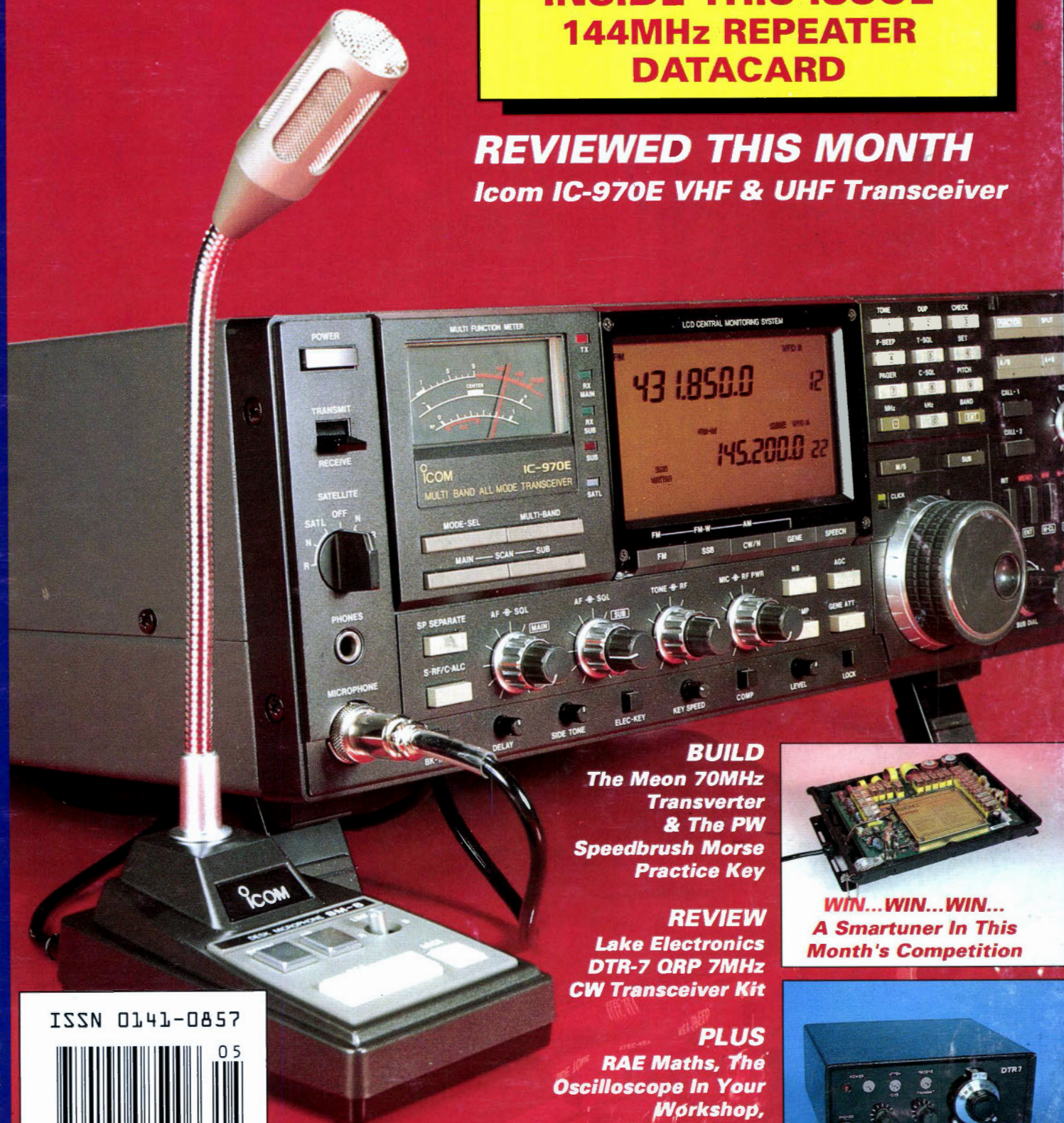


PW

FREE
INSIDE THIS ISSUE
144MHz REPEATER
DATACARD

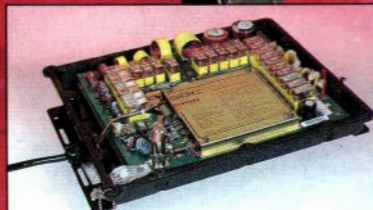
REVIEWED THIS MONTH
Icom IC-970E VHF & UHF Transceiver



BUILD
*The Meon 70MHz
Transverter
& The PW
Speedbrush Morse
Practice Key*

REVIEW
*Lake Electronics
DTR-7 QRP 7MHz
CW Transceiver Kit*

PLUS
*RAE Maths, The
Oscilloscope In Your
Workshop,
CB High & Low
AND LOTS MORE!*



WIN...WIN...WIN...
*A Smarttuner In This
Month's Competition*



ISSN 0141-0857



MAY 1991
£1.60

THE NEW

FT-1000

FOR DYNAMIC DX

YAESU

The FT-1000 is a new top of the range all mode h.f. transceiver that is the result of more than 25,000 hours of intensive research by Yaesu's top design engineers. They have adopted a completely new approach to the application of digital and RF technology. The extensive use of surface mounted components has allowed six microprocessors and five Direct Digital Synthesisers to be integrated with a simple to use operator interface to give a highly reliable full featured transceiver that has been optimised for serious h.f. applications. Please write or call SMC or your local authorised Yaesu dealer for the full specifications of this dynamic new transceiver and discover how you can open up the bands.



YAESU

UK Sole Distributor

South Midlands Communications Ltd

S.M. House, School Close,

Chandlers Ford Industrial Estate,

Eastleigh, Hants SO5 3BY

Tel: (0703) 255111

Prices and specifications are subject to change without notice

YAESU

MAY 1991
(ON SALE APRIL 11)
VOL. 67
NO. 5
ISSUE 1010

NEXT ISSUE (JUNE)
ON SALE MAY 9

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

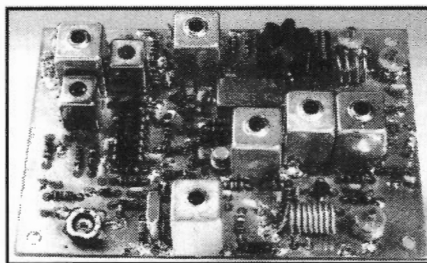
Make-up (Poole Office)

Marcia Brogan

☎ Poole (0202) 676033

FAX Poole (0202) 666244

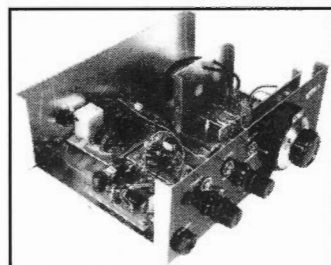
Contents May 1991



19



26



40

Regular Features

- 79 Advert Index
- 48 Bargain Basement
- 76 Book Service
- 14 Competition Corner
- 39 Errors & Updates
- 11 Keylines
- 15 Newsdesk '91
- 61 PCB Service
- 18 Radio Diary
- 11 Receiving You
- 13 Services
- 74 Subscribers' Club
- 35 Wireless-Line

- 19 **The PW Meon - 4
Transverter - Part 1**
Andrew Talbot G4JNT

- 26 **Review - The Icom IC-
970E Transceiver for
VHF & UHF**
Mike Richards G4WNC

- 32 **Mathematics For The RAE**
Ray Fautley G3ASG

- 36 **Getting Started -
The Practical Way**
Rev. George Dobbs G3RJV

- 40 **Review -
Lake DTR-7 CW Transceiver Kit
For 7MHz**
Mike Richards G4WNC

- 42 **The Oscilloscope In Your
Workshop**
Fred Judd G2BCX

- 47 **Antenna Construction - Piping
Up On 144MHz**
Richard Barrett G1VFF

- 49 **The PW Speed-Brush - The Key
To Successful Morse**
Steve Ortmyer G4RAW

- 51 **Satellite Scene**
Pat Gowen G3IOR

- 55 **Reflections**
Ron Ham

- 58 **Packet Panorama**
Roger Cook G3LDI

- 60 **Focal Point**
Andy Emmerson G8PTH

- 63 **CB High & Low**
'Quaynotes'

- 64 **Backscatter**

- 71 **PW Special Offer**

- 72 **Book Reviews**

COPYRIGHT © PWPUBLISHING LTD. 1991. Copyright in all drawings, photographs and articles published in *Practical Wireless* is fully protected and reproduction or imitation in whole or part is expressly forbidden. All reasonable precautions are taken by *Practical Wireless* to ensure that the advice and data given to our readers are reliable. We cannot however guarantee it and we cannot accept legal responsibility for it. Prices are those current as we go to press.

