

PW

Reviewed This Month

A New British Product

The AKD 2001 144MHz Mobile FM Transceiver

Constructional

Build The PW Robin Frequency Counter

Plus

Dayton HamVention Report

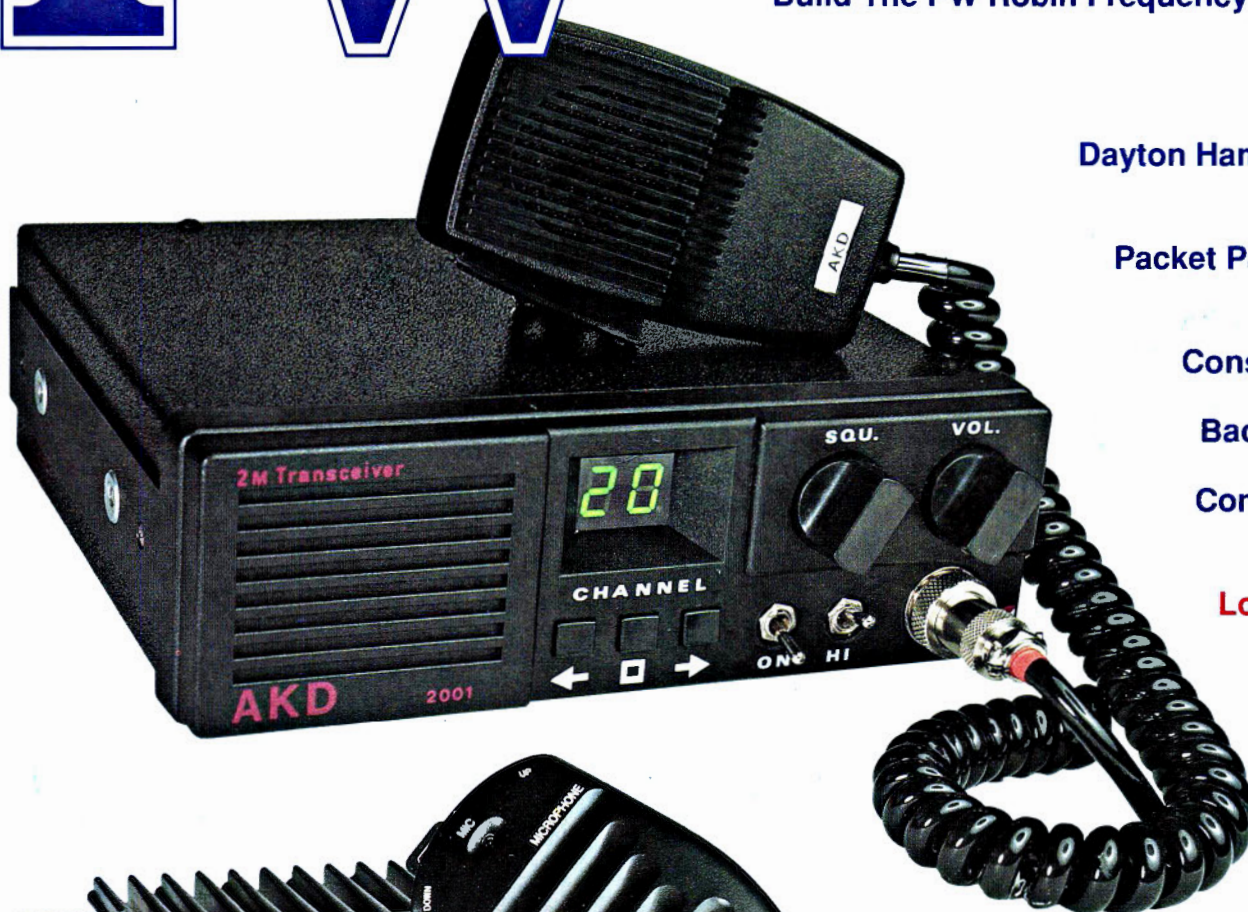
Packet Panorama

Antenna Construction

Backscatter

Competition

And Lots More!



PW Special Offer

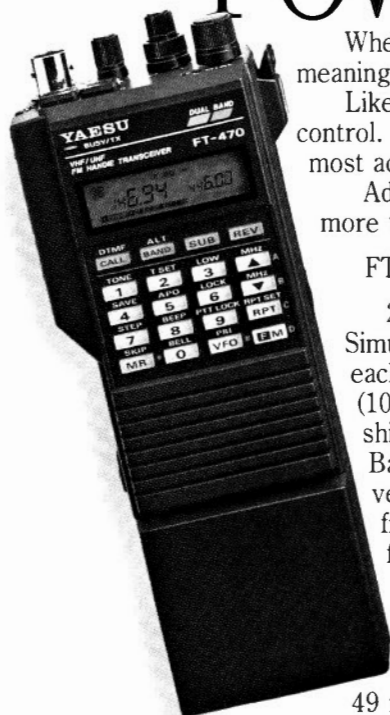
Move Into The Fast Lane With An
Alinco DR-112 144MHz Mobile
Transceiver Plus Mounting Kit &
Antenna For **£249!**

ISSN 0141-0857



JULY 1991
£1.60

OUR COMPLETE LINE OF PORTABLE POWER TOOLS.



When you're talking Yaesu handhelds, power takes on many meanings.

Like maximum RF output. Sophisticated microprocessor control. Deceptively simple operation. Even cost savings—as most accessories are interchangeable throughout the line.

Added up, it's no wonder amateurs choose Yaesu HTs more than any others.

FT-470. DUAL-BAND OPERATION PERFECTED.

2 metre and 430-440 MHz 42 memories. Simultaneous receive of both bands. Dual VFOs each band. Paging feature. DTMF autodialer (10 memories, 15 digits each). Auto repeater shift. Scanning features. Auto power-off. Battery saver. Audible command verification. Keypad and rotary-dial frequency entry. Battery packs available from 2.3 to 5 watts. More.

FT-411 SERIES. MAXIMUM SINGLEBAND PERFORMANCE.

2 metre FT-411 and 430 MHz FT-811. 49 memories. Dual VFOs DTMF autodialer (10 memories, 15 digits each). Auto repeater shift. Scanning features. Auto power-off. Battery saver. Audible command verification. Key-pad and rotary-dial frequency entry. Many battery packs available, from 2.3 to 5 watts. More.



FT-23R SERIES. SMALL, SMART, RUGGED.

2 metre FT-23R, and 430 MHz FT-73R. 10 memories (7 store odd splits). Memory scan at 2 frequencies per second. High/low power switch. LCD power output and "S"-meter display. Auto-battery saver. Alluminium-alloy case. Water-resistant seals. Many battery packs available, from 2 to 5 watts. More.



Want more information? Call **(0703) 255111**
Or call into your local authorised Yaesu dealer and ask about the FT-470, FT-411 and FT-23R Series handhelds. The power in handheld performance.

South Midlands Communications Ltd, S M House,
School Close, Chandlers Ford Industrial Estate,
Eastleigh, Hampshire, SO5 3BY. Telephone (0703)
255111, Fax (0703) 263507, Telex 477351
SMCOMM.

YAESU

Prices and specifications subject to change without notice.

JULY 1991
(ON SALE JUNE 13)
VOL. 67
NO. 7
ISSUE 1012

NEXT ISSUE (AUGUST)
ON SALE JULY 11

EDITORIAL & ADVERTISEMENT OFFICES

Practical Wireless
Enefco House
The Quay
Poole
Dorset BH15 1PP
☎ Poole (0202) 678558
(Out-of-hours service by
answering machine)

CREDIT CARD ORDERS

(0202) 665524
(Out-of-hours service by
answering machine)
FAX Poole (0202) 666244

Editor

Rob Mannion G3XFD

Art Editor

Steve Hunt

Technical Projects

Sub-Editor

NG ("Tex") Swann G1TEX

Technical Artist/

Photography

Rob Mackie

Production

Sharon George

Editorial Assistant

Donna Vincent

Administration Manager

Kathy Moore

Accounts Manager

Alan Burgess

Accounts Assistant

Darren Howe

Clerical Assistant

Rachel Parkes

Advertisement Manager

Roger Hall G4TNT

PO Box 948

London SW6 2DS

☎ 071-731 6222

Cellphone 0860 511382

FAX 071-384 1031

Advert Copy and

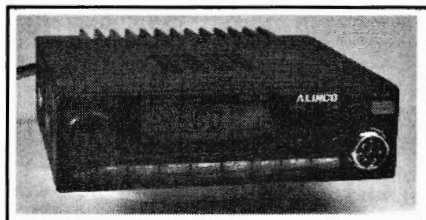
Make-up (Poole Office)

Marcia Brogan

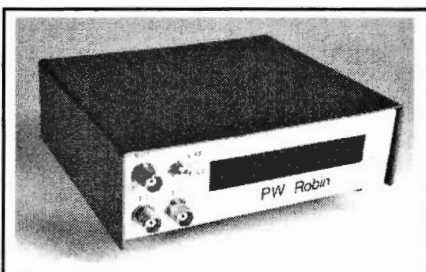
☎ Poole (0202) 676033

FAX Poole (0202) 666244

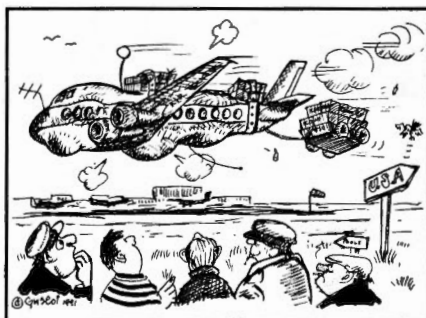
Contents July 1991



19



26



32

*Getting Started - The Practical
Way has been held-over this
month.*

Regular Features

- 71 Advert Index
- 60 Backscatter
- 59 Bargain Basement
- 68 Book Service
- 14 Competition Corner
- 11 Keylines
- 15 Newsdesk '91
- 59 PCB Service
- 25 Radio Diary
- 11 Receiving You
- 13 Services
- 67 Subscribers' Club
- 13 Wireless-Line

19 PW Special Offer

20 PW Review - The AKD 2001 144MHz Transceiver

Richard Ayley G6AKG

23 A Three Element Portable 144MHz Beam Antenna

Kevin James G6VNT

26 The PW Robin Frequency Counter Part 1

Mike Rowe G8JVE

31 CB High & Low 'Quaynotes'

32 The Dayton HamVention '91 Report

Rob Mannion G3XFD

35 PW Morse-Master Part 2

Steve Farrow G8IWW

38 The PW Moon-4 Part 3

Andrew Talbot G4JNT

42 Reflections

Ron Ham

45 Mathematics For The RAE

Ray Fautley G3ASG

48 Satellite Scene

Pat Gowen G3IOR

50 Packet Panorama

Roger Cooke G3LDI

53 The Oscilloscope In Your Workshop

Fred Judd G2BCX

ICOM

NEW MULTIBAND IC-970E Base Station



Designed for the serious operator on the 144, 430 and 1200MHz bands, Icom's new IC-970E has up-to-date technology for DX, digital and satellite communications.

The IC-970E is supplied as an all mode dual-band for 144 and 430MHz bands. Optional units expand its capabilities to 1200MHz or wideband receiving from 50-905MHz.

Communications via satellites has never been easier. The IC-970E automatically tracks uplink and downlink frequencies as the tuning control is rotated also, ten specific memory channels for satellite frequencies.

The dual-band watch allows you to receive both MAIN and SUB band audio simultaneously, multiple scanning systems on the MAIN and SUB bands plus 99 memories, an easy to read central display and Icom's DDS system make this one of the most comprehensive multi-band transceivers available.

For more detailed information on the IC-970E Base Station or any other Icom radio equipment contact your local authorised dealer or call Icom (UK) Ltd.

Datapost: Despatch on same day whenever possible.

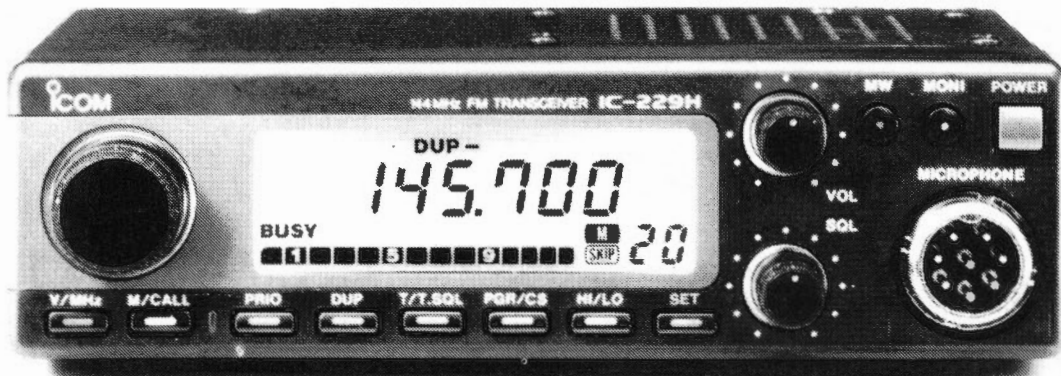
Visa & Mastercards: Telephone orders taken by our mail order dept. instant credit & interest free H.P.



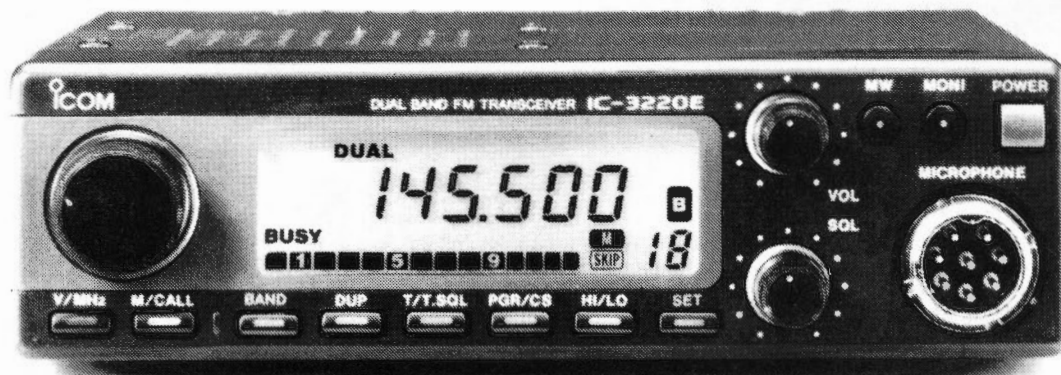
Count on us!

NEW MOBILES

IC-229E/449E
2M, FM Mobiles



IC-3220E
Dual-Band
Mobile



Icom have built a range of ultra compact FM mobile transceivers. Similar in style, easy to operate and perfect for driving safety. Advanced features include a variety of tuning steps, memories, scan functions, adjustable R.F. power, optional pager and tone squelch units for selective calling. All these models include the HM-59 hand microphone with up/down and 1750Hz tone call for repeater operation. The unique simple operation enables each function to be operated with one switch. Illuminated switches and controls give complete night time operation.

IC-229E VHF Mobile. This VHF 25 watt transceiver measure just 140(w) x 40(h) x 105(d) mm. No need to worry about installation, its small enough to fit most vehicles. Also available the IC-229H 50 watt version where extra high power is required.

IC-449E UHF Mobile. High sensitivity with GaAs FETs and 35w output power provide optimum performance with this UHF transceiver. 20 Memory channels and a programmable call channel can be used to store most used frequencies.

IC-3220E Dual Band Mobile. Enjoy complete dual-band operation. In addition to cross band duplex operation this transceiver can receive both MAIN and SUB bands simultaneously. One of the smallest dual-band mobile transceivers available, the IC-3220E has a 25 Watt output on both bands. Where higher power is required the IC-3220H offers 45 watts on the 144MHz band and 35 watts on the 430MHz band.

Icom (UK) Ltd.

Dept PW, Sea Street, Herne Bay, Kent CT6 8LD. Tel: 0227 741741 24 Hour. Fax: 0227 360155

South Midlands Co

Southampton (0703) 255111 Leeds (0532) 350606 Chesterfield (0246) 453340

★ PLEASE NOTE WE SHALL BE CLOSED ON

HF EXCELLENCE

Have you always wanted to stand out from the crowd? Well now's the time to stand head and shoulders above the crowd with the FT1000 and FT990 HF transceivers, from Yaesu, arguably the crown king and prince of all HF transceivers. Designed with no expense spared, these transceivers offer exceptional performance combined with the ease of operation, a truly marvellous step forward in HF communications. The FT1000 and FT990 feature the very latest in electronics and microprocessor technology to ensure a highly reliable and exciting-to-use transceiver for all modes of operation on the HF bands.



FT-1000

- ★ Amateur Bands Tx 160-10m.
- ★ General Coverage Rx.
- ★ Dual Independent Rx capability.
- ★ Power output up to 200W PEP.
- ★ Auto ATU and internal P.S.U.

FT-990

- ★ Amateur Bands Tx 160-10m.
- ★ General Coverage Rx.
- ★ Power output up to 100W PEP.
- ★ Auto ATU and internal P.S.U.
- ★ 50 Memories.



NEW FT-26 & FT-76
2m & 70cms
MINI HANDHELDS
A REAL HANDFUL!



- UP TO 5W OUTPUT
- 5.5-16 VOLT DC INPUT
- AUTOMATIC PWR SAVER
- 53 MEMORIES
- BUILT IN VOX (WITH YH2)
- CTCSS OPTIONAL

Not shown full size.

Southampton (0703) 255111
SMC HQ, School Close,
Chandlers Ford Ind. Est.
Eastleigh,
Hants SO5 3BY.
9am.-5pm. Mon-Fri
9am.-1pm Sat

Leeds (0532) 350606
SMC Northern,
Nowell Lane Ind. Est.
Nowell Lane,
Leeds LS9 6JE.
9am.-5.30pm. Mon-Fri
9am.-1pm Sat

Chesterfield (0246) 453340
SMC Midlands,
102 High Street,
New Whittington
Chesterfield,
9.30am.-5.30pm.
Tues-Sat

Birmingham 021-327 1497
SMC Birmingham,
504 Alum Rock Road,
Alum Rock,
Birmingham B8 3HX.
9am.-5.00pm. Tues-Fri
9am.-4pm Sat

Axminster (0297) 34918
Reg Ward & Co. Ltd.
1 Western Parade,
West Street,
Axminster,
Devon EX13 5NY.
9.00am.-5.20pm. Tues-Sat

Communications Ltd.

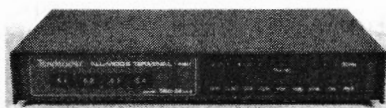
0246) 453340 Birmingham 021-327 1497 Axminster (0297) 34918

ON FRIDAY 28th JUNE FOR STOCKTAKING ★

NEW TELEREADER TNC TERMINALS

INTRODUCING THE NEW TNC24MKII AND TNC MICRO

Two new TNC units, the TNC24MkII and TNC Micro, are both compact full featured designs, built to exacting standards for the discerning packet operator. The TNC Micro being totally portable and the size of a cigarette packet.



**TNC
24MkII
£325**



**TNC Micro
£209**

- ★ PACKET, CW, RTTY & FAX modes.
- ★ PSK & JAS-1 B modes for satellite packet.
- ★ Auto doppler shift tuning.
- ★ Message storage facility.
- ★ Neat compact design.

- ★ Ultra compact size.
- ★ AX25 Level 2 Protocol.
- ★ Message Board.
- ★ Supplied NiCad & Charger.

WHY NOT DROP US A LINE FOR MORE INFO!

SMC FOR ALL YOUR ACCESSORIES

BASE STATION ANTENNAS

HF			
CSTD-HP	10-80m Trapped Dipole	£55.75	C
OSGSRV	10-40m Half size GSRV	£19.95	B
OSGSRVF	10-80m Full size GSRVF	£26.25	B
HF3VNB	12-17-30m Vertical	£69.00	C
28HS-2HB	10m HB9CV 2 Element	£66.00	C

VHF/UHF

DSC770	Discone 70-700MHz	£25.50	C
TW435D	Discone 400-1200MHz	£47.00	B
D130	Discone 25-1300MHz	£76.65	C
2HB6	6m HB9CV 2 element	£36.75	C
HS-GP62	6m 2 step collinear	£66.36	D
ABC23	2m 3x5/8 collinear	£45.00	C
GP23	2m 3x5/8 collinear	£45.00	C
GPVSS	2m 2x5/8 collinear	£46.49	C
SG144	2m Swiss Quad (Vert. Pol)	£69.45	C
GP714	70cm 14 step collinear	£96.00	C
WX1/N	2m/70cm 4.5/7.2dB collinear	£60.25	C
WX2/N	2m/70cm 6.0/8.0dB collinear	£80.75	C
WX4/N	2m/70cm 7.8/10.8dB collinear	£106.25	C
CA2X4WX	2m/70cm 6.5/9.0dB collinear	£80.72	C
CA2X4MAX	2m/70cm 8.5/11.9dB collinear	£102.12	C
LT606	Log Periodic 50-500MHz	£189.00	C

MOBILE ANTENNAS

HF			
SMC12SE	12m Fold-over	£16.85	B
SMC15SE	15m Fold-over	£16.85	B
SMC17SE	17m Fold-over	£18.75	B
RSL28B	10m Fold-over	£14.25	B
PL20M	20m Fixed	£22.90	B
PL40M	40m Fixed	£22.90	B
PL80M	80m Fixed	£24.00	B
PL160M	160m Fixed	£24.50	B
FLEX110	160-10m	£82.00	C

VHF/UHF

2GW	2m 1/4 wave	£4.00	B
2NE	2m 5/8 wave foldover	£13.50	B
VM-144HP	2m 7/8 wave foldover	£32.65	B
78B	2m 7/8 wave ball	£15.35	B
88F	2m 8/8 wave	£18.40	B
268E	70cm 2 sect collinear	£33.50	B
35B	70cm 3x5/8 wave	£34.50	B
VM-727RS	2m/70cm 1/2+2x5/8 wave Hi Pwr	£28.35	B
VM-727SKR	2m/70cm 1/2+2x5/8 wave	£25.50	B
HS-727VMS	2/70 1/2+2x5/8 wave shortened	£26.50	B

CA2X4MB	2m/70cm 4.5/7.4dB	£38.50	C
CA2X4KG	2m/70cm 2x5/8+4x5/8 wave	£40.75	C

MOUNTS

SMOGCCA	Gutter Clip c/w 4m cable	£14.25	B
SMCSOCA	Cable Ass. 4m SO239/PL259	£7.05	B
SMCSOCAL	Cable Ass. 6m SO239/PL259	£7.36	B
HS-TMK	Trunk Mount H.Duty c/w cable	£18.91	B
SOMM	Mag Mount c/w 4m cable	£13.02	B
SMOGCD	Gutter Clip only	£6.59	B
ESD	Bumper Strap	£11.75	B
RSM4M	Mag Mount c/w Cable Ass.	£26.44	B
TBR	Hatchback Mount	£11.50	B

MINI VHF/UHF

CHL21J	2m/70cm 0/2.15dB	£14.75	B
CHL23J	2m/70cm 2.15/3.8dB	£17.35	B
HS-727SS	2m/70cm 0/2.8dB	£17.35	B

MOUNTS MINI

RS17	Mini Trunk mount only	£12.75	A
RS16	Mini Gutter Clip only	£12.75	A
CK-3LX	Mini Cable Ass. RS16/RS17	£16.25	B
SSB1	Mini Hatch Mount c/w 5m cable	£27.00	B
SS-BM	Mini Multipurpose Mount only	£10.25	B

DUPLEXERS

CF416MN	144/430 Duplexer UHF/N conn.	£26.00	B
HS790DN	144/430 Duplexer UHF/N slts	£26.00	B
CFX4310	144/430/1200 Triplexer	£36.75	B

BALUNS

CBL-30	1:1	1.7-30MHz	SO239	1kWPEP	.....	\$18.95	A
CBL-2000	1:1	0.5-60MHz	SO239	2kWPEP	.....	\$25.50	A
CB2F/2k	1:1	2-30MHz	SO239	2kWPEP	.....	\$30.50	B
CB2F/4k	1:1	2-30MHz	SO239	4kWPEP	.....	\$56.00	B
CB2F/6k	1:1	2-30MHz	HN type	6kWPEP	.....	\$179.00	D
CB2F/10k	1:1	2-30MHz	HN type	10kWPEP	..	\$460.00	D
CB2F/5k	4:1	50MHz	N type	3kWPEP	.....	\$105.75	D

PRICES FOR POSTAGE ON ALL THE ABOVE ITEMS ARE CODED AS FOLLOWS:

A = £1.75
B = £4.00
C = £6.00
D = £10.00
E = £15.00

STRUMECH VERSATOWER

STANDARD 13M20 SERIES

13M20P25	25FT POST MOUNT	£468.83
13M20P40	40FT POST MOUNT	£660.35
13M20P60	60FT POST MOUNT	£777.85
13M20FB25	25FT FIXED BASE MOUNT	£324.30
13M20FB40	40FT FIXED BASE MOUNT	£442.33
13M20FB60	60FT FIXED BASE MOUNT	£569.83
13M20BP25	25FT BASE PLATE MOUNT	£553.43
13M20BP40	40FT BASE PLATE MOUNT	£767.28
13M20BP60	60FT BASE PLATE MOUNT	£863.63
13M20M25	25FT MOBILE TOWER	£2226.63
13M20M40	40FT MOBILE TOWER	£2439.30
13M20M60	60FT MOBILE TOWER	£2613.20

HEAVY DUTY 16M20 SERIES

16M20P40	40FT POST MOUNT	£820.15
16M20P60	60FT POST MOUNT	£930.60
16M20P80	80FT POST MOUNT	£1457.00
16M20FB40	40FT FIXED BASE MOUNT	£658.00
16M20FB60	60FT FIXED BASE MOUNT	£780.20
16M20FB80	80FT FIXED BASE MOUNT	£1245.50
16M20BP40	40FT BASE PLATE MOUNT	£849.50
16M20BP60	60FT BASE PLATE MOUNT	£972.90
16M20BP80	80FT BASE PLATE MOUNT	£1563.93
16M20M40	40FT MOBILE TOWER	£2909.30
16M20M60	60FT MOBILE TOWER	£3031.50
16M20M80	80FT MOBILE TOWER	£3760.00

MIDITOWER SERIES

P30	30FT POST MOUNT	£500.55
BP30	30FT BASE PLATE MOUNT	£528.75
FB30	30FT FIXED BASE MOUNT	£429.09

36FT VERSIONS OF ABOVE.
1 EXTRA SECTION ADD £45.83

All towers except mobiles are available from stock 13M20 and 16M20 series all supplied with auto brake winches. All are supplied with H2R head unit drilled to take GS-065 bearing. Holding down bolts for BP and FB towers are available at £29.38 per set extra.

Alternative winches and head units are available at extra cost.
Delivery is by quotation dependent upon distance.



- Free Finance on selected items, subject to status. Details available on request.
- Up to £1000 instant credit, a quotation in writing is available on request, subject to status.
- Yaesu Distributor Warranty, 12 months parts and labour.
- Carriage charged on all items as indicated or by quotation.
- Prices and availability subject to change without prior notice.
- Same day despatch wherever possible.

Waters & Stanton 0702 206835 or 204965

BEST PRICES! FAST MAIL ORDER

ALINCO

The Serious Alternative

First in Europe!

2 Metre Handheld
+ AM Airband Rx!

Range: AM 108-138MHz
FM 138-180MHz

DJ-160EA

£239

The DJ-160EA is the natural progression from the DJ-160E. Exactly the same package but with a much wider coverage and the addition of AM airband, a first in handhelds. The wide frequency range coupled with all the standard features of the DJ-160E give the new DJ-160EA an unrivalled specification. Standard features include 3 or 0.5 Watts output, LCD display, keypad selection, rotary frequency control, 21 memories, scan and priority, reverse repeater, 5-25kHz steps, DTMF decoder, auto power off, DC-DC 12V converter, 700mAh pack, rapid AC charger. Add to this AM airband coverage and you will see why the DJ-160EA is destined to become the best selling handheld for 1991!

DJ-460E...£239 (70cms)

Best Airband Receiver Ever! VT-125MkII £169

It's a fact, the VT-125 mkII is the best and most sensitive airband receiver ever produced. That's not just our opinion, it is the opinion of the professionals who are buying this in quantities!

- 108-142MHz
- 30 Memories
- 25KHz steps
- Free ni-cads
- Free Mains charger
- Latest Mk-II version!
- Full accessories



DIAMOND ANTENNA

Are A

Ham's Best Friend!

If you want the very best antenna for VHF or UHF then choose from the range that is stocked by most amateur radio dealers! Diamond give you more gain and quality £ for £. They are tough, sleek, pre-tuned, and have a spares back-up that is second to none. All "X" series models are fibre glass encapsulated and knock down into sections for easy transport. And if after purchasing, you are not convinced that they are great value for money with super low VSWR's, simply return the antenna to us within 14 days for a full refund. Now that's the kind of confidence that our competitors don't have. Nuff said!

CP22J	2m 2x 1/4th 6/5dB gain	49.95
The following have patented "C" load phasing.		
X-50	2m/70cm 4.5/7.2dB 1.7m	59.95
X-300	2m/70cm 6.5/9dB 3.1m	89.00
X-500	2m/70cm 8.3/11.7dB	119.00
X-700	2m/70cm 9.3/13dB	199.00
Others:		
D-707	Active base 1.5-1300MHz	99.00
D-505	Active mobile as above	69.00
CP5	80-10m HF vertical complete!	189.00
SAE for 26 page Diamond Catalogue. Fabulous!		

£349

INCLUDES
TONE
SQUELCH

DJ-560E

2m & 70cm 2W • 130-174 & 400-520MHz Rx • Keypad entry • Rotary tuning • 2 x Vol/Squ controls • 5/12.5/25kHz etc steps • DTMF • Dual Watch • Scanning • Bell alarm • 40 memories • 12V DC-DC • Auto dial • AC charger • 700mAh pack • 169 x 57 x 32mm • Rubber Duck • Plus many other features. • Phone for details.

DR-590E
2M & 70CMS

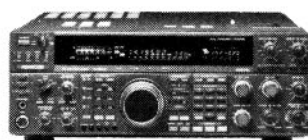
£499



2m & 70cms • 45 Watts • 10 or 5 Watts low power • Dual watch • Full Duplex • Automatic Repeater Memory • 38 Memories • Auto Band Change • Reverse Repeater • 6 channel steps 5-25kHz • Brightness control • Priority • Bell Function • Detachable front panel option • Built-in speaker • Fist mic and full mounting kit • 150 x 50 x 178mm.

SPECIAL THIS MONTH
20% DISCOUNT OFF JAYBEAM

KENWOOD SPECIALIST DEALER



TS 850!
£1325 +
FREE PSU!

COMING SOON!
New TS 450 & TS 690
Phone for information and delivery

Full 12 month warranty
Phone for latest
DEALS!

TS-140S	Compact HF rig + FREE PSU!	£880
TS-450S	Classic HF rig + FREE PSU!	TBA
TS-690S	HF with 6 metres + FREE PSU!	TBA
TL-922	Hunky 2kW Linear in stock!	£1495
TS-790E	2m/70cms (Part Ex welcome!)	£1525
TH-77E	Dualband handy + Free High Gain Ant.	£395
TR-751E	2m All Mode + FREE PSU!	£610

Retail and Mail Order: 22 Main Road, Hockley, Essex SS5 4QS. Tel: (0702) 206835/204965
Retail Only: 12 North Street, Hornchurch, Essex. Tel: (04024) 44765
VISA & ACCESS MAIL ORDER. 24 Hour Answerphone. Open 6 Days a Week 9am-5.30pm.
Rail: Liverpool St./Hockley or District Line/Hornchurch

ALL MAJOR BRANDS STOCKED

LARGEST IN SOUTH EAST

THE NEW FAMILY

In the last decade AOR has gained a reputation for unique high performance wide band radio receivers world-wide. With the arrival of its new subsidiary AOR (UK) Ltd, UK customers may enjoy a much closer link with the factory. We are pleased to introduce the new family of AOR receivers.



AR2800 Base/mobile scanning receiver.

The frequency coverage is 500kHz – 600MHz and 800MHz – 1300MHz. All mode AM, FM (narrow), FM (wide), and built-in BFO for USB, LSB, CW. The AR2800 features 1000 memories for spot frequencies and 10 search banks. Operation of the receiver is fairly easy and is similar to that of the popular AR1000/AR2000. The AR2800 is operated from 13.8V DC and is supplied with an AC adaptor, DC lead, mobile mount and telescopic aerial.

R.R.P. including VAT £395 (carriage extra).

AR3000 Unique top of the range desk top wide band scanning receiver. All mode AM, FM (narrow), FM (wide), USB, LSB, CW. The frequency range is 100kHz – 2036MHz with no gaps.

Triple and quadruple conversion ensure superior performance. The receiver is supplied with a telescopic aerial, 13.8V DC lead, AC power supply and operating manual. **R.R.P. including VAT £765 (carriage extra).**

AR2500 Base/mobile scanning receiver, the coverage is 500kHz – 1500MHz with no gaps. All mode AM, FM (narrow), FM (wide), and built-in BFO for USB, LSB, CW. An RS232 socket is fitted on the rear panel. **R.R.P. including VAT £419 (carriage extra).**

AR2000 Hand-held wide band scanning receiver. Improved specification. The coverage is 500kHz – 1300MHz with no gaps. Modes are AM, FM (narrow) and FM (wide). There are 1000 memories and 10 search banks. **R.R.P. including VAT £259 (carriage extra).**



AOR (UK) Ltd.

Trade inquiries welcome

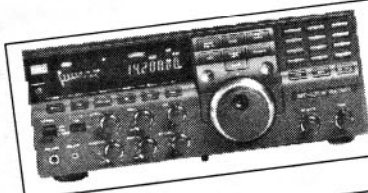
Room 2, Adam Bede High Tech Centre,
Derby Road, Wirksworth, Derbys. DE4 4BG.
Tel: 0629-825926 • Fax: 0629-825927

E&OE

ARE

COMMUNICATIONS

6 Royal Parade, Hangar Lane, Ealing, London W5A 1ET, England.
Tel: 081-997 4476. Fax: 081-991 2565



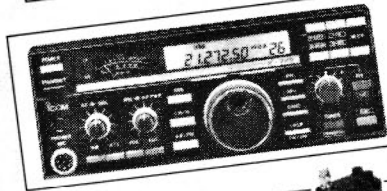
NRD 535

We would need a whole page to describe the wonders of this new JRC receiver. We were one of the first to offer delivery of this superb receiver, and at £120 less than list price! Call us and reserve yours from the next shipment.



YAESU FT-747

Available with No deposit and 48 months to pay.
The FT747 HF Transceiver SSB/CW/AM (and optional FM) 100 watts pep output on all HF bands and general coverage on receive 100kHz-30MHz. Dual VFO 20 memories.



IC-725 & IC-726

Transceivers for both mobile or base - the 726 has 6 meters inc.

PHONE FOR OUR PRICE YOU WILL BE AMAZED



**STANDARD C-528
DUAL BANDER**

**KENPRO KT-22E
140-150MHz**



Standard and Kenpro

Certainly not twins. - But each exceptional in their own way. The Standard C520 or C528. Still offers more facilities than any other dual bander and at our price hard to beat. Then the Kenpro KT22E - Exceptional value - reliable and simple to use - VHF 2 metres plus.

Opening Hours:

Monday-Friday 8.30-6.00pm Saturday 9.00-3.00pm

NEW Reserved car parking at rear of showroom. ALL EASY TERMS ARE BASED ON AN APR OF 34.4%

MICRONTA®



P
R
E
S
S

Multi testers

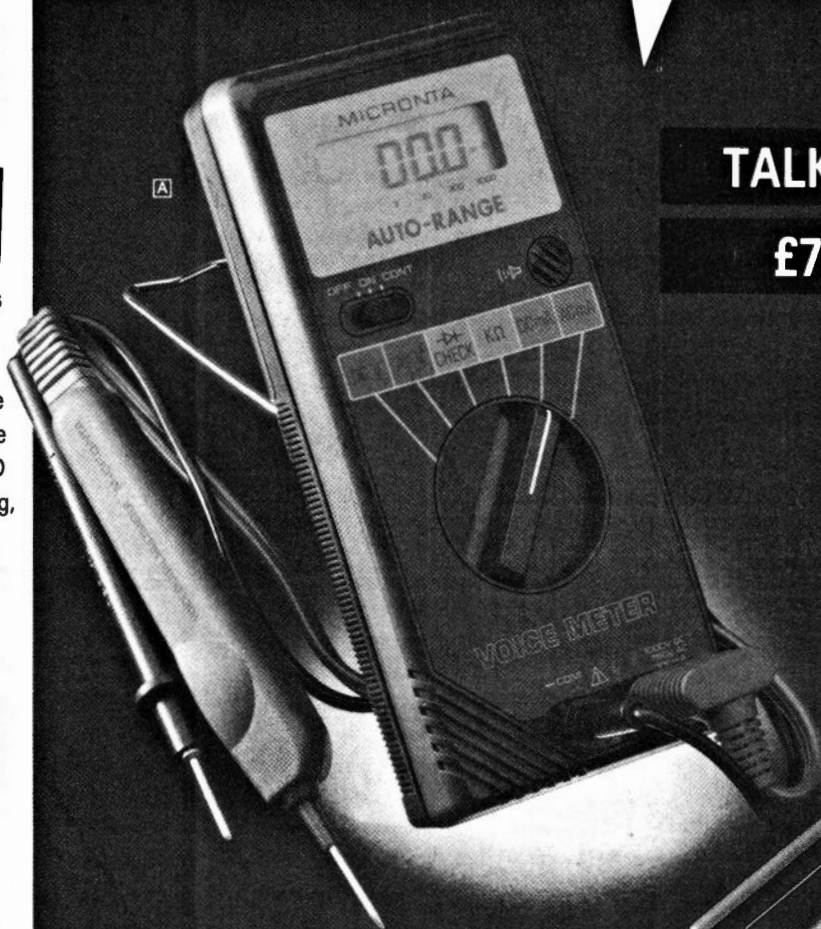
[A] Talking Multitester. Press a button on the probe and the meter will call out it's reading in clear English. The reading is also shown on the units large, easy to read LCD display. Features autoranging, autopolarity, continuity sounder, diode-check and over-range indicators. Measures to 1000 VDC, 750 VAC, 300mA AC/DC, 30 megohms resistance. Requires 4 "AA" batteries.

[B] Digital Multimeter. Full autorange or manual range control, selectable by a switch. Easy to read LCD display. Ideal for use in the field, lab, shop, bench or home. Fold-out stand allows you to adjust position for better visibility or to hang unit. Features continuity check, autopolarity, diode-check and low battery indicator. Measures to 1000 VDC, 750 VAC, 200 mA AC/DC, 20 megohms resistance. Requires 2 "AA" batteries.

Tandy®

ALL THE ACTION
AS IT HAPPENS!

InterTAN U.K. Ltd.,
Tandy Centre,
Leamore Lane, Walsall,
West Midlands. WS2 7PS
Tel: 0922 710000



TALKING METER

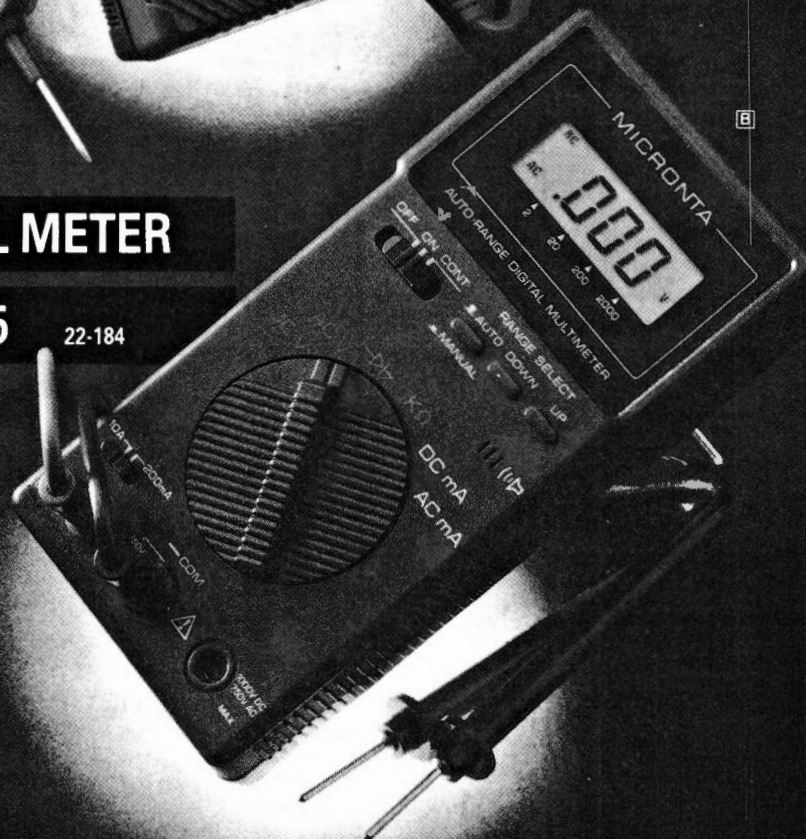
£79.95

22-164

DIGITAL METER

£39.95

22-184



YOU WILL ALWAYS GET THE BEST DEAL AT

ARROW

**SPECIAL OFFERS AVAILABLE
AT YOUR LOCAL RALLY:
PHONE TO RESERVE**

**ALL MAJOR BRANDS ON OFFER
MANY MAJOR ITEMS AVAILABLE —
INTEREST FREE!**

DUAL BAND 2M+70CMS HANDY'S

23CMS

 <p>IC-W2 £395 NOW IN! IC-24ET ICOM £356!! CASH PRICE</p>	 <p>TH-77E KENWOOD £397 or £133 DEP + 9 x £29.33</p>	 <p>C528 STANDARD £387 or £129 DEP + 9 x £28.67</p>	<p>TM53E 23CMS BARGAIN £350</p>
---	---	--	---

HF TRANSCEIVERS WITH GENERAL COVERAGE

<p>NEW TS850S KENWOOD</p>  <p>£1,325</p>	<p>SUPER BARGAIN TS950SD KENWOOD TOP OF RANGE PSU, ATU, DSP ALL FILTERS £2,995!!</p>	<p>JST 135 HF TRANSCEIVER</p>  <p>STAR BARGAIN £1,095 CASH PRICE</p>	<p>IC-735</p>  <p>£929 CASH PRICE</p>
--	--	---	--


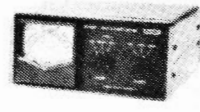
RECEIVERS AND SCANNERS

<p>ICR-7100</p>  <p>All mode receive. 25-2000MHz £P.O.A. S.A.E. Details</p>	<p>IC-R72E ICOM</p>  <p>£663 or £221 DEP + 9 x £49.11</p>	<p>AR3000</p>  <p>SUPERSCANNER CASH PRICE £695</p>	<p>NEW AOR AR2500 AR2800 £P.O.A. AR1000 £254</p> 
---	---	---	---

MOBILE DUAL BANDERS

BONITO

DAIWA

<p>NEW! TM702 KENWOOD</p> <p>£455 or £152 DEP + 9 x £33.67</p>	<p>NEW C5608D STANDARD</p>  <p>£664 or £221 DEP + 9 x £49.22</p>	<p>NEW BONITO FAX DECODER with SSTV DETAILS SAE</p>	<p>AMATEUR RADIO ACCESSORIES</p>  <p>NS660P PEP meter</p>
---	---	---	--

ARROW RADIO

For a good
deal — a fair
deal — the
best deal

HEAD OFFICE:
5 The Street, Hatfield Peveral
Chelmsford, Essex CM3 2EJ
Tel: 0245 381626/381673
Fax: 0245 381436
Hours:
9-5 (Closed Thursdays)

GLASGOW:
Unit 17
Six Harmony Row
Govan
Glasgow
Scotland G51 3BA
Tel: 041 445 3060
Hours: 8.30-5.30 Mon-Fri
(closed Saturday)

WIGAN:
Greensway Arcade
Gerrard Street
Ashton-in-Makerfield
Wigan, Lancs
Tel: 0942 713405
LEICESTER:
DAVE FOSTER (Agent)
Tel: 0533 608189
Latest calls 8.30pm please!

YOUR ORDER CAN BE TELEPHONED WITH CREDIT CARD DETAILS & DESPATCHED IMMEDIATELY!

COMET ANTENNA

'The effective aerial'

**NON RADIAL: Mobile antennas independent of
vehicle ground plane**

CHL21J 144/432 MHz, Unity/2.15dB, 100W Only 29cms long	£14.80
CHL23J 144/432 MHz 2.15dB/3.8dB 100W Only 0.44 metres	£17.30
CHL24J 144/432 MHz 2.15dB/5.0dB 100W 0.8 metres long	£25.85
CHL25J 144/432 MHz, 3dB/5.5dB, 120W, 0.93 metres long	£30.45
CHL250H 144/432 MHz 3.0dB/5.5dB 200 Watts 0.95 metres long	£33.50
CHL260 144/432 MHz 4.5/7.2dB 130W 1.5 metres long	£38.30
CHL185 5/8 wave non-radial 144 MHz 4.1dB 200W 1.43 metres long	£20.40

**2x4 SERIES + TRIBAND MOBILE and
base station antennas**

CA-2x4M 144/432 MHz 4.5/7.2dB 150W 1.53 metres	£38.50
CA-2x4KG 144/432 MHz 6.0/8.4dB 120W SSB 2.06 metres	£40.83
CPR5400 High quality Mobile Dual Bander 144/430 MHz	£30.95
CPR5600 High quality Mobile Dual Bander 144/430 MHz	£41.15
CX-702 Mobile Tribander 50/144/430 MHz 2.15/6.0/8.4dB 120W 2.1M	£45.95
CX-725 Base Tribander 50/144/430 MHz 2.15/6.2/8.4dB 200W 2.43M	£71.50
CX-801 Mobile Tribander 144/432/1296 MHz 3/6.8/9.6dB 100W 1.0M	£36.40

**2x4 SERIES & DUAL BANDERS featuring the
unique super linear converter system**

CA-2x4DXM 144/432 MHz 8.8/12.2dB 200W 6.05M	£135.30
CA-2x4MAX 144/432 MHz 8.5/11.9dB 200W 5.4 metres "N" G Fibre	£99.95
CA-2x4WX 144/432 MHz 6.5/9.0dB 200W 3.18 metres Glassfibre	£80.70
CA-2x4SUPERII 144/432 MHz 6.0/8.4dB 200W 2.43 metres G Fibre	£79.00
CA-2x4FX Compact 144/432 MHz 4.5/7.2dB 200W 1.79 metres	£57.00
CA-2x4BX 144/432 MHz 3.0/6.0dB 120W 1.15M	£38.80
GPX2010 PRESTIGE Base Antenna for 2M (9.5dB) 70cms (13.2dB) 7.9 Metres long 4 Section 200W The Highest Gain Dual Bander in the World!	£148.00

DUPLEX & TRIPLEXERS Zinc alloy diecast

CFX5140 Triplexer 1.3-90 MHz + 130-200 MHz + 380-500 MHz PL259	£38.95
CFX4310B Triplexer 1.3-150 + 350-500 + 840-1400 MHz	£38.10
CF413N 432/1296 MHz 500/200W PEP 55dB isolation "N"	£37.45
CF416M/Mp/Np Duplexer 1.3-150 + 400-540 MHz "N" & PL259	£27.40
CF416N/Mp/Np Duplexer 1.3-150 + 400-540 MHz "N" & PL259 N output	£30.80
CF4160/B 1.3-150 + 400-540 MHz PL259 & N when flying leads used	£27.40

SR SERIES TO ORDER ONLY.

MONO BANDER MOBILE ANTENNAS

CA285 5/8 wave 3.5dB 300W 1.32 Metres Base loaded	£15.50
CA287C 7/8 wave 5.2dB 200W 1.89 metres double co-phase	£23.00
CA430TM 3 x 5/8 wave 432 MHz 6.8dB 150W 1.47 metres	£30.60

MONOBAND BASE ANTENNAS

ABC21 5/8 wave Ground Plane 144 MHz 3.4dB 200W 1.4 metres	£25.00
ABC22A 2 x 5/8 wave 144 MHz 6.5dB 2.87 metres	£36.80
ABC23 3 x 5/8 wave 144 MHz 7.8dB 200W 4.5 metres	£60.80
ABC71 5/8 wave ground plane 432 MHz 3.4dB 0.54 metres	£22.00
ABC72 2 x 5/8 wave GP 432 MHz 200W 5.8dB 1.07 metres	£35.60
CA712EF 432 MHz Twelve x Half wave! 9.5dB 3.10 metres	£56.20

HF & 50 MHZ

CHA-5 Vertical with Loaded Radials for 80/40/20/15/10 M 200W SSB 5.29 Metres. Features trifilar wound toroidal core. SPECIAL OFFER	£199.00
CHA-6 Vertical as above but with "six" metres	£229.00
52HB4 4 El HBVCV Beam 10.4dB for 50 MHz 400W SSB 3.2M	£69.40
CBL30 HF 1.7 — 30 MHz Balun 1:1 1kw	£18.40
CBL200 5-60MHz Balun 1:1 2KW PEP	£25.55

CRZ/DISCONE & HANDHELD ANTENNAS

CRZ120B A Unique wide band Active antenna 500 Hz to 1500 MHz 1.24 Metres with controller	£90.40
CRZ07 Mobile Active Wide Band Antenna 0.5-1500 MHz 1.05 metres	£68.00
CDS180 Discone antenna 25-1300 MHz + TX 6/2/70/23cm 4.105 metres	£71.00
CDS150 Discone antenna 25-1300 MHz + TX 6/2/70/23cm 1.785 metres	

CH72S Designed for dualband 144/432 MHz handhelds 0/3.2dB BNC	£61.25
CH25 Flexi Half wave BNC (self resonant)	£12.00
CA28N BNC Telescopic Quarter wave antenna	£12.25
ROD2 BNC 5/8 wave base loaded Telescopic antenna	£11.00
CH720C BNC Dualband 2M/70cms Flexi-Black 2.15/3.8dB 50W 0.45M	£13.25
CH101 1.8-150 MHz/15-150.1.5KW PEP/SWR/PWR	£14.85

NEW: "B" SERIES

B-10 144/430 MHz Dual Band Mini Mobile Slimline Black 0/2.15 dB 50W 0.3M Long	£16.95
B-20 144/430 MHz Dual Band Mobile Slimline Black 2.15/5.0dB 50W 0.775M Long	£23.70

FULL LIST ON REQUEST

DAIWA SWR METERS

CN410M SWR/PWR Meter Cross Needle 3.5-150 MHz	£57.80
CN460M SWR/PWR Meter Cross Needle 140-450 MHz 15/150W	£57.60
DPB30N Digital Meter 1.8-150/150KW 140-525/150W N Sockets	£193.15
NS660P 1.8-150 MHz 15/150/150W PEP & Hold	£111.40
UB6VN 140-525 Sensor for NS660P	£46.50
CN101 1.8-150 MHz/15-150.1.5KW PEP/SWR/PWR	£57.80

DAIWA POWER SUPPLIES

PS3131 1-15V Variable 30amp max Cross needle meter	£145.60
PS304 1-15V Variable 30amp max	£126.25
PS120MII 3-15V Variable 9.2amp Protection circuit	£72.80
PS140II 13.8V 12amp Protection circuit	£81.25

DAIWA ANTENNA TUNERS

CNW319II 3.5-54 MHz 150W CW	£173.78
CNW419 1.8-30 MHz continuous 200W (100W 1.8-3.4)	£193.20
CNW518 8 Bands 3.5-30 MHz 1KW CW	£291.25
CNW727 ATU 2M/70cm + SWR/PWR 200W CW (150W-70cm)	£140.80

DAIWA LINEAR AMPLIFIERS

LA2035R 2M + Pre-amp 1-5W in/30W out	£72.80
LA2065R 2M + Pre-amp 1-14W in/60W out	£134.95
LA2155H 2M + Pre-amp 1.5-25W in/150W out	£261.00
LA4090 70cm + Pre-amp 10W in/85W out 25W in/90W out	£251.40

**ALL DAIWA PRODUCTS
AVAILABLE —**

FULL CATALOGUE ON REQUEST



Communications Centre (Photo Acoustics Ltd.)

TWO-WAY RADIO • AMATEUR RADIO • AUDIO VISUAL • SALES & SERVICE

58, High Street, Newport Pagnell, Bucks. MK16 8AQ Tel: (0908) 610625 Fax: (0908) 216373

P
H
O
T
O

A
C
O
U
S
T
I
C
S



TS-850S Greatness Re-asserted

Once again Kenwood stamp their authority on the HF transceiver market with the introduction of the latest in their ever popular "8" series transceivers, the TS-850S.

Designed to fit the market between the TS-440S and the TS-950S, the TS850S is another landmark in top performance transceivers for the operator who knows what he wants and can appreciate the real performance advantages which come from owning Kenwood equipment.

In a major new transceiver, there are so many features and subtle details of operating convenience that it is quite impossible to describe them in a few words. Suffice to say that 1Hz tuning rates from an advanced DDS driven synthesiser, and a +24dBm

intercept point will give you a flavour of receiver performance, whilst a transmit output power of 120W and an optional Digital Signalling Processor (DSP) will put you in top place on the bands.

New Product Information sheets are available on request, and of course the TS-850S will be on show. We are happy to talk about and demonstrate why we sincerely believe that the TS-850S will satisfy your operating needs; whether these are keeping in touch with friends on 80 or chasing some rare DX on 20.

The TS-850S; Kenwood have taken you another step forward. See it soon.

TS-850S...

£1,325.00 inc VAT

KENWOOD TH-77E DUAL BANDER

- ★ World's smallest package for 2M/70cm dual bander
- ★ 5W & hi-low power output
- ★ Dual scan-dual VFO's
- ★ Built in DTSS and pager function
- ★ Larger dual displays
- ★ 40 multi-function memories

TH-77E £395

Full range of accessories for all models

P&P £5.00

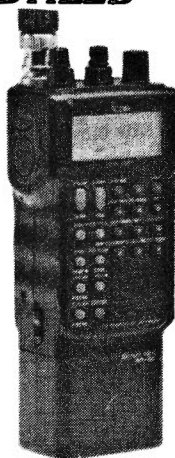


NEW - NEW - NEW IC-W2E DUAL-BAND HANDHELD

IC-W2E features include:

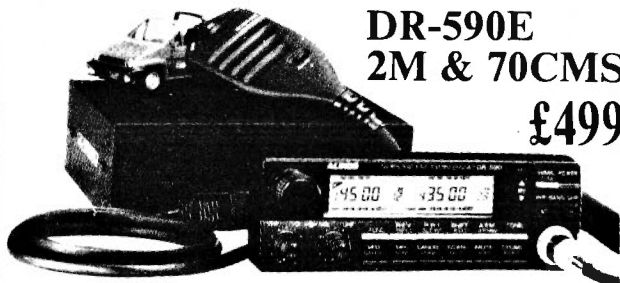
- Optional pocket beep and tone squelch for quiet standby.
- High speed scan and priority watch.
- Full 5W output power with external 13.5-16V power supply unit.
- 24 hour clock with ON/OFF timer.
- 1750Hz tone call to access repeaters.
- Programmable offset frequency.
- Monitor function that allows you to check repeater input frequency.
- External DC power jack.
- Memory mask to hide seldom-used channels.
- Memory transfer function.
- PTT lock function.
- Keypad and tuning control lock.
- Automatic power save.

£395.00



DR-590E 2M & 70CMS

£499



2m & 70cms • 45 Watts • 10 or 5 Watts low power • Dual watch • Full Duplex • Automatic Repeater Memory • 38 Memories • Auto Band Change • Reverse Repeater • 6 channel steps 5-25kHz • Brightness control • Priority • Bell Function • Detachable front panel option • Built-in speaker • Fist mic and full mounting kit • 150 x 50 x 178mm.

SPECIAL OFFERS

	P&P	
REALISTIC Pro-2006 VHF/UHF scanner with Hyper-Scan, covers 25-550MHz & 760-1300MHz	£249.95	£7.50
SGC Automatic Antenna Tuner, works with any HF transceiver. Covers 1.8-30MHz. 10-150W Input. Will tune from 8-80ft. antenna. Waterproof for all weather. 10mS retuning time	£425.00	£12.00

SECONDHAND LIST

	P&P	
REGENCY MX4200 VHF/UHF Scanner covers 60-89MHz, 118-136MHz, 144-174MHz, 380-495MHz & 800-950MHz	£169.00	£5.00
ICOM Micro 2E 2M Handheld Transceiver c/w Nicad Pack, charger & DC converter	£149.00	£5.00
YAESU FT-790R 70cms Multimode. Ex. cond.	£249.00	£7.50
UNIDEN BEARCAT 200XLT VHF/UHF Handheld scanner	£169.00	£5.00
KENWOOD TR-3600E 70cms Handheld Transceiver	£169.00	£5.00
ERA MICROREADER Mk II c/w RTTY Decoder with built-in display	£75.00	£5.00
YAESU F7-708R 70cms Handheld Transceiver c/w three Nicads & car adaptor	£132.00	£5.00
YAESU F7-207R 2M Handheld Transceiver c/w Nicad & charger	£89.00	£5.00
SONY PRO-80 Handheld HF/VHF Receiver. Covers 150kHz-108MHz & 115-223MHz. AM/FM/FMW & SSB. (As new)	£225.00	£5.00
AR900 Handheld VHF/UHF Scanner, c/w Nicad Pack, charger & aerial. (As new)	£155.00	£5.00
YAESU FRG-9600 VHF/UHF Scanner fitted with HF modification. (Ex. cond.)	£359.00	£7.50
YAESU FRG-8800 HF Receiver c/w VHF Converter fitted. (Ex. cond.)	£529.00	£12.00
ICOM IC-505 6M Multimode Transceiver	£279.00	£12.00
KENWOOD TR-851E 70cms Multimode. 25W complete & as new	£575.00	£12.00

AUTHORISED AGENTS FOR KENWOOD, ICOM, YAESU & STANDARD. FULL SERVICE FACILITIES AVAILABLE

SPEND UP TO £1,200 INSTANTLY WITH A PHOTO ACOUSTICS LTD. CREDIT CHARGE CARD — APPLY FOR DETAILS

PART EXCHANGE WELCOME. ASK FOR KERRY G6IZF OR ANDY G4YOW

RETAIL SHOWROOM OPEN MONDAY-FRIDAY 9.30-5.30, Saturday 9.30-4.30

Goods normally despatched within 24 hours. Please allow 7 banking days for cheque clearance. Prices correct at time of going to press — E&OE



Keylines

Amateur radio has a valuable part to play in times of emergency. The fact that there are amateur radio-related emergency organisations and systems in countries throughout the world, proves my point.

Radio amateurs, whether it be in Manchester or Minnesota, Canada or Kalgoorli, are ready to drop what they're doing so that they can help provide emergency communications. Despite, and perhaps because of, the modern extremely sophisticated official communications systems, we can still help by providing lightweight, reliable and user-friendly equipment for times of emergency.

In the UK we have RAYNET. They carry out many tasks for the various official services and played an important part in the fairly recent Boeing 747 aircraft sabotage disaster in Lockerbie, Scotland. The RAYNET groups are very well organised, and they go to great lengths to equip themselves and their vehicles with the best equipment they can afford.

So, it's obvious that there are a great number of people willing, able and waiting to be asked to help. Disasters, accidents and other events occur

regularly, and all over the world radio amateurs are ready to spring into action. However, there are some tragic events where we could play a part but aren't able to because those who may need us, don't know we're ready and waiting!

Bashed Bangladesh

It's a terrible thing to suggest, but I think that many people may have become used to hearing the news that "A cyclone has struck Bangladesh, killing and injuring many thousands". They may be so used to the regular disasters, that they are shutting off the terrible truth. If you add the statement of fact that this low-lying country is one of the poorest nations on earth, to my suggestion, we've certainly a lot to worry over.

Please don't misinterpret my words. I'm profoundly concerned that this country is so badly affected and so regularly, by such bad storms. I've no doubt also that I'm not alone with my innermost thoughts, which suggest that Bangladesh should be abandoned and the people rehoused somewhere else.

However, such thoughts are tempered by reality, especially as there's literally nowhere else for them to go. In any case, if our European neighbours can keep The Netherlands 'afloat' and mostly watertight, surely the United Nations (with Dutch expertise) could help?

