and a report). At 2003UTC the club station transmitted "RRR" for the whole one minute period, as callsigns are now not needed and as soon as W5UN copies "RRR", the contact is complete.

At 2004UTC W5UN transmitted "RRR FB RRR FB", this is merely courtesy to let the GX4NOK know that he is happy with the contact. At 2005UTC the club station transmitted "FB FB RST 429 429 429 BK". At 2006UTC W5UN transmitted "RRR RST 419 419 73 73 73 DE W5UN" and at 2007UTC the club station transmitted "73 73 73 DE GX4NOK VA".

Although the procedures may seem a little long-winded, this is necessary as signals are normally very weak and subject to deep fading. Charged with this success, the Wakefield club set about making their second e.m.e. contact on the following evening.

The second time they set their sights on KB8RQ located in Ohio who uses a 32-Yagi system with 1.5kW at the antenna feedpoint. The contact was quickly made with conventional e.m.e. sequencing.

With moon time running out they attempted a QSO with VE7BQH in Canada. Although both callsigns were received the moon disappeared below the horizon before the final "roger" confirmation could be received.

METEOR SCATTER

Colin Morris G0CUZ (IO82) reports that, after a few years of inactivity he is again active via meteor scatter on the 144MHz band. In December he participated in the Bavarian Contest Club (BCC) meteor scatter contest. This was arranged to coincide with the Geminids meteor shower.

The aim of the contest was to generate more c.w. activity on the random m.s. frequencies and to make this type of operation more popular. No scheduled (pre-arranged) contacts were allowed, all QSO's being made either by calling CQ or replying to a similar call.

The use of the IARU Region 1 letter system was also recommended, especially as the rules gave considerably more points for a contact made using this procedure. The letter system works like this - for unscheduled (random) m.s. contacts the frequency used for CQ calls on c.w. should be on, or close to, 144.100MHz.

Immediately following the letters 'CQ', another letter is inserted to indicate the frequency you will be listening for a reply on. The letters A-Z indicates 1kHz steps up from the frequency you're actually calling 'CQ' on.

Thus c.w. operation via m.s. utilises a nominal 'CQ' calling frequency on and around 144.100MHz, but the resulting contacts are spread over the frequency range up to 144.126MHz. Therefore, if you heard "CQT UT6X ... CQT UT6X" on 144.100MHz, you reply to the Ukrainian station on 144.120MHz, as T is the 20th letter of the alphabet.

The contest also required that the accepted practice of exchanging callsigns, reports and final 'rogers' (all information received correctly) be used. Although Colin couldn't be active for the entire contest (it ran for 80 hours over a four day period), he did manage to find time to be active during two night time sessions.

Between 0100-0600UTC on December 12, only four stations using high-speed Morse were heard, as the meteor reflections were very short and weak. A total of three complete c.w. contacts were made with the stations of S51AT (Slovenia), YU7MS and 9A4FW (Croatia).

Conditions weren't particularly good on December 15 and were aggravated by a high electrical noise level at Colin's QTH. He was able to null out the noise by pointing the antenna on a beam-heading of 50°. However, this meant that he wasn't beaming in the optimum direction for mainland Europe contacts - all was not lost as Colin did manage to make three side-scatter contacts with German stations DL1MAJ, DL5MAE and DF8AA.

Later during the night, the QRN subsided and contacts were completed with the stations of F6CRP and IZ1BPN. He also called HB9FAP and I1DMP but got no reply. Colin G0CUZ uses an ETM8C keyer to generate the high speed c.w. necessary for m.s. work and a DF7FK digital recorder (DTR) for decoding purposes.

The business end is a Yaesu FT-726R transceiver and a 400W amplifier using a pair of 3CX400A7 valves. The antenna is a 5-element Yagi, 1.5m long, with an MGF1302 Gallium Arsenide f.e.t. (GaAs f.e.t.) low-noise pre-amplifier to increase the receive sensitivity.

It's interesting to note that Colin has always used a very small Yagi for his v.h.f. DX work. **This should be an encouragement to many of you with antenna restrictions.**

DEADLINES

Please forward any news, views, comments or photographs to the address and by the date given at the top of the column.

THANKS FOR YOUR LETTERS AND GOOD LUCK WITH THE DX.

73 David G4ASR

ED TAYLOR N0ED TAKES AN IN-DEPTH LOOK AT THE NEW AMERICAN AMATEUR RADIO REGULATIONS

RadioScene

SCENE USA

PLEASE SEND ME REPORTS & INFORMATION FOR THE JULY COLUMN BY APRIL 15TH.

ED TAYLOR N0ED
PO BOX 261304
DENVER
COLORADO 80226
USA

E-MAIL: N0ED@qsl.net

BIG CHANGES ARE TAKING PLACE IN AMERICAN AMATEUR RADIO REGULATIONS - THE MORSE TESTING LEVEL HAS BEEN DRASTICALLY REDUCED - AN EVEN MORE RADICAL MOVE THAN IN THE UK - AND ED N0ED INVESTIGATES THIS MOVE AND TRIES TO FORESEE ANY FURTHER DEVELOPMENTS.

As in other countries, the USA is getting to grips with licence changes, in particular, there's serious attention paid to the expectation that Morse code testing as an international requirement for h.f. access will be abolished in the next few years. People also consider that 'something must be done', because the number of Radio Amateurs is decreasing and those that are coming into the hobby are in the older age group.

Several proposals try to address the issue of declining numbers in the Amateur Radio hobby. The American national society, the **American Radio Relay League (ARRL)**, put forward a rather complicated scheme that, it assumed, would be a stepping-stone to a completely no-code licence.

Now, the national body which regulates radio matters, the **Federal Communications Commission (FCC)**, has set out a new licensing structure to come into effect in April this year. They've side-stepped (but not completely ignored) the ARRL proposals, probably because the FCC wanted to simplify things.

Let me explain what's going to happen and then mention some reactions I've heard. This subject is one which generates more heated discussion than anything else and will surely continue to do so.

The scheme that has been in effect in the USA for several years encompassed six classes of licence and before you suggest that this is too many and why would anyone need it, just look at the UK. If you count Novice A and B, Class A & B, and Class A/B, you discover that the UK actually has five licences. The British system has come about by gradual change - in the US, changes often result from complete reorganisation.

I won't give too much detail about the different American levels and testing requirements as this was covered in 'Scene USA' in April 1996. The system uses an 'incentive' scheme, where each level allows more spectrum usage than the previous and each lower level must be obtained before proceeding to the next.

The current American licences are Novice, Technician, General, Advanced and Extra. The Technician class exists in two varieties: one allowing v.h.f. and u.h.f. and the other (with a Morse test) adding parts of the h.f. bands.

QUIRKS & SHORTCOMINGS

It has to be said that the new system has a few quirks and shortcomings. A major criticism is that there's no practical element in the testing. Amateurs only have to pass the written examinations which are multiple choice.

What's more, the answers to all possible questions are published in advance! Admittedly, there are over ten times more of these than in the exam, but rote memorisation plays a big part in some people's exam preparation!

With a Morse test for h.f., the successful candidates are then let loose on the bands. So, you can hear 'Hams' on the air with virtually no knowledge of operating or band conditions and, for example, with no clue as to how to make a simple 20m dipole and hang it from a tree.

New 'Hams' of Technician level and above can use 1500W as soon as they get their licences. It's amazing there aren't more problems of misuse and interference!

SOUND FAMILIAR?

Does the American scenario sound familiar? The UK licence, in my view, has similar faults. The UK Novice licence seemed to be a great way to address some of these problems and I thought (among others) that all amateurs should have to pass the Novice exam before going on to the full licence. Perhaps we'll see this the next time the UK system is changed.

The problem will continue in the USA even under restructuring, although concern has been expressed and it's much more difficult to learn and demonstrate practical skills because of the distances that many prospective 'Hams' would have to travel. Still, it should be possible to teach and test something about the practical side of the hobby, even at a distance.

The new US system also provides incentives on a graduated basis which no longer really corresponds with the aspirations of those who enter Amateur Radio. For instance, although the Technician licence gives high power access to all v.h.f./u.h.f. bands, the exam is fairly low in skill level.

There are three (more difficult) exams needed for full h.f. band access and why should full h.f. operation require a higher proficiency level than operation above 30MHz? (Perhaps the reverse should be the case)?

There's another aspect of the American system which will have to be dealt with some day, although this hasn't happened in the current changes. That is the fact that exactly one half of the 3.5 and 7MHz bands are allocated to c.w. and data, even though these sub-bands are sparsely occupied.

These two particular bands are wider than in the UK, but the most ardent c.w. operator would have to admit that this is unfair and results in heavy overcrowding in the 'phone bands during good conditions and wide-open spaces in the c.w./data bands. The FCC has said it will revisit this issue, adding that it would like to have a consensus from amateurs as to what to do!

TWO MAIN CHARACTERISTICS

The new American licensing scheme has two main characteristics. The Morse requirement is reduced to five words per minute (w.p.m.) and, instead of six licence classes, there will only be three.

The change in Morse testing is quite dramatic. The old system required exams at five, 13 and 20w.p.m. depending on the licence class and the FCC has selected what it calls the 'least burdensome requirement' which will satisfy international treaty requirements. So all classes of licence will, from now on, only require five words per minute Morse.

As you can imagine, this has caused quite a furore in radio circles. There are (at least) two schools of thought. Some amateurs, mainly those who want to use h.f., but can't or won't master the Morse code, have said it's a welcome change and about time.

Many also look forward to the day when there's no Morse test at all. I should add that this is the view of quite a few in the rest of the amateur community. (Who have themselves succeeded in the higher speed Morse tests).

On the other hand, there are seasoned licensees who seem to be in despair about what is happening to Amateur Radio and who feel that this is the final straw in 'dumbing down'. Many of these are (not surprisingly) those who have passed the 13 or 20w.p.m. tests to get higher class licences. Their point is that the technical knowledge of those entering Amateur Radio is very low and that this change will lower the standard even further.

There's also the argument that the h.f. bands are too full and we need a way of excluding people who aren't really interested. Since Morse code is a very efficient and useful method of communicating, it is argued that this is a reasonable filter to keep the bands from getting yet more overpopulated.

Is there a third major voice in this debate? I think so, but it comes from those who are unlikely to be consulted and

Fig. 1: The man himself, Ed N0ED, operating during the RSGB IOTA 1999 contest in Bermuda as VP9/N0ED.

these are the people who might take an interest in 'Ham' radio if the entry requirements were different.

Some of them are technically oriented and see the Morse test as an irrelevance to the experimentation they might carry out. Some are simply attracted by talking to people in different places, and lose interest when the Morse code requirement is mentioned.

It seems likely that the new American Morse testing regime will go into effect as planned. Although there's been much grumbling and petitioning, the writing is on the wall.

The FCC, in a singular choice of terminology, has said it will not necessarily 'sunset' the Morse code requirement, even if eliminated from international regulations. However, the winds of change are likely to sweep away Morse testing, in the US as well as elsewhere.

A WELCOME REDUCTION?

Most US amateurs have welcomed the reduction of number of licence classes. The system of incentive licensing has worked tolerably well, but there were lots of anomalies that haven't all been eliminated in the new system and which may perhaps be seen as an interim arrangement.

In a straightforward and decisive move, Novice and Advanced licences are to be abolished. New exams are being devised for the remaining three licence classes - although the General examination will remain much the same.

No new Novice and Advanced licences will be issued, but existing licensees in these categories will retain their existing band allocations. Presumably this will change when the next round of restructuring takes place.

The entry-level licence in the USA will now be called Technician. There will still be two varieties - separating those who have passed the five w.p.m. Morse test and the rest. The former will have access to some parts of the h.f. bands at 200W, as well as all of v.h.f./u.h.f. at 1500W.

There is another anomaly which, I feel, will have to be sorted out sooner or later. This is the fact that the new procedure still doesn't address the fact that an amateur who wants to use all the h.f. allocations needs a far greater knowledge of technical and licensing subjects than a v.h.f./u.h.f. user. This has occurred because the spectrum below 30MHz was considered much more desirable than that above.

It seemed logical to make it harder to get on all the h.f. bands, perhaps because they were overcrowded. Of course, in an incentive system, there also has to be something valuable withheld, so that there's an achievement to work for.

But the withheld band segments are now appearing to be an anachronistic representation of a former generation's aspirations, rather than a fabulous prize to be striven for. The same anomaly doesn't really exist in the British system.

At present, the divide between five w.p.m. and 12w.p.m. affects the maximum power a licensee may use on h.f. This, I feel, has little logic, but does no real harm.

I find the US licensing systems (both old and new) less defensible, because they link technical knowledge with access to either side of an artificial break point, 30MHz. It would make more sense if additional licence exams allowed more power, rather than more h.f. bandwidth.

In the broader context, I feel that we have to take a hard look at the image of Amateur Radio (if it can be said to have one) and how that affects the future of our hobby (say, the next 20 years). We can't afford to continue being a backward-looking group of older men, struggling to defend a hobby which is being overtaken by events.

If Radio Amateurs don't adjust to reality, the authorities will do what they think necessary. We might regret not taking the necessary steps earlier.

In that light, the changes in the American licence that I have described can only be seen as a stepping-stone to something rather different. It's almost as if Amateur Radio is being prepared for what will be a much more radical shake-up - including abolition of the Morse test and what might replace it - a much bigger issue in the USA since the no-code licence is a fairly recent innovation.

In the UK, amateurs are accustomed to the fact that 'Class B' licensees are sometimes very accomplished people, with a lot of technical knowledge. This is not the perception in the USA and there will now be the added fact that even the most qualified of 'Hams' has only to learn five w.p.m. Morse. I think that people will eventually get used to the new scheme, but expect continuing outrage from the 'old fogeys'!

HELP PLEASE!

I need to ask readers for the help, in a future column I will be talking about visiting and operating in the region around the USA, particularly in Mexico and the Caribbean. If you have experience of this area, please can you let me know the following - the difficulties (if any) of getting your licence, where you stayed, your experiences on the air and how you were received by the locals. Photographs are always welcome.