PUBLISHED on the second Thursday of each month by P.W. Publishing Ltd., Enefco House, The Quay, Poole, Dorset BH15 1PP. Printed in England by Blackmore Press, Shaftesbury, Dorset. Tel: 0747 53034. Distributed by Seymour, Winsor House, 1270 London Road, Norbury, London SW16 4DH. Tel: 081-679 1999, Fax: 081-679 8907, Telex: 8812945. Sole Agents for Australia and New Zealand - Gordon and Gotch (Asia) Ltd., South Africa - Central News Agency Ltd. Subscriptions: INLAND £18.00, EUROPE £21, OVERSEAS (by ASP) £22, payable to PRACTICAL WIRELESS, Subscription Department, P.W. Publishing Ltd., Enefco House, The Quay, Poole, Dorset BH15 1PP. PRACTICAL WIRELESS is sold subject to the following conditions, namely that it shall not, without the written consent of the publishers first having been given, be lent, re-sold, hired out or otherwise disposed of by way of trade at more than the recommended selling price shown on the cover, and that it shall not be lent, re-sold, hired out or otherwise disposed of in a mutilated condition or in any unauthorised cover by way of trade, or affixed to or as part of any publication or advertising, literary or pictorial matter whatsoever. *Practical Wireless* is published monthly for \$40 per year by P.W. Publishing Ltd., Enefco House, The Quay, Poole, Dorset BH15 1PP U.K. Second class postage paid at Middlesex, N. J. Postmaster: send address changes to C and C Mailers International, 40 Foxhall, Middlesex, N. J. 08848.

ICOM

ICOM... STILL THE HAM W

Visit ICOM (UK) on stand A1 at this years RSGB Convention. Hall 7, N.E.C. April 27/28th. Get some 'hands on' experience of models from the entire ICOM range which includes base station transceivers, receivers, mobiles and handhelds. BCNU!

To promote the hobby for everyone, ICOM (UK) are proud to be the only Ham manufacturer to have supported the Novice Licence Project Year by sponsoring the RSGB's 'Amateur Radio for Beginners' video available from the RSGB.

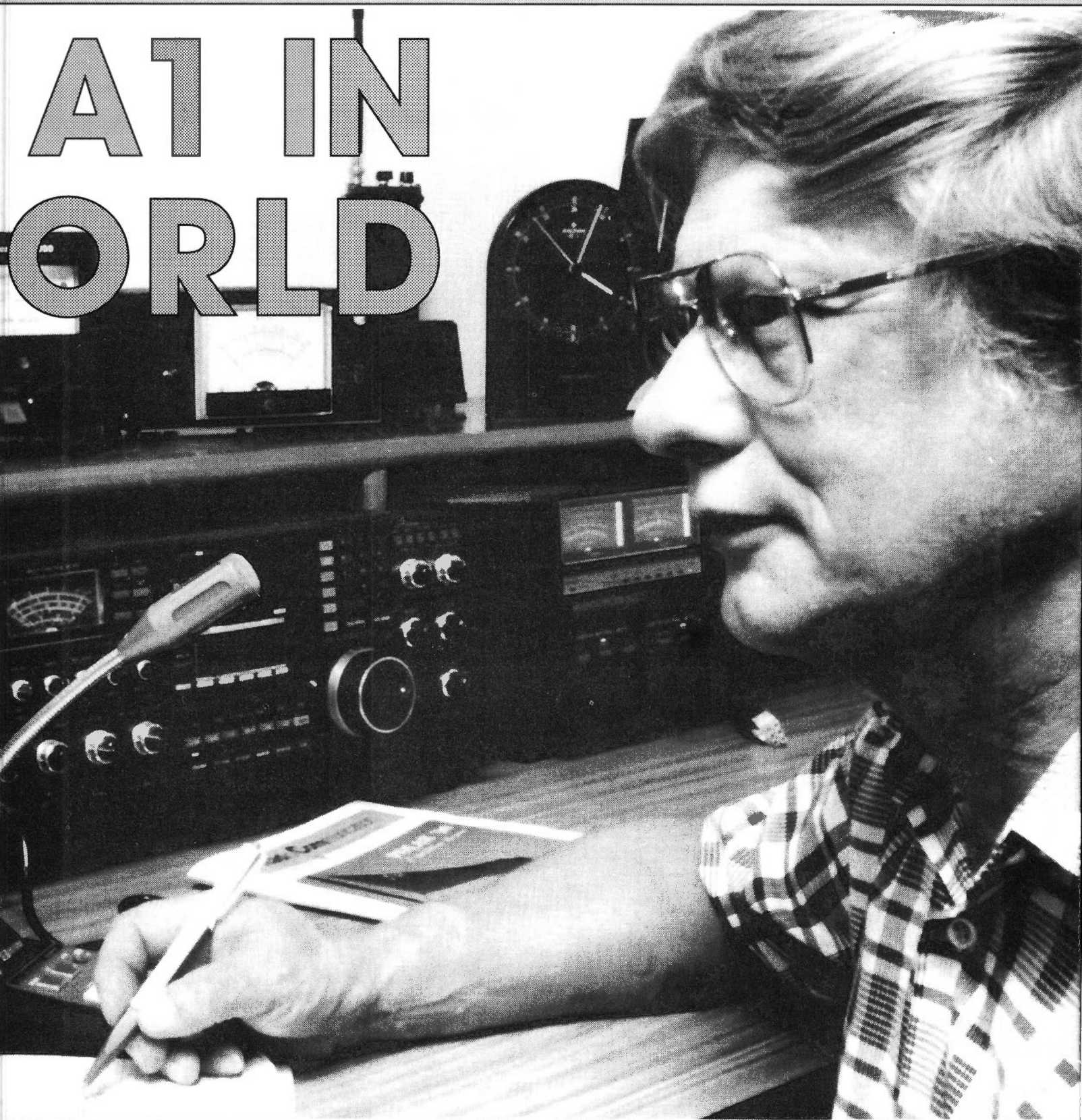
Datapost: Despatch on same day whenever possible.

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



Count on us!

A1 IN
WORLD



Icom (UK) Ltd.

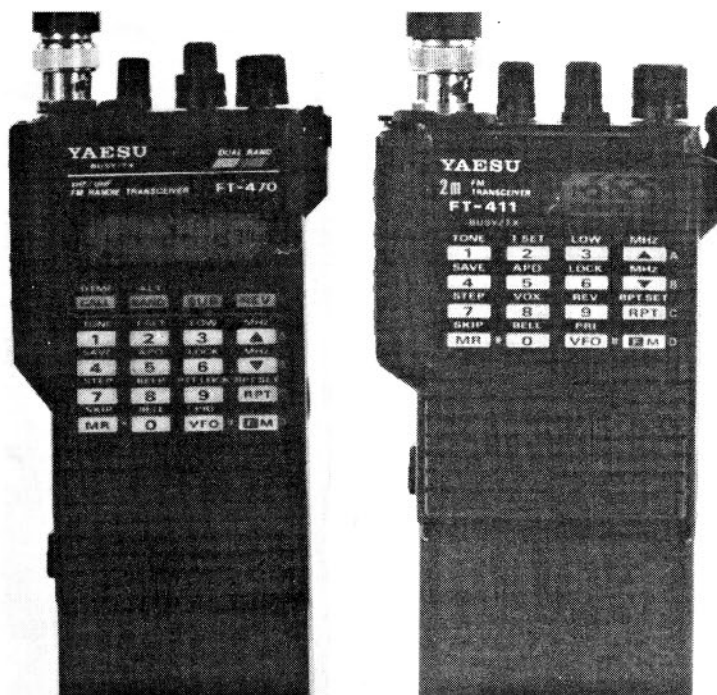
Dept PW, Sea Street, Herne Bay, Kent CT6 8LD. Tel: 0227 741741 24 Hour. Fax: 0227 360155

South Midlands Co

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

SPRING SALES

WHY NOT SHAKE OFF THE WINTER BLUES WITH
A SPRING SPECIAL FROM **SMC**



We are pleased to offer **FREE** with every FT-23R, FT-73R, FT-411, FT-811, FT-911 & FT-470 an FNB9 NiCad Pack and NC27C Charger.