The people of Bangladesh need help, and when the disasters strike, the world turns to assist in any way possible. However, one of the biggest problems in this densely-populated country is the lack of communications. The problems become far worse when the cyclones strike, leaving the country with the minimum of civil and military communications.

Call For Help

The Bangladeshi authorities (many of you may remember the country as East Pakistan) could call upon radio amateurs to help - if there were enough in the country to help! It appears, although I can't confirm it as 'official policy', that the authorities don't encourage amateur radio, apart from granting the occasional permit to visiting radio amateurs.

Before I wrote 'Keylines', I made several attempts to extract some comment from the Bangladesh High Commission in London. I FAXed two letters, and one was duplicate to 'chase them up', and I also wrote direct to the High Commissioner. Eventually, in desperation I managed to obtain some information over the 'phone, although it's not good news for intending RAE candidates in Chittagong!

Transmitters Banned

It appears that in Bangladesh, ANY form of privately owned transmitter is illegal. Even CB radio in its most basic form is not allowed. After a great deal of chasing around by 'phone, I found a source 'close to the High Commission' who was willing to tell me that amateur radio in Bangladesh is neither allowed or encouraged. In fact, I was told by my source that he'd tried to become an amateur himself a few years ago, but had to give up in the end.

Another information source passed on a story which really told me how paranoid the Bangladesh authorities must be. They confiscated his TV

infra-red remote control, acquired with the set, as he arrived home from abroad!

I hope, eventually, to have a full statement on the Bangladesh Government's attitude to amateur radio. However, I've got to be fair, as much of the delay in getting a reply to my questions is obviously because communications to and from Bangladesh are strictly limited due to the storm damage.

Just think how much better their communications could be, if radio amateurs were allowed to help! Even if the country allowed the import of very cheap, low power short-range CB radio equipment, stranded villagers would have some emergency communications.

In the meantime, why can't radio amateurs around the world, the 'United Nations In Amateur Radio', put pressure on the Bangladeshi authorities to allow amateur radio into the country. Once in operation, a radio network could have countless technical spin-offs, apart from the much needed emergency communications system!

73s DE Rob Mannion
G3XFD

Receiving You...

★★★★★STAR LETTER★★★★★

Dear Sir

I like the new format of your magazine very much and the way it addresses some of the issues affecting the viability of amateur radio now and in the future. Your 'Quaynotes' column is long overdue in this respect. This is because many of the thousands of licensed amateurs who came into amateur radio over the past 10 years, have 'graduated' from Citizens Band radio.

However I feel that today's CB'er (perhaps tomorrow's amateur) demands more than a photo of someone else's QSL card. I for one would like to see some technical articles dedicated to antenna theory/propagation for these bands. I believe it is time to ditch the image of CBers as 'radio simpletons' unable or unlikely to progress beyond speaking into the microphone.

Thanks for a much improved and less stuffy read.

Ellis Evans G1PDA, New Eltham, London

Editor's reply: It would be interesting to hear what other readers of the 'CB High & Low' page think of this suggestion. Get those pens out, and let's be hearing from you all.

Dear Sir

Despite the April fool article (by Gerald Stancy G3MCK) published in *Practical Wireless* April 1991 issue, it is possible to use logic circuits in radio circuit applications.

My book *50 Circuits using 7400 Series ICs*, Babani book number BP58, describes circuits for a phase sensitive detector using 7400 i.c.s, an r.f. attenuator

using a 7400, a voltage controlled oscillator using 7401 type, a signal injector using 7413 i.c.s and others.

If anyone is interested in buying the book, it is still available at £2.50 (retail) from Babani.

R. N. Soar
Doncaster

Editor's comment: It's nice to hear that our little joke has practical possibilities Mr Soar!

Receiving You...

Send your letters to the Editorial Offices in Poole, the address is on our contents page. Writer of the Star Letter each month will receive a voucher worth £10 to spend on items from our PCB or Book Services, or on *PW* back numbers, binders, reprints or computer program cassettes. And there's a £5 voucher for every other letter published.

Letters must be original, and not duplicated to any other magazines. We reserve the right to edit or shorten any letter. Brief letters may be filed via our Prestel Mailbox number 202671191. The views expressed in letters are not necessarily those of *Practical Wireless*.

Dear Sir

I'm a Chartered Engineer. In order for me to call myself such, and to earn my living as a professional engineer, I must be a member of an Engineering Institution, in my case the I. Mech. E. In addition, I must pay an annual fee to the Engineering Council. I have no choice. Nevertheless, I am more than happy to pay the subscription of £75, because I belong to a professional body which represents my interests both nationally and internationally.

Moreover, it provides me with a number of membership services, including access to professional advice outside my expertise. It also provides me with a high quality monthly magazine, as well as organising regular conferences, exhibitions, etc., which allow me to keep up-to-date within my chosen field.

I ensure that the Institution reflects my views by voting each year in the Council elections, for candidates I believe will represent me fairly. Professionals take an interest in their professional body.

Since 1969 I have also held an amateur radio licence. When the prized ticket first dropped through the letterbox, separate licences were required for mobile operation and for television. There were less bands than now, the regulations were far more restrictive, and many lived in fear of a knock on the door from the local Post Office inspector.

There is absolutely no doubt in my mind that the very significant improvements to the conditions under which we operate, have been achieved over the past 22 years through the tireless efforts of our much maligned national society, the RSGB. We expect the RSGB to represent our views, yet the majority of us fail to take any interest in the affairs of the society, and half of all licence holders are not even members. This cannot escape the attention of those in authority.

If amateur radio is to survive in the modern world, we must be completely professional in our approach to the hobby. We must put personal vendettas aside and remember that the spirit of amateur radio is greater than one individual licensee. We must be represented at the highest levels and make the RSGB our 'professional body' and not a club. Only then will the bickering stop and the future begin. That's why we must all be members of the RSGB like it or not. The I. Mech. E. collects my annual Engineering Council registration fee; why shouldn't the RSGB issue my licence, collect my fee and be paid by the DTI for doing so?

M. E. Costello G3YPP
Shefford
Bedfordshire

Dear Sir

Having purchased a standard C528 twin band hand-held from Amateur Radio Communications at Newton-le-Willows approximately seven months ago, a fault developed with the 144MHz side of the radio.

A quick trip over to the shop found me chatting and having free coffee with the resident engineer Frank. While being supplied with the cups of free coffee, the fault on the rig was found and the replacement part ordered.

I left the radio at the shop following their promise that it would be repaired as soon as possible. I expected at least a week's delay, as it was a Thursday (allowing postal time, the weekend and their Monday closing day).

To my utter surprise and delight, I received a call the following day, Friday, saying the part had come. The radio was repaired and ready for collection, less than 24 hours later at no charge!

My heartfelt thanks go to Peter (G4KKN), Frank the engineer and the rest of the staff, Elaine and Richard for the coffee and help.

I'm a very satisfied customer. I suggest that for choice, service, facilities and courteous helpful advice that you go to ARC, Newton-le-Willows.

Graham Blomley
GWOHUS
Nr Mold
Clwyd

Dear Sir

I settled down this evening to read my May copy of *PW*, a magazine I have received and enjoyed for many years, and found the free 144MHz repeater card enclosed. My enjoyment of the magazine ceased temporarily at that point as I found yet again that my country (Scotland) had been 'chopped off' at the top.

I would hate to be classed as 'one of these wingers from north of the border', but although I am Scottish, I am also British, and not a regular complainer. In fact this is the first time that I have been compelled to put pen to paper on such a matter. This kind of treatment of my homeland incenses me and I hope that some cognisance of my views is accepted by you.

It would be interesting to see what kind of a reaction you would get from 'G' land if your next issue of a repeater card 'cut-off' in the South of England on a line roughly through the Isle of Wight, with a few dots and arrows indicating the approximate positions of repeaters placed to the south of the line. I am sure that the reaction from the south of the border would far exceed any mild nationalistic reaction from us Scots, and that your magazine would be left in no doubt as to what side your bread was buttered on!

The United Kingdom starts at the Shetland Isles in the north and finishes at the Scilly Isles in the south (maybe even at the Channel Islands) and, while it has been generally accepted by map makers that it is not practical to include the Northern Isles in their usual place in

relation to the mainland, at least they are illustrated on the UK maps.

Your magazine purports to represent amateurs in the UK. Please do us all the courtesy of treating us as a nation, and as equals, and your popularity will do nothing but flourish. If you don't include some of us in the illustrations of the United Kingdom, it will encourage the separatists among us. This could foster the sometimes over jealous nationalistic response from some quarters.

I would just like to repeat again that I do enjoy your excellent magazine.

R. C. Young GMOGRW
Nr Mauchline
Ayrshire

Editor's comment: To show what he meant, GMOGRW sent back his data card with the Isle of Wight and part of the south coast missing! I'm sorry that our efforts offended him but when the card was designed, I had the choice of including the UK as a whole in very small scale, thus placing the marked repeater locations very close together, (including those in the Central Belt in Scotland) or by the method eventually adopted. I took the decision to present the card in a way so it would be useful to as many people as possible, placing (graphically speaking) as few repeaters away from their correct positions as we could. Sorry for any offence caused, but the design by Rob Mackie our graphics artist (he's from Scotland!) and editorial content prepared by myself (formerly GM3XFD and although I'm English-born, I'm very pro-Scottish) was unintentional! **However, before we offer the next free Data Card (for 430MHz) perhaps readers would let us know their feelings on the subject?**

Receiving You...

Dear Sir

I can't tell you how pleased I was to read the item in the March *PW* reporting the meeting held by the DTI between the Radiocommunications Agency, the RSGB, *PW*, *Short Wave Magazine* and others.

I am tremendously encouraged by this demonstration from the ultimate authorities of Amateur Radio in this country that they realise that the RSGB is not the sole voice of our hobby. It is of paramount importance that the authorities, the policemen and the representatives of the end users develop a substantial understanding and trustworthy relationship.

Considering that the DTI have thrust this responsibility on yourself and other amateur radio journalists, it is necessary to proceed with some caution due to the undemocratic nature of your selection. However, I would like to offer my support for your remaining in this position. I'm sure that any item worthy of report, and open forum would find space in *PW*. Additionally, I'm sure that you would not make an observation on any point without acknowledging the feelings of *PW*'s readers.

I used to be an RSGB member, but after eight years became disillusioned with their management style. I now buy *PW* to keep me up-to-date. It seems to me that the 50% of licensed operators who are not RSGB members must be, like me, either reading *PW*, *SWM* or other magazines. If this is so then it's vital that the opportunity is recognised and grasped.

Please remember that there are many of us out here in the wilderness who do not agree with all that the RSGB does.

Bob Ralph G8LJG
Solihull, West Midlands

Dear Sir

Now that the Government has hammered the final nail in the telephone monopoly coffin, isn't it time that British amateurs were allowed to handle third party traffic? After all, they would no longer be depriving a public body of revenue, but would only be competing in a very minuscule way with private enterprise. Since the demise of the telegram (I wonder if other countries have withdrawn this service?) such a facility could provide a useful and free service, albeit in a very small way.

I am not suggesting that the traffic system should be organised on the almost professional lines of the USA - merely that it should no longer be an offence for any amateur to contact

another amateur with the request to pass on a message on behalf of a third party purely as a favour. A useful spin-off would be to show amateur radio in a more favourable light to the public at large, and indeed, thus help to recruit more into the ranks.

Alec Foxhall G6NPK
Bitterne
Southampton

Editor's comment: Alec Foxhall has an interesting suggestion, especially when the recent disasters, and loss of communications facilities following storms in various parts of the world are considered. Where under-developed countries don't have organisations like RAYNET, I can see a real need. What do you think readers?

Dear Sir

Reference the City & Guilds Radio Amateur's Examination, Subject 765.

I'm concerned at the difficulty experienced by potential candidates for the above examination, in finding an institution within the Poole/Bournemouth areas which is providing a course and an examination centre. The following comments based on my experience may be of some help to them: In order to run the course, an educational institution must have sufficient students enrolled to make it a viable course (12 or more people).

Although your local college may be an examination centre, it will only run the exam if it has been running the course. It follows that you may sit the exam without attending a course only if the College has been running a course.

I am constantly having queries passed to me in relation to these matters and have noted that in spite of being informed of the procedures that:

1. Potential students do not turn up to enrol on the course.
2. The course therefore doesn't run.
3. They arrive with further queries in October/November and then find they're too late.
4. The external candidates then cannot find anywhere to sit the examination because the course isn't being run at that centre.

To avoid these problems potential RAE candidates should: Keep their eyes open for college enrolment dates

and times. They should then enrol on time. If there are sufficient students the course will run and if the course does run, external candidates will also be able to sit the exam at the same centre.

Local institutions in Dorset likely to run the course are:

Bournemouth and Poole college of Further Education, North Road, Parkstone, Poole. Tel: (0202) 747600.

Adult Education Centre, Purbeck School, Wareham. Tel: (0929) 556809.

There are clubs in: Bournemouth - Bournemouth Radio Society.

Wimborne - Flight Refuelling ARS.

Poole - Poole Radio Amateurs Society.

Finally, may I wish anyone taking the RAE this year, the very best of luck and success.

Dave Mason G3ZPR
Head of Educational Services

The Bournemouth and Poole College.

Editor's Comment:

Although the information regarding the Dorset Colleges will only be of use to candidates in this area, I felt that the general advice offered by Dave G3ZPR, on what to do, would prove useful in any area of the UK. The *PW* office now has the most-up-to-date list of centres (kindly provided by the C&G) on the most recent venues for the RAE. If you want to know of your nearest centres, please send an s.a.e. to Donna Vincent (marking it: RAE List) and we'll provide as much information as we can on examination centres near you.

Services

Queries

We will always try to help readers having difficulties with a *Practical Wireless* project, but please note the following simple rules:

- 1: We cannot give advice on modifications to our designs, nor on commercial radio, TV or electronic equipment.
- 2: We cannot deal with technical queries over the telephone.
- 3: All letters asking for advice must be accompanied by a stamped, self-addressed envelope (or envelope plus IRCs for overseas readers).
- 4: Make sure you describe the query adequately.
- 5: Only one query per letter please.

Back Numbers & Binders

Limited stocks of many issues of *PW* for the past years are available at £1.65 each including post and packing.

Binders, each holding one volume of *PW*, are available price £4.50 each (£1 P&P for one, £2 for two or more).

Send all orders to the Post Sales Department.

Subscriptions

Subscriptions are available both for the UK and overseas. Please see current issues for the latest prices.

Constructional Projects

Each constructional project is given a rating to guide readers as to its complexity.

Beginner: A project that can be tackled by a beginner who is able to identify components and handle a soldering iron fairly competently.

Intermediate: A fair degree of experience in building electronic or radio projects is assumed, but only basic test equipment is needed to complete any tests and adjustments.

Advanced: A project likely to appeal to an experienced constructor and often requiring access to workshop facilities and test equipment for construction, testing and alignment. Definitely not recommended for a beginner to tackle on their own.

Components for our projects are usually available from advertisers. For more difficult items a source will be suggested in the article. Kits for many of our recent projects are available from CPL Electronics who advertise in the magazine.

The printed circuit boards are available, mail order, from the Post Sales Department.

Mail Order

All *PW* services are available Mail Order, either by post or using the 24hr Mail Order Hotline (0202) 665524. Payment should be by cheque (overseas orders must be drawn on a London Clearing Bank), Access, Mastercard or Visa please.

Wireless Line

This is an information service for the radio enthusiast, updated each Friday. Calls cost 45p per minute peak time and 34p per minute off-peak. The number to ring is: (0898) 654632.

Let's Hear Your Opinion!

Write and tell us of any points of view you may have.

Competition Corner

PHOTOCOPIES FOR COMPETITION ENTRIES MUST INCLUDE THE CORNER FLASH FROM THIS PAGE

Wordsearch

L	N	J	R	U	J	B	V	U	P	L	V	N	I	F	S	S	C	W	S	D	Q	B	O	C
L	I	L	F	A	O	P	Y	A	J	J	V	O	B	F	D	G	W	E	D	S	T	E	Q	L
U	B	I	U	R	W	T	N	X	N	R	S	K	S	A	T	T	R	Z	O	N	G	O	M	G
S	R	E	A	O	E	O	E	Y	S	Y	V	R	Y	C	F	F	A	E	E	Z	F	Z	K	C
F	P	P	M	K	R	L	T	T	R	H	P	P	U	O	I	S	S	M	T	R	Y	Z	S	I
H	B	S	C	A	B	J	Y	B	X	X	E	A	K	O	R	L	E	H	E	N	R	S	I	H
F	N	A	M	A	D	F	Q	U	K	K	Q	B	F	B	F	S	L	Q	R	O	U	J	D	L
Q	P	A	T	T	V	A	N	H	W	W	G	C	Q	I	A	N	U	O	B	Y	D	O	K	U
P	S	R	V	P	A	K	O	X	Z	X	M	R	F	B	U	E	O	I	S	D	M	V	C	C
S	O	Y	I	L	X	S	T	U	I	I	I	D	G	V	N	A	N	E	Y	C	T	Y	E	H
P	N	D	A	N	U	Z	Y	W	J	K	L	A	C	C	R	Y	L	V	M	K	O	T	F	Z
O	W	C	F	N	V	Q	A	Y	U	A	J	F	Y	U	G	P	Q	J	B	V	C	P	L	D
C	U	A	T	B	O	X	D	R	N	E	H	Q	E	E	K	V	U	Y	E	V	B	E	E	U
I	K	S	U	H	A	I	M	Z	T	T	S	Z	Q	B	S	D	T	D	E	U	M	X	D	X
Y	B	D	D	V	E	R	T	A	O	X	F	J	O	O	O	A	Q	N	P	G	N	Z	K	X
G	Z	G	Q	J	R	R	G	N	E	K	F	K	O	A	S	Y	T	S	W	T	M	D	E	A
U	E	B	Y	S	K	Z	S	A	E	B	B	L	I	C	W	O	C	H	C	L	F	P	E	V
C	L	L	P	F	E	I	F	G	I	V	K	C	M	L	Z	T	O	T	E	Z	F	D	K	Q
G	L	U	E	P	V	T	N	O	S	N	M	R	E	T	S	A	M	E	S	R	O	M	D	N
M	T	Z	O	M	M	G	O	Z	O	K	B	A	Y	W	O	C	O	P	Z	L	P	P	I	H
M	Y	B	P	E	E	Q	O	N	O	I	D	M	H	L	O	F	H	W	F	C	B	Q	O	X
H	X	E	L	Z	F	N	S	C	Y	O	D	T	W	B	O	E	F	E	S	V	J	A	R	Q
W	I	Z	H	W	G	D	T	G	I	A	C	E	D	C	R	W	L	G	U	K	X	Q	M	B
J	M	G	U	S	Q	X	O	I	L	B	U	B	L	V	U	X	E	A	V	H	C	D	A	D
M	S	F	H	W	X	B	T	S	Z	G	E	Q	A	K	Z	N	O	X	E	J	X	M	J	S

Fourteen different 'radio' words have been hidden in the letter grid. They have been printed across (forwards or backwards), up and down or diagonally, but they are always in a straight line without odd letters in between. You can use the letters in the grid more than once for different words, and they're not all used. Once you have found all fourteen words, mark them on the grid and send in your answers.

Send your entry to PW Publishing Ltd., July '91 Wordsearch Competition, Enefco House, The Quay, Poole, Dorset BH15 1PP. Closing Date last post received Friday 26 July 1991. The Editor's decision on the winner is final, no correspondence will be entered into.

First prize is a year's subscription to *Practical Wireless*, two runners-up receive six months subscriptions.

**Basement
Frequency
Morsemaster
Quaynotes
Beam**

**HamVention
Oscilloscope
Robin
Counter
High**

**Packet
Dayton
Low
Panorama**

Name

Address

.....

.....

.....

Postcode

Club News

Coulsdon ATS meet 2nd Mondays, 7.45pm at St. Swithun's Church Hall, Grovelands Road, Purley, Surrey. On July 8, they have a 144MHz Fox Hunt, assemble at Grovelands Road. Further details from **Andy Briers G0KZT** on 081-668 7004.

RAF Halton ARS meet every Thursday, 7.30pm, to RAFARS members only. For further details, contact **Terry Owen G4PSH** on (0296) 85760, or write direct, QTHR.

Derby & District ARS meet Wednesdays, 7.30pm at 119 Green Lane, Derby. June 19 is The History of British Naval Aviation, an illustrated talk by Mr L. H. Owen, the 26th is a Night on the Air, July 3 is a Junk Sale and the 10th is The Novice Licence - illustrated talk by Roy Dakton. Details from **Richard Buckby G3VGW** on (0773) 852475.

Oxford & District ARS meet 2nd & 4th Thursdays, 7.30pm at the British Legion Club, Marston, Oxford. June 22 is Chairman's BBQ, held at Fromley Hall Farm, Nr Worminghall and July 6/7 is VHF/UHF NFD. Details from **G8PX** on Oxford 58785.

Wakefield & District RS meet Tuesdays, 8pm in First floor rooms, Ossett Community Centre, Prospect Road, Ossett. June 18 is On the Air (c.w.), the 29th is the Rothwell Gale, July 2 is On the Air and the 9th is HF Operating Procedures G4JMT. For more details, contact **John-Lloyd Bailes G0MVA** on Wakefield 260048.

Loughton & District ARS meet in Room 14, Loughton Hall, 7.45pm. June 14 is a Quiz night (radio related and trivial pursuit questions) and the 28th is a Calibration and Alignment evening. More details from **Mike Pilsbury G4KCK** on 081-504 4581.

Coventry ARS meet Fridays, 8pm at Baden Powell House, 121 St. Nicholas Street, Radford, Coventry. June 14 is a Canal Trip - see **George G3TFA** for details, the 21st is Outdoor Operation evening - Burton Dassett Country Park and the 28th is a Night /n the Air - Gliding Trip. Details from **Neil** on (0203) 523629.

Mid-Sussex ARS meet Thursdays, 7.45pm at Marle Place Further Education Centre, Leylands Road, Burgess Hill, West Sussex. June 13 is Windmills evening; Jack and Jill car park, the 20th is an informal, the 27th is a talk on Astronomy by Eric Zucker, July 4 is an informal, prep for VHF Field Day, July 6/7 is VHF Field Day and the 11th is an informal, prep for Brighton rally. **John Fuller G00IO**, 13 Lucastes Lane, Haywards Heath, West Sussex. Tel: (0444) 450957.

Grafton RS meet Fridays, 8pm at Holy Trinity Church Hall, Stapleton Hall Road, London N4. July 5 is Detection Equipment and the 19th is WWII Radio Interception. For further details, contact **Rodney Harrigan G6JUZ** on 081-368 8154.

Mansfield ARS have an HF Activity evening on July 4. They meet at The Polish Catholic Club, off Windmill Lane, Woodhouse Road, Mansfield. More details from **Mary G0NZA** on (0623) 755288.

Bromsgrove ARS meet at Lickey End Social Club, Alcester Road, Burcot, Bromsgrove. June 23 is Lower Wick Fair & Boot sale, the 25th is Night on the Air and July 9 is Antenna Construction Tests & Prize. **Mr D. Edwards G4ZWR**, 2 Mason Close, Headless Cross, Redditch, Worcs B97 5DF. Tel: (0527) 546075.

Aylesbury Vale RS meet 1st & 3rd Wednesdays, 8pm at the Old Village Hall in Hardwick, except during June, July and August, when there is only one meeting on the 1st Wednesday of the month. July 3 is a demonstration and talk by **Derek Pearson G3ZOM** on products & kits available from JANDEK Kits. Further details from **Martyn Baker G0GMB** on (0908) 560026.

Maidenhead & District ARC meet at The Red Cross Hall, The Crescent, Maidenhead, 7.30pm. July 4 is System X Telephone Exchanges by Alan G1DNP and the 6/7th is VHF Field Day at John Hampden School, High Wycombe. For more information, contact **Neil G8XYN** on (0628) 25952.

Nottingham ARC meet Thursdays, 7.30pm at the Sherwood Community Centre, Mansfield Road, Nottingham. On July 11 they have a talk on Ambulance Communications by Alan G8SSL. Further details from **Rex Beasall** on (0602) 733740.

Verulam ARC meet on the 2nd & 4th Tuesdays, 7.30pm at the RAF Association HQ, New Kent Road, (off Malborough Road). June 25 is a talk on Amateur Radio in the USSR by A. Slater G3FXB. Details from **Rosemary Evans G0NDB**, The Old Dairy, Chipperfield Road, Hemel Hempstead, Herts HP3 0JR.

Braintree & District ARS meet 1st & 3rd Mondays, 8pm at the Community Centre, Victoria Street. June 17 is Six Club Speakers and July 1 is a Quiz evening. More info from **M. Andrews**, 22 Arnhem Grove, Braintree, Essex CM7 5UQ.

Sutton & Cheam RS meet 3rd Thursdays, 7.30pm at Downs Lawn Tennis Club, Holland Avenue, Cheam, with natter nights on 1st Mondays in the Downs Bar. On June 20 they have an Inter-Club Quiz S8C v CATS, the 25th is a Committee meeting at G3WHK, the 30th is the Longleat Mobile rally (coach trip), July 1 is a natter night and the 6/7th is VHF National Field day at Leek, Staffs. **John Puttock G0BVV**, 53 Alexandra Avenue, Sutton SM1 2PA.

Fylde ARS meet 2nd & 4th Thursdays, 7.45pm at South Shore Tennis Club, Midgeland Road, Blackpool. June 27 is a talk on Construction by George Dobbs G3RJV and July 11 is an RSGB Video Screening. **Eric Fielding G4IHF**, 6 Thornton Avenue, Lytham St. Annes, Lancashire FY8 3RL. Tel: (0253) 726685.

Dorking & District RS meet 2nd & 4th Tuesdays, 7.45pm at the Friends Meeting House, South Street, Dorking (opposite the Spotted Dog). June 15 is a VHF NFD Planning meeting, July 6/7 is VHF NFD and July 9 is an Informal. Further details from **John Greenwell G3AEZ** on (0306) 77236.

Norfolk ARC meet Wednesdays, 7.30pm at The Norfolk Dumpling, The Livestock Market, Harford, Norwich. June 19 is Experiments with Op-Amps by Mike Harris G3YIA, the 26th is a Debate - 'Does Packet Radio Have A Future?', July 3 is an evening at Happisburgh (Eastern Communications & Seaside) and the 10th is a Mobile DF Hunt. More details from **Jack Simpson G3NJO** on (0603) 747992.

Llanelli (Coleshill) ARS meet Mondays, 7.30pm at the Coleshill Day Centre for the Handicapped, Coleshill Terr Llanelli. RAE class, c.w. class, nights on the air and various talks. Special event station in July at Pembrey Country Park. Further information from **Roy Jones GWOKJZ** on (0554) 820207/759844.

Plymouth RC meet Tuesdays, 7pm at the Fredrick Street Centre, Plymouth. Details from **Sandy Pimlott G8IDE** on (0752) 363607.

Sevenoaks & District ARS have Weather Satellites, Mike Senior G4EFO on June 17 and Worked All Britain/Heard All Britain, John Fitzgerald G8XTJ on July 5. Please send all correspondence to the Secretary, **Ted Denman G7HKE**, c/o Sevenoaks District Council, Council Offices, Argyle Road, Sevenoaks, Kent TN13 1HG.

Salisbury Radio & Electronics Society meet 7.30pm, at the Grosvenor House Centre, Churchfields Road, Salisbury. June 25 is Preparations for VHF national field day, July 2 is a talk about Weather Satellites and the 9th is a committee meeting. Details from **David Kennedy, 'Celeborn'**, 11 Silverwood Drive, Laverstock, Salisbury, Wilts SP1 1SH. Tel: (0256) 342289 day or (0722) 330971 eves and weekends.

Northampton RC have moved to 2 Harvey Street, Northampton. They meet Thursdays, 8pm and for more details contact **Paul G0HWC** on (0327) 41267 evenings.

Newsdesk '91



NEC News Extra

What a happy crew! As most of you appeared to have visited the *PW & Short Wave Magazine* stand at the RSGB's NEC show, literally buying nearly everything on sale, we thought you ought to see them during a brief moment when they stopped work for a photograph.

The team were: (left to right) Marcia Brogan, Sandie Hunt, Peggy 'Brown Owl' Ganderton and the Editor of *Short Wave Magazine*, Dick Ganderton. Unseen, but

busily composing and designing the picture from behind the camera, was Steve Hunt, Art Editor for both *PW* and *Short Wave*.

Our NEC team were close enough to see the delight on Bob Harrison G4UJS's face when he won the RSGB's main lottery prize - a new red Ford Fiesta car. Jim Bacon G3YLA, drawing the tickets, also drew Bob's number for a combined TV-Video set, but generous G4UJS handed the prize to be drawn again, when he knew he'd won the car!

SMC Annual Stocktake

As usual SMC will be having its annual stocktake at the end of June. This will take place this year on Friday June 28 and will mean that all their showrooms will be closed on this day.

Normal trading will resume on Saturday June 29 and SMC would like to apologise for any inconvenience this may cause.

MIR Handbook

An excellent written work on the Soviet space station entitled *Space Station MIR*, already adopted by the JUNO Project, is now generally available. G4IHF has written a 37-page treatise which includes many diagrams, tables, tracking methods and experiments.

The content, presentation and informative reading this book provides brings a highly complex subject

into fully understandable and exciting reading. It is highly recommended to all of those who wish to follow, learn of, communicate with or use MIR as a stimulating educational project. It is produced at low cost and no profit, for the benefit of all users and potential users at £5.50, which includes post and packaging from:

John Branegan G4IHF, 8 Whitehills, Saline, Fife, Scotland KY12 9UJ.

New American Kit Dealership For Raycom

Following his successful visit to the Dayton Hamvention, with the *Practical Wireless* organised group, Ray Withers of Raycom Communications Systems Ltd. has now been appointed the UK dealer for the exciting range of amateur radio kits from Ramsey Electronics Inc.

Ramsey Electronics have been supplying top-quality constructional kits in the USA for over ten years. All the kits come with professionally produced handbooks and instructions. Their recently-introduced fully synthesised 144MHz 3W f.m. transceiver kit, expected to cost around £129 in the UK, is already proving immensely popular in the USA. A 430MHz version of this kit, suitable for UK Novice use, is to be introduced soon.

These kits will certainly be very popular in the UK. You can get the full details on the wide range of Ramsey products, including h.f. transmitter and receiving kits, plus 50 and 144MHz projects, by calling **Raycom on their Hotline 021-552 0073.**

**SEND ALL
YOUR NEWS
AND NEW
PRODUCT
DETAILS TO
SHARON
GEORGE AT
THE EDITORIAL
OFFICE IN
POOLE.**

Newsdesk '91

Pembrokeshire RS

Pembrokeshire RS will be running a special event station for the Cutty Sark Tall Ships Race, to be held for the first time on the Milford Haven waterway, Pembrokeshire, Wales.

The Cutty Sark Tall Ships race runs from the 9th to the 14th of July 1991, with a proposed sail past of all the entrants on the Haven on July 14, before heading out to the sea for the start. The ships should start arriving from the 7th or 8th, maybe even before. They are hoping for about 60 ships to be in the Haven, from some 18 countries, and the Cutty Sark Committee are expecting almost a million visitors over the period, it will be a big thing down there.

Their station will be run from July 1 for 28 days, under the callsign GB2TSR and should be great fun to run and take part in. The station will be from a caravan in the lower park of the British Legion, Hamilton Terrace, Milford Haven.

They would like as many contacts as possible on all bands and modes. So, give them a call on the air, or if you are in the area, please call in. They are hoping for a good QSL card, sponsored by the Preseli District Tourist Council and Dowty Precision Seals, which is being negotiated.

For any more information, but please not about reservations, etc., write to:
**Paul Delaney
GW0HPQ
67 Haven Drive
Milford Haven
Pembrokeshire
Wales SA73 3HW.**



World Record on NTL Tower

The world abseiling record was broken on May 8 at the National Transcommunications Emley Moor television tower in West Yorkshire, Britain's tallest self-supporting structure. After months of preparations by two outdoor pursuits professionals, Phil Barber (31) and David Griffiths (28), took less than five minutes to abseil 267m in front of Yorkshire TV's live cameras, courtesy of NTL's transmissions going out above their heads. The previous record was for a descent of 259m at the Drax power station in November 1989. They will now take their place, along with the tower itself, in the *Guinness Book of Records*.

An attempt the previous week was abandoned at the last minute due to the wind speed rising above safe limits, but during the successful attempt conditions were perfect, with only a light breeze in the evening sunshine. Afterwards, Phil Barber admitted feeling 'almost suicidal going over the edge of the balcony into the unknown'. But the stringent safety arrangements left no doubts that the pair would live to tell the tale.

The abseilers celebrated their achievement with champagne, courtesy of the tower owner, National Transcommunications, and the transmission company also presented a cheque for £500 to the local representative of the NSPCC charity.

Further information from **Bruce Randall on (0962) 822582.**

Battle of the Somme

The 75th anniversary of the Battle of the Somme occurs on June 30 to July 2. The Bedford & District ARC are planning to operate a special event station during this period from Kempston Barracks, Bedford, with the callsign GB75SOM.

Visiting operators will be especially welcome during this time. Depending on conditions they hope to operate mainly on the h.f. band in c.w., s.s.b., AMTOR and PACKET radio.

50th Anniversary

RAF Cardington in Bedfordshire will be the setting for the 50th anniversary celebrations by the 134 Bedford Squadron Air Training Corps on 14 July 1991. Bedford & District ARC are planning to operate a special event station for this anniversary.

The callsign GB50ATC will be used on the 3.5 and 7MHz bands.

Amateur Radio Motorcycling Association

Martin Lynch of the Amateur Radio Exchange Centre in Ealing, is trying to form a register on Motorcycling enthusiasts also involved in amateur radio, either as an operator or a listener.

Days out are planned, with events spread throughout the year. It is hoped that not only will this attract interest from the UK, but due to *PW's* world-wide distribution, overseas visitors may also participate.

A joining fee of £2 would be appreciated, just to cover administration, etc.

**Martin Lynch G4HKS
The Amateur Radio
Exchange Centre
286 Northfield
Avenue, Ealing
London W5 4UB.**

Twinning Link With Appeal

Trowbridge & District ARC are staging a special event station for three days in July and hope to make 1991 contacts, using the callsign GX2BQY.

As part of the West Wiltshire '91 Trade & Commerce Exhibition, at Court Mills Centre, Polebarn Road, Trowbridge, members of the public are more than welcome to see the radio station in action on July 11, 12 and 13, both on h.f. and v.h.f.

As well as complementing the exhibition, the club hope that contacts will be sponsored with the money going towards the £50 000 needed to provide a £250 000 dedicated music centre in West Wiltshire for young musicians.

A special QSL card will be available via G2BQY, also the event will promote the aims of the Novice Licence and project YEAR.

More information, if required, from **Ian Carter on (0380) 830383**.

WAB News

The Worked All Britain Awards Group have suggested that readers of *PW* would like to recommend to their committee a worthy charity related to our hobby which WAB could make a donation.

The WAB Awards Group will be celebrating 25 years in amateur radio in 1993 and aim to organise fund raising activities both on and off the air, and they will be running a lottery which proved very successful during their Guide Dog Appeal. **Steve Bryan G1SGB 99 Greystones Road Whiston Rotherham South Yorkshire S60 4BH. Tel: (0709) 543747.**

Newsdesk '91

Stolen Equipment

The following equipment has been stolen from Bury Radio Club:

Yaesu 980 - No. 3E010513

Yaesu 225RD - No. 9H060023

The equipment was purchased by the extremely hard fund raising efforts of the members, and any information regarding this would be greatly appreciated. Contact:

Harry Hargreaves G4ZSI, Bury Radio Club's Secretary, 7 Harwood Walk, Tottington, Bury BL8 3NT. Tel: (0204) 886505.

Junk Sale

The Huntingdonshire ARS 1991 Junk Sale will be held at The Medway Centre, Coneygear road, Huntingdon, Cambs, on 26 August 1991. Doors open 10am to 4pm. Food and drink available all day. Talk-in on v.h.f.-S22, u.h.f.-GB3OV repeater on 433.125 RB5.

There will be a selection of trade stands, with junk, components, antenna bits and NiCads, together with a Bring & Buy.

Tables and boot pitches will be available on the day subject to space at a cost of £6, and in advance £5.

Contacts or queries to: G1YVS on (0860) 433891 or (0733) 241109 evenings, G8LRS on (0480) 456772 evenings, G7DIU on (0480) 431333, G0JLQ on (0480) 454858.

Radio & Computer Fair

Sussex Amateur Radio & Computer Fair will be held on Sunday July 14, 10.30am to 4pm, at Brighton Racecourse. Trade stands, Bring & Buy, picnic area, refreshments, car park, free shuttle to Brighton sea front. Details from **Barry Parkes on (0273) 501100.**

Special Event Station

Mrs Gail Stevens is organising a special event station to demonstrate the fascinating hobby of amateur radio, to the girls (ages 11 to 18 years), parents and visitors at a Grand Fete at Helenswood School, in Hastings, on 14 July 1991. The station will be QRV on Saturday 13 July 1991.

They shall be using the Hastings Electronics and Radio Club's callsign GX6HH/P so that the girls may pass greeting messages across the world.

Gail would be interested to hear from any amateurs world-wide with a view to arranging skeds, maybe with other schools or perhaps with the various towns named 'Hastings' around the world, although anyone is welcome to join in the fun.

The girls will be designing their own unique QSL card which will be sent for each contact. All QSLs to be sent via G0GRK.

Any contact with GX6HH/P will count as 2 points towards the 1066 Award. Gail may also be able to arrange for other local stations to be 'on air' to enable the award to be completed.

All enquiries should be addressed to: **Mrs Gail Stevens G0GRK 33 Langham Road Hastings East Sussex TN34 2JE.**

New 144MHz AKD Mobile Transceiver

AKD are proud to announce the launch of their very own 144MHz f.m. mobile transceiver. Manufactured in their factory in Stevenage, this competitively priced, no fuss, British designed unit, is supported by the usual AKD two year warranty.

Ideal for the beginner and enthusiast alike, the rig costs £193.75 inc VAT.

The company are also launching their new h.f. wavemeter, the WA3, following successful field trials undertaken by a friendly, local amateur club.

Unit 5 Parsons Green Estate Boulton Road Stevenage Herts SG1 4QG.

Auction of Surplus Equipment

On June 22, The University of Surrey Electronics & Amateur Radio Society will be holding an auction of surplus and second-hand test equipment, computer equipment, etc. To be held at the Lecture Theatre L, University of Surrey, Guildford, starting at 12 to 4pm.

Information can also be obtained over packet network from G7GIJ @ GB3UPZ.

James Barnett, Chairman Univ. of Surrey E&ARS, Electronic Eng Dept. University of Surrey, Guildford, Surrey GU2 5XH.

Fastnet Rock Lighthouse

Final arrangements have been completed for the first expedition to Fastnet Rock Lighthouse off the South coast of Ireland in July 1991.

The callsign EJ7FRL is to be used for this expedition.

The IOTA reference number is EU-121 which results from revisions to the IOTA directory and which applies for the new group, Irish Coastal Islands. The QSL address is via EI2BB call book address or bureau.

Preferred frequencies are: s.s.b. 1.8, 3.775, 7.075, 14.140, 14.240, 21.275, 28.450MHz and WARC bands and 144.260.

The c.w. frequencies are: 10kHz up on 3.5 and 7MHz; 10kHz and 30kHz up on 14, 21 and 28MHz and 144.040MHz.

Weather permitting, the group will land on Fastnet by helicopter on July 9 and leave the Rock ten days later on July 19.

This is the first expedition to Fastnet and may be the only one for which permission will be granted, and they hope to provide as many people as possible with a chance to work ECHO JULIET SEVEN FASTNET ROCK LIGHTHOUSE.

For further information, contact: **EI3GU 31 Seaview Park Shankill Co. Dublin Ireland**

CLARK SCAM HEAVY DUTY 40' TELESCOPIC PNEUMATIC MASTS

Retracted 7'8" Head load 40lbs with or without supporting legs + erection kit in bag + handbook £200 - £500

CLARK SCAM HEAVY DUTY 70' TELESCOPIC PNEUMATIC MASTS

Retracted 13'5" Head load 90lbs with or without legs + erecting kit + handbook £500 - £800

TEXSCAN CATV SET TOP CONVERTOR Tuner FX range 54MHz - 450MHz output on channel 48 UHF-PAL-Synthesiser controlled - keypad or IR remote controller **brand new & boxed** with circuits & information. Not tested. £20 or two for £30 IR Control £5

RACAL MA4204 ENCRYPTION UNIT (Speech or data security scrambling) for use with HF-VHF for field telephone equipment. Solid state. Alloy air sealed case - 12V DC supply - each unit can send or receive - but two must be used one to receive the other for sending both switched to the same number selectable from rotary switches on the front panel 512 operating codes available - **Brand new with book.** £150 or two for £275 or four for £500

RACAL MA4230 - MA4231 AUTOMATIC MORSE RECEIVING AND SENDING SYSTEM. MA4230 AUTOMATIC MORSE SENDER - Small solid state unit incorporates a full alphanumeric keyboard for entering messages which can be sent immediately or stored for 30 days. Output is in Morse code 10 to 20 wpm or 8 to 16 times this speed. Internal storage of up to 1000 characters etc., contained in small alloy airtight case with book. **Brand new. MA4231 AUTOMATIC MORSE READER** Self contained - receives Morse code from above unit or radio audio output at up to 160 words per minute, by hand or automatic - stores up to 912 characters - readout on unit - letter by letter - LED display or printer VDU etc., many adjustable speeds ASC11 or Baudot. Power 11-30V DC or AC mains by MA4232 power unit with book - MA4230 + MA4231 + battery charger + line adaptor & book. Not tested. Internal battery (NICAD) may need replacing due to storage. **Brand new** £100

AS ABOVE BUT ARABIC NOT ENGLISH But supplied with kit to convert to English - new keyboard cover + proms + book. Line adaptor - **Brand new** £50

MARCONI TF2008 SIGNAL GENERATORS 10KC/S TO 510MC/S AM/FM or sweep output. Complete with book. Not tested - as they come from the pile - will have small faults - as received MOD hence clearance price. £250 each. Front panel protected with metal cover therefore fair condition. Wooden kit box of leads etc. £25

ARMY TYPE MORSE KEYS Large quantity available. £5 ea

ARMY WHIP AERIALS AND BASE 12' or 16' - NEW £20 - £25

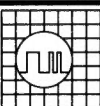
Small selection only listed. Export trade & quantity discounts price is Ex-works. SAE all enquiries. Phone for appointment or for demonstration of any item, availability or price change. VAT and carriage extra.

JOHNS RADIO

Government and manufacturers surplus Electronic items.
Stabilized power units and Telecommunication Equipment

84 Whitehall Road East, Birkenshaw, Bradford BD11 2ER

Tel No: (0274) 684007 Fax No: (0274) 651160

**SUREDATA**

AMSTRAD REPAIR AND SECOND USER SALES

This month we offer you a **DOUBLE DRIVE SYSTEM** for the price of a single drive system **£360 including VAT**. A new **AMSTRAD PC1512** Single Drive with Mono Monitor plus a second 3.5" 720k drive fitted, all with a 12 month return to base warranty. Now you can own a new piece of computer equipment at a price that last month would have got you only Second User equipment. The prices of second user goodies have also dropped, so now is the time to call us on the hot line and see what's on offer.

Don't forget our **AMSTRAD REPAIR** service, it keeps the Bank Manager at bay (ours that is not yours).

We take money and plastic. So pick up the phone and let us help you.

73 John G3TLU.

SUREDATA

TELEPHONE: 081-902 5218

Second User **HOTLINE: 0831 616519** (After hours)

DEPT PW, UNIT 5, STANLEY HOUSE,
STANLEY AVENUE, WEMBLEY,
MDDX HA0 4JB (opposite Dorothy Avenue)

**PACKET for Spectrum
NO TNC.**

Yes, packet without a TNC, as shown working at the NEC. Programme on EPROM, and Modem in one unit, ready to run. All you will need to supply are the leads!

Price, complete and
ready to run **ONLY £99.50**

Send large SAE (33p stamp) for details of all our products.

J.B.P. ELECTRONICS LTD.

VISA

Unit 45, Meadowmill Estate, Dixon Street,
Kidderminster DY10 1HH Tel: (0562) 753893

**MARTIN LYNCH**

G4HKS

THE AMATEUR RADIO EXCHANGE CENTRE

286 Northfield Avenue, Ealing, London W5 4UB. Tel: 081 566 1120 Fax: 081 566 1207

STANDARD
AMSTRAD

ALINCO
KENWOOD
Authorised Dealer

YAESU
ICOM

NOUVELLE CUISINE?

You know the style - Not a lot of it, and what there is costs a fortune.

There may only be one **MARTIN LYNCH** outlet, but it is worth a visit - just like a good restaurant.

Too often you travel a great distance and see only a handful of items that look half tempting, but are often badly presented and over-priced.

A La Carte Menu**Main Course**

The "MENU" at **MARTIN LYNCH** is always plentiful, (SEND FOR YOUR FREE USED EQUIPMENT LIST AND SEE HUNDREDS OF MOUTH-WATERING GUARANTEED ITEMS), the presentation is always excellent along with courteous, knowledgeable and **LICENSED STAFF**. Even the **COFFEE** is freshly percolated and we do not charge for the biscuits!

You may also have noticed the latest addition to the "authorised" dealerships, listed above. I am proud to say that Lowe Electronics have authorised **MARTIN LYNCH** to sell the excellent **Kenwood** brand. This includes the **TS850S**, (more rare than a fillet steak in a vegetarian restaurant), along with all the rest of the product range. Call in today for your **KENWOOD** requirements.

**Choose From Our Tempting Range of
Equipment**

Apart from establishing the largest display of **AMATEUR RADIO EQUIPMENT** IN THE COUNTRY, I also have the new range of **YAESU**, **ICOM**, **STANDARD** and **ALINCO**, along with accessories on show. I am constantly on the lookout for good clean equipment for part exchange or outright purchase.

Ring or FAX your details through for cash,
RIGHT NOW!!

Martin Lynch is a Licensed Credit Broker.



Full written details upon request. Typical APR 36.8%

PHONE 081 566 1120

For fast mail order Tel: 081 566 1120 Please add £10.50 for 48 hour delivery. Shop opening hours: Tuesday - Saturday 10 - 6pm
24 hour Sales **HOT LINE** 0860 339 339 (After hours only).
Fax order line open 24 hours.

PW Special Offer

Here's a treat for readers - An Alinco 144MHz Mobile Transceiver For £249 including p&p!

Save £26 on normal price of package deal.

The mobile operating season's here! Why don't you treat yourself to a new rig and take advantage of our July special offer. Just look at what you get for your money:



ONLY £249 inc. P&P
A SAVING OF £26 ON THE NORMAL PRICE

The Alinco DR112 144MHz transceiver + Microphone + Mounting Kit + Low Profile Magnetic Mount Antenna.

The rig features: Easy-to-use and simply laid-out front panel controls, clear, easy-read tuning and control display, small physical profile for easy fitting in the car, 25W r.f. (high) output 5W (low) output and a low power consumption, dual-conversion receiver providing 2W of audio output. On the transmitting side the rig comes complete with electret microphone and all the facilities required to get you 'up and running' on 144MHz, whether it be for simplex or repeater operation.

Come on, join the fun and don't be stuck in that hot shack - go mobile with the *PW* July special offer!

HOW TO ORDER

Complete both coupons in ink, giving your name and address clearly in block capitals. Coupon 2 will be used as the address label to despatch your transceiver to you. Send the coupons with your cheque to: *Practical Wireless*, Transceiver Offer (July), FREEPOST, Enefco House, The Quay, Poole, Dorset BH15 1PP. If you wish to pay by credit card (Access, Mastercard, Eurocard or Visa only), please fill in your card details and sign the coupon where indicated. Available to readers of *PW* in England, Scotland, Wales, N. Ireland, the Channel Islands, the Isle of Man and BFPO addresses. Orders are normally despatched within 28 days, but please allow time for carriage.
The closing date for this offer is 10 July 1991.

(1)

To: **PRACTICAL WIRELESS, Alinco DR112 Offer (July), FREEPOST, Enefco House, The Quay, Poole, Dorset BH15 1PP**

Please send me.....Alinco DR112 Transceivers @ £249 inc. P&P each.

Name.....

Address.....

.....Postcode.....

☐ I enclose cheque/PO (Payable to PW Publishing Ltd) £.....

☐ Charge to my Access/Visa Card the amount of £.....

Card No.

Valid from to

Signature.....Tel:.....

(2)

Name.....

Address.....

.....Postcode.....

If you do not wish to cut your copy of *PW* you must still send this flash with full details and remittance.

PW Publishing Ltd., Poole, Dorset (Reg. No. 1980539, England)

**PW JULY 1991
TRANSCIVER
OFFER**

The AKD 2001 144MHz Transceiver

Richard Ayley G6AKG believes that the simple to operate and well made AKD 144MHz f.m. transceiver could become something of a standard. Read on and see what you think.



I know that I certainly yearn for the simple life, so the hobby can return to the 'hands-on' experience it once was. That's why I was so keen to review this new transceiver from AKD. It looked easy to operate with its handsome and simple front panel, while still retaining its versatility for the minimum number of 'bells and whistles'.

After removing the four case-fixing screws, I looked in amazement at the beautifully laid out p.c.b., with its interesting array of components. I felt sure the p.c.b. must be made abroad and boxed in this country.

To confirm this I called AKD and spoke to their Technical adviser, John Armstrong G8MVH. John assured me that the 2001 was a 100% British product designed by AKD, and manufactured at their factory in Stevenage.

Under The Bonnet

With the outer case removed, the first thing to catch my eye on the p.c.b. was the enormous outline of the 40-pin d.i.l. package of a 6802 microprocessor and its attendant 28-pin EPROM. I'm no expert, but I found this choice of chip a little strange knowing from personal experience how noisy, from an EMC (Electromagnetic Compatibility) point of view, this processor can be. There seemed to be no logical reason for putting this device into the circuitry of a sensitive radio transceiver. However, as I later discovered, my fears were unfounded.

As AKD pointed out, there are many advantages to using this microprocessor. For one thing it's cheap, and the other is, that with all its surplus processing power you can get it to do all sorts of other things, besides loading the divide data into the synthesiser chip.

The processor can generate the tone burst for example. To take this further, you can get it to generate all the tones for accessing private repeaters or selcall activated stations. It means in simple terms, that for a little extra cost lots of software add-ons can be put into the basic transceiver.

The Synthesiser

The synthesiser chip is a Plessey device which is loaded serially with data from the microprocessor. The receiver is a fairly standard type dual-conversion superhet with the first i.f. being 10.7MHz and the second 455kHz.

The front-end device is a dual-gate m.o.s.f.e.t., as is the mixer. Most of the receiver gain, plus

demodulation and squelch circuitry is provided by the excellent Motorola MC3357 chip, which makes frequent appearances in a large number of transceivers these days.

Preliminary Manual

Unfortunately, the rig was so new it only had a preliminary manual, without the circuit diagram. This prevents me from going into any detail about the transmitter. Despite this, I'm glad to say that the p.a. stage uses discreet components, unlike some which use the very expensive-to-replace modules. The review transceiver on my set-up at home produced a very healthy 25W into 50Ω at 3.75A input on a 13.8V supply.

Physical Design.

On the clean and uncluttered front panel, next to the mylar-coned speaker, is the channel display which is configured with two green, seven segment l.e.d. displays. The channels are arranged in a logical manner so that '00' equals R0 up to '07' which equals, you guessed it, R7.

The simplex channels then follow on from '08' to '23', on 'switch-on' the rig powers up on channel '20', the calling frequency S20. If you need it, AKD can provide an alternative EPROM that powers the transceiver up on a preferred packet operating frequency for unattended operation.

The multi-mode section of the band is held on channels '24' to '43' consecutively. Channels '44' to '51' cover from 145.8 to 145.975, while in '60' to '67' and '70' to '77' give you the option of re-using those repeater input and output frequencies not used in your area, for simplex operation. Reverse repeater operation is catered for on channels '90' to '97', and all channel steps are in 25kHz.

Channel Selection

Channels are selected by using one of three push-to-make buttons located below the display, with the left and right buttons activating the up and down channel selection. These are single-shot, or repetitive in operation when held down. The full channel compliment can be scanned through in approximately eight seconds. Listen on input, for repeater use, is covered with depression of the third, centre button, and this only functions when a standard repeater channel has been called up.

The only rotary controls on the front panel are the squelch and volume. The squelch is what I term as hard, as it's either open or closed. The control exhibits quite a large amount of hysteresis, and this takes some getting used to for its most sensitive setting.

Below the two rotary controls are the 'on-off' and 'high-low' power switches. These are miniature toggle switches and they're very easy to operate. The 2001 has two power settings of 25W and 5W, the low power setting being ideal for packet operation, while 25W is just right for local mobile working even with a modest antenna.

The microphone supplied is a fairly ordinary medium impedance dynamic type. One of the four microphone pins is fed with pre-volume control, low level audio. While this is OK for packet operation, it's not so good for driving a low impedance inserts as used in most headsets.

Mobile Working

When I first tried the AKD 2001 mobile, I was struck by the transceiver's sensitivity. It seemed streets ahead of my hotted up ex-p.m.r. rig. I could hear our local repeater at almost twice the distance obtained on my own rig using just a 1/4λ antenna. The audio reproduction on receive was good, although the outer case resonated a little on some of the more processed signals.

Operation of the transceiver while mobile was easy. All the controls are well spaced and logically laid out. The only slight problem encountered, was a tendency to overshoot the channel I was trying to set. I'd prefer something more tactile, possibly a click-stop switch for channel selection.

When working simplex, the audio reports were good, although my local repeater kept telling me that the rig's deviation was a bit on the thin side. I had to 'talk up' enough audio to hold the repeater open. There is an internal preset deviation control to tweak if you run into this situation. However, to be fair, our local repeater is regarded as being too fussy with regards to audio quality.

Base Station

As a base station transceiver the 2001 gave a good account of itself. However, in the quiet of my shack, one or two internally generated spurious emissions were detected. These were of such a low level that the only time I noticed them, was with the squelch set to its most sensitive point during a quick sift through the channels. No apparent degradation in signal-to-noise ratio was detected on the few channels effected.

If there's one improvement I'd make to the 2001, it would be to remove the low-level audio on the microphone socket. I'd re-route it to a 5-pin DIN socket on the rear panel, along with the p.t.t. and audio input lines. This modification, along with the EPROM for packet channel power-up would increase versatility.

If the fourth pin on the microphone socket was fed via a 100Ω resistor from the speaker, the output would drive a low impedance headset insert. With these modifications the transceiver would be attractive to packet and mobile devotees. Having said that, it doesn't mean I wouldn't buy a 2001 for my car. The rig is so simply laid out, that the modifications could be done by even a comparatively inexperienced amateur.

The Package

The AKD 2001 transceiver comes with a microphone, manual and a two year warranty, for £193.75 including VAT. I spoke to AKD about modifications and they state that the warranty will be honoured as long as any modification has not contributed to the failure of the equipment. I think this is pretty amazing when compared to the hard-nosed approach to the honouring of warranty claims by many manufacturers.

PW

Summing Up

From the time I unpacked the 2001, I felt at home with the rig. The use of easy-to-obtain components, along with the high standard of construction, provide the feeling the rig will be around for many years to come. The uncluttered lay-out of the controls and their 'KISS' operation made the transceiver refreshingly simple to use. All in all, these features add up to a transceiver that should appeal to both enthusiasts and beginners alike.

The price and specification of the 2001 will make it a hard act to follow. It's quite likely that this rig could become something of a standard. The transceiver got my vote anyway, now all I need to do is convince the XYL I need one!

Future Developments

Updated EPROMs with features like, customer selectable packet channel power-up will be available by the time you read this review. The other exciting piece of news to come from AKD is that they intend to market 70 and 50MHz versions of this transceiver very soon.

My thanks to AKD for the loan of the review transceiver and the co-operation of their Technical Adviser John Armstrong. Finally - I can tell you that I'm looking forward to reviewing the 70MHz version of this transceiver.