I'm also starting to prepare a list, for a future Web site, of properties in all parts of the world (hotels or private houses) where Radio Amateurs can operate fairly easily, either taking their own gear and antennas, or using those already installed. If you've been 'on the air' whilst on holiday, or for a few days in a contest (or just for fun), please contact me. Many thanks.

THAT'S ALL FOR THIS EDITION OF 'SCENE USA'. PLEASE KEEP SENDING YOUR COMMENTS & OPINIONS TO THE ADDRESS AND BY THE TIME STATED AT THE TOP OF THIS COLUMN.

73 Ed NOED

HF FAR & WIDE

LEIGHTON SMART GW0LBI
33 NANT GWYN
TRELEWIS
MID GLAMORGAN
CF46 6DB
WALES

Tel: (01443) 411459

E-MAIL: trelewis@skynow.net

LEIGHTON GW0LBI BRINGS YOU SOME MORE CONTACT REPORTS FROM AROUND THE UK THIS MONTH. HE SAYS THAT, DESPITE THE RECENT IMPROVEMENT IN PROPAGATION, SOME REPORTERS THINK THAT CONDITIONS AREN'T AS GOOD AS THEY WERE THIS TIME LAST YEAR. READ ON & SEE WHAT THEY HAVE TO SAY ...

As I write this column, the first month of the year 2000 is about to draw to a close. There seems to be a general consensus amongst our reporters that things aren't quite what they expected!

Despite a marked improvement in general propagation, a number of reporters still think that conditions aren't as good as they were at this time last year. Although the higher frequency bands have proved very effective over the past few months, there have still been periods when the bands have been either completely flat or else signal strengths have been very low.

However, one thing that hasn't changed on the bands is the number of pile-ups for DX stations - although, unfortunately, along with them comes the inevitable poor operating. In particular I mention an example on 18MHz recently where things were so bad I couldn't even hear the DX station because of all the QRM!

Despite calls for order, stations were calling the wanted station even when he was transmitting - and when he was already in contact - thus reducing it all to the level of a farce. There followed arguments and bickering which made the situation even worse, making it sound like a pub-brawl on air.

I wonder if this is really what we want people to hear when they listen in on our bands and what impression it gives to those who are considering joining us as licensed amateurs? Not exactly the best advertisement for our hobby, eh?

PROPAGATION REPORT

Moving swiftly on now and its over to our Yeovilian reporter **Don McLean G3NOF** for his usual 'Propagation Report'. Don says: "On the 14MHz band, west coast north American stations were heard on most days between 1600 and 1800UTC, including Alaska and Hawaii, along with Antarctica around 1730UTC.

"Another daylight band, 18MHz, produced signals from New Zealand, Australia and Japan on the long path in the mornings, with the band changing to short path at about 1000UTC, while some Asian signals came in at around 1400 to 1500UTC.

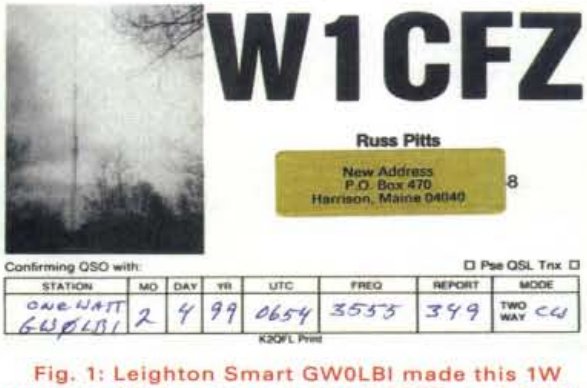


Fig. 1: Leighton Smart GW0LBI made this 1W contact with American station W1CFZ, on 3.5MHz. He says that he's quite proud of it!

THIS MONTH GRAHAM HANKINS G8EMX CELEBRATES THE OFFICIAL APPROVAL OF ANOTHER ATV REPEATER!

RadioScene

"The 21MHz band was generally only open between 0900 and 1900UTC, starting with the short path to Australia, New Zealand and Japan. North Americans were heard from 1300 to 1900UTC, with good signals from the west coast of the USA from 1600UTC.

"The narrow 24MHz allocation opened at around 0830UTC with the long path to Asia and Japan, followed by the short path from 1000UTC. North America was heard from 1300UTC until the band closed at 1700UTC.

"A few New Zealand stations were heard on 28MHz at around 0900UTC on the long path, with north America coming in from 1300UTC until the band closed, usually around 1800UTC".

YOUR REPORTS

Your reports now and we start with the 14MHz band as space is limited this month. First up is **Sean Gilbert G4UCJ** of Milton Keynes, who's been using the /2K suffix and who says he notched up over 750 contacts with it in just one week! (Don't you sleep at all Sean?)!

However, his 14MHz log for December shows VQ9VK (Chagos Island) at 1130UTC, 5T5U (Mauritania) at 1335UTC and OX3FV (Greenland) at 1732UTC. All worked with 3W of c.w. and an indoor dipole.

Meanwhile, down in Yeovil, Don McLean G3NOF lists his high power s.s.b. contacts with EP2SMH (Iran) at 1542UTC, KH6NJ (Hawaii) at KL7JM (Alaska) at 1800UTC, TA2BK (Turkey) at 1613UTC. As well as R1ANZ (Antarctica) at 1750UTC and 3DA0WPZ (Swaziland) at 1817UTC, QSL via ZS6WPX.

Taking part in the **'Original QRP Contest'** in early January was **Eric Masters G0KRT** who has been rather busy in his new job (good luck Eric!) but has still found time to get on the air. Using just 5W of c.w. and a wire antenna he lists his 14MHz contacts with OK1FVD (Czech Republic), UR5VK (Ukraine), HA8RJ (Hungary), SM6FPC (Sweden), DL3KVR (Germany) and RN1AO (Russia) all between 1200 and 1330UTC.

THE 18 & 21MHz BANDS

On to the 18 and 21MHz bands now. Using a 40m horizontal loop antenna on the 18MHz band brought **Robin Trebilcock GW3ZCF** of Bishopston near Swansea two nice s.s.b. contacts in the form of VK3EW (Australia) at 1025UTC and 7X2DG (Algeria) at 0952UTC, while 21MHz brought him contacts with LU9AY (Argentina) at 1701UTC, 9K2/KM5FY (Kuwait) at 1015UTC, RA9UAR (Asiatic Russia) at 0940UTC and W6XS west coast USA) at 1731UTC.

All-c.w. man **Ted Trowell G2HKU** on the Isle of Sheppey in Kent used 70W on 18MHz to hook up with VE6XG (Canada) and VQ9VK (Chagos Island), both at around 1600UTC, while operating on 21MHz to snag PY2OW (Brazil) at 1500UTC and FP5EJ (St. Pierre & Miquelon Islands) at 1600UTC.

Don G3NOF used s.s.b. as usual, listing his 18MHz contacts with JT1BV (Mongolia) at 1000UTC, 9Q5ZW (Democratic Republic of Congo) at 0912UTC, QSL via OM3LZ, and W5SAL (New Mexico, USA) at 1606UTC. His 21MHz list includes BV2TL (Taiwan) at 1228UTC, DS3BGI (Korea) at 1018UTC QSL via HL3QVZ, XE3AAF (Mexico) at 1714UTC, 8P9EM (Barbados) at 1251UTC and ER2000A (Moldova) at 1250UTC.

THE 24 & 28MHz BANDS

The 24 and 28MHz bands this month sees a very warm 'HF Far & Wide' welcome to **Hughie Purvis M5ABM** near Middlesborough. He has been rather busy of late on the higher frequency bands, using 50W of s.s.b. and a 4-element 28MHz monoband beam.

Hughie's first list includes a 24MHz contact with A41KJ (Oman) at 1230UTC, as well as his 28MHz contacts with VK6APH (Australia) at 1200UTC, HS0ZBS (Thailand) at 0900UTC, VC4X (Canada) at 1608UTC, VR2K (Hong Kong) at 1030UTC and K1RED (USA) at 1400UTC.

Robin GW3ZCF offers a single 24MHz contact this month with A41LZ (Oman) at 0930UTC. While using low power on 24MHz this month was Carl Mason GW0VSW of Skewen, whose 4W of c.w. reached out to OH3BFK (Finland) at 1100UTC, 8P9EM (Barbados) at 1210UTC and HC5AI (Ecuador) at 1308UTC.

However, on the 28MHz band Carl switched to higher power at 80W and snagged 3B8FG (Mauritius) at 1251UTC, and KP4/G3MHV (Puerto Rico) at 1254UTC, all contacts made using a G5RV dipole antenna.

On 28MHz Sean G4UCJ lists PZ5RA (Suriname) at 1718UTC, as well as 5H3RK (Tanzania) at 1211UTC, while Ted G2HKU spend some time on 28MHz too, using c.w. to hook up with LU4DD (Argentina) at 1100UTC, P40V (Aruba Island) at 1500UTC, while 1600UTC brought in VP5/K4LQ (Turks & Caicos Islands), CO8LY (Cuba) and ZP6CW (Paraguay).

To tie up the ribbons this month is Don G3NOF, whose s.s.b. signals reached out to NP2BT (US Virgin Islands) at 1205UTC, 8P9EM (Barbados) at 1706UTC and 9G1MR (Ghana) at 1157UTC.

SIGNING OFF

Well that just about wraps things up for this month. A good crop of DX was reported this time around so, despite the bands sometimes being quiet, there's a great deal of long distance traffic out there to be worked.
I guess it's a question of monitoring conditions daily and being on the right band at the right time! Thanks again to all 'HF Far & Wide' reporters for their most valuable information.

AS USUAL, REPORTS, INFORMATION AND PHOTOGRAPHS (I LIKE TO PUT A FACE TO YOUR NAMES!) BY THE 15TH OF THE MONTH. DETAILS AT THE TOP OF THE COLUMN.

Leighton GW0LBY

FOCAL POINT

REPORTS & INFORMATION TO:

GRAHAM HANKINS G8EMX
17 COTTESBROOK RD
ACOCKS GREEN
BIRMINGHAM B27 6LE

E-MAIL:
graham@ghank.demon.co.uk

PACKET: G8EMX@GB7SOL

THIS MONTH GRAHAM HANKINS G8EMX CELEBRATES THE OFFICIAL APPROVAL OF ANOTHER ATV REPEATER AND TELLS YOU A LITTLE BIT ABOUT THIS YEAR'S BATC RALLY WHICH TAKES PLACE IN MAY THIS YEAR.

It's always a pleasure to be able to begin 'Focal Point' with news of another new Amateur TV (ATV) repeater receiving official approval and this is one of those times! The new ATV repeater, **GB3YT**, has just been licensed and will be on 1.3GHz (24cm), co-sited with the existing GB3WY 430MHz (70cm) voice repeater at Queensbury near Bradford, Yorkshire.

The ATV repeater will transmit on 1316MHz and receive on 1249MHz. The antennas will be horizontally polarised omni-directional Alford Slots and the effective radiated power will be the standard maximum 14dBW.

Allan Robinson G3TQA is keeper of GB3YT and says: "The site is on the eastern edge of the Pennines which should give it excellent coverage to the east, hopefully right out towards the coast. Coverage to the south should also be good and we hope to be able to reach as far as the northern limit of the service area of ATV repeater GB3VL (Lincoln). When not in use, the repeater will be in beacon mode transmitting test cards and text pages".

This particular ATV repeater replaces the service lost when GB3ET had to be taken off-air last year, because of a site-rental price increase. Perhaps the most major challenge for any repeater group is finding a site capable of providing adequate r.f. coverage but without interference to other repeaters or services. As well as somewhere where the repeater can be installed at acceptable cost or, ideally, free.

Hopefully, GB3YT will provide equivalent service - Allan G3TQA adds: "We still have some work to do before we're ready to switch on GB3YT but it should only be a few weeks before the repeater is on the air - there will also be a Web site soon"!

ANNUAL BATC RALLY

In early Spring the **British Amateur TV Club (BATC)** organises its annual rally which, for the past few years, has been held at the Sports Connexion near Coventry. This year sees the BATC Rally moving to a new venue, the **Bletchley Park Cryptology Museum near Bletchley** (stating the obvious!), **Buckinghamshire** on **Sunday 7 May 2000**.

Rally organiser **Dave McQue G4NJU** says: "Besides the Hall for the usual traders, there will be rooms for members to demonstrate their equipment. There will be a limited area for the outdoor flea market and early booking is advised, £7 in advance £10 on the day.

"The museum itself is closed on the day but special tours of the Cryptology Trail will be available". Also at the museum is the ATV demonstration room which can access and receive ATV repeaters GB3TV and GB3TG.

"Members and traders wishing to exhibit should contact either Dave G4NJU or **Tom G3LMX**, both addresses are in the Call Book. More information on the rally and the BATC can be

Fig. 1: Mike Saunders G8LES demonstrating ATV at a rally. The BATC hopes to appear at some of the larger rallies this year.

found on the Internet at **http://www.batc.org.uk**

TEST CARD SOFTWARE

The 'PCATV' software generates test cards complete with callsign onto a PC monitor and it is something that I've mentioned it in a previous 'Focal Point'. The latest version of this software allows for different callsign extensions to be added, without re-registering.

So, once the programme has been downloaded and registered to a callsign, (by payment of a nominal fee), the suffixes /P, /A, (and even /M!) or the plain callsign can be selected at will. Don't forget that your computer will need a video card with 'TV Out' to get a 625 line PAL test card picture!

A BREAK FROM ATV?

I try to avoid writing about broadcast, or professional TV here, because 'Focal Point' is about ATV which, by my definition, is TV pictures over the amateur bands. However, I'm going to break my own rules, because I'm considering buying a super new Widescreen TV! So I paid a visit to a couple of local retailers.