This makes these some of the best value hand-helds around.

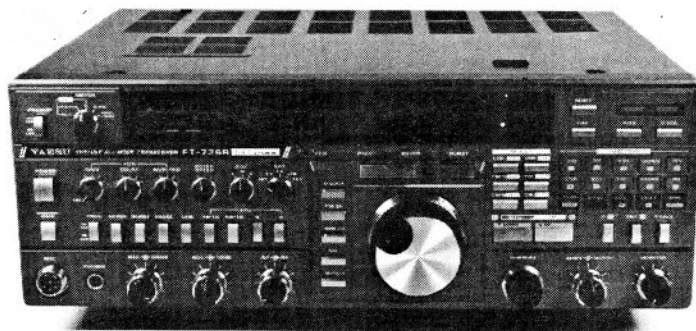
FT-23R	£209	FT-73R	£229
FT-411	£225	FT-811	£239
FT-911	£329	FT-470	£369

N.B. Prices may change due to the increase in VAT.

OR THE INCREDIBLE FT-736R

With a **FREE** 6m module, a saving of **£245** on the normal retail price.

You pay only £1389 for arguably the world's best multiband VHF/UHF Station



★ ALL THESE OFFERS AVAILABLE FROM 14th MARCH TO ★
30th APRIL FROM ALL SMC BRANCHES

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

SEE US ON STAND
C2 & C6 AT THE **NEC**
ON SAT 27th & SUN 28th APRIL

**FOR THESE AND OTHER SPECIAL OFFERS AND THE
WHOLE YAESU RANGE OF EQUIPMENT**

SMC...For all your accessories

ROTATORS

Superb engineering standards combined with pin sharp setting accuracy means new technology from Yaesu.

ROTATORS

AR200XL	OFFSET TYPE 3 WIRE	£49.50	C
G-250	BELL TYPE TWIST/SWITCH CTL	£78.00	C
G-400	BELL TYPE METER CONTROLLER	£149.00	C
G-400RC	BELL TYPE ROUND CONTROLLER	£179.00	C
G-600RC	BELL TYPE ROUND CONTROLLER	£235.00	C

G-800SDX	BELL TYPE 450 DEG VAR SPD	£325.00	C
G-1000SDX	BELL TYPE 450 DEG VAR SPEED	£368.00	C
G-2000RC	BELL TYPE ROUND CONTROLLER	£445.00	D
G-500A	ELEVATION METER CONTROLLER	£199.00	C
G-5400B	AZIMUTH/ELEV DUAL CONTROL	£375.00	D
G-5600B	AZIMUTH/ELEV DUAL CONTROL	£435.00	D
RC5-1	BELL TYPE ROUND CONTROLLER	£219.00	C
RC5-3	BELL TYPE PRESET	£275.00	C
RC5A-3	BELL TYPE VAR SPD & PRESET	£425.00	C
RC5B-3	BELL TYPE VAR SPD & PRESET	£675.00	D

ROTATOR HARDWARE

AR200AB	ALIGNMENT BEARING AR200XL	£17.50	B
GS-050	ROTARY BEARING 1.5' MAST	£19.95	B
GS-065	ROTARY BEARING 2' MAST	£29.95	B
GS-038	LOWER MAST CLAMP G-400,600 etc	£16.95	B
9523	CHANNEL MASTER BEARING	£19.95	B
CK46	ROTARY BEARING 1.5-2.5 MAST	£34.95	B
MC1	LOWER MAST CLAMP RC5 SERIES	£25.00	C

COMPUTER INTERFACES FOR G-5400/G-5600B

IF-100PC	I/F C/W LEAD & SOFTWARE IBMPC	£139.00	B
IF-100C64	I/F C/W LEAD 7 SOFTWARE CBM64/128	£145.00	B

ROTATOR CONTROL CABLE

RC6W	6 WAY G-250, 400, 600, RC KR500 PER MTR	£0.66
RC6W	8 WAY G-2000.CREATE SERIES	£0.72

CARRIAGE:

ROTATOR CABLE	
£3.50 UP TO OVER 20 MTS, OVER 20 MTS £5.00	

STRUMECH VERSATOWER

STANDARD 13M20 SERIES

13M20P25	25FT POST MOUNT	£458.85
13M20P40	40FT POST MOUNT	£846.30
13M20P60	60FT POST MOUNT	£761.30
13M20FB25	25FT FIXED BASE MOUNT	£317.40
13M20FB40	40FT FIXED BASE MOUNT	£481.85
13M20FB60	60FT FIXED BASE MOUNT	£598.85
13M20BP25	25FT BASE PLATE MOUNT	£541.65
13M20BP40	40FT BASE PLATE MOUNT	£750.95
13M20BP60	60FT BASE PLATE MOUNT	£845.25
13M20M25	25FT MOBILE TOWER	£2179.25
13M20M40	40FT MOBILE TOWER	£2387.40
13M20M60	60FT MOBILE TOWER	£2557.60

HEAVY DUTY 16M20 SERIES

16M20P40	40FT POST MOUNT	£802.70
16M20P60	60FT POST MOUNT	£910.80
16M20P80	80FT POST MOUNT	£1426.00
16M20FB40	40FT FIXED BASE MOUNT	£644.00
16M20FB60	60FT FIXED BASE MOUNT	£763.60
16M20FB80	80FT FIXED BASE MOUNT	£1219.00
16M20BP40	40FT BASE PLATE MOUNT	£851.00
16M20BP60	60FT BASE PLATE MOUNT	£952.20
16M20BP80	80FT BASE PLATE MOUNT	£1530.65
16M20M40	40FT MOBILE TOWER	£2847.40
16M20M60	60FT MOBILE TOWER	£2967.00
16M20M80	80FT MOBILE TOWER	£3680.00

MIDITOWER 13M10 SERIES

13M10P30	30FT POST MOUNT	£489.90
13M10BP30	30FT BASE PLATE MOUNT	£517.50
13M10PB30	30FT FIXED BASE MOUNT	£481.62
36FT VERSIONS OF ABOVE, 1 EXTRA SECTION ADD		£44.85

ALL TOWERS EXCEPT MOBILES ARE AVAILABLE FROM STOCK.
10M10 SERIES SUPPLIED WITH STANDARD WINCHES. 13M20 & 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 £28.75 PER SET EXTRA.

ALTERNATIVE WINCHES AND HEAD UNITS ARE AVAILABLE AT EXTRA COST.
DELIVERY IS BY QUOTATION DEPENDENT UPON DISTANCE.