REVIEW

Provisional Manufacturer's Specifications

General

Modulation	F3E
Frequency Range	144-146MHz
Supply Voltage	13.2V ±10%
Channel Spacing	25kHz
Speaker	80mm Internal
Operating Temp. Range	-10 to 50°C
Frequency Stability	10ppm over -10 to 50°C

Transmitter

RF Output (High)	25W (Supply Current 4A)
RF Output (Low)	5W (Supply Current 2A)
Conducted Harmonic Content	1mW
Audio Distortion	3%
Audio Response	6dB/Octave from 300Hz to 3kHz
Deviation	4kHz
Tone Burst	0.5s of 1750 ±2Hz

Receiver

Sensitivity	Better than 0.3µV for 12dB SINAD
Adjacent Channel Sensitivity	-60dB (Relative to wanted signal)
Image Response	-70dB (Relative to wanted signal)
Audio Response	6dB/Octave De-emphasis over 300Hz to 3kHz
Audio Output	2W

Yaesu

icom

KENWOOD

FT1000	HF Transceiver	2995.00 (110.00)
FT787	NEW HF Transceiver	P.O.A.
FEX787(2)	HF Transceiver	1899.00 (110.00)
FEX787(70)	2m Module (787)	182.89 (4.00)
FEX787(10)	70cm Module (787)	229.89 (4.00)
SP787	6m Module (787)	182.89 (4.00)
FT747GX	Speaker	71.47 (4.00)
FT757GX	Budget HF Transceiver	899.00 (110.00)
FT757GX	Mkt HF Transceiver	999.00 (110.00)
FT757GX	20A P.S.U.	223.75 (8.00)
FC700	Manual ATU	152.24 (8.00)
FT757HD	Heavy Duty 2m P.S.U.	264.37 (8.00)
FT757HD	Remote Aerial Switch	81.74 (4.00)
FT757HD	270cm 45/35W Base Stn.	1358.00 (110.00)
FT757HD	2m/70cm Dual Band FM Mobile	839.00 (110.00)
FT757HD	Mkt Super 290 2m Multimode 2.5W	429.00 (8.00)
FT757HD	Mkt 6m M/Mode 2.5W	429.00 (8.00)
FL020S	25W Linear	117.50 (3.00)
FL020S	6m 10W Linear	111.37 (3.00)
FL020S	NEW 2m 45W FM Mobile	Special 329.00 (8.00)
FL020S	2m Helical	8.88 (2.50)
YHA440	70cm 1 wave	12.77 (2.50)
MM815	Mobile Bracket	14.55 (2.50)
FT411	2m H/H Keyboard	Special Price (4.00)
FT411	70cm H/H Keyboard	Special Price (4.00)
FT411	2m/70cm Dual Band H/H (Body only)	Special Price (4.00)
FT411	2m Mini H/H	Special Price (4.00)
FT411	70cm Mini H/H	Special Price (4.00)
FT411	NEW 2m H/Held	P.O.A.
FT411	70cm H/Held	P.O.A.
FT411	Nicad Battery Pack (23/73)	29.37 (2.50)
FT411	Nicad Battery Pack (23/73)	38.25 (2.50)
FT411	Nicad Battery Pack (23/73)	89.33 (2.50)
FT411	Charger (23/73)	18.09 (2.50)
FT411	Charger (23/73) 13A Plug	18.09 (2.50)
FT411	Charger (23/73)	18.09 (2.50)
FT411	Base Charger (23/73)	70.50 (4.00)
FT411	Car Adapt Charger (23/73)	24.85 (2.50)
FT411	Speaker Mic	31.73 (2.50)
FT411	Speaker Mic Miniature (23/73/727)	31.73 (2.50)
FT411	60-950MHz Scanning RX	820.08 (110.00)
FT411	Power Supply for 9500	25.54 (2.50)
FT411	Car Adapter/Charger	22.32 (2.50)
FT411	Speaker Mike	35.19 (2.50)
FT411	HF Receiver	849.00 (110.00)
FT411	Converter 118-175 for above	102.18 (4.00)
FT411	RX ATU	60.28 (3.00)
FT411	Hand 600 Spin mic	21.46 (3.00)
FT411	Desk 600 Spin mic	90.95 (3.00)
FT411	Boom mobile mic	25.54 (3.00)
FT411	Lightweight phones	20.42 (3.00)
FT411	Padded phones	20.42 (3.00)
FT411	Lightweight Mobile H/ant-Boom mic	29.38 (3.00)
FT411	PTT Switch Box 270/2700	22.48 (2.50)

IC705	HF Transceiver	2550.00 (110.00)
IC751A	HF Transceiver	1535.00 (110.00)
IC735	HF Transceiver	1000.00 (110.00)
IC728	HF/6m base stn.	1015.00 (110.00)
IC728	HF Base Transceiver	779.00 (110.00)
AT150	150W ATA (735)	335.00 (8.00)
P565	Ext PSU (735)	195.00 (8.00)
IC505	50MHz multi-mode portable	539.00 (8.00)
IC229E	NEW 2m 25W FM Mobile	299.00 (8.00)
IC23E	2m New Mini Handheld	279.00 (8.00)
IC278E	2m 25W Base Stn	1090.00 (110.00)
IC45E	70cm H/Held	304.80 (8.00)
W2E	NEW 2m/70cm H/Held	P.O.A.
IC24ET	2m/70cm Dual Band H/Held	385.00 (8.00)
IC490	70cm 10W M/Mode	Special price (8.00)
IC2400	2m/70cm FM Dual Band Mobile	649.00 (8.00)
IC3220E	2/70 FM Mobile	510.00 (8.00)
ICR71	Gen Cov RX	875.00 (110.00)
IC7000	VHF/UHF Scanner	1012.00 (110.00)
AH7000	25-1300MHz Discone	64.29 (4.00)
SP3	Ext Speaker	65.39 (4.00)
IC700R711	DC Cable (R70/R711)	8.18 (2.50)
IC267	FM Board (R70/R711)	43.93 (2.50)
GC5	Work Clock	43.93 (3.00)
BC35	Desk Charger	76.38 (3.00)
BP83	Battery Pack 7.2V (SE SERIES)	38.58 (2.50)
BP90	Empty Battery Case (SE SERIES)	10.75 (2.50)
BP94	Battery Pack 7.2, 1000mAh (SE)	74.03 (3.00)
CP12	12V Cigar Lead (SE SERIES)	12.72 (2.50)
DC1	DC/DC converter operates from 12V	18.40 (2.50)
HM46	NEW Mini speaker mic	24.15 (2.50)
HS51	Headset inc PTT/Vox unit	42.15 (2.50)
LC81	SET 2/4 SET/R/SP84	6.64 (2.50)
SM8	1.3uA/800uA BP Base Mic	87.87 (3.00)
R1	150kHz-1300MHz RX	398.00 (8.00)
R72	NEW HF RX	659.00 (110.00)
R100	5000KHz-1800MHz	610.00 (8.00)

TS950S	NEW HF Transceiver	2995.00 (110.00)
TS140	HF 9 Band Gen. Cov. TX/RX	880.00 (110.00)
TS680S	HF/6m TX Gen. Cov. RX	995.00 (110.00)
TS440	9 Band TX General Cov RX	1163.87 (110.00)
AT440	Auto/ATU	147.97 (4.00)
PS52	H/Duty PSU	236.00 (8.00)
AT230	At Band ATU/Power Meter	213.20 (8.00)
PS430	Power Supply	177.85 (8.00)
SP31	Speaker	64.84 (4.00)
TL922	10/180 2kW Linear	1486.00 (110.00)
TH28	2m H/Held	264.00 (8.00)
TH48	70cm H/Held	278.00 (8.00)
TH77	2m/70cm H/Held	395.00 (8.00)
TH27	NEW 2m H/H	254.00 (8.00)
TH21S	70cm H/Held	275.13 (8.00)
TR751	2m 25W M/M Mobile	610.00 (110.00)
TS790	VHF/UHF Transceiver	1625.00 (110.00)
R2000	Gen Coverage HF/RX	599.00 (110.00)
VC10	118-174MHz Converter (R2000)	185.46 (4.00)
R5000	General Coverage HF/RX	895.00 (110.00)
VC20	118-174MHz Converter (R5000)	170.95 (4.00)
TM702	NEW 2m/70cm FM Mobile	456.00 (8.00)
TM731	70cm FM Mobile	675.00 (110.00)
TM241E	2m FM Mobile 50/10/5W	285.00 (8.00)
TM441E	70cm FM Mobile 35/10/5W	325.00 (8.00)
MC50	4P Desk Mic	47.08 (4.00)
MC50A	8P Desk Mic	90.13 (4.00)
MC80	Electric Desk Mic	55.15 (4.00)
MC85	Desk Mic Audio Level Comp	101.16 (4.00)
MC43	8P Fast Mic	22.70 (3.00)
MC43	4P Fast Mic	22.70 (3.00)
MC55	Mobile Mic (6p. 0.8p)	53.84 (3.00)
LF30	HF Low Pass Filter	32.96 (3.00)
H58	Lightweight H/phones	24.98 (3.00)
H55	Deluxe H/phones	38.35 (3.00)

C W Keysers

HI-MOUND	HK703 Straight key (adjustable tension)	50.75 (4.00)
HI-MOUND	HK705 Straight key (adjustable tension)	28.75 (4.00)
HI-MOUND	HK706 Straight key (adjustable tension)	29.50 (4.00)
HI-MOUND	HK707 Straight key (adjustable tension)	28.00 (4.00)
HI-MOUND	HK707 Straight key (adjustable tension)	27.00 (4.00)
HI-MOUND	HK802 Straight key (Deluxe-Brass)	100.00 (4.00)
HI-MOUND	HK803 Straight key (Brass)	91.50 (4.00)
HI-MOUND	MK703 Squeeze key	37.80 (4.00)
HI-MOUND	MK704 Squeeze key	25.50 (4.00)
HI-MOUND	MK705 Squeeze key	35.75 (4.00)

STARMASTER	Electronic Keyer Unit (No Paddle)	59.95 (4.00)
Dewsbury	Electronic Memory Keyer (No Paddle)	95.00 (4.00)

Rotators

AR200XL	Light Duty	50.50 (8.00)
G260	Light Duty	79.75 (8.00)
G400	Medium Duty	152.00 (8.00)
G400RC	Medium Duty (Round Face)	172.85 (8.00)
G800RC	Medium/Heavy Duty	240.00 (8.00)
G3000RC	Heavy Duty	454.00 (8.00)
G500A	Elevating Rotator	203.00 (8.00)
GR5400B	Azimuth/Elevating	383.00 (8.00)

SWR/PWR Meters

HANSEN	1.5-150MHz	16.50 (3.00)
JD110	3.5-150MHz	27.45 (4.00)
Oscar 1718	1.6-60MHz	95.00 (3.00)
Yaesu Y560	140-525MHz	83.00 (3.00)
Y560	140-150/430-450	36.75 (4.00)
Comet CM420	1.8-200MHz	76.80 (4.00)
Comet CD120H1	1.6-60MHz	90.85 (4.00)
Comet CD2700	140-525MHz	79.85 (4.00)

Miscellaneous

SMC2 2U	2 Way SO239 Switch	19.35 (4.00)
SMC2 2N	2 way 'n' Sata Switch	24.00 (4.00)
Comet CSW20	SO239 switch	26.50 (4.00)
T25	30W Dummy Load	11.80 (3.00)
T100	100W Dummy load	50.00 (3.00)
T200	200W Dummy load	66.50 (3.00)
WAI	Wavemeter 120-450MHz	27.84 (3.00)
PK232	Packet/RTTY Terminal	319.95 (4.00)
Datong D70	Morse Tutor	68.38 (4.00)
Datong FL2	Audio Filter	102.07 (4.00)
Datong FL3	Audio Filter/Autotuner	153.21 (4.00)
Datong ASP	Processor 4pin	87.01 (4.00)
Datong ASP	Processor 8pin	97.01 (4.00)
Datong AD370	Active Antenna	91.69 (4.00)

Antennas

DS770	70-700MHz RX Discone	25.50 (8.00)
D130	26-1300MHz Discone	78.68 (8.00)
Jaybeam	TB3 MkIII 3e HF Tribander	403.10 (110.00)
Creative	CD318 JR 4e HF Tribander	308.00 (110.00)
Creative	CD318 4e HF Tribander	357.00 (110.00)
GPV65	2m Coinear	46.49 (8.00)
WX1	2m/70cm Base Fibre Glass	56.00 (8.00)
WX2	270cm Base Fibre Glass	76.85 (8.00)
WX4	270cm Base Fibre Glass	101.16 (8.00)
CF416MN	2m/70cm Diplexer	28.00 (4.00)
OSTDHP	10/80m trapped dipole	56.75 (8.00)



Instant credit available.
Mail/telephone order by cheque or
credit card. Cheques cleared before
goods despatched.



OPEN TUES.-SAT. 9.00-5.30
(CLOSED MONDAYS)
LUNCH 1-2pm

STOCK ITEMS USUALLY
DESPATCHED WITHIN 48 HRS

DELIVERY/INSURANCE PRICES
IN BRACKETS
(E&G)

BUY THE BEST — BUY



SOLID BRITISH ENGINEERING

BRITISH WORKMANSHIP AT ITS BEST

CAPACITORS, ROLLER COASTERS AND BALUNS

BUILD YOUR OWN A.T.U. FOR £75.55

CAP-25S	£20.60
CAP-25T	£25.10
R/COAST	£29.85 + £4.50 p&p

BUILD YOUR OWN LOOP — COMPLETE KITS

AMA3 KIT COVERS 10-20m	£308.15 + £10.00 p&p
AMA5 KIT COVERS 30-80m	£398.85 + £15.00 p&p

or individual parts available

AMA-3 10-20m	£339.50 + £15.00 p&p
AMA-5 30-80m	£463.30 + £20.00 p&p

only two aerials needed for continuous coverage from 3.5 to 30MHz

COST OF TWO AERIALS	£716.85 + £30.00 p&p
COST OF TWO KITS ONLY	£621.05 + £25.00 p&p

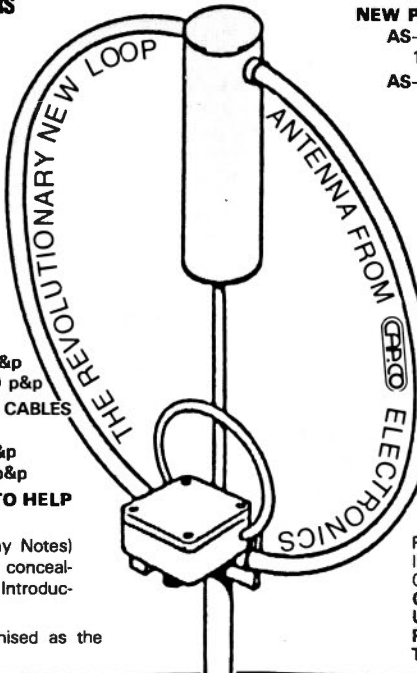
THIS OFFER INCLUDES CONTROL BOX, CLAMPS & CABLES
NOW AVAILABLE

AMA-6 COVERS 12-40m	£377.90 + £15.00 p&p
AMA-4 COVERS 80-160m	£541.70 + £30.00 p&p

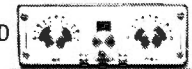
ANY QUERIES — ASK US — WE WOULD LIKE TO HELP
NEW PRODUCT

The "un-named" CB antenna (see PW May Quay Notes)
can be mounted outdoors or in the attic for total conceal-
ment. No TVI or BCI 25.6-33MHz-200 Watts. Introductory
offer price £79.50 + £10 P&P

CAP.CO ELECTRONICS LTD. are now recognised as the
leading authorities on LOOP Antennas



SPC-300D



SPC-3000D



'STAY TUNED FOREVER'

With a CAP.CO A.T.U

NEW PRODUCTS

AS-305 AERIAL SWITCHING UNIT
1-160MHz, 3000 Watts PEP £72.50 + £5.00 p&p
AS-305R AERIAL SWITCHING UNIT
Remote version of above £82.50 + £5.00 p&p
See PW April for review.

SPC-100 A.T.U.

This small budget priced A.T.U. designed with
low power operator and short wave listener in
mind L&C Match covering an impedance range
of 6:1 Max power 300 Watts PEP
£85.80 + £5.00 p&p

We have recently acquired the licence for the
production and marketing of all the aluminium products
previously manufactured by Western Electronics Ltd.
The principal products are the ALUMAST high strength
lightweight aluminium tower, the DX-PENETRATOR
series of Tribander beams and vertical antennas e.g.:
DX-6V 6 Band Vertical Antenna £175.00 inc. VAT
Built to the traditional high quality of the existing
CAP.CO products, the addition of these items will
expand considerably the range of antennas available
from a British manufacturer.

★ Available Shortly ★

DX-PENETRATOR DX-260 2-element 6-Band Quad
DX-PENETRATOR DX-460 4-element 6-Band Quad

FOR MORE INFORMATION ON ANY OF OUR PRODUCTS
INCLUDING HIGH POWER A.T.U.'s, LOOP ANTENNAS FOR
COMMERCIAL USE SEND SAE TO:
CAP.CO ELECTRONICS LTD,
UNIT 28, PENLEY INDUSTRIAL ESTATE
PENLEY, WREXHAM, CLWYD LL13 0LQ
TEL: 0948 74717 FAX: 0948 74728

A Three Element Portable 144MHz Beam Antenna

Construction

Do you live at a poor v.h.f. site? If so, Kevin James G6VNT suggests that you try portable operation from your local 'high spot', using his lightweight beam antenna design to work that elusive 144MHz DX.

I've had many memorable contacts with this antenna design over the years, and thought it would interest others with a liking for home construction. Contacts into the continent have been obtained with ease, under favourable conditions, using only a modest 25W.

The design is a narrow band 3-element Yagi antenna, which is omega matched for ease of tuning, good s.w.r. and high gain. In theory a 3-element yagi yields about 8.5dBd of gain, but you can never achieve this in actual practice, due to various losses in matching, etc. My design was made narrow band, to obtain maximum gain, and was tuned for the s.s.b. portion of the 144MHz band.

Many hours of tests, which were carried out over a period of several months, took place before I was satisfied that it was not possible to squeeze any more gain out of three elements.

Construction Details

You should refer to **Fig. 1** for the basic design lengths. The antenna boom consists of 740mm of 15mm square hollow aluminium tubing. This tubing has standard end caps and is the same type used on many broadcast TV and v.h.f. f.m. radio antennas.

The elements were made from 8mm diameter hollow tube, with the ends flattened about 8mm in from the outer ends. This stops them whistling in the wind!

When you're making the antenna, the elements can be mounted on standard black mounting blocks for 15mm square tube. These are bolted on with 25mm long 4BA screws and nuts.

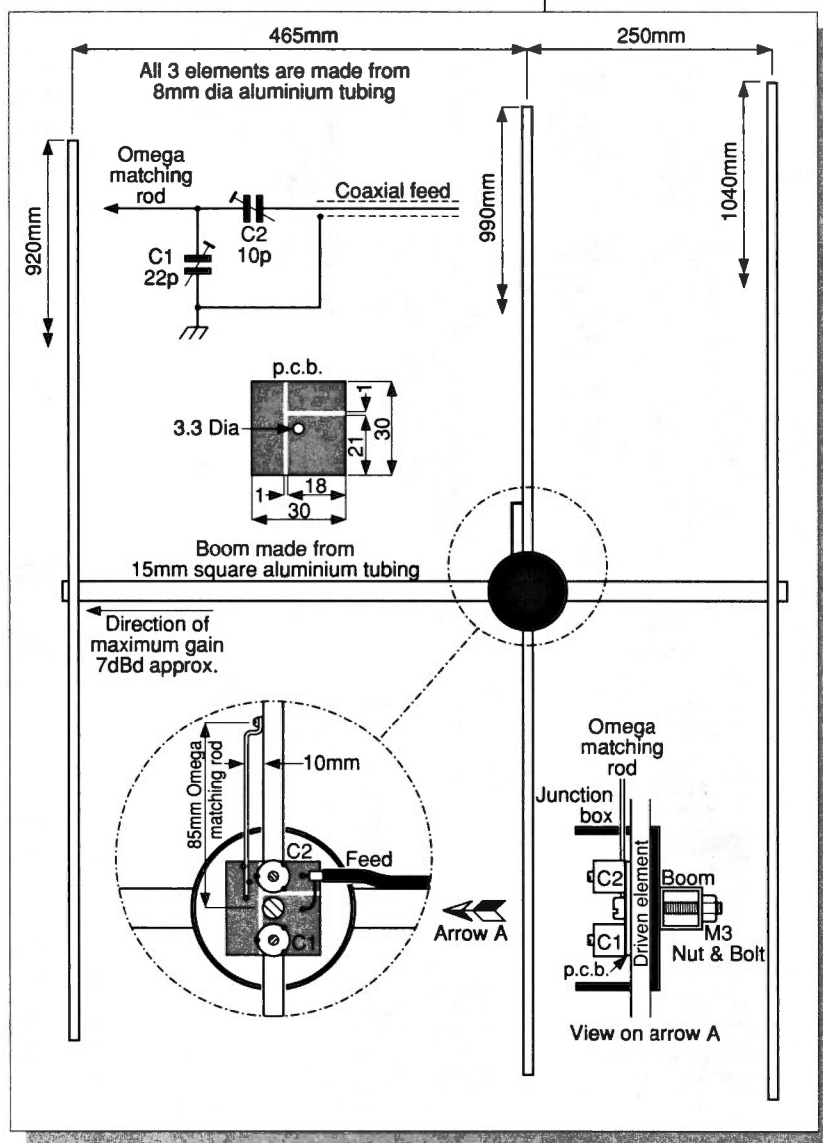
When blocks have not been available, I've filed a groove across the boom to stop the elements rotating. This can stop problems occurring especially if they are accidentally knocked when the antenna is being hoisted aloft. It doesn't appear to have affected the performance in any of the antennas I've made.

Making The Connection

A small p.c.b. inside a waterproof junction box matches the 4.7m length of RG-58 coaxial feeder to the driven element. The p.c.b. circuit is shown in **Fig. 2**, and the component placement diagram is shown in **Fig. 3**.

The omega match was chosen because it will provide a 1:1 s.w.r. when it's adjusted correctly. It also saves having to mess around altering the length of the omega wire to obtain a good match.

The wire is deliberately made short, and increasing the capacity of capacitor C2 effectively lengthens the omega wire, (or shortens it, if the capacity is reduced). This makes the antenna very easy to adjust, if slightly different materials are used in construction



to what I've specified. All the materials can be obtained on antenna stands at most of the mobile rallies. I actually bought mine from a local TV aerial manufacturer in the Bristol area.

The Board

The p.c.b. is made from 1.6mm single-sided glass fibre board, 30mm square. As many of you'll already know, p.c.b.s can be made in a variety of ways. One simple method is to cover the copper foil side with masking or drafting tape. You should then cut away fine strips where you don't want copper to remain after the etching process. A scalpel or modelling knife is best for this, and don't forget to take care so as to avoid cutting yourself!

The board is then dropped into a small jar of ferric chloride solution and allowed to etch for about 15 minutes with occasional careful agitation. Take care when you agitate the solution, it can stain you and your clothing and it's toxic.

When the process is completed, you can peel the

Fig. 1: The 144MHz beam antenna with insets showing matching, p.c.b., connection, layout and constructional details.

RST

RST MAIL ORDER CO.
LANGREX SUPPLIES LTD.
1 MAYO ROAD,
CROYDON,
SURREY CR0 3QP.
**SPECIAL EXPRESS
MAIL ORDER SERVICE**

AZ31	£p	EM34	P.O.A.	PY33	2.50	6AS6	6.00	6SC7	3.00
CL33	4.00	EM81	2.50	PY81	1.50	6ASTG	9.50	6SG7M	2.50
D7867	1.50	EM87	2.50	PY82	1.50	6AT8	2.00	6S7	3.00
D7832	1.50	EN91 Mult	7.50	PY83	1.50	6AUSGT	5.00	6SK7	3.00
E880C	4.00	EY51	3.50	PY88	2.00	6AUS	2.50	6SL7GT	4.50
E180F	8.95	EY86	1.75	PY500A	4.00	6AWBA	4.00	6SN7GT	4.50
E810F	25.00	EY88	1.75	PY800	1.50	6B7	4.00	6SS7	3.00
EABC20	1.95	EY500A	3.00	PY801	1.50	6B8	4.00	6UBA	1.50
EB91	1.50	EZ80	1.50	QOV02.6	19.50	6B4S	1.50	6V6GT	4.25
EBF80	1.50	EZ81	1.50	QOV03.10	5.00	6B47	5.00	6V4	3.00
EBF89	1.50	GY501	3.00	QOV03.10 Mult	15.00	6B6E	1.50	6X5GT	2.50
EBL31	£12.50	GZ32	6.50	QOV03.20A	25.00	6B86	2.50	12AT7	2.25
EC31	6.50	GZ33	4.50	QOV06.40A Mult	40.00	6B8	2.25	12AU7	2.25
EC33	7.50	GZ34 GE	7.50	QOV03.12	10.00	6B86	2.50	12AX7	2.25
EC35	7.50	GZ37	4.50	R18	4.00	6B7A	3.50	12AX7A GE	7.00
EC38	7.50	KT61	7.50	R19	3.00	6B7	6.00	12BA6	2.50
EC381	2.25	KT66	15.00	SP41	6.00	6B8A	4.00	12BE6	2.50
EC382	2.25	KT66 GEC	35.00	SP61	4.00	6B87	6.00	12BH7A GE	6.50
EC383 Siemens	2.25	KT77 Gold Lion	4.50	U19	10.00	6B86	4.50	12BY7A GE	7.00
EC385	3.50	P.O.A.		U25	2.50	6B87	1.50	12E1	20.00
EC386	3.50	KT88	15.00	U26	2.50	6B26	2.50	12HG7 12GN7	6.50
EC391	2.00	N78	9.00	U37	7.50	6C4	1.95	30FL12	1.50
EC392	1.50	OA2	2.70	UABC80	1.50	6C5	3.50	30P4	2.50
EC395	3.50	OB2	2.70	UBF89	2.50	6C8A	3.00	30P19	2.50
EC42	3.50	OC3	2.50	UCH42	4.00	6C8GA	5.00	30P13	1.50
EC481	3.00	OD3	2.50	UCH81	2.50	6CL6	3.75	30P14	1.80
EC480	1.50	PC86	2.50	UCL82	2.00	6CG7 GE	5.25	5725	70.00
EC482	1.50	PC88	2.50	UCL83	3.00	6CH6	6.00	805	50.00
EC483	3.00	PC82	2.50	UF89	2.00	6CW4	6.00	807	5.00
EC486	1.75	PC87	2.00	UL41	10.00	6D6	3.50	811A	18.50
EF37A	3.50	PC900	2.00	UL84	2.00	6DC5 GE	12.00	812A	32.50
EF38	2.75	PCF80	2.00	UY41	4.00	6DC6B	9.50	813	27.50
EF40	5.00	PCF82	1.50	UY85	2.25	6E4S	3.50	866A	25.00
EF41	3.50	PCF86	2.50	VR105/30	2.50	6E4S	1.85	872A	20.00
EF42	4.50	PCF801	2.50	VR150/30	2.50	6F6	3.50	931A	25.00
EF50	2.50	PCF802	2.50	Z759	35.00	6GK6	4.00	2050A GE	10.00
EF54	4.50	PCF805	1.70	Z803U	25.00	6H6	4.00	7163	10.00
EF55	3.50	PCF808	1.70	Z221	3.50	6H8	4.95	5614A	4.00
EF80	1.50	PCH200	3.00	3B28	20.00	6J5	3.00	5842	12.00
EF86	5.00	PCL82	2.00	4CX250B	62.00	6J6	3.00	6060	8.50
EF91	1.95	PCL83	3.00	5R4GY	8.00	6J7	4.00	6146B GE	15.00
EF92	2.15	PCL84	2.00	5U4G	5.25	6J8A GE	9.50	6550A GE	15.00
EF163	2.00	PCL85	2.50	5Y4G	4.00	6J8C	8.50	6883B GE	16.00
EF184	2.00	PCL86	2.50	5Y4G	4.00	6J8C GE	11.25	6873	11.00
EH90	1.75	PCL805	2.50	5Y3GT	2.50	6K9GT	3.00	7025 GE	7.00
EL32	2.50	PC500	8.00	5Z3	4.00	6K7	4.00	7027A GE	12.50
EL33	7.50	PFL200	2.50	5Z4GT	2.50	6K8	4.00	7199	10.00
EL34 Philips	10.00	PL36	2.50	63CL2	1.75	6K86 GE	11.95	7581A	12.00
EL34 Siemens	4.50	PL81	1.75	6AB7	3.00	6L6G	5.50	7596	15.00
EL36	4.00	PL82	1.50	6AH6	4.00	6L6CCTL	9.50	7587	23.00
EL39	25.00	PL83	2.50	6AK5	4.50	6L6C Siemens	4.50	7868	8.50
EL81	5.00	PL84	2.00	6AL5	1.00	6L6C GE	9.50	8068	15.00
EL84	2.25	PL504	2.50	6AM6	1.95	6L7	3.50	8417 GE	11.50
EL86	2.75	PL506	5.50	6AN5	8.00	6LQ6	9.50		
EL91	4.00	PL509	6.00	6AN8A	4.50	6Q7	4.00		
EL95	2.00	PL519	6.00	6AQ5	3.25	6RH46BKN8	12.00		
EL380	18.50	PL802	6.00	6AR5	25.00	6SA7	3.00		

Tel. 081-684 1186

Open daily to callers. Mon-Fri 9am-4pm — Closed Saturday
Valves, Tubes and Transistors Over 6000 types available
from stock

Fax: 081-684 3056



Prices excluding
VAT add 17.5%

Terms C.W.O. and Visa Cards accepted. Orders despatched
by return
Quotations for any types not listed S.A.E.
Post and packing £1.00 per order + VAT

Telex
946708



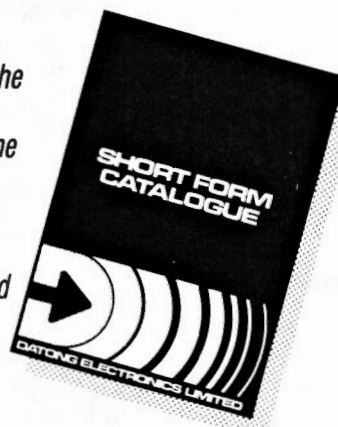
D A T O N G
ELECTRONICS LIMITED

Clayton Wood Close
West Park
Leeds LS16 6QE
Tel: 0532 744822
Fax: 0532 742872

**For products you can rely
upon to give amazing results**

For information on **Active
Antennas, RF Amplifiers,
Converters, Audio Filters, the
Morse Tutor and Speech
Processors** send or telephone
for a free catalogue and
selective data sheets as
required.

All our products are designed
and made in Britain.
Orders can be despatched
within 48 hours subject to
availability.



— VISA AND ACCESS WELCOME —



**ENTERPRISE
RADIO
APPLICATIONS
LTD.**

5 Clarendon Court
Winwick Quay
Warrington
WA2 8QP
Tel: (0925) 573118

MK.II MICROREADER



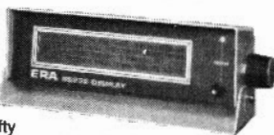
The easiest way to receive CW & RTTY without all
the fuss of computers. Just plug into your speaker
socket and switch on. The Microreader
automatically decodes both amateur and
commercial stations displaying the received text on
its own LCD screen. The Microreader also incorporates a MORSE TUTOR
facility that allows you to check both your receiving and sending performance.
£170.00

BP34 AUDIO FILTER

Someone once said that this filter is too good for
amateur radio use. We, along with hundreds of
BP34 users would disagree. The BP34 combines
ease of use with a degree of performance not
found in any other filter. Exceptionally sharp cut off and guaranteed 80dB
stopband attenuation make this filter a must for the more serious user.
£109.50

RS232 DISPLAY

Don't tie up your computer while monitoring. This new unit will display, store
and print messages sent via the RS232
output from the MICROREADER or
PACKET TNC. Text is stored in memory
and at the same time displayed on the
large 160 character backlit screen. A
unique scrolling facility allows you at any
time to scroll back and forth through over fifty
screens of text messages while still receiving data. The display
incorporates a PARALLEL PORT that allows printing of all or selected sections
of text at the touch of a button. £185.00



BP12 DATA FILTER

A compact low power filter specifically designed for data
applications such as CW, RTTY & HF PACKET. Both audio
and TTL tone data outputs are provided. Ideal for use with
computers. £44.00

All products are guaranteed for two years
and all prices include VAT
and postage and packing.



IF AN ADVERT IS WRONG, WHO PUTS IT RIGHT?

We do.

The Advertising Standards Authority
ensures advertisements meet with the
strict Code of Advertising Practice.

So if you question an advertiser, they
have to answer to us.

To find out more about
the ASA, please write to
Advertising Standards
Authority, Department X,
Brook House, Torrington
Place, London WC1E 7HN.



This space is donated in the interests of high standards
in advertisements.

tape off and hey presto, one printed circuit! This method is only suitable for simple p.c.b.s such as this, but it's very quick and easy. The full p.c.b. details are shown in the inset in Fig. 1.

A cross section through the junction box is shown, and as can be seen, one screw secures the p.c.b., the element and junction box to the boom. **Makesure that the element centre is in contact with the screw**, as this should ground it to the boom at this point. The physical sizes are not absolutely critical for the p.c.b. layout, so different junction boxes can be utilised.

Setting-Up

To set up the antenna you should mount the assembly on a 1.5m pole with its junction box cover removed, and away from metal obstacles such as cars! Next, arm yourself with a plastic knitting needle filed to a screwdriver edge and stand behind the reflector element.

Once in this position you can alternately adjust C1 and C2, until the lowest s.w.r. is obtained. Before you begin this operation, ensure that the omega wire is about 10mm away from the driven element, until the point where it is connected with a solder tag and screw.

Cable Points

One point to remember is that it's not advisable to use a length of RG-58 any longer than about 4m, as the loss in the feeder becomes objectionable. The alternative RG8 cable was not used as it's so thick it does not bend easily, particularly in cold weather. It's not so easy to thread in and out of car doors or windows either. Using this cable would defeat the convenience

and portability of the antenna.

Don't run high power through this antenna, unless you change the type of trimmer capacitors used. A heavy duty compression type with ceramic base with high quality insulation, able to work at higher voltages is required for higher power use.

Better Results

The antenna gave notably better results than a HB9CV, it also had a very reasonable null on the rear. With an S-9 + signal in the front, swinging the antenna round gave less than S-1 on the rear. When pointed at a constant signal source, approximately 17m away, an S-5 + reading was obtained, as opposed to an S-4 from the HB9CV.

I hope that other readers will have as many happy hours, and memorable contacts, from this relatively compact and simple antenna as I had! I wish you good 144MHz DX next time you work portable. **PW**

How Much? Approximately £10 How Difficult? Intermediate

Shopping List

Lengths of 8mm aluminium tubing (see text), length of 15mm square section aluminium tubing (ex TV or v.h.f. radio antenna, see text), plastics junction box, p.c.b. material, masking tape, coaxial cable, trimmer capacitors, wire for omega matching rod, sealant, nuts and bolts.

Radio Diary

* Practical Wireless & Short Wave Magazine in attendance

June 16: Denby Dale & District ARS have their Rally at Salendine Nook High School, Huddersfield. Open 11am until 4pm. Same venue as last year. **J. D. Chappell at 221 Huddersfield Road, Shelley, Huddersfield HD8 8LJ.**

***June 30:** The 34th Annual Longleat Rally will be held, as usual, at Longleat House, Warminster, Wilts. **Shaun O'Sullivan G8VPG. Tel: (0225) 873098.**

***July 5:** Woburn rally.

July 7: The York Radio Rally will be held in the Tattersall Building, York Racecourse, Knavesmire, York. Doors open at 11am, entrance fee 50p and there's ample free parking. Attractions include amateur radio, electronics and computer traders, arts and crafts, Morse Testing, a licenced bar and cafe. Talk-in on S22. **Dave G7FGA. Tel: York (0904) 790079.**

July 7: Kings Lynn ARC present the Great Eastern rally at The Corn Exchange, Tuesday Market Place. Open 10am, entry £1, free parking, Bring & Buy, licenced bar, refreshments. Talk-in S22. **Derek Franklin G0MQL, Laurel Farm, 7 Holly Close, West Winch, Kings Lynn, Norfolk PE33 0PW.**

***July 13:** The Cornish RAC will be holding their rally at Penair School, St Clements, Truro. All the usual attractions, refreshments, free parking, etc. Doors open 10am, 9.30am for the disabled. Talk-in on S22. **Rolf Little Tel: (0872) 725952.**

July 14: The Sussex Amateur Radio & Computer Fair will again be held at Brighton Racecourse. All the usual traders and other attractions will be there. Doors open at 10.30am. **Ron Bray G8VEH. Tel: (0273) 415654 office hours.**

July 21: The 8th McMichael rally and car boot sale at the Haymill Youth and Community Centre, Burnham Lane, Slough (near Burnham railway station). Starts at 10.30am and admission is £1. The car boot sale is £6 per pitch on the day. There is free parking on site and talk-in is available on S22. **Neil G8XYN on (0628) 25952.**

July 21: The Colchester Mobile rally will be held at the Sports & Leisure Centre, Brinkley Lane, Colchester. Easily accessible site with free car parking and an extensive area under cover for traders and radio societies.

July 28: Rugby ATS have their annual Car Boot Sale, venue to be advised nearer the time.

The event opens at 10am and talk-in will be provided by GB8CBS on S22. **Kevin G8TWH on (0203) 441590.**

***July 28:** The Scarborough ARS will be holding their annual rally at The Spa, South Foreshore, Scarborough. Doors open at 11am until 4pm. Many trade stands, large Bring & Buy, Tombola, licenced bar and refreshments. Morse tests followed by a demonstration by the North Yorkshire Morse test team. Entrance 50p including a prize draw. **Ian Hunter G4UQP (QTHR). Tel: (0723) 376847.**

August 11: The 32nd Annual Derby Mobile rally will take place this year at a new venue, Littleover Community School, Rykneld Road, Littleover, Derby. The school is situated on the A5250 road, just north of its junction with the A38. Talk-in on 144MHz. All the usual attractions, including the famous monster Junk Sale. **Martin Shardlow G3SZJ, QTHR. Tel: (0332) 556875.**

***August 11:** Hamfest 91 will be held at the Flight Refuelling Sports & Social Club Grounds, Merley, Wimborne, Dorset. The event opens at 10am and will feature a Bring & Buy, trade stands, radio and electronics car boot sale, craft fair, field displays and attractions for the whole family. Special disabled parking is available in the grounds and overnight camping can be arranged. **John G0API. Tel: (0202) 619649, Rob G6DUN. Tel: (0202) 479038.**

August 18: The West Manchester Radio Club's 'Red Rose Rally' will be held at the Bolton Sports & Exhibition Centre, Silverwell Street, Bolton (town centre). All the usual trade stands, societies, Bring & Buy, etc. All at pavement level, with facilities for the disabled. Refreshments available all day and bar. Doors open at 10.30am for disabled and 11am for the general public. Admission £1, children free. **Dave G1100 on (0204) 24104 evenings only.**

September 1: Preston ARS will be holding their 24th Annual Rally at the University of Lancaster, as in previous years. **Godfrey Lancefield G3DWQ, QTHR. Tel: (0772) 53810.**

***September 1:** Telford amateur radio rally will be held at the Telford Exhibition Centre, Telford Centre, Shropshire. Doors open 11am (10.30 disabled). **John Bumford G0GTN, 19 Bewdley Avenue, Monkmoor, Shrewsbury SY2 5UQ.**

September 8: Vange ARS will be holding their annual rally at the Laindon Community Centre, Laindon High Road/Aston Road, Laindon, Basildon, Essex. The centre is only a short walk from Laindon Station (British Rail) on the Fenchurch Street to Shoeburyness Line. Doors open from 10.30am to 4.30pm with admission at 50p. The rally will include many traders, Bring & Buy, refreshments and a free raffle. Talk-in is on S22. Approach roads will be signposted. **Doris Thompson on (0268) 552606.**

***September 8:** the Lincoln Hamfest will be held at the Exhibition Centre, Lincolnshire Showground. Doors open 10.30am to 5.30pm (10am disabled). **Sue Middleton, 14 Toronto Street, Lincoln LN2 5NN.**

The PW Robin Frequency Counter Part 1



Mike Rowe G8JVE developed the PW Robin as the replacement for his elderly frequency counter. Mike now shows you how to build his wide band, low power design.

My ancient counter used an enormous amount of power, and it struggled to count up to any reasonable frequency. Its replacement, the 'PW Robin', will count up to at least 450MHz with a resolution of 1 or 10Hz depending on the range (the prototype managed up to 900MHz Ed.).

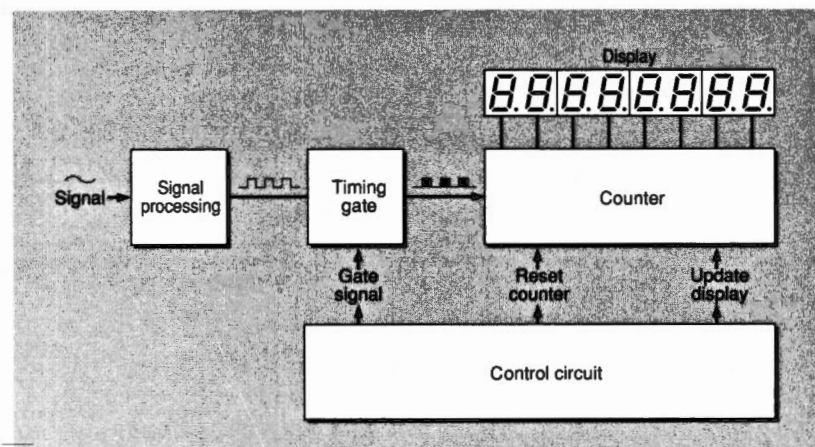
I could have used a complex counter device, such as the 7216 as the heart of my new instrument. However, after some consideration I decided to use individual i.c.s for several reasons:

- (a) They're much cheaper.
- (b) The minimum frequency is higher (50MHz compared to 10MHz).
- (c) If it goes wrong, probably only one i.c. will need to be replaced, at a much reduced cost. The system is also capable of modification. If you only wish to cover the h.f. ranges, simple changes make this possible. Another bonus is, that with the exception of the prescaler chip, none of the i.c.s cost more than £1.

Basic Counting

If you refer to Fig. 1.1, you'll see that it's a simplified diagram of a frequency counter. Before being counted the incoming signal has to be processed.

Fig. 1: Simplified block diagram of a frequency counter.



This processing involves amplification and clipping so that the signal has a constant amplitude. The process also creates well defined edges to enable accurate counting.

The stream of processed signals is then passed to a timing gate circuit. This gate acts as a 'tap' on the signals. The 'tap' is opened for a known time, allowing signals through. The series of gated signals are then passed on to the counter circuits.

Once they're passed on the total number of pulses is counted. If the gate was opened for one second, and one million pulses were counted, then the frequency is 1MHz (one million cycles per second). If two million were counted, it will be 2MHz and so on. The control circuit acts as the manager of all the various timing pulses, to ensure that the counter control pulses occur in the right order.

Control Chain

The diagram, Fig. 1.2, shows the control and count circuitry. The control chain derives all the control signals from one crystal frequency. This process begins with integrated circuit IC1, which combines an on-chip oscillator with a 2^{14} (16 384) divider. The oscillator is crystal controlled and runs at 4.194304MHz.

In order to obtain an exact gating period of one second, a frequency of 0.5Hz is required as, only the positive going half-cycle of the clock is used for gating the signals. To obtain the required 0.5Hz, the crystal frequency has to be divided by 2^{23} (8388 608). The oscillator i.c. only divides by 2^{14} , so a further division of 2^9 (512) is needed. This extra division is carried out by IC2.

From this point, the 0.5Hz output from the i.c. is split into different paths. The first pathway is into the counter gate (IC4b). The second path is to the counter timebase. This timebase is another c.m.o.s. type device, and it's a dual precision monostable.

Both halves of the device are connected as non-retriggerable monostables. One triggers a pulse of approximately 30ms, by the trailing (falling) edge of the clock pulse. The NOT-Q output on pin 7 is a negative going pulse fed to the latch inputs of the decoder/driver i.c.s. This pulse triggers the second half of IC3, again with an output pulse width of some 30ms. The Q output of this monostable is a positive going pulse, which is then fed to the counter i.c.s resetting them to zero, before beginning the count sequence again. So, after all that, you can see that all the timebase functions are dependent upon satisfactory operation of the clock oscillator.

Counter Stages

The counter i.c.s are all high-speed c.m.o.s. type 74HC390. This i.c. is a dual decade counter with b.c.d. (binary coded decimal) outputs. They are cascaded to give total count of 10^8 . This allows a resolution of 1Hz on the h.f./l.f. inputs and 10Hz on v.h.f./u.h.f.

The b.c.d. outputs feed the decoder/latch/driver i.c.s. These i.c.s (c.m.o.s. type 4511) then drive the four dual seven segment common cathode i.e.d. displays.

Better Display

The use of the latching inputs ensures a non Practical Wireless, July 1991

blurring display. The count data presented on the b.c.d. input pins, will only be passed to the driver section of the i.c. when the latch input is low.

When the count is proceeding, data is continually changing on the data outputs of the counters. This only ceases to change when the gating signal is removed. At this point the latch pulse is still high. When the first monostable is triggered, the latch line goes momentarily low allowing the data on the inputs to be transferred to the display. This line then goes high again isolating the counters from the decoders. The display is updated every two seconds.

The reset line is a positive going pulse which resets the counters to zero at the end of each counting period. If this isn't done, the counters would display a cumulative total, each count then being added to the value of its predecessor. This pulse must arrive after the latch pulse, if it doesn't, the counter will only display zero.

Signal Processing

Now we'll carry on by turning to the signal processing and gating circuits shown in Fig. 1.3. You'll see that from the diagram, that the signal gate circuitry uses a pair of quad two input NAND gates. The switching of the h.f./l.f. inputs is entirely automatic and it uses the logic gates of IC6.

To raise the h.f. signals to defined logic levels, an amplifier consisting of TR2-6 is included. The amplifier input is protected by D4/5, with current limiting provided by R5. Isolation is given by the capacitor C13. The bandwidth of this amplifier, incidentally, is from approximately 1-40MHz.

Low frequency signals are processed by the Schmitt trigger pair comprising TR7/8, with TR9 raising the level to the input requirements of IC6a. Overload protection is provided by D6/7, necessary limiting by R18 and suitable isolation by C17. The response of this amplifier extends up to about 1MHz.

On v.h.f./u.h.f. TR1 is a common emitter amplifier driving the Plessey SP8680 pre-scaler device. In this application the i.c. is connected to divide-by-ten.

The inductor, RFC1, in the collector circuit provides a rising h.f. response to the amplifier. To provide overload protection, the input is equipped with diodes D2 and 3, with limiting by R2. Capacity coupling is used at the input of the SP8680 i.c. which has its own internal input biasing circuitry.

Input Selection

The selection of input and decimal point switching on the display is performed by S1, which is a front panel mounted switch. When the l.f./h.f. range is selected, you can see that the 5V rail is connected to the l.f./h.f. circuitry.

Power is not fed to the pre-scaler circuitry, in order to conserve energy as IC5 consumes over 100mA. The front panel switch S1, a double pole centre-off device, also serves as an on/off switch.

The 5V supply for the counter is derived from a 12V supply. This supply comes via IC19 with C19 and 20 suppressing any tendency to self-oscillation, which is evident with some 7805s. Reverse polarity protection is by D1, with short circuit protection by F1.

Well, that's the basic circuit described. Next time, I'll describe how to build the PW Robin frequency counter.

Fig. 1.2: The Controller/timesbase and Counter Circuits.

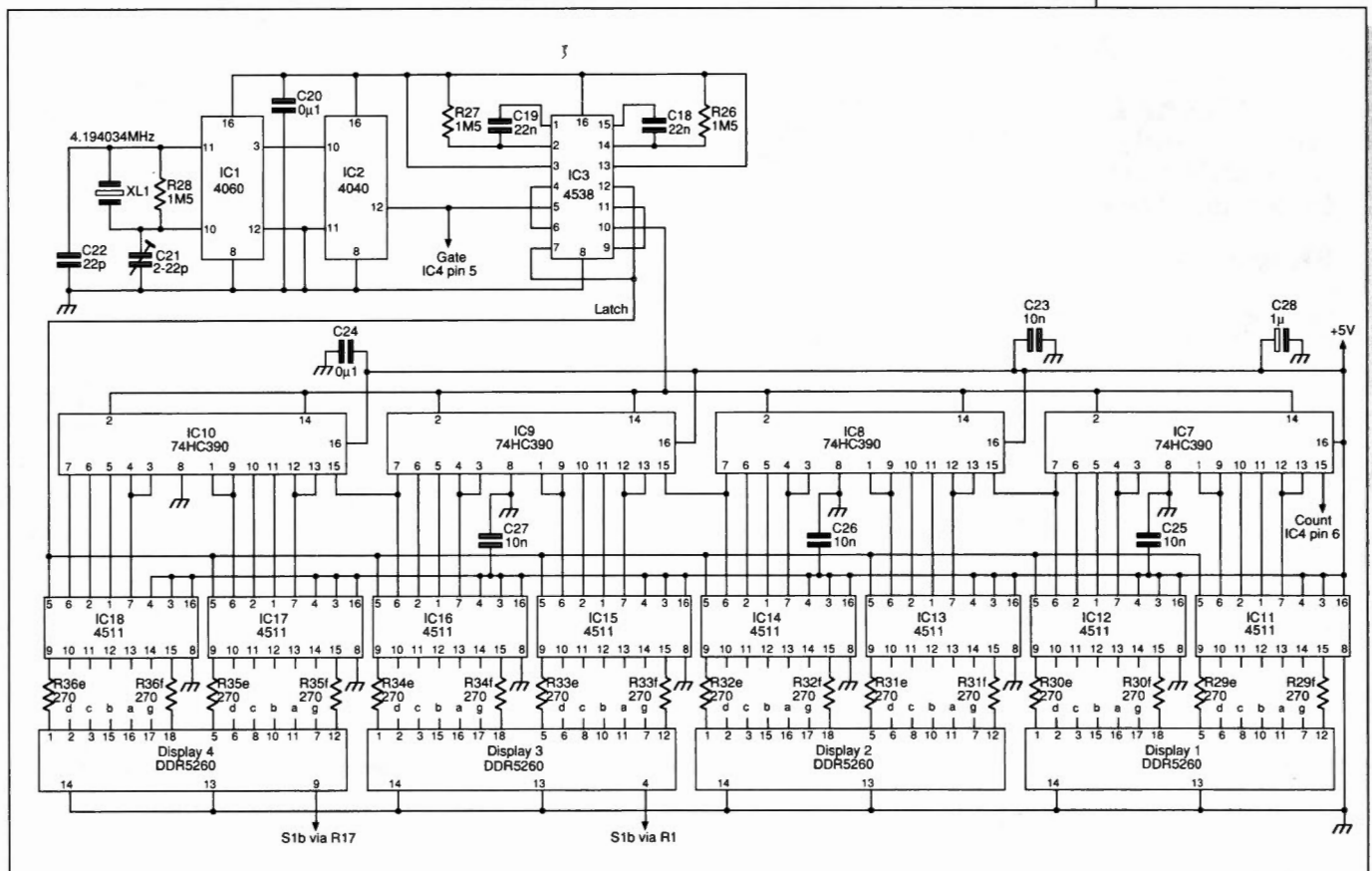
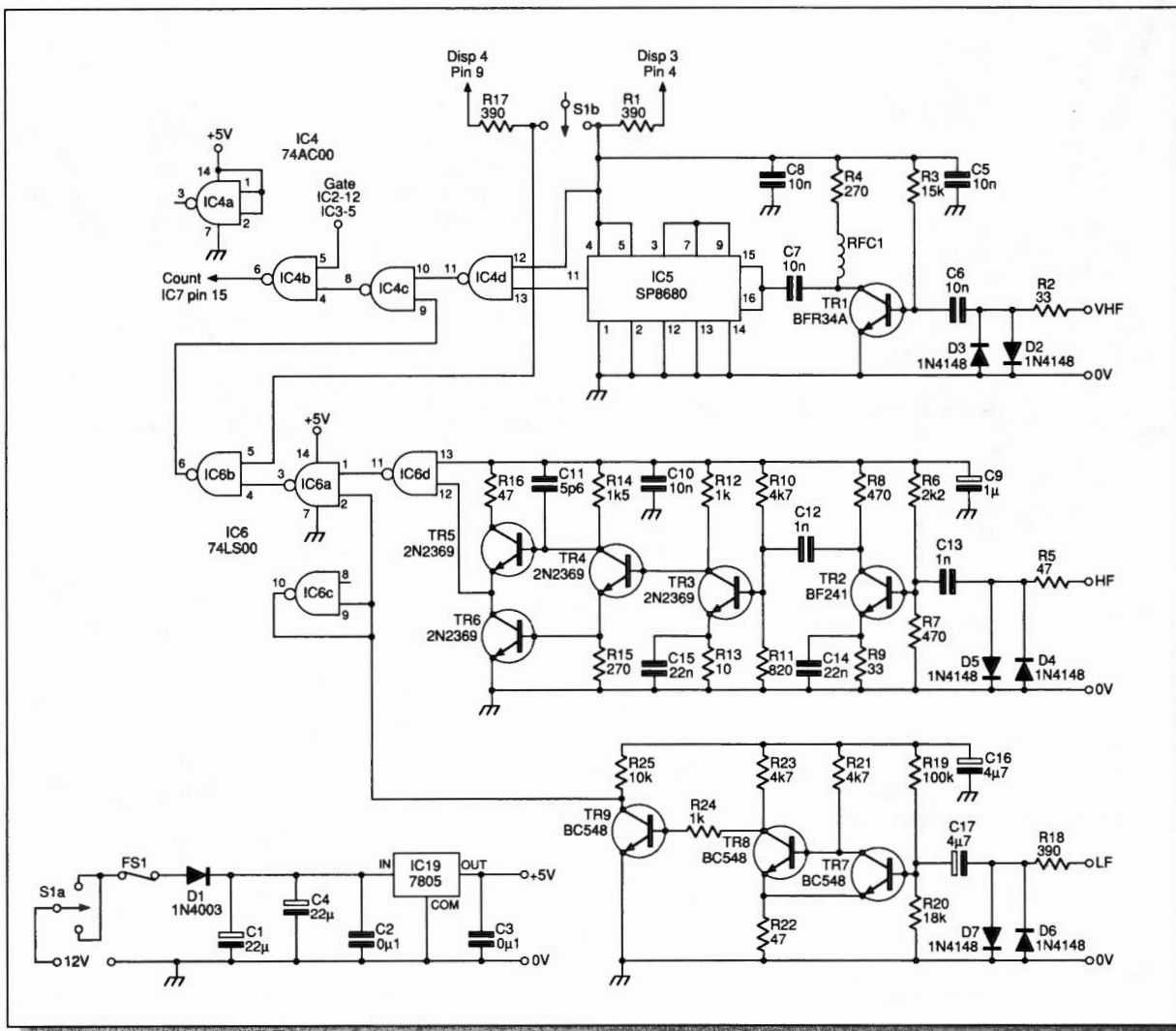


Fig. 1.3:
The
processing
circuits
for the
three
frequency
bands
covered
by the PW
Robin.
Integrated
circuits
IC4 & 6
form the
gate
circuits.



Next month Mike brings the circuits together.

How Much? £50
approximately (+ p.c.b.s)
How Difficult?
Intermediate

Shopping List

Resistors

Carbon Film 5% 0.25W

10Ω	1	R13
33Ω	2	R2, 9
47Ω	3	R5, 16, 22
270Ω	58	R4, 15, R29(a-g), R30(a-g), R31(a-g), R32(a-g), R33(a-g), R34(a-g), R35(a-g), R36(a-g)
390Ω	3	R1, 17, 18
470Ω	2	R7, 8
820Ω	1	R11
1kΩ	2	R12, 24
1.5kΩ	1	R14
2.2kΩ	1	R6
4.7kΩ	3	R10, 21, 23
10kΩ	1	R25
15kΩ	1	R3
18kΩ	1	R20
100kΩ	1	R19
1.5MΩ	3	R26, 27, 28

Capacitors

Disc Ceramic		
5.6pF	1	C11
22pF	1	C22
1nF	2	C12, 13
10nF	9	C5, 6, 7, 8, 10, 23, 25, 26, 27
22nF	4	C14, 15, 18, 19
0.1μF	4	C2, 3, 20, 24

Miniature Axial Electrolytic 16VW

22μF	2	C1, 4,
------	---	--------

Foil Trimmer

2-22pF	1	C21
--------	---	-----

Tantalum Resin Dipped Bead 16VW

1μF	2	C9, 28
4.7μF	2	C16, 17

Semiconductors

1N4003	1	D1
1N4148	6	D2-7
2N2369	4	TR3-6
BC548	3	TR7, 8, 9
BF241	1	TR2
BFR34A	1	TR1

Integrated Circuits

4040	1	IC2
4060	1	IC1
4511	8	IC11-18
4538	1	IC3
74AC00	1	IC4
74HC390	4	IC7-10
74LS00	1	IC6
7805	1	IC19
SP8680	1	IC5
DDR5260	4	Display 1-4 (common cathode dual 7-segment displays)

Miscellaneous.

Crystal 4.194304MHz, miniature coaxial cable, switch s.p.c.o. (Biased centre-off), BNC sockets (3), d.c. single hole input socket (1), Heat resistant sleeving (1mm bore), Case (Maplin 1605), 6mm mounting pillars, nuts, bolts and washers (3mm), red filter for display, Connecting wire, fuse (1.6A) and suitable fuse holder. Printed circuit boards (counter and display) will be available from our PCB services, in time for the construction stage.

RAYCOM

COMMUNICATIONS SYSTEMS LIMITED

Telephone 021-544-6767

RAYCOM AMATEUR RADIO CENTRE

ONE STOP SHOPPING FOR ALL YOUR COMMUNICATIONS NEEDS

International House
963 Wolverhampton Road
Oldbury
West Midlands B69 4RJ

Sales Hotline 021-552 0073
Fax: 021-544 7124
Late night line: 0836 771500 Before 9pm please!
Shop hours Mon-Sat 9am-5.30pm

INTRODUCING RAYCOM SPEEDMAIL

The fastest mail order system in the country. Raycom have always had a very quick response to customer needs and our new SPEEDMAIL service will ensure you get the fastest delivery possible. Our one step shopping policy now takes another step forward in customer care. Simply write to Raycom Speedmail (address above) or phone our sales hotline to place your order. You can quote your credit card number for immediate despatch for NEXT DAY DELIVERY. (Cheques are also welcome but do take a few days to clear).

KENWOOD	ICOM	YAESU
TS950SD £2995	IC781 £4595	FT1000 £POA
TS950S £2295	IC765 £2550	FT990 £1849
TS940S £1995	IC751A £1535	FT747GX £569
TS850S £1325	IC735 £1000	FT757GX2 £969
TS440S £1160	IC726 £1015	FT767GX £1599
TS140S £880	IC725 £779	FT26 NEW £245
TS680S £995	IC2SE £279	FT811 £POA
TS711E £915	IC2SET £299	FT470 £POA
TS790E £1525	IC275E £1090	FT290R2 £429
TM241E £295	ICW2E NEW £395	FT690R2 £429
TM702E £445	IC24ET £385	FT5200 NEW £839
TM731E £675	IC3220E £510	FT736R INC 6M £1359
TH27E £254	IC970E £POA	FT650 £1079
TH77E £395	ICR9000 £POA	FT8800 £649
R2000 £599	ICR7000 £950	FT9600 FROM £499
R5000 £895	ICR72 £659	
HF225 £429	ICR100 £510	
	ICR1 £399	

ASK ABOUT OUR RI
MODIFICATION.

NEW FOR OLD

We are always on the look out for good second hand equipment. If you would like to upgrade to new please give us a call. We have the largest display of used equipment in the Midlands and have a constant stream of customers demanding more! We probably have a customer waiting for your old gear right now! Why not convert your old receiver or handheld or mobile into cash right now? Give us a call and tell us what you have — we need your gear now!

NAVO AMR1000S

Still the highest spec 2m FM set on the market. Made in the UK, ideal for base, mobile and for packet.

New price now only £249

YAESU FRG9600



9600 standard 60-905MHz£469
9600 MkII 60-905MHz£499
9600 MkII pack 60-905MHz£545
9600 MkV 0.2-950MHz£625
9600 MkV pack 0.2-950MHz£699
Standard to MkII upgrade£40
Standard to MkV upgrade£149
MkII to MkV upgrade£129
All packs include PSU and ROYAL 1300 disconel

TEK 2000

A new HF mobile! 25W output on 7, 21 and 28MHz with CW, USB, LSB and FM. Compact size for easy mobile installation and a very cost effective entry onto the HF bands.

Only £299

HUGE RANGE AT RAYCOM

Obviously we sell much more than we can ever hope to advertise. If you would like our complete brochure pack please send us £1. We can then provide all the information you need to help you choose your new HF rig, VHF/UHF handheld or new receiver. If you need more information or would like to arrange a personal demonstration please feel free to visit our showroom or give us a call.



OUT NOW!

SUMMER 1991 CATALOGUE

- 192 pages
- £££'s discount vouchers
- 100s new products
- New range kits
- Over 3000 lines
- Fast same day despatch

Available from most large newsagents or directly from **Cirkit**



£1.70
plus 30p
postage

Cirkit

CIRKIT DISTRIBUTION LTD

Park Lane · Broxbourne · Hertfordshire · EN10 7NQ

Telephone (0992) 444111 · Fax (0992) 464457



SPECIALISTS IN DRESSLER ACTIVE RECEIVE ANTENNAS

NEW ARA 1500

50-1500MHz
Now UPGRADED Sept 90

'N' Type Connection

Gain 11.5dB

Noise 3.0dB

Intercept point
3rd Ord
+ 21dbm

£163.00

Now with fully
tuneable
interface.



EXCITING NEW SHORTWAVE ACTIVE ANTENNA

ARA 60

30kHz to 60MHz up to 100MHz.

Size: 940mm high
64mm diameter

Gain: 11dB

Intercept point 3rd order + 44dbm

£163.00

Also a wide range of masthead pre-amps available for most V.H.F. and U.H.F. frequencies, including scanner pre-amps from £89.

dressler
COMMUNICATIONS LTD.

191 FRANCIS ROAD
LEYTON - E10 6NQ - LONDON

TELEX 8953609 LEXTON G

PHONE 081-558 0854 081-556 1415

FAX 081-558 1298

24hr Hotline ansaphone No: 081-558 0854

OPEN MON - FRI 9AM - 5.30PM

OPEN SAT - 9.30AM - 4.30PM

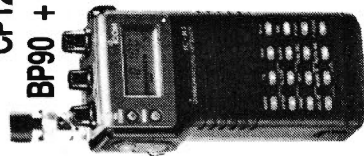
INTEREST FREE HP FACILITIES AVAILABLE
ON MANY ITEMS



Prices correct at time of going to press. Please phone for latest quote.

Or contact your local agent anytime on the following number:
Terry (Biggleswade, Beds.) 0767 316431

ICR1 CP12, HP4
BP90 + 2 CASES
£398



ICR71 ARA60
£875



ICR7000 ARA1500
£1015



ALL INCLUDING THE ABOVE ACCESSORIES

LARGEST U.K. ICOM DEALER

Authorised Kenwood Dealer

KENWOOD

R5000 inc ARA60 ... £925
TS440 inc ATU £1175
TS680 £895
TS850 inc ATU £1395
TH77 £385

YAESU

FT736
FT470
FT767
FT411
FT23

SPECIAL
OFFER
PRICES

LARGEST LONDON YAESU DEALER

NRD

NRD535 only £1015
NRD535 with ARA60 £1115

AOR

AOR1000 Mk 3 £239
AOR8000 £710
AOR2515 £585

STANDARD

C528 AX700
C112 C5608
FEW ONLY
C500 £335

COME AND VISIT OUR TOTALLY REFITTED LONDON SHOWROOM

This month Quaynotes looks in more detail at slow scan TV work on 934MHz, has some information of a possible solution to 27MHz antenna diplexing problems and reports on CB activity in South Africa.

Welcome to YOUR column once again. I'm pleased to see from my mailbag arriving from the office that you've been writing and expressing interest in what we're doing in 'CB High & Low'. Keep it up!

I've no doubt you'll remember that I showed an interest in the 934MHz slow scan TV (SSTV) activities of **Bill Reynolds UK161**, who lives in Kettering Northamptonshire. Following the picture and mention of his activities in the May 'High & Low', a number of other operators wrote and said that they were also interested in Bill's activities.