Now, the picture and sound of your traditional 'telly' has hardly been demanding of viewer intervention - channel change, brightness, colour saturation and volume were all we were expected to want to alter.

'Contrast' was either internally preset or hidden at the back of the cabinet, well away from the 'lay' viewer. But the TV in the 21st century is now part entertainment centre and part computer with on-screen 'menus' allowing the user to 'fiddle' with almost everything!

When considering the models on sale, I always ask for the remote control because I need to 'play' with the functions and, incredibly for such a fundamental operation, see how long it takes a set to change channel! My current TV at home responds with a new programme the instant the remote button is pressed, but several of the show models went to 'black' for a period between channels. So my search for a widescreen model with 'immediate channel change' continues!

The TV widescreen tube format, or aspect ratio, has been standardised as 16:9 (sixteen by nine). This is much closer to that of many cinema films than the 4:3 relative screen dimensions of traditional sets.

Of course, 4:3 analogue programmes will continue to be broadcast for some time to come. So a 'widescreen' set has to accommodate several picture proportions.

How does a standard 4:3 picture appear on a widescreen set? If displayed as transmitted, (and why on earth not?) the picture will be symmetrically in the centre of the wide screen so obviously a 'black margin' of unused tube will be on the left and right edges.

Surprisingly, some viewers object to this, (as they do to the bands top and bottom when a brave broadcaster transmits a film in its intended widescreen format!). So a 4:3 picture can be electronically stretched horizontally to fill the available area - of course, this distorts the image!

Or the 4:3 can be 'zoomed' or expanded in both dimensions - no distortion and the wide screen is filled horizontally but top and bottom are slightly 'cut off'! Aspect ratio as viewed can be selected by the viewer.

All these choices, and many, many more are selectable. For the first time in domestic TV viewing, there appears to be a 'learning curve' involved! Anyway, I'm afraid that's all I have room for this month.

UNTIL THE NEXT TIME MY COLUMN'S IN *PRACTICAL WIRELESS* ...

73 Graham

DATA SCAPE

NEWS, VIEWS & PICTURES TO:

ROGER COOKE G3LDI

TEL: (01508) 570278

E-MAIL: rcooke@g3ldi.freeserve.co.uk

PACKET: G3LDI@GB7LDI

THIS MONTH ROGER COOKE G3LDI SPEAKS OF THE IMPORTANT PART PLAYED BY THE COMPUTER MONITOR IN TODAY'S AMATEUR RADIO STATION & TELLS YOU OF THE ARRIVAL OF THE NEW LCD MONITOR. AS WELL AS ALL THIS HE ALSO LOOKS BRIEFLY AT THE NEW AMERICAN LICENCE CHANGES.

The new millennium will bring us technology that most of us only dreamed about or read in the ***Eagle*** comic in the 20th Century. The amateur station will be designed with the monitor as the centre point and the station will be controlled from the computer, most probably voice accessed.

The keyboard will still be used however and I can't see this being replaced totally - at least not in the foreseeable future. There are certain specific things that the keyboard will be used for, the RTTY contacts for example. They wouldn't be quite the same without a keyboard!

For the amateur of the future, staring at a screen will be mandatory for the operation of the station. Indeed, I spend most of my time doing just that at the moment, with the BBS, Satellite Gateway, RTTY operating, typing articles and so on and the monitor should, therefore, be the best that you can buy, with low glare and at a comfortable position.

DESIGN OF MONITORS

The design of monitors has improved at a dynamic pace over the years. Increasingly, there's no such thing as a standard monitor type that suits all users. New technologies and designs keep the market fresh and tempt us with different appearances too.

Most users, however, give little thought to their monitor - to most users a monitor is a lump of plastic that sits on the desk gathering dust, only receiving the attention of its owner when it breaks. In fact most users are only concerned enough to ask if the monitor is included in the price of the PC.

Monitors provide constant scares over health and safety, as much related to poor posture as to radiation from the cathode ray tube (c.r.t.). Most monitors today are multi-scan (which means they can perform at high resolutions with fast refresh rates) and many now come with audio built in.

There are a number of things to consider when buying a monitor, the first of which is the use to which it will be put. If it's used mainly as a text monitor, for example the amateur station monitor, then pure colour quality will be of little interest. But, for somebody with graphics as their main interest, the ability to show true colours is critical.

The old c.r.t. type monitor will gradually be replaced with the flat-screen l.c.d. display. These can now be seen in banks and building societies and will shortly reduce in price to make them competitive with the c.r.t. monitor.

There are several obvious advantages to the l.c.d. monitor compared to the c.r.t. - the power supply for a start, or lack of it. In the older c.r.t. displays, the electron beam gun, the deflection yoke or coils and the c.r.t. are the three major components.

The electron beams are emitted from the gun in the neck of the c.r.t. Being negatively charged, the electrons are attracted by a high-voltage electric field that is generated at the front of the c.r.t.

To guide the electrons to strike and illuminate the proper phosphor areas on the front inside surface of the c.r.t., called the shadow-mask, a deflection yoke is used to deflect the beam. The tube takes up an enormous amount of room and the larger the screen size, the larger the monitor.

The l.c.d. display on the other hand, is like a picture, only slightly fatter. Liquid crystal is a substance that is neither liquid nor solid, but exists in a state somewhere between the two.

Liquid crystal is formed by blending certain base materials (dioxene and biphenyls) with other materials to obtain properties such as viscosity, elasticity and reflective index. When you combine l.c.d. and flat panel technology, as a means of converting video signals to images, you end up with the type of screen used in notebooks.

In the early days of mobile

Web Watch:

Graphics Card Web Site: http://www.zdnet.com/products/filter/guide/0,7267,1500117,00.html

Packet Radio Web Site: http://www.tapr.org/tapr/html

MULTICOMM 2000

SPECIAL SALE ON SELECTED ITEMS

ICOM ICOM ICOM ICOM

PCR-1000
£229

PCR-100
£149

IC-T81E
£269

IC-746
£1069

ONE ONLY IC-746 EX-DISPLAY ONLY £825

IC-2100H
£189

IC-2800H
£395

Limited stock

IC-706 MkII G
£899

SP-21 SPEAKER.....£45 FL-222 FILTER.....£40
FL-223 FILTER .....£40 FL-101 FILTER.....£40
FL-100 FILTER.....£40 FL-70 or FL-63.....£20 each

YAESU

FT-1000MP DC
£1495

ONE ONLY FT-1000MP AC WITH 4 FILTERS EX-DISPLAY £1425

FT-1000MP AC
£1425
DISPLAY UNIT WITH 4 FILTERS

FT-8000 £239

SP-8
£99

£89
MD-100

FT-100
£875

FT-2500M
£189

HEAVY DUTY
G-450
£275

FT-8100
£319

ATAS-100 ANTENNA
£150

ALINCO

DX-70T H
£525

SUPER SAVERS PHONE FOR DETAILS

SGC

SG-2020
Brilliant HF QRP transceiver
£499

PC-16000E
ONE ONLY
SPECIAL PRICE
£1199

patcomm

FULLY FEATURED HF TRANSCEIVER WITH BUILT-IN RTTY & CW DECODER. FULL DSP, KEYBOARD SUPPLIED. 100W OUT GENERAL COVERAGE RECEIVE.

SPECIAL OFFERS

FT-90
SUPERB MINI-DUAL BAND MOBILE RIG ONE ONLY AT
£269

ONLY ONE OF EACH

2 YEAR GUARANTEE

FT-900ATC
AUTO ATU, COLLINS FILTERS. NEW IN THE BOX. LAST ONE ONLY
£699

TS-570DG
£799

£49
HS-5 HEADPHONES

KENWOOD

MC-60A
£79

TH-G71E
£189

TM-G707E £245

OPENING HOURS

Monday - Friday 9.00-5.00pm. Saturday 9.00-2.00pm.
Closed Sundays.

FINANCE

WE NOW CAN OFFER YOU A COMPETITIVE FINANCE PACKAGE WITH NO DEPOSIT.
Multicomm 2000 is a licensed credit broker APR 19.5%. Written quotations are available upon request.

FINANCE EXAMPLE. APR 19.5%

Cash Price	No deposit	Balance for finance	36 months @	Total finance price
£289.00	£00.00	£289.00	£10.45	£376.20

ORIGINAL DELUXE
USED £99

BLUE RACER
£139

RadioScene

PCs, gas plasma-based screens were common, but these days, liquid crystal is considered to offer the most potential. In an active matrix display, each individual pixel is controlled by an active element, usually a thin film transistor.

The thin film transistor gives fast response times which makes it suitable for moving picture applications such as televisions, although it's common to see a notebook sold with an active matrix l.c.d. screen. A passive matrix display uses no transistor and is thus better suited to still image applications, such as PC use.

THE GRAPHICS CARD

The monitor is only part of the story. The other consideration is the graphics card. These days, most PCs have a good quality graphics card as standard, with an STB or ATI graphics board as the usual choice.

Again, if high quality graphics performance is required, then a high quality graphics card is also required. The normal way to connect these cards has been a PCI slot in the PC.

As PCs have become faster, this method has been superceded by the Advanced Graphic Part (AGP), which arrived with the Pentium II chip. Now there's the Pentium III chip, which is, again, in the process of being upgraded.

Performance is quadrupling and with the arrival of 64bit chips this year, no doubt even faster AGP will emerge. Great graphics cards need good drivers and if you have a poor driver the performance will suffer.

For the average amateur station, however, great graphics aren't necessary. A good monitor is and next time you're in the market for one, give it some thought, as it will play an increasingly important part of your station.

Why not take a look at the following site which looks at graphics cards. This site can be found at:

http://www.zdnet.com/products/filter/guide/0,7267,1500117,00.html

PACKET RADIO

Packet radio has been with us now for over 15 years! Have I been running my BBS for that long? No wonder I have grey hair! Seriously though, it's a British disease when presented with something new, high-tech or up-market, to knock it as much as possible - I've never seen the point of being quite so negative, but it's always been thus and no doubt always will!

Most of the party-poopers were on the Internet and made it known that they wouldn't use something like the Packet network put on by a bunch of amateurs. With the advent of free ISPs and cheap weekend calls, this effect has increased.

It's a bit like the 'clique' effect - you know what I mean, guys chatting on "their" 144MHz repeater, when joined by others just move up to "their" 430MHz repeater. When the same thing happens there, they move up to "their" 1296MHz repeater and there they remain, both talking, but not to anybody else in a hobby that is supposed to be sociable!

I shouldn't complain, my BBS has less work to do in forwarding mail, as does the Satellite Gateway, so the use of the v.h.f./u.h.f. bands will gradually fade away. This makes an ideal situation for the predators, the commercial people who wish to sell off our bands and take them from us!

It may not be all gloom and doom however, Packet radio has evolved over the years and one of the reasons that traffic is lower is due to the diversification within Packet itself. We now have DX-Clusters, used by DXers, and avid contesters alike.

The DX-Cluster is now part of the contest station, if points are at a premium. Automatic Postion Reporting System (APRS) is gaining in popularity, mostly in the USA granted, but it has quite a following in the UK now. DXpeditions now use the data satellites to move log data around, as well as the Internet, as witnessed by the Spratly Island expedition and the Heard Island group.

The Internet is responsible for siphoning off many former users of the Packet network, but give it some thought, if we carry on that way, we will become Amateur Telephone Operators instead. Much better to keep the amateur traffic on the amateur network and the quasi-business mail for the Internet. It might be a good thing to combine the two, as per the latest RSGB announcement, but it could also be a rod for our own backs.

For some more information on Packet radio, why not take a look at the following Web site:

http://www.tapr.org/tapr/html

AMERICAN LICENSING CHANGES

The Federal Communications Committee (FCC) has issued its long-awaited Report and Order in the 1998 Biennial Regulatory Review of Part 97 - more commonly known as "license restructuring". The bottom line is that starting April 15 2000, there will be three license classes - Technician, General and Amateur Extra - and a single Morse code requirement of 5wpm.

"We believe that an individual's ability to demonstrate increased Morse code proficiency is not necessarily indicative of that individual's ability to contribute to the advancement of the radio art", the FCC said. Besides drastically streamlining the Amateur Radio licensing process, the FCC said its actions would "eliminate unnecessary requirements that may discourage or limit individuals from becoming trained operators, technicians, and electronic experts".

Although no new Novice and Advanced licenses will be issued after the effective date of the Report and Order, the FCC doesn't plan to automatically upgrade any existing license privileges. The ARRL had proposed a one-time, across-the-board upgrading of current Novice and Tech Plus licensees to General class, but the FCC declined to adopt the idea.

This means that current licensees will retain their current operating privileges, including access to various modes and sub-bands and will be able to renew their licenses indefinitely.

The following is a quote from a recent issue of ***QST*** magazine and, it seems that the American Amateur Relay League (ARRL) is adopting a similar approach to the RSGB in respect of the c.w. code speed.

"Of course, viewed from the other perspective, c.w., although a licence requirement in my day, is just another data mode. Morse is no longer required by the commercial employers such as shipping, etc. However, is this any excuse why we should lower our standards? I would suggest this argument would remain until the last c.w. operator bites the dust! On the amateur bands, that will not be for many, many years".

Being a long-licensed G3, I suppose I could be accused of being a Luddite in this regard. I do feel that so much has been done in the last decade or two to diminish any effort required from the individual in order to obtain the Amateur Radio licence, that it's becoming a joke. It seems to be something that is no longer held in any regard by any prospective employer, as it used to be and also not particularly valued by the individual.