SWR/PWR METERS

FS710V	50-150MHZ	15/1500W	PEP	£107.80	B
FS301MH	2-30MHZ	200/2000W		£42.25	B
FS711H	2/30MHZ	20/200W	HEAD/DISPLAY	£43.65	B
FS711V	50-150MHZ	20/200W	HEAD/DISPLAY	£43.65	B
FS711U	430-440MHZ	5/20W	HEAD/DISPLAY	£43.65	B
FS711C	26-30MHZ	10/100W	HEAD/DISPLAY	£24.55	B
W720S	130-440MHZ	20/200W	HEAD/DISPLAY	£52.75	B
FS20DL	3-150MHZ	1/10W		£43.65	B
FS20D	3-150MHZ	5/20W		£43.65	B
SWR3E	3.5-150MHZ	20/200/1000W		£28.75	B
JD110	1.5-150MHZ	10/100W		£16.50	B
OSCAR-171B	3.5-150MHZ	REL POWER/SWR twin meter		£26.85	B
SP425	140-524MHZ	5/15/150W		£119.95	B
YS60	1.6-60MHZ	20/200/2000W		£93.15	B
YS60B	140-525MHZ	4/20/200W		£81.65	B
CM-420	2M/70CMS	15/50W MINI		£36.00	B
CD-120	1.6-200MHZ	15/60/200W		£75.00	B
CD-160H	1.6-60MHZ	20/200/2000W		£89.00	B
CD-270D	140-525MHZ	15/60/200W		£78.00	B

IMPORTANT!
Prices may change
due to the increase
in VAT.

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



- Free Finance on selected items, subject to status. Details available on request.
- Up to £100 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.

YOU WILL ALWAYS GET THE BEST DEAL AT

ARROW

SEE US AT

NEC

CASH BARGAINS

SEE NEW MODELS

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

DUAL BAND HANDHELD TRANSCEIVERS

EXPANDED RECEIVE CAPABILITY AVAILABLE

 <p>IC-24ET ICOM £349!! CASH PRICE</p>	 <p>TH-77E KENWOOD £389 or £130 DEP + 9 x £28.77</p>	 <p>FT470R YAESU INC FNB10+CHARGER £399 CASH PRICE</p>	 <p>C528 STANDARD £379 or £127 DEP + 9 x £28</p>
---	---	---	---

H.F. TRANSCEIVERS WITH GENERAL COVERAGE

 <p>NEW TS850S KENWOOD £1,295 LIMITED AVAILABILITY</p>	 <p>IC-735 BARGAIN!! £899 CASH PRICE</p>	 <p>FT747GX YAESU £549 LIMITED QUANTITY!</p>	<p>JST135 £1,195 or £399 DEP + 9 x £88.33</p>
---	---	---	---

RECEIVERS AND SCANNERS

<p>NEW! NRD535 £1,095 LIMITED AVAILABILITY</p>	 <p>AR1000 AOR £249 or £83 DEP + 9 x £18.44</p>	<p>NEW! MVT7000 £POA</p>	 <p>IC-R72 ICOM £599 CASH PRICE</p>
--	--	--	---

DUAL BAND MOBILE TRANSCEIVERS

<p>NEW! TM702 KENWOOD £449 or £150 DEP + 9 x £33.22</p>	 <p>C5608D STANDARD £649 or £217 DEP + 9 x £4</p>	<p>NEW! FT5200 YAESU £POA</p>	 <p>IC3220E ICOM £459 CASH PRICE</p>
---	--	---	--

COMET ANTENNA

'The effective aerial'

3 NEW ANTENNAE

B10 — Black mini dual bander,
non radial **£16.65**

B20 — Black slim line,
dual bander **£23.20**

CHA6 — Vertical for 80, 40, 20, 15, 10
and SIX with loaded radials **£225**

GPX2010 Highest Gain Dual Band Base antenna in the
WORLD!

7.9 Metres long 9.5dB/2M 13.2 dB/70cms**£142.95**
CDS150 DISCONE in S/Steel 25/1300 Mhz ONLY**£59.95**
CHL72S NEW 2/Band BNC whip for Dual Band Handhelds**£11.85**

NON RADIAL: Mobile antennas independent of vehicle ground plans
CHL21J 144/432 Mhz, Unity/2.15dB, 100W Only 29cms long**£14.49**
CHL23J 144/432 Mhz 2.15dB/3.8dB 100W Only .44 metres**£16.95**
CHL24J 144/432 Mhz 2.15dB/5dB 100W 0.8 metres long**£25.30**
CHL250H 144/432 Mhz 3.0dB/5.5dB 200 Watts 0.95 metres long**£32.80**

2x4 Series + Triband mobiles and base station antennas
2x4M 144/432 Mhz 4.5/7.2dB 150 watt 1.53 metres**£37.65**
2x4 SERIES & DUAL BANDERS featuring the unique super linear converter
system
2x4MAX 144/432 Mhz 8.5dB/11.9dB 200 Watt 5.4 metres "N" G. Fibre**£99.95**
2x4WX 144/432 Mhz 6.5/9.0dB 200W 3.18 metres Glassfibre**£78.95**
2x4SUPER II 144/432 Mhz 6.8/4dB 200W 2.43 metres Glassfibre**£77.35**
2x4FX Compact 144/432 Mhz 4.5/7.2dB 200W 1.79 metres**£55.80**

DUPLX & TRIPLEX Zinc alloy diecast
CFX5140 50/144/432 Mhz 800/800/500 Watt PEP 55dB isolation**£38.10**
CF413N 432/1296 Mhz 500/200W PEP 55dB isolation "N"**£36.85**
CF416 144/432 Mhz 800/500W PEP 60dB isolation**£28.80**

SR Series to order only. MONO BANDER MOBILE ANTENNAS
CA285 5/8 wave 3.5dB 300Watt 1.32 Metres Base loaded**£15.00**
CA287C 7/8 wave 52 dB 200W 1.89 metres double co-phase**£22.50**
CA430TM 3 x 5/8 wave 432 Mhz 6.8dB 150W 1.47 metres**£29.95**

MONOBAND BASE ANTENNAS
ABC21 5/8wave Ground Plane 144 Mhz 3.4dB 200W 1.4 metres**£24.50**
ABC22A 2 x 5/8 wave 144 Mhz 6.5dB 2.87 metres**£36.00**
ABC23 3 x 5/8 wave 144 Mhz 7.8dB 200 W 4.5 metres**£59.50**
ABC71 5/8 wave ground plane 432 Mhz 3.4dB .54 metres**£21.56**
ABC72 2 x 5/8 wave GP.432 Mhz 200W 5.8dB 1.07 metres**£34.85**
CA712EF 432 Mhz Twelve x Half wave 9.5dB 3.10 metres**£55.00**

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**
S2HB4 4 El.HB9CV Beam 10.4dB for 50 mhz 400W SSB 3.2M**£87.90**
CBL30 HF 1.7 — 30 Mhz Balun 1:1 1kw**£20.85**

CRZ/DISCONC & HANDHELD ANTENNAS
CRZ12DB A Unique wide band Active antenna 500Hz to 1500 Mhz 1.24
Metres with controller**£96.30**
CDS180 Discone 28-1300Mhz + TX 6/2/70/23**£69.50**
CRZ-07 Mobile Wide-band Active**£66.50**

See the superb range of Comet antennas at
our shops or rallies inc NEC
Performance with economy from Comet
"The effective aerial"

SAVE MONEY WITH OUR

0% FINANCE

Our zero interest terms are available on
many major items, see examples in this ad.
Please call for a quote on your choice —
Arrow sell all major brands as authorised
dealers.

ARROW RADIO

For a good
deal - a fair
deal - the
best deal

HEAD OFFICE:

5 The Street, Hatfield Peverel,
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)
Telephone: 0533 608189
Latest calls
8.30pm please!



YOUR ORDER CAN BE TELEPHONED WITH CREDIT
CARD DETAILS & DESPATCHED IMMEDIATELY!
FREE FINANCE ON MANY MAJOR ITEMS AT RRP.
(Ask for details of qualifying items —
see examples above).

MICRONTA®

TALKING METER

ZERO POINT
ZERO ONE
VOLTS AC



NEW

Tandy®

22-164

£79⁹⁵

Talking Multimeter. Press a button on the probe and the meter calls out its reading in clear English. The reading is also shown on the unit's large easy to read LCD display. Features autoranging, autopolarity, continuity sounder, diode-check and over-range indicators. 10 megohms input. Measures to 1000 VDC, 750 VAC, 300 mA AC/DC, 30 megohms. Measures: 6¹³/₁₆ x 3⁵/₃₂ x 1¹/₄".