Well, Bill has come up trumps and sent several photographs in for me to use in the column. Bill's photograph, **Fig. 1**, showing the SSTV set-up is very interesting and he explains how he approaches this fascinating aspect of the radio hobby.

Transceive Program

In his letter, Bill tells us that "I use a Sinclair ZX Spectrum computer with the GIFTU Transceive Program. I've enclosed a print-out of my set-up which I use as a CQ caption".

Although we're not showing the separate print-out Bill sent, it can be seen clearly on-screen in **Fig. 1**. He mentions that the audio output of the Spectrum computer is connected directly to the microphone socket of his 934MHz Cybernet Delta One transceiver, with the incoming signal being taken from the extension speaker.

Unfortunately, the photograph of Bill's extensive antenna system wouldn't reproduce very well. Fortunately Rob Mackie, the *PW* technical artist helped out (you've guessed it - I'm no artist) and produced the excellent diagram of the antenna 'farm' shown in **Fig. 2**.

After help like that from the *PW* office - I'd better not complain about them like I did last month regarding the competition entries!

Another keen 934MHz operator, **Les Jenkins GB37**, has written to me with news of his activities. Les, who lives near Godalming in Surrey was a frequent contributor to Ron Ham's 'Propagation' column in 'Backscatter'.

Holiday Home

Les is fortunate in having a holiday home in Deal, Kent. At this location he has a 12-element loop quad antenna, and a 7-element

collinear antenna. Also operating a Cybernet Delta One, Les also uses a masthead transmit and receive amplifier as the QTH is nearly at sea level with the mast only being 3m a.s.l!

Despite this station being so low down, Les reports that he worked out to Felixstowe, and up to Clacton-on-Sea on April 23. He also reports working to Ashington - that's not so bad if it was the



Ashington in Northumberland (or was it the West Sussex version?). Either way, I'm pleased to welcome you to 'High & Low' Les, and I hope we'll hear from you regularly.

Good Ideas

I'd also like to pass on greetings to **Fred Crease G4WMI**, who took the trouble to try and contact me on the 'phone via the *PW* office. Fred ended up chatting to the editor Rob Mannion G3XFD, to whom he wrote a letter. Rob duly passed the letter on to me, and so I'm very pleased to hear from you Fred, especially as you have come up with some good ideas!

Fred reckons that a number of 'old timers' on 934MHz have gone QRT when their rigs have developed faults or when their antennas have been damaged in storms. Why not, he suggests, publish some simple 934MHz antenna designs that can be built by, or on behalf of, the old timers? Fred has even suggested that he and his friends could possibly help get people back on air in some cases. I thought that this was such a good idea that I talked it over with the editor. The end result, I'm pleased to say, is that a simple replacement 934MHz antenna project is now in the pipeline!

Fred also mentioned the

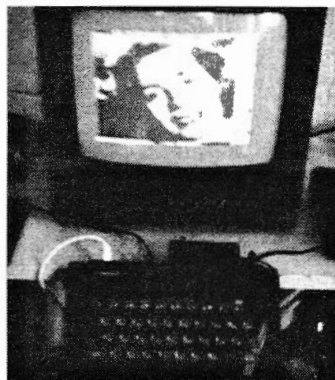


Fig. 1: Bill UK161's SSTV set-up.

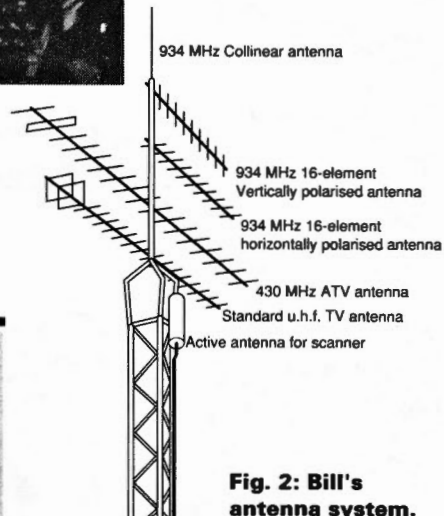


Fig. 2: Bill's antenna system.

27 and 144MHz. He kindly offers to "Dig out the article" for Wyn. I've no doubt others will be interested too Denis (including me), so you can expect other letters to be passed on to you!

It's not often that I get letters from abroad for this page, but I had a pleasant surprise when **Mr D. M. Carmichael** wrote from Bryanston in South Africa to comment on 'High & Low'. Despite the fact that he's so far away, Mr Carmichael is very pleased that *PW* has given CBers "A voice".

He reports that "Unfortunately, CB activity in South Africa is difficult, mainly due to the fact we can't get good equipment". Mr Carmichael (sorry to be so formal, but like so many of you who write, he forgot to include his christian name!) is interested in the CB loop antenna featured in the May competition, so I've sent him some more details. He also says how much he enjoys *PW* and, in particular the 'High & Low' monthly offerings.

Well, I'm pleased to hear that you enjoy the CB page Mr Carmichael, but it only works because you, like the many others who write, take the time and trouble to do so. I hope we'll also hear more about CB activities from other countries, and perhaps you'll send us some photographs and other details of your activities in South Africa very soon.

Well, that's the lot for now, keep writing and working on CB 'High & Low' - it's all part of the radio hobby!

Quaynotes

THE DAYTON HAMVENTION

'91 REPORT



The Dayton HamVention in Ohio USA celebrated its 40th anniversary this year. Rob Mannion G3XFD, went on behalf of PW, made a lot of friends, enjoyed himself immensely and has a lot to tell us!

Despite the fact that I knew how big the Dayton HamVention would be, I was totally unprepared for the event itself when I was there. It was huge! I quickly came to the conclusion that the HamVention is not an event - it's an experience of a lifetime and one that I shall never forget even when I attend future shows.

Everyone in the UK jokes about how big everything in the USA is, whether it be distance, the size of cars, the countryside or the large quantities of food available. Well, it's no joke, the countryside, people and food are wonderful. The show is the hub of all activity, but there's something for everybody and you can be sure that I didn't see everything, as there just wasn't enough time.

Getting The Picture

It's very difficult, but enjoyable to paint a picture of this show in words. However, it's been made easier and part of my job has been done by our ever-cooperative cartoonist John Worthington GW3COI.

John's interpretation in cartoon form of our aircraft taking off from Gatwick and then struggling back, stuffed to the roof with 'goodies' sums it up. It was a good trip indeed, but it's not my job to tell you about those adventures, Roger Hall G4TNT plans to do that next month. I'm going to concentrate on the show and some of the equipment on sale.

Although we were still jet-lagged the morning after arrival, it was another early start for my roommate Don Watson GW3RJY and I. Fortunately, getting to the show was no problem as we had a very comfortable free mini-bus ride straight to the giant Hara Arena, on the outskirts of Dayton. Even the mini-bus was a giant of the species and it was very effectively air-conditioned!

Remote Parking

The first-time visitor begins to get an inkling of the size of the HamVention when the first car parks are passed. Some of them seem a very long way from the

arena itself. In fact, Don and I were glad to be on the bus as it whisked us, in presidential style, straight to the entrance of the show.

Of course, we'd got there early so I could join the other PW team members at our stand. Don soon found himself working on the G-QRP stand, much to his, George Dobbs G3RJY's and other friends delight.

We spent a short while, between the rain showers, looking around the Flea Market. When it comes to the biggest, and most likely attraction for UK visitors, I'll put my reputation on the line and state firmly that it's got to be the outdoor Flea Market.

The outdoor market was stupendous. Although I had seen photographs taken from the air, I was still quite unprepared for its immense size. Even now, after I had attempted to walk round it in three or more sessions, I'm not at all sure that I managed to see everything!

There's so much to see in the outdoor market, that I became dizzy with looking at it all. If you have the money with you, it's even possible to come away from the show with a complete broadcast transmitter. Yes, I even saw one of those for sale. Anyone want a 5kW medium wave transmitter for \$3 000?

Something For Everyone

Despite the huge number of wonderful, bargain-filled stands in the main hall, the Flea Market amazed me. I was quite taken aback when I saw the sheer variety of equipment on offer. I expected to see a great deal of surplus computer gear, plus the inevitable stands of cheap imported electrical and electronic consumer goods from the Far East on sale, as happens at many UK rallies.

Although computer gear and imported products were there, with very reasonable prices I might add, this sort of trading did not dominate the market in any way. In fact, I'll be honest in saying that the only thing that did dominate in the Flea Market were variety and people!

One stand seemed to be surrounded by broadcast receivers from the 1930s and 1940s. Surprisingly, the sets that were all switched on and working, seemed to be tuned to separate stations broadcasting different, but obviously 'dated' programmes.

Fascinated, I stopped and summed up the situation. Listening to each radio was like travelling back in time to the period it represented. The late 1930s front-room style console radio was tuned into the stunningly effective radio drama version of *The War Of The Worlds*, produced by Orson Wells.

Listening to this programme made me realise why America became almost panic-stricken when the programme was first broadcast. Even standing there in a Dayton car park in 1991 it seemed rather frightening! To add to the realism, the mid-1940s radio was reproducing news of the successful D-Day Landings and the cheaper-looking white Bakelite-cased set was obviously tuned into the McCarthy era with a programme on 'Un-American activities'.

The spell was only broken when the stall holder had to rewind a tape, or do some other adjustment on the multi-track (multi-deck even!) system in the van. Despite the fact that he was very busy, he took the trouble to show me the sophisticated, home-built equipment.

The illusion was created by professional recordings of the required period. The recordings were then played on a system capable of broadcasting up to

ten channels on the medium wave band, to radio receivers within 30m of the vehicle. I was spell-bound and fully intend to look him out next year!

Projects And Ideas

I was of course on the look-out for ideas and projects to use in *PW*. I wasn't disappointed! During my look around the show I had noticed that quite a few kit manufacturers were showing their products.

My attention was drawn to the kits made by the American company Ramsey Electronics. These kits, attractively packed and very reasonably priced, seemed to be the most popular. I eventually found that Ramsey Electronics had a stall not so far from the *PW* stand, and very appropriately it was even closer to the G-QRP Club stand.

On my way to the Ramsey Electronics stand, I had to pass a seething mass of radio amateurs gathered around another stall. I needn't have worried, it wasn't a 'bun fight', it was only the G-QRP stand! The stand was very popular, with Dick Pascoe G0BPS and George Dobbs G3RJV coping with a very interested group of North American visitors.

On arrival at the Ramsey Electronics stand, I was very interested to find that their range of kits is very wide and their list is expanding all the time. Especially interesting was their delightful newly-introduced 144MHz fully synthesised f.m. transceiver kit and it only cost around the \$100 mark!

I made the mistake, when I bought the Ramsey Electronics 50MHz f.m. receiver kit for \$29, of not buying a 144MHz version and others to bring home. The mistake was unfortunate, as this price advantage is diminished somewhat by transport, import duty, VAT and other costs by the time they arrive in the UK. Despite that, there is nothing available from UK manufacturers, in the v.h.f. area, to compete with the Ramsey Electronics kits as yet.

The 50MHz f.m. receiver kit arrived home safely in my bag, and I aim to build it as a review feature in *PW* as soon as possible. I was so impressed with the

obvious quality and care taken with the kits and their excellent instruction manuals, that I also intend to use the kits for a school radio club I help run.

New Receiver

There were a lot of products being launched at the show. Among them was the newly-introduced, simple-to-look at, but attractively styled Drake R8 communications receiver. Locally-made in Ohio, this receiver is packed with useful features and presented in a 'no fuss' professional way. I wasn't surprised to find that the appearance of the R8 ensured that the Drake stand was very crowded!

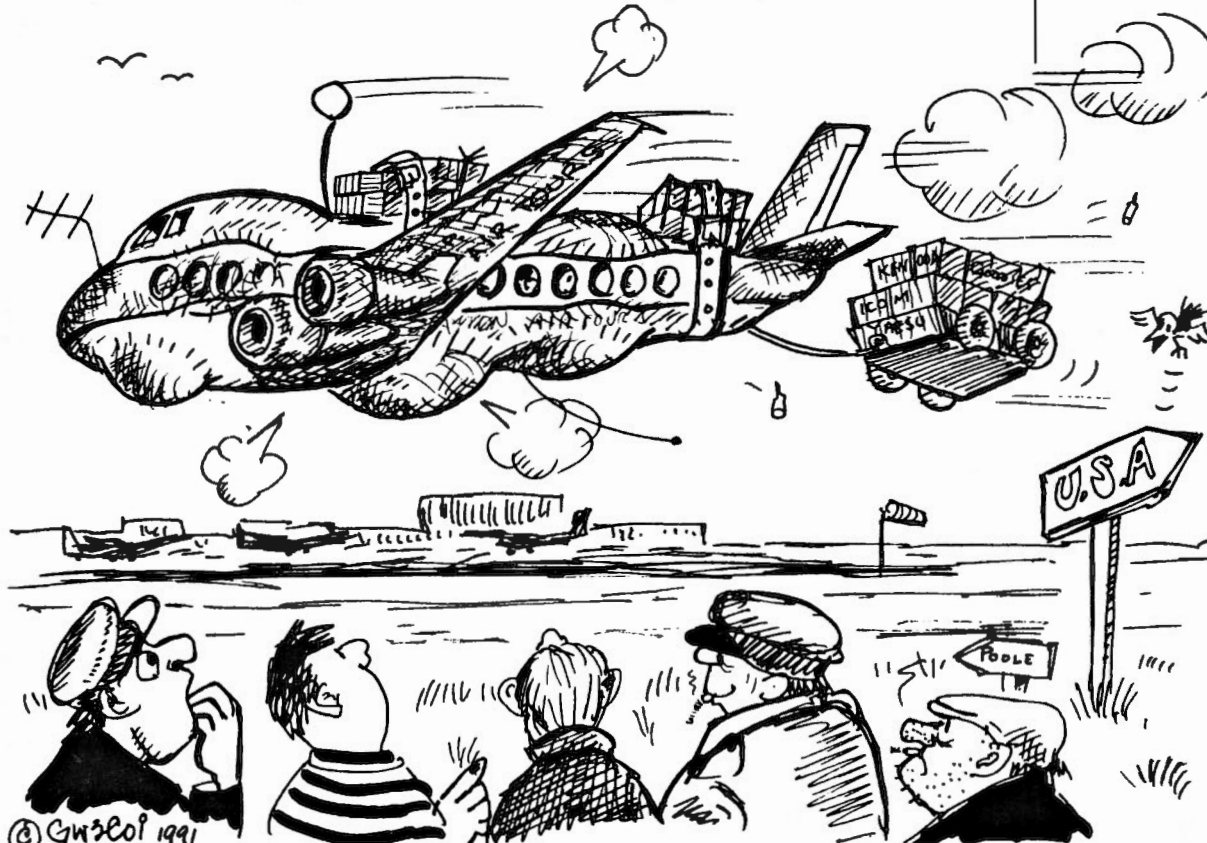
The specification on the receiver is mouthwatering to both licenced radio amateurs and the keen s.w.l. and it's marked up at a very good price. I'm pleased to report that our sister publication *Short Wave Magazine*, intends to review it as soon as one is available. They can't make them fast enough it seems.

Well, I could write a book on my experiences in Dayton, but I'd better save some of the various little incidents for future 'Keylines' hadn't I? However, I'll round off by saying that I came away from Dayton with several good ideas on mobile safety, and with the conviction that we must revive enthusiasm in the UK (and elsewhere of course) for h.f. bands mobile working. The Americans do it so well, and I've several ideas for rather special little h.f. mobile transceivers.

Finally, would you believe that I drove a trolleybus in Dayton? Well, I did, even if it was only for a few yards! Dayton has an extensive pollution-free system and I spent an hour and a half gliding around the city and suburbs for 60¢!

Unfortunately, they may scrap them before next year, but for someone who is very keen on electric traction - that was certainly my 'last day' treat. When the photographs are processed, I'll keep them on my office wall and bore everyone to tears about the day G3XFD went mobile under 'open wire' feeders at 400V d.c. with a p.a. taking 200A or more!

We're looking forward to seeing YOU at Dayton Next year. You've read Rob's account of the trip, and next month Roger Hall G4TNT will explain how you can join the Dayton '92 party. You'll also be able to read what our readers thought about the trip and the adventures we had on the way!



KW COMMUNICATIONS LTD

CHATHAM ROAD, SANDLING, MAIDSTONE ME14 3AY

Tel: 0622-692773, 762274 Fax: 0622-764614 Tlx: 965834

All prices subject to change

SCANNERS & RECEIVERS

Item	Description	Price incl. VAT	P/P
AR900K	6 band hand held scanning RX	£235.00	
AR1000	Scanning RX 8-1300MHz	£249.00	
MT900	Scanner RX 25-1300MHz hand held	£238.00	
MT6000	Scanner RX 25-13MHz Base/Mobile	£345.00	
R100	Wideband RX	£499.00	
R700	Wideband RX	£989.00	
FRG9600(M)	60-950MHz	£499.00	
R535	Airband VHF & UHF	£249.00	
WIN108	Handheld Airband 108-136MHz	£175.00	
R2000	General Coverage HF Receiver	£595.00	
R5000	General Coverage HF Receiver	£875.00	
HF225	General Coverage HF Receiver	£425.00	
R 1	Hand portable Receiver	£399.00	
R 71	General Coverage HF Receiver	£855.00	
FRG 8800	General Coverage HF Receiver	£649.00	

BUTTERNUT (U.S.A.)

Item	Description	Price incl. VAT	P/P
HFVBX	6 Band Vertical	£179.00	
HFV2	80/40m Vertical	£142.00	£4.00
A1824	18 & 24MHz Add on Kit	£38.85	
MPS 11	HF6V Radial Kit	£33.50	£3.00
STR	Mounting Post HF6 & HF2	£8.00	£2.00
20MRK	HF2V 20m Add on Kit	£33.50	£2.00
30MRK	Cushcraft 30m Add on Kit	£228.91	£8.00
TBR160S	160m Add on Kit for HF6 & HF2	£64.48	£3.00
2MCV	3dB 2m Colinear	£53.99	£3.00
2MCVS	5dB 2m Colinear	£63.99	£3.00
HF5B	5 Band Mini Beam	£234.15	-

CUSHCRAFT (U.S.A.)

Item	Description	Price incl. VAT	P/P
124WB	Cushcraft 124WB VHF Beam Anten	£37.08	£4.00
153CD	Cushcraft 15-3CD 3E1 25m Beam	£140.00	
154CD	Cushcraft 15-4CD 4E1 15m Beam	£148.29	£8.00
203CD	Cushcraft 20-3CD 3E1 20m Beam	£238.91	-
204CD	Cushcraft 20-4CD 4E1 20m Beam	£328.70	-
215WB	Cushcraft 15E1 2m Yagi Antenna	£98.90	£8.00
4218XL	18 Element 2m Boomer	£121.90	£8.00
A3SS	Cushcraft 3 Ele Tribander SS	£324.02	-
A4S	Cushcraft 4 Ele Beam Antenna	£391.95	-
A50-B	Cushcraft 6m 6 Ele Beam Antenna	£182.51	£8.00
AP8	8 Band Vertical	£164.76	£8.00
ARX2B	Cushcraft VHF Vertical Antenna	£45.59	£3.00
ARX450B	Cushcraft VHF Beam	£42.84	£3.00
AV3	Cushcraft AV3 Trapped Vert Ant	£75.00	£8.00
AV5	Cushcraft AV5 Trapped Vert Ant	£151.80	£8.00
DW3	Cushcraft 10, 15 & 20m Dipole	£138.67	£4.00
D3W	Cushcraft 10, 12 & 17m Dipole	£138.67	£4.00
LAC1	Cushcraft Lightning Arrestor	£6.58	£1.00
LAC2	Cushcraft Lightning Arrestor	£6.58	£1.00
LAC4H	Cushcraft Lightning Arrestor	£22.78	£1.00
R45K	R4 to R5 Conversion Kit	£35.01	£4.00
R5	Cushcraft 1/2 Wave Vert 10-20m	£258.91	-
TEN3	3 Element Monobander	£115.03	£4.00

MFJ (U.S.A.)

Item	Description	Price incl. VAT	P/P
MFJ1274	Packet Radio Terminal	£204.25	£3.00
MFJ1278	Multi Mode Data Controller	£228.49	£3.00
MFJ1701	6-way Antenna Switch	£39.30	£2.00
MFJ1704	4 Position Ant Switch	£66.41	£2.50
MFJ202B	RF Noise Bridge	£63.20	£2.00
MFJ204B	Antenna Noise Bridge	£84.31	£2.00
MFJ280	300W Dummy Load	£32.57	£2.00
MFJ401B	Econo Keyer Kit	£59.21	£3.00
MFJ407B	Electronic Keyer	£78.73	£3.00
MFJ422B	Electronic Morse Key Bench	£146.25	£3.00
MFJ422BX	Electronic Morse Keyer W/O Bench	£78.46	£3.00
MFJ484C	Grandmaster Memory Keyer	£162.32	£3.00
MFJ722	CW/SSB Filter	£76.46	£2.50
MFJ723	CW Filter	£48.54	£2.50
MFJ752C	Tunable Filter	£104.42	£3.00
MFJ815	SWR Meter 2kW	£78.74	£2.50
MFJ840	2m Wattmeter	£21.02	£2.00
MFJ841	2m In-line Wattmeter	£42.14	£2.00
MFJ901B	200 Watt ATU	£70.05	£2.50
MFJ931	Artificial Ground	£86.61	£3.50
MFJ941D	300 Watt Basic Tuner	£105.40	£3.50
MFJ945C	Versa Tuner 11 Mobile	£97.37	£3.50
MFJ949D	De Luxe 300W ATU	£168.82	£3.50
MFJ962B/C	1.5kW ATU	£258.84	-
MFJ986	1.5kW Roller Inductor Tuner	£279.62	-

LOADS & SWITCHES

Item	Description	Price incl. VAT	P/P
T35	Toyo 30W 1-500MHz Dummy Load	£10.20	£2.00
T100	Toyo 100W 1-500MHz Dummy Load	£45.00	£2.00
T200	Toyo 200W 1-500MHz Dummy Load	£84.00	£2.00
DL1	Texpro 1.5kW 160-10M Dummy Load	£75.00	£2.00
KS 2	Koyo Coaxial switch 2 way 1.0kW	£28.89	£2.00
S20N	Koyo Coaxial Switch 2 way 1.0kW 1-1000MHz N	£32.86	£2.00
SA 450M	Toyo Coaxial Switch 2 way 2.5kW 1-1500MHz SO239	£18.50	£2.00
SA 450N	Toyo Coaxial Switch 2 way 2.5kW 1-1500MHz N	£28.00	£2.00
DRAE UHF	UHF 3 position Antenna Switch N	£24.15	£2.50
DRAE VHF	VHF 3 position Antenna Switch SO239	£18.69	£2.50

VSWR/POWER METERS

Item	Description	Price incl. VAT	P/P
W160	Koyo 15/60W 2m In-Line VSWR	£32.91	£2.00
W544	Koyo 7/40/400W 140-460MHz	£107.00	£2.00
W560M	Koyo 3/20/200 1.8-520MHz	£99.90	£2.00
W570	Koyo 5/20/200 1.8-1300MHz	£124.75	£2.00
K 20	Koyo 15/50W 2m	£24.60	£2.00
K 100	Koyo 2KW 1.8-60MHz	£79.98	£2.00
K 200	Koyo 200W 1.8-60MHz	£61.55	£2.00
K 400	Koyo 200W 140-525MHz	£63.65	£2.00
YM 1E	Koyo 120W 3.5-1500MHz	£32.00	£2.00
T 435	Toyo 200W 2m & 70cm VSWR/Wattmeter	£67.77	£2.00

WIDE BAND ANTENNAS

Item	Description	Price incl. VAT	P/P
AH 7000	Discone 25-1300MHz	£82.50	£4.00
YADC 2	Discone 14-1300MHz	£78.00	£4.00
DSC 8	Discone TX/RX 70-880MHz	£25.95	£4.00
SC3000	Discone 300-512MHz	£63.99	£4.00

ICOM

Item	Description	Price incl. VAT	P/P
IC-751A	HF All Band, General Coverage Rx 12V	£1500.00	-
IC-735	HF All Band, General Coverage Rx 12V	£979.00	-
IC-726	HF All Band, General Coverage Rx + 8m	£969.00	-
IC-725	HF All Band, General Coverage Rx 12V	£759.00	-
IC-505	6M Transceiver, SSB/CW 12V	£529.00	-
IC-2SE	2M FM Handportable with Nicad/charger	£275.00	-
IC-2SET	2M FM Handportable Keypad entry DTMF	£295.00	-
IC-2GE	2M FM Handportable with Nicad/charger	£265.00	-
IC-228E	2M FM Mobile 25W 20 Memo 12V	£385.00	-
IC-228H	2M FM Mobile 45W 20 Memo 12V	£385.00	-
IC-290D	2M SSB/FM/CW 25W 5 Memo 12V	£559.00	-
IC-275H	2M Transceiver SSB/FM/CW 100W 12V	£1,039.00	-
IC-4SE	70CM FM Handportable inc Nicad/charger	£310.00	-
IC-4SE	70CM FM Handportable Keypad entry DTMF	£310.00	-
IC-4GE	70CM FM Handportable inc Nicad/charger	£299.00	-
IC-R100	Wideband Receiver	£499.00	-
IC-AT150	Automatic Antenna Tuner 100W	£329.00	-
IC-AT500	Automatic Antenna Tuner 500W	£529.00	-

KENWOOD

Item	Description	Price incl. VAT	P/P
TS950SD	NEW Transceiver	£3,199.00	-
TS940S	9 Band TX General Cover Rx	£1,995.00	-
A1940	Auto/ATU	£244.88	-
TS140	HF 9 Band Gen. Cov. TX/Rx	£862.00	-
TS680S	HF/6m TX Gen. Cov. Rx	£985.00	-
TS440	9 Band TX General Cov. Rx	£1,138.81	-
PS50	H/Duty PSU	£222.49	-
AT230	All Band ATU/Power Meter	£208.67	-
TH25	NEW 2m H/Held	£238.00	-
TH45	NEW 70cm H/Held	£268.00	-
TH75	NEW 2m/70cm H/Held	£398.00	-
TH205	2m H/H	£215.26	-
TH215	2m H/H Keyboard	£252.13	-
TR751	2m 25W M/M Mobile	£599.00	-
TM701	NEW 2m/70cm FM Mobile	£469.00	-
TM721	2m/70cm FM Mobile	£675.00	-
TM231E	NEW 2m FM Mobile 50/10/5W	£289.00	-
TM431E	NEW 70cm FM Mobile 35/10/5W	£318.00	-

TEN TEC (U.S.A.)

Item	Description	Price incl. VAT	P/P
TT 562	Omni V HF Transceiver CW/SSB/FM 200 9 bands	£1,900.18	-
TT 585	Paragon General Coverage HF Transceiver 200W	£1,839.00	-
TT 961	Power Supply for Omni, Paragon	£215.00	-
TT 282	6.3MHz 250Hz Filter	£60.00	£2.00
TT 285	6.3MHz 500Hz Filter	£60.00	£2.00
TT 288	6.3MHz 1800Hz Filter	£60.00	£2.00
TT 1140	Circuit Breaker	£16.00	£2.00
TT 217	9.0MHz 500Hz Filter	£60.00	£2.00
TT 218	9.0MHz 1800Hz Filter	£60.00	£2.00
TT 219	9.0MHz 250Hz Filter	£60.00	£2.00
TT 256	FM Transceiver Module for Omni & Paragon	£60.49	£2.50
TT 220	9.0MHz 2.4KHz Filter	£60.00	£2.00
TT 425E	Titan Linear 1.5kW 160-10m	£2,171.00	-
TT 420	Hercules II 500W Solid State 160-10m	£839.00	-
TT 9420	Hercules II Power Supply 100A 13.8V	£660.00	-
TT 700C	Ten Tec Electret Hand Microphone	£32.00	£2.00
TT 705	Ten Tec Electret Desk Microphone	£65.00	£2.00
TT 238	Ten Tec ATU 2.0kW L match 160m-10m	£361.69	-
TT 254	Ten Tec ATU 200W T match 160m-10m	£153.33	£3.50

YAESU

Item	Description	Price incl. VAT	P/P
FT1000	HP Transceiver	£2,995.00	-
FT767	HF Transceiver	£1,599.00	-
FT747GX	Budget HF Transceiver	£659.00	-
FT757GX	Mk II HF Transceiver	£969.00	-
FP700	20A P.S.U.	£219.00	-
FC700	Manual ATU	£149.00	£3.00
FT757HD	Heavy Duty 2m P.S.U.	£258.75	-
FT4700	New 2m/70cm Dual Band FM Mobile	£675.00	-
FT290	Mk II Super 290 2m Multimode 2.5W	£429.00	-
FT690	Mk II 6m M/Mode 2.5W	£399.00	-
FT411	New 2m H/H Keyboard	£225.00	-
FT811	New 70cm H/H Keyboard	£238.00	-
FT470	New 2m/70cm Dual Band H/H	£389.00	-
FT23R	2m Mini H/H	£209.00	-
FT73R	70cm Mini H/H	£229.00	-
FN89	Nicad Battery Pack (23/73)	£34.50	£2.00
FN810	Nicad Battery Pack (23/73)	£34.50	£2.00
FT736	2/70cm 25W Base Station	£1,359.00	-

ROTATORS

Item	Description	Price incl. VAT	P/P
AR40	Hy Gain for up to 3 sq. ft. wind load	£168.67	£4.00
AK4511	Hy Gain for up to 8.5 sq. ft. wind load	£238.00	-
HA4W	Hy Gain for up to 15 sq. ft. wind load	£325.80	-
T2X	Hy Gain for up to 20 sq. ft. wind load	£399.00	-
2303	Sky King Light Duty Rotator	£39.89	£4.50
G400RC	Yaesu Round 360° metre	£169.00	£5.00
G800RC	Yaesu Round 360°	£219.00	£5.00
AR200XL	Offset lead unit, 3 wire, rotary dial control	£49.50	£4.00
G250	Yaesu twist and switch control	£78.00	-
K5050	Kenpro Stay Bearing	£19.95	£4.00
GC038	Yaesu Rotator lower mast clamp	£16.95	£4.00

If you don't see it please ask — we have over 1000 items in stock. We are located just off the Eastern side of the A229 between Junction 3, M2 and Junction 6, M20. Follow the signs to SANDLING.



Instant credit available
Mail/Telephone order by cheque or Credit Card
(E&OE)



OPEN TUES. SAT. 9.30-5.30
(CLOSED MONDAYS)

STOCK ITEMS USUALLY
DESPATCHED WITHIN 24 HRS.

DELIVERY/INSURANCE PRICES
MAINLAND ONLY

The use of the printed circuit board (a prepared p.c.b. is available from the *PW* services) simplifies construction of the project. You should start this operation by inserting the 12 Veropins into the board from the copper track side.

After checking that the heads of the pins are correctly located snugly against the tracks, you can apply the solder. The next stage is to prepare the components for placing on the p.c.b.

Referring to the component overlay, **Fig. 1.2**, fit the socket for IC1 to the p.c.b, **Fig. 1.3**, where shown, and solder. Observing the polarity of the transistors, the diode D1 and the electrolytic capacitors C1 and C6, fit and solder the components to the board. Set the adjuster of R6 to mid position.

Boxing Up

Referring to the photo next to **Fig. 3**, you can now drill two holes in the lid of the box. One hole is 16mm in diameter. If a drill bit of this size is not available, drill the largest size hole that is available and file to size, taking care not to mark the exterior of the lid. Cut a circular piece of material about 25mm in diameter out of an old pair of ladies tights (don't forget to **ASK** the YL or XYL!).

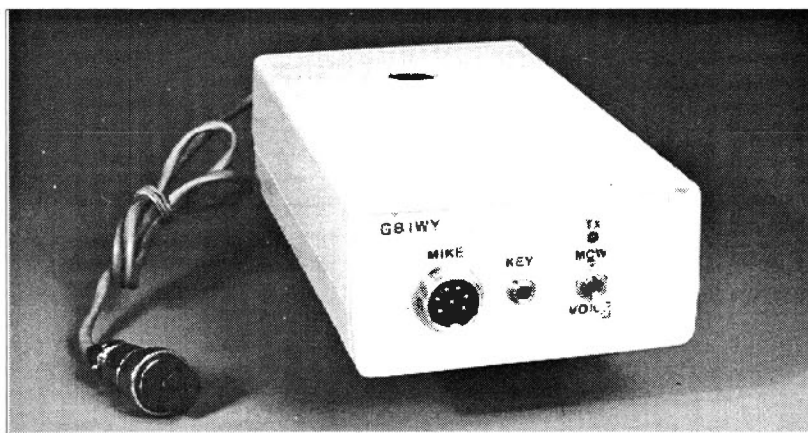
Using epoxy resin adhesive, glue to the inside of the lid over this hole, stretching the material from the tights (you did ask didn't you?) to remove any creases and wrinkles

Another Hole

Noting that there is another 16mm hole, drill the front panel described above, taking particular care not to bend the panel or to scratch the anodising. Thoroughly de-burr the holes on both sides and degrease the panel using hot soapy water. After rinsing thoroughly, allow the panel to dry.

Using 2.5mm and 3mm rub-on lettering, you can now apply suitable lettering to the front panel. Once the lettering is fixed, you can brush on three coats of clear varnish to protect the anodising and lettering from abrasion. Allow the varnish to harden for 48 hours before fitting the components to the front panel.

Using four small self-tapping screws, secure the



The PW Morse-Master

Part 2

This month Steve Farrow G81WY describes the final wiring, setting up and boxing the Morse-Master project ready for use.

p.c.b. to the moulded-in p.c.b. mounts in the lid of the box. Fit the switch and the sockets for the microphone and the Morse key to the front panel.

Using equipment wire, connect the switch and sockets to pins 5 to 12 of the p.c.b. as shown in the view of the box wiring photograph, and the circuit diagram, **Fig. 1.3**. Shorten the leads of the TX l.e.d. and solder short lengths of the equipment wire to the leads. Insulate the joints with short lengths of sleeving.

The next stage is connecting the anode of the l.e.d. to pin 10 of the p.c.b. and the cathode to terminal 'C' of the switch. Push the l.e.d. through the hole in the front panel.

Next, connect the piezo transducer to pins 1 and 2 of the p.c.b. Wire the built-in battery compartment in the base of the box to the negative and positive terminals of the switch.

Then fit the grommet into the hole in the rear of the lid and feed a length of twin screened cable through

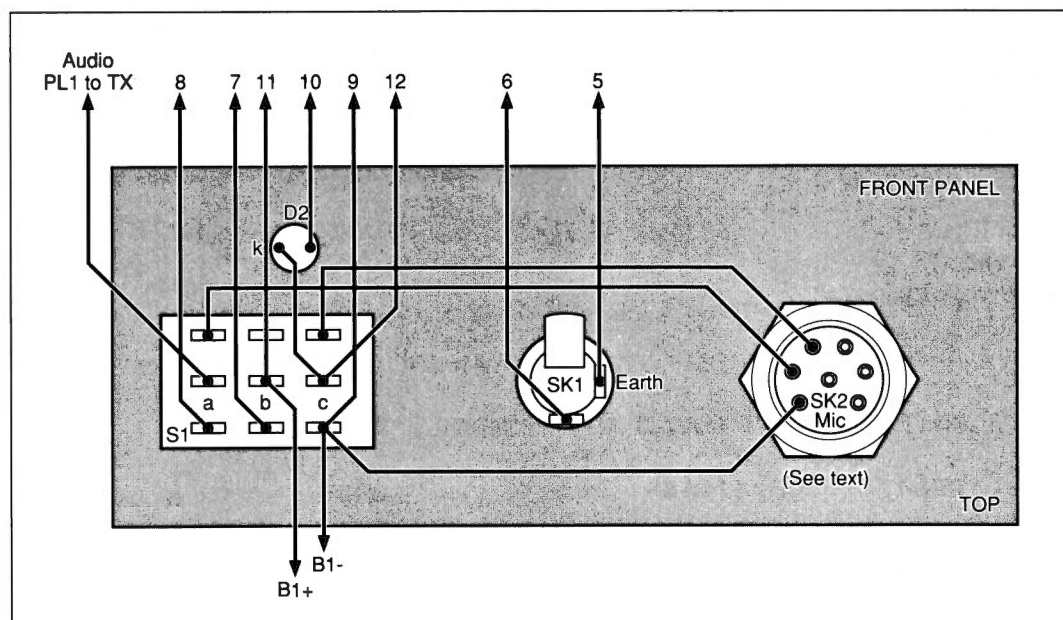


Fig. 2.1: The Morse-Master front panel wiring, switching and control lay-out diagram.

the grommet. Terminate one core of the cable at one end of the terminal 'D' of the switch and the other end to pin 2 of the plug that connects to the transceiver plug.

Tidy Up

Tidy the wiring and lace into a cableform inside the box. You can refer to the photograph in Part 1 to help your lay-out. The diagram, Fig. 2.1 in this part, shows the wiring diagram for the front panel, plug, sockets and switching.

Fit the cable tie tightly onto the cable connected to the transceiver. This should be done inside the box adjacent to the grommet, to strain relieve the connections to the p.c.b. Then fit four stick-on feet to the base of the box.

Take care when you insert IC1 into its socket. The device is static sensitive and to prevent damage, an earthed wristband should be worn or you should place the i.c. while standing on an earthed metal tray!

Final Testing

Check the board and wiring for faults. Insert four AA size batteries into the battery compartment and switch the unit to MCW, it is shown as this in Fig. 1.1. Check that the TX l.e.d illuminates and measure the battery current, which should be approximately 5mA.

Plug in a Morse key, check that the tones are heard from the piezo transducer and that the battery

current rises to about 10mA when the key is down.

Next, you should switch the unit to 'voice' and plug a microphone into the unit. Check that the TX l.e.d illuminates when the p.t.t. button of the microphone is depressed, and that the l.e.d. is extinguished when the button is released.

The battery current (about 5mA) is only drawn when the l.e.d is illuminated. Connect the unit to the transceiver and with the help of a friend, adjust potentiometer R6 'on air' to set the level of the tone output.

Using Morse-Master

Using the Morse-Master on air couldn't be simpler! You should connect into the transceiver in place of the microphone. Plug the key and the microphone into the Morse-Master. To speak, all you have to do, is set the switch to 'voice', press the p.t.t. on the microphone and start your 'speech'!

To send a Morse signal, set the switch to MCW and start transmitting. At the end of the Morse 'over', you simply return the switch on the Morse-Master to 'voice' to place your transceiver ready to receive.

There's no excuse for you not to practice now, and I'll look forward to working you on 144MHz c.w. soon!

PW

DEWSBURY ELECTRONICS

Professional-grade, high performance data communications decoder/analyser, yet easy to use and at an affordable price:

- ★ Decodes Morse code, standard baudot, bit-inversion, arq, fec, ASCII, packet radio and variable speed baudot and ASCII.
- ★ For professional users, 14 additional commercial data communications modes (on supplementary eeproms) are available.
- ★ Measures baud rates with high accuracy and makes synchronous and asynchronous bit analysis.
- ★ LED-bar indication for tuning.
- ★ Hard-and software additions and upgrade capabilities.
- ★ Built-in f7-b (f6) decoder.
- ★ Universal microprocessor video card (24 lines x 80 characters or 18 lines x 40 characters).
- ★ Extensive rfi-filtering on all lines.
- ★ 5 int. language sets, including Cyrillic and Greek.
- ★ RS-232c/v. 24 serial port, Centronics parallel port.
- ★ Optimal customer's support due to in-home r+d and 1 year warranty.

PRICES FROM £996.80 inc. VAT.

For details of this and other decoders please send an s.a.e.

wavecom W 4010



**NOW AVAILABLE
VERSION 5**

Stockists of DIAWA - VIBROPLEX - ICOM - YAESU - KENWOOD - JRC - WAVECOM

**DEWSBURY ELECTRONICS, 176 LOWER HIGH STREET, STOURBRIDGE,
WEST MIDLANDS DY8 1TG**

Tel: (0384) 390063/371228 Fax: (0384) 371228

Instant finance available subject to status. Written details on request.



NEVADA...

.... IF IT'S RADIO WE'LL KEEP YOU POSTED

Yes, after 21 years in the business, we carry just about everything for the Radio Enthusiast. Send in £2 now for our new 1991 colour catalogue and see for yourself.

Scanning Receivers

AR 3000 BASE/MOBILE

Superior wide coverage 100kHz - 2036MHz
ALL MODE NOT GAPS! 400 memories £765.00

Icom R1 The world's smallest scanner. 150kHz - 1300MHz.
100 Mem. AM/FM & WFM modes. Full range of accessories
in stock £369.00

NEVADA MS 1000. The world's first mobile 1000 channel scanner.
Modes AM-FM-WFM. Specs similar to HP200 - additional AF Scan
facility & remote cassette option £279.00

FAIRMATE HP200E. The Ultimate Handheld - 500kHz - 600MHz
& 805MHz - 1300MHz AM/FM & Wide FM. Complete with
accessories £269.00

Shortwave Receivers

LOWE HF225 30kHz - 30MHz - FM filters (optional) £425.00

ICOM R7000 25MHz-2GHz - all mode operation with 99 user
programmable memories £ PHONE

SONY RADIOS We are the main shortwave stockist.

ICF-2001D Portable s/w receiver with civilian airband. Built-in timer
- 30 memories £299.00

ICF-7600 The new pocket s/wave RX with SSB - the ideal travel
companion £ PHONE

Trading Post

Prices just seem to go up and up these days that's why a lot of us are tending to look a little closer to the used and secondhand market. Here is just a small selection of our's.

FRDX400 Rx.....	£245	YAESU FT290 m/m.....	£345
TS430S HF.....	£625	FR9600 boxed.....	£375
FT7B c/w Top band.....	£345	TS930S c/w auto atu.....	£1095
ATLAS 210 & v/o rare.....	£385	FRG7700 v.g.c. RELIABLE.....	£425
CTE CT1600 H/H clean.....	£95	SONY 2001 Portable rx.....	£190

Latest Standard Twin Band mobile. 4 months old, boxed £525

Please check availability prior to ordering - don't forget we also take part exchange - phone for details

Kenwood & Icom Amateur Radio

As mainstream dealers for all of **Icom & Kenwood** Amateur Radio products, we carry a good cross selection of their popular models. Now available from **Kenwood** is their new exciting **TS850SD H.F. Transceiver**, w/without, ATU, Gen. Cov. Receive plus many more features.

Shortly available from **ICOM** is their new **W2 Twin band H/held**. Demand will be great so phone now to reserve yours ...!

★ LOOKING FOR A GOOD PIX OR SPECIAL CASH DEAL ON ANY OF OUR RANGE ★

★ - CALL PAUL ON OUR 'HOT LINE' FOR AN INSTANT QUOTE ★

This is only a small selection - many more models in stock.

Service and Repair

Due to today's spiralling economy and ever increasing prices our hobby is in danger of becoming a 'rich man's' pastime. If you are like me and hang on to your equipment the need for good servicing and repair becomes apparent. Recognising this need we have completely reorganised and expanded our already efficient Service Department ... If your old faithful FT101 needs a 'tweak' or you find yourself losing that elusive 2mtr. DX due to a poor and tired receiver ... then let our service department give your gear a well earned 'M.O.T.' Take advantage of cheap telephone rates and call us in the afternoon for an instant service quote - our rates are always extremely competitive ... and the work is guaranteed ...!

Trading Post

FT290 II Boxed. Mutek FE....	£385	SX200 B/Scanner am/fm.....	£125
Realistic Pro 32 h/h.....	£130	Kenpro 2mtr. Mobile, 25W....	£195
Bearcat DX1000 s/w rx.....	£275	Bearcat 200XLT & S/Pack.....	£185
FDK 25 watt 2mtr mobile.....	£175	FT221 2mtr. s.o.b.....	£375
Realistic Pro 34 h/held.....	£155	Yaesu d/band FT2700, boxed.....	£375

If you are looking for a particular radio, phone us with the details ... we will phone you when one becomes available. Our stock is forever changing. It pays to keep in touch!

Kenpro Radio

We are now the UK sole distributor of Kenpro. The first in a long established line is the:

KT22EE 2MTR HANDHELD Thumbwheel operated this is an ideal 1st radio - more new models to follow £139.00

NEW BS25 MKII DOCKING BOOSTER Boost the output of your 2mtr handheld to 25W. Suitable for: ICOM, Kenpro, CTE, and BS23 for some Yaesu handhelds £69.95

WANTED FOR CASH - all makes of Amateur Radio, CB Radio, Shortwave and Scanning Receivers to add to our already huge stocks of s/hand fully guaranteed equipment. Just call Paul Martin on 0705-662145 for an instant quote.

New Scanning Receivers

We are the UK distributors for the Yupiteru range of sensitive scanning receivers. Here are some of the latest models we carry in stock:

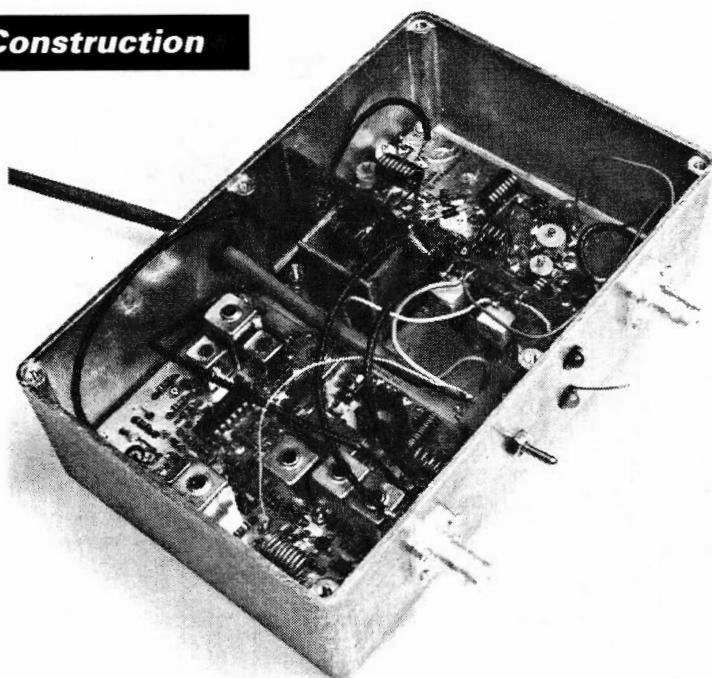
MVT-7000 H/held. The Very Latest model! Super Wide Band Coverage (100Kcs-1300MHz) 200 memories, c/w all accessories £289.00

MVT-5000 H/held (25-550MHz, 800-1300MHz), 100 memories, c/w all accessories. Now with free PSU101! £249.00

MVT-6000 Base/mobile version of the MVT-5000 h/held supplied with all accessories and AC adaptor. £279.00

★★ Phone now for details of our Special Offers ★★

NEED AN ITEM IN A HURRY - WE SHIP ANYWHERE FAST!
CALL US NOW! ON 0705 662145 OR FAX US ON 0705 690626
Nevada Communications, 189 London Road, Portsmouth PO2 9AE



The PW Meon-4

(Part three)

In the final part of the PW Meon-4 project, Andrew Talbot G4JNT, describes the switching circuits so you can get busy on 70MHz.

Errors & Updates

In part one of this project, on page 25 of the May '91 issue of PW, there were two small errors in the parts list. There were only three 68Ω and five 100Ω resistors required. The lists of component names were in both cases correct. Our thanks to those who brought it to our attention.

The necessary change-over between transmit and receive is achieved by switching the supply rails to the various sections of the circuit. The circuit diagram in Fig. 3.1 shows this change-over switching. The attenuator, made up of R204-208, reduces the 145MHz transmission down to 1mW. This level is more suitable for the input of IC1 of Fig. 3(± PW Meon-4, part 1 in May).

The attenuator is made with standard value components, and does work even if not numerically correct. The prototype was designed to compliment a 144MHz portable transceiver of some 2-3W of r.f. output. If you intend using it with a transceiver of differing output power, changes (±) will have to be made to the attenuator.

As shown, +12V is directed to the receive converter and the 145MHz out from this circuit is routed to the transceiver. Diodes D210 and 202 rectify the small amount of 145MHz sensed by C202. This rectified signal is filtered, before being fed to the base of TR201. This transistor switches the two relays RL201 and 202 from the receive to the transmit state. As the relays operate, the l.e.d. D206 illuminates, showing that +12V is being passed to the transmit converter and the p.a. circuitry. The 145MHz from the transceiver is transverted to 70MHz and transmitted.

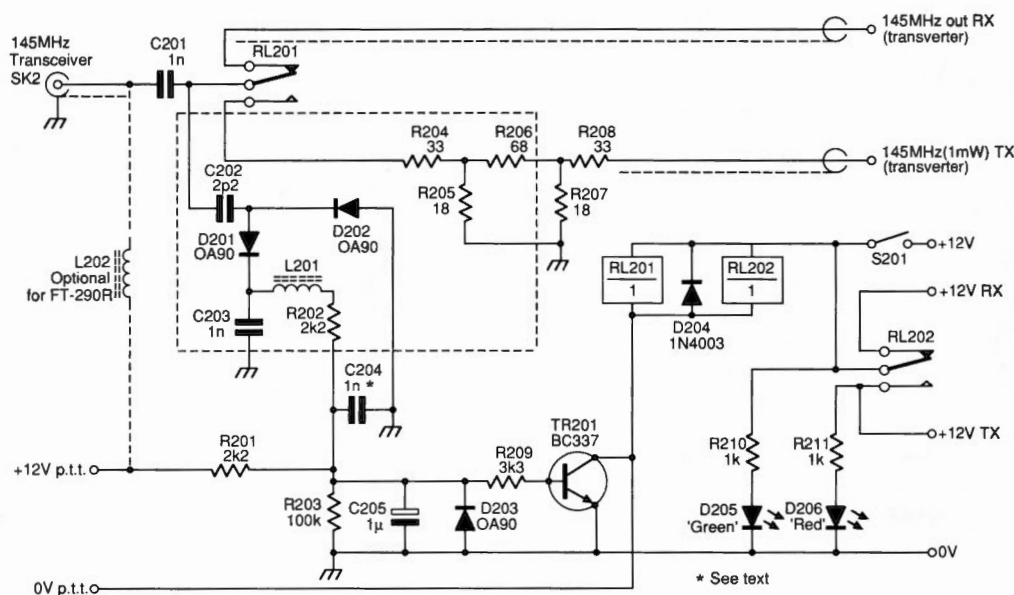
Optional Items

There are several optional, or variable, components in the circuit. Inductor L202 may be fitted if the unit is used with an FT-290R, or other transceiver, having a d.c. voltage present on transmit. Space has been left in the layout if this component is to be fitted. Another optional component, capacitor C204 may be fitted in one of two positions, or even left out all together. If fitted, it may be either within the area bounded by the screening material, or on the land near R203/205. This component was not needed on the prototype, but may cure certain cases of 'relay chatter'.

Hang-Time

The capacitor C205 with R209, controls the hang-time of the circuit. This interval, before the circuit returns to the receive state after the end of transmission,

Fig. 3.1: The PW Meon-4 transmit/receive change-over system circuit.



Tantalum bead capacitors of the required value (100μF) may be difficult to find. If you can't find one, the value may be made up from more than one capacitor. They should all be grouped on the land, which is shown low on the right on the p.c.b. overlay drawing of **Fig. 3.2**.

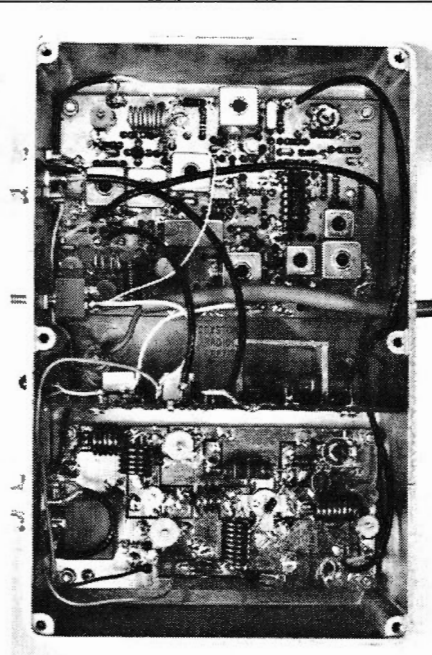


Fig. 3.3: The prototype 'PW Meon-4'. You can use the illustration as an aid to connecting up the various sections.

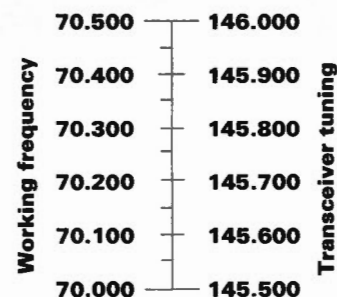
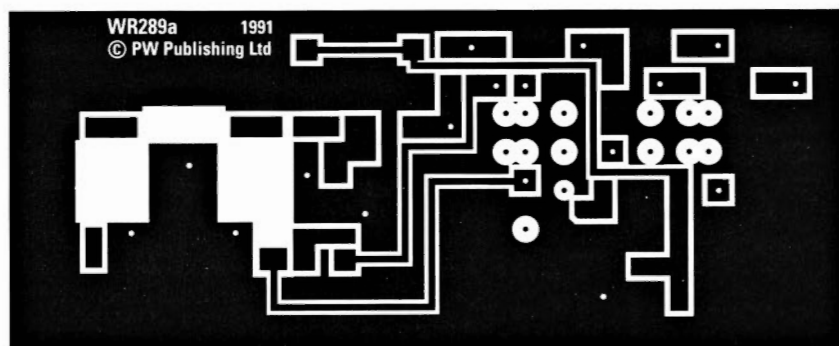


Fig. 3.4: A frequency conversion chart to take the guesswork out of it!

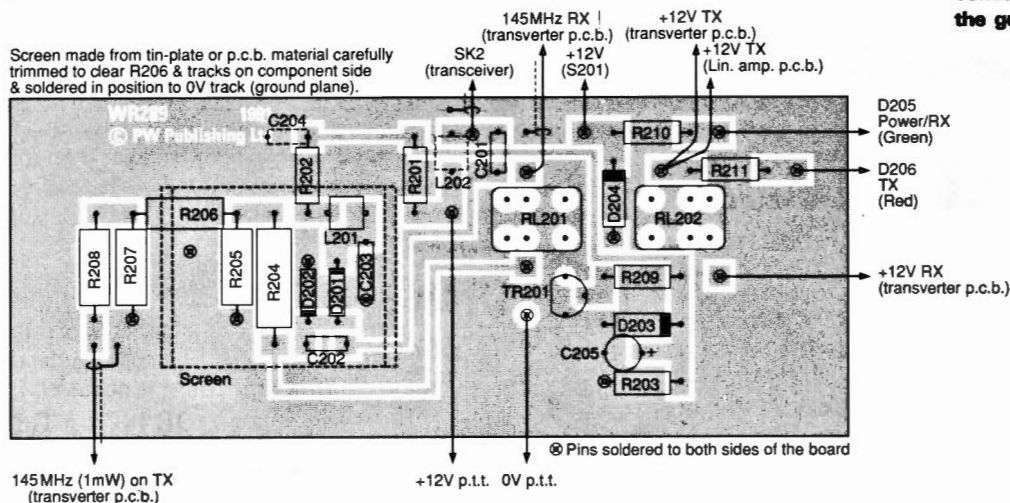


Fig. 3.2: The overlay and track pattern of the change-over board. The relays are physically small and must be treated with care. Care must also be taken when soldering the screening material to the earth plane. A solder-bridge can short one of the signal tracks to ground.

Professional WEATHER MONITORING at low cost

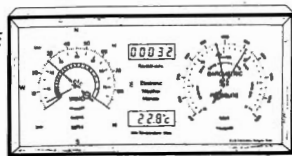
FEATURES (depending on model)

- WIND DIRECTION
- WIND SPEED
- GUST ALARM
- GUST SPEED
- RAINFALL
- SUNSHINE
- OUTSIDE TEMPERATURE
- MIN-MAX TEMPERATURE
- RELATIVE HUMIDITY
- BAROMETRIC PRESSURE
- WOODEN CABINET
- MAINS & 12-24V DC

★ ★ All main readings at a glance ★ ★

SEND FOR
COLOUR
BROCHURE

Prices
from only
£159
inc. VAT



R&D ELECTRONICS, UNIT 19, THE ST JOHN WORKSHOPS,
MARGATE, KENT CT9 1TE. TEL: (0843) 221622

S.E.M.

UNIT P, UNION MILLS,
ISLE OF MAN
Telephone: (0624) 851277

S.E.M. Q.R.M. ELIMINATOR MKII. This device can phase out completely local interference of ANY KIND. Connects in your aerial feeder and covers 100kHz to 60MHz. You can transmit through it. **£98.50** incl ex stock.

HI Q RECEIVER AERIAL MATCHING UNIT. Provides a high selectivity impedance match for wire or co-ax fed aerials to your receiver **£66.50** incl ex stock.

S.E.M. TRANZMATCH MKIII. The only Aerial Matcher with UNBALANCED and TRUE BALANCED OUTPUTS. 1kW 1.8-30MHz, **£165.00**. Built-in EZITUNE (see below), **£55.00**. Built-in Dummy Load, **£10.90**.

EZITUNE. Allows you to TUNE UP on receive instead of transmit.

FANTASTIC CONVENIENCE. Stops QRM. Boxed unit, **£59.50**. P.C.B. and fitting instructions to fit in any ATU, **£55.00**.

FREQUENCY CONVERTERS. V.H.F. to H.F. gives you 118 to 146MHz on your H.F. receiver, Tune Rx, 2-30MHz, **£77.00** ex stock.

H.F. to V.H.F. gives you 100kHz to 60MHz on your V.H.F. scanner, **£66.50** ex stock. Plug in aerial lead of any receiver. Tuning from 100MHz up.

2 or 6-METRE TRANSMATCH. 1kW, will match anything, G2DYM or G5RV: on VHF. **£55.00** ex stock.

DUMMY LOAD. 100W THROUGH/LOAD switch, **£38.00** ex stock.

VERY WIDE BAND PRE-AMPLIFIERS. 3-500MHz. Excellent performance. 1.5dB Noise figure. Bomb proof overload figures. **£45.00** or straight through when OFF, **£55.00** ex stock.

R.F. NOISE BRIDGE. 1-170MHz. Very useful for aerial work measures resonant freq. and impedance. **£59.50** ex stock.

IAMBIC MORSE KEYS. 8-50 w.p.m. auto squeeze keyer. Ex stock. Ours is the easiest to use. **£59.50**. First class twin paddle key, **£35.00** ex stock.

TWO-METRE LINEAR/PRE-AMP. Sentinel 40: 14 x power gain, e.g. 3W-40W (ideal FT290 and Handhelds), **£125.00**. Sentinel 60: 6 x power, e.g. 10W in, 60W out, **£135.00**. Sentinel 100: 10 x 100W out, **£185.00**.

H.F. ABSORPTION WAVEMETER. 1.5-30MHz, **£55.00** ex stock.

MULTIFILTER. The most versatile audio filter. BANDPASS Hi Pass, Lo Pass and two notches. **£95.00** ex stock.

HIGH PASS FILTER/BRAID BREAKER. Cures T.V.I., **£8.95** ex stock.

CO-AX SWITCH. Three-way + earth position. D.C.-150MHz, 1kW, **£39.50** ex stock.

12 MONTHS COMPLETE GUARANTEE INCLUDING TRANSISTORS

Prices include VAT and delivery. C.W.O. or phone your CREDITCARD NO.

Ring or write for further data or catalogue. Orders or information requests can be put on our Ansaphone at cheap rate times.