SOME Y2K PROBLEMS

Whilst most of the Packet network seem to have rolled over to the 21st Century with minimal problems, there were a

Fig. 1: The Zetnet Web site can be found at: http://www.zdnet.com/products/filter/guide/0,7267,1500117,00.html

Fig. 2: This site on Packet radio can be found at: http://www.tapr.org/tapr/html

few problems around that you might enjoy reading about.
1. A Y2K problem caused a US military satellite system to lose contact with the earth. Unusually, the Pentagon - which tends to play down the significance of technical difficulties - said that the glitch was a "significant problem".
2. Hewlett-Packard's Internet site clicked over to read 'January 1, ***DATE INVALID***'
3. Microsoft admitted two Y2K-related problems affecting *Internet Explorer* and its Hotmail E-mail program, i.e. 'displays showed the date as 3900 on some Web pages and Hotmail could be affected by false error messages.
4. International reports suggest that seven US nuclear power stations suffered what were described as "minor" Y2K glitches. The monitoring system at a Japanese nuclear plant also crashed.
5. Millennium bug computer glitches added a century to some Italian jail sentences and knocked 100 years off others. This forced court officials to close administrative offices.
6. The BBC Radio One Web site was hit by an embarrassing date roll-over, which sent the station back to 01 January 1900. The first stab at fixing apparently changed the date to 01 January 0020, but all is OK now.

KEEN PSK31 OPERATOR

I recently received an E-mail from **David G3VFP**, a very keen PSK31 operator. His comments were very interesting and, in effect, he's supporting both c.w. and Data modes and so isn't biased either way.

David took me to task for calling PSK31 a "fun-mode". Well, I think that it's fun, as is operating RTTY. Both are person-to-person contacts and both are real-time. They also share the fact that neither is error correcting and operators typing errors are there to see, unless buffer sending is used of course - that's why I think of PSK31 as a "fun-mode".

Looking at Packet radio and BBS operation, this is much more like a service than a personal contact medium. I wasn't being derisory in any way by describing PSK31 a fun mode.

However, band plans are becoming more difficult with more data modes to cater for in a limited bandwidth and I've had several pleas from the QRP c.w. operators not to impinge on their frequencies. Please bear this in mind when looking for that ever-decreasing clear frequency!

THAT'S ALL

Anyway, that's all for this month's edition of 'Data Scape'. I hope that you'll join me next month when I hope to bring you more news of a data nature. Don't forget to keep your opinions coming in.

NEWS, VIEWS & PICTURES TO ME AT THE ADDRESS AT THE TOP OF THIS COLUMN.

73 Roger

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 IS BACK WITH SOME READER FEEDBACK AND QUERIES AS WELL AS SOME INFORMATION ON WHERE YOU CAN FIND ALL THE DIFFERENT E-MAIL ADDRESSES OF ALL THE INTERNATIONAL BROADCASTING STATIONS. ALL MIXED IN WITH HIS USUAL FREQUENCY NEWS, OF COURSE.

Fig. 1: Radio New Zealand QSL card.

Welcome to this month's roundup of what's happening in international broadcasting worldwide. There's been some reaction to items in recent columns, plus some news from readers, so let's kick off with this E-mail from **Christopher Bingham** in Liverpool:

"I found a Californian medium wave (m.w.) station on 873kHz last night and they were broadcasting an American football match! I have a Phillips 1986 SC2999 world communications portable receiver with just a telescopic aerial!

"They had all the funny American adverts too! The radio doesn't have true s.s.b., just a b.f.o. Does this make it impossible to receive good s.s.b. signals even with an external aerial? I thought this would interest any NFL fans!".

I have to disappoint you, Christopher - although there was commentary of an American football game, the station you were listening to wasn't in California. The signal on 873kHz comes from Frankfurt in Germany and the station is the American Forces Network, **AFN**.

The Frankfurt transmitter is 150kW and serves the US Armed Forces in Germany. There are lower power transmitters carrying the same programmes in Stuttgart, Heidelberg and Münchengladbach. You can contact AFN at **APO 09742-4310, Frankfurt, Germany**.

E-MAIL FROM CYPRUS

John Parry 5B4AFR sent an E-mail from Cyprus following up an item about the 'numbers' station that appeared in February's edition":

"Referring to Anthony Privitera's letter re: Kilo Alpha Papa 2. This, and other letters transmissions, come in here loud and clear in daylight. I feel sure that they originate in this [Eastern] part of the Mediterranean, probably Israel. The messages are likely to be from a security organisation to their agents in the field. The code is more than likely to be of the 'one day pad' type". The days of spying are certainly not over, so keep your ears on the short wave bands to discover other 'numbers' stations.

John Baxter in Hull sent me a message using his new E-mail phone: "Been monitoring **Radio New Zealand International (RNZI)** (see **Fig. 1**) for the last few weeks, they where coming in quiet strong after 0800UTC on 17.675MHz. They announce that they're on from 1650 till 0705 (must be the Pacific Islands local time).

"Anyway, the last week I've heard only adjacent splatter on that frequency, but I've found them even stronger, on 17.690MHz at 0705 to 1105UTC". Well, I gave the frequencies for RNZI in last month's column, but in case you missed them, here they are again (all times are in UTC):
1850-0606 on 17.675MHz;
0606-1005 on 17.690MHz;
1105-1500 on 6.105MHz;
1500-1650 on 6.145MHz;
and on weekdays between 1650-1850 on 17.675MHz.

John goes on: "By the way Peter, can you help me? I hear **Radio Havana Cuba** regularly in Spanish after midnight and at 0100UTC in English and want to send them an E-mail. I notice that in your column in the December 1999 *PW* you give the E-mail address for Radio Havana as **rhc@radiohc.org** should this have an extension .co"?

Well, the answer is no, John, it should not! The ".org" at the end stands for organisation and, in Internet terms, this means a non-profit making organisation. I've always thought that the BBC ought to be ".org" instead of ".co.uk" as it doesn't make a profit.

DIFFERENT E-MAIL ADDRESSES

If you're interested in seeing all the different E-mail addresses of the world's international broadcasters, then check out the latest edition of the ***Global Broadcasting Guide***. It's available from the *PW* Book Service, or you can order on line at **www.aib.org.uk** (See **Fig. 2**).

China Radio International (CRI) is now on m.w. in London for an hour a day. Tune to **Spectrum Radio** on 558kHz at 2300UTC to hear news and current affairs programmes from Beijing. This arrangement mirrors one that has existed a long time in Washington DC in the USA where WUST relays CRI programmes.

Spectrum Radio, based in Wandsworth, South West London, carries a mixture of programmes in different languages, from Tamil to Arabic. The transmitter is at Crystal Palace, although it's not operated by Crown Castle Transmission who own the mast and most of the buildings on the site.

It's just 600W and covers the Greater London area. I'd be interested in finding out how far the Spectrum signal gets - if you live outside London and manage to catch the CRI broadcast at 2300UTC, please let me know.

MULTICOMM 2000

SPECIAL SALE ON SELECTED ITEMS

COLLECTOR'S CORNER

COLLINS EQUIPMENT

S-LINE

312B-4

KWM-2

75S-3

30L-1

516F-2

75A-4

75A-3

We have been supplying specialist radio collector's world-wide for over 4 years now. In this time, we have built up a fabulous collection for ourselves. We have decided to offer part of our collection, which is in "museum quality" for sale. We have been specialising in Collins and Drake equipment. The items we are showing are just a small part of our collection. We have so many items, including memorabilia, available. You need to call us for our full itemised list. If there is an item that we do not have, we would have no problem obtaining it for you. We have not indicated any prices on our collector's items because each one is individual and has a history behind it.

DRAKE EQUIPMENT

4-A LINE

4-B LINE

4-C LINE

TR4-CW

RV4-C

STATION CONSOLE

2-B

2-C

MS-4

AC-4

MN-4

W-4

RECEIVERS

AOR AR5000
SW/VHF/UHF
RECEIVER
£1195

ICOM IC-R8500
SW/VHF/UHF
RECEIVER
£899

BEARCAT 9000XLT
VHF/UHF
SCANNER
£229

DRAKE R-8B
SHORT WAVE
RECEIVER
£969

AOR AR-8200
SW/VHF/UHF
SCANNER
£299

VR-500
SW/VHF/UHF
SCANNER
£225

MVT-9000mkII
SW/VHF/UHF
SCANNER
£325

MVT-7100
SW/VHF/UHF
SCANNER
£195

PW'S REGULAR REPORT SECTION - FULL OF TIPS, IDEAS AND INFO

RadioScene

INCREASED ENGLISH SERVICE

Deutsche Welle (DW) (PO Box 100 444, 50968 Cologne, Germany) has increased its English radio service on satellite and via the Internet. Until the beginning of the year there was an annoying gap in the European afternoon between 1330 and 1600UTC. The rearrangement of DW's satellite channels gives listeners and rebroadcasters the opportunity to hear DW English 24 hours a day on DW2. DW1 carries German programmes.

Here's the complete short wave (s.w.) schedule for DW in English (all times are in UTC):
0100-0145 on 6.040, 6.145, 9.640, 9.700, 9.765MHz;
0200-0245 on 7.285, 9.615, 9.765, 11.965MHz;
0300-0345 on 6.045, 9.535, 9.640, 9.700 11.750MHz;
0400-0445 on 7.280, 9.565, 9.765, 11.965MHz;
0500-0545 on 6.100, 6.120, 9.670, 11.795MHz;
0600-0645 on 7.225, 9.565, 11.785MHz;
0600-1900 on 6.140MHz;
0900-0945 on 6.160, 11.785, 12.055, 15.105, 15.410, 15.470, 17.800, 17.820, 17.860, 21.600MHz;
1100-1145 on 15.410, 17.800, 21.780MHz;
1600-1645 on 6.170, 7.225, 9.735, 11.785, 15.145, 15.380, 17.800, 17.810MHz;
1900-1945 on 11.765, 11.810, 13.610, 15.390, 17.810MHz;
2000-2045 on 9.725MHz (this is the European transmission);
2100-2145 on 9.615, 9.690, 9.765, 15.135, 15.410, 17.560MHz; 2300-2345 on 9.525, 9.815, 13.690MHz.

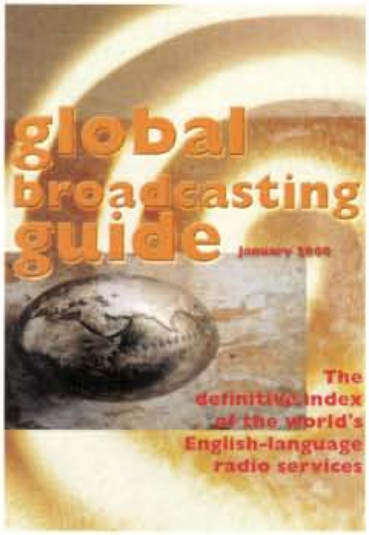


Fig. 2: The front cover of the Global Broadcasting Guide.

Czech-based, US-funded **Radio Free Europe (RFE)** and **Radio Liberty (RL)** have cut back on their night-time Serbian-language programs (via satellite and terrestrial transmitters) to Yugoslavia, returning to the regular broadcasting hours that had been increased during the NATO air campaign last year. The Balkan service of **Voice of America (VoA)**, **RFE** and **RL** on Astra continues 24 hours-a-day, uplinked from the UK.

The VoA is cutting more of its services to Europe and Baltic-language programmes will cease this summer. The Estonian, Latvian and Lithuanian services have been on the air since 1951.

But research suggests that there are now very few listeners for these services and head of VoA, **Sanford Ungar**, believes that more resources should be concentrated on reaching listeners via s.w. and rebroadcasting in Africa, Afghanistan, China and South Asia.

Meanwhile, VoA has a new address following a change in some US Zip codes (the equivalent of UK postal codes). Mail should now be sent to VoA, **Washington DC 20237, USA**.

Fig. 3: Small sticker courtesy of Radio Havana Cuba.

OTHER FREQUENCY NEWS

Now on to some other frequency news for you. **Radio Vilnius (Kornaskio 49, LT-2674 Vilnius, Lithuania)** reaches out from Lithuania via its own m.w. transmitters and by a hired transmitter in Germany. The English schedule is (all times are in UTC):
0030-0100 on 6.120MHz;
0930-1000 on 9.710MHz;
2130-2200 on 666 and 1557kHz.

Radio Albania is on the air with English (all times are in UTC):
0130-0200 on 6.115, 7.160MHz;
0330-0400 on 6.115, 7.160MHz;
1745-1800 on 7.210, 9.755MHz;
2230-2300 on 1215kHz m.w. plus 7.130 and 9.540MHz.

You might like to try a more ambitious DX catch - so why not try **Radio Cambodia**. It has two English-language broadcasts, at 0015-0015 and 1200-1215UTC both on 11.940MHz, although the station does tend to drift to nearby frequencies. At other times of the day, you can hear Lao and Thai language programmes.

THAT'S ALL AGAIN FOR THIS MONTH. UNTIL THE NEXT ISSUE OF *PW* - GOOD LISTENING!

Peter

Web Watch:

***Global Broadcasting Guide*: www.aib.org.uk**

Radio Havana Cuba: rhc@radiohc.org

SEND YOUR ADVERT TO PRACTICAL WIRELESS, BARGAIN BASEMENT, ARROWSMITH COURT, STATION APPROACH, BROADSTONE, DORSET BH18 8PW

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

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.

For Sale

Alinco DJ-G5T dual-band hand-held with extras, as new, £175. AR7030 receiver in excellent condition with power supply, £325. Tel: London (SW15) 0181-785 7314.

Alinco DX-70TH with unused remote head cable EDS-6, £425. Alinco EMS-14 desk microphone, £35. Trio TS-120V, £150. Watson 10A p.s.u., £30. MFJ-906 6m (50MHz) a.t.u./power, £30. Shure 444 microphone, £25. Tel: Mick M5AED on Northants (01536) 763637.

Antiference A260 six channel TV/f.m. distribution unit, brand new, £35. MFJ 6m (50MHz) a.t.u. (MFJ-903), £30. Tel: Andrew G8GNI (01908) 263758, after 8pm.

AOR 1000 channel scanner 0.1-1300MHz a.m. and f.m., £120 o.n.o., includes adapter. Tel: David on north London 0181-200 7725 or (07091) 214584 (mobile).