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

ARE

COMMUNICATIONS
THE SHOP WITH THE SMILE

ICOM

IC-R100 - WITH SSB!



IC-R100 Mobile/Base Receiver now with SSB!

WHY SETTLE FOR ANYTHING LESS!

For the enthusiast who prefers a more permanent installation, the IC-R100 is ideal, giving full frequency coverage of 500kHz-1800MHz and AM/FM/FM wide modes of operation. The IC-R100 boasts 100 memory channels to store your favourite stations and has features similar to the little pocket receiver. **ONLY FROM US - WITH SSB!**

£510 inc. SSB or 48 Monthly payments of £18.36

STANDARD C528

Probably the most versatile dual band handheld available!

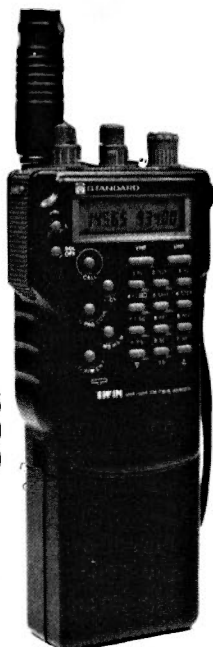
Packed with so many features that we haven't the room to list them all. But we will try a few:

Full Duplex
Dual Receive
Extend Cover
Programmable Offsets
DTMF
5 TONE PAGER
RECEIVE 130-175
330-470
820-960

OPTIONS: CTCSS

£349

or 48 monthly payments of £12.57



FIRST AGAIN!!

'The Ditherers Delight' 7 DAYS!!

'Change of mind time'

If you wish, you can exchange any rig within 7 days of purchase.

ICOM IC-R7000HF Receiver

500kHz - 2GHz



Now available on super credit terms. 48 Monthly payments of £35.98. Cash/cheque/credit card price:

£999

Yes, 500kHz to 2Ghz CONTINUOUS receive in one unit. Using the ICR7000 multimode facilities. This probably makes the "Two in One" ICR7000HF Receiver the most versatile scanner available today. Because of the enormous frequency coverage. It has 200 mode sensitive channels for increased flexibility.



ICOM IC-726 HF

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



PHONE FOR OUR PRICE YOU WILL BE AMAZED

ICOM The New Amazing IC-R1 Scan Receiver

Now at a new amazing price!

£369

48 Payments of £13.29 per month.

Frequency range 100kHz to 1300MHz no gaps AM or FM Also available on easy terms.

Other scanners

available: Jupiter II, Fairmate and Uniden.



THERE ARE NOW 3 PLACES TO SAVE MONEY:

1. A BANK
2. A BUILDING SOCIETY
3. ARE COMMUNICATIONS

WE'RE KEEPING THE WORLD TALKING!

A DREAM COME TRUE

Bored with two metres? Then why not turn that 2m rig onto the HF bands



HX240 TRANSVERTER

YAESU FT290

FT290R II £395

2 METRE TRANSVERTER TOKYO HX240 Transverter £239

WITH AUTO SWITCH £259

With the HX 240 feed in 3 to 10 watts on 2m and transmit on 10-15-20-40 or 80 with 40 watts output.

Once again ARE COMMUNICATIONS BREAK THE PRICE BARRIER!

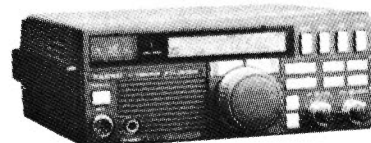
Now a 2 metre Hand-Held transceiver made by Kenpro. Model KT22E for **£144 inc. VAT** Package includes NICAD pack charger and antenna.



- ★ Fully synthesised
- ★ Thumbwheel tuning
- ★ 10MHz cover on RX
- ★ 1750kHz Tone Burst
- ★ 600kHz Shift for repeater operation
- ★ Low and High power switch

A SUPERB DEAL!

SAVE OVER £150 YAESU FT-747 NOW £529 inc. FM Board CW & AM Filters are available at £35 each



AVAILABLE WITH NO DEPOSIT AND 48 MONTHS TO PAY £19.05 PER MONTH.

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.

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%

ARE Communications, 6 Royal Parade, Hanger Lane, Ealing, London W5A 1ET. England

Tel: 081-997 4476 Fax: 081-991 2565



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 - 180

DJ-160EA

£229

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...£229
(70cms)



£339

DJ-560E

INCLUDES
TONE
SQUELCH

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.

25W 2M

Price
Crash!



NEW
DR-112EM
MISER'S MOBILE!

2m FM • 25 Watts • 5 Watts Low Power • 14 memories • 6 channel steps • 4 Scan modes • 1750Hz tone • Reverse repeater • Memory skip • Priority • Call channel • Dist mic • Mounting kit • Built in speaker

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 2 x 3/8th 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	129.00
X-700	2m/70cm 9.3/13dB	195.00
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!		

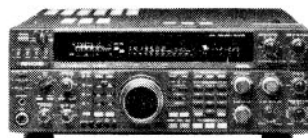
DR-590E
2M & 70CMS
£499



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 • Dist mic and full mounting kit • 150 x 50 x 178mm.

MAMMOTH HAM RADIO SALE, SUNDAY 19th MAY,
at our Hockley premises, 10 a.m.-4 p.m.
New & Used Equipment, Bring & Buy, Junk Stall
Super Prices, FREE Refreshments! Well worth a visit.

KENWOOD SPECIALIST DEALER



TS 850!
£1295 +
FREE PSU!

All Models stocked
Best Deals!
Wide range in stock

Full 12 month warranty
Phone for latest
DEALS!

TS-140S	Compact HF rig + FREE PSU!	£862
TS-440S	Classic HF rig + FREE PSU!	£1138
TS-680S	HF with 6 metres + FREE PSU!	£985
TL-922	Hunky 2kW Linear in stock!	£1495
TS-790E	2m/70cms (Part Ex welcome!)	£1495
TH-77E	Dualband handy + Free High Gain Ant.	£389
TR-751E	2m All Mode + FREE PSU!	£599

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



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

PHOTO ACOUSTICS



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...

£1,295.00 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 £389

Full range of accessories for all models

P&P £5.00



FAIRMATE HP200

1,000 CH Handheld Scanner exclusive to Nevada dealers!

Freq Range: 500kHz-600MHz
805MHz-1300MHz

Modes: AM-FM-Wide FM

A much improved version of the HP100E

The new HP 200 has superior performance and stability.

Accessories included as standard are:-

- ★ VHF Antenna
- ★ UHF Antenna
- ★ Telescopic Antenna
- ★ UK spec. DC charger/adaptor
- ★ Earphone
- ★ Carrying case

NOTE: Sensitivity below 2MHz:- 10µV for 20dBQ AM 60% Mod.



£269



AR-1000 Series II

The latest from AOR. A handheld version of the AR-2002, offering coverage from 500kHz to 1300MHz, 1000 memory channels and all mode operation. All the improvements at no extra cost.

£249.00



AR-900

Covers all bands you ever needed in AM and FM and has 100 memories. Designed for the UK listener and well tried with thousands already in use. A powerful receiver in a tiny handheld package.

£199.00



AR-800

The baby of the family. Covers 77-105, 118-174, 400-495, 839-950MHz in AM and FM. Complete with rechargeable battery pack, charger and flexy aerial. All current channel spacings can be programmed.

£169.00

KENPRO KT22E

Package includes NICAD pack charger and antenna

- ★ Fully synthesised
- ★ Thumbwheel tuning
- ★ 10MHz cover on RX
- ★ 1750kHz Tone Burst
- ★ 600kHz Shift for repeater operation
- ★ Low and High Power switch

£139.00



SECONDHAND LIST

ALINCO DJ-500E Dual Band Hand held complete (as new).....	£249.00
KENWOOD TS440S HF transceiver with built-in auto ATU. (As new).....	£950.00
YAESU FT-690II 6m Multimode c/w FL6020 10W Linear, Nicads & Charger. (As new).....	£399.00
KENWOOD RZ-1 Broad Band Scanner. Covers 500kHz-905MHz. AM/FM/FMW.....	£295.00
KENWOOD TR-851E 70cms Multimode. 25W complete & as new.....	£575.00
SONY PRO-80 Handheld Receiver. Covers 150kHz-223MHz. All modes. (As new).....	£218.00

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

We meet many readers during shows, rallies and other events. Many readers take the opportunity to come and chat, buy books, bend the editor's ear and suggest ideas for *PW*. However, it's not often we are privileged to meet a reader from abroad who's taken the trouble to find our corner of Dorset and come into the office!