TRANS LV. safety isolation types Prio 240v Sec 12.6V at 9 amps £23 also Sec 24V at 15 amps £45 both types in metal cases. **CONT METER** No.1 portable type Geiger Counter 0.1 to 10 Mill/Rontg with meter ind. two part unit Probe head plus main unit in carry case, req 300V DC 200 Ua checked with Inst/Tech H/BK also circ for Transis PU. £48 also Radiac Trainer 0 to 300 U/R per hour all in one case with meter Ind req 120V HT & D Cell tested. £28 **COAX H.D.** type UR67 50 ohm 10mm OSD good quality new. 15mt £11.50 50p mt over this. **OPTICAL ACES.** mixed selection of mostly new spares inc eyepiece, 40mm lenses, mirrors, prisms, etc. 10/12 items. £23. **SPEAKER UNIT** AFV. in metal case 5 1/2" dia 3 1/2" deep 2.5 ohm semi weatherproof new. £12.50. **V.H.F. OSC ASS** tunes 95/140 Mc/s direct cal with piston type atten inc 6x valves removed from old Boonton Sig Gens. £23. **AERIALS** Dipole As ass nom 420 Meps with SO239 connect & mt brk new. £4.50 ea 2 for £8. Also VHF type nom 125 Meps with A/C mt base 29" long 1/2 wave new. £8.50. **AERIAL AMP & Dist** unit nom I/P freq 162/174 Meps provides 4 o/p N type connec reqs 12 or 24V DC £16.50. **ROTARY INV.** I/P18V DC at 18 amps for full O/P of 230V 50c/s 180 wetts Sine wave new. £48. **ARMY MAST KIT** 36/48ft as 13x4" section 2 1/2" dia with guys, base, stakes etc rated 50lb at 36ft new cond. £135. **TRANS CVT** I/P range 190/260V D/P 230V at 500 Watts £85. **POWER UNIT KIT.** with trans 240-0-240V at 40 Ma 6.3 at 1 & 2 amp, choke, smooth cap, rect valve circ. £15.50. **CRT** General purpose type DH3.91 1" dia new with base. £14.50.

Above prices include Carr/Post & VAT.

Goods ex equipment unless stated new.

2x22p stamps for List 46/2

A.H. SUPPLIES

Unit 12, Bankside Works, Darnall Rd, SHEFFIELD S9 5HA.
Phone. 444278 (0742)

G6XBH GIRAS G8UUS

Visit your Local Emporium
Large selection of New/Used Equipment on Show

AGENTS FOR:

YAESU • AZDEN • ICOM • KENWOOD • ALINCO
ACCESSORIES

Welz Range, Adonis, Mics, Mutek Pre-Amps

Barenco Mast Supports, DRAE Products, BNOS Linears & PSU's

★ ERA Microreader & BPS4 Filter, SEM Products ★

★ Full range of Scanning Receivers ★

AERIALS, Tonna, Full Range of Mobile Ants, Jaybeam

BRING YOUR SH EQUIPMENT IN FOR SALE

JUST GIVE US A RING

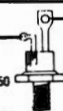
Radio Amateur Supplies

3 Farndon Green, Wollaton Park, Nottingham NG8 1DU
Off Ring Rd., between A52 (Derby Road) & A609 (Ilkeston Road)
Monday: CLOSED Tuesday-Saturday: 10.00 a.m. to 5.00 p.m

Tel: 0602 280267

J. BIRKETT

RADIO COMPONENT SUPPLIERS



25 The Strand
Lincoln, Tel. 520787
(0302 1JF)

Partners J.H.Birkett.
J.L.Birkett.

MAINS TRANSFORMERS. 240 Volt Input Type 1. 15 volt 1 amp @ £2.50

(P&P £1.30). Type 2. 13.8 volt 3.65 Amps @ £3.60 (P&P £1.95).

WIRE ENDED DIODES BY127. 1300 PIV 1 Amp @ 12 For £1.00, 1N 4007

@ 12 For £1.00, 1N 4148 @ 100 For £1.30.

24 VOLT REED RELAYS @ 30 For £1.50, 24 Volt MINATURE PLUG-IN

RELAYS SPCO 10 Amp contacts @ 20 For £2.95.

AIR SPACED VARIABLE CAPACITORS. 15+15pF @ £2.50, 10+10+20pF @ £1.50, 250+250pF @ £2.50, 100+200pF @ £2.50,

200+350pF @ £2.50, 250+250+20+20pF @ £2.50, 180+380pF @ £2.50, 206+178pF @ £2.50, C804 Types 25pF @ £2.50,

50pF @ £2.50.

CRYSTALS FILTERS 1.4MHz BW 2.4KHz Lower Side Band @ £2.50, 10.7MHz ± 8KHz @ £3.95, 10.7MHz ± 7.5KHz @ £3.95.

R.F. POWER MODULE MITSUBISHI Centre Frequency 156MHz 12 Volt 28 Watt with data @ £17.95.

R.F. TRANSISTORS. Like MRF455. 12 Volt 30MHz 60 Watt @ £9.95.

CATV AMPLIFIERS 40 To 440MHz Type 1. contains R.F. Modules TRW 615850, Motorola 615850 and 615723 in Die Cast Box @

£18.95 (P&P £2). Type 2 contains 2 Phillips R.F. Modules. 6GY85, 1-6GY84 in Heat Sink Assembly @ £15.95 (P&P £2). Type 3.

contains R.F. Modules 3 Phillips 6GY85, 1-6GY85 plus other Modules in Die Cast Box @ £22.95 (P&P £3.).

WIRE ENDED CAPACITORS. 0.033uF, 0.1uF 400v.w. @ 10p each, 0.47uF 250v.w. @ 20 For £1.00.

RF POWER TRANSISTORS. Matched Quads 2 To 30MHz, 20 Watt CTC711884 @ £19.95 The Set, Mullard 5448LY @ £4.95,

PT8708 @ £5.95, 6FW16A & 75p. 2N5590 @ £5.95, RF 2123 (2N5591) @ £7.95.

ACCESS and BARCLAY CARDS ACCEPTED. P&P 80p under £5. Over Free. Unless Otherwise Stated.

C.M. HOWES KITS Available By Post and For Callers.

NEW! 40M QRP TX/RX KIT

COMPLETE TO THE LAST NUT!



- ★ 2W CW OUTPUT
- ★ 7.0-7.1MHz
- ★ STABLE VFO
- ★ SIDETONE
- ★ RIT
- ★ AUDIO FILTER

★ CASE AND ALL HARDWARE INCLUDED ★

DTR7 — KIT £87.50 READY BUILT £140.00

Send SAE for Brochure or call Alan, G4DVW on 0602 382509



LAKE ELECTRONICS

7 MIDDLETON CLOSE, NUTHALL, NOTTINGHAM NG16 1BX
(callers by appointment only)



ALL VALVES & TRANSISTORS

Call or Phone for a
most courteous
quotation

081-743 0899

We are one of the largest stockists of valves etc. in the UK

COLOMOR ELECTRONICS LTD

170 Goldhawk Road, London W12 8HJ

Fax 081-749 3934.

Do not increase the hang-time much more than a few seconds. If the hang-time is too long, it may cause you to lose some of the answering call before the transverter has returned to receive.

Layout Guide

Using the photographs of the p.c.b. and complete unit as a guide, you should mount the various circuit boards into the die-cast aluminium box. In the original 'PW Meon' (†) a second die-cast box was used, inside the main box, to contain and screen the power amplifier. In this design the switching board itself acts as a screening shield between the two other boards. The method of screening used on the prototype unit is a cheaper technique that works well. A heat-sink is not necessary for the unit. Even on full transmitted output, the die-cast box was only hand warm after several hours of operation.

Local Oscillator Reduction

A final check can now be made for l.o. leakage. Start the check by removing the 144MHz drive and connecting the power meter already described above. Using one of the p.t.t. lines, put the system into the transmit state. The linear amplifier has sufficient bandwidth to show if significant levels of 75.5MHz are leaking through. Should there be any residual l.o. output, L3 on the transverter board may be adjusted to minimise the problem. A 'zero' reading on the meter should be possible. You may need to readjust the tuning if any changes have to be made to the setting of L3. It may be necessary to realign all stages again with the new settings of the 75.5MHz trap filter. On the prototype, a level (75.5MHz l.o.) of -50dBc was achieved.

Final Tweaks

The final stage of the alignment process is to set the correct operating point. This is carried out with maximum operating power from the transmitter applied. You should adjust R38, on the transverter board, to give **no more** than 8W output for s.s.b. operation. If too much output is obtained, at maximum attenuation, then this may be corrected by increasing the value of R3 to give a suitable range of adjustment. If a second, external, linear amplifier is to be used, R38 should give a suitable output power to drive the amplifier. Adjust the drive signal to the linear amplifier to at least 3dB lower than that needed for maximum output. This will allow a reasonable overhead, so reducing 'splatter'.

No Pre-amplification

The prototype had sufficient sensitivity not to require a pre-amplifier at any stage. Should one be needed, or desired, there are two possibilities. A 70MHz pre-amplifier could be placed between the 'Receive converter' output of the p.a. board and the '70MHz in' connection on the transverter p.c.b. If a 145MHz pre-amplifier is available, this could be placed between the '145MHz out RX' of the transverter p.c.b. and the similarly marked pin of the switching p.c.b. As with the use of any pre-amplifier, gain should be kept to the minimum needed to make a signal usable. **PW**

Now you're ready to go and I'm looking forward to working you on the 70MHz band any mode any time.

How Much? £9
(+ p.c.b. changeover unit only)
How Difficult?
Intermediate

Shopping List

Resistors

2W 5% Carbon Film
33Ω 1 R204

1W 5% Carbon Film
68Ω 1 R206

0.5W 5% Carbon Film
18Ω 2 R205, 207
33Ω 1 R208

0.25W 5% Carbon Film
1kΩ 2 R210, 211
2.2kΩ 2 R201, 202
3.3kΩ 1 R209
100kΩ 1 R203

Capacitors

Miniature Ceramic Plate
2.2pF 1 C202
1nF 3 C201, 203, with C204 (optional)

Tantalum Bead 16V working
1μF 1 C205 *see text

Inductors

L201 consists of 4t of 22s.w.g. enamelled copper wire wound on a ferrite bead. The optional inductor L202, if required, is similarly wound.

Semiconductors

1N4003 1 D204
BC337 1 TR201
OA90 3 D201, 202, 203
i.e.d. 2 D205, 206 (colours to suit)

Miscellaneous

Two ultra-miniature s.p.c.o. relays (Electromail order No. 345-038), a suitable single pole power switch, interconnecting cable. Miniature coaxial cable (RG174), plugs and sockets as required. Change-over p.c.b. (WR289 *PW Services*), plus p.c.b. pins, die-cast aluminium box 186x106x56mm (or similar). Screws/nuts and washers for mounting the various boards.

Further Reading (†)

'PW Meon-4 Transverter', part one *PW* May 1991 p19. Part two *PW* June 1991 p34.
'PW Meon 50MHz Transverter' by Dave Powis G4HUP and Sam Jewell G4DDK, *PW* October 1985, p36, + 'Kindly Notes / Errors & Updates'.
Radio Data Reference Book by G.R. Jessop G6JP. ISBN 0900612 67 3 published by RSGB (attenuators p151 in the fifth edition).
PW March 1991 page 69 gives a 70MHz bandplan. This was in the regular column 'VHF-Up', by David Butler G4ASR.

Reflections

This month, Ron Ham reflects on the fact that there was a lot more behind the Central Post Office than the handling of the Royal Mail!

The GPO

Now that it is becoming history, let us reflect on the fact that there was a lot more behind those three well known letters 'GPO' (General Post Office) than the handling of the Royal Mail. They stood for the massive amount of research that went into the mechanical and electronic sorting of letters and parcels for daily distribution around the world.

The GPO were responsible for the telegram service and, for developing, installing and maintaining the telephone network throughout the UK and connecting it to overseas systems by cable, wireless and satellite. Their engineers were very much involved in the many aspects of radio and television from the very beginning because, communications was their business.

I was reminded of this on April 14 when I saw a rare sight, a couple of 1936/7 Morris 8 vans, **Fig. 1**, in Post Office livery (left red, right dark-green), parked in Sussex at **The Amberley Chalk Pits Museum** during a vintage vehicle rally. Such custom-built vans were ordered by the GPO for use by their postmen (left) and telephone-linesmen (right) and now, 55 years later, these two are kept in their former glory by **J. Bambrough** of Horndean, near Portsmouth.

Ninety-five years ago it was **Sir William Preece**, then Post Master General, who encouraged the young Marconi by asking him to demonstrate his wireless techniques to senior Post Office staff. The result was that signals were transmitted, in London, from St. Martin's-le-Grand to the Victoria Embankment and later similar experiments were successfully

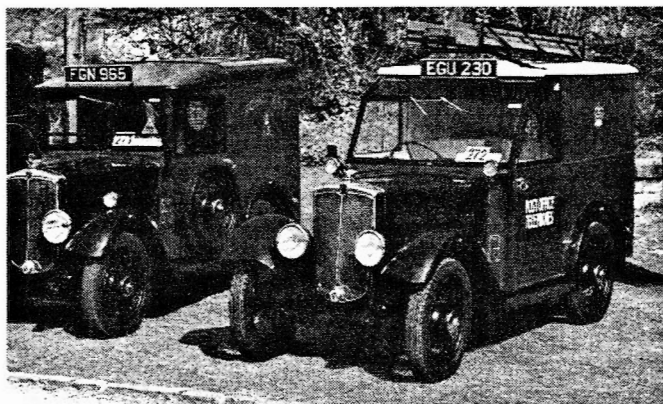


Fig. 1: 1936/37 PO Vehicles.

carried out on Salisbury Plain and across the Bristol Channel.

Marconi and Preece were contemporaries of **Sir Oliver Lodge** who, at that time, had suggested that there was more to solar radiation than visible light. Fifty years later, in the early days of 405-line television, a matter where I had first-hand experience, it was the Post Office Interference Department who were called upon when electrical equipment, ranging from light bulbs to motors and medical apparatus to RADAR, were carving up the pictures on newly installed, Band I (40 to 70MHz), television receivers. It was in 1947/8 that I first saw the effect of American R/T traffic chopping up BBC television signals on 45MHz while a massive Sporadic-E opening was in progress.

Natural Causes

Engineers from the BBC, the Post Office and the radio industry pioneered international communication routes around the globe via ionospheric reflection. They soon became very much aware that random activity, associated with sunspots, could suddenly

disturb the ionosphere and consequently disrupt the paths of radio signals being carried via that medium. The majority of wireless operators, both amateur and professional, have experienced, at some time, the effect on incoming signals of echoes, rapid-fading and total blackouts, resulting from enhanced solar activity. In addition, many have heard the wide-band fluctuations in the receiver background noise caused by radio waves originating on the sun.

Better Understanding

There can be little doubt that the consistent use of radio receivers, as a scientific tool to record these happenings, have lead to our better understanding of the sun and its influence over the earth and its complex atmosphere. This is of course a never ending story and is why I try to use as many reader-reports as possible each month. In this way, this column can make more information available for posterity and to the students of radio and astronomy who may require it for their research projects.

More About March

After my deadline for June 'Reflections', in which I reported that the sun was very active during March, further important information arrived. Reports such as the daily graph of solar flux, **Fig. 2**, kindly sent by **Neil Clarke** (Ferrybridge) who told me that "many of the daily solar flux figures were flare enhanced and consequently it is rather difficult to see any real variations". However, Neil calculated the mean level for the month at 225 units. From the 23rd to the 25th inclusive, **Ron Livesey** (Edinburgh) identified 5, 6 and 4 active areas, respectively, on the sun's disc using a 2.5in refracting telescope and a 4in projection screen. Ron's equipment is no doubt similar in principle to that used by **Clive Brook** in Plymouth, **Fig. 3**. Despite cloudy conditions around noon on the 23rd and 24th, Clive's screen revealed 3 sunspot groups with 12 and 15 spots respectively and at 1537 on the 28th he added 2 groups to his solar log and **Ted Waring** (Bristol) counted 14 spots.

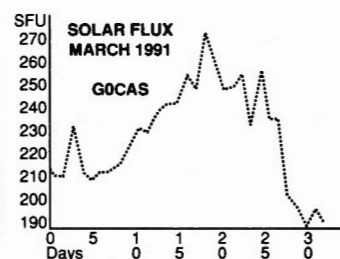


Fig. 2: Daily Solar Flux for March.

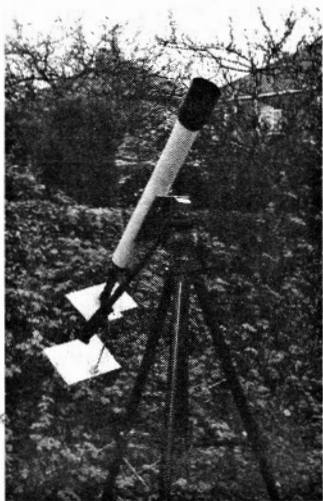


Fig. 3: Clive Brook's projection apparatus.

The Earth's Magnetic Field

Last month I referred to the solar activity and the radio blackout on the 25th, which I now know spread over to the 26th, so, in addition to Fig. 2, it is also interesting to see Neil Clarke's print-out of the 'Ap' magnetic index, Fig. 4, showing that massive peak on the 25th. "After 4 months of very quiet geo-magnetic activity, March 1991 saw a major storm", wrote Neil and added that this storm began on the 24th and lasted until the 28th with 'Ap' figures for those days at 115, 92, 83, 32 and 20 respectively. Neil is currently experimenting with his own magnetometer, which clearly detected that big storm and I hope to learn more about this instrument in due course. The magnetometers used by Tony Hopwood (Worcester), Karl Lewis (Saltash), Ron Livesey, David Pettit (Carlisle) and Doug Smillie (Wishaw), between them, recorded the big magnetic storm from the 24th to the 26th inclusive.

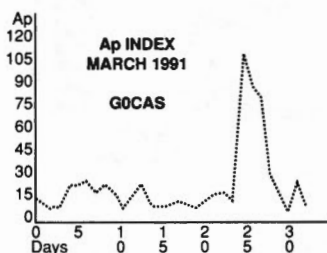


Fig. 4: Ap Magnetic Index for March.

Aurora Reports

Ron Livesey is the auroral co-ordinator for The British Astronomical Association. He received reports of "all sky, all night" aurora for the 24th/25th from 38 observers, ranging from many parts of the British Isles, North Dakota and Denmark. "Active aurora" was again seen from North Dakota and Scotland by 7 observers overnight on the 25th/26th. Doug Smillie reported hearing auroral reflections on terrestrial signals in the 50 and 144MHz bands on the 24th and 25th, and Tony Hopwood noted this effect around 2100 on the 25th. Ern Warwick (Plymouth) heard the German beacon DK0WCY on 10.144MHz, give weak auroral warnings between 1800 and 1910 on the 27th, 2000 to 2100 on April 1 and 1215 to 1900 on the 4th.

April's Active Sun

Another large group was observed on the central meridian of the sun's disc and it was drawn at 1450 on April 15, Fig. 5, by Patrick Moore with his projection system installed at his observatory in Selsey. Ted Waring counted 17 spots on the 8th and Clive Brook identified 4 groups on the 5th, 20th and 5 on the 15th and 16th. Cmdr Henry Hatfield (Sevenoaks), using his spectrohelioscope, observed 2 groups on the 10th, 21st and 28th, 4 groups on the 3rd, 12th and 13th and 5 on the 11th. Henry also recorded individual bursts of solar radio noise with his radio telescopes on both 136 and 1297MHz on days 2, 11 and 20. Ern Warwick (Plymouth) reports a noisy background at 1720 on the 14th and a high noise level on the 15th, 16th, 19th and 20th on 28MHz. He also noted echos on the signals from the African beacons ZS5VHF and Z21ANB on the 13th and on the United States beacons WA4DJS on days 5, 6, 8 and 9 and W3VD on the 14th and 15th. On checking the 14MHz beacons he found 'fast-fading' on the signals from KH60/B on the 12th, 13th, 14th and 22nd and W6WX on the 13th and 22nd. Both 'echos' and 'fast-fading' are due to some form of ionospheric disturbance and this is not surprising when the state of the April sun is considered.

Drawing Sunspots

Any experienced astronomer will tell you, and I have WARNED readers many times in my articles in *PW* and *Short Wave Magazine*, that you should **NEVER LOOK DIRECTLY AT THE SUN THROUGH ANY OPTICAL EQUIPMENT**. This is because this could seriously damage your eye-sight and brain. Our regular sunspot contributors like Henry Hatfield, Ron Livesey, Patrick Moore and Ted Waring all use some form of projection apparatus attached to their optical telescopes. This simple device, usually home-made, is attached to the eye-piece end of a tripod-mounted refractor telescope while its object glass is pointed in the general direction of the sun. The final adjustment is made, with your back to the sun, by moving the main telescope tube and centering the solar image on to the screen.

Thanks

My thanks to Clive Brook for sending the photograph, Fig. 3, of his 2.5in telescope and the projection screen which took him less than an hour to make. I have included this because I have indications that many of you are keen to know when sunspots are present and how to go about drawing them. "The projection apparatus was made from balsa wood, cardboard, a jubilee clip and a length of telescopic radio aerial," said Clive, and he quite rightly

added, "The materials are much easier to obtain than a new eyeball!"

It should be obvious by looking at Fig. 3, that the drawing paper would be placed on the lower "shelf" in front of the eyepiece and would be held in place by a couple of paper clips or small bulldog clips. Adjustment for the solar disc size and fine focus is made with the telescopic rod attached to the base of this 'shelf' at the lower end, and also to the base of the 'light-deflector' at the top end. The latter has a centre hole through which is passed the focus tube. Don't run any risks, if any of you are not sure about making a projector. Please have a word with someone in your local astronomical society. The address of the secretary is almost sure to be in your public library.

Sporadic-E

By the time you read this, the 1991 Sporadic-E season should be well under way and among those who will be active is Bob Cooper, Jr. currently ZL0AAA. Bob will be operating from the Azores from approximately June 4 to 27 and plans to have 100W plus equipment running on the 28, 50 and 144MHz amateur bands. His liaison frequency will be 28.885MHz, and his keyer beacon frequencies will be 50.105MHz and 144.105 or 144.205MHz. He will also have f.m. and TV monitoring gear covering 30 to 150MHz. PW

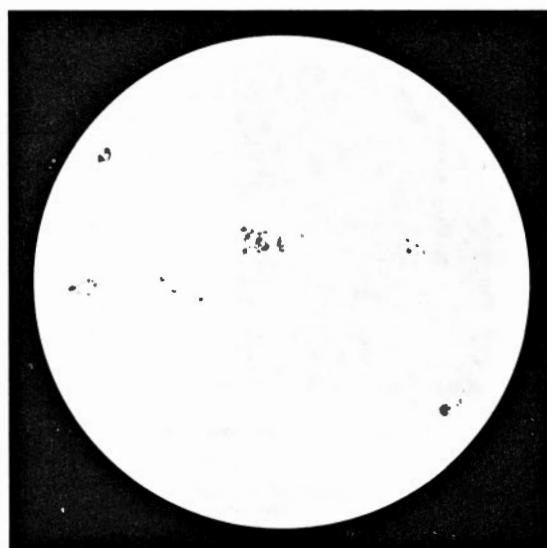


Fig. 5: Large sunspot Group - April 15.

Reflections



STANDARD.

C150 REDUCED PRICE £199

The new Standard C150 is a super compact 2m transceiver that has all the usual features that you would expect from a modern microprocessor controlled radio - plus several new ones.

- ★ Frequency range 144-146MHz (with extended Rx capability).
- ★ Up to 5W RF output (switchable Hi-Mid-Low).
- ★ 20 memories (20 banks of 10).
- ★ Power requirements 5.5-16V d.c.
- ★ Superb sensitivity - less than 0.16V (12dB SINAD).
- ★ 6 Different monitoring methods (dual Watch modes)!
- ★ 14 Different scanning Modes!
- ★ Individual and group call paging functions available.
- ★ Semi-duplex operation with separate Tx and Rx frequencies.
- ★ Squelch Off button.
- ★ Battery Save and Automatic Power Off facilities.
- ★ Built-in S-meter.
- ★ Splash proof case.
- ★ Soft touch buttons & knobs.
- ★ Rotary knob or push-button frequency selection.
- ★ PTT and keyboard locks (rotary knob is left active).
- ★ Sockets for external microphone, speaker and power supply.
- ★ A comprehensive range of accessories are available, including DTMF and CTCSS.
- ★ Size 124mm H x 55mm W x 31mm D



C500 REDUCED PRICE £300 with CNB 111 Ni-Cad Pack

Ask anyone who has one, his opinion of the well proven C500, and he will tell you that it can't be beaten. Thousands of users around the world are of the same opinion!

We have now made it affordable by reducing the price *still* further to £300, so what are you waiting for?

THIS IS, OF COURSE, THE *EUROPEAN VERSION WITH FACTORY FITTED TONEBURST* - PLUS MANY OTHER INCREDIBLE FEATURES NOT PREVIOUSLY AVAILABLE IN A HANDHELD.

- ★ Frequency coverage 144-146 & 430-440MHz with Full Duplex available.
- ★ Extended receive capability:- 130-169.995 & 410-470MHz
- ★ 2.5 to 5W output (depending on battery pack).
- ★ High or Low switchable RF output.
- ★ Step sizes:- 5/10/12.5/25/50kHz (user programmable).
- ★ Keyboard programmable repeater offset (0-39.9MHz)
- ★ Reverse repeater mode.
- ★ Priority Channels available on both bands.
- ★ Each band has 10 memories for frequency and repeater offset.
- ★ Dual synthesised VFOs.
- ★ User programmable CALL button (instant QSY to your favourite channel - either band).
- ★ Numerous scanning modes (Pause or Busy - memories - band, etc.)
- ★ Auto Power Off - with Alarm (4mA current drain on standby).
- ★ Battery Save on receive - 9 user programmable Rx/Off ratios.
- ★ Vacant Channel Search - for easier QSYing.
- ★ Lock - disables keypad and/or PTT.
- ★ Squelch Off button (saves twiddling the knob).
- ★ Low Battery indicator.
- ★ Easy to read Liquid Crystal Display with backlight.
- ★ LCD S/Power output meter.
- ★ Can be powered directly from a car's cigar lighter (5W output)
- ★ Keypad or Rotary Knob frequency selection.
- ★ Dimensions:- 173mm H x 60mm W x 34mm D.

PLEASE REMEMBER, WE ARE THE SOLE IMPORTER OF STANDARD EQUIPMENT IN THE UK AND WE ARE ABLE TO OFFER A FULL BACKUP SERVICE AND SPARES FROM STOCK. THESE PRICES ARE INCLUSIVE OF 15% VAT. SO YOU CAN SAVE 2.5% EXTRA.



NORMAN
G4THJ



Normally 24hr despatch but please allow 7 days for delivery

400 EDGWARE ROAD, LONDON W2
071-723 5521 Tlx 298765

OPENING TIMES:

9.30am-5.30pm Mon-Fri. 10am-4.30pm Sat.

Mathematics For The RAE

Part 4

Errors & Updates

Twelve year old Peter Maunder of Streatham has earned himself a £5 voucher for spotting the mistake on page 32 of the May issue of *PW*. Halfway down the right hand column, when multiplying 0.0376 by 25.1, the line '1880', should have read '18800', even though the answer was correct. Well done Peter (we'll take it out of Tex's pocket *Ed.*).

Answers

Now to put you out of your misery, here are the answers to last session's problems on fractions and decimals.

- | | | |
|---------|----------|---------|
| (i) c | (ii) d | (iii) b |
| (iv) a | (v) c | (vi) a |
| (vii) d | (viii) b | (ix) d |
| (x) d | (xi) a | |

You did get them all right, didn't you? Well done if you did.

Indices

Now we've got fractions and decimals out of the way, the next to be tackled are INDICES or POWERS OF NUMBERS. Indices aren't difficult, especially if we look at them this way: If we multiply a number by itself, the number is said to be 'squared'. If we multiply the 'squared' answer by the original number again, the number is said to be 'cubed'. If we represent the number (which can be ANY quantity) by the letter 'a', this 'squaring' and 'cubing' can be written mathematically (or algebraically) as below.

$a = a^1$ the number itself ('a to the first power')

$a \times a = a^2$ (or a 'squared', 'a to the second power')

$a \times a \times a = a^3$ (or a 'cubed', 'to the third power')

This multiplying can go on theoretically forever:

$a \times a \times a \times a = a^4$ (or 'a to the fourth power')

$a \times a \times a \times a \times a = a^5$ (or 'a to the fifth power') and so on.

The '2' in a^2 is called an INDEX (plural INDICES) and that is what this part is all about. If we want to write down the number 'one hundred', we can do it the normal way using '0s' like this: 100

or another way would be: 10×10

Using indices it would be written as: 10^2

Not a lot of space saving there! Supposing we want to write down the number 'one million' in the way we wrote 'one hundred' - what then?

1000 000 or

$10 \times 10 \times 10 \times 10 \times 10 \times 10$

Using the 'index' method it only needs to be 10^6

You are less likely to make mistakes, like losing a '0' or two if you always use indices when you can. With quantities less than 1, where small numbers like 'a thousandth' or 'a millionth' are quite common in radio problems, indices can help. They keep you from

Practical Wireless, July 1991

losing '0s' AFTER a decimal point as they can in front of it!

For example:

$$\frac{1}{10} = 10^{-1}, \text{ or } \frac{1}{100} = 10^{-2}, \text{ or } \frac{1}{1000} = 10^{-3} \dots$$

$$\frac{1}{1000000} = 10^{-6} \dots \dots \frac{1}{10^n} = 10^{-n} \text{ (general rule)}$$

If we can have '+' and '-' indices, what about 10^0 ? What does that (ten to the power of nought) mean? The answer, although unusual, is 1 (see later in this section for the explanation). ANY QUANTITY RAISED TO THE POWER '0' IS EQUAL TO 1 (or unity). So $10^0 = 1$, $99^0 = 1$, also $X^0 = 1$ and $Y^0 = 1$. This means that any number raised to the power of nought is the same as any other number raised to the power of nought. i.e. $397^0 = 1^0 = 1$.

Indices In Multiplication

What happens when we have to multiply numbers together if they have indices? If the numbers to which the indices are appended are the SAME, (and the numbers are quite often '10s') all we need to do is to ADD the indices together. A few examples:

$$(i) 10^3 \times 10^6 = 10^{(3+6)} = 10^9$$

$$(ii) 10^2 \times 10^3 \times 10^6 = 10^{(2+3+6)} = 10^{11}$$

$$(iii) 10^6 \times 10^9 \times 10^{-7} = 10^{(6+9-7)} = 10^8$$

That was simple and easy wasn't it?

Indices In Division

Dividing is just as simple. To divide using indices you should just SUBTRACT the index of the number of the denominator from that of the numerator, as long as the numbers preceding the indices are the same (again usually '10s'). Here are some more examples: $(10^6 \div 10^2) = 10^4$ and $(10^{10} \div 10^4) = 10^6$

Using the same rules on a more complicated example:

$$\frac{10^4 \times 10^8}{10^9 \times 10^{-3}} = \frac{10^{(4+8)}}{10^{(9+(-3))}} = \frac{10^{12}}{10^6} = 10^{(12-6)}$$

$$= 10^6$$

And another:

$$\frac{10^2 \times 10^3}{10^{-6} \times 10^{-5}} = \frac{10^{(2+3)}}{10^{(-6)+(-5)}} = \frac{10^5}{10^{-11}}$$

$$= 10^{(5-(-11))} = 10^{16} = 10\,000\,000\,000\,000\,000$$

Coefficients

A COEFFICIENT is a number which multiplies a term including an indexed number. It mostly appears at the beginning of the term. If no coefficient is written, a '1' is assumed. The coefficient multiplies the rest of the term. To help you understand, we'll look

Theory

As we progress further into the fascinating world of maths, Ray Fautley G3ASG thinks it's time to turn to numbers with indices.

at some numbers having both indices and coefficients.

In 3×10^2 , the '3' is the coefficient, and is the same as 3 times $100=300$. In the case of 12×10^{-6} , '12' is the coefficient, and '-6' the index. This is the same as 12 times one millionth. A bit more care is necessary when ADDING together numbers which have indices. Only numbers which have the SAME INDEX may be added. You'll realise this by following these examples:

$$\begin{aligned} \text{(i)} \quad & 10^3 + 2 \times 10^5 + 6 \times 10^3 + 3 \times 10^5 \\ & \text{Collecting the '10^3's together and then the '10^5's:} \\ & (10^3 + 6 \times 10^3) + (2 \times 10^5 + 3 \times 10^5) \\ & = (1+6) \times 10^3 + (2+3) \times 10^5 \\ & = 7 \times 10^3 + 5 \times 10^5 \end{aligned}$$

$$\begin{aligned} \text{(ii)} \quad & 7 \times 10^{-6} + 4 \times 10^6 + 3 \times 10^{-6} + 7 \times 10^6 + 5 \times 10^3 \\ & = (7+3) \times 10^{-6} + (4+7) \times 10^6 + 5 \times 10^3 \\ & = 10 \times 10^{-6} + 11 \times 10^6 + 5 \times 10^3 \\ & = 10^{-5} + 11 \times 10^6 + 5 \times 10^3 \end{aligned}$$

The same rule applies when subtracting numbers having indices.

$$\begin{aligned} \text{(i)} \quad & 5 \times 10^{-2} - 2 \times 10^{-2} \\ & = (5-2) \times 10^{-2} = 3 \times 10^{-2} \end{aligned}$$

$$\begin{aligned} \text{(ii)} \quad & 8 \times 10^3 - 3 \times 10^3 - 2 \times 10^3 - 5 \times 10^6 \\ & = (8-3-2) \times 10^3 - 5 \times 10^6 \\ & = 3 \times 10^3 - 5 \times 10^6 \end{aligned}$$

Thinking Cap Time

Now that you've read about dividing indexed numbers, have you worked out why any number to the power of nought is always 1?

Maybe a little help would be appreciated?

$$5 \div 5 = 1, 7 \div 7 = 1, 15797 \div 15797 = 1$$

If the above statement is true then:

$$10^y \div 10^y = 10^{(y-y)} = 10^0 = 1$$

It's easy once you know how, isn't it?

Now for the 'exam' part. Try the following problems on indices, the answers will appear with the next part of the series.

$$\text{(i)} \quad 10^6 \times 10^3 = ?$$

- (a) 10^3 (b) 10^{18}
(c) 10^{-3} (d) 10^9

$$\text{(ii)} \quad 10^{-5} \times 10^6 = ?$$

- (a) 10 (b) 10^{-11}
(c) 10^{-1} (d) 10^{11}

$$\text{(iii)} \quad 10^3 \times 10^2 \times 10^6 = ?$$

- (a) 10^{-1} (b) 10^4
(c) 10^9 (d) 10^{11}

$$\text{(iv)} \quad 10^{-6} \times 10^7 \times 10^3 = ?$$

- (a) 10^{-16} (b) 10
(c) 10^4 (d) 10^{13}

$$\text{(v)} \quad (3 \times 10^2) \times (2 \times 10^{-3}) \times (12 \times 10^3) = ?$$

- (a) 17×10^2 (b) 72×10^2
(c) 72×10^8 (d) 17×10^8

$$\text{(vi)} \quad (2 \times 10^4) + (7 \times 10^{-6}) + 10^4 = ?$$

- (a) $(3 \times 10^4) + (7 \times 10^{-6})$
(b) $(9 \times 10^4) + (7 \times 10^{-6})$
(c) $(2 \times 10^8) + (7 \times 10^{-6})$
(d) $(14 \times 10^4) + (7 \times 10^{-6})$

$$\text{(vii)} \quad (7 \times 10^{-3}) - (3 \times 10^{-3}) = ?$$

- (a) 4×10^{-6} (b) 21×10^{-3}
(c) 21×10^{-6} (d) 4×10^{-3}

$$\text{(viii)} \quad [(3 \times 10^2) + (6 \times 10^3)] - [(2 \times 10^2) + (2 \times 10^3)] = ?$$

- (a) $10^2 + (8 \times 10^3)$
(b) $(6 \times 10^2) + (8 \times 10^3)$
(c) $10^2 + (3 \times 10^3)$
(d) $(6 \times 10^2) + (3 \times 10^3)$

That's all for now, keep up the practice and above all - don't be frightened of maths, it can be fun.

Tidy up that pile of mags! 0202 665524

PW BINDERS Only £4.50 each

(plus £1 p&p for one binder, £2 p&p for two or more, UK or overseas)

Are you tired of sifting through cardboard boxes and carrier bags to find that useful item in *PW*? Our smart binders, covered in blue plastics, are a must for your library, keeping your radio magazines in good condition and easily accessible.

Plus! Tidy up those other mags too. Plain binders to take any A4 size magazines - no names, no pack drill !!!

HOW TO ORDER

Send a postal order, cheque or international money order with your order stating number and type required to:

PW Publishing Limited, FREEPOST, Enefco House, The Quay, Poole, Dorset BH15 1PP.

Payment by Access, Mastercard, Eurocard or Visa also accepted on telephone orders to Poole (0202) 665524. Normally despatched by return of post but please allow 28 days for delivery.

Prices include VAT where appropriate.

AMATEUR RADIO COMMUNICATIONS LTD.

AUTHORISED ICOM, YAESU AND STANDARD DEALER

HF TRANSCEIVERS

YAESU

- FT-1000 – Top of the range
- FT-990 – General Rx, ATU, PSU
- FT-767GX – HF & 2/6/70 option
- FT-650 – 6m/10m, SSB, 13.8V
- FT-757GXII – 12V General Coverage
- FT-747GX – Ideal for mobile use

ICOM

- IC-781 – HF + Built in ATU & PSU
- IC-765 – All band Transceiver
- IC-735 – HF Gen. Cov. – 12V
- IC-726 – HF/6m – 12V
- IC-725 – Budget HF – 12V

NOW EX STOCK
THE ACCLAIMED SMARTUNER
Model SG-230
 Phone for details!

POINTS TO CONSIDER WHEN CHOOSING THE EMPORIUM TO BUY YOUR NEW RIG FROM:

1. The largest selection of new and secondhand equipment in the North of England.
2. All demo transceivers are available for back to back tests enabling you to choose the make or model best suited to your requirements.
3. Adequate stocks of all equipment kept.
4. 98% of all servicing and guarantee work carried out in house – often while you wait, therefore eliminating the 2 or 3 weeks delay while your equipment is returned to the main importer.
5. A friendly and expert advice service both technical and practical.

OUR AIM IS 100% SATISFACTION

DUAL BAND TRANSCEIVERS

- C-5608 – with LCD Keypad
- IC-2400 – Dual receive/Display
- IC-3220 – Inc. Airband
- DR-590 – Dual receive

- C-528 – Extremely popular
- DJ-560 – Great Value for money
- IC-W2E – Another Icom winner

SCANNERS/ HF RECEIVERS

ICOM

- IC-R9000 – Unbelievable
- IC-R7000 – Can't be beaten
- IC-R100 – Budget scanner
- IC-R72 – Budget HF Receiver
- IC-R71 – Old favourite
- IC-R1 – See it to believe it

YAESU

- FRG-9600 – 50-950 AM/FM/SSB
- FRG-8800 – Value for money

FAIRMATE

- HP 200E – Most popular Handheld Scanner yet!



38 Bridge Street, Earlestown, Newton-le-Willows,
 Merseyside WA12 9BA. Only 1 mile from Junction 23 – M6

Telephone: N-le-W (09252) 29881

Fax No: 09252 29882

OPEN TUES-SAT 10 a.m. - 5 p.m.



INSTANT FINANCE AVAILABLE SUBJECT TO STATUS

Prices correct at time of going to Press.

E & OE.

ALINCO • AOR • TONNA • JAYBEAM • SANDPIPER • BNOS • AKD • CAPCO • REVEX • STANDARD

SUSSEX AMATEUR RADIO & COMPUTER FAIR

SUNDAY 14th JULY 1991 – 10.30 to 4.00

Brighton Racecourse

Trade Stands • Bring and Buy Stall
 Picnic Area • Refreshments • Car Park

FREE SHUTTLE
 to Brighton Sea Front

Details: 0273 501100

MAKE YOUR INTERESTS PAY!

Over the past 100 years more than 9 million students throughout the world have found it worth their while! An ICS home-study course can help you get a better job, make more money and have more fun out of life! ICS has over 90 years experience in home-study courses and is the largest correspondence school in the world. You learn at your own pace, when and where you want under the guidance of expert 'personal' tutors. Find out how we can help YOU. Post or phone today for your **FREE INFORMATION PACK** on the course of your choice. (Tick one box only!)

Electronics	<input type="checkbox"/>	TV, Video & Hi-Fi Servicing	<input type="checkbox"/>
Basic Electronic Engineering (City & Guilds)	<input type="checkbox"/>	Refrigeration & Air Conditioning	<input type="checkbox"/>
Electrical Engineering	<input type="checkbox"/>	Car Mechanics	<input type="checkbox"/>
Electrical Contracting/Installation	<input type="checkbox"/>	Computer Programming	<input type="checkbox"/>
<input type="checkbox"/> OCSE/GCE/SCE over 40 examination subjects to choose from			

Name _____ Address _____



International Correspondence Schools, Dept. EES71 312/314 High Street, Sutton, Surrey SM1 1PR. Tel: 081-643 9568 or 041-221 2926 (24 hrs.)

QUARTZ CRYSTALS

QuartSlab MARKETING LTD

P.O. Box 19 Erith Kent DA8 1LH

Telephone: 0322 330830

Fax: 0322 334904

Telex: 8813271 GECOMSG

(Attention QUARTSLAB)

An SAE with all enquiries please
 PRICES INCLUDE P&P and VAT

STOCK CRYSTALS

CRYSTALS FOR 2 METRES
 HC25 £2.75 FOR ONE CRYSTAL £2.50 EACH FOR 2 OR MORE
TX CRYSTALS
 12MHz 30 & 40pF
RX CRYSTALS
 44MHz Series Res R0-R7, S0-S23,
 14/15MHz 30pF Scanner Crystals
 SR9 crystals £3.50
HC8 £2.50 FOR ONE CRYSTAL £2.50 EACH FOR 2 OR MORE
TX CRYSTALS
 4MHz 30pF
 44MHz Series Res R0-R7, S20-23
4 METRE CRYSTALS FOR 70.26 IN HC8/U AT £2.50 each
 TX 8.78250 RX 29.7800
70CM CRYSTALS £3.50 or £3.35 each.
 For Pyle PF1 PF2 & PF70 series and FDK MULTI U11 SU20 RB0 RB1
 RB2 RB3 RB4 RB5 RB6 RB7 RB8 RB9 RB10 RB11 RB13 RB14 RB15.
 Also for MULTI U11 ONLY SU16 SU18
CONVERTER CRYSTALS IN HC18/U AT £3.35 each.
 22.000, 36.666, 42.000, 96.000, 116.000
FREQUENCY STANDARDS £3.20 each.
 HC6/U 1000kHz 10.00MHz
 HC18/U 7.00MHz 10.00MHz 10.70MHz 48.00MHz 100.00MHz
TONEBURST, LF. & MPU CRYSTALS IN HC18 £2.80 each.
 7.168MHz (For 1750 Hz Tone), 10.245 (for 10.7 LF.)
 3.2768 4.000 5.0688 10.245MHz 15.00000
YAESU CRYSTALS FOR FT101 FT101 & etc £4.70 each.
 Many available ex stock (A list is available on request please send S.A.E.)
 Full list available on request, please send SAE

MADE TO ORDER CRYSTALS

FUNDAMENTALS	PRICE	OVERTONES	PRICE
FREQUENCY RANGE		FREQUENCY RANGE	
1.5 TO 2.0MHz	£3.00	3rd OVT 21.00 TO 65.00MHz	£5.35
2.0 TO 6.0MHz	£5.00	5th OVT 60.00 TO 110.00MHz	£8.00
6 TO 21MHz	£5.35	5th OVT 110.00 TO 125.00MHz	£8.75
21 TO 25MHz	£7.00	7th OVT 125.00 TO 175.00MHz	£11.00

DELIVERY: Approx. 2 weeks.

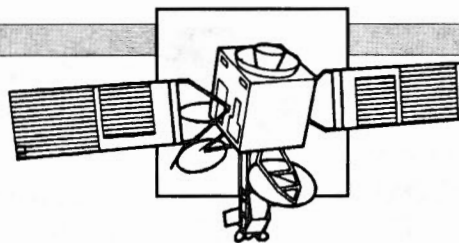
Unless otherwise requested fundamentals will be supplied for 30 pf load capacities and overtones for series resonant operation.

HOLDERS – supplied for crystals above 2MHz

HC6/U & HC33/U 1.5-175MHz
 HC18/U & HC25/U 2-175MHz
 HC17 Add £1.00 HC45 Add £3.75

DISCOUNTS: Price on application for 10 + units to same frequency spec. or bulk purchases of mixed frequencies.
 COMMERCIAL CRYSTALS: available on fast delivery and at competitive prices.
 EMERGENCY SERVICE: Add the surcharge for each XTAL. Days refer to working days. 4 days + £12, 6 days + £7, 8 days + £5, 13 days + £3.
 CRYSTAL SOCKETS HC25 £0.25 ea. MINIMUM ORDER CHARGE FOR SOCKETS £1.50 unless ordered with crystals.
 TERMS: Cash with order post inc. to UK & Northern Ireland. Cheques & P.O.'s to QSL LTD.

PRICES INCLUDE P&P and VAT



MIR

Musa, as shown by the Fig. 1 inset, which is the packet radio message he sent down to readers in late April, has been rather too busy to be able to get onto speech f.m. as often as he wished. However, his automatic packet radio has been on and operative continuously.

John G6SVJ, managed to connect to U2MIR-1 at 0941UTC on April 19 to read the mailbox contents. There he found headed messages from VOISA, KF0QN, XE2KAF, ZL1AFC, WG2G, ZL1AAN, VK2BY, IW1BMJ, N6TAF, N5PNU, K3JDG, KV4FZ, KP4BJD, HK4NNJ, VK4JON, LU7DSU, WG2G, VK2YOD, CE2FME, WA1GUD, KC4UZA, KJ9U, but none from Western Europe. Some of the message titles John saw were fascinating, such as 'Thanks Musa', 'Strawberries', 'Not much new', 'TNC software', 'Saluti' and 'Tanti Saluti', 'Saludos', 'Keps for STS-37', 'Space-space', lots of 'Hello Musa's' and 'Very Happy Birthday from Flo'. Quite a few messages were from TR8CA, who, because of the multiple up QRM and the difficulty to access from Europe, takes the RK3KP UA traffic via h.f. packet to pass on to U2MIR. Perhaps the best contest prize that we could offer readers for our next competition, would be a holiday at a packet radio QTH well away from Western Europe. This would enable the winner to have a QSO with the spacecraft crew!

Due to thousands of stations calling, very few European stations can successfully work MIR, because of the onboard QRM. One of the lucky few was Paul Goodrum G1WWX, Downham Market, Norfolk, as shown in Fig. 2, stayed up until 1am on May 15, which payed off. He is believed to be, at the time of writing, only the second 'G' station to have successfully entered a message into U2MIR-1's mailbox.

Musa Manarov U2MIR from MIR and Ken Cameron KB5AWP, pilot on the Shuttle, made the first amateur radio manned space-to-space QSO over Australia at 1241UTC on April 9, when seven radio amateurs were in orbit at once. Due to the usual problems, only callsigns were exchanged.

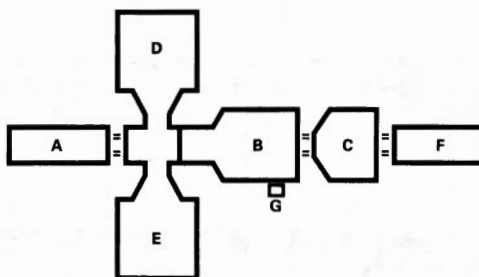
By the time you read this, Helen Sharman's GB1MIR mission will have come and gone, hopefully without intruders calling over the scheduled school contacts. Helen has her licence, as does Tim Mace, which is seen being passed to them in Star City by Richard Horton G3XWH, in Fig. 3. Boris Stepanov UW3AX, who has been of enormous organisational help in the official amateur radio commu-

SATELLITE SCENE

by Pat Gowen G3IOR

This month Pat Gowen G3IOR looks at topical news on the main current and future amateur spacecraft activities, with an update on the microsats to follow next month.

"The closer our landing, the more work there is. We are now changing blocks of apparatus and are installing new ones in my 'radio shack', so now the room is a shocking mess. I have almost stopped working Ham radio. My Ham radio gear is installed in the 'Kvant' module - the astrophysical one. Here is the sketch of our space station":



- A - Cargo ship
- B - Main module (main controls, main life space-cooking, exercises, Victor's sleeping place)
- C - Module 'KVANT' (my rig is here)
- D - Module 'KVANT-2' (life systems, exit for EVA)
- E - Module 'KRISTALL' (ovens for technology semiconductors, etc. My sleeping place)
- F - Our space ship (very good indeed)

"This month we have to go out twice on spacewalks (EVA). Our task is to transfer two drives for the solar batteries from module E to module C. The last time we went out, we installed special bearings (supports) on module C. The work is rather difficult. For transferring the drives we use a special cargo (load) Shaft G. It is telescopic like some antennas.

Now, about a few rumours:

We always have a stock of food to last several months, so hunger never threatened us, (and I have remained stout and handsome).

If the Progress cargo ship had not arrived, there would not be new equipment for subsequent experiments. However, there is still enough food, water, oxygen, forks and knives.

About a possible collision: Progress lost radio contact with the station and missed the docking unit. But for these events, we have some automatic control in the Progress on-board computer to put the cargo ship right back. In addition, at the moment of docking the crew must be inside the space ship with the hatch closed.

You see, it was not so dangerous.

We succeeded only in exchanging callsigns with STS-37. They had a damaged antenna.

73, Musa U2MIR

Fig. 1.

nications mission, can be seen in his Moscow office in Fig. 4, together with his 'JUNO' certificate.

Phase III Satellites

OSCAR TEN showed the first signs of its recovery in late April, with a rather weak and wobbly, but continuous carrier on the 145.810MHz beacon frequency. The Mode B transponder, with care, should be fully usable again now, but please first check into the nets to ensure that full transponder operational status is now advisable.

An attitude change was planned for OSCAR-13 in May, despite the

fact that solar eclipses affecting this satellite began on 22 May 1991. In the past, it has been the policy of the command team policy not to institute magnetorquing operations during eclipses. This is because of the demand made upon a limited charge battery supply. However, in August this year, as there is no choice but to perform this operation during periods of eclipse, it was considered that some experience of the techniques of magnetorquing during the June eclipses could be effected. This has the added bonus of an extra month of operation with the more favourable attitude of 180/0° in the process.

Problems then occurred in late

April and early May because of the wild magnetic field variations during the post equinoctial period of intense solar activity. This was combined with a severe series of non-scheduled geomagnetic storms of long duration. A delay of the final desired orientation resulted, but all was eventually mastered by the dedicated control and command team.

To keep us informed G3RUH and DB2OS report that the current transponder schedule, operative until 17 July 1991, will see the finish of the joint Mode BS. This is because Mode S operation while the Mode B transponder was still activated was found to be impractical, due to the interference caused by the high-power Mode B users. Thus, from Mean Anomaly 130 to Mean Anomaly 140 the Mode B transponder will in future be commanded off. The present schedule is now:

Mode B: MA 000 to MA 095.
Mode JL: MA 095 to MA 125
Mode LS: MA 125 to MA 130.
Mode S: MA 130 to MA 140
Mode B: MA 140 to MA 256

The omni-directional antennas will be in use from MA 240 to MA 030. Perigee eclipses up to a maximum of 29 minutes duration will occur from May 21, until the end of September. The latest May spacecraft attitude was ALON/ALAT 179.5/0.0.

The command team report that all transponders will have to be switched off from MA 200, through perigee to MA 035 from 22 May 1991 to 24 June 1991, even though further magnetorquing will not commence until 17 June 1991. Having the transponders off over this period, will provide a needed opportunity to gauge the state of the battery prior to the start of the eclipse period.

RS-Satellites

Whilst RS-10/11 continues to perform perfectly without a break, RS-12/13 took a tumble in early May. Nothing was heard from the new RS-12 transponder on either 29 or 145MHz for many weeks. A common command system to the main NAVSAT satellite and the RS-12/13 passengers was responsible, and the overall command station had sent signals, either accidentally or intentionally, to turn the amateur satellite off. Prior to then it was functioning perfectly, and until the decay of the equinoctial high solar flux which will not return again until September, I managed to work 24 countries via the satellite. These included W1,2,3,4,8,9 and 0, VE1 and 3, CZ3ANIK, UA0's ICA and JDV in far Zone 19, ZL2 and

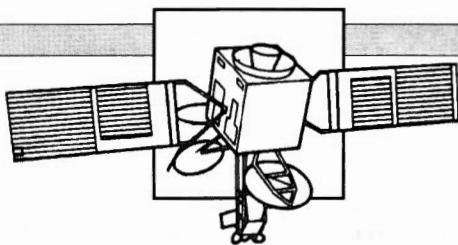


Fig. 2.



Fig. 3.

many Europeans. I found that I could access the 21MHz input and hear the 29MHz return, even when the satellite was up to 48° sub horizon from 320° through north to 20° azimuth. The RS-12 is highly recommended to old and new satellite fans alike. You will find it to be quite fascinating, of high DX-potential, and a source of superb ionospheric data and research to boot!

The full set of parameters and the means of decoding the letters and figures sent down by the RS-12/13 c.w. telemetry beacon, have now been supplied by Leo RA3AT, head of the RS3A command station. Being two full pages long, they are too extensive to fit into the restricted space of our column, but an s.a.s.c. marked 'RS-12/13 TLM PSE' sent to PW will result in a copy being sent to you by return of post.

The RS-14, known as OSCAR-21, still has its share of problems, and apart from the 145MHz c.w. telemetry, remained inactive for most of April. The sudden demise of the operating and fully functioning satellite, was rumoured to be a little 'finger trouble' from the command station. It is thought that the problem accidentally inserted the -12dB attenuator pads into the command receiver input, thus giving a distinct 'deafness' to signals intended to restore the situation. Leo UA3CR and his AMSAT-U-Orbita group have made good use of the telemetry findings that so many kindly sent in at his request, and found this to be of paramount importance in analysing the situation on board. He writes "We think there is some failure with the switching system in the RX input, probably relays activating the input attenuator. We plan to do some experiments to repair this". He hopes that all systems will be active and functioning again by the time you read this.

Coming Satellites

Whilst Dr. Karl Meinzer DJ4ZC, assures us that the future of the next Phase III-D satellite is secure, the same cannot be said for the projected Phase IV geosynchronous satellite. The earth pointing antennas diagram of this satellite are shown in Fig. 5. There is no doubt as to the technical feasibility nor the construction possibility, but unless international funding can be found for the project within the limitations of a poor economic climate, the future is doubtful at the moment.

UoSAT-F

On April 26, Arianspace announced that the earliest possible

ARIANE launch of ERS-1 from Kourou, French Guiana would be on Monday May 6. The ERS-1 is accompanied by UoSAT-F, which to be placed into a sun-synchronous 800km Low Earth Orbit. This latest satellite from the University of Surrey stables was first planned, and later dropped, but is now definitely to carry amateur radio equipment operating on a time-share basis.

The satellite's primary non-amateur radio mission is to provide store-and-forward communications for 'Satel-Life', an organisation formed by 1985 Nobel Prize winner Dr. Bernard Lown. Satel-Life will use UoSAT-F to provide a non-profit electronic mail network for health professionals. This will be initially to five African medical schools, to run 'Health-Net' for the exchange of electronic mail and reception of up-to-date medical literature.

Health-Net is a direct application of the current store-and-forward satellite communications techniques, developed in the Amateur Service and used by the microsats. When not serving Health-Net on non-amateur frequencies, UoSAT-F will work on Amateur Satellite Service frequencies, transmitting and receiving AX.25 data using 9600 bit/second f.s.k. modulation. The 2 or 5W downlink is on 435.120MHz (+/- Doppler shift) and supports a 1200bps a.f.s.k. backup. The uplink is on 145.900MHz, also 9600bps f.s.k. with 1200bps a.f.s.k. backup, and this channel will be used by ground stations transmitting 'hole lists' and requests for the PACSAT Broadcast Protocol.

There should be little interference with the UoSAT-OSCAR-14 microsat using the same frequency, format and modulation. However, it has the advantage that stations already equipped for UO-14 operation will be able to receive UoSAT-F with exactly the same software and hardware they already use. The UoSAT-F will transmit telemetry and status messages as U-o-14 and files will be broadcast using the PACSAT Broadcast Protocol as already used on PACSAT, LUSAT and UO-14.

The UoSAT-F's role in the amateur satellite service will be similar to that of UO-9, UO-11 and

WEBERSAT. Instead of providing a two-way communication service, it will transmit experimental data and telemetry. The most exciting aspect of this mission will be the charge-coupled device (c.c.d.) camera. The UO-F's c.c.d. camera design incorporates all of the lessons learned from previous UoSAT c.c.d. experiments. It has a 110° wide angle lens providing a field of view only slightly smaller than the satellite's footprint itself. Images will measure 1600 by 1800km, making identification of ground features much easier than those from the previous cameras of UO-9 and WO-18. The image will be 578 pixels by 576 pixels, providing ground resolution on the order of 2km. Each pixel is 8 bits, giving a black and white image with 256 levels of grey.

In service UoSAT-F will broadcast its c.c.d. images regularly, using the standard PACSAT Broadcast Protocol. The two transputer microprocessors in the c.c.d. camera module will take the image and send it over an on-board network to the main 80C186 on board computer OBC186. The OBC will put the image into a file, with 256 bytes of image header information and a standard PACSAT File Header. This file will then be broadcast. For those interested in

writing their own display program, complete technical details of the image file contents will be published soon, and as soon as confirmed that the camera is working, a display program for PC compatible computers will be distributed as software by the satellite itself, using the Broadcast Protocol.

The wide-angle black and white c.c.d. camera on UoSAT-F will complement the WEBERSAT camera that has recently been so successful, and taking advantage of the stable, Earth pointing UoSAT and the 9600 bit/second downlink, it should provide very interesting results for experimental and educational users.

Satellite Modes And Frequencies

Finally, many readers have asked for the frequencies and modes used by the many amateur radio satellites. Your s.a.e. with a request for 'SATFREQS' to PW will provide this comprehensive information to you.

Remember that an s.a.s.c. sent to PW marked 'KEPSETS PSE' will provide you with latest fully titled sets of all satellites. PW



Fig. 4.

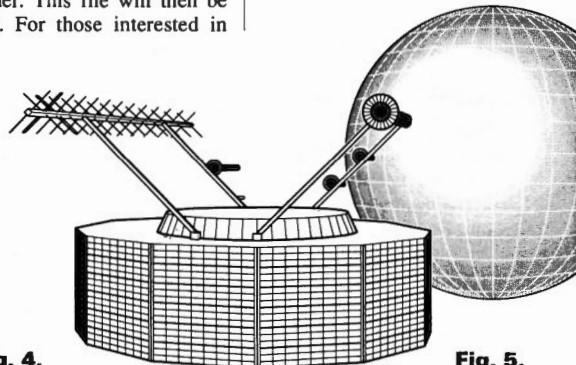


Fig. 5.

PACKET PANORAMA

This month Roger Cooke G3LDI, provides some statistics and some sound advice on improving the packet networks.

I'm pleased to report that I've been asked to join the RSGB Data communications committee. This will be as a corresponding member mainly, due to the fact that I work most Saturdays with the day job, then run quite a busy function-band in the evenings.

However, having been active on h.f. packet since mid-1985, with a BBS on h.f. since early 1986, I hope I'll be able to contribute something constructive. I'm especially interested in the band-planning situation. If any of you have any strong views on this matter that you would like me to present, please let me have them. Either way, I am not prejudiced. Biased yes, but prejudiced no! We desperately need to get the situation sorted out, internationally, not just in our own back-yard.

Traffic

Just to give an idea of what goes where, who sends what to whom, etc., I am including some of my log-file analysis for the month of March, together with that from Manos SV1IW.

This will give you some indication of just what the BBS has to get through in the course of one month. It will also serve to remind us that, as the users increase, so does the traffic. So please give a thought to that when planning your next bulletin.

Referring to the tables, it can be seen that Manos SV1IW, is one of my main forwarding routes, both for private mail and bulletins. Most of the @EU bulletins come via Jim 4X1RU, who edits them first, taking out all the out-dated, irrelevant, advert-related and foreign language items, that only serve to clog the system. These items are however, imported elsewhere and only serve to waste time both in forwarding them around GBR, and being listed but hardly ever read by users.

Reading In Chambers

Speaking pedantically, a bulletin is, according to Chambers Dictionary, 'an official report of public news, or of a patient's progress'. This

statement covers the BBS system admirably. It does indeed have some very interesting and informative 'bulletins' posted, but they're interspersed amongst others that should never have been posted in the first place.