Clearout: AOR AR2002 scanner, Icom IC-255A 25W, 2m (144MHz) f.m. transceiver, new in box. 75W s.s.b./f.m. 2m amplifier. 3-1000z/socket never used, in box. Kenpro KR400 rotator. 30A p.s.u. components, make me an offer. Tel: Mark 0171-728 1692.

Codar CR70A valve general coverage receiver, £25. Truvox TSA100 stereo amplifier, plus matching tuner, mid 1960s, £20 the pair, Eagle TT145 transistor checker, £10. Grundig battery tape recorder, boxed, v.g.c., £20. Tel: Ken on Gloucestershire (01453) 845013.

Complete Collins TCS12 station comprising transceiver, receiver, 20242 mains p.s.u., remote control unit, loading coil, T17 microphone and all cables, in good unmodified condition, £250. Tel: John (01903) 241810, after 8pm and at weekends.

Drake TR4C complete with MS4 power supply and speaker and MN2000 a.t.u. All pristine condition, £500 o.n.o. Tel: G0VZO (QTHR) (01203) 382215.

ETM9C-X3 keyer with built-in twin paddle, speaker for sidetone, new in box, £100 (cost £139.95). Yaesu FT-480R 2m (144MHz) all mode transceiver, first £100. Tel: (01709) 850517.

For Sale: Drake MS-4 speaker, offers. BC221, £20 plus carriage. Wanted: MFJ-259 antenna analyser, Kenwood VFO-230, SM220 monitor, Butternut vertical antenna. Tel: Suffolk (01449) 676355.

FT-102 with FV-102 and FP-102 receiver, side of FT-102 needs some attention, £250 the lot including full set of valves. Tel: G4PRI (QTHR) on Uxbridge (01895) 270772.

FT-102, £275. HF-225, £230. Century 22, £175. HW9, £130. HW7, £50. Barograph, mahogany glass case, offers. Contact: B Alderson, 43 Brompton Rd, Northallerton DL6 1ED.

FT-757GX and FP-757HD p.s.u. with manual, boxed, £350, g.w.o. FRG-8800 communications receiver and manual with v.h.f. mod., boxed plus extras, £280 g.w.o. Tel: Alvechurch, Worcestershire 0121-445 4283.

FT-900CAT h.f. transceiver c/w auto a.t.u., 250Hz c.w. filter, as new, £600. IC-706MkII, as new, with remote control mount kit, £550 or exchange for FT-847. Tel: M0AFJ (01908) 260167.

GRE PSR-239 portable scanner, 200 channels with battery pack and telescopic antenna, new, still boxed, £85. 2m (144MHz) collinear, nearly new, £30. Trio TS-700S, 2m base, all mode, v.g.c., £290. Tel: Frank G4PKX on Northwich (01606) 331431, after 5pm.

Grundig Satellite 205A transistor 5000A. 160, 80, 40, 20, 15 and 10m (1.8, 3.5, 7, 14, 21 and 28MHz) band, l.w. - 145-30kHz??, m.w. - 510-1620kHz, s.w.1 - 187-62m, s.w.2 - 67-24m, s.w.3 - 25-15m, s.w.4 - 15.5-10, f.m. - 87-108Mhz, s.w. - 7.65-2.05MHz 160m, 3.4-3.9 80m, 6.9-7.4 40m, 13.9-14.5 20m, 20.9-21.5 15m, 27.9-29.8 10m?? Tel: John (01283) 221870.

Grundig YB-500 as new, plus case book, £80. Tel: Greg (01782) 535374.

Grundig YB400, £80. Boxed C4200, CB1100, YB1100, all £5. Bush TR116, £4. Dynatron Sapphire, £6. Hacker Herald and Hunter, offers. Pye record maker-player, paper disc recorder, offers, buyers, must collect. Tel: White (01244) 310267.

Hacker manuals, not copies: RG16; GP40; GP42; GP46; RP75; RP25B; RP37; RP18; GP45; RP73; RP35; RP36; GP15; RP34; RP30/31; RP38A; GP19; RP38; RP25; RP33. All at £3 each. Contact: G3HWD, "Esperanza", 1 Alan Rd, Padstow, Cornwall PL28 8DS.

HRO 5T plus some plug-ins, £100. Spares box for 19/22 Set number ZA26825, £25. Redifon R551 100kHz-30MHz with handbook and spares, £150. Can be collected or postage at cost. Tel: Liskeard (01579) 345740, anytime before 10pm.

Icom IC-275H 2m (144MHz) multi-mode. IC-PS55 power supply, both mint condition, £500 the pair. Tel: G7LLL (01795) 667084.

Icom IC-700UK marine synthesised 12V h.f. s.s.b. transceiver, 150W, switchboard modified for v.f.o. operation £110. Tel: Bedford (01234) 349402.

Icom IC-8500 s.w./u.h.f.-v.h.f. receiver, boxed, almost new, £750. National 170NC?? valve receiver, u.s.b./l.s.b./a.m. matching speaker supply, excellent condition, three filters, very sensitive, £150. Grundig Satellite 2000 and 6100, both radios excellent condition, £150 each or AOR AR1000 hand-held scanner, £100. Tel: West London 0208-813 9193.

Icom IC-R8500 receiver, mint, boxed, £850. Yaesu VX-1R dual-band hand-held, £150. Timestep Proscan 187MHz WXSAT receiver, mint, £150. Buyer inspects and collects. Tel: Alan on Cheshire (01606) 883768.

Icom IC-R8500 receiver, £950. Timewave DSP-9+ digital noise filter, £100. AR-1500 scanner 500kHz-1300MHz all modes charger, £140. Lowe AP-150 filter/amplifier/speaker, £75. All in good condition. Tel: Alan on Surrey 0181-391 1145.

International Radio Amateur Callbooks: 1994 North America and 1996 rest of World, £10 or £6 each plus postage. Also Yaesu FRT-7700 a.t.u., £35 plus postage. Tel: Alex on west Kent (01732) 864920.

Kenwood interface IF-232C for TS-50 with leads and software, £60. Soft case for Alinco DJ-580, £5. 21-element 70cm (430MHz) beam, new with box, £30. Yaesu FT-757, 0.30??, £300. Tel: West Midlands (01543) 377860.

Kenwood R2000 receiver, h.f., boxed, v.g.c., £175. Icom communications receiver, boxed, v.g.c., £150. SMC hand-held, 16 channel 70cm (430MHz) with chargers, boxed, £50. Tel: Andy on Staffs (01283) 716634.

Kenwood R5000 h.f. receiver, v.g.c., £450 or exchange for h.f. transceiver. Tel: John G4XYY (01937) 844197.

Kenwood SM220 plus Pan adapter, £195. Standard C-880 2m (144MHz) f.m. mobile, £85. Kenwood TS-120 and TS-130 h.f. rigs faulty for spares or repair, £75. Each PCMCIA 33.6 modem, £30. Tel: Dave on Norfolk (01603) 745512.

Kenwood TH-78E 144/430MHz dual-band hand-held, 0.5/2/5W includes charger, speaker/microphone, case and CTCSS, used only for a little receiving, boxed, like new, price £180 (cost £450). Tel: St. Annes on Sea (01253) 782339.

Kenwood TM-701E dual-band transceiver 5/25W f.m. 144/430MHz, good condition, £185. Tel: Alan on Burton on Trent (01283) 716634.

Kenwood TS-570DGE c.w. filter, extended W&S warranty absolutely mint, £650. Index QRP plus c.w./s.s.b., manual, g.c., ideal portable rig, much DX including VK WKD!, £350 including P&P. Tel: G3YCC (QTHR) on Hull (01482) 650410.

Kenwood TS-850SAT used QRP only, box. etc., mint, £650. FT-290R2 2m (144MHz) multi-mode with clip-on 25W linear, £200. AKD 6001 6m (50MHz) f.m. rig, boxed, £60. Wanted: ATV equipment transceivers, antennas, etc. Tel: Gary 2M0APC on Aberdeen (01224) 712370 or E-mail: 2m0apc@bun.com

Lowe HF-150, PR-150, SP-150 with rack (mint), £400. FRG-9600, realigned (bills) mint, £225 or exchange all for mint condition FT-757GX. FC-757 a.a.t.u., little tatty hence £480 both. Tel: (01903) 859712.

Marconi receiver CR-100/2 60kHz-30MHz with manual, £20 o.n.o. Zetagi B40 v.h.f., s.s.b./a.m. power amplifier 144MHz 35W, £15 o.n.o. Tel: David on north Kent (01634) 220747, anytime (leave message if necessary).

Megger Major leather case, £25. UPS by APC model No. 420, 260W output rating, £15. HF receiver Yaesu FRG-7700 with SEM a.t.u., £170. Tel: John (Pinner) G4UBB 0208-868 7684.

NRD-515 plus memo plus speaker, mint condition. E-400 NRD-525, like new, four filters, book, boxed, £400. Trio R820, Rolls Royce matching speaker, book, like new, works OK. Display faulty hence £300. Harris r.f. 2305 h.f. receiver, 0-30MHz solid state a.m.-u.s.b., l.s.b.-c.w., RTTY, very sensitive, USA made, £250. Tel: 0181-813 9193.

Philips ex-p.m.r. hand-held transceiver converted to 70cm (430MHz) f.m., £30. Tel: Ron (01905) 355381, after 6pm.

Racal 1792 table top case, £45. 5MHz oscilloscope 9420, £10, carriage paid. Looking for Taylor 45C valve tester or AVO suitcase type. WHY? Also Collins 75A4 receiver. Tel: Pat (01743) 884858.

Racal 1792, £475. Racal 1784, £450. Racal 1771, £200. Harris h.f. receiver/transceiver, £200. Racal Keynard system, £125. Collins 618T, £50. Collins 618S, £50. Eddystone single channel receiver, £20. Buyer to inspect. Tel: (01952) 419666.

Rollercoasters Johnson and Eddystone QRO transmitting capacitors. TCS12 loading coil less case. Send an SAE for list and prices. Tel: GW3EJR (QTHR) (01239) 682629.

Russian u.m. r.f. amplifier, £25. Finnish LV302 manpack, £55. Larkspur J3 control unit complete installation kit, £30. A40 radio complete in carrier with antennas, headgear, remote antenna with connection, £60. Tel: Bob Warner (01233) 636185, 45 Eastry Close, Ashford, Kent TN23 5RS.

Scanner Nevada MS1000 wide band base/mobile, f.m./w.f.m./a.m., as new, unboxed, £95. Palstar KH6 6m (50MHz) hand-held amateur transceiver, unboxed, as new, £40. Alinco DJ-S11 2m (144MHz) hand-held amateur transceiver, unboxed, £40. Tel: M1CZW (01691) 672910.

Ship's ten channel receiver/transceiver. Apelco oscilloscope, dual beam signal generators, power supply, twin crystal sets, 200 crystals, transistor tester, frequency counter. Tel: (01827) 65641.

Silent Key sale: Cushcraft R7000 40-10m (7-28MHz) vertical, no ground required perfect condition, boxed, £175. Morse keys, straight and paddle, marble bases, £30 each. Ring for more details on other equipment. Tel: John GW4TQD on Chepstowmon (01291) 621526.

Silent key sale G3RRD: Ten-Tec Argosy II with PP, £200. MFJ-249 antenna analyser, £75. Heathkit RF1U signal generator, £20. Maplin Gold dip meter, £15. Maplin Gold DVM M5010EC, £10. Tel: Arthur G3EKD (QTHR) on Stroud (01453) 757637.

Sinclair Pocket TV, Sinclair, Cambridge programmable calculator Amplion Delegate valve radio circa 1948, l.w./m.w./s.w. in perfect working order, offers invited: Tel: Phil Vann 0208-855 3652, 4 Monkton Rd, Welling, Kent DA16 3JU.

Smith Corona PWP1400 personal word processor with full instructions, 3.5inch diskettes, excellent condition, demo available, buyer to collect, £75 o.n.o. Tel: Ken on Coleford (01594) 836503.

Solartron double beam oscilloscope CT436A, manual, transformer open circuit, £15. Sony open reel video recorder CV2100ACE, manual, tapes, fault, £15. BBC 'B' computer, monitors, Panasonic printer twin 5.25 drive, £15. Tel: Chessington, Surrey 0208-397 3614.

Ten-Tec OmniD h.f. transceiver, p.s.u., microphone, manual, just overhauled, £160. Nevada TM-1000, 2kW a.t.u., roller coaster, 4:1 balun, £90. CB type s.w.r. meter, 10W, £5. Cambridge noise bridge, £10. Tel: G4ILA 0161-477 6702.

Three section tower: wind-up/tilt-over 30ft lattice tower plus ten foot aluminium tube, ready for collection, £175. Tel: Geoff on Guildford (01483) 570033.

Top Ten devices band decoder 1.8-30MHz and six way relay, box, auto and manual for Icom h.f. transceiver/receiver in mint condition, £200. Price in Sterling, best offer secures. Tel: Eamonn EI3FFB on the Republic of Ireland 00353 (0)62 54183, evenings.

TR-2300 2m (144MHz) transceiver, boxed with accessories, £80. Kenwood VB-220GX 2m 10W p.a., £20. 2m slim-jim antenna, as new, £10. Shack clearout, send s.a.e. for list. Tel: John McKae 0161-477 6702, The Rectory, St. Mary's Drive, South Reddish, Stockport SK5 7AX.

Trio JR310 amateur bands receiver, 3.5-29.7MHz, £65. Vintage Hallicrafters HT41 0.5kW valve linear amplifier, £150. BC348 classic Second World War aircraft receiver, £125. Tel: (01482) 887938.

Trio TV-502 2m (144MHz) transverter and handbook, £25. Belcom liner2 2m s.s.b. transceiver and matching p.s.u., £40. Tel: Stuart (07803) 601176.

TS-870 mint, boxed, £1150. TS-780, 2m/70cm (144/430MHz), boxed, £300. IC-R72 h.f. receiver, boxed, £350. IC-R7100 v.h.f./u.h.f. receiver, boxed, £350. FT-10ZD MkII, WARC/f.m. full line up, £300. Kam plus computer monitor, £100. Tel: Lawrence on Cheshire 0161-427 1809.