In late February, Doctor Burkhard Freund Y26IG from Magdeburg in what was East Germany, while on an educational visit to the UK, came and met some members of the editorial team. Burkhard's English (he's a specialist English teacher and translator) placed our German at the bottom of the class, but despite that he put us at our ease and we enjoyed the meeting and became good friends.

Second Meeting

In fact we were able to meet Burkhard twice in two days as the local newspaper

wanted to photograph him here in the office. He was able to see us at our busiest, so much so that we were only able to round up part of the

team - and one of them (Rob Mackie) was behind the camera!

Pictured from left to right and standing behind Burkhard

are Donna 'Toad' Vincent (Editorial Assistant, secretarial help and 'Bargain Basement'), Sharon George (Production, 'Newsdesk '91'



Rob Mannion G3XFD

and 'Backscatter'), G3XFD, and 'Tex' Swann G1TEX, our technical projects sub-editor. Rob Mackie, our photographer, was behind the camera and Steve Hunt our art editor was, as usual, extremely busy designing the next issue of *PW*.

We know that the magazine reaches around the world and we are always delighted to hear from distant readers. I wonder who can claim to be our most remote reader? I've no doubt we'll hear eventually!

To finish off this month, I'm sorry to say that I forgot to thank the Flight Refuelling Ltd's Amateur Radio Club for last month's cover photographs. The club kindly allowed us to feature a (small) part of their impressive antenna farm at Merley near Wimborne. Unfortunately the photo-credit was left out so I owe a belated acknowledgement to them. Thankyou!

73s DE Rob Mannion G3XFD.

Receiving You...

From The Wireless Institute of Australia

Dear Sir

With reference to the news item in the March issue of *PW* regarding the operation of the VK3 QSL Bureau.

We are dismayed that you would publish such material without first verifying the authenticity.

The information published is completely untrue and we believe libellous.

A great disservice has been done to the WIA Victorian Division, Amateur Radio and me personally.

Mr Terry Robinson has been circulating defamatory material of this nature to a number of

publishers, however they have at least had the temerity to seek verification.

Legal action was commenced against Mr Robinson late last year and he was warned if he did not desist from his mischievous actions, the Wireless Institute of Australia Victorian Division would seek damages in a court of law.

The publication of this material has severely damaged the reputation of the 'worlds oldest radio society' and my personal reputation on an international scale.

The following is an official statement issued by the Council of the Wireless Institute of Australia on 21 November 1991.

"All amateurs are assured that the WIA Victorian Division Inwards QSL Bureau is operating efficiently within the guidelines of the I.A.R.U.

The WIA Victorian Division Inwards Bureau operation is fully computerised and cards are handled and distributed by paid staff.

Cards for both WIA members and non members are accepted.

Cards for members

are processed and distributed as a free membership service, and cards for non members are made available for collection without charge or they may be distributed in the same manner as member's cards for a nominal charge".

The address for all Inwards QSL cards to the

VK3 area is:

VK3 Inwards QSL Bureau
Box 757 G
GPO Melbourne 3001

We look forward to any explanation you may care to offer.

Barry Wilton VK3XV
Secretary - Manager
Wireless Institute of Australia

Editor's comment: As requested by the Wireless Institute of Australia I've reproduced their letter in full. I apologise unreservedly for printing what turned out to be false information. The information was published in good faith and attempts were made to contact Mr Wilton direct for confirmation of the facts. In future *PW* won't publish any material referring to the WIA or its activities unless we have specific permission to publish that information from the WIA.

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 much enjoy reading *PW* magazine. Thank you for the excellent articles. Recently I built the *PW* 'Marland'. This nice transmitter now works faultlessly since I have eliminated a parasitic oscillation (microphone amplifier TR7-BG109, one capacitor from base to collector). Now I have got very complementary reports when I use it on the air.

Now I am waiting for the companion receiver (it should be based on discrete devices please).

Other home-brew *PW* projects I have built are: *PW* 'Badger', the *PW* 'Portland', and speech processor (works very well) and now the *PW* 'Empire' valved transceiver from the 1000th issue of your magazine. Thank you, everyone at *PW*.

**Johann Hans OE7UT
Kufstein
Austria**

Editor's reply: Thank you Johann! We're very pleased to hear that *PW* projects are being built in the Austrian Tyrol. George Dobbs G3RJV is working on the receiver side of the 'Marland', and we hope to publish it in the near future. George intends to try and equally balance discrete and integrated components in the new receiver.

Editor's note: The following extracts are from some of the mass of letters received in the *PW* office, after the publication of William Mitchell EI5GO's letter in the March issue. We must point out that we have not received any letters in direct support of Mr Mitchell's opinion.

★★★★★STAR LETTER★★★★★

Dear Sir

I must take Rob Mannion to task over his recent remarks about amateur radio and it's 'old man's image'!

Let's face it Rob, old age is relative - but it's many of the old men amongst our ranks who have the real 'know how' - and, dare I suggest, part of your job as Editor of a much respected magazine is to tap this know-how for the benefit of others.

I read recently of a man of 81 who had passed the RAE and got his A licence. I also know a man of 81 who turns out a worthwhile constructional project each month - and goes 'old-time dancing five times a week. As I said Rob, old age is relative!

Conversely I don't believe that a whole boat-load of those 'Enid Blyton' characters featured within the pages of *Radcom* during the past year - complete with their bulbs and batteries - are going to make the slightest dent in the amateur radio world, despite the incomplete RSGB video.

What we do need is an influx of people, male or female, young or old, who have their own personal curiosity, interest and motivation about all things radio. After years in the doldrums *Practical Wireless* has taken off and is doing its utmost to attract such people. Now we need a *Radio Communication* magazine that communicates.

It's a high-tech' world we're living in Rob, so you set the pace for your readers and we'll try to keep up with you - young or old!

H. N. Kirk G3JDK

Rotherham

Yorkshire

G3XFD's comment: Well, what can I say Mr Kirk? Perhaps I ought to be pleased to be approaching the point where I can honestly claim to be an old man. The *PW* team will certainly try to set the pace for you and I'll find out what my own bunch of Enid Blyton characters (at a school radio club I help run) think of your comments. In the meantime, we'd like to hear what younger readers think of Mr Kirk's opinion.

Dear Sir

The letter from William Mitchell EI5GO is almost totally lacking in logic.

What hard evidence is there to support the contention that the repeater abuses are limited to the less intelligent, or even to the licenced? After all, anybody could buy or steal a rig, and can make a nuisance of him or herself on a repeater. But that does not automatically mean that the recent B licensees are automatically the culprits.

It is equally illogical to suggest that the Novice Licence is going to cause the same problems, before the first Novice Licence is issued.

I recently heard a QSO on 14MHz being interrupted by another station deliberately trying to spoil it, yet no UK Novice Licence has yet been issued.

Unfortunately, there will always be wallies but it is unfair to lay the blame on particular segments of the hobby.

**C. J. Charles GOLWA
Cheadle
Stoke-on-Trent**

Dear Sir

I would suggest to Mr Mitchell that rather than upsetting newcomers to our hobby that he uses his communication skills, written and practical to assist those of us who wish to become good ambassadors of our hobby. I for one would welcome his assistance in passing this so-called ridiculously easy RAE exam!

As yet, I am only half way through my course for the RAE and find it quite hard at times. Mr Mitchell's letter has given me a new lease of life, I will pass the RAE and I won't become a wally!
**J. Briggs
23 Base Wksp
BFPO 20**

Dear Sir

I found that many of the comments made by EI5GO extremely offensive. He refers to a "mass of zero IQs coming onto the airways", and assumes that anyone using a 'hand-held' transceiver with a 'rubber duck' antenna is an idiot! For some operators - that's the only rig they can afford.