Garbage Defined

The proliferation of what must be called garbage, is causing the system to become self-strangling. This is in spite of many sysops attempting to ease the situation by employing second, third and even fourth radio ports. I think we can view the system as a 'sick patient' that requires medical attention, indeed surgery in some cases! I feel it is time to take the whole system to task. I'm sure that you all know what I mean by 'garbage'. This occurs in several different categories:

1) Foreign language bulletins. I admit some can be useful for students of that language, but the majority should never have come over the channel in the first place. Most seem to be asking for help

from their own people so why target the bulletin @EU?

2) One station was issuing 5k bulletins of temperature measurements in all major capitals - one month old!

3) Bulletins emanating from Japan and such places issued @WWW, containing heard lists on 50MHz, six months old!

4) Humour bulletins, some very risqué, some downright disgusting, some very racial. All totally unnecessary, (I am not a kill-joy, I just think that a BBS is not the time or place for it).

5) The endless debating society debacle. Say no more!!

6) The adverts, whatever type.

To use a system, such as amateurs have established over the last five years, in any of the above ways, is, to my mind advocating chaos. Each sysop has contributed a vast amount of equipment, money and time, in order to provide a resource which should be a virtual reference library of immediate, up-to-date information on amateur radio (am I the only idiot editing at 6am?).

However, in order to make the system work under the

GB7LDI From Fri Mar 01 1991 to Mar 28

Total Message #'s Used	4035
(From #2185 To #6220)	
Total Messages received	628
Total NTS traffic handled	6
Local NTS traffic handled	2
Total Messages Killed	3576
Total Log Records Read	19268
Total Number of Users	58
Number of Restarts	49
Number of Quits	17

Messages Forwarding Data

Messages forwarded	4005
Messages rejected on forwarding	2331
NTS messages forwarded	4
\$ type bulletins forwarded	2661

Messages forwarded to other BBSs

2384 To/from GB7VLS	921 To/from SV1IW
278 To/from WA3TAI	81 To/from TF3KB
4 To/from 4X1RU	37 To/from RK3KP
33 To/from RS3A	19 To/from GB7TLH
5 To/from G0MWH	3 To/from [44.131.16.2]

Log analysis SV1IW

Traffic of SV1IW BBS for all available ports.

For the period from 18-03 to 24-03.

Total connection time	9147 min. (152h 7 min.)
Total time on local console	29 min.
Total time on h.f. 10/15/20	248 min.
Total time on v.h.f. 144.650	5769 min. (96h 9 min.)
Mean time per connection	9 min.
Mean time per user	132 min.
Number of messages killed	107
Number of messages read	560
Number of users	69
Number of LOG lines	6327

Number of forwarded messages per day

Number of forwarded messages	1511
Messages received on forward	620
Messages received on reverse	82
Number of messages refused	272

PACKET PANORAMA

strain, forwarding is virtually continuous all day, leaving a few evening hours for users. The situation is, of course, exacerbated if the private mail pool is suddenly increased due to a change in propagation! Collisions and retries occur, complaints come in and so on.

Non-Bulletins

What I would like to see with reference to the above is:

Foreign language bulletins. Remove them all (except, of course, the private mail to and from that particular country).

Temperature charts a month old. They are killed on sight and should never have been originated in the first place, unless it is personal mail to an individual who might want it. I wonder why though?

Heard lists, etc. The same applies - as above.

Humour bulletins. Send them to the *Beano* or *Dandy*. I run a BBS, not a comic!

Debating Society. Letters to the Editors of *PW*, *RadCom* or other radio magazines please, NOT the BBS.

Adverts. NONE whatsoever allowed, I don't run an *Exchange and Mart* and have no intention of doing so. Just think of the awful proliferation if it was 'legal'.

Please ask yourself 'Is my bulletin really necessary?' before placing it on the BBS.

You're a 'Forthright, autocratic beggar' I hear you cry! Perhaps, but I pay the electricity bill and own the gear, so I consider I am entitled to express these opinions! I would, however, be pleased to hear your opinions and will be more than happy to present them in this column. If I am outnumbered, I stand to be corrected.

Just enough space to remind those who are coming to the EADG Barbecue (QTH G3LDI) on June 30. The catering arrangements have now been made, but there are just a few spaces left if you're quick. See you there.

Brickbats, rocks and verbal abuse to G3LDI @ GB7LDI, QTHR or tel: (0508) 70278.

73 and happy packeting.

Please send a large s.a.e. envelope to the editorial office, if you would like a more detailed analysis of the figures shown in the tables.

BBS	Received		Sent		Efficiency Bits/s
	NbMess	Size	NbMess	Size	
4X1RU	48	73344	161	305180	204
DK0MWX	2	208	1	516	6
EA4BS	0	0	8	5567	20
F6FBB	2	933	10	12097	46
GB7LDI	156	193135	91	110320	44
HB9JAM	6	7507	89	108523	82
I1HUH	0	0	2	1254	31
I5SGG	35	2164	19	16428	27
PA0SCH	29	49630	114	169688	45
PA3AIR	80	141237	11	22821	42
RK3KP	9	4405	8	6385	15
SM5BKI	3	1803	11	13587	21
SV1ML	255	313327	196	318407	100
SV2DXC	18	18112	289	597189	66
SV7QI	1	297	11	6424	165
SV8RV	29	47397	204	320364	76
VS6UF	22	20298	47	60403	30

Starting Frame

Backbone: A packet radio network that transfers mail automatically; access to this network is limited to BBSs only.

Backbone frequency: The operating frequency of the backbone network.

Backspace: A terminal (screen/keyboard) key or control character that deletes, in reverse order, previously typed characters.

Balanced: A relationship where two stations communicate with one another as equals; that is, neither one is primary (master) or secondary (slave).

Balanced Link Access Procedure (LAPB): The CCIT X.25 link-layer protocol that was the model for AX.25.

Battery-backed RAM (bbRAM): RAM that is powered by a battery to enable it to store data while its host device is switched off.

Baud (Bd): A unit of signalling speed equal to the number of discrete conditions or events per second.

Baudot Code: a numerical definition of characters used in passing messages between computer systems. It is almost identical to the Murray Code, used in Great Britain.

Baycom: A packet system comprising a very simple, build-it yourself, cheap t.n.c. and a program for IBM/clones. Written by programmers in Germany, the program is available as 'Shareware' (try-before-buy).

BBS: Abbreviation for Bulletin Board System, (see below).

Beacon: A t.n.c. Command/function (normally shortened to 'b') that permits a station to automatically send unconnected (or general call) packets at regular intervals.

Bell 103: The designation for the (Bell) telephone company standard modems that transfer data at 300 baud using 200Hz frequency-shift-keyed tones centred at 1170 and 2125Hz. It is more common now to use 1600 and 1800Hz, producing a centre frequency of 1700Hz.

Bell 202: The designation for the telephone company standard modems that transfer data at 1200 baud using frequency-shift-keyed tones at 1200 and 2200Hz; commonly used for v.h.f. packet applications. Use of these frequencies again produce the same centre frequency of 1700Hz.

Bit: Binary digit. A signal that is either on/off or one/zero. Bits are combined to represent alphanumeric and control characters for data communications.

Bit rate: The speed at which information is transferred, usually expressed in baud or bits per second (b.p.s.). Also called Baud-rate or data rate, though Baud-rate and b.p.s. may not be the same.

Bit stuffing: A process that prevents AX.25 fields from having the same unique contents as the flag field. Also called zero bit insertion.

Bits per character: The number of bits combined to represent alphanumeric and/or control characters for data communications. Baudot and Murray code both use a reduced range character set (see ASCII).

Buffer: A portion of the computer memory that is set aside to temporarily store data that is being received or transmitted.

Bug: A term used in computing to describe a recurring program error that causes an unwanted, or unexpected result.

Bulletin Board System (BBS): A computer system where messages and files can be stored for the benefit of other users.

Bye: BBS command (often just 'b') to 'log off' or disconnect from most bulletin boards or message systems.

Byte: A group of bits, usually eight in number.



Castle Electronics

Tel: 0384 298616

Fax: 0384 270224

**MAJOR SERVICING/REPAIR
CENTRE FOR ALL AMATEUR,
PMR AND COMMERCIAL
RADIO EQUIPMENT...**

**KENWOOD YAESU
ICOM ALINCO**

SR STANDARD.

**plus MOTOROLA and MAXON
and all other major manufacturers**



- ★ Suppliers of all above makes and offering a full service and spares back-up
- ★ Supply and installation of all PMR and commercial radio systems
- ★ Guaranteed 7 day turnround (subject to spares availability)
- ★ Collection and delivery service available if required
- ★ Trade service enquiries welcome (special rates)

Castle Electronics are a fully equipped DTI approved radio engineering company based in the West Midlands, who specialise not only in PMR equipment, but in land and marine based HF communications equipment of all types.

Our engineers are widely experienced in not only early but also digital/synthesised radio equipment covering a wide range of makes and models.

A 24 hour emergency call out service is available covering the whole of the UK.



**UNIT 3, "BAIRD HOUSE", DUDLEY INNOVATION CENTRE
PENSNETT TRADING ESTATE, KINGSWINFORD
WEST MIDLANDS D76 8XZ**



Certain types of test and measuring equipment require the use of a 'scope to 'see' some aspects of the application. One, for example, is in the measurement of Total Harmonic Distortion (THD) from quality audio amplifiers.

This technique will be apparent from details of this application and the oscillogram, Fig. 3.7, included in this article. Incidentally, full constructional details of a combination sinewave generator and THD meter were published in *PW*, March and April 1983. (The 'PW Durley Distortion and SINAD Meter, by E.A.Rule).

Of course, there are books available dealing with various kinds of testing and measuring equipment requiring the use of a 'scope (Reference 2, Part. 1). Other applications are dealt with in the following sections.

Phase Differences Again

Although the simple methods illustrated in Part 2, will indicate phase difference between two signals at the same frequency within the audio spectrum, or even at very low radio frequencies, they're not particularly accurate.

This lack of accuracy is mainly because there's no indication of the difference in a finite number of degrees. Remember that a complete sinewave, or parts of it, can be measured in degrees, as in Fig. 3.1, and that 360° is also the equivalent of a complete circle.

Circular Time Bases

More accurate measurement of phase difference, or shift, can be obtained by using a 'circular timebase'. I demonstrated in Part 2 that a perfectly stationary circle can be displayed on a c.r.t. screen.

Do you remember the 'OXO' oscillogram in Part 2? For the letter 'O', a sinewave (about 1000Hz) was fed 'direct' to one Y input and simultaneously, but via a capacitive/resistive network to the other Y input as in Fig. 3.2. This network is used to shift the phase of one signal by 90°.

The two signals are shown separately in the oscillogram, Fig. 3.3, in which (A) is the direct signal and (B), is the same signal via the network. The phase difference is not instantly apparent until both signals are displayed, one over the other, as at (C).

A 'circular timebase' is produced in the same way with a sinewave direct to one Y input and via a 90° phase shift network to the other as in Fig. 3.2. The sinewave signals to the c.r.t. itself are adjusted to the same amplitude and the 'scope switched for 'XY' function as described above. Slight adjustment of the gain of each Y amplifier, and the X shift control may be necessary to produce a nice round circle centralised on the crt screen as (C) in the oscillogram, Fig. 3.4.

Using A Circular Timebase

The 'bright spot' (A) on the circular timebase in Fig. 3.4, is a signal we can call (S2) but which is out of phase with another (S1) which isn't visible but otherwise located at the top of the circle i.e. at 0/360°. Taking this point as 0 degrees and moving clockwise, the position of the bright spot (S2) is at approximately 100°. The signal S2 is made visible by feeding it to the 'Z input' (see 'Z modulation' below). Details for suitable external circuitry will be found in references 1 and 2, part 1.

However, as proof that the method is viable, the oscillogram, Fig. 3.5, is included and which was ob-

The Oscilloscope In Your Workshop

In part three of the series, Fred Judd G2BCX looks at measuring distortion, recaps on phase measuring techniques, other display types and photography.

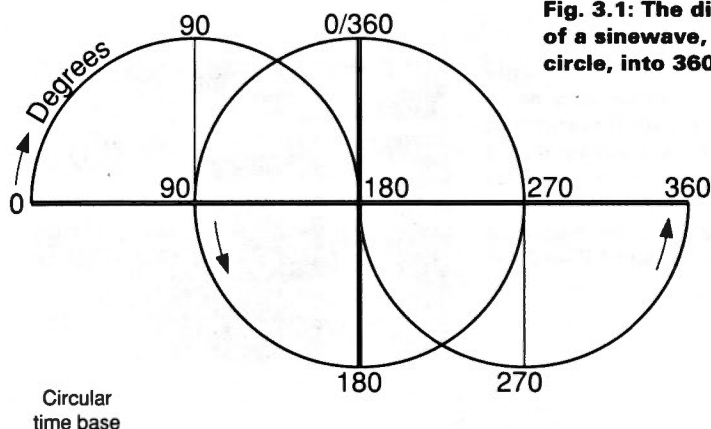


Fig. 3.1: The division of a sinewave, or a circle, into 360°.

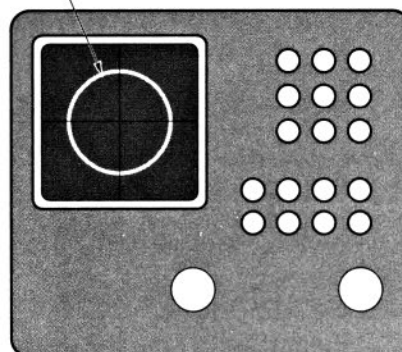


Fig. 3.2: 90° phase shift network and connection of a sinewave both direct and via the network to a 'scope Y amplifier inputs (see text). Values C1, C2, R1 and R2 depend on frequency.

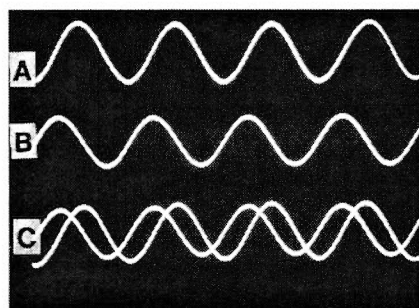
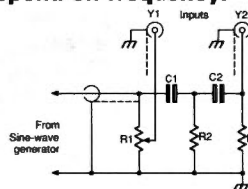


Fig. 3.3: There is a difference in phase between the sinewaves (A) and (B) but this is more apparent visually when they are one above the other as in (C).

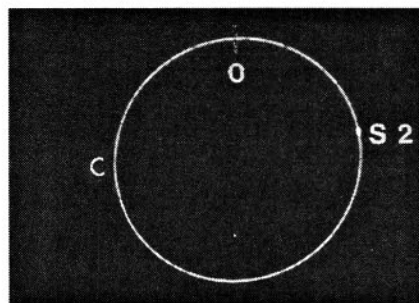


Fig. 3.4: The formation of a circular timebase (C) with a 'Z modulated' signal (S2) about 100° from the 0° point marked at top of circle (see text and Fig. 5).

Fig. 3.5: A circular timebase (C) with a Z modulated signal (A) at 0° and another at (B) phase advanced by 70° from (A). The graticule divisions are each 10°.

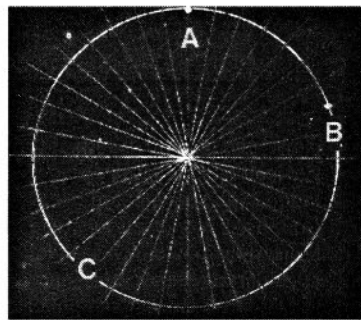


Fig. 3.6: Oscilloscope display of a more sophisticated method of measuring phase difference. See text for interpretation of relationship between the (A) and (B) and the markers.

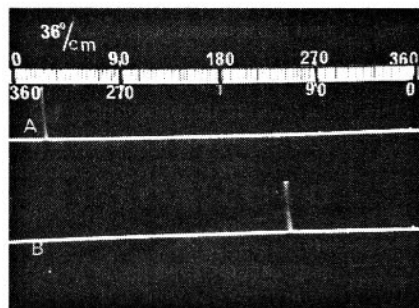


Fig. 3.7: Total harmonic distortion (THD) from a high quality amplifier at 1000Hz. (A) The sinewave at the amplifier output. (B) The THD at 0.1% or -60dB relative to output signal (see text).

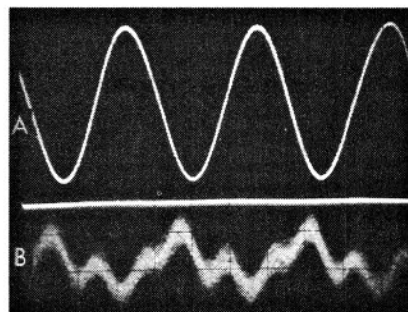


Fig. 3.8: Three 'frames' of a still TV picture. Signals from video output to c.r.t.

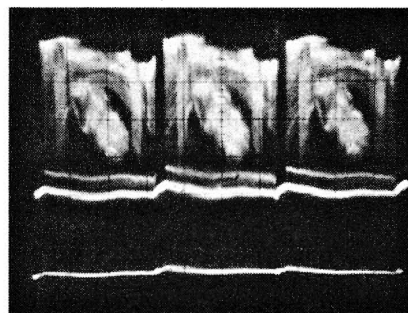
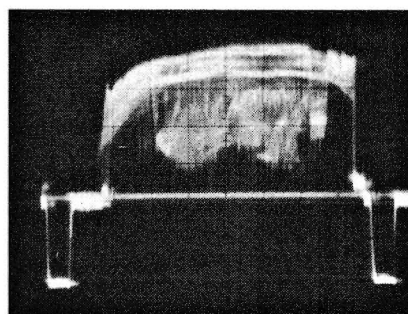


Fig. 3.9: One 'line' from a still TV picture with video frequency modulation to c.r.t. and at the left, the next line pulse.



tained using specially designed external equipment. The 10° calibration lines are marked on a special graticule to which the circular timebase (C) is aligned.

The phase difference between signal (A) at 0° and signal (B) is 70°. A difference of ± 2 or 3° is quite easy to discern using this method.

Z Modulation.

Most 'scopes have the Z modulation facility which allows signals to be fed direct to the grid of the c.r.t. Such signals may be + or - going. If they're + going, parts of the trace coincident with the signals will be brightened up and if negative will appear as blank spaces on the trace.

The Z modulation technique is used in the previous application, and it will be mentioned again later in connection with another task. You've already watched the technique in operation on TV! The video signals to construct your facsimile picture, are used in a form of Z modulation at the c.r.t. grid in TV sets to produce the light and dark parts of the received scene.

Another Method

The following alternative method was originally devised by me for measuring phase difference. It can measure the phase difference between signals at different frequencies. It can also be used in the same way when evaluating the two channels of a stereo audio amplifier, the replay channels of stereo tape recorders and signals from a stereo gramophone pick-up. The equipment as a whole had other phase measurement applications, but the essential 'indicator' was a dual trace 'scope.

The oscillogram, Fig. 3.6, shows the phase difference between signals at the two outputs of a stereo amplifier. A sinewave was fed to the inputs of BOTH channels simultaneously. The two amplifier outputs were connected to separate inputs on the phase measuring equipment.

The 'blip' on trace (A) indicates a phase difference of 18° between the two channels at 1000Hz and on trace (B) a phase difference of 241° at 10 000Hz.

Note: the slight distortion in the photograph makes the readout appear slightly inaccurate. With the actual display it was possible to read ± 1 or 2° (Calibration 3.6°/ma).

Total Harmonic Distortion

The measurement of THD, as it's usually called, involves the use of a very low distortion sinewave generator and harmonic distortion analyser. While 'readout' is usually from an analogue meter, a 'scope is necessary to 'see' the distortion content as well as residual hum and noise.

The noise is normally measured separately and hum is filtered out for THD measurement. The sinewave used for this application must have a harmonic distortion content of not greater than 0.05% at all frequencies used for testing. Any hum and noise with the signal must be in the region of -80dB reference the maximum level of that signal.

A Practical Example

The trace (A) in the oscillogram, Fig. 3.7, shows the test sinewave of 1000Hz at the amplifier output. For measurement purposes, the output signal from the amplifier is fed to a correctly impedance-matched dummy load and simultaneously to the distortion analyser.

The THD, etc., is **RELATIVE** to the maximum output power of the amplifier before the onset of 'clipping'. Trace (B) shows the measured THD which was 0.1% or -60dB relative to the amplifier noise on the harmonic signals.

It's highly probable these days that full performance testing on high quality amplifiers is entirely automated, with the results being fed directly to a computer for analysis and readout. This was in fact being done experimentally by one large manufacturer in Japan, nearly 20 years ago!

Video Applications

Oscilloscopes are much used in the TV and video engineering field, particularly by service engineers. I've already given as reference 3 in Part 1, the book *Servicing With The Oscilloscope* by Gordon J. King, and I recommend it once again.

You may now realise that to deal fully with most of the different applications using a 'scope, would mean writing a whole article for each one. Because of this, our look into video must be limited to the two oscillograms, both of which were taken from a video recorder (video signal output).

The oscillogram, Fig. 3.8, shows three 'frames' of (Z) modulation for a still picture, while Fig. 3.9 shows 'one line' with the picture modulation applicable to that line. The pulse for the line scan itself, can be seen on the left and that for the next line on the right. Using suitable timebase speeds, a 'scope will also resolve a large number of the line scan pulses. It will also display the sync' pulses, frame scan waveform and even the Ceefax (or Oracle) information pulses between frames.

Pulse Shaping Circuits

Again, and for the same reasons as the video applications, examples of pulse shaping circuits must be limited. Basic methods are shown, Fig. 3.10, with (A) being a simple 'differentiating' circuit for producing + or - going, narrow pulses suitable for triggering, or as markers.

Pulses of either polarity are obtained with the addition of a diode as in (B). The circuit (C) is for 'integration' which, with suitable values of C and R, will produce a sawtooth-waveform.

Each of the circuits shown require a squarewave input and can be used in conjunction with a transistorised amplifier. The circuit (D), is a 'mono-stable' (one shot multivibrator) which requires a negative going 'trigger' pulse to make it function.

The circuit will produce a variable width squarewave at the output, depending on the value of C2 and variation of VR1. This circuit is sometimes called a 'flip-flop' because of the way it functions. It is however, useful for providing variable 'gating' pulses. The oscillogram, Fig. 3.11, shows (A) an initiating squarewave, (B) complete differentiation (production of sharp + and - pulses) and (C) the - pulses rectified out to provide single + pulses. There are of course other 'shaping circuits' using transistors, as well as integrated circuits, for specific 'pulse' applications.

Squarewaves And Y Inputs.

Most 'scopes have a provision for a.c. input (via a capacitor) or d.c. input, which is direct to the Y amplifier itself. The a.c. input is suitable for most repetitive waveforms. For the examination of squarewaves, especially at low frequencies and of course d.c. potentials, the Y amps: d.c. inputs must be used.

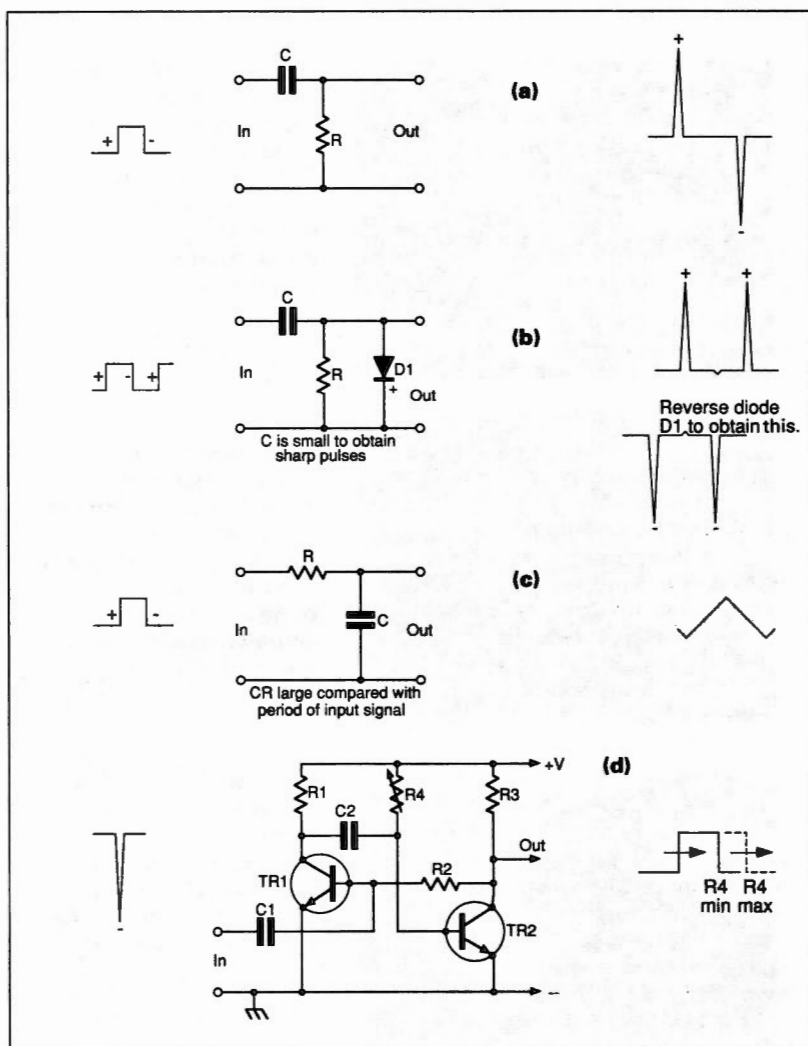


Fig. 3.10: Basic waveform 'shaping' circuits (A) for differentiation of a square-wave. (B) A diode may be connected across R to provide either single positive or negative narrow pulses. (C) Integration. With suitable values of C and R a sawtooth wave can be obtained. (D) A 'one shot' multi-vibrator (flip-flop) will provide a variable width square-wave (see text).

Low frequency squarewaves fed via a.c. inputs will suffer some differentiation, and the tops and bottoms will be slanting as in the oscillogram, Fig. 3.12, in which (A) is a 10Hz squarewave via the Y input, switched for a.c. signals, and (B) switched for a.c. input. This applies when a.c. coupling is used in normal amplifier circuits.

Other Applications

The flexibility of modern 'scopes allows for many different applications. We have dealt with only a few here, but there is room for one more. I devised this circuit some years ago, for using a dual beam 'scope for 'automatic plotting' of antenna radiation patterns from v.h.f. models.

The model antennas, operated at a frequency of around 600MHz, were working replicas of antennas intended for v.h.f. and u.h.f. amateur bands. Details of this, and later methods can be found in *Out of Thin Air, Wires and Waves* and my book, *The 2 Metre Antenna Handbook*, all available from PW Publishing.

The oscillogram, Fig. 3.13, is a 'Cartesian' plot of the radiation pattern from a 600MHz model of a 2-element ZL Special antenna otherwise intended for operation on 144MHz. The 'dots' are sharp + going pulses used as Z modulation (trace brightness-up) and 10° apart. These measurements made it possible to replot the radiation patterns on polar graph paper. The continuous 'plot rate' was about 3 per second.

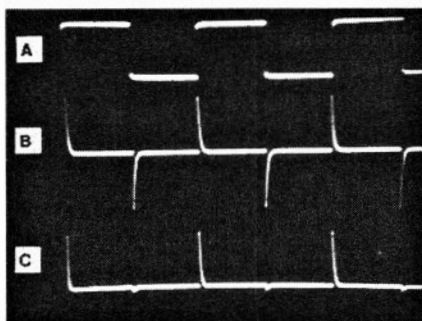


Fig. 3.11: Oscilloscope showing examples of Fig.10 (A) and (B). (A) Squarewave. (B) Differentiation. (C) Positive narrow pulses by differentiation and use of a diode.

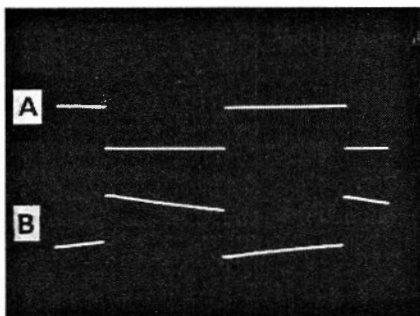


Fig. 3.12: (A) A low frequency (10Hz) square-wave as it should appear using the d.c. input to the Y amplifier(s) (B). The tops and bottoms will appear to be sloping if the Y amplifier(s) a.c. inputs are used.

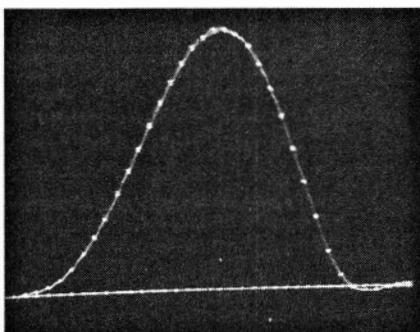


Fig. 3.13: A 'Cartesian' plot of the radiation pattern from a very high frequency model of a 2-element ZL special antenna. Markers 10° (see text for other details).

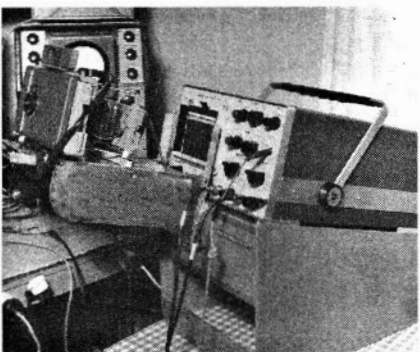


Fig. 3.14: Oscilloscope stand and camera support. The 'scope is an Advance OS250. Camera is a Polaroid model 350. The 'scope in background is a Cossor 1039 MKIII.

Oscilloscope Photography

Some of the oscillograms in this series have been taken with a Topward 7021 3 trace 'scope, available from Maplin Electronics. Some were from an Advance OS250 dual trace model and a few were taken from a Cossor 1039 MKIII 'scope.

With the Advance and the Topward 'scopes, photography was carried out with a Polaroid camera model 350 using 3000 ASA black and white instant film packs, 'Polaroid 667 Professional' type. The camera was modified for time exposure, in addition to the electronically controlled shutter speeds, and the lens aperture was 'stopped' to about f16.

In order to obtain to maintain optimum focus and keep the camera perfectly aligned with the 'scope screen, a suitable stand and adjustable camera support was constructed as shown in Fig. 3.14. Photos were taken with the room darkened and the c.r.t. brightness at maximum. This is essential if there is any movement in the signals displayed on the screen.

That's all for this month. Next time we'll look at the 'spectrum monitor', a specialised and very useful extension of the 'scope. Special Instruments using long persistence c.r.t. displays and large screen 'scope v.d.u.s.

AVAILABILITY PROBLEMS?

Be sure of getting your copy of PW each month. Place this regular order form with your newsagent... today.

If you have any problems obtaining your issues of PW, please let us know the details and we'll endeavor to solve them.

Dear Newsagent,
please reserve / deliver my monthly
copy of PRACTICAL WIRELESS

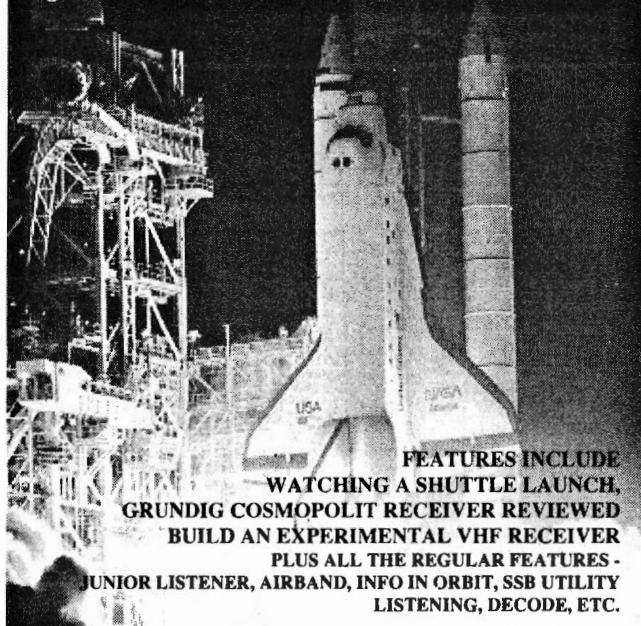
Distributed by Seymour

NAME

ADDRESS

Signed

SHORT WAVE MAGAZINE JUNE 1991 ISSUE ON SALE NOW



FEATURES INCLUDE
WATCHING A SHUTTLE LAUNCH,
GRUNDIG COSMOPOLIT RECEIVER REVIEWED
BUILD AN EXPERIMENTAL VHF RECEIVER
PLUS ALL THE REGULAR FEATURES -
JUNIOR LISTENER, AIRBAND, INFO IN ORBIT, SSB UTILITY
LISTENING, DECODE, ETC.

Having difficulties with RAE MATHS?

PWT Electronics have produced a 3 hour video on "RAE Maths ONLY" to help with the RAE Exam. ALSO: **RAE COURSE** on video. Contains nearly all you need to know for the Radio Amateurs Examination.
Both videos £25.00 each incl. p&p. VHS only.

PWT Electronics, 21 Elmbank, Buckfastleigh, Devon TQ11 0DN

SGC

SG-230

SMARTUNER

HF ANTENNA COUPLER
SSB, AM, CW & DATA
FAST - INTELLIGENT - ACCURATE
OPERATES WITH ANY HF TRANSCEIVER

The Smartuner high technology coupler intelligently tunes any length antenna (8 to 80ft) in the HF band. The unit will operate with any HF transceiver within its specifications. The Smartuner switches 64 input and 32 output capacitance combinations plus 256 inductance combinations in a "pi" network resulting in over a half-million different ways to ensure a perfect match for the transceiver; and, it remembers the frequency and the tuning values and will re-select these values in less than 10ms next time you transmit on that frequency.



**SPECIAL
HAM PRICE:**
U.S. \$555.00

Includes shipping to U.K.

- MICROPROCESSOR CONTROLLED
- NON-VOLATILE MEMORY
- WATERPROOF
- B.I.T.E. INDICATOR
- FOR MARINE, AVIATION, HAM AND PARA-MILITARY APPLICATIONS
- 1.8 TO 30 MHz RANGE
- 10 TO 150W INPUT POWER
- 10ms RETUNING TIME
- 8 TO 80 FT ANTENNA (ALL Types)

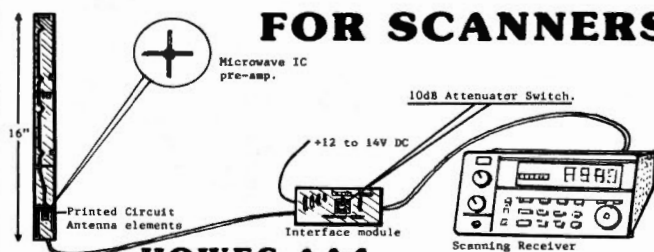
Visa and Mastercard/Access Accepted

The SG-230 Smartuner is available from: **Paktel Communications (0945) 65716**
Communications Centre (0908) 610625 and Cap.Co Limited (0948) 74717
DELIVERY FROM STOCK

SGC Inc. SGC Building, 13737 S.E. 26th St. Bellevue, WA. 98005 USA
P.O. Box 3526, 98009. Telex: 328834. Fax: (206) 746-6384 Tel: (206) 746-6310

C.M.HOWES COMMUNICATIONS

ACTIVE ANTENNA FOR SCANNERS



HOWES AA4

The **HOWES AA4** Active Antenna gives full coverage from 25 to 1300MHz. It is designed to be the ideal solution for those requiring a compact, broadband antenna for use with scanning receivers. The AA4 features advanced technology with a low noise microwave IC amplifier.

- ★ Fully broad-band covering 25 to 1300MHz.
- ★ Low noise microwave IC (NF <3dB). Over 15dB gain. IP3 +15dBm.
- ★ Coax powering 12 to 14V DC at less than 20mA.
- ★ 10dB switched attenuator on the receiver interface board.
- ★ 16 inches long, 1.2 inches wide. Easy to build kit or ready built modules.

If your scanner reception could benefit from the addition of a remotely located antenna, or you would like a much neater, more compact alternative to the ugly discone types, then the **HOWES AA4** could be just the job! You can read the review in the November '90 Short Wave Magazine. Excellent performance in a small space!

AA4 Kit: £19.80

Assembled PCB modules: £26.80

AA2 ACTIVE ANTENNA for 150kHz to 30MHz

The **HOWES AA2** is the active antenna to use for general coverage HF reception. Broad-band performance that does not tail off at the higher frequencies. The neat, compact answer for those with limited space, holiday use, mobile operation etc. Two selectable gain settings, local or coax powering (12 to 14V), IP3 +38dBm. Easy to build and much liked by customers!

AA2 Kit: £8.50

Assembled PCB: £12.90

Mail order to: EYDON, DAVENTRY
NORTHANTS NN11 6PT
Tel: 0327 60178



HF SSB and CW RECEIVERS

Our range of simple, but very effective receivers opens up the world of long distance radio communications for a very modest outlay. Most of the kits listed below are designated for use on various amateur bands. Give us a ring to discuss your requirements for frequencies not shown here.

The kits contain the electronics to build the receivers. "Hardware packages" contain the mechanical items (case, dial, knobs, sockets etc) to go with the "works" supplied in the basic kit. In addition, all our amateur band receivers have **matching transmitters** to suit the **Novice** and full amateur licence. These can be combined with other kits to form complete transceiver projects.

SSB/CW RECEIVERS	Kit	Assembled PCB
DXR10 3 Band (10, 12 & 15M) for DX amateur work	£26.60	£39.90
DcRx54 4.45MHz Aircraft band (rescue etc)	£15.90	£22.70
DcRx20, 40 or 80M Single band amateur receivers.	£15.90	£22.70

DXR10 Hardware package: £14.90

DcRx Hardware package: £16.50

RECEIVER ACCESSORIES

CBA2 Buffer to enable use of DFD5 counter	£5.90	£9.50
CSL4 Sharp, dual bandwidth (SSB & CW) filter	£10.50	£17.40
DCS2 "S Meter" kit for above receivers	£9.20	£13.80
DFD5 Digital frequency counter/display	£41.50	£64.50
XM1 Crystal Calibrator, 8 marker frequencies	£16.90	£22.80

CV100 - ADD SHORTWAVE TO YOUR SCANNER!

This kit converts 1 to 40MHz up to 101 to 140MHz so you can tune these frequencies with a normal VHF scanner. No mods to the radio are needed.

CV100 kit: £26.50

Assembled PCBs: £37.90

PLEASE ADD £1.20 P&P to your total order value.

HOWES KITS are produced by a professional RF design and manufacturing company. They contain a good quality printed circuit board with screen printed parts locations, full clear instructions and all board mounted components. Sales and technical advice are available by phone during office hours. Please send an SAE for our **free catalogue** or specific product data sheets.

73 from Dave G4KQH, Technical Manager.

JAYBEAM * CUSHCRAFT * TONNA * MIRAGE

ANTENNAS and Accessories

JAYBEAM * CUSHCRAFT * TONNA * BUTTERNUT * MIRAGE * MET * BNOS * YAESU ROTATORS * MFJ * LANDWEHR * DRAE * KLM * DATONG * SANDPIPER

HF TRIBAND BEAMS		
CUSHCRAFT	A35-3EL	£360.00
JAYBEAM	TB3-3EL	£403.00
	MM3-MINIMAX	£417.00
KLM	KT34A-4EL BEAM	£390.00

HF VERTICALS		
BUTTERNUT	HF2V-80 + 40	£149.00
	HF6VX-80-10	£175.00
CUSHCRAFT	R5-20-10M	£265.00
JAYBEAM	VR3-20-15-10	£ 94.10
HY-GAIN	DX88 8-BAND	£239.00

6 MTS		
MET	50-5 5EL YAGI	£ 75.63
CUSHCRAFT	A50 6 6EL	£186.00
TONNA	20505 5EL	£ 59.00
KLM	7EL YAGI	£185.00
	10EL YAGI	£337.00

4 MTS		
MET	70-5 5EL YAGI	£ 66.00
	70-3 3EL YAGI	£ 43.85
JAYBEAM	4Y/4M 4EL	£ 54.40

2 MTR YAGIS		
CUSHCRAFT	4218XL 18EL BOOMER	£149.00
	215WB 15EL BOOMER	£106.00
MET	144-19T 19EL YAGI	£ 81.25
	144-14T 14EL YAGI	£ 67.86
	144-7T 7EL YAGI	£ 35.16
JAYBEAM	PBM14 14EL P/BEAM	£ 93.53
	LW8 8EL YAGI	£ 31.96
TONNA	20817 17EL YAGI	£ 64.00
	20813 13EL YAGI	£ 55.00
	20809 9EL YAGI	£ 39.00
	20089 9EL PORTABLE	£ 39.00
KLM	20EL LONG YAGI	£196.00
	16EL LONG YAGI	£156.00
	HB9CV 2EL BEAM	£ 5.50

2 MTR VERTICALS		
MET	144GP GROUND PLANE	£ 20.95
JAYBEAM	LR1 4.3dB CO-LINEAR	£ 50.99
CUSHCRAFT	ARX2B RINGO RANGER	£ 49.00

70 CMS		
TONNA	20921 21EL YAGI	£ 53.00
MET	432-5B 5EL YAGI	£ 24.63
	432-17T 17EL	£ 57.18
JAYBEAM	PBM24 24EL P/B	£ 72.03
	MBM48 48EL M/B	£ 58.63
	MBM88 88EL M/B	£ 81.78
KLM	20EL LONG YAGI	£117.00
	30EL LONG YAGI	£137.00
CUSHCRAFT	ARX450B/R/RANGER VERTICAL	£ 49.00

23 CMS		
TONNA	20623 23EL YAGI	£ 39.00
	20655 55EL YAGI	£ 55.00
JAYBEAM	D15/23 15EL DBL	£ 76.84
SANDPIPER	20TURN HELICAL	£ 48.34
	28TURN HELICAL	£ 56.21

13 CMS		
TONNA	20725 25EL YAGI	£ 41.00

SATELLITE SPECIALS		
JAYBEAM	145 Mhz	£ 76.96
TONNA	10EL X YAGI	£ 65.00
KLM	9E X YAGI	POA
	14C RHC/LHC	POA
	22C RHC/LHC	POA
JAYBEAM	435 Mhz	£ 87.42
TONNA	12E X YAGI	£ 48.00
KLM	19E X YAGI	POA
	18C RHC/LHC	POA
	40CX RHC/LHC	POA

MIRAGE PRE-AMPS		
	2MTR G/F IN-SHACK	£ 92.00
	2MTR G/F MASTHEAD	£130.00
	70CM G/F IN-SHACK	£ 92.00
	70CM G/F MASTHEAD	£130.00

MIRAGE LINEAR AMPS		
	With Pre-Amps	
	A1015G 6MTS 10-150W	£275.00
	B23G 2MTS 2-30W	£125.00
	B108G 2MTS 10-80W	£157.00
	B1016G 2MTS 10-160W	£252.00
	B3016G 2MTS 30-160W	£225.00
	Without Pre-Amps	
	D15N 70cm 2-20W	£140.00
	D1010N 70cm 10-100W	£293.00
	D3010N 70cm 30-100W	£270.00

Full range of coax, plugs, masts, brackets etc. etc.

PLEASE SEND LARGE SAE FOR FULL PRICE LISTS

Prices do not include carriage Phone your order for same day despatch

WESTERN ELECTRICAL DISTRIBUTORS LTD

Maesbury Road, OSWESTRY, Shropshire SY10 8EZ

Phone: 0691 653221 Fax: 0691 670282

MIRAGE * DRAE * SANDPIPER * LANDWEHR

TX-3 RTTY CW ASCII TRANSCEIVE

High performance, low cost. Unbeatable features. BBC, CBM64 tape £25, disc £27. SPECTRUM tape £40, +3 disc £42 inc adapter board. VIC20 RTTY CW program tape £20. All need our TIF1 interface or a terminal unit.

GX-2 FAX SSTV TRANSCEIVE

All modes of FAX and colour/mono SSTV. Review in August 90 Ham Radio Today. BBC only. Complete system only £99 or £119 with FAX direct printing option.

RX-8 MULTIMODE RECEIVE SYSTEM

Fax to screen and printer, colour SSTV, HF and VHF PACKET, RTTY, AMTOR, CW, ASCII, UoSAT. Every feature. Full disc, printer support. Reviews OCT 89 Ham Radio Today. BBC only. Complete system only £259. DISCOUNT for RX-4 users.

RX-4 RTTY CW SSTV AMTOR RECEIVE

Still a best-seller. BBC, CBM64 tape £25, disc £27. VIC20 tape £25. SPECTRUM tape £40, +3 disc £42 inc adapter board. All need our TIF1 interface. SPECTRUM software-only version £30.

TIF1 INTERFACE for best HF & VHF performance with our software. Kit £25, ready-made & boxed £40. Only with TX-3 or RX-4 software.

APT-1 WEATHER SATELLITE MODULE

Converts satellite signal for display on any FAX system. £59. For use with RX-8, all connections included and price only £39 if ordered at same time as RX-8.

FAX AND WEATHER SATELLITES

Full resolution charts and greyscale pictures from any SPECTRUM computer to a dot matrix printer. FAX £80 or WX SATS £99, both £139.

Also MORSE TUTOR £8, LOGBOOK £8, RAE MATHS £9 for BBC, CBM64, VIC20, SPECTRUM. BBC LOCATOR with UK, Europe, World maps £10. All available on disc £2 extra.

Full info available on everything. Please ask. PRICES INCLUDE VAT AND P&P BY RETURN



technical software (P.W.)



Fron, Upper Llandwrog, Caernarfon LL54 7RF Tel: (0286) 881886.

COMMUNICATION CENTRE OF THE NORTH

The largest range of communications equipment available in the North. Full range of receivers, transceivers, antennas, power supplies, meters. Ali tubing - wall brackets - rotators - insulators.

FULL KENWOOD RANGE IN STOCK.

BUTTERNUT		
HF2V 40-80M vertical	£143.77	
20MRK 20M add on kit	£34.25	
HF6VX 6 band vertical	£162.97	
TBR160S 160M add on kit	£55.16	
HF5B Triband Mini Beam	£240.11	
NEW RS 5 Band Vertical	£298.72	
CUSHCRAFT		
A3 3 element Triband	£331.86	
A4 4 element Triband	£408.75	
10-3CD 3 element 10m	£123.51	
15-3CD 3 element 15m	£143.06	
20-3CD 3 element 20m	£244.07	
AP8 8 band 25ft vertical	£185.50	
AV5 5 band 25ft vertical	£123.00	
RS 5 Band vertical Antenna	£268.94	
15 element 2 Boomer	£98.95	
ANTENNA TUNERS		
Kenwood AT230	£213.20	
MFJ 962B 1.5kW Tuner	£246.24	
MFJ 949C 300W Versatuner	£160.41	
MFJ 941D watt Basic	£167.28	
MFJ 1601 Random Wire Tuner	£46.97	
Kenwood AT250 Automatic Tuner	£373.95	
TEN TEC "254" 200 Watt Antenna Tuner	£193.26	
ET-1 300 Watt Antenna Tuner	£111.95	
SCANNING RECEIVER RANGE		
AR300 Base Station	£781.63	
AR2002 Base Station	£497.58	
AR950 Base Station	£254.38	
AR2500 Base Station Receiver	£419.00	
AR2800 Base Station Receiver	£395.00	
AR800 Hand-Held	£168.98	
RS375 Airband Hand Held	£54.77	
ICOM R7000 Base Station	£1010.48	
RS35 Airband Base Station	£240.11	
WIN 108 Hand-Held Airband	£176.81	
AR1000 Hand-Held	£254.41	
SWR/POWER METERS		
SX200 1.8-200MHz	£86.42	
SX400 140-525MHz	£80.72	
W510 1.8-300MHz	£80.72	
DIAWA CN410M 35-150MHz	£63.06	
DIAWA CN460M 140-450MHz	£66.82	
NS660P 1.8-150MHz + PEP	£117.50	
KOYO-100 1.8-60MHz	£76.62	
KOYO-200 1.8-200MHz	£81.31	
KOYO-400 140-525MHz	£63.34	
DUMMY LOADS		
MFT300 Watt D. load	£34.23	
TenTec 300 Watt Dummy Load	£33.72	
L20 20 Watt Dummy Load	£22.48	
NEW GAP VERTICAL All band vertical	£210.08	

A FULL RANGE OF RECEIVERS FOR AIR-BAND - MARINE - SHORT WAVE - AVAILABLE

G5RV full size £18.91 half size £16.35. Full range of Antenna - NEW HIGH POWER G5RV ANTENNA £28.61 G5RV 160M Antenna £28.50 Accessories plus full range of VHF - UHF - HF mobile antennas.

Full range of RSGB and ARRL publications in stock.

Part Exchanges welcome. Second hand lists daily.

Send S.A.E. for details of any equipment.

HP terms. Access/Barclaycard facilities.

Open 6 days a week. 24 Hour Mail Order Service.

Goods normally despatched by return of post.

POSTAGE-CARRIAGE EXTRA AT COST.

AKD PRODUCTS NOW IN STOCK

D130N Wideband Discone Antenna

25-1300MHz

6 Metre 3 El Beam

50M Copper Antenna Wire

HS50B 1-1 kW Balun

£81.72

£28.56

£7.50

£25.12

Phone 0942-676790.

STEPHENS JAMES LTD.

47 WARRINGTON ROAD,
LEIGH, LANCs. WN7 3EA

Write out your advertisement in BLOCK CAPITALS - up to a maximum of 30 words plus 12 words for your address - and send it together with your payment of £2.35, and corner flash or subscriber dispatch label to: **Donna Vincent, PW Bargain Basement, Enefc House, The Quay, Poole, Dorset BH15 1PP.**

Subscribers must include the dispatch label bearing their address and subscription number to qualify for their free advert.

Advertisements from traders, apparent traders or for equipment which it is illegal to possess, use or which cannot be licensed in the UK, will not be accepted.

No responsibility will be taken for errors.

FOR SALE BBC Master 128, colour monitor, opus dual 40/80 DD. Morley ROM expansion board, Teletext adaptor, EPROM blower. WW+, TNC, Comstar, speech, Master ROMs. Ham software, cords documentation, £390. C. Forster G4FFU, 48 Woolstington Gardens, Woolstington, New-castle NE13 8AR. Tel: 091-286 6842.

WANTED Dymo-style embossed label tape, grey or clear/colourless. Any width. To embellish radio panels in Aircraft Museum. Godfrey Manning G4GLM, 83 The Drive, Edgware, Middlesex HA8 6PS. Tel: 081-958 5113 (weekday evenings).

FOR SALE Going QRT, Yaesu FT-901DE with spare valves, £375. Trio 9500 70cms multi-mode, £280. Three section telescopic mast, heavy duty rotator and housing TB3 trib-ander, £420. Dip meter, other bits. Colin Anderton G0DNQ, Edgehill Road, Moreton, Wirral. Tel: 051-678 6052.

FOR SALE Dragon 32 computer with G4BMK RTTY terminal unit and software, good condition, £50. Oscilloscopes, one dual beam Russian model C1-16, one single beam, both old, heavy and working but need slight attention, £15 each or £25 the pair. Mr G. Valenti G6XJN. Tel: 081-644 6102.

FOR SALE Butternut HF 6VX with adaptors A18+24, TBR160s, STR11 radials, mounting post, £225. Jaybeam parabeam 144MHz 13ele, £48. Yagi 144MHz 7ele, £38. Cash only, buyer collects. John. Tel: (0789) 778736.

FOR SALE Coaxial cable 1/2in diameter (new) 2.3mm conductor, £0.50 per metre + p&p. Copperclad p.c.b. material several types available e.g., 3 x 8in single sided fibre glass, £0.50 + p&p. Tel: Malcolm (0536) 520457.

FOR SALE Amstrad 1640 complete with 30MB hardcard, £300. PK-232 Dec 88 software, £160. Both in used condition, also Drsi 1200/1200 & 1200/300 cards, £150 the pair. Mr J. W. Oakley. Tel: (0243) 771691 (between 4pm and 6pm weekdays).

BARGAIN BASEMENT

FOR SALE FT-209RH, FNB-3 charger, boxed, £130. Tokyo hy-power HT120, 14MHz s.s.b./c.w., 25W, £230. Racal - Dana frequency counter, 120MHz, £80. Telequipment D34 portable scope 15MHz dual beam, £80. Bob G4KSG. Tel: 021-705 1089.

WANTED RCA AR 8516L, also AR88 for spares. Mr M. Stevenson. Tel: (0702) 522929.

FOR SALE Realistic PRO 2004 scanner 25-550 + 800-1300MHz as new, boxed, manual, etc., £170 o.n.o. W. McGuigan. Tel: (0236) 53366.

FOR SALE BNOS 3-50W u.h.f. LPM linear, £100. Philips portables v.h.f., £100, u.h.f., £100. Icom IC3200 mobile, £300. Mast head pre-amp u.h.f., £50. G. Mansi, 47 New College Close, Gorleston, Norfolk NR31 7DF. Tel: (0493) 442426 (between 5pm and 7pm).

FOR SALE As is, where is and buyer to collect, 144MHz 12ele ZL special, £30. 144MHz 5ele Yagi, £10. Revco discone, £5. Mr C. R. Jones. Tel: (0204) 77081 (between 1100 and 1200 Saturdays).

WANTED Oric-1, Oric Atmos or Acorn Atom computer, must be in g.w.o. Also any radio or electronic orientated hardware or software. Paul Fellingham G7FJC. Tel: (0273) 689290 (evenings and weekends only).

FOR SALE Trio/Kenwood TS-940S with SP940 and auto a.t.u. 500Hz c.w. filter, mint condition, all manuals/boxed with mic, £1400. Icom IC725 with a.m./f.m. and c.w. filter plus 40A heavy duty p.s.u., £550. Arn Smyth G3XNE, 62 Agnes Close, Bude, Cornwall EX23 8SB. Tel: (0288) 354564 (evenings).

FOR SALE Yaesu FT-23R 144MHz hand-held transceiver. FNB-10 NiCad battery pack, also d.c.-d.c. converter for use in car or shack, boxed, £145. James Charnock. Tel: 051-428 6731.

FOR SALE Kenwood transceivers TS120S h.f. s.s.b./c.w. 200W. TR7800 144MHz auto-patch, scan, etc., 25W - computer patch for C64 c.w./a.f.s.k./RS232, very versatile (US made), £550 for all, s.a.e. for details. James Coubrough, Lomond Cottage Caravan, Rowdennan, Glasgow G63 0AR.

FOR SALE Cubic astro-D 1-30MHz transceiver 100W with a.t.u./p.s.u. antenna, Morse key, all ready to go in a small suitcase, £500 o.n.o., would consider swap. Ian. Tel: Tewkesbury (0684) 298504.

FOR SALE MK328 receiver kit (steel case) with handbook. Size 175x89x50mm, bands 1-5, frequency range 2.5 - 30MHz, b.f.o. for c.w. traffic, £125 or swap for scanner. H. L. Clark, 27 Croft Rise, East Bridgford, Nottingham NG13 8PS. Tel: (0949) 20837.

FOR SALE Yaesu FT-767 GX all-mode transceiver with 144MHz and 50MHz modules,

very good condition, £1525. G1WMV, QTHR. Tel: (0908) 660089.

FOR SALE Sommerkamp FT-290 Mk1 with muTek front-end and up/down mic, £300. Realistic PRO-200250 channel a.m./f.m. 12V or mains scanner 68-88, 108-174, 410-512, boxed with automatic memory battery charger, £120. Robert Trussler G4MOCN, 28 Balfon Crescent, Hamilton, Strathclyde. Tel: (0698) 286078.

FOR SALE Heathkit SW7800 general coverage receiver 150kHz to 30MHz in 30 overlapping 1MHz bands five digit L.d. display to 1kHz resolution, l.s.b./u.s.b./c.w./a.m./mains/12V d.c. manual, £150 o.n.o. Vic Flowers G8QM, 9 Laburnum Grove, Sunnyside, Newcastle-upon-Tyne NE16 5LY. Tel: 091-488 1070.

FOR SALE Shacklog comprehensive amateur radio logging software for IBM PC and compatibles. Includes real-time QSO logging, QSL labels, QSO search/sort/print, import facility and much more, £18.50. Alan Jubb G3PMR, 30 West Street, Great Gransden, Sandy SG19 3AU. Tel: (0767) 77913 or (0763) 260776.

FOR SALE HP100E H/H scanner 15MHz-1.3GHz a.m., f.m., w.f.m., 1000 channels, £180. Kenwood RZ1, 500kHz-950MHz a.m., f.m., w.f.m. mobile/base scanner, £280. Both as new, boxed with manuals. Andy G1JYV. Tel: (0462) 816610 after 5.30pm.

WANTED Circuit diagram and microphone for Sommerkamp TS280 f.m. Eric Cousins G0DRG, 23 Hamton Crescent, Totton, Southampton, Hants SO4 3PB. Tel: (0703) 666133.

FOR SALE Timested PC sat III IBM/PC weather satellite acquisition board and software, £110. RIG Meteosat dish and feedhorn, £60. Jaybeam 137MHz cross dipole antenna, both antennas new, £30. Paul Chamberlain G4XHF, 9 Goffs Close, Crawley, West Sussex RH11 8QB. Tel: (0293) 515201.

FOR SALE Shack clearance job lot valves late 40s onwards, 3 power supplies, transistors, resistors, diodes, log control capacitors, beam antenna 144MHz x 2. Mr K. Wood G1RLH, 43 Dordon Road, Dordon, Tamworth, Staffordshire B78 1QW. Tel: (0827) 897837.

FOR SALE Scopex 4D10 oscilloscope, £150. Advance r.f. signal generator type Q model 1, £75. Advance signal generator type 62, £75. AVO meter model 8 MkII and handbook (no leads), £50. Tel: (0926) 881566 after 6pm.

FOR SALE FT-101 WARC 12, 17 & 30m. Double balanced mixer fitted. FV101B external v.f.o. both in good condition and full working order with manuals, £365 o.v.n.o., buyer collects. David. Tel: 081-504 8187 Chigwell, after 6pm.

FOR SALE Trio R1000 receiver 200kHz-30MHz, £175. Yaesu FC-102 a.t.u., £75. Yaesu FT-690R 50MHz transceiver, FL6010 matching 50MHz 10W linear, 4-element 50MHz beam, £300. Brian G4IYC. Tel: (0538) 723718.

FOR SALE Icom 71 (minor fault) Yaesu 9600 (Raycom MODII) SP-102 speaker, h.f. converter. D130, sloper and two active antennas, a.t.u./RTTY TU coax switches, cables, manuals. Complete, £650 w.h.y. camping equipment? Tel: (0202) 302050 Bourne-mouth.

FOR SALE Standard C500 with extended coverage, 3 sets NiCads and charger, £275. KR5400 AZ/ELV rotator, cable, pole, brackets, £150. Yaesu FRG-9600 and h.f. converter, £375. Les G6HSW. Tel: (0954) 789757.

FOR SALE AVO 8, leather case, £85. Teletext, adaptor, £60. Dragon 32, £45. Dragon 32 spares, £20. Dragon RS232 kit, £30, printer switch, £15, software, books. **Wanted** KDK, TM, 56B, RX, consider part exchange, cash adjustment. D. F. Thompson G8SBU, 131 St. Johns Road, Exmouth, Devon EX8 4EW. Tel: (0395) 265059.

FOR SALE BBC B colour monitor, disk drive, printer, some software and books. Would swap for FT-290 144MHz, 70cm or h.f. or sell for £250. Tel: Manchester 061-793 1292.

FOR SALE or exchange standard C5800 144MHz all-mode mobile, £300. **Exchange** for dual-band hand-held or good h.f. receiver especially HF125/225. Andy G6PDW. Tel: (0924) 441136.

FOR SALE Amstrad 464 computer with colour monitor, disk drive, joystick, DMP 2000 printer plus software, tapes and discs including Rembrandt and Mini Office II, £250. Ron Wood G6CTT, 104 Hainault Avenue, Westcliff-on-Sea, Essex SS0 9EY. Tel: (0702) 353676.

FOR SALE Cybernet Delta One 934MHz transceiver, complete with mobile antenna, £200. John. Tel: (0543) 675746.

WANTED Reliable h.f. transceiver/receiver, possibly TS130S will exchange or sell either Yaesu FT-290II or Amstrad PC1512DD, each valued around £325. Both in v.g.c. may swap both for the right transceiver/receiver. Keith QTHR. Tel: 061-477 5303 not QTHR.

FOR SALE Uniden Bearcat 100XL hand-held programmable scanner, 16 channels, 9band coverage, automatic search, selective scan delay, priority channel, excellent condition, £95. K. Lear, 93 Queens Drive, Nantwich, Cheshire CW5 5JD.