Two Heathkit oscilloscopes, £20 each. Dancom RT-101 marine s.w. receiver, £30 plus various components for sale/disposal. Tel: John Wilson 0208-516 9582.

Vintage radios: Ultra 1946, Bush 1957, also Advance a.m./f.m. signal generator, Simpson multi-meter, Tektronix oscilloscope, two reel-to-reel tape decks. All cheap to clear, buyer collects. Tel: Selsey, Sussex (01243) 606312.

Wearite P coils PO1, PO2, PA2 with information leaflets. Also six Denco DP plug-in coils, all unused and in original containers with details, £15. Tel: John G3ZXW, near Bournemouth, (01202) 884905.

Welz SP-200 v.s.w.r./p.w.r. meter 1.8-200MHz, excellent condition, boxed, £35, prefer buyer to collect or carriage at cost. Tel: Bob G8BCA on Mildenhall, Suffolk (01638) 714051.

WiNRADIO 1500i complete with original packing, software and manual bought new in May 1999. Tel: (01375) 370939 or 0181-594 0282 (days).

Yaesu ATAS 100 plus FC-20 eternal a.t.u. suitable for FT-847 and FT-100, £350. Exchange for FT-101ZD with f.m. plus WARC bands, never used mobile. Tel: Derek on Redditch, Worcs (01527) 458796.

Yaesu FT-101E h.f. transceiver, v.g.c. for its age. Decca Supermatch KW109 a.t.u., 1000W. Butternut h.f. vertical antenna, 10-80m (28-3.5MHz), £300 the lot, no split. Tel: Frank G4PKX on Northwich (01606) 331431, after 5pm.

Yaesu FT-101Z, FV-101Z, FTV-250, SP-90 SPC antenna tuner, YD148 microphone, all box, manuals, £200. Yaesu 290R RN transverter, 6-2m (50-144MHz). Daiwa d.c. power unit PS30XMII 30A car kit, all box, manual, £250. Tel: Frome, Somerset (01373) 300986 or (0410) 494619.

Yaesu FT-101Z, key. Vektronics VC300DLP 300W a.t.u., boxed, as new. Bremi p.s.u. can deliver on route Pembroke to Dorset to best offer made, very good starter kit. Tel: Roy MW0COB (01646) 602084.

Yaesu FT-101ZD WARC bands, good condition with manual, price £225. Kenwood TS-520S, good condition with manual, price £220. Tel: 0515-228 2515.

Yaesu FT-530 2m/70cm (144/430MHz) hand-held wide-band receiver, carry case, charger, battery, MH-29A2B remote speaker, microphone with full display, boxed, manual, mint condition, £155. Tel: Adrian G7HSA on Shropshire (01584) 872618.

Yaesu FT-726R 2m-70cm (144-430MHz) satellite unit, workshop technical manuals, £400 o.n.o. KW (E-ZEE) match, £30. Morse tutor - Datong model D70, £20. Microwave modules linear 8 receive amplifier, pre-amplifier MML/144/25, £20. Tel: Telford (01952) 251478.

Yaesu FT-727R 2/70m (144/430MHz) hand-held, complete with charger and manual but a bit deaf on 2m hence £40. Tel: Lee (01494) 638809.

Yaesu FT-840 100W h.f. transceiver, £400. Vectronics VC300DLP a.t.u., £60. Zurich DPS2512 metered 25A p.s.u., £60. All as new, deliver reasonable distance or plus carriage. Tel: Jim G4ILK on north Devon (01271) 325898.

Yaesu FT-847 h.f. to 70CM, 20 months old, boxed, £995. Also Kenwood TS-680S h.f. plus 6m (50MHz), £345. Buyer to collect or pay carriage. Tel: John G0GUL on Coventry 0247-645 0476 or E-mail: pjsolman4@ic24.net

Yaesu FT-900AT h.f. transceiver, manual, boxed, mint condition. Tel: Andy on Worcs (01562) 68316 or (07801) 825641.

NEW RULES!

Rules on how readers are to send their Bargain Basement forms have changed. Please remember to include your dated, coloured corner flash from this page along with your entry.

Wanted

70MHz solid state linear amplifier wanted. Output 100W or more. Tel: Mike on Leicester (01530) 414473.

Any information on hand-held set, model Philips P1030 v.h.f. transceiver - original or photocopies, will pay postage. Tel: Stephen Woolley (01244) 823592, 249 High St, Connah's Quay, Deeside, Flintshire CH5 4DJ.

Chunky 1950s/1960s h.f. transmitter, e.g. Panda, Labgear, etc. Yaesu FT-102 r.f. board or rig to break, panel type 192 for R1155/T1154. Tel: Ken on Gloucestershire (01453) 845013.

Circuit/manuals Boonton 8900B HP-432C (CT495 version) power meters, Heathkit (Daystrom) AG-GU audio generator, AV-9U valve millivoltmeter, thermistor probe for HP-432 - any condition. Information Fenlow 7000 voltmeter and spare nixie tubes. Tel: Jack McDonald (01705) 233245, 13B Alsford Rd, Waterlooville, Hants PO7 5NB.

Collins 515-1 must be in v.g.c. and g.w.o. SEM QRM eliminator, £40 or exchange for good a.t.u. will consider any other good Collins receiver. Tel: Preston (01772) 704009.

CW filter for Trio TS-520 Y3395C. Tel: Stuart (07803) 601176.

CW filter for Yaesu FT-101F type XF30C. Also copy of instructions for Datong FL3 audio filters. Tel: John on Lancs (01995) 606621.

Data for Cossor type 343 ganging oscillator, also mains p.s.u. for CT-52 ex-services oscilloscope. Tel: Tim Packer (01970) 890563 (not Sundays please).

Early wireless equipment wanted: crystal sets; valve receivers; Morse keys; Spy sets; horn speakers; early TV, books, valves, parts, any condition considered. Tel: Jim Taylor G4ERU (01202) 510400, No.5 Luther Rd, Bournemouth BH9 1LH.

Eddystone 770S anything considered also any Eddystone components, literature, etc., WHY? Please dig deep in your lofts and garages. Tel: Simon (01434) 633913 or E-mail: simon@nomis.co.uk

Icom IC-T8E triple band hand-held with case and BR-197 case, £175. Swap 23cm (1296MHz) radio or Yaesu FT-290R MkII with cash difference. Also wanted control box for Yaesu RC-600 rotator, wanted Tiny 2 TNC. Tel: (01226) 742971 or E-mail 2e1fcg.waspchelver@lineone.net

Information PK96 handbook circuit diagram, software to run TNC, any costs will be met if reasonable. Tel: Brian (01268) 756331 or E-mail: Brian: g7iio@yahoo.com

Johnson Viking (any model) Heath Apache or Collins 32V a.m./c.w. transmitter. Gonset G66B receiver. 1930s Californian R/9 and 'Radio' magazines, 1960s '73' magazines. FT-243 80m (3.5MHz) crystals. Tel: Dave G3UUR on Norwich (01603) 721310 or E-mail: g3uur@cfgs.freeuk.com

Manual or circuit diagram for type CT346 oscilloscope, all expenses paid. E-mail: gall@venusic-net.com.au**??**

MI Portable a.m. signal generator TF888 70kHz-70MHz receiver tester working or not. Tel: (01234) 354767.

Morse keys wanted by private collector, also telegraphic sounders relays, galvanometer, bug keys, anything considered, Silent Key Sale, etc. Tel: Gerald 0118-983 4307.

R1475 receiver any condition considered preferably with matching 360 p.s.u. also want R1155 and R107 receivers in working condition. Tel: Steve G8EBM (QTHR) (01335) 360755 or E-mail: g8ebm@compuserve.com

Racal units from the valve era eg. linear amplifier type 349, a.t.u. type MA144, MA79G exciter MA174 antenna multi-coupler, RA70 and RA73 frequency converters, etc., good home waiting for big heavy Racal lumps! Tel: Yorks (01482) 887938.

SEM Z-Match a.t.u. with or without noise bridge or MFJ-901 a.t.u., must be v.g.c. Tel: Mike on 0191-389 2822.

SM8 desk microphone in excellent condition. Icom compatible, must be reasonably priced, Gloucester/Cheltenham area would be advantageous. Tel: Bill (01684) 295770 or (07771) 870611, anytime.

Spy/Special forces radio sets from any period or origin wanted by private collector, accessories and incomplete units for spares also required, your price paid for special items. Tel: Bill G8PUJ (QTHR) on east London 0208-505 0838, evenings.

TH-D7E battery NiCad pack PB-6 or PB-7 or PB-8 and compact charger and BT-6 battery case. Also CTCSS unit TSU6 or KTQ8 and or service manual. Tel: Patrick GW1SXN (01286) 675468, 12 Church St, Caernarfon.

Trio TR-7500 2m (144MHz) f.m. transceiver repair/maintenance manual**??** photocopies OK, all expenses reimbursed. Tel: G3IVG (01706) 225906, 252 Edgeside Lane, Rossendale, Lancashire BB4 9TY.

Wanted for Eddystone 830/2 receiver- non reversible mains connector and 12 way male connector for audio, muting and a.g.c. Information on source of Eddystone spares. Tel: Ron G4MNB (QTHR) (01793) 331585.

Wanted to complete Bendix MN-26 radio compass project, MN-22A, MN52H Azimuth indicator, IN-4 left-right indicator, MN-20A loop antenna, MR-57 tuning meter, cables, plugs and a maintenance handbook. Tel: Yorks (01482) 887938.

Wanted: circuit diagram and any details of Cirkit HFPA kit. Also wanted: GDO, professionally built. Tel: G4JBL (01258) 473845.

Wanted: Diawa 2002 auto a.t.u. can you help. Tel: John G0CHQ 0181-561 3837.

Wanted: Sony 2010 radio, reasonable price, OAP. Tel: E Rowe 0151-648 3031, 11 Thorstone Drive, Irby Wirral, Merseyside CH61 4XR.

Wanted: *SWM* April 1972, article on Eddystone 888A. Tel: Jim Boal (01232) 283789, 53 Belmont Ave, Belfast, BT4 3DE.

Wanted: £250 for any of these: ex-RAF TR9 1082 or RX1084 or ground power unit for 1154/1155. Tel: Tom (01597) 811591.

WS19 radios and/or spares. Also still looking for Second World War; handie-talkies, please send details, all answered. Tel: John G8BXO (01769) 573382, 3 West Park, South Molton, Devon EX36 4HJ.

Yaesu FRG-7700 active antenna in g.w.o. Tel: Alex on west Kent (01732) 864920.

Exchange

Alinco twin band DJ-G5 hand-held with manual, speaker, microphone, charger, mint condition, boxed, exchange for FT-290RMkII 2m (144MHz) multi-mode. Tel: Clive on Birmingham 0121-608 3188.

Exchange: DX-394 plus PRO 2042, both mint condition and boxed with cash for FRG-100. Tel: Jim Boal (01232) 283789, 53 Belmont Ave, Belfast, BT4 3DE.

Icom IC-706MkIIG fitted: FL-100; FL-223 filters; UT-102 voice synthesiser; MB62 M/BKT. SEC 1223 p.s.u. Fairhaven RD-500VX, all boxed, like new. Swap all for IC-756PRO, willing to deliver. Tel: Barry M0APO (01274) 880895 or mobile: (07718) 942908.

Marconi TF2432A 560MHz digital frequency counter, v.g.c., swap for Icom M5 v.h.f. marine hand-held or WHY? 55 channel marine hand-held. Also wanted: duff NiCad packs EBP-16N EBP-14N EDH-5 for Alinco DJ-X1D. Tel: Alan (01207) 544342, after 6pm.

Yaesu FT-ONE h.f. transceiver, v.g.c., box and manual. Swap for dual-band 2m/70cm (144/430MHz) base or mobile transceiver. Tel: Dave on Rainham, Kent (07979) 828471.

Please use the Form from a previous issue to send your advert in or write it neatly on a postcard (always including the corner flash).

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 & Cinema -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.

MORSE IDENT PICCHIP. Your callsign, QTH, etc. Max 60 characters. P1C12C509 plus circuit. £10. Tel: 01782 869247.

MORSE PRACTICE PICCHIP. A-Z, 0-9 etc. PIC12C509 chip and circuit diagram. £10. Cheque or P/O. Chris Barker, 52 Spode Street, S.O.T. Staffs ST4 4OY. Tel: 01782 869247.

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.

Have you got some radio equipment for sale? Then advertise it on this page.

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

ALL TYPES MILITARY RADIOS. 1155, 38, 58, BC348, 18 set. Single sets or complete collection. Phone/Fax Military and Domestic Radios. Grantham 01476 574047.

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

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.

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.

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: .....

Trader's Table

Disclaimer

Advertisements from traders for equipment that is illegal to possess, use or which cannot be licensed in the U.K. will not be accepted. While the publishers will give whatever assistance they can to readers or buyers having complaints, under no circumstance will the magazine accept liability for non-receipt of goods ordered, late delivery or faults in manufacture.