Mr Mitchell also seems to require that repeaters should be closed down because they are abused. If someone is shot and killed, who or what is charged? It's not the gun, but the person pulling the trigger who's guilty.

To many amateurs, the local repeater may be the only centre of activity. I'm a fairly new amateur as you will see by my callsign, and horror upon horror, I came into amateur radio via, dare I say it, CB!

**Dick Pascoe G0BPS
Folkestone
Kent**

Dear Sir

I feel that Mr Barker G3WAL and Mr Mitchell EI5GO, are totally unjustified in suggesting that the repeater network should be closed down.

Removing this excellent service from amateur radio would be playing into the hands of the idiots whose sole aim is the withdrawal of the repeater network.

I needn't remind anybody of the terrible effects of the snow in December, when the repeater network provided a vital service to the housebound, and also to others who were caught out in awful road conditions.

I feel it would be a great tragedy if this vital service was removed, and I think G3XFD's funding programme (The CARRIES proposal) is a very good idea to boost repeater funding.
**Paul Robertson G7JCG
Redditch
Worcestershire**

Receiving You...

Dear Sir

As a short wave listener studying for the RAE, I'm aiming to start with a B licence, with a view of one day obtaining an A licence, I was upset to read Mr Mitchell's comments.

I think that his views are elitism at their worst. Comments like E15GO's reinforce the 'fuddy-duddy', 'old fogey' image amateur radio is trying to get rid of.

Please Mr Mitchell, don't judge every operator by the 'wally' element you've heard, as there are a lot of good guys and girls out there!
E. R. Hagon
Salisbury
Wiltshire

Dear Sir

May I say that in my opinion, 'Bargain Basement' is a great idea. I am certain that it will be well received and should result in an increased readership. I wish *PW* every success.

B. D. Tipper G3WWL
Sutton Coldfield
West Midlands

Editor's reply: Glad you like the idea Mr Tipper. Keep those adverts coming readers!

Dear Sir

Thanks for a most interesting piece on repeaters in the February issue of *PW*. I fully endorse the CARRIES idea suggested in 'Keylines', which I think is excellent. I live near GB3CF, but being on a good v.h.f. site, occasionally use several other repeaters. Your suggestion for a general fund will give me a way of supporting the other repeaters without breaking the bank!

As a relative newcomer I know that there is some antipathy towards the RSGB (of which I am a member) but feel strongly that anything of the CARRIES type should come under the wing of the RSGB. The hobby must have a strong unified voice. I know from my business life that a diversity of special interest groups does not have the same 'muscle' or credibility as one major body.

John Heath G7HIA
Kirkby Mallory
Leicestershire

Dear Sir

The RAE and type of licence held are totally irrelevant to radio and repeater abuse. You don't need a licence to lock up a repeater and/or use obscene language on the air.

All you need is a rig. Whether it's hand-held, home-built or commercial multi-mode equipment doesn't matter. It's the person using it who counts! If this person is an idiot with no respect for others, we have a problem, and as I've said, there's no licence or RAE needed although I realise many abusers may be licenced.

By saying the c.w. test filters out the pollution, E15GO implies

class B licencees are the source of this abuse and this is very unfair. I also ask that he give novice operators a chance. Don't forget that we are 'innocent until proven guilty'!

One method to lessen the problem would be selective or restricted access to repeaters. The access tone would be given to repeater group members only, and perhaps changed every three or four months.

There's no complete solution, but let's sit down and put things in perspective, there are far worse troubles and evils in life!

Garry Ward G7ITR
Woolford
Bury

Dear Sir

William Mitchell E15GO is under the wrong impression, if he thinks that anyone who uses a hand-held rig is a simpleton.

I passed the RAE in 1988 after a year of hard study. I had no previous radio or electrical experience when I decided to 'have a go'. It was sheer determination to succeed which finally got me through, with a similar attitude from a very hardworking tutor, (thank you Russ G4NUG).

I waited two years before being able to afford any equipment - a hand-held transceiver with a 'rubber duck' antenna. At home I can't have external antennas or base stations and this was the only way I could get on the air.

I consider myself a sensible user. My local repeater is often the only means I have to cover any distance.

I don't believe that I'm the only person who makes sensible use of my radio equipment. Perhaps Mr Mitchell should think carefully before tarring all hand-held transceiver users with the same brush.

Michael Clift G7FDL
Aylesbury
Bucks

Dear Sir

I was shocked to read such a negative attitude from E15GO regarding 144MHz. Anybody like myself preparing for the RAE in May, will probably take his comments on the "ridiculously simple RAE" and the other equally misguided opinions, as a direct insult.

So what if a new licensee introduces himself to the hobby on one of the many available hand-helds? Just because he has a rubber duck equipped rig - does that really make him a wally?

Repeater clubs and

users should police their repeaters and co-operate with the AROS, providing evidence, names and locations (as mentioned in the March *PW* 'Newsdesk '91', to try and stamp abuse out. The many dedicated people who run, build and maintain repeaters are doing a great job. They deserve some positive credit instead of listening to people winge about something that is not their fault.

Ian Bull
Peacehaven
East Sussex

Dear Sir

As a recently licenced amateur, I was greatly incensed by E15GO's letter. I obtained two distinctions in the RAE (I'm very proud of that achievement), have ten GCSEs to my name and expect to pass four A-levels this summer and yet he considers me to have an IQ of zero!

Please don't shut abused repeaters. They provide an excellent service to the many mobile stations who use them. The answer to repeater abuse is swift action and stiffer penalties on the abusers, not the repeaters and their genuine users.

Mr Mitchell has made a grave mistake in voicing his pitiful opinions and has offended a great many people. Is this the true spirit of amateur radio? I sincerely hope not.

David Murray G7HME
Aughton

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 44p per minute peak time and 33p per minute off-peak. The number to ring is: (0898) 654632.

Receiving You...

Dear Sir

I am not a licensed amateur, but I do intend to take the RAE when I have finished my college course. I'm 21 years old and have been interested in radio for the past 12 years.

Only the snobby attitude, which some amateurs like Mr Mitchell hold, has kept me back from the RAE, although I realise that not everyone has opinions like Mr Mitchell's.

I've been a short wave listener for many years and I fear that unless you're able to build a working transceiver you're not welcome on the amateur bands. I'm not technically gifted - so this attitude worries me.

I agree wholeheartedly with Mr

Mitchell's opinion that these wallies should not be allowed to get on the air. However, from his wording I feel that I fit into his wallie category. I find this extremely insulting as I'm fluent in three languages and I'm studying for two degrees in arts-based subjects and will eventually have 'Reverend' in front of my name.

Surely he doesn't really believe that by making the RAE more difficult, and incorporating a 'Technical Excellence' test, that his so-called 'zero IQs' will be kept off the air? As the well known proverb says: 'Where there's a will, there's a way'.

Hugh Anthony Quinn
Co. Kildare
Republic of Ireland

Dear Sir

I found the late Mr Muldoon's article on PME in the March issue most interesting. As he rightly said the loop impedance will be unlikely to exceed 0.35Ω and compression fittings must be used on all joints. This is all very well if the work is properly carried out.

My house was built some 15 years ago and has two phases incoming, one for the central heating system and the other for normal domestic purposes. About three or four years ago I was experiencing very bad regulation on the domestic system which supplied the radio shack. In the course of investigation it was noticed that when the one system was loaded the voltage on the other was increased and vice-versa. After some thought it was realised that the fault probably resided in the neutral connection and the power company was informed.

When the linesman came out to investigate, it was found that the fault was due to dissimilar metals in the compression sleeves at the feed point to the house. I can't remember now whether it was copper fittings on aluminium conductors, or the other way round, but protective grease on the fittings, on all the conductors, has dried out and serious corrosion has taken place.