Readers' Ads July 1991 Coupon

PCB SERVICE

Always check a recent issue of *PW* for the current details of price and availability, or call the office. Please enquire for p.c.b.s not mentioned here as this is only a list of recent additions to the service.

Printed circuit boards for *Practical Wireless* constructional projects are available from the PW PCB SERVICE. The boards are made in 1.5mm glass-fibre, and are fully tinned and drilled. All prices include postage, packing and VAT for UK orders. Orders and remittances should be sent to: **PW Publishing Limited, FREEPOST, Enefc House, The Quay, Poole, Dorset BH15 1PP**, marking your envelope **PCB SERVICE**. Cheques should be crossed and made payable to PW Publishing Ltd.

When ordering, please state the Article Title and Issue Date as well as the Board Number. Please print your name and address clearly in block letters, and do not send any other correspondence with your order. You may telephone your order using Access or Visa. A telephone answering machine will accept your order outside office hours.

Please allow 28 days for delivery.

Board	Title of Article	Issue	Price £
WR289	MEON 4 (CONTROL)	JULY 91	POA
WR288	MORSE MASTER	JUNE 91	4.89
WR286	MEON 4 (LIN AMP)	JUNE 91	5.54

Back-Scatter

HF Bands

Reports to

Paul Essery GW3KFE

287 Heol-y-Coleg, Vaynor, Newtown, Powys SY16 1RA

It has been a pretty miserable spring so far, with the long spell of good conditions coming to an abrupt end, although the bands are not too bad at the time of writing, even if the May Bank Holiday weather is of the sort to tempt me to write a column rather than enjoy fresh air!

Lots of contacts reported, so everyone's list has been severely pruned - sorry!

Splatter

One of the disturbing trends of today, is that of incorrect operation of equipment. One of the trends is the 'wrong v.f.o.' syndrome, which occurs on modern equipment where the pushbutton reigns supreme and there's no room on the panel for an adequate indicator.

Far worse though, is the general tendency for DXers and contesters to over-modulate to the point where they splatter over several kHz. There are some stations who openly admit to a policy of deliberate overdrive, on the principle that by splattering nearby QSOs out of existence, they get a clear channel for themselves despite the annoyance caused.

This it seems, is a prime reason for the widespread perception in UK at least, that contest or DX operators are just an infernal nuisance. That is **NOT** a label most of us want.

Bands

As indicated, the conditions were up and down. However, it's a rare wipe-out that kills all the bands. Anyway, if all else fails you can read a book, watch TV or even go on v.h.f. for a few minutes!

The 1.8MHz Band

The s.s.b. transmission from **G2HKU** (Minster, Isle of Sheppey) managed **ON7BW**, but Ted tried his key for **PA3FPA**, **OY6FRA**, **UB5KFU**, **OK1FWQ**, **YL1YR** and **UW1ZE**.

I've already mentioned the Powys club net on 1.932MHz (Tuesdays, 1900 clock time), and now I have a letter from **Dave G0MJK**. He points out that the Northampton group have a net on Sundays, 1.925MHz 1245 clock time for about an hour. Dave has either an **FT707** or **FT101ZD** to make the QSOs, but doesn't say what antenna he uses on this band.

Another newcomer to the band is **Angie G0HGA** (Stevenage), since she received loan of a rig covering 1.8MHz.

Pirate!

Angie G0HGA, notes that she has been receiving various reports that her call is being pirated. At the time she wrote it seemed that the pirate was mainly on 7MHz, he doesn't give a name, his keying is poor and he is a bit of a bore into the bargain. Angie had

the ultimate frustration when she heard the pirate twice herself! When she was QRT.

Award

Up in Nottinghamshire **G0NRA** is the Awards Manager for the Mansfield Club, and kindly sent a specimen and a set of rules. To receive this handsome sheepskin, amateurs or s.w.l.s must obtain a minimum of 30 points, by way of five for the Club stations, **G1GQC** or **G3GQC**, two points for any member of the Mansfield club and one point for any other station in the county of Nottinghamshire. A station may only appear in the list once, regardless of band or mode. A list of Mansfield club members is obtainable from **G0NRA** in return for a s.a.e. Applications, by way of a certified copy of the log entries plus £2, \$4 or 7 IRCs, go to G. Lowe **G0NRA**, 25 Manor House Court, Kirkby in Ashfield, Notts NG17 8LH.

Complaints Corner

I've received, via the Editor, a letter from **G3GTF**, who objects to the mention of 3.5MHz inter-G contacts, and wants every QSO to have a time in GMT attached. Perhaps I should make the position clear. If Joe Bloggs is using QRP and has QRP antennas to boot, G contacts are DX to him, and I will therefore give 'em a mention. As for tacking times onto every call sign, if the QSO occurred at a 'normal' time, then I don't think the time needs to be mentioned, but if it happens at an 'odd' time and our correspondent mentions it, I do likewise.

The 3.5MHz Band

Pat ON7PQ (Kortrijk), remarks that his c.w. got across to **WS5E**, **VE3BCH**, **KG5U**, **3A/DK6AS**, **RA9YY/RA0Y** in Zone 23 and **YU400/5B4**.

Turning to **G3LPS** (Blackburn) Eric keyed with **VE3EJ**, **VE1ZZ** and **9H1EL**.

Meanwhile, **G0KRT** runs 2W of c.w. from a Lake DTR3, with a Howes receiver, while on the antenna side he has 25m of wire out, fed against a counterpoise. Two-way QRP accounted for **G0JNA**, **G0KJN**, **G3NVV**. During the AGCW-DL Morse Memory Week (April 20-26) he raised **G3IVF**, **ON5AG**, **ON5NO**, **G0OEY**, **G0GKH**, **G3ZWH**, **G4USS**, **G3ATH**, which left **F6EQC**, **PA0AUV** and **G300K**.

For her efforts, **G0HGA** had MORSE as star of the month, plus a goodly selection of European stations, some QRP, some at the 50W mark, all on the key.

Don G3NOF (Yeovil) made a foray on the band with s.s.b. and raised **FP5DX** and **U040F**.

The 7MHz Band

Mike GW0HWK (Wrexham) has been off work and in the 'bandage factory', but adds that he wishes he knew what they dripped into his arm - it was better than his home-brewed ale! On 7MHz he worked **GJ3DVC** and managed some European QSOs.

It's **ON7PQ**'s turn now: Pat has **VU2PTT**, **4Z0V**, **P40V**, **H44VU**, **9H30G**, **VK6BFW/VK9X**, **OJ0/OH3TC**, **4K2FJL**, **RA9Y/RA0Y**, **4K2/UA3DJG**, **WA11JB/C6A**, **ZS6CDP** and **Z23JO**.

Eric G3LPS, has a long list and a severe noise noted in the DX part of the band. He made it through to **VU2FWW**, **5Z4FN**, **ZD8VJ**, **VE7CC**, **ZL1AIZ**, **VA7FJE**, **VE4JB**, **VK7RO**, **VK2APK**, **9H1EL**, **VK2BJ**, **YU400/5B4**, **CG7QP**, **4K1A**, **PS7BX**, **UA9KCN**, **Y88POL**, **LU1CC**, **CE7PVC**, **HK7/SM5HV** and **VU2SU**.

Next we have **Tim G4EZA** (Mablethorpe), who has an inverted-V fed with 10m of open-wire line, having parallel elements for 7 and 14MHz. By shorting the feeder at the bottom and feeding through a Z-Match, as a 'T' antenna against ground radials and the fences, the arrangement works quite well for long-distances. For the nearer stuff, the system is fed as a normal inverted-V, when the DX goes down by 3-4 S-points, and the nearer stuff goes up by 2 S-points. Full-power c.w. (around 80-100W) on 7MHz saw off **AB4FC**, **KE2TS**, **K3RAC** and **WB4BX**. At 5W, **FE1LZJ**, **IK3NWU**, **SM5CCT**, **Y41RG**, and at 200mW **GM40MU**, **OK1DMS** and **PA3FSC**.

On this band **G0HGA** used 15W for **AA4V**, **K4MC**, **K1BU**, **WC1X**, **K2SB**, **W2QD**, **W3G0H**, while a rise to 90W yielded **K1BU**, **KA1DWX**, **NT1V**, **W2IRZ**, **K1ZZI**, **W0YR**, and **VE3VA**. Others included **OJ0/OH3TC**, **EA6ZY**, **TK4MI**, **CT1BQH**, **UL7TAM** **RH2E** and **MORSE**. For **G3NOF** the s.s.b. score was **LU1IV**, **UL2I/UA4HVV** and **UL8YLA**.

The 10MHz Band

For 10MHz **ON7PQ** offers **3A/DK6AS**, **H44VU**, **TK/DL7HZ**, **J27P**, **MORSE**, **CU2AK**, **OX3FV**, **OA4ZV**, **JJ1VKL/4S7** and **ZS1JX**, all on the key. Now to **G4EZA**. Tim tried 100W for **WA6PSD**, **W7VY**, **WX7R** who was 449 with 4W. Down to 5W for lots of EUs, and with 200mW **G10NMZ**, **PA3ALX** and **Y26XN**. For **G2HKU** the tally on this band included **YL2PQ**, **KP2A**, **HV3SJ** and **WA1THUM**.

Expedition News

Between July 20 and 27, the Island-Hoppers DX Group will sport an EJ prefix from Great Blasket Island for the IOTA fans. Frequencies will be around

1.965, 3.785, 7.085, 14.285, 21.385, and 28.585MHz, all ± 1 QRM. They will also be on 50MHz, 70MHz, 144MHz and 432MHz. QSLs, direct only to **E13BA**. Our thanks go to **Conor McGlynn EI6HF** for this news.

The 14MHz Band

Don G3NOF heads off on 14MHz. He reports his s.s.b. contacts with **FR5ZN**, **SV2ASP/A** (Mount Athos), **5H3DC**, **5H3GN**, **7X5ST/3V8**, **9M2CW** and **9M8FH**.

Now to **Mary G0NZA**, as shown in Fig. 1, who worked **A61AD**, **SV0HV/9**, **VK6RI** (short path at 1717GMT), **ZP5KI** and **7X2DX**.

Meanwhile **G2HKU** raised **VK2DZD**,



Fig. 1.

4L1QRQ, **UA0QFC**, **UA0IG** and **Y03PQ/MM** in the Straits of Gibraltar.

I've had to prune the long list from **G0HGA**, but she piled up some 52 USA stations, of which 6 were W6s and 2 from W7; **VKs**, **VEs**, **VU2NI**, **ZL2QW** (a YL), **JX7DFA**, **P40V**, **PP7JR**, **V19ISM**, **HK3RQ**, **GW3INW/HK3**, **MORSE**, several **VEs**, and **G3LQI/M** on narrow-boat 'Moorlands', EU, USSR, all on c.w. plus **VK2ERY** (another YL) and **OE6JRD**.

Now to **G0MJK**, who found **K4ZWG**, **WQ4J**, **N3GPP**, **VK6NS** (Perth, W. Australia at 1803GMT!) **WA2YGV**, and a brace or Europeans, all on s.s.b.

Tim at G4EZA used his full-power c.w. for **PY2NN**, **PY3AVF**, **YN1CC**, **4K20IL**; 5W for a brace of SMs; cranking the mode switch to s.s.b. yielded **HK1FCG**, **TA2/LA6WEA**, **TA5/NOFYR**, **TF5BW**, **VK6NC**, **YC30SE**, **YW1A** (=YV), **3A2LZ**, and **5B4YX**. Only 5W was needed for **3A2LU**.

For his report, **G3LPS**'s long list can be summarised as **VKs**, **VE7**, **9H1EL**, **ZL3GQ**, **5B4**, **V07**, **A22GH**, **VA6BF**, **ZD8VJ**, **FY5FO**, a shoal of **VE1-2-3-4**, all in BERU, plus **MORSE**, **4K4/UA90DV**, **UF7Q/UL7LS** and **UA0WAD**.

Mike of GW0HWK reports that he managed **ZP6HR**, **J39CO**, **SV0HV/9**, **4L0DXC**, **V41MB**, **A92FN**, **OD5ZZ**, **5B4ZZ** and **PT7YS**.

Over in Belgium, **ON7PQ**, the keyer connected with **H44VU**, **7P8EN**, **1A0KM**,

Back-Scatter

4K4/UA9COV (IOTA AS-42), VK6BFW/VK9X, MORSE, 4K1A, VQ9JH and FK8FS.

The note in April's issue where GOGOP mentioned 28MHz reception of ZS6RF and ZU1B, brought forth an interesting letter from **Jules du Plessis ZS6AHI**. He says that Grant Dalziel ZU1B was indeed in QSO with his father Leon, but mentions also that ZU1B is the very first of the new novice calls to be allocated. Apparently ZU1A had been allocated for demonstration purposes, to the Johannesburg Amateur Radio Club.

The 18 and 24MHz Bands

Pat ON7PQ got on 18MHz for YU400/5B4, A92FN, 7Q7WW, VK6BFW/VK9X, H44VU, Y88POL, JR5JAQ/JD1, T77C, C02AW, ZS6QU, D68FT, FW0BX, A22GH, ZD8LI, 9Y4KB, VP2ES, and K9EL/VS6. The 24MHz band wasn't quite so good, but offered A92FH, SV11A/A, TA5/HA0MM, KC6VW, H44VU, 3C1EA, FM5WD, HF0POL (S. Shetland), 4U1UN, 9Y4KB, 3B8CF and Y88POL.

Another long list came from GW0HWK. On 18MHz he found D44BC, V2/VE2ODC, TU2OP, 9H1LR, HF0POL, CP6XK, EL2SM, JH5AVM, ZB2AZ, XQ2X (Frans Ambrosio Is), A71AL, 9Y4RT, PZ1DK, 8P9BY, KP4QY, UG6LQ, VK7TK, KL7XD, VEs, Ws, and smaller fry. On 24MHz he found VK6BFW/VK9X, V47KJ, 8P6CC, HF0POL, EL2SM, VP8CFV, V41MB, 9J2AD, PZ1EL, JAs, 4X6DK, V51KCJ, 9Q5TE, 5Y4FO, 3B8CF, Z21CS, SV0HV/9, ZC4CZ, 5B4JE, PJ8AD, TL8MB, UH8EA, CU2AK, VU2R, LU8EWD, UA4HTT/RV4L, and the usual Ws and EU.

On this band, G4EZA found his c.w. useful for EA6/DF3FJ, JA7JI, W6DU while s.s.b. managed JR5JAQ, and UM8MCW; these were 18MHz, while 24MHz produced JA8AJE and UJ8KA

by keying, CN8BX, JL1UJG and UM8MTA on sideband.

A letter from **Vince 9H1IP** (M'Scala, Malta), was some ten days reaching me, despite being correctly addressed and air-mailed! However, sticking to s.s.b. on 24MHz he worked ZC4CZ, TZ5PS, V47KJ, HH2GB, VK6BFW/VK9X, KP2BU/C6A, 4S7NB, PJ8AD, V51BG, VKs, VP8CES (Antarctica), various rare Ws, VE, EA6, A22AA, CP6XK, 9X5NH, XE3EB and VE1CBK/V08. For 18MHz the tally included 9Q5TE, EL2SM, 9J2MK, VP8CFR, UA0FF, Ws, YV, VE7, VP2MLD, A71AL, CP6XX, YB, UM8, KP4CKY, TL8MB, FM5WD, N4YBF/6Y5, XE3EB and PY7EC.

Now to **Andrew G3VWC** (Bath). He has just recommissioned his 1967 bug key since his el-bug relay 'turned its toes up.' On 18MHz, the old key and transmitter made it out to UO50LW, VE3HV, KB4GID, R18BQ, TA2A0, W8MJG, YQ3R and W6ZUL.

This time G2HKU had a sniff of 18MHz, with W7QK (Oregon), VK7AAQ, and VK3MJ, while 24MHz yielded C01HJ, JG1IEQ/3, N5TP, 4X1FC, KB2EA; all were c.w.

Up in Nottingham, G0NZA has been giving 21MHz a bashing. Mary dismisses 10, 18 and 24MHz as 'nothing of note!'

Down in Yeovil, G3NOF noticed that in mid-April VKs were to be found on 24 and 28MHz at around 2200-2400GMT. Don takes 18MHz as giving EX1RB, KL7XD, RM8MA/RM0T UM8MCW, VP8CFR, YB0WR, YU400/5B4. On 24MHz it included A61AD, CU8AI, D44BC, DU1KK, DU4DX, ER4L, FM5EP, FS/JA1FUI, FS/JL1RUC, JAs, K4OVS/C6A, NH6C, PJ2MI, PZ1DY, S79KMB, SV0HV/9, T77J, TL8MB, UA4HTT/RV4L, UH8EA, UM8MCW, UM8MTA, VK3CEW, VK7GK, VK80B, VP8CFV, VQ9AY, Y88POL (Antarctica), YB0XX, ZS6AIS/7P8, 3B8CF, 4J0Q, 7Z1IS, 9J2AD and 9Q5TE.

The 21 and 28MHz Bands

Lumped together to save space! This time G2HKU avoided 21MHz, but on 28MHz he worked PY2OU, KB4GY and FY5FE.

Mary G0NZA used s.s.b. for RA1AKB (Kotlin Is), VP5LJ, SV5AJJ (Rhodes), VU2TTC, and 4X4MS, OD5ZZ, EW10WV 80km from Chernobyl, U29CWV, while c.w. went out to UA3LEY and HA0LPH.

From Somerset, G3NOF booked in, on 21MHz, BT80TUA (a 'special' from BY1QH), CK7C, C02VG, C06CG, F00IGS, FW0BX, FS/JG1TCB, H44MS, HC1EA, HK3JJH, HS0E, JAs, KG4AR, KL7s, KP4BZ, NL7DU, NU2L/VE2 (Sept Isles), T30A, UA4HTT/RV4L, UA0KBY, U20CXD, V47KJ, VA6SV, VKs, VY2QST, W0ACT (S Dakota), XK6GV (=VE6GV), YC0MNO, ZD7CRC, 8P9FF and 9N1MM.

The 28MHz list is longer yet, and includes 9X5SW, 6Y5IC, 5T5HH, 5Z4s, 5N9ABY, 4X4s, 4S7, 4K20IL, ZP0Y, ZP5LOB, ZL, ZF, YB, XE, VU2SMN, VQ9s, VP5VDR, VKs, V31DF, T120Y, TA, PJ9X, P40V, P29NMD, KC7V (Arizona), K8JP/VA2, JAs, J37AE, J43AHRs, HU0WDX, HH7PV, HC10T, FS/JL1RUC, FR5DX, FL6YL, DU1ETU, D68FT, C40R, BT80TUA, A41KV and A22A.

On now to ON7PQ. Pat keyed on 21MHz with 9N1MM, 8Q7ZL, 7Q7WW, VK6BFW/VK9X, H44VU, FW0BX, 4K4/UA0KW, 4K20IL, VP5P, AH6JF, FW/VK2BEX, 9Y4KB, VP2ES, K9EL/VS6. On 28MHz he found 7Q7WW, H44VU, P40V, RA1YY/RA0Y, FW/VK2BEX, CE0FFD, ZD8LI, OK3CLA/5N0, WA1JJB/C6A, 9M2ZA and 7Z1AB.

For GW0HWK his short visit to hospital meant he was able to get some extra shack-time in. The 28MHz band saw him chasing VP8CFN, Z21HD, ZC4DG, 5B4ES, AP2JZB, HK6MCK, UL8DGZ, 9H3MU, CU3AV, Z21DB, 5Y4FO, 4X1PB, P40V, VA8A, VP5E, ZP6A, ZV/VE30DC, 5Z4RT and GW/

Y26EO/M. Turning to 21MHz the list here says ZB2AZ, 7X4VAK, 9L2DG, ZD8DX, CX5CG, OD5ZZ, Ws, FM4FM, PY4PB, CU1AF, Ws, and smaller fry.

Over to the G3LPS key; Eric mentions YU400/5B4, ZB2EO, ZC4CZ, HK3RQ and 4K20IL in Franz Josef Land.

For his report G4EZA hooked on to 21MHz and worked YV1AD on the key, plus sideband to KP4BZ, TA5/N0FYR, YB4ZBY, YW3A (=YV), ZW40D, ZX5C (=PY), and 4K2/UA3DJG. While 28MHz saw him working sideband to ZC4MK, ZD8DX, and c.w. to TA2DA and YU400/5B4.

At G3VWC, Andrew's key raised CX3EU, CX8DR, PZ1AV, PY1RCR, PY2BDN, PY8RR, VS6UW, LW2DFM, LU1FNH, JN1LZF, JH1BBT, JR7INP, UA9KFB, UA9KCN, UW0FP (Sakhalin), UA0UG, UA0IG, UD850DKW, UL7JW, EX3FJL (Franz Josef Land), W0UO (Colorado) and W7WHO in Oregon.

On 21MHz G0MJK managed VE3AGS, WA4RNN, VE30CW, PY2AIZ and 9H1GL, but on 28MHz, only SV3AGN was booked in.

Finally to G0HGA. On 28MHz, she had a c.w. QSO with NA8G at 2130 on 10W, plus JH1TZZ, JA0DWY, UA0MO, U3DR and LU6EF, while on 21MHz the scalps included VK3ELB, JG1PED, PR7BC, MORSE, 4L1QRQ, WX2L, W3ARK, NA8G, NX1X, WF1W, WJ2W, K4FU, KC4WWQ, W6UZ/4, WA7WOC and KA5QBY plus the usual USSR and Europeans.

How about a photograph of you in your station to use in 'HF Bands'? Colour or black-and-white prints are welcome, provided they are sharp and clear.

Deadlines and Things

Don't forget Wireless Line on (0898) 654632 for all the latest DX happenings. Meantime, your deadlines are June 24 and July 29 to arrive addressed as above. **Till then, 73!**

Solar Data for April 1991

The quiet side of the sun was facing our way between April 1-7 but magnetic disturbances still continued. A major flare occurred at 2255UTC, on April 2, lasting for 100 minutes. From April 8, as the more active side of the sun rotated into view, there was a rise in solar activity. Sixteen M type flares were reported between April 8-14, the most active day being the 11th when five M class flares were observed. During the following week, from April 15-21, there were 22 flares but despite this, the solar flux levels remained fairly steady. It is interesting to note that during the period April 7-20 there was no recorded instances of long distance propagation affecting the 50MHz band. From April 22 to the end of the month there was a big decline in solar activ-

ity. A well positioned coronal hole contributed to an increase in geomagnetic activity from April 28. This intensified on April 29, giving rise to a major geomagnetic storm and the consequential auroral activity effecting all v.h.f. bands.

The solar flux index climbed from 193 units on April 1, to peak at 268 units between April 14-16. It then declined to 135 units by April 24, increasing

slowly to 160 units by April 30.

The daily geomagnetic A index was at a minor storm level of 32 units on April 4, and at a major storm level of 53 units on April 29. During the period, April 8-24, it was quiet to unsettled.

Forecast For June-July 1991

We are now in the period when Sporadic-E propagation is most

prevalent. It will effect the 50 and 70MHz bands almost every day, and occasionally reach up to the 144MHz band. It may even be effecting that band at this very moment!

During the summer months it's expected that high pressure will dominate over Europe. Tropospheric conditions should therefore be enhanced on a number of days. Generally speaking though, the summer tropo openings never compare to the spectacular distances that can be worked during the autumn.

Aurora!

Reports are still coming in regarding the aurora on March 24. **Dave Lewis GW4HBK** (I081) concentrated on 70MHz and between 2210-2310UTC worked G3CQJ (I091), G4ASR (I081),

Back-Scatter

VHF Up

Reports to
David Butler G4ASR
Yew Tree Cottage
Lower Maescoed, Herefordshire HR2 0HP

G8GXP (IO93), G8VZT (IO82) and G0EHV (IO94). At 2235UTC, Dave was called by a G station, but unfortunately the auroral distortion was so bad that the station couldn't be identified.

Rick SM7SCJ (JO65QJ), managed to work 42 stations between 1722-0227UTC in the event on March 24. Contacts with the UK included G3BW, G3UTS, G4E2P, G4PIQ, G4SWX, G0CUZ, G0KON, G14KSO, GM4CXM, GM4YXI, GM/DL5BCU and GW4VEQ.

Another widespread aurora occurred on Monday April 29, effecting all bands up to 430MHz. **Chris Tran GM3W0J** (IO77) got in the shack at 1530UTC, switched on the 50MHz receiver and heard auroral signals from all over N.W. Europe. Moving to 50.140MHz s.s.b., he called 'CQ Aurora' and worked PA3BFN, G3UHH and G8GXP in quick succession. At 1536UTC he was called in the pile-up by CX8BE (GF15), who was 55A. Assuming that it was F2 or TEP, Chris turned his antenna on the direct path of 220 degrees but nothing was heard. Returning the 6-element Yagi back to 45 degrees, contact was again established and 55 reports exchanged, GM3W0J giving him 55A and Jorge CX8BE giving him 55. Later in the event, Chris worked SM6HYG and SM7NNJ who both confirmed that they had heard CX8BE via the aurora. A telephone conversation with CX8BE also confirmed that the QSO had taken place and that GM3W0J was the only European station heard at the time, and that it was tone-A. It is assumed that in Uruguay, auroral signals have not been heard before, hence the 55 report. As both signals were tone-A, and as the contact could only be completed via the auroral curtain, Chris is claiming this as a new world record for 50MHz auroral working - 11300km! I have a copy of the tape recording made at the time and it really does sound exciting. Contact me if you want to borrow it.

At my QTH, I found little in the way of DX on 50MHz, and so I moved up to the c.w. end of 144MHz. There wasn't much in the way of DX there either but I did manage to work, between 1625-1805UTC, DJ1JJ/P (JO52), DK1KR (JO53), EI6GF (IO62), PA3FJY (JO32) and 5 GM stations in IO67, IO75, IO77, IO85 and IO86. I tried making a number of calls on 70MHz but despite hearing GB3ANG (70.060MHz) fully auroral, I heard no other tone-A signals. I was pleased however to be called, on tropo at 1805UTC, by G4EJM (IO94). Bill is located in Cleveland, a fairly rare 70MHz county.

Marcel FD1DQK (JN18), was a bit more fortunate in finding the DX on 144MHz. From his QTH in Paris, he made a number of c.w. contacts via the aurora between 1630-1730UTC. Towards the end of the event, while on a beam heading of 45 degrees, he was called by R1JEA. The signal was very weak and did not exhibit the normal auroral distortion. Marcel thinks that the mode was either Auroral-Es or

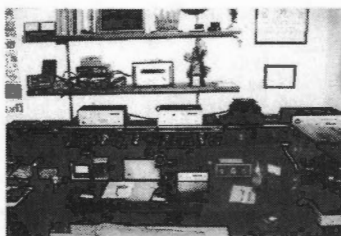


Fig. 1: The shack and antennas of the well-known 50MHz DXer WB20TK.

possibly FAI. The latter may well be so, as Didier FC1MXE (JN05) reported FAI propagation a few days later, working IC8CQF, IC8EGJ, IT9IPQ, IW8BZN and hearing IT9OWA/9.

Field aligned irregularity is a new mode to most v.h.f. operators. However, because the FAI and Sp-E seasons coincide, it appears that some 144MHz openings that have been called Auroral-Es or Sp-E were in reality FAI. Although s.s.b. can be quite intelligent via FAI, signals are normally weak and fluttery, so c.w. may yield better results.

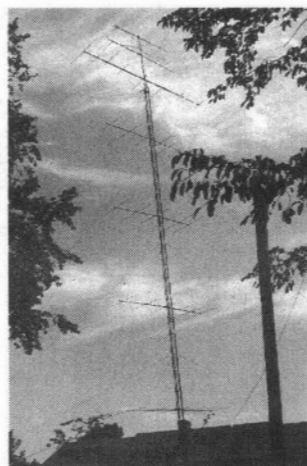
Sporadic-E

As I have already mentioned, we are now within the main Sp-E season. In the northern hemisphere this is most likely to occur between April-August, with a minor peak in late December. Although it can occur mainly during daylight hours, the best times for monitoring the 144MHz band will be between 1100-1300UTC and 1700-2000UTC, especially throughout June and July. It is very common on 50MHz and you can expect to find one-hop signals, around 2000km, nearly every day. It should be noted that occasionally, a multi-hop path exists on 50MHz across the Atlantic to North America. Statistics tell us this is more likely to occur during the first and third weeks of July between 2200-0000UTC.

The Sp-E cloud can be quite small and moving very rapidly, so on 144MHz in particular, you may not have much time to make a contact and go looking for another. Callsigns, report, locator and 'roger' are all you need exchange, and with a little practice you can complete the contact in 10-15 seconds. See you in the pile-up!

Meteor Scatter

During March/April of this year, **Eckart DJ4UF** operated from various locations in France and Spain. Using an FT290R, 150W and a 13-element Yagi on a wind-surfing mast, a number of m.s. contacts were made into the UK. Operating from JN12 on March 31,



he worked G0GMS, G0KON, G4E2P and G4YTL. On April 7, whilst in locator JN13, he contacted G0GMS and G4YTL.

Petros SV1AAF located in Athens (KM18) is now active on c.w. meteor scatter. Want to work Luxembourg? The 'DL West v.h.f. DX Group' will be active from JN29 between June 28-30, using the callsign LX/DL4EBX. The group will primarily be active via meteor scatter on 144.073MHz. Schedules will be taken in advance on the v.h.f. net by DL1EFJ or DL8EBW. You can also arrange a sked by writing to **Guido Junkersfeld DL8EBW**, Gneisenastrasse 10, D-5600 Wuppertal 11, Germany or by telephoning him on 010 49 202 781170. **Lasse SM5DCX/3**, is going to be active via c.w. meteor scatter from JP81 between July 22-28. He will take skeds on the v.h.f. net.

The following data, concerning meteor showers occurring during June-July, will help you determine in which direction to beam at specific times and when the shower is below the horizon. The June Perseids, alternatively called the 54 Perseids, are encountered between June 22-30, peaking on Wednesday June 26. Between 0700 to 0900UTC beam north-east or south-west, 0900 to 1200UTC beam east or west, 1200 to 1500UTC beam south-east or north-west, 1500 to 1600UTC beam south or north. The radiant is below the horizon from 1700 to 0300UTC.

The Beta Taurids shower lasts for over a month, from June 5 to July 17, reaching a maximum on Thursday June 27. This shower has virtually the same beam-heading characteristics as the June Perseids, the only minor difference being that the shower is below the horizon from 1700 to 0500UTC.

The Alpha Orionids occur between July 9-15, with best activity being on Friday July 12. Between 0600 to 0800UTC beam north-east or south-west, 0800 to 1200UTC beam east or west, 1200 to 1400UTC beam south-east or north-west. This shower does not favour the north-south path and is below the horizon from 1600 to 0500UTC.

The Nu Geminids stream is encountered between July 9-18, peaking on Friday July 12. Between 0600 to 0900UTC beam north-east or south-west, 0900 to 1200UTC beam east or west, 1200 to 1400UTC beam south-east or north-west, 1400 to 1500UTC beam south or north. The radiant is below the horizon between 1700 to 0300UTC.

The L. Geminids shower can be worked between July 4-29, the best day being Friday July 12. Between 0700 to 0900UTC beam north-east or south-west, 0900 to 1400UTC beam east or west, 1400 to 1600UTC beam south-east or north-west. The north-south path is not usable with this shower. It is below the horizon from 1800 to 0400UTC.

The 50MHz Band

As predicted in a recent issue of *PW*, the band opened up to Africa and South America on a number of occasions with most openings occurring between April 1-6 and 21-29. Towards the end of the month, the first real signs of the summer Sp-E season was detected, allowing many inter-European contacts to be made. These European, African and South American openings continued into the first week of May, but more about these in next month's column.

The month started off slowly with only TL8MB, TR8CA and V51VHF being reported on April 1. It was a little better on the 2nd, with TR8, V51, ZS6, 3DA0BK, 7Q7JA and 9L1US being heard in a morning opening from around 1030UTC. Although GJ4ICD heard PY5CC and KP2A at 1400UTC on April 3, very little else was reported in the UK until April 5. The band was open all day from 0945-1645UTC with at least 12 African countries being worked. Some of the DX included A22BW, CN8ST, TL8MB, TU2MA, V51E, ZD8LI, ZS2/4/6, ZS9A, 3DA0BK, 3X1SG, 7Q7JA and 9L1US. The band was also open to North and South America with FM3AG and FM5WD on Martinique, KP2A, LU7DZ, LU9AEA, PP5WL and PY5CC all putting in an appearance. On April 6, PY0FF on Fernando de Noronha and ZP6XPW in Paraguay were worked from the UK. Some real DX at last! For the next fortnight however, the band was very quiet with nothing being reported until April 21, when a small opening into V51 and ZS9 took place around 1630UTC. The band was open to Africa again, on April 26, with V51, ZS6 and ZP6XPW being worked in a two-hour opening commencing from 1600UTC. The final DX opening of the month occurred on April 28 with propagation to South America. The band opened up from 1230UTC, with many UK stations working into CX, LU and PY. At 1250UTC, I heard the beacon ZP5AA, on 50.025MHz, peaking 529. It runs 5W into a ground plane antenna. Not a bad way to finish off the month.

Ela Martyr G6HKM (JO01) made

Back-Scatter

reference to my comments in the May issue of *PW*, in which I stated that the Republic of the Philippines (DU) were in Oceania. According to her Philip's Atlas, DU is listed as Asia and Ela would much prefer to claim DU than ZC4 for WAC. In fact she could have claimed it some time ago but wanted better DX for Asia! Whenever I need to find out which continent a particular country is in, I always refer to either the ARRL or RSGB operating manuals. Both of these show that the Philippines are in Oceania.

The shack and antennas of the well-known 50MHz DXer WB20TK are shown in Fig. 1. He uses an FT102, Microwave Modules transverter and amplifier. The antenna system consists of an 8-element Yagi at 34m for 50MHz, an 18-element Yagi at 38m for 144MHz and a 28-element Yagi at 40m for 430MHz. Mounted, off the side of the 33m high tower, is an array of four 6-element Yagis for 50MHz.

The 144MHz Band

Conditions during April were unexceptional with only the aurora on April 29 livening up the band, and that only for 3 hours or so! Many bands seem to be getting quieter and quieter, with very little to report. Apart from the aurora, I only made 4 QSOs during the month, G6HEF (IO84), GM4DGT (IO85), MORSE (IO81) and PE1CZQ (JD22). Ela G6HKM found EI3GE and GU4XGG, but little else.

Geoff Brown GJ4ICD (IN89) mentions hearing some very strong EA1 and EA3 stations, via tropo, on April 4. He also heard a very weak EA6 station, possibly EA6FB on 144.290MHz. Did anyone else hear this station?

John Hill G7CLY (IO93), reports that he has been off the air for 6 months following the demise of his antennas in the December gales. He has now erected a 13-element Tonna at 8m a.g.l. and reports working 17 countries and 3 countries since the beginning of April.

The 430MHz Band

Philip Lancaster G0ISW (IO84), has been concerned about the level of activity on this u.h.f. band. He sent out a packet radio bulletin to this effect, and was pleased to get a favourable response from G7HUD (IO83), G8DQK (IO83), GM4CXP (IO85) and GM6BIG (IO75). As everyone requested schedules to take place during the week, he has arranged activity periods to run on Wednesday and Thursday evenings starting at 1930UTC. The suggested meeting frequency is 432.210MHz with either s.s.b. or c.w. being used. Any suggestions for different modes, frequencies, times are welcomed. Philip is located in Cumbria at 166m a.s.l. and with 10W into a phased array of 16 dipoles, he can normally work to the south coast. He hopes that other operators will join in and increase activity on the band.

Annual c.w. ladder

Station	50	70	144	430	Points
G4OUT	18	4	81	—	85
G4ASR	—	—	37	—	55
GW4VXX	—	—	11	—	11
GM4CXP	—	1	6	—	7

Number of different stations worked since 1 January 1991

Another station looking for schedules is **Markus DH5YAU** (JO41). He runs 150W to four 33-element Yagis. You can arrange a schedule by writing to Markus Toppmoller, Auf dem Knull, D-4830 Gutersloh, Germany or by telephoning 010 40 524 125 146.

Beacon and Repeater News

Mike UL7GCC has passed on the news that he is running a private beacon on 50.055MHz, from locator MN83KB. Using the callsign UL7GCC/RL3Q, it is operational between 1500-0300UTC, running 3W into a ground plane antenna. Mike mentions that he hopes to change the antenna to a Yagi sometime in the summer.

Larus TF4LB is running a beacon TF4SIX on 50.57MHz. Located in HP86LB, it runs 15W into a 2-element cubical quad antenna. This beacon is replacing TF3VHF which was destroyed late last year. If you hear the beacon and there is no other TF activity, you can telephone Larus on 010 354 4 4386 and he will come on the air.

A microwave beacon GB3SEE, is now operational from Reigate (IO91VG) on 10368.850MHz. Reports should be sent to G00LX QTHR.

A telephony gateway has recently been installed in Budapest. A 28MHz s.s.b. transceiver has been connected to a 144MHz f.m. repeater enabling Hungarians with 144MHz hand-helds to make DX contacts. Try calling on 28.444MHz and you might get a pile up of HA and HG operators. It may be an ideal way of arranging those meteor scatter skeds!

News has been received of repeater units located on the Channel Islands. The Jersey 144MHz repeater GB3GJ has unfortunately closed down

Annual v.h.f./u.h.f. table January to December 1991

Station	50MHz		70MHz		144MHz		430MHz		1296MHz		Points
	Countries	Counties	Countries	Counties	Countries	Counties	Countries	Counties	Countries	Counties	
G6HKM	43	31	—	—	38	11	12	3	10	2	150
G6ESB	4	2	13	2	36	6	25	6	4	2	100
G4ASR	—	29	41	4	10	7	—	—	—	—	91
GM4CXP	2	1	2	2	22	3	—	—	—	—	32

permanently, but on a more positive note the Guernsey u.h.f. repeater GB3GU is again up and running, this time from a new site near St Peter Port.

The Northampton microwave repeater/beacon is now operational on 1297.125MHz. Reports are welcomed by Paul Young G0HWC.

DXpedition Update

Bo OZ1DJJ will be active on 50MHz from various squares in Greenland during 1991. Using the callsign OX3LX, he will operate from GP38 between June 7-22, GQ30 between June 25-July 6 and GQ12 from July 8-20. He will be running 50W into a 5-element Yagi.

During July and August, Laurant FJ5BZ will also be operating from Greenland on 50MHz. He will use the callsign OX/F6GOX and whilst there, will install a beacon OX3BCN, on 50.025MHz.

A group of French operators will be running e.m.e. from Jersey during July. Using the callsign F6KSX they will operate on 430MHz between July 4-6 and 144MHz between July 7-8.

During July, Johannes LA6HL will be making his annual trip to Iceland. He will use an FT726 into a 5-element Yagi on 50MHz, and the same transceiver on 144MHz into a 160W amplifier and 15-element Cue Dee antenna. Between July 4-9 he will operate from locator squares IP14, IP24, IP25, IP34 and IP35. He will then move to a camp site near Reykjavik (HP93), staying there from July 10-19, during which time he will increase the antenna system to two Yagis and work e.m.e. on 144.039MHz. Between July 20-25, Johannes will go to the south coast, IP03 and IP13, where the take-off is very good into Europe. He will operate

on 144.183MHz, via meteor scatter, transmitting during the first 2.5 minute period. As has been the practice in past years, Johannes will spend more time listening than transmitting. He mentions that the best time to make random calls, on 144MHz, would be from 2000UTC. Because of TV restrictions, he is only allowed to transmit on 50MHz between 2300-1800UTC. After leaving Iceland, he will be active from the Faroe Islands, operating on both 50MHz and 144MHz.

The Island Hoppers DX Group, based in Dublin, will be activating the Great Blasket Island between July 20-27. This Island will be of great interest to IOTA hunters as it has not been activated for a number of years. The callsign has not yet been allocated but it will have the prefix EJ signifying an island off the Irish coast. The frequencies to monitor are 50.150MHz, 144.260MHz and 432.220MHz. It's possible that there will be some activity on the 70MHz band. Further details may be obtained from Conor McGlynn EI5HF.

QRZ Contest!

The Danish Society, EDR, have organised a microwave activity week to run between 1200UTC on June 15 to 1200UTC on June 22. The intention is to promote narrowband activity on the 10, 24 and 48GHz bands. Further information can be obtained from Steen Gruby OZ9ZI, Hogevej 1, DK-3660 Stenlose, Denmark.

Don't forget that our very own event, the **Practical Wireless** 144MHz Low Power Contest, takes place between 0900-1700UTC on Sunday June 16.

The RSGB cumulative contests, for all bands between 3.4GHz and 24GHz, will also be held on Sunday 16th, these events taking place between 0900-2100UTC. The next leg of the contest will be on July 14.

The German 144MHz c.w. contest, AGCW-DL, will be held between 1900-2300UTC on Saturday June 22. The contest exchange consists of the report, serial number, power section and locator. The power sections are; A = less than 3.5W, B = less than 25W, C = more than 25W. An example would be 599012/C/IO81MX. I can supply the rules for this contest plus other information sheets on receipt of an s.a.e.

Operators of the 430MHz band are well catered for during the weekend of June 22-23. An f.m. contest for fixed and portable stations will be held between 1400-1800UTC on the 22nd followed by a c.w. event between 2000-

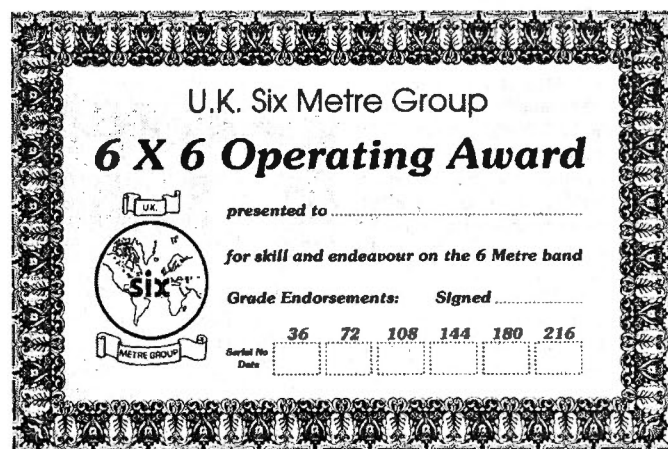


Fig. 2.

Back-Scatter

2400UTC. The 430MHz Trophy contest will be held on Sunday 23rd between 0900-1700UTC.

A QRP 144MHz telephony contest has been organised by the WAB group, to run between 0900-1700UTC on Sunday June 30. All licensed amateurs and short wave listeners are eligible to enter. The contest exchange is RST, serial number, WAB area and county. Further details of all WAB contests can be obtained from G4SKQ QTHR.

The big event of the year, the v.h.f. field day, takes place on July 6-7 between 1400-1400UTC. Activity will be

on all bands from 50MHz through to 2.3GHz.

The seventh annual CQ World-Wide v.h.f. WPX contest takes place on July 20-21. Further details in next months column.

Scandinavian activity contests will be held on the following dates. 50MHz activity on June 25, 144MHz on July 2, 430MHz on July 9 and Microwaves on June 18. All sections run between 1700-2100UTC. You can obtain a full set of rules by sending me a stamped addressed envelope.

The 50MHz contests and activity

periods mentioned above provide an ideal opportunity to build up your score for the UK Six Metre Group '6X6' Award shown in Fig. 2. For details of the group, send a s.a.s.e. to Ted Collins G4UPS QTHR.

Deadlines

Please send your letters to reach me by the end of the month. I always write up the column in the first few days of the following month. Don't forget that I can also receive messages via packet radio at my mailbox GB7TCM.

Photographs of your shack, antennas or any v.h.f. activity are especially welcome. Other pictorial items such as QSL cards, awards, certificates, etc., are also required. These can all be returned if necessary.

144MHz QRB Table

Top distances (kms)		
Tropo	3160	GM4YXI
Aurora	2029	G4ASR
Sp-E	3080	G0EVT
Meteor	2107	G4ASR

Back-Scatter

Broadcast Round-up

Reports to Peter Shore via the PW Editorial Office

There are continuing ups and downs in international radio broadcasting, with the full extent of Radio Canada's cutbacks now apparent. The station's present schedule is included in 'The Americas' news section. A campaign has been started in Canada run by former RCI producer Wojtek Gwiazda. The Coalition for the Restoration of Full RCI Funding was launched in Ottawa during April, and calls on the government to reinstate RCI's full budget and recommence RCI-originated programmes in English and French, instead of domestic service relays. Listeners are urged to protest to the Canadian PM, the Rt Hon Brian Mulroney at the House of Commons, Ottawa, or to fax him on +1 613 957 5636.

Ian MacFarland of *SWL Digest* fame tells me that he'll be working at Radio Japan, as reported last month, for two years in the English news division, co-hosting the *News Round* programme on Thursday and Friday live at 0700 and 1100GMT.

Radio Japan is presently negotiating with the BBC World Service to use its transmitters for relays to Europe. At the moment, Africa Number One facilities in Moyabi, Gabon, carry Radio Japan's programmes to Europe and Africa, but it seems that coverage is not as good as Tokyo had hoped, and they believe that the BBC can do better. At the Tokyo-Yamata site of Radio Japan, three more 300kW transmitters will be added to the four 100kW and four 300kW senders already there by the year 1993. This is to improve reception in South East Asia and the Asian continent.

There's to be a Leningrad Hamvention during early August, where broadcasters including the Voice of America, Swiss Radio International, Radio Netherlands and Radio Japan will be exhibiting. Plans exist for a Broadcasters' Forum in Moscow before the Hamvention, and in Prague afterwards. The Forum gives listeners the opportunity to raise questions with broadcasters, and they are usually informative and very good fun. More news as it arrives.

Staying in the Soviet Union, there's news that Deutsche Welle is negoti-

ating with the powers that be, to use former Soviet jamming transmitters to relay its programmes to Asia. The German government has made available DM 6 million for this project, and the Director-General of DW suggests that the arrangement could be in place later this year, with 15 hours of broadcasting a day when the contract begins. Soviet television, carrying a report on the agreement, commented "What times we live in. Earlier this would have been considered fantasy".

Radio France International has announced that within the next six years it plans to increase the number of 500kW transmitters at its Allouissodun transmitting centre to an incredible 24. These will replace twelve 100kW senders presently there, and add four to the existing complement of eight 500kW transmitters. In addition, RFI will build a three-sender station in Djibuti, East Africa with a total of 1500kW of power, and add a fifth 500kW transmitter to the relay base in Montsinery, French Guiana. A transmitting site is also to be constructed in Thailand. Clearly RFI is planning to become the French-language equivalent of the BBC World Service.

Radio Finland meanwhile is not in the happy position of RFI, and will be cutting back some of its operations. Night-time transmissions to Europe are being suspended, and the station will close at 2200GMT, reopening at 0300, saving some 2000 programme hours a year. The affected programmes consist mainly of music so the loss is not too great. The transmitters to be silent during the dark hours will be the medium and long wave channels of 558, 963 and 252kHz, and the European short wave frequency of 6.12MHz. Radio Finland incidentally is one of the very

few stations which broadcasts a weekly programme in classical Latin.

Israel Radio's hours are to be cut back from the current 117 hours a week to less than 60. Portuguese, Hungarian and Romanian services will be axed, and there is a rumour that English, presently three and a quarter hours daily, and French, now two and a quarter hours, will be reduced to just an hour each. The money saved will be directed to new stations for immigrants, regional road safety stations (one wonders what they'll broadcast) and round-the-clock news on domestic Network Two.

Europe All times GMT (=UTC)

We reported in May's edition that RTBF, the French broadcasting network in Belgium, had stopped its international service. We can now report that RTBF is back on the air with a relay of the domestic French Radio 1 network at:

0530-0630 on 17.68 and 7.14MHz
1100-1130 on 25.645 and 9.925MHz
1600-1715 on 17.675 and 15.54MHz

Radio Finland's English service is now:

0630-0645 on 11.755, 9.56 and 6.12MHz
0800-0855 on 21.55 u.s.b., 17.80MHz
1130-1200 on 21.55 u.s.b., 15.40MHz
1330-1400 on 21.55 u.s.b., 15.40MHz
1400-1430 on 21.55 u.s.b., 15.185, 11.82, 11.755 and 6.12MHz
1830-1900 on 15.185 u.s.b., 11.755, 9.55 and 6.12MHz
1955-2000 on 15.185 u.s.b., 11.755, 9.55 and 6.12MHz

2130-2150 on 11.755, 9.55 and 6.12MHz
2300-2320 on 15.43 u.s.b., 15.185MHz

The Latin programme mentioned earlier can be heard on Sundays included in all the English broadcasts.

Radio France International with English is at:

1230-1300 on 21.645, 21.635, 15.195, 15.155, 11.67 and 9.805MHz
1400-1500 on 21.765, 17.65 and 11.91MHz (via China)
1600-1700 on 17.85, 17.795, 17.62, 15.53, 12.015, 11.705 and 6.175MHz

Lots of news this month from **Roy Merrill**, including a report of Iceland heard with assorted music and occasional R/T(I) on 3.296MHz u.s.b. at around 2030. The full schedule for Iceland to Europe and Scandinavia is now:

1215-1245 on 15.79 and 13.83MHz
1855-1930 on 11.402 and 13.855MHz
0000-2400 on 3.295, 6.10 and 9.265MHz

RAI from Rome has English transmissions to Europe at:

0425-0440 on 9.575 and 7.275MHz
1935-1955 on 11.80, 9.71 and 7.275MHz
2025-2045 on 11.80, 9.575 and 7.235MHz

Radio Kiev can be heard on 11.76MHz, sometimes as early as 1815 but is usually covered in QRM from at least three co-channel stations - VoA, Radio Pyongyang and Radio Moscow - with adjacent channel QRM from Radio Finland on 11.755. The signal improves from 2200 with SIO up to 433, peaking occasionally to 544, in parallel with 4.94MHz.

Radio Moscow has doubled its Afrikaans service, which is now heard 1800-1900 on 15.18 and 17.58MHz.

Radio Tashkent has an English programme daily at 0100 for thirty minutes on 7.335 and 7.19MHz.

Back-Scatter

Radio Yugoslavia has English 2100-2145 on 5.96 and 11.735MHz, but both suffer co-channel QRM from Moscow, with the 11MHz channel virtually unreadable, says Roy Merrall. English is also scheduled for 1830-1900 on 15.165 and 6.165MHz.

African and Middle Eastern Stations

La Voix de la Revolution Congolaise is well received on 4.765MHz around 2200 with French language programming.

The Voice of Ethiopia has an English programme from 1500 to 1600 on 9.56 and 7.165MHz.

Kol Israel is in Hebrew on 13.752MHz around midday, improving during the evening, occasionally rating SIO 544.

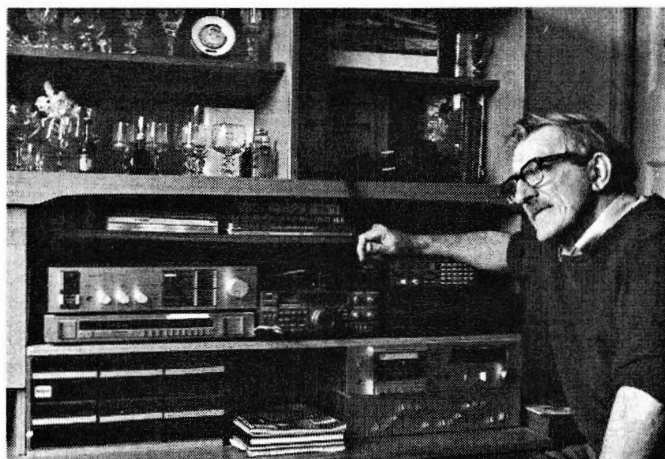
KBC Nairobi on 4.935 fades in around 1730 and provides reasonable musical entertainment up to SIO 433. Often clashes with Radio Kiev on 4.94MHz.

Radio RSA operates English to Africa now:

0400-0500 on 11.92, 11.86 and 5.96MHz
1000-1100 on 17.835MHz
1100-1200 on 11.90, 11.86 and 9.555MHz
1500-1800 on 15.21 and 7.23MHz
1600-1800 on 17.79MHz

Roy Merrall reports the Voice of Turkey, heard strongly on 9.445, with an announced schedule of:

2000-2050 to Europe on 9.795MHz
2200-2250 to Europe on 9.445; SE Asia on 17.88; Middle East 9.665MHz
0300-0350 to N. America on 9.445; SE Asia on 17.88MHz



Crystal clear reception from Roy Merrall's set up.

The latest schedule from UAE Radio in Abu Dhabi shows the North American English service 2200-2400 on 17.855, 15.305 and 13.605MHz. Arabic to Europe is on the air:

0600-1200 on 25.69 and 21.515MHz
0600-1400 on 21.735MHz
0600-1900 on 17.855MHz
1400-2200 on 11.985MHz
1900-2200 on 13.605MHz

UAE Radio Dubai is heard well at 1330-1350 on 13.675, and at 1630-1645 on the same channel.

Radio Zanzibar is heard sometimes as early as 1700, on variable 11.7342MHz, with an English by Radio programme noted on Sundays at 1705.

Asia and the Pacific

Radio Afghanistan to Europe has retimed its broadcasts by half-an-hour.

English can now be heard at 1800-1900 on 15.51 and 11.845MHz.

Radio Australia is noted with English for the Pacific, and Chinese simultaneously on 13.605 at 2054 onwards. The Chinese predominates with SIO 544 initially.

FEBA Radio in the Seychelles has an English broadcast to the Middle East at 0432-0502 on 17.81 with 100kW of power, at 1500-1555 to S Asia on 11.865 and at 1500-1600 on 9.59 and 15.33MHz.

Radio Japan via Moyabi is on the air in the evening in a number of European languages. One language programme noted by Roy Merrall was Japanese by Radio in the Italian transmission at 2115 on 15.355MHz.

Radio New Zealand International on 15.12, suffers co-channel QRM from FEBA Seychelles and later from SLBC in Sri Lanka at 2000.

The Sri Lanka Broadcasting Cor-

poration's English World Service comes in clearly from 2000-2130 on 15.12, in parallel with 9.72MHz.

The Americas

Radio Cultura in Sao Paulo, Brazil, has been caught by Roy Merrall on 17.815MHz around 2130, albeit weakly. The signal improves rapidly to SIO 232 by 2200. Roy thinks that its pretty good for a 1kW transmitter!

Radio Canada International's remaining European English language transmissions are now:

0200-0229 on 9.65, 7.27, 7.23, 6.125 and 6.035MHz
0515-0559 on 17.84, 11.755, 9.75, 7.295, 6.15 and 6.05MHz
1400-1429 on 21.545, 17.82, 17.795, 15.235, 15.315, 15.305 and 11.935MHz
1500-1529 on 21.545, 17.82, 15.325, 15.305 and 11.935MHz (includes RCI news bulletin)
1600-1629 on 21.545, 17.82, 15.325, 15.305 and 11.935MHz
1700-1759 on 21.545, 17.82, 15.325, 9.555 and 7.235MHz
1900-1929 on 21.675, 17.875, 15.325, 13.65, 7.235 and 5.995MHz
1930-1959 on 21.675, 17.875, 15.325, 13.65, 9.67 and 6.17MHz
2100-2159 on 17.875 and 15.325MHz

Radio Havana Cuba has been heard testing in compatible single sideband (s.s.b.).

The tests have been on 5.965 at 0400-0600, beamed to North America. English to Europe is at 2000-2100 on 17.835MHz.

Radio Surinam International relayed by Radiobras is heard 1700-1750 on 17.75MHz at present. English is at around 1725.

THE UP-TO-DATE NEWS & INFORMATION SERVICE FOR
THE LISTENING ENTHUSIAST

0898 654676

UPDATED EVERY SATURDAY

RADIO LINE

RADIO LINE

For the listening enthusiast **Radio Line** - prepared by the staff of *Short Wave Magazine* - provides up-to-date information on all aspects of the listening hobby. By calling **0898-654676** you'll hear the latest news on scanning, broadcast bands, airband topics, propagation, rallies, utility listening, satellites, TV DXing, it's all there.

What's the latest on the bands? Call Radio Line to find out. Up-dated every Saturday - it's the number for every listening enthusiast to tune into!

If you have information for Radio Line, call Dick Ganderton or Elaine Richards on **0202-678558**. (answering machine after working hours).

Calls charged at 34p per minute off-peak, 45p per minute at all other times. Information prepared by the staff of PW Publishing, Enefco House, The Quay, Poole, Dorset BH15 1PP.



Amateur Radio for Beginners

by Victor Brand, G3JNB

At last, a simple introduction to the hobby, written specifically for the absolute beginner of any age. This copiously illustrated book shows how to tune into the fascinating world of short-wave radio, how to make a crystal set, and just how to go about becoming a radio amateur.

65 pages; 210 by 145mm; £4.56 incl p&p



RSGB Amateur Radio Call Book

The latest 1991/92 edition of this indispensable reference contains an up-to-date listing of the names and addresses of UK and Republic of Ireland radio amateurs plus a directory containing all sorts of useful information, from country checklists and operating data to RAE centres. Don't be without it!

414 pages; 297 by 210mm; £9.27 incl p&p

Space Radio Handbook

by John Branegan, GM4IHJ

Space exploration by radio is exciting and it's open to anyone! This book shows how it's done and the equipment you'll need. It covers the whole field, including auroras, meteor scatter, moonbounce, satellites and other space craft, even simple radio astronomy. If you're ready to use radio to explore beyond the atmosphere, let this book be your guide.

242 pages; 244 by 183mm; £13.34 incl p&p

• **HOW TO ORDER:** Phone your credit card (Access/Visa) order in on 0707 49855 or send a cheque/PO. Allow up to 28 days for delivery.

The Radio Society of Great Britain welcomes all radio amateurs and short-wave listeners as members. The benefits of membership include a monthly magazine, *Radio Communication*, use of the RSGB QSL Bureau, discounts on books and much, much more.

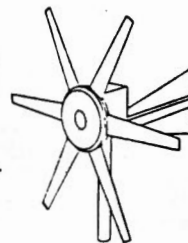
• For a FREE sample copy of *Radio Communication* and a membership information pack, just call us or write to the address below.

Radio Society of Great Britain (PW)
Lambda House, Cranborne Road,
Potters Bar, Herts, EN6 3JE
Tel: 0707 59015



RUTLAND WINDCHARGERS

- ★ Free power from the wind
 - ★ Independent battery charging systems
 - ★ Charging commences at 4mph (2m/s)
 - ★ Charges 4Amps at 22mph (10m/s)
 - ★ Ideal for remote telecoms, automatic feeders and lighting barns, sheds, etc.
- For free brochure contact:



Marlec Eng Co Ltd, Unit K, Cavendish Ctyd
Sallow Road, Corby, Northants NN17 1DZ
Tel: 0536 201588 Fax: 0536 400211

TENNAMAST for TILTOVERS

GM60AL - GM4VHZ - GMONHH

Our wind up, tiltover Tennamasts are now better than ever. We continue to expand the range, and now galvanise all our masts to BS729. They are safe and easy to use; slim, elegant and economically priced.

BEAM KITS Homebrew your own GM4UTP 5 Band Quad or VK2ABQ Beam with our low cost kits. We can supply Head Units separately to suit, 2-3".

THE HUSTLER. The ultimate mobile now available.

Call 05055 3824 (24 hours) for
Brochure and Info plus
friendly technical advice

TENNAMAST SCOTLAND
81 Mains Road, Belth, Ayrshire KA15 2HT



"Characteristics" for Amateur Radio

44 Hildethorpe Road, Bridlington, East Yorkshire YO15 3BG
Tel: (0262) 673635 Fax: (0262) 670568



Door Plaques
"The Shack"
£3.25



NEW!
Personalised Plaque



Personalised Mugs & Plaques
£3.75

(UK PRICES ONLY)

Allow 3 weeks for delivery of mugs.
Prices include P&P. Cash with order.



SALES (DEVON) Communications Specialists

Largest stockist of CB Radio, Scanners and Accessories in Devon, part exchange welcome, full workshop facilities on the premises.