THE SHORTWAVE SHOP
01202 490099

HF TRANSCEIVERS

ICOM 736 HF plus 6 Meters £696
ICOM 706Mk2 DSP. HF/6/2Mtr. £695
KENWOOD TS570S HF+Gen Rx. £525
YEASU FT707 HF Ham Band Mobile. £195
YEASU FT747GX HF Gen Coverage Rx £345
YAESU FT70G HF Manpack. Mint £355
YAESU FT757 GX2 HF Mobile £395
YAESU FT101ZD HF Ham Bands £225
TRIO TS820S HF Ham Bands £185
KENWOOD TS530S Ham Bands £295

VHF/UHF TRANSCEIVERS

YAESU FT726R 50/144/433 Modules £525
YAESU FT290R Mk2 with FL2025 Amp £265
ICOM H16 VHF.The Engineers Radio £125
ICOM U16 UHF The Engineers Radio £125
KENWOOD TH 79E VHF/UHF Handie £135
AKD7003 70cms FM Mobile £75
AKD6001 50Mhz FM Mobile £95
TRIO TS711E VHF Multimode Base £435
KENWOOD TH42E 70cms Handie £99
KENWOOD TH205E VHF Handie £85
CTE1600 VHF Handie £65
KENPRO KT44 UHF Handie £50

RECEIVERS and SCANNERS

JRC NRD525 HF Receiver £395
DRAKE R8E High Spec HF/VHF Receiver £495
ICOM R71E High Spec HF Receiver £450
YAESU FRG8800VHF. HF+VHF Rx. £395
YAESU FRG 100 HF Receiver £295
LOWE HF 125 HF Rx. SYNC AM/FM £165
LOWE HF 150 Compact HF Rx. £250
LOWE HF225 HF Rx. SYNC AM/FM £235
KENWOOD/TRIO R1000 HF Rx. £245
YAESU FRG7 Analogue HF Rx. £95
SONY ICF7600 c/w AN1 Active Ant. £95
SONY SW100 Micro SW Receiver £95
AKD HF3S HF Receiver Ex Demo £125
AOR AR3000A Latest Spec Receiver £450
AOR AR8200 HF/ VHF/UHF Scanner £195
YAESU FRG9600 VHF/UHF Base £185
YUPITERU MVT7100 HF/VHF/UHF £125
YUPITERU VT125Mk2. Air Scanner £85
DIAWA SR9 VHF Ham Channels Rx. £45
LOWE FS10 Marine Handheld Rx. £45

ACCESSORIES

TIMEWAVE DSP-59+ DSP Filter £125
YAESU FRT7700 SWL ATU. £49
TOKYO HL110 VHF 100W. Amp. £125
LOWE AP150 Active Speaker Unit £135
YAESU FL2100 HF Linear Amp. £295
YAESU FC700 HF Antenna Tuner £95
YAESU FP707 20A. Power Supply £75
ICOM IC20 Speaker c/w Filters £49
YAESU FT7700 VHF Receive Converter £49
DIAWA LA2155E 150W VHF Amp £135
MICROSET R432-90 UHF 90Watt Amp. £195
DATONG FL3 Active Filter £65

Call for latest second hand items or visit our Website http:\\www.shortwave.co.uk

NEVADA
01705 662145

TRANSCEIVERS HF

ICOM IC-706 MKII DSP
100W HF & 6M +20W, 2M TRANS £799.00
ICOM IC-707 HF 100W TRANSCEIVER £329.00
KENWOOD TS-850SAT
HF 100W TRANSCEIVER + ATU £799.00
TRIO TS-940S 100W HF TRANSCEIVER £795.00
YAESU FT-757GX HF TRANSCEIVER £395.00
TRANSCEIVERS VHF/UHF
ALINCO DR-M06DX 6M FM 20W MOBILE £189.00
ALINCO DR-610E 2M/70CM MOBILE T'SCEIVER £269.00
DENPA MZ22 2M FM MOBILE £125.00
ICOM IC-207H 2M FM MOBILE TRANSCEIVER £229.00
KENWOOD TM-45/E 70CM FM MOBILE £199.00
KENWOOD TM-733E
2M/70CM MOBILE TRANSCEIVER £295.00
STANDARD C-5200 TWINBAND 50W MOBILE £299.00
STANDARD C-78 + AMP 70CM MOBILE + 10W AMP £135.00
STANDARD C-8900 2M MOBILE £185.00
TRIO TR-2200 GX 2MTR PORTABLE £59.00
TRIO TS-700 2M MULTIMODE BASE £250.00
TRIO TS-711E 2M MULTIMODE BASE £395.00
YAESU FT-290R 2M MULTIMODE + ACCESSORIES £195.00
YAESU FT-726R 2M/70CM/6MF MULTIMODE BASE £549.00
YAESU FT-726R HF/2M/70CMS BASE TX £599.00
YAESU FT-7708H 7CM FM MOBILE £125.00
YAESU FT-790R11 70CM MULTIMODE T'SCEIVER £225.00

RECEIVERS

AOR AR1500 MULTIMODE HANDHELD SCANNER £125.00
AOR AR8000 HANDHELD SCANNING RECEIVER £179.00
BEARCAT UBC3000XLT HANDHELD SCANNER £149.00
BEARCAT UBC65XLT HANDHELD SCANNER £55.00
COMMTEL 510 WIDEBAND HANDIE RECEIVER £145.00
ICOM ICR-71E HF RECEIVER £599.00
ICOM PCR1000 PC BASED SCANNING RECEIVER £219.00
KENWOOD R5000VHF HF RECEIVER +
VHF + FILTERS ETC £699.00
SANGEAN ATS-803A S/WAVE RECEIVER £99.00
SANGEAN ATS-909 SHORTWAVE RECEIVER £125.00
SONY AIR 8 AIRBAND + SHORTWAVE RECEIVER £125.00
TRIDENT TR2400 VHF/UHF HANDIE SCANNER £149.00
TRIO R1000 HF RECEIVER £139.00
YAESU FRG-7700 HF RECEIVER £169.00
YAESU FRG-965 BASE SCANNER £299.00
YUPITERU MVT 3300 VHF/UHF HANDIE SCANNER £110.00
YUPITERU MVT 9000 VHF/UHF HANDIE SCANNER £249.00

HANDHELDS

ADI AT400 70CM HANDI TRANSCEIVER £79.00
ALINCO ALM-203E 2M H/HELD TX £99.00
ALINCO DJ-180EB 2M HANDIE - EX DEMO £129.00
ALINCO DJ-180 2MTR H/HELD + EDC46 Fast Charger £99.00
ALINCO DJ-480 70CM HANDIE £99.00
ALINCO DJ-C1 2M POCKET HANDI £79.00
ALINCO DJ-C5 2M/70CM POCKET HANDI £125.00
ICOM IC-T8E TRI BAND HANDIE £225.00
KENPRO KT22 2M HANDIE £59.00
YAESU FT-411 2M HANDIE £125.00
MISCELLANEOUS EQUIPMENT
AEA PK80 PACKET TNC £49.00
AEA PK88 1200 BAND TNC £55.00
AEA SWR121 HF ANTENNA ANALYSER £199.00
AMDAT ADC-60 FREQUENCY STANDARD CLOCK £99.00
COMET CF706 DUPLEXER HF + 6M/2M £29.00
DATONG ASP AUTOMATIC SPEECH PROCESSOR £49.00
DATONG FL5 AUDIO FILTER £59.00
DRAE 24 AMP 24 AMP POWER SUPPLY £75.00
ERA MICROREADER DATA READER V4.02 ..... £99.00
HANSON FS302M 50-150 SWR/PWR METER 20/200W £19.00
ICOM AT160 AUTOMATIC ATU £159.00
ICOM AT-180 AUTO ANTENNA TUNER FOR IC-706 ..... £249.00
ICOM PS-15 20 AMP PSU £129.00
KENWOOD AT-200 ANTENNA TUNER £129.00
KENWOOD AT-230 ANTENNA TUNER £99.00
KENWOOD PS-430 POWER SUPPLY £80.00
KENWOOD AT250 AUTO ATU (TS140/680) £189.00
KENWOOD RM1 KEYPAD FOR TS850S £29.95
LESON BASE MIC DESK MIC £29.00
MW MODULES MML432/50 432/50 70CMS AMP £99.00
MW MODULES MM-4000KB
RTTY TRANSCEIVER INTERFACE £49.00
PALSTAR AT300CN ANTENNA TUNER £89.00
PALSTAR PS04 2/4 AMP POWER SUPPLY £14.00
SISKIN MULTICAT COMPUTER INTERFACE £39.00
TOKYO HL100B AMP 100W 21 - 28MHz
FOR FT726 (HF) £129.00
TRIO MC-50 BASE MIC £39.00
TRIO SM-220 MONITOR SCOPE £179.00
TRIO VB-2200GX 10WATT AMP FOR 2200GX £39.00
YAESU ATU-767 INTERNAL AUTO ATU FOR FT767 ..... £79.00
YAESU FC-757AT AUTO ANTENNA TUNER £150.00
YAESU FP-757GX SWITCH MODE PSU £79.00
YAESU FRA-7700 ACTIVE ANTENNA £39.00
YAESU FRT-7700 ACTIVE TUNER £39.00
YAESU FRV-7700 VHF CONVERTER £45.00
YAESU MMB-20 MOBILE MOUNT - FT-757 ETC £15.00
YAESU YM48A 8 PIN DTMF MIC £19.95
YAESU PA-3 MOBILE ADAPTOR FT-208, 209 ETC £12.00

SOUTH EAST COMMUNICATIONS
00353 51 871278

STATION ACCESSORIES

Heatherlite Explorer 1200watt HF AMP £899
Garmin GPS 45XL handheld GPS £169
Kenwood DSP-100 D.S.P. unit for TS850 ..... £199
Diamond SX100 SWR/PWR meter 3kw £65
Uniden 360 lazer radar speed detector £159
Garmin GP38 G.P.S. £89
AOR SDU-5000 spectrum display for
AOR/Icom £349
Yaesu FRT7700 short-wave A.T.U. £49
Watson 25amp P.S.U. Demo model £79
Yaesu FC-20 auto atu for FT847 ..... £169
Bnos 2meter amp 10w in 180w out £199
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
MFJ 989C 3KW atu £199
Ameritron AL-811X 600watt HF amp £495
Revex WS40 2m/70cm SWR/PWR meter £49
Global AT1000 SWL ATU £69
Packratt AEA PK900 dual port all mode TNC £249

VHF/UHF TRANSCEIVERS

Kenwood TM241E 50watt mobile £149
Yaesu FT2400 50 watt 2meter mobile £149
Icom IC-T8E triband handheld 2m/70cm/6m £189
Icom IC-Q7E 2m/70cm, 30-1300mhz RX £119
Icom IC-2350 dualband mobile 50watt wide RX £299
Kenwood THD7E 2m/70cm h/h, built in TNC £199
Alinco DR580 dualband h/h with 900mhz RX £169

HF TRANSCEIVERS

Yaesu FT1000D fully loaded 200watt £1799
Yaesu FT100 Demo model, HF to 70cm £899
Kenwood TS950SDX 150watt £1849
Yaesu FT847 boxed and mint £1149
Yaesu FT1000MP/AC demo £1750
Icom IC706 MK11 DSP HF to 2m mint £799
Yaesu FT920 AF HF+6M demo £1095

SHORTWAVE RECEIVERS

JRC NRD345G boxed and mint £399
Yaesu FRG 8800, o to 30mhz RX ..... as new £299
Lowe HF225 0-30mhz all mode £225
Lowe HF150 0-30mhz with keypad £249
Realistic DX394 0-30mhz new £99
Trio/Kenwood R-600 base receiver,
mains 0-30mhz £169
Sangean ATS803A portable receiver SSB etc £89
Icom IC-R70 0-30mhz all mode £299
AOR 3030 0-30mhz mint £329
Sony 2001D HF+VHF airband £169
Sangean ATS909 HF +ssb etc £89
Target AKD HF3 0-30mhz ssb etc £89
Sony SW55 portable receiver station names etc £169

SCANNERS BASE/MOBILES

AOR5000 all mode 0-2600mhz £899
Alinco DX10 all mode to 2ghz £199
Icom ICR2 0 to 1300mhz £119
Icom IC7100 25-2000mhz base receiver
1000 mem £799
Yupiteru MVT9000 0-2036mhz £199
Yupiteru MVT7100 0-1650mhz charger
nicads etc £179
Realistic Pro2042 1000 memories base £149
Icom IC8500 0-2000mhz 1000mem as new £849
AOR 8200 0-2000mhz boxed mint £289
Realistic PRO63 100 mem, 66-512 with gap £79

All prices in Sterling

WATERS & STANTON
01702 206835

HF TRANSCEIVERS

MFJ	MFJ-9020	20m CW QRP Transceiver	£125.00
Ten-Tec	556 Argo x2	QRP HF TX, 40m Module Inc	£299.00
Yaesu	FT-840	Base Transceiver with Gen.Cov. 12V	£695.00

VHF/UHF BASE/MOBILE TRANSCEIVERS

ADI	Sender 450	70cm FM H/Held	£69.00
Albrecht	AE-550	2m FM Mobile 25W 10Ch.	£79.00
AKD	4001	4m FM Mobile Channelised 25W	£125.00
Alinco	DR-M06T	6m FM Mobile 10W CTCSS	£159.00
Alinco	DR-M06SX x2	6m FM Mobile 10W	£159.00
Alinco	DR-130	2m Mobile, 35W, 20Memories	£99.00
Icom	IC-2350H	2m,70cm FM Mobile 50W, 35W	£299.00
Icom	IC-271E	2m All Mode Base 25W with PSU option	£349.00
Kenwood	TM-451E	70cm FM Mobile 35W 2m RX, Full Duplex	£299.00
Kenwood	TM-732E x4	2m,70cm FM Mobile 50W,35W	£479.00
MFJ	MFJ-9402	2m SSB 7W pep Transceiver	£169.00
Yaesu	FT-225RD	2m All Mode Base 25W with Match Mains/12V	£549.00
Yaesu	FT-736R	2m,70cm and 6m All Mode Base Transceiver	£799.00
Yaesu	FT-5200	2m,70cm FM Mobile 50W,35W	£299.00
Yaesu	FT-7900R	70cm All Mode Portable 1W Batt.or 12V	£399.00
Yaesu	FT-8100R x2	2m,70cm FM Mobile 50W,35W (Remote Head)	£299.00