The moral is to fit a voltmeter in the shack to constantly monitor the supply voltage and report any bad regulation problems to the supply authority.

S. F. Brown G4LU
Oswestry
Shropshire

Competition Corner

You could win an SGC Smartuner, worth £395, for your shack. There's been a lot of interest in this useful antenna tuner system. If you win the SGC Smartuner, kindly donated by the manufacturers, you could use it for portable, mobile and main station operation. Just think - no more antenna tuning. All you have to do is transmit, the Smartuner does the rest for you!

How To Win Your Smartuner

If you read the review on this clever automatic antenna tuner in March issue of *PW* - you'll have no trouble in answering the six simple questions on what it can do and how it does it! All you have to do is answer the six questions below, and complete the following Limerick tie-breaker before sending in your entry (with the corner flash from this page if you send a photocopy).

- 1: In what country is the SGC Smartuner made?
- 2: How does the Smartuner tuning system work?
- 3: What type of antenna is the Smartuner specifically designed for?
- 4: What is the power input range of the Smartuner?
- 5: What is the Smartuner's power consumption?
- 6: What is the Smartuner's recurrent memory re-set time?

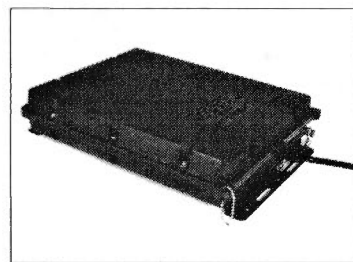
Tie-Breaker Limerick

*There was a reader from Poole,
who certainly wasn't a fool,
to make his signal a boomer,
and win an Smartuner,*

**PW MAY '91
COMPETITION
ENTRY
COUPON**

Complete the final line of the Limerick and send your entry with the six questions answered (and the corner flash if you send a photocopy of this page) to: *PW Smartuner Competition (May 91)* by 9 May 1991. The winner will be announced in the August issue of *PW*. The four runners-up will be able to choose vouchers for the *PW Book Service* or one year subscriptions. Get smart readers - have a go!

PRIZES...PRIZES...PRIZES



Runners-up can choose either
a one year *PW* subscription
or
£20 in vouchers for the
book service.

Name

Address

.....

.....

Postcode

☐ Subscription

☐ Vouchers (please specify)

Newsdesk '91

RAIBC Appeal

The Radio Amateur Invalid & Blind Club have been collecting all the various types of vouchers and stamps given out when you buy petrol. These are used either directly or indirectly by the club committee to purchase radio equipment for their blind and disabled members. They also compile audio cassette home study courses to enable their blind and severely handicapped members to study at home for a City and Guilds exam. To date they have been able to purchase over £12 000 worth of equipment by this method.

Although they are a registered charity, they don't ask the public for money. They feel that it's easier to get donations of vouchers and stamps that people wouldn't miss or might throw away without exchanging them for the goods offered in the catalogues.

The Shell organisation decided to end their current promotion on 10 March 1991. This leaves the RAIBC with a shortfall of Shell stamps of around 25 000 to enable them to complete their current project. The Shell stamps can still be surrendered by the RAIBC until 31 May 1991.

The RAIBC can also make use of all odd vouchers and stamps which include BP, ESSO, Texaco, Maxol, Privilege, Green Shield and even Air Miles.

They've received used postage stamps in their mail and although they don't make use of these themselves, they pass them on to help to buy Guide Dogs for the blind.

Should anyone wish to send tokens, they can do so free of charge, to **RAIBC (NI), Freepost, BE 1796, Belfast BT12 5BR**. Used postage stamps can be sent direct to **Archie, PO Box 87, Belfast BT12 5PU**.

RAIBC would also like to thank all of the garage owners and members who have already supported their appeal.

HMS Fearless

The town of Scarborough has adopted the warship *HMS Fearless* and to celebrate the first visit to the resort of this newly commissioned veteran of the Falklands War, the Scarborough Special Events Group will be on the air as GBORN from May 9 to 13th, whilst the warship is at anchor in the bay.

Operation will be around 3.725 and 7.055MHz in the h.f. bands plus 144MHz s.s.b. and f.m. in addition to activity on the RNARS nets.

Special QSL cards will be available to commemorate the occasion and further details can be obtained from:

Roy Clayton G4SSH
9 Green Island
Irton
Scarborough
North Yorkshire
YO12 4RN.

Car Boot Sale

On 26 May 1991, Northampton Radio Club have a Car Boot Sale at the rear of the 'Red Lion' public house, on the A45 400 yards from junction 16 of the M1 (Northampton turn).

There will be parking for over 500 cars, entrance fee will be 50p per car, or 25p per person. If you are selling, the fee will be £6.50 in advance, or £9 on the day.

There will be a licensed bar open from 12 p.m., food all day long and a Bring & Buy sale. Many radio/computer/electronic stalls to see.

Any bookings to **Paul GOHWC on (0327) 41267 evenings**.

Special Event Station

The weekend of May 11/12 May 1991 will see the 10th Anniversary of the Southern Electric Museum which is located in the Old Power Station, Bargates, Christchurch, in Dorset.

The Museum, which is dedicated to the supply and use of electrical energy and equipment through the ages, is a unique collection and will be open to visitors from 11am to 4.30pm on both days.

The members and reps. of the Bournemouth & District RAIBC Group will be operating the Special Event callsign GB2SEM from the museum and a unique colour QSL card will be available for all reports and QSOs via the RSGB QSL Bureau, or direct (with an s.a.e. please) to G6DUN who is QTHR.

The station will be active on 3.5 and 7MHz in the mornings and on 14, 21 and 28MHz in the afternoons. Contacts and talk-in will also be available on 144MHz f.m.

Bruel & Kjaer

A 24-page full colour booklet from Bruel & Kjaer reviews the basic requirements for quality, speed and cost-effectiveness of electronic measurements, in particular with respect to signal sources.

Advances in frequency synthesis and analogue circuit design have made it possible to achieve a high degree of accuracy and efficiency in signal generators, enhancing the overall quality of measurements. At the same time, Bruel & Kjaer has placed considerable emphasis on interface design, human engineering and reliability, to maximise test system up-time.

The booklet considers the role of the signal generator in applications as diverse as design and test of digital audio devices; high-resolution A-D converters; scientific, industrial and medical instruments; telecommunications and navigational equipment; and a variety of dynamic measurements in the low-frequency electronics, sound and vibration areas.

For each application, combinations of excitation, measurement and data presentation equipment are detailed.

For further information, contact:

Les Minikin
Bruel & Kjaer (UK) Ltd
92 Uxbridge Road
Harrow HA3 6BZ.
Tel: 081-954 2366.

International Marconi Day 1991

The Cornwall Amateur Radio Club would like to remind radio amateurs and s.w.l.s intending to take part in the IMD on Saturday 27 April, that the occasion is a one-day event starting at 00.00z and finishing at 23.59z. The official award is for full two-way working only and not for full two-day working as stated in the April issue of *PW*.

Thanks!

The committee of the Lancastrian Rally would like to thank all those who turned up at their rally on January 27 and made it a very successful day. They hope you will all come again next year on Sunday 26 January 1992, same time, same place.

Training College Open Day

Saturday 13 April 1991 is Open Day at The Salvation Army's William Booth Memorial Training College, where for over 60 years Salvation Army Officers have been trained for their life time in the ministry.

To celebrate this special day, WACRAL (World Association of Christian Radio Amateurs and Listeners) and The Royal Air Force have organised this Special Event Station using the callsign GB4SA.

The Salvation Army Training College
Denmark Hill, London SE5 8BQ.

New Catalogue

LMI UK, the Nuneaton-based distributor of electronic components, have published a new short form catalogue covering their versatile range of new and established LMI products. Included are p.c.b. terminal blocks, connectors, quick connect tab terminals and electronic modules.

The module range and high density screw terminals able to mate with DIN 41612 type D, E and F are recent introductions.

These high quality products are all manufactured from UL94VO approved polycarbonate material, and they have many uses within the electronic/electrical, control, instrumentation, engineering and