★ Open Sundays & Evenings by request ★ We will mail to you at our cost ★
(All personal callers please telephone first to avoid disappointment)

SOUTH BRENT, DEVON TQ10 9JT Tel: (0364) 73891 Fax: (0364) 72907

SRW KILOWATT LOUDENBOOMER

400 Watts **output** on all 9 H.F. bands. Internal mains P.S.U. Total Weight 6Kg. Only 14" wide, 10" deep and 5" high. Fits on MFI desk! Matches FT747 etc. Drive with any 50 to 100 watt output rig. RF or hardware switching. The power gain of a beam, on all the bands. At least 2's points! NOW ONLY £549 + VAT. For more details contact Steve Webb, G3TPW at:

S.R.W. COMMUNICATIONS Ltd.,
Astrid House, The Green, Swinton, MALTON,
North Yorkshire YO17 0SY Tel: (0653) 697513.



PW SUBSCRIBERS' CLUB

If you have a subscription then you will know all about the *Practical Wireless* Subscribers' Club. If you do not have a subscription then doubtless you will be wondering just what this page is all about. Membership of the *PW* Subscriber's Club is free and automatic for all Subscribers, and is our way of saying thank you to all those who have enough faith in their favourite magazine to pay for it 'up front'. Each month there will be Special Offers and occasional competitions with some really useful prizes to be won.



This month we have a special tool kit offer for *Practical Wireless* Magazine Subscribers' Club members. This Starter Tool Kit contains a snip cutter, a pair of long-nose pliers, a 75mm long light-duty flat blade screwdriver, a No.1 crosspoint screwdriver, 75mm long, a desoldering tool and a soldering kit containing a CS iron, stand and a 5m pack of 18s.w.g. solder, presented in a cloth tool-roll. As a member of the *Practical Wireless* Subscribers' Club you can obtain your tool-kit for just £20 including post and packing. These kits will be dispatched in the week commencing 1 July 1991 by Recorded Delivery. The closing date for all orders is 25 July 1991. Please mark your orders PW Subscriber Club July, PW Publishing Ltd. FREEPOST, Enefco House, The Quay, Poole, Dorset BH15 1PP.

COMPETITION

This month you can win one of a selection of torches, from a pen-light to a reading light. Answer these four simple questions and send your answers, with your Subscriber's Number, to PW Subscriber's Club Competition, Enefco House, The Quay, Poole, Dorset BH15 1PP.

- 1: What is the symbol for an *npn* transistor in a circuit diagram?
- 2: What does the abbreviation m.o.s.f.e.t. stand for?
- 3: What is the formula for the impedance of a tuned circuit?
- 4: What is the value of a 500pF and 0.45nF capacitor series?

All entries to be submitted, with your Subscriber's Number, by 5 July '91 for UK and 30 August '91 for Overseas Members.

SUBSCRIPTIONS TO PRACTICAL WIRELESS MAGAZINE

Be sure of your copy every month, beat the price rise and qualify for the Subscribers' Club as well. Special offers and discounts normally available to all members, including those abroad.

Please indicate the type of subscription required:
PRACTICAL WIRELESS 1 YEAR

- ☐ £19.00 (UK)
☐ £21.00 (Europe)
☐ £22.00 (Rest of World)

SHORT WAVE MAGAZINE 1 YEAR

- ☐ £19.00 (UK)
☐ £21.00 (Europe)
☐ £22.00 (Rest of World)

SPECIAL JOINT SUBSCRIPTION 1 YEAR ONLY

- ☐ £32.00 (UK)
☐ £35.00 (Europe)
☐ £37.00 (Rest of World)

Prices current at June 1991

Subscription to commence with issue dated.....

☐ Please send me a Starter Tool Kit at the special *PW* Subscribers' Club price of £20.00 inc. P&P.

To: PW Publishing Ltd., FREEPOST, Subscriptions Dept., Enefco House, The Quay, Poole, Dorset BH15 1PP

Name.....

Address.....

.....

.....

☐ I enclose cheque/PO (Payable to PW Publishing Ltd) £.....

☐ Charge to my Access/Visa Card the amount of £.....

Card No.

Valid from to

Signature.....

**Credit Card Orders
can be taken on
(0202) 665524.**

If you do not want to deface your *PW* a photocopy of this coupon will be accepted.

HOW TO ORDER

POST AND PACKING: add 85p for one book, £1.50 for two or more books, orders over £30 post and packing free, (overseas readers add £1.50 for one book, £3.00 for two or more for surface mail postage) and send a postal order, cheque or international money with your order (quoting book titles and quantities) to **PW Publishing Limited, FREEPOST, Enefco House, The Quay, Poole, Dorset BH15 1PP.** Please make your cheques payable to Short Wave Magazine, payment by Access, Mastercard, Eurocard or Visa also accepted on telephone orders to Poole (0202) 665524. Books 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.

* A recent addition to our Book Service. O/P = Out of print, O/S = Out of stock.

RADIO

AIR & METEO CODE MANUAL

10th Edition. **Joerg Klingenfuss**
Detailed descriptions of the World Meteorological Organisation Global Telecommunication System operating FAX and RTTY meteo stations, and its message format with decoding examples. Also detailed description of the Aeronautical Fixed Telecommunication Network amongst others. 289 pages. £15.00

HIGH POWER WIRELESS EQUIPMENT

Articles from *Practical Electricity* 1910-11
Edited by **Henry Walter Young**
A reprint of interesting practical articles from the very early days of radio. 99 pages. £6.95

PASSPORT TO WORLD BAND RADIO 1991

This book gives you the information to explore and enjoy the world of broadcast band listening. It includes features on different international radio stations, receiver reviews and advice as well as the hours and languages of broadcast stations by frequency. 398 pages. £13.95

RADIOTELETYPE CODE MANUAL

10th Edition. **Joerg Klingenfuss**
This book gives detailed descriptions of the characteristics of telegraph transmission on short waves, with all commercial modulation types including voice frequency telegraphy and comprehensive information on all RTTY systems and c.w. alphabets. 96 pages. £8.00

RESCUE

Paul Beaver & Paul Berriff
This book follows the life and conditions of rescue helicopter crews. This is not drama, this is real life and it makes a true impression of the rescuers for the reader. There are transcripts of air/ground and between crew dialogues, a summary of the main distress and rescue radio frequencies and helicopter base locations. 192 pages. £9.99

SCANNERS (Third Edition)

Peter Rouse GU1DKD
A guide for users of scanning receivers, covering hardware, antennas, accessories, frequency allocations and operating procedures. 245 pages. £18.95

SCANNERS 2

Peter Rouse GU1DKD
The companion to *Scanners*, this provides even more information on the use of the v.h.f. and u.h.f. communications band and gives constructional details for accessories to improve the performance of scanning equipment. 216 pages. £9.95

SHORT WAVE RADIO LISTENERS' HANDBOOK

Arthur Miller
In easy-to-read and non-technical language, the author guides the reader through the mysteries of amateur, broadcast and CB transmissions. 207 pages. £7.99

1934 OFFICIAL SHORT WAVE RADIO MANUAL

Edited by **Hugo Gernsback**
A fascinating reprint from a bygone age with a directory of all the 1934 s.w. receivers, servicing information, constructional projects, circuits and ideas on building vintage radio sets with modern parts. 260 pages. £10.15

TELEVISION

A TV-OMERS HANDBOOK (BP176)

R. Bunney
Information on transmission standards, propagation, receivers including multi-standard, colour, satellites, antennas, photography, station identification, interference etc. Revised and updated 1986. 87 pages. £5.95

GUIDE TO WORLD-WIDE TELEVISION TEST CARDS

Edited by **Keith Hamer & Garry Smith**
Completely revised and expanded, this is a very handy and useful reference book for the DX-TV enthusiast. Over 200 photographs of Test Cards, logos, etc., world wide. 60 pages. £4.95

THE ATV COMPENDIUM

Mike Wooding G8IQM
This book is for those interested in amateur television, particularly the home construction aspect. There is not a 70cm section as the author felt this is covered in other books. Other fields, such as 3cm TV, are covered in depth. A must for the practical ATV enthusiast. 104 pages. £3.00

SATELLITES

AN INTRODUCTION TO SATELLITE TELEVISION (BP195)

F. A. Wilson
Answers all kinds of questions about satellite television. For the beginner thinking about hiring or purchasing a satellite TV system there are details to help you along. For the engineer there are technical details including calculations, formulae and tables. 104 pages. £5.95

SATELLITE TELEVISION A layman's guide

Peter Pearson
Pictures from space, that's what satellite television is all about. Orbiting satellites 35 000km high receive TV signals from stations on the earth and retransmit them back again. This book explains all you need to know to set up your own satellite TV terminal at home, dish and accessories, cable and tuner. 73 pages. £1.00

SATELLITE TELEVISION INSTALLATION GUIDE

2nd Edition. **John Breeds**
A practical guide to satellite television. Detailed guidelines on installing and aligning dishes based on practical experience. 56 pages. £11.95

THE SATELLITE BOOK (A complete guide to satellite TV theory and practice)

John Breeds
This book deals almost exclusively with television broadcast satellites and is a comprehensive collection of chapters on topics, each written by an expert in that field. It appears to be aimed at the professional satellite system installer, for whom it is invaluable, but it will be appreciated by a much wider audience - anyone interested in satellite technology. 280 pages. £27.00

THE SATELLITE EXPERIMENTER'S HANDBOOK (USA)

A guide to understanding and using amateur radio, weather and TV broadcast satellites. 207 pages. £7.50

WEATHER SATELLITE HANDBOOK 4th edition

Dr Ralph E. Taggart WB8DQT
This book explains all about weather satellites, how they work and how you can receive and decode their signals to provide the fascinating pictures of the world's weather. There are plenty of circuit diagrams and satellite predicting programs. 192 pages. £13.50

THEORY

A BEGINNERS GUIDE TO MODERN ELECTRONIC COMPONENTS

(BP285)
R.A. Penfold
This book covers a wide range of modern components. The basic functions of the components are described, but this is not a book on electronic theory and does not assume the reader has an in-depth knowledge of electronics. It is concerned with practical aspects such as colour codes, deciphering code numbers and the suitability. 164 pages. £3.95

AUDIO (Elements of electronics - book 6)

F. A. Wilson
This book studies sound and hearing, and examines the operation of microphones, loudspeakers, amplifiers, oscillators, and both disk and magnetic recording. Intended to give the reader a good understanding of the subject without getting involved in the more complicated theory and mathematics. 320 pages. £3.95

COMMUNICATION (BP69)

Elements of Electronics Book 5
F. A. Wilson
Fundamentals of line, microwave, submarine, satellite, digital multiplex, radio and telegraphy systems are covered, without the more complicated theory or mathematics. 256 pages. £2.95

EVERYDAY ELECTRONICS DATA BOOK

Mike Tooley BA
This book is an invaluable source of information of everyday relevance in the world of electronics. It contains not only sections which deal with the essential theory of electronic circuits, but it also deal with a wide range of practical electronic applications. 250 pages. £3.95

FILTER HANDBOOK A practical design guide

Stefan Niewiedomski
A practical book, describing the design process as applied to filters of all types. Includes practical examples and BASIC programs. 195 pages. £25.00

FROM ATOMS TO AMPERES

F.A. Wilson
Explains in simple terms the absolute fundamentals behind electricity and electronics. 244 pages. £3.50

PRACTICAL ELECTRONICS CALCULATIONS AND FORMULAE (BP53)

F. A. Wilson
This has been written as a workshop manual for the electronics enthusiast. There is a strong practical bias and higher mathematics have been avoided where possible. 249 pages. £3.95

SOLID STATE DESIGN FOR THE RADIO AMATEUR

Leo Hayward W7Z01 and Doug DeMaw W1FB
Back in print by popular demand! A revised and corrected edition of this useful reference book covering all aspects of solid-state design. 256 pages. £10.95

THE ARRL ELECTRONICS DATA BOOK

Doug DeMaw W1FB
Back by popular demand, completely revised and expanded, this is a handy reference book for the r.f. designer, technician, amateur and experimenter. 280 pages. £8.95

TRANSMISSION LINE TRANSFORMERS

Jerry Savick W2FMI
This is the second edition of this book, which covers a most intriguing and confusing area of the hobby. It should enable anyone with a modicum of skill to make a balun, etc. 270 pages. £13.50

BEGINNERS

AN INTRODUCTION TO RADIO DXING (BP91)

R. A. Penfold
How to find a particular station, country or type of broadcast and to receive it as clearly as possible. 112 pages. £1.95

BEGINNER'S GUIDE TO RADIO

9th Edition. **Gordon J. King**
Radio signals, transmitters, receivers, antennas, components, valves and semiconductor, CB and amateur radio are all dealt with here. 286 pages. £8.95

ELECTRONICS SIMPLIFIED - CRYSTAL SET CONSTRUCTION (BP92). F.

A. Wilson
Especially written for those who wish to take part in basic radio building. All the sets in the book are old designs updated with modern components. 72 pages. £1.75

THE SIMPLE ELECTRONICS CIRCUIT AND COMPONENTS Book One (BP62)

The aim of this book is to provide an in-expensive but comprehensive introduction to modern electronics. 209 pages. £3.50

LISTENING GUIDES

AIR BAND RADIO HANDBOOK (3rd Edition)

David J. Smith
Listen to conversations between aircraft and ground control. The author, an air traffic controller, explains more about this listening hobby. 174 pages. £6.99

DIAL SEARCH

6th Edition With Updates. **George Wilcox**

The listener's check list and guide to European broadcasting. Covers m.w., l.w., v.h.f. and s.w., including two special maps. 54 pages. £3.95

FLIGHT ROUTINGS 1991

T.T. Williams
Identifies the flights of airlines, schedule, charter, cargo and mail, to and from the UK and Eire and overflights between Europe and America. 104 pages. £5.25

GUIDE TO BROADCASTING STATIONS

20th Edition 1989/90. **Philip Darrington**
Frequency and station data, receivers, antennas, Latin American DXing, reporting, computers in radio, etc. 240 pages. £10.95

GUIDE TO FACSIMILE STATIONS 10th Edition

Joerg Klingenfuss
This manual is the basic reference book for everyone interested in FAX. Frequency, call sign, name of the station, ITU country/geographical symbol, technical parameters of the emission are all listed. All frequencies have been measured to the nearest 100Hz. 318 pages. £14.00

GUIDE TO FORMER UTILITY TRANSMISSIONS

3rd Edition. **Joerg Klingenfuss**
Built on continuous monitoring of the radio spectrum from the sixties until the recent past. A useful summary of the former activities of utility stations providing information for the classification and identification of radio signals. 126 pages. £8.00

GUIDE TO UTILITY STATIONS

9th Edition. **Joerg Klingenfuss**
This book covers the complete short wave range from 3 to 30MHz together with the adjacent frequency bands from 0 to 150kHz and from 1.6 to 3MHz. It includes details on all types of utility stations including FAX and RTTY. There are 15802 entries in the frequency list and 3123 in the alphabetical call sign list plus press services and meteorological stations. 502 pages. £19.00

HF OCEANIC AIRBAND COMMUNICATIONS

3rd Edition. **Bill Laver**
HF aircraft channels by frequency and band, main ground radio stations, European R/T networks and North Atlantic control frequencies. 29 pages. £3.50

MARINE UK RADIO FREQUENCY GUIDE

Bill Laver
A complete guide to the UK s.w. and v.h.f. marine radio networks. Useful information, frequency listings and the World Marine Coastal Phone Stations. 62 pages. £4.95

NEWNES SHORT WAVE LISTENING HAND BOOK

Joe Pritchard G1UOW
A technical guide for all short wave listeners. Covers construction and use of sets for the s.w.l. who wants to explore the bands up to 30MHz. 288 pages. £12.95

RADIO LISTENER'S GUIDE 1991

Clive Woodyear
This is the third edition of the essential guide for all radio listeners. Simple-to-use maps and charts show the frequencies for all the radio stations in the UK. When travelling or at home, the guide gives you all the frequencies you'll ever need. 56 pages. £2.95

THE COMPLETE VHF/UHF FREQUENCY GUIDE

Revised 1990 - 1991 Edition.
This book gives details of frequencies from 26-2250MHz with no gaps and who uses what. Recently updated, there are chapters on equipment requirements as well as antennas, etc. 88 pages. £5.95

THE INTERNATIONAL VHF FM GUIDE

7th Edition. **Julien Baldwin G3UHK and Kria Partridge G8AUU**
The latest edition of this useful book gives concise details of repeaters and beacons worldwide plus coverage maps and further information on UK repeaters. 70 pages. £2.95

SHORT WAVE LISTENERS CONFIDENTIAL FREQUENCY LIST

Bill Laver
Covering the services and transmission modes that can be heard on the bands between 1.635 and 29.7MHz. £2.95

WORLD RADIO TV HANDBOOK 1991

Country-by-country listings of l.w., m.w. & s.w. broadcast and TV stations. Receiver test reports. English language broadcasts. The s.w.l.'s 'bible'. 576 pages. £17.95

INTERFERENCE

INTERFERENCE HANDBOOK (USA)

William R. Nelson WA6FOG
How to locate and cure r.f.i. for radio amateurs, CBers and TV and stereo owners. 253 pages. £6.75

RADIO FREQUENCY INTERFERENCE (USA)

What causes r.f.i.? Are all r.f.i. problems difficult, expensive and time-consuming to cure? These questions and many more are answered in this book. 84 pages. £4.30

AMATEUR RADIO

ALL ABOUT VHF AMATEUR RADIO (USA)

W. I. Orr W6SAJ
VHF/UHF propagation, including moonbounce and satellites, equipment and antennas. 172 pages. £7.95.

AMATEUR RADIO CALL BOOK (RSGB)

1991 Edition
Now incorporates a 122-page section of useful information for amateur radio enthusiasts. 429 pages. £7.20

AMATEUR RADIO SATELLITES the first 25 years

Arthur C. Gee G2UK
This souvenir publication is mainly a pictorial account of the pattern of developments which have occurred over the last 25 years in amateur radio satellite operations. 34 pages. £2.25

AN INTRODUCTION TO AMATEUR COMMUNICATIONS SATELLITES BP230

A. Pickard

This book describes several currently available systems, their connection to an appropriate computer and how they can be operated with suitable software. 102 pages. **£3.95**

AN INTRODUCTION TO AMATEUR RADIO (BP257)

I. O. Poole

This book gives the newcomer a comprehensive and easy to understand guide through amateur radio. Topics include operating procedures, jargon, propagation and setting up a station. 150 pages. **£3.50**

HINTS AND KINKS FOR THE RADIO AMATEUR

Edited by Charles L. Hutchinson and David Newkirk

A collection of practical ideas gleaned from the pages of *QST* magazine. 152 pages. **£4.95**

HOW TO PASS THE RADIO AMATEURS' EXAMINATION (RSGB)

Clive Smith G4FZH and George Benbow G3HB

The background to multiple choice exams and how to study for them with sample RAE papers for practice plus maths revision. 88 pages. **£6.70**

PASSPORT TO AMATEUR RADIO

Reprinted from *PW* 1981-1982

The famous series by GW3JGA, used by thousands of successful RAE candidates in their studies. Plus other useful articles for RAE students. 96 pages. **£1.50**

PRACTICAL GUIDE TO PACKET OPERATION IN THE UK

Mike Mansfield G6AWD

Introduces the concept of packet radio to the beginner. Problem areas are discussed and suggestions made for solutions to minimise the problems. Deals with the technical aspects of packet taking the reader through setting up and provides a comprehensive guide to essential reference material. 91 pages. **£5.95**

PRACTICAL IDEAS FOR RADIO AMATEURS

Ian Poole G3YWX

Offers a wealth of hints, tips and general practical advice for all transmitting amateurs and short wave listeners. 128 pages. **£5.95**

RADIO AMATEUR CALLBOOK INTERNATIONAL LISTINGS 1991

69th Edition

The only publication listing licenced radio amateurs throughout the world. Also includes DXCC Countries list, standard time chart, beacon lists and much more. Over 1500 pages. **£19.50**

RADIO AMATEUR CALLBOOK NORTH AMERICAN LISTINGS 1991

69th Edition

Listings of US amateurs (including Hawaii). Also contains standard time chart, census of amateur licences of the world, world-wide QSL bureau and much more. Over 1400 pages. **£19.50**

RADIO AMATEUR'S GUIDE TO RADIO WAVE PROPAGATION

(HF Bands). F. C. Judd G2BCX

The how and why of the mechanism and variations of propagation in the h.f. bands. 144 pages. **£2.95**

*THE 1991 ARRL HANDBOOK FOR THE RADIO AMATEUR

This is the 68th edition of this very useful hardback reference book. Updated throughout it has several new sections covering oscilloscopes, spectrum analysers, digital frequency synthesis, phase-noise measurement and new constructional projects. 1200 pages. **£18.95**

*THE ARRL OPERATING MANUAL

Another very useful book from the ARRL. Although written for the American radio amateur, this book will also be of use and interest to the UK amateur. 684 pages. **£12.95**

THE ARRL SATELLITE ANTHOLOGY

The best from the Amateur Satellite News column and articles out of 31 issues of *QST* have been gathered together in this book. The latest information on OSCARs 9 through 13 as well as the RS satellites is included. Operation on Phase 3 satellites (OSCAR 10 and 13) is covered in detail. 97 pages. **£4.95**

THE ARRL UHF/MICROWAVE EXPERIMENTER'S MANUAL

Various Authors

A truly excellent manual for the keen microwave enthusiast and for the budding 'microwaver'. With contributions from over 20 specialist authors. Chapters covering techniques, theory, projects, methods and mathematics. 446 pages. **£13.50**

THE COMPLETE DX'ER

Bob Locher W9KNI

Now back in print, this book covers equipment and operating techniques for the DX chaser, from beginner to advanced. 187 pages. **£7.95**

THE RADIO AMATEUR'S DX GUIDE (USA)

15th Edition

The guide contains information not easily obtained elsewhere and is intended as an aid and quick reference for all radio amateurs interested in DX. 38 pages. **£2.95**

THE RADIO AMATEUR'S QUESTIONS & ANSWER REFERENCE MANUAL

4th Edition. R. E. G. Petri G8CCJ

This book has been compiled especially for students of the City and Guilds of London Institute RAE. It is structured with carefully selected multiple choice questions, to progress with any recognised course of instruction, although it is not intended as a text book. 280 pages. **£7.95**

THE RAE MANUAL (RSGB)

G.L. Benbow G3HB

The latest edition of the standard aid to studying for the Radio Amateurs' Examination. Updated to cover the latest revisions to the syllabus. 132 pages. **£6.70**

YOUR GATEWAY TO PACKET RADIO

Stan Horzepa WATLOU

What is packet radio good for and what uses does it have for the 'average' amateur? What are protocols? Why, why, when? Lots of the most asked questions are answered in this useful book. It included details of networking and space communications using packet. 278 pages. **£7.95**

MAPS

IARU LOCATOR MAP OF EUROPE

DAIRC

This multi-coloured, plastics laminated, map of Europe shows the IARU ("Maidenhead") Locator System. Indispensable for the v.h.f. and u.h.f. DXer. 632 x 872mm. **£5.25**

NORTH ATLANTIC ROUTE CHART

This is a five-colour chart designed for the use of ATC in monitoring transatlantic flights. Supplied folded. 740 x 520mm. **£4.50**

RADIO AMATEUR'S MAP OF NORTH AMERICA (USA)

Shows radio amateur prefix boundaries, continental boundaries and zone boundaries. 780 x 636mm. **£2.95**

RADIO AMATEUR'S PREFIX MAP OF THE WORLD (USA)

Showing prefixes and countries, plus listings by order of country and of prefix. 1014 x 711mm. **£2.95**

RADIO AMATEUR'S WORLD ATLAS (USA)

Seventeen pages of maps, including the world-projection. Also includes the table of allocation of international call sign series. **£3.50**

DATA REFERENCE

DIGITAL IC EQUIVALENTS AND PIN CONNECTIONS (BP140)

A. Michaels

Equivalents and pin connections of a popular selection of European, American and Japanese digital i.c.s. 256 pages. **£5.95**

INTERNATIONAL TRANSISTOR EQUIVALENTS GUIDE (BP05)

A. Michaels

Possible substitutes for a popular selection of European, American and Japanese transistors. 320 pages. **£3.95**

NEWNES AUDIO & HI-FI ENGINEER'S POCKET BOOK

Vivian Capel

This is a concise collection of practical and relevant data for anyone working on sound systems. The topics covered include microphones, gramophones, CDs to name a few. 190 pages. Hardback. **£9.95**

NEWNES COMPUTER ENGINEER'S POCKET BOOK

This is an invaluable compendium of facts, figures, circuits and data and is indispensable to the designer, student, service engineer and all those interested in computer and microprocessor systems. 203 pages. Hardback. **£9.95**

NEWNES ELECTRONICS POCKET BOOK

5th Edition

Presenting all aspects of electronics in a readable and largely non-mathematical form for both the enthusiast and the professional engineer. 315 pages. Hardback. **£10.95**

NEWNES RADIO AMATEUR AND LISTENER'S POCKET BOOK

Steve Money G3FZL

This book is a collection of useful and intriguing data for the traditional modern amateur as well as the s.w.l. Topics such as AMTOR, packet radio, SSTV, computer communications and maritime communications are all covered. 160 pages. **£3.95**

NEWNES RADIO AND ELECTRONICS ENGINEER'S POCKET BOOK

18th Edition. Keith Brindley

Useful data covering math, abbreviations, codes, symbols, frequency bands/allocations, UK broadcasting stations, semi-conductors, components, etc. 325 pages. Hardback. **£9.95**

POWER SELECTOR GUIDE (BP235)

J. C. J. Van de Ven

This guide has the information on all kinds of power devices in useful categories (other than the usual alpha numeric sort) such as voltage and power properties making selection of replacements easier. 160 pages. **£4.95**

CONSTRUCTION

HOW TO DESIGN AND MAKE YOUR OWN PCBs (BP121)

R. A. Penfold

Designing or copying printed circuit board designs from magazines, including photographic methods. 80 pages. **£2.50**

INTRODUCING QRP

Collected articles from *PW* 1983-1985

An introduction to low-power transmission (QRP). This book includes full constructional details of a variety of designs by Rev. George Dobbs G3RJV for transmitters and transceivers covering Top Band to 14MHz, together with test equipment by Tony Smith G4FAI. 64 pages. **£1.50**

MORE ADVANCED POWER SUPPLY PROJECTS (BP192)

R. A. Penfold

The practical and theoretical aspects of the circuits are covered in some detail. Topics include switched mode power supplies, precision regulators, dual tracking regulators and computer controlled power supplies, etc. 92 pages. **£2.95**

POWER SUPPLY PROJECTS (BP76)

R. A. Penfold

This book gives a number of power supply designs including simple unregulated types, fixed voltage regulated types and variable voltage stabilised designs. 91 pages. **£2.50**

PRACTICAL POWER SUPPLIES

Collected articles from *PW* 1978-1985

Characteristics of batteries, transformers, rectifiers, fuses and heatsinks, plus designs for a variety of mains-driven power supplies, including the *P.W.* "Marchwood" giving a fully stabilised and protected 12V 30A d.c. 48 pages. **£1.25**

QRP NOTEBOOK

Doug DeMew W1FB

This book deals with the building and operating of a successful QRP station. Lots of advice is given by the author who has spent years as an ardent QRP'er. All the text is easy-to-read and the drawings large and clear. 77 pages. **£4.95**

TEST EQUIPMENT CONSTRUCTION (BP248)

R.A. Penfold

Describes, in detail, how to construct some simple and inexpensive, but extremely useful, pieces of test equipment. 104 pages. **£2.95**

50 (FET) FIELD EFFECT TRANSISTOR PROJECTS (BP39)

F.G. Rayer

50 circuits for the s.w.l., radio amateur, experimenter or audio enthusiast using f.e.t.s. 104 pages. **£2.95**

ANTENNAS (AERIALS)

AERIAL PROJECTS (BP105)

Practical designs including active, loop and ferrite antennas plus accessory units. 96 pages. **£2.50**

ALL ABOUT VERTICAL ANTENNAS (USA)

W. I. Orr W6SAI & S. D. Cowan W2LX

Theory, design, construction, operation, the secrets of making vertical work. 191 pages. **£7.50**

AN INTRODUCTION TO ANTENNA THEORY (BP198)

H. C. Wright

This book deals with the basic concepts relevant to receiving and transmitting antennas. Lots of diagrams reduce the amount of mathematics involved. 86 pages. **£2.95**

ANTENNA IMPEDANCE MATCHING

Wilfred N. Caron

Proper impedance matching of an antenna to a transmission line is of concern to antenna engineers and to every radio amateur. A properly matched antenna as the termination for a line minimises feed-line losses. Power can be fed to such a line without the need for a matching network at the line input. There is no mystique involved in designing even the most complex multi-element networks for broadband coverage. Logical step-by-step procedure is followed in this book to help the radio amateur with this task. 152 pages. **£11.95**

BEAM ANTENNA HANDBOOK (USA)

W. I. Orr W6SAI & S. D. Cowan W2LX

Design, construction, adjustment and installation of h.f. beam antennas. 198 pages. **£5.75**

*NOVICE ANTENNA NOTEBOOK

Doug DeMew W1FB

Another book from the pen of W1FB, this time offering "new ideas for beginning hams". All the drawings are large and clear and each chapter ends with a glossary of terms. 130 pages. **£5.95**

OUT OF THIN AIR

Collected Antenna Articles from *PW* 1977-1980

Including such favourites as the ZL Special and '2BCX 16-element beams for 2m, and the famous "Slim Jim", designed by Fred Judd G2BCX. Also features systems for Top Band, medium wave/long wave loop designs and a v.h.f. direction finding loop. Plus items on propagation, accessories and antenna design. 80 pages. **£1.80**

SIMPLE, LOW-COST WIRE ANTENNAS FOR RADIO AMATEURS (USA)

W. I. Orr W6SAI & S. D. Cowan W2LX

Efficient antennas for Top Band to 2m, including "invisible" antennas for difficult station locations. 191 pages. **£6.75**

THE ARRL ANTENNA BOOK (USA) 15th Edition

A station is only as effective as its antenna system. This book covers propagation, practical constructional details of almost every type of antenna, test equipment and formulas and programs for beam heading calculations. **£12.95**

THE ARRL ANTENNA COMPENDIUM (USA)

Volume One

Fascinating and hitherto unpublished material. Among the topics discussed are quads and loops, log periodic arrays, beam and multi-band antennas, verticals and reduced size antennas. 175 pages. **£7.50**

THE ARRL ANTENNA COMPENDIUM (USA)

Volume Two

Because antennas are a topic of great interest among radio amateurs, ARRL HQ continues to receive many more papers on the subject than can possibly be published in *QST*. Those papers are collected in this volume. 208 pages. **£7.50**

THE RADIO AMATEUR ANTENNA HANDBOOK

William I. Orr W6SAI & Stuart D. Cowan W2LX

Yagi, quad, quagi, I-p, vertical, horizontal and "sloper" antennas are all covered. Also towers, grounds and rotators. 190 pages. **£6.75**

W1FB'S ANTENNA NOTEBOOK

Doug DeMew W1FB

This book provides lots of designs, in simple and easy to read terms, for simple wire and tubing antennas. All drawings are large and clear making construction much easier. 124 pages. **£3.95**

WIRES & WAVES

Collected Antenna Articles from *PW* 1980-1984

Antenna and propagation theory, including NBS Yagi design data. Practical designs for antennas from medium waves to microwaves, plus accessories such as a t.u.s., s.w.r. and power meters and a noise bridge. Dealing with TVI. 160 pages. **£3.80**

25 SIMPLE AMATEUR BAND AERIALS (BP125)

E. M. Noll

How to build 25 simple and inexpensive aerials, from a simple dipole through beam and triangle designs to a mini-rhombic. Dimensions for specific spot frequencies including the WARC bands. 80 pages. **£1.95**

25 SIMPLE INDOOR AND WINDOW AERIALS (BP136)

E. M. Noll

Designs for people who live in flats or have no gardens, etc., giving surprisingly good results considering their limited dimensions. 64 pages. **£1.75**

25 SIMPLE SHORT WAVE BROADCAST BAND AERIALS (BP132)

E. M. Noll

Designs for 25 different aerials, from a simple dipole through helical designs to a multi-band umbrella. 80 pages. **£1.95**

25 SIMPLE TROPICAL AND MW BAND AERIALS (BP145)

E. M. Noll

Simple and inexpensive aerials for the broadcast bands from medium wave to 49m. 64 pages. **£1.75**

FAULT FINDING

ARE THE VOLTAGES CORRECT?

Reprinted from *PW* 1982-1983

How to use a multimeter to fault-find on electronic and radio equipment, from simple resistive dividers through circuits using diodes, transistors, i.c.s and valves. 44 pages. **£1.50**

GETTING THE MOST FROM YOUR MULTIMETER (BP238)

R. A. Penfold

This book is primarily aimed at beginners. It covers both analogue and digital multimeters and their respective limitations. All kinds of testing is explained too. No previous knowledge is required or assumed. 102 pages. **£2.95**

MORE ADVANCED USES OF THE MULTIMETER (BP265)

R.A. Penfold

This book is primarily intended as a follow-up to BP239, *Getting the most from your Multimeter*. By using the techniques described in this book you can test and analyse the performance of a range of components with just a multimeter (plus a very few inexpensive components in some cases). The simple add-ons described extend the capabilities of a multimeter to make it even more useful. 85 pages. **£2.95**

OSCILLOSCOPES, HOW TO USE THEM, HOW THEY WORK 3rd Edition

Ian Hickman

This book describes oscilloscopes ranging from basic to advanced models and the accessories to go with them. **£14.95**

TRANSISTOR RADIO FAULT FINDING CHART (BP70)

C. E. Miller

Used properly, should enable most common faults to be traced reasonably quickly. Selecting the appropriate fault description at the head of the chart, the reader is led through a sequence of suggested checks until the fault is cleared. 635 x 455mm (approx). **£0.95**

COMPUTING

AN INTRODUCTION TO COMPUTER COMMUNICATIONS (BP177)

R. A. Penfold

Details of various types of modem and their applications, plus how to interconnect computers, modems and the telephone system. Also networking systems and RTTY. 96 pages. **£2.95**

NEWNES AMATEUR RADIO COMPUTING HANDBOOK

Joe Pritchard G1UOW

Shows how radio amateurs and short wave listeners can 'listen' to signals by reading text on a computer screen. This book also covers the application of computers to radio housekeeping jobs such as log-keeping, QSL cards, satellite predictions and antenna design as well as showing how to control a radio with the computer. 368 pages. **£14.95**

MORSE

INTRODUCING MORSE

Collected Articles from *PW* 1982-1985

Ways of learning the Morse Code, followed by constructional details of a variety of keys including lambic, Triambic, and an Electronic Bug with a 528-bit memory. 48 pages. **£1.25**

THE SECRET OF LEARNING MORSE CODE

Merk Francis

Designed to make you proficient in Morse code in the shortest possible time, this book points out many of the pitfalls that beset the student. 87 pages. **£4.95**

The prepaid rate for classified advertisements is 42 pence per word (minimum 12 words), box number 60p extra. Semi-display setting £13.90 per single column centimetre (minimum 2.5cm). Please add 17.5% VAT to the total. All cheques, postal orders, etc., to be made payable to Practical Wireless. Treasury notes should always be sent by registered post. Advertisements, together with remittance should be sent to the Classified Advertisement Dept., Practical Wireless, Enefco House, The Quay, Poole, Dorset BH15 1PP. Telephone (0202) 676033.

Classified Ads

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

Receivers

B.F.O. KITS, resolves single side-band on almost any radio, £14.95. **CORRIGAN RADIOWATCH**, 7 York Street, Ayr KA8 8AR.

G3LLI for ICOM & YAESU - BUT Holidays? Phone first! Also CW Filters FT1012D, 902, 707 & 102 £40 P.P. - Valves & Mod kits 101E, etc. - P.X. Commission sales. **HOLDINGS AMATEUR ELECTRONICS**, 45 Johnson Street, Blackburn BB2 1EF. Tel: (0254) 59595.

OSCILLOSCOPE EX-MOD Double Beam with manual £60.00. AVO8, multimeter with case. Very good condition £55. Technics oscilloscopes. 50MHz band-width arriving soon. Phone for details and lists. Tel: Wolverhampton (0902) 20315. **COLLECTORS PARADISE**, 56a Worcester St. Wolverhampton.

Antennas

HANDHELD ACTIVE AERIAL tunable 150kHz to 30MHz. Details S.A.E. **PERINS**, 76c Whitehill Road, GRAVESEND, Kent DA12 5PH.

60Ft. TILTOWER, VERSATOWER, c/w head unit, bearing, stainless steel cables, etc., V.G.C. £550. Also Thunderbird Jnr Beam. £125. Telephone (0751) 74449.

Valves

HIGH POWER TRANSMITTER VALVES, Klystrons, Magnetrons, 4CX350A, 4CX1000A, 4CX250B, etc. One million valves in stock. Phone or fax for quote, discounts for large value inquiries. Orders from manufacturers, Govt. Depts., overseas etc. welcome. **BILLINGTON VALVES**, Oakendene Industrial Estate, Near Horsham RH13 8AZ. Callers by appointment only. Fax: (0403) 86510. Telex: 87271. Phone: (0403) 865105. Minimum order £20 + VAT.

Service Sheets and Servicing

TECHNICAL INFORMATION SERVICES (PW)

76 CHURCH STREET, LARKHALL, LANARKSHIRE ML9 1HE
Phone: (0698) 884585, Mon-Fri, 9am-5pm. OR. Phone: (0698) 883334 any other time.
IMMEDIATE dispatch on all **ACCESS & VISA** orders
PHONE OR WRITE NOW FOR FREE QUOTE & FREE CATALOGUE with every S.A.E.

SERVICE MANUALS & SERVICE SHEETS

Remember, not only do we have EVERY Service Sheet ever made, but we also have
ONE OF THE WORLD'S LARGEST SELECTION OF SERVICE MANUALS
NOTE:- Over 200 separate Titles of Technical books are always in stock, over 1/2 are exclusive to TISI
CTV SERVICING by KING - £14.95, VCR SERVICING by BEECHINGS - £25.00, Ku-BAND SATELLITE TV - £25.00

SERVICE MANUALS

Available for most Video Recorders, Colour & Mono Televisions, Cameras, Test Equipment, Amateur Radio, Vintage Valve Wireless, Any Audio, Music Systems, Computers, Kitchen Appliances, etc.

Equipment from the 1930s to the present and beyond. Over 100 000 models stocked, originals and photostats. FREE catalogue Repair and Data Guides with all orders.

MAURITRON TECHNICAL SERVICES (PW),
8 CHERRY TREE ROAD, CHINNOR, OXON, OX9 4QY
Tel: (0844) 51694 Fax: (0844) 52554

TECHNICAL MANUALS, AR88, CR100, R210, HRO, £4 each. Circuits only 150 pence, plus SAE, lists thousands. **BENTLEY**, 27 De Vere Gardens, Ilford, Essex IG1 3EB. Phone: 081-554 6631.

TEST EQUIPMENT MAINTENANCE

Spare Parts, Service Manuals and a comprehensive repair service now available for all makes of Test Equipment (Scopes, Generators, PSUs, AVOs, Counters, DMMs, etc. etc.). We support equipment manufactured by over 100 different companies. New secondhand Test Equipment also supplied. Valves & Misc Components also supplied. Trade Enquiries welcome. No minimum order charge.

HESING TECHNOLOGY

41 Bushmead Road, Eaton Socon, St Neots, Cambs PE19 3BT
Tel: (0480) 214488 (anytime) 216870 (eves).

Wanted

WANTED FOR CASH Test equipment, communications equipment, computer hardware, unused valves, transistors, IC's etc. PHONE 051-523 4464. **TEST GEAR**, Computers, Computer Surplus, Amateur. Bought for cash. (0425) 274274

MOST VALVES WANTED: for cash. Large or small quantities must be unused and boxed. CBS, 157 Dickson Road, Blackpool FY1 2EU (0253) 751858.

WANTED VALVES ESP. KT66, KT88, PX4, PX25, Klystrons, Magnetrons, Transistors, I.C.s, Plugs, Sockets. If possible send written list - we reply same day. Cash waiting. **BILLINGTON VALVES**, Oakendene Industrial Estate, Near Horsham RH13 8AZ. Callers please phone for appointment. Tel: (0403) 865105. Fax: (0403) 865106. Telex: 87271.

Are you a radio club that would like to tell everybody about your Rally?

If the answer is YES then contact Marcia on (0202) 676033 for our special rates for clubs.

ORDER FORM PLEASE WRITE IN BLOCK CAPITALS

Please insert this advertisement in the next available issue of Practical Wireless for.....insertion/s.

I enclose Cheque/P.O. for £.....(42p per word, 12 minimum, please add 17.5% VAT to total). Rates and Postal Address at top of page. (Cheques and Postal Orders should be made payable to Practical Wireless).

CATEGORY HEADING

Name

Address

Veteran & Vintage

THE VINTAGE WIRELESS BOOK LISTING Published regularly containing 100s of out of print, old and collectable wireless and T.V. books, magazines, etc. Send three first class stamps for next copy or £1.75 for next four issues. **VINTAGE VALVE LISTING** A listing of 100s of unused/new valves of all types 1925-1975. SAE for list, with your requirements. **WANTED** Pre 1960 wireless books, magazines, catalogues, any printed material or ephemera relating to wireless. **VINTAGE RADIO ROOM** Open at rear of our bookshop. Numerous wireless sets/valves/components and equipment for sale. Callers by appointment please. **CHEVET BOOKS** 157 Dickson Road, Blackpool, FY1 2EU.

WANTED BY COLLECTOR. Old/unusual wireless or television especially Beird mechanical disk television. (0484) 651408.

Please mention Practical
Wireless when replying to
advertisements.

Educational

COURSE FOR CITY & GUILDS, Radio Amateurs Examination. Pass this important examination and obtain your licence, with an RRC Home Study Course. For details of this and other courses (GCSE, career and professional examinations, etc) write or phone - THE RAPID RESULTS COLLEGE, DEPT JX106, Tuition House, London SW19 4DS. Tel: 081-947 7272 (9am-5am) or use our 24hr Recordacall service 081-946 1102 Quoting JX106.

For Sale

OSCILLOSCOPE, TEKTRONIX 7704, delay time base, several amplifiers to 50MHz high voltage probe manuals £300. Tel: (0623) 22102.

MAINS FILTERS specifically for amateur and commercial radio, reduce T.V.I. and lower the noise threshold of reception significantly. Full details: RELLO ELECTRONICS, 16 Stirling Road, St Leonards-on-Sea TN38 9NP.

KENWOOD 9130-2m All mode transceiver, matching speaker & base. As new. (0422) 351348.

RCS VARIABLE VOLTAGE D.C. BENCH POWER SUPPLY 1 to 24 volts up to 0.5 amp. 1 to 20 volts up to 1 amp. 1 to 16 volts up to 1.5 amps. D.C. Fully stabilised. Twin panel meters for instant voltage and current readings. Overload protection. Fully variable. Operates from 240V A.C. Compact Unit: size 9 x 5.5 x 3ins.

£42 Incl. VAT + Post £2. **NEW MODEL** Up to 38 volts DC at 6amp. 10 amp peak. Fully variable. Twin Panel Meters. Size 14.5 x 11 x 4.5in. £96 inc VAT. Carr £5. **RADIO COMPONENT SPECIALISTS** 337 Whitehorse Road, Croydon SURREY, U.K. Tel: 081-684 1665 List, Large S.A.E. Delivery 7 days. Callers Welcome. Closed Wednesday

Components

J. A. B. Electronic and R.F. Components. (Toko now available). Callers:- 1180 Aldridge Road, Rear of Queslett Motors, Great Barr, Birmingham. Tel: 021-366-6928 For opening times. MAIL ORDER Catalogue & Discount Vouchers send 75p.

CUSTOM TRANSFORMERS Wound to your specification. From:- £30 inc. VAT & delivery. Tel: (0277) 811802.

Computer Soft/w & Hard/w

COMMODORE COMPUTERS (+4, C16, 64, 128). "MICROCOM" CW/RTTY TX/RX with superb Morse tutor. "TURBO LOG" ultimate high speed station log. "MICROCOM INTERFACE" ready built. S.A.E. to:- Moray Micro Computing, Enzie Slackhead, Buckie, Moray AB5 2BR. (Telephone: 0542 7384).

IBM/COMPATIBLE SHAREWARE 10,000+ FILES. Send £1.50 for comprehensive catalogue on disk. Cheap-est prices! AK SHAREWARE, 54 Sheldrake Road, Mudeford, Dorset BH23 4BP.

ENLOG - COMPUTERISED LOG BOOK AND DATABASE FOR IBM PC AND COMPATIBLES. Full colour with pop up menus. All details on any previously worked station virtually instantly. No practical limit on number of entries. Available on 5 1/4" or 3 1/2" disks (with operating manual) at only £29.99 inclusive or write for free demonstration disk to ENWARE, 49 Wimborne Road West, WIMBORNE, Dorset BH21 2DQ.

ATARI 520/1040/STE MORSE MASTER. All resolutions. Highly commended, this feature packed. **TRAINER/SIMULATOR** is ideal for use by novices and professionals. Send/receive under **REALISTIC** on-air conditions (**ORM, QRN, QRG, QSB**). Cable included. £29.99 from **BOSCAD LTD.** 16 Aytoun Grove, Balldridgeburn, Dunfermline, Fife KY12 9TA. Write for information pack, or Telephone: (0383) 729584, evenings.

Miscellaneous

HEATHKIT U.K. Spares and Service Centre. Cedar Electronics. 12 Isbourne Way, Broadway Road, Winchcombe, Cheltenham. Glos. GL54 5NS. Tel: 0242 602402.

G2VF RADIO PROJECTS. Easy to make and not expensive. SAE details. RYLANDS, 39 Parkside Avenue, Southampton SO1 9AF.

INDEX TO ADVERTISERS

AH Supplies 40
AOR UK 7
ARE Communications 7
Amateur Radio Comms .. 47
Arrow Radio 9

Birkett, J 40

CB Sales Devon 66
Cap.Co 22
Castle Electronics 52
Characteristics 66
Cirkit 29
Colomor 40

Datong 24
Dewsbury 36
Dressler Communications 30

ERA. 24

Howes C.M Communi-
cations 57

ICS Intertext 47
Icom (UK) 2, 3, Cover iii

J & P Electronics 18
Johns Radio 18

KW Communications 34

Lake Electronics 40
Langrex Supplies 24
Lee Electronics 44
Lowe Electronics 18

Maplin Electronics Cover iv
Marlec Engineering 66
Martin Lynch 18

Nevada 37

PWT Electronics 57
Photo Acoustics 10

Quartslab 47

R & D Electronics 40
RAS Nottingham 40
RSGB 66
RST Valve 24
Radio Shack 72
Raycom 29

SEM 40
SGC 57
SRW Communications ... 66
South Midlands Communi-
cations Cover ii, 4, 5
Stephens James 58
Suredata 18
Sussex Amateur Radio
Fair 47

Tandy 8
Technical Software 58
Tennamast 66

Ward Reg & Co 22
Waters & Stanton 6

SERVICE INFORMATION

AKAI			
V53300/EK Svc Man	VCR 2.50	2222 Svc Man	CTV 2.50
V53300/EG Svc Man	VCR 2.50	2252R Svc Man	CTV 2.50
BRC 200 series Svc Man	CTV 3.50	4210 Svc Man	CTV 2.00
BUSH BC611 Svc Man	CTV 1.00 *	4210 Svc Man	CTV 2.50
BC6100 Svc Man	CTV 1.00 *	4230 Svc Man	CTV 2.00
BC6200 Svc Man	CTV 1.00 *	4230 Svc Man	CTV 2.50
BC6240 Svc Man	CTV 1.50	5010 Svc Man	CTV 1.50
BC6248 Svc Man	CTV 1.50	5011 Svc Man	CTV 1.50
BC6268 Svc Man	CTV 1.00 *	5011UE/GB Svc Man	CTV 1.50
BC6300 Svc Man	CTV 1.00 *	5012 Svc Man	CTV 2.50
BC6338 Svc Man	CTV 1.00 *	6010 Svc Man	CTV 1.50
BC6340 Svc Man	CTV 1.50	6011 Svc Man	CTV 1.50
BC6348 Svc Man	CTV 1.50	6011TD/GB Svc Man	CTV 1.50
BC6368 Svc Man	CTV 1.00 *	6022 Svc Man	CTV 2.50
BC6437 Svc Man	CTV 1.00 *	8240 Svc Man	CTV 3.00
BC6438 Svc Man	CTV 1.00 *	8260 Svc Man	CTV 3.00
BC6448 Svc Man	CTV 1.50	8610 Svc Man	CTV 3.00
BC6468 Svc Man	CTV 1.00 *	8630 Svc Man	CTV 3.00
BC7000 Svc Man	14in CTV 1.50	9260 Svc Man	CTV 3.00
BC7100 Svc Man	16in CTV 1.50	GSC600 Svc Man	CTV 1.50
BC7200 Svc Man	CTV 1.50	GSC600 Svc Man	CTV 2.00
BC7205 supplement	CTV 1.00	GSC700 Svc Man	CTV 1.50
Ranger 2 Svc Man	12in TV 1.00	GSC700 Svc Man	CTV 2.00
Ranger 3 Svc Man	14in TV 1.00	P2002GB Svc Man	mono TV 1.00
DECCA		R500GB Svc Man	mono TV 1.00
37 series Svc Man	CTV 1.00	S7150GB Svc Man	CTV 1.50
80 series Svc Man	CTV 1.00	S7150GB Svc Man	CTV 2.00
C20307 Svc Man	CTV 1.00	SC8445 Svc Man	CTV 2.00
C26306 Svc Man	CTV 1.00		
C26300 Svc Man	CTV 1.00		
CS2230 Svc Man	CTV 1.00		
CS2631 Svc Man	CTV 1.00		
Ekco CT102/104 Svc Man	CTV 2.50		
Ferranti CT1166/1167 Svc Man	CTV 2.50		
Fidelity VTR1000 Svc Man	VCR 1.50		
GEC McMichael V4002H			
Svc Man	VCR 2.00		
GEC V4000H Svc Man	VCR 2.50		
GRUNDIG			
1621 Svc Man	CTV 2.00		
1621 Svc Man	CTV 2.50		
1631 Svc Man	CTV 2.00		
GRUNDIG CON'T			
1631 Svc Man	CTV 2.50		
2210 Svc Man	CTV 2.50		

Abbreviations:

Svc Service
Man Manual
CTV Colour TV
T/T Teletext
Sys System

**LOTS MORE SHEETS
ETC. AVAILABLE. FOR
FULL LIST SEND SAE
TO ADDRESS BELOW.**
*Photocopy.

Postal Orders and Cheques made payable to:

PW PUBLISHING LTD

PO Box No.21, Enefco House, The Quay, POOLE, Dorset BH15 1PP

YOUR LOCAL DEALERS

SOUTH WALES

ELECTRO MART

Receivers, Scanners, Howes, ERA, CB, Marine radio etc. part exchange welcome.

96 High St, Clydach,
Swansea
Tel: 0792 842135

WEST MIDLANDS

BADGER BOARDS

QUALITY PCB's
MULTIPLE or SINGLES & KITS
Please send S.A.E. for information or
write for quotation to:

BADGER BOARDS
1180 Aldridge Road
Great Barr, Birmingham B44 8PE
021 353 9326

OXFORDSHIRE

PROCOMM (UK)

Cash paid for used Amateur
Equipment.

Part exchange welcome SAE for
stocklist.

9 a.m. - 9 p.m. Mon-Sat
Callers by appointment please.
102 Larkhill Road, Abingdon OX14 1BJ

0235 532653 &
0860 593052



DERBYSHIRE

RILEY'S T.V. SERVICES LTD.

SUPPLIERS OF:-
SCANNERS - C.B. 27-934 MHZ -
AERIALS - TEST METERS - TOOLS -
TELEPHONE KITS AND CABLES

125 LANGWITH ROAD
HILLSTOWN
CHESTERFIELD S44 6LX
PHONE 0246 826578

CLOSED WEDNESDAY

HERNE BAY

ICOM (UK) LIMITED

The Official Icom Importer
Unit 8, Sea Street
Herne Bay, Kent CT6 8LD
Tel: 0227 741741

Fax: 0227 360 155
Open Mon-Fri 9 am-5.30 pm
(Lunch 1-2.00 pm)

SOUTHAMPTON

South Midlands Communications

Official Yaesu Importer

S.M. House, School Close,
Chandlers Ford Industrial Estate,
Eastleigh Hants SO5 3BY.
Tel: 0703 255111

PORTSMOUTH

Nevada Communications

Visit our showrooms for Icom,
Kenwood, amateur radio products &
a large range of scanning receivers.
New & part-ex welcome.

189, London Road,
North End, Portsmouth,
Hants, PO2 9AE
Tel: 0705 662145

DEVON

Reg. Ward & Co. Ltd.

The South-West's largest amateur
radio stockist. Approved dealer for
Kenwood, Yaesu and Icom

1 Western Parade,
West Street, Axminster,
Devon, EX13 5NY
Tel: 0297 34918

(Closed 1:00-2:00 and all day Monday)

BUCKINGHAMSHIRE

Photo-Acoustics Ltd.

Approved Kenwood, Yaesu and
Icom dealer (part exchange
always welcome)

58 High Street, Newport Pagnell,
Buckinghamshire MK16 8AQ
Tel: 0908 610625

(Mon-Fri 9:30-5:30, Sat 9:30-4:30)

SCOTLAND

JAYCEE ELECTRONICS LTD

20 Woodside Way, Glenrothes
Fife KY7 5DF
Tel: 0592 756962 (Day or Night)

Open: Tues.-Friday 9-5; Sat. 9-4;
Sunday by appointment

KENWOOD, YAESU & ICOM APPROVED DEALERS
A good stock of new and secondhand
equipment always in stock

PLEASE MENTION

PRACTICAL WIRELESS

WHEN REPLYING TO
ADVERTISEMENTS

YORKSHIRE

YAESU
ICOM
Kenwood

Alan Hooker Radio Communications

42, Netherhall Road, Doncaster.
Tel: 0302 325690

Open Mon-Sat 10-5pm
Closed Thursdays

CORNWALL 24hrs, 7 Days a Week

SKYWAVE

RADIO AMATEUR & MARINE
COMMUNICATIONS SERVICES
ICOM, YAESU, NAVICO
JAYBEAM, Etc.

Slades Road, St. Austell,
Cornwall PL25 4HG
Tel: 0726 70220

Voice Bank: 0426 961909

Contact Marcia
on the
Advertising Hotline
(0202) 676033
for our special
rates for advertising
in this section.

WEST SUSSEX

MAIL ORDER
RETAIL



BREDHURST ELECTRONICS LTD.

High St., Handcross, West Sussex
Tel: (0444) 400786

Situated at the Southern end of
M23. Easy access to M25 and
South London.
Open Mon-Fri 9am-5pm
except Wed 9am-12.30pm.
Sat 10am-4pm.



YAESU
ICOM

VISA

RADIO SHACK

Access



KENWOOD TS-850S

The latest transceiver from this famous stable
TS-850S SUPERB SPECIFICATIONS

Creating a new era in Amateur Radio!

Call us for the latest details and stock position, also for any other
model from

KENWOOD ICOM YAESU

Scanners by AOR, Fairmate, Jupiter, Icom, Realistic,
Bearcat to name but a few.

Competitive service and prices.

We will be pleased to quote you for anything you
require in the communications or computer field. In
order to avoid a great deal of time wasting on both
our parts, we now deal with callers by appointment.
We are pleased to hear from you and see you, and
we aim to give you the attention you deserve, so
please call us first.

73s Terry Edwards G3STS

VISA

RADIO SHACK LTD

(Just around the corner from West Hampstead Station on the Jubilee Line)
Giro Account No. 588 7151 Fax: 071-328 5066 Telephone: 071-624 7174

188 BROADHURST GARDENS,
LONDON NW6 3AY

Access



ICOM

Count on us!

IC-725 Budget HF



- General Coverage Receiver
- 105dB Dynamic Range
- 100W Output
- DDS System
- 26 Memories
- Scanning
- CI-V Computer Control
- Semi Break-in

The new ICOM IC-725 budget H.F. has been produced due to the demand for a simple, high specification transceiver. Despite the limited features, compared to more expensive equipment this set retains a superior level of technical performance necessary to operate on the H.F. bands today.

Additional features include Noise Blanker, Pre-amp, Attenuator, AGC and RIT. The DDS System (Direct Digital Synthesizer) ensures fast Tx/Rx switching times, ideal for Data Communications. An A.T.U. controller is built

into the IC-725 for use with the AH-3 H.F. Automatic Antenna Tuner for mobile or base station operation.

Accessory options available are the PS-55 20A P.S.U., AH-3 Auto Antenna Tuner, UI-7 AM Tx. FM Tx/Rx Unit, FL-100 500Hz CW Filter, FL-101 250Hz CW Narrow Filter and SP-7 External Loudspeaker.

For more information on the IC-725 budget H.F. and other ICOM amateur equipment contact your nearest authorised ICOM dealer or phone us direct.

Icom (UK) Ltd.

Dept PW, Sea Street, Herne Bay, Kent CT6 8LD. Tel: 0227 741741 24 Hour. Fax: 0227 360155

Datapost: Despatch on same day whenever possible.

Visa & Mastercards: Telephone orders taken by our mail order department. Instant credit & interest free H.P. available.





NICAM

...set your sights on a better sound!

Experience a new sensation. An experience that opens up a whole new spectrum of sound.

Put yourself on stage at the Albert Hall, surrounded by a great orchestra. Imagine the sound you will hear, every nuance, every note; or travel up the Nile with an intrepid explorer, a journey not only full of breathtaking beauty and colour, but rich in the sounds of another continent; or capture the hidden gasps of 100,000 hardened fans at Wembley for the F.A. Cup Final, when the ball skims the crossbar with the last kick of the match; follow with your ears as well as your eyes, dodging the bullets, as your favourite hero battles out of yet another tight corner, it's just like being in a cinema!

Nicam hi-fi stereo will turn your living-room into a living room of

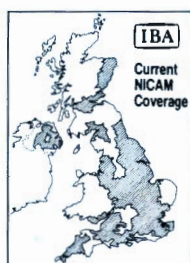
sound! You don't settle for second best with television picture quality, why settle for second best in television sound quality? Nicam sound is the new high quality digital stereo sound system, pioneered by BBC, ITV and TV/video manufacturers. In fact so good is Nicam it is comparable to the superb sound reproduction of the compact disc, when played through your existing hi-fi arrangement. If your television hasn't got a built-in Nicam decoder, you will need the Maplin Nicam Tuner System. Ultimately almost all of your favourite programmes will be broadcast in superb hi-fi quality stereo-sound. Without a Maplin Nicam Tuner you won't be able to capture every sound to its full.

Nicam hi-fi stereo. Catch your breath, open your eyes, and pin back your ears! It's what your hi-fi system was made for... It's what your ears are made for!

DIGITAL STEREO TV SOUND FROM YOUR HI-FI

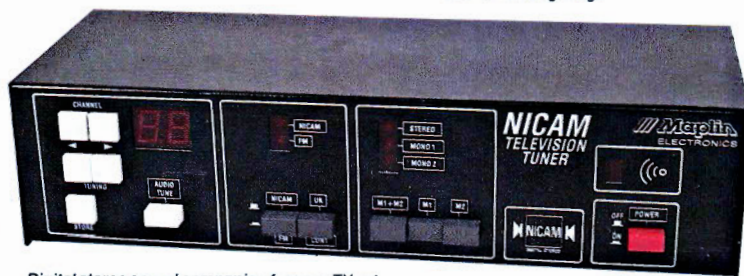
The complete kit contains all the components required to build the unit. However you will also need: a power supply, 12V at 600mA regulated e.g. YZ21X at £9.95; a co-ax Y adaptor e.g. FS23A at £1.20; a co-ax lead to connect to your TV or video; RW36P 2m long at £1.36, JW39N 5m long at £1.98, or JW40T 10m long at £2.95; a phono lead to connect to your hi-fi e.g. RW50E at £1.06 or a SCART-Peritel lead JW36P at £5.95. An infra-red remote control kit is also available LP20W at £29.95.

Complete kit LP19V only £149.95 incl. VAT + £1 mail-order handling charge.



Maplin ELECTRONICS
CREDIT CARD HOTLINE
0702 554161

For a friendly welcome and the very best of service why not visit our shops in Birmingham, Brighton, Bristol, Leeds, London (Edgware and Hammersmith), Manchester, Newcastle-upon-Tyne, Nottingham, Reading, Southampton and Southend-on-Sea.
Subject to availability. Prices subject to change.



Digital stereo sound companion for your TV set.