VHF/UHF HAND HELD TRANSCEIVER

ADI	AT-18	2m FM H/Held	£69.00
Alinco	DJ-F1E	2m FM Mini H/Held	£99.00
Alinco	DJ-160	2m FM H/Held	£90.00
Alinco	DJ-180	2m FM H/Held with sp.mic,DC lead,Batt box	£79.00
Alinco	DJ-191	2m FM H/Held	£119.00
Alinco	DJ-480 x2	70cm FM H/Held	£99.00
Alinco	DJ-560	2m/70cm FM H/Held	£149.00
Alinco	DJ-580 x3	2m/70cm FM H/Held Full Duplex Airband RX	£169.00
Alinco	DJ-G5	2m/70cm FM with wide RX	£169.00
Arden	PCS-300	2m H/Held 8 Channel Memories	£59.00
Delcom	VHF	2m FM Handy	£69.00
Hora	C-150	2m FM H/Held with Battery box	£69.00
Icom	IC-02E	2m FM H/Held with sp. mic.	£79.00
Icom	IC-04E	70cm FM H/Held with Case	£99.00
Icom	IC-U16 X2	70cm H/Held, 16 Channels	£60.00
Icom	IC-25ET x2	2m FM H/Held	£149.00
Icom	IC-24ET	2m/70cm FM H/Held	£159.00
Icom	IC-32E	2m/70cm FM H/Held with Full Duplex	£229.00
Icom	IC-W21E x2	2m/70cm FM H/Held	£199.00
Icom	IC-W21ET	2m/70cm FM H/Held	£199.00
Icom	IC-Q7E	2m/70cm FM micro with 30-1300MHz RX	£115.00
Icom	IC-2GXET	2m FM H/Held	£119.00
Kenwood	TH-22E	2m FM H/Held	£99.00
Kenwood	TH-28E	2m FM H/Held	£119.00
Kenwood	TH-75E	2m / 70cm H/Held	£149.00
Kenwood	TH-77E	2m/70cm FM H/Held with Sp.mic Full Duplex	£225.00
Kenwood	TH-78E x2	2m/70cm FM H/Held with Full Duplex	£249.00
Kenwood	TH-79E	2m/70cm FM H/Held	£225.00
Kenwood	TH-215E	2m FM H/Held	£95.00
Standard	C-156 x2	2m FM H/Held	£99.00
Standard	C-520	2m,70cm FM with Full Duplex , Batt. box	£185.00
Standard	C-528 x2	2m/70cm FM Dual Watch,Full Duplex+Deskcharger	£199.00
Yaesu	FT-51R	2m/70cm FM Dual Display Wide RX 80Ch.	£199.00
Yaesu	FT-73R	70cm H/Held	£119.00
Yaesu	FT-530 x3	2m,70cm FM Handy with Full Duplex	£195.00

SHORTWAVE RECEIVERS

AKD	HF-3 x3	Target 0-30MHz 12V Receiver	£99.00
AKD	HF-3E	30kHz-30MHz AM,SSB 12V with Interface and PSU	£199.00
Grundig	YB-400	Portable Receiver with FM stereo and SSB	£99.00
Grundig	YB-500 x2	0.15-30MHz Portable with SSB + FM Stereo , RDS	£130.00
Icom	IC-R72 DC	100kHz-30MHz AM,CW,SSB 12V with PSU	£449.00
Lowe	HF-150 x3	30kHz-30MHz All Mode 12V with Keypad,PSU	£249.00
Lowe	HF-225 x7	30kHz-30MHz All Mode Receiver 12V	£299.00
Lowe	HF-250 x2	30kHz-30MHz Receiver 12V PC Computable	£399.00
Marui	MR-4099	Portable Receiver with FM stereo and SSB	£79.00
Panasonic	RF-B65	FM / LW / MW / SW Receiver , 36 Memories	£49.00
Roberts	R-617	Portable 153kHz-30MHz AM,FM stereo	£99.00
Roberts	R-861 Portable	150kHz-30MHz SSB , FM stereo RDS	£149.00
Sangean	ATS-803A	Portable Receiver with SSB	£69.00
Sony	ICF-SW1	Portable Receiver with AM & FM.	£129.00
Sony	ICF-SW20	Portable Receiver with FM stereo	£45.00
Sony	ICF-SW7600 x2	Portable Receiver with FM stereo and SSB	£119.00
Sony	ICF-SW7600G x3	Portable Receiver with FM stereo and SSB	£135.00
Trio	R-1000	200kHz-30MHz AM,SSB,CW Receiver mains	£199.00
Yaesu	FRG-7700	150kHz-30MHz AM,SSB,CW,FM Mains	£225.00
Yaesu	FRG-8800	150kHz-30MHz All Mode + 118-174MHz mains	£349.00

SCANNERS MOBILE/BASE

AOR	AR-2002 x2	25-550,800-1300MHz AM,FM,WFM 20Ch. 12V	£199.00
AOR	AR-2800	0.5-600,800-1300MHz AM,FM,WFM 1000Ch. BFO	£449.00
AOR	AR-5000+3	10kHz-2.6GHz All Mode Receiver 1000Ch. 12V	£999.00
IRL	SX-400 x2	26-520MHz AM,FM,WFM 20Ch. 12V	£225.00
Realistic	Pro-2005	25-520,760-1300MHz AM,FM,WFM 400Ch.	£195.00
Realistic	Pro-2014	68-512MHz (with gaps) FM Receiver 50Ch. 12V	£85.00
Realistic	Pro-2026	66-956MHz (with gaps) AM,FM 1000Ch. 12V	£149.00
Yaesu	FRG-9600	60-905MHz All Mode Receiver 12V	£225.00

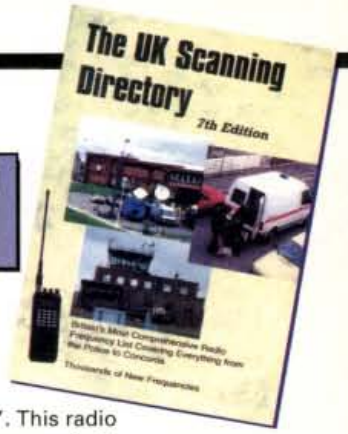
SCANNERS HAND HELD

Alinco	DJ-X1 x2	100kHz-1300MHz AM,FM,WFM 100Ch.	£139.00
Alinco	DJ-X10 x3	100kHz-2000MHz All Mode 1000ch	£199.00
AOR	AR-1500	500kHz-1300MHz All Mode 1000Ch.	£125.00
AOR	AR-8000	500kHz-1300MHz All Mode 1000Ch.	£199.00
Black Jaguar	BJ-200MKII	26-520MHz AM,FM,WFM	£69.00
Commtel	Com-214	66 - 956MHz (with gaps) AM, FM	£99.00
Fairmate	HP-2000	0.5-1300MHz AM,FM,WFM 1000Ch.	£145.00
Icom	IC-R1 x4	0.1 - 1300MHz AM/FM/WFM 100Ch.	£199.00
Icom	IC-R2	0.495-1309MHz AM,FM+WFM 450Ch.	£109.00
Icom	IC-R10	500kHz-1300MHz All Mode 1000Ch. + RS-232	£199.00

LOTS MORE HAND HELD SCANNERS, STATION ACCESSORIES AND MISCELLANEOUS ITEMS ALSO AVAILABLE. PLEASE CALL DETAILS.

Book Store

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 of the MONTH

The UK Scanning Directory - Seventh Edition

The **seventh edition of *The UK Scanning Directory*** says that it "covers everything from secret government frequencies down to your local traffic warden". This radio listing covers 26MHz-1.8GHz but has been revised to include "thousands of new frequencies".

Part one of the book lists "tens of thousands of frequencies" including the civil and military aviation, Army, Navy, police, DSS Snoopers, GCHQ, Bailiffs, prisons, outside broadcasting, motor racing, universities, railways, telephones, couriers and many more, the book claims. Part two, on the other hand, covers the civil aviation band with every airport in the UK listed.

Finally, part three includes European frequencies "of interest to the DXers in the UK". *The UK Scanning Directory* - Seventh Edition is available from the *PW* Book Store for **£19.50** plus P&P.

To order please either use the form on page 82 or call the Credit Card Hotline on (01202) 659930 and quote *PW* 4

	Pages	Price
LISTENING GUIDES		
Airband		
Abc AIRBAND RADIO GUIDE 4th Edition	96	£7.99
Abc AIRLINE LIVERIES 4th Edition. Gunter Endres	144	£9.99
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 99.	134	£9.95
CALLSIGN 99	168	£9.95
FLIGHT ROUTINGS 1999. Williams.	160	£7.95
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		£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
SIMPLE ELECTRONIC NAVIGATION. 2nd Edition. Mike Chenery	64	£8.95
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
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/GW0LNG.	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	£12.50
PRACTICAL TRANSMITTERS FOR NOVICES. John Case GW4HWR.	126	£12.30
RADIO AMATEURS EXAMINATION/END OF COURSE TEST PAPERS. Ray Petri G0OAT	104	£13.95
RAE MANUAL (RSGB). New Revised Edition.	127	£14.95
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
WINDOWS '98 EXPLAINED (BP456). N. Kantaris & P. Oliver	160	£6.99

	Pages	Price
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	£8.50
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.	448	£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	£10.50
MICROWAVE HANDBOOK - CONSTRUCTION & TESTING VOL 2 (RSGB)	120	£15.75
MICROWAVE HANDBOOK - BANDS & EQUIPMENT VOL 3 (RSGB)	140	£15.75

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		£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	£19.95
YOUR MOBILE COMPANION. Roger Butch	190	£8.50
YOUR VHF COMPANION. Steve Ford	230	£7.50

	Pages	Price

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	£8.95
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 AntiqueElectronic 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)

SPECIAL OFFER

❑ Please send me..... copies of ***The UK Scanning Directory – 7th Edition*** for **£19.50** plus **£1.25** P&P (UK only)
Overseas prices on application.

£ .....

Book Orders

..... **£** .....
..... **£** .....
..... **£** .....
..... **£** .....
..... **£** .....
..... **£** .....

Postal charges:
£1.25 for one, **£2.50** for two or more (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 CREDiT CARD ORDER

*Recieve 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. Come 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 include major trunking modes: Motorola SmartNet® and MPT1327.

ONLY £69.00 inc vat

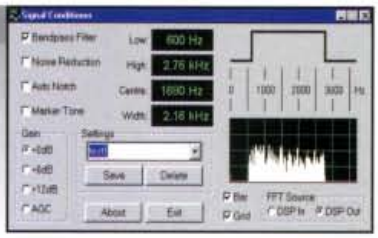
TAKE A LOOK AT WiNRADiO's DiGiTAL SUiTE (AWARDED 5 STARS BY WRTH)

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)



WiNADiO™ 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, and greatest, 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 **WR31000i-DSP** with its hardware for real-time recording, signal conditioning and decoding applications. It's all you need.

NEW EXTERNAL MODEL

EXTERNAL WiNRADiO™

We are now able to offer you a complete range of stand-alone WiNRADiO comms systems:

- **WR1000e - £359 INC VAT**
- **WR1500e - £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 (entirely 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-1000	WR-1500	WR-3100
Construction of internals	WR-1000i/WR-1500i-3100iDSP- Internal full length ISA cards		
Construction of externals	WR-1000e/WR-1500e - 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 step size	100 Hz (5 Hz BFO)	100 Hz (1 Hz for SSB and CW)	100 Hz (1 Hz for SSB and CW)
IF bandwidths	6 kHz (AM/SSB), 17 kHz (FM-N), 230 kHz (W)	2.5 kHz(SSB/CW), 9 kHz (AM) 17 kHz (FM-N), 230 kHz (W)	2.5 kHz(SSB/CW), 9 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	3-8 cards (pse ask)
Dynamic range	65 dB	65 dB	85dB
IF shift (passband tuning)	no	±2 kHz	±2 kHz
DSP in hardware	no - use optional DS software	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 when bought with 'e' series unit (otherwise: £99 inc)
PPS NiMH 12v Battery Pack and Charger: £99 inc when purchased with 'e' series unit (otherwise: £139 inc)
The WiNRADiO Digital Suite: £74.99 inc when purchased with a WiNRADiO receiver (otherwise: £81.05 inc)

To receive your completely free (no obligation) info pack and WiNRADiO software emulation demo disk all you have to do is get on the internet and go to our website at http://www.broadercasting.com. If you don't yet have easy access to the internet then by all means feel free to telephone us or send a fax.

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

EARTH STATION FT-847

HF/50/144/430 MHz All Mode Transceiver

"Compact, too--great for our next 'rover' operation."

"HF, VHF/UHF, and satellite, all-in-one!"

"Looks like Yaesu did it again!"

"And the DSP helped me hear my first moonbounce signal ever!"

The FT-847 changes base station operation forever. Now, three radios in one--HF, VHF/UHF, satellite; technology in its finest application, from the world leader in amateur communication.

With its unequaled combination of features, like DSP filters—notch, NR and BPF, built-in 6-meter, voice monitor, separate sub-band dial, Shuttle Jog dial, Smart Search, and digital meter, the FT-847 is the only radio of its kind! Exclusively for satellite work, 19 memories exceed any other radio. For performance, power-up with 100W for HF/6-meter, and 50W for 2-meter and 430 MHz. Additional "must-haves" include cross-band full duplex, normal/reverse tracking, CTCSS and DCS encode/decode, and direct keypad frequency entry. Plus, the FT-847 is 1200/9600 bps packet-ready.

Take the next step in all-band performance and take home the FT-847 today!

Only one transceiver gives you all mode operations on HF/50/144/430 MHz with full Satellite capability.

NEW Yaesu Patented Design

ATAS-100

Active Tuning Antenna System

Designed for the FT-847. Works on 7/14/21/28/50/144/430 MHz Amateur Bands for mobile operation.

YAESU

Choice of the World's top DX'ers

http://www.yaesu.co.uk

Specifications subject to change without notice. Specifications guaranteed only within amateur bands.
Some accessories and/or options are standard in certainareas. Check with your local Yaesu dealer for specific details.

YAESU UK LTD. Unit 12, Sun Valley Business Park, Winnall Close Winchester, Hampshire, SO23 0LB, U.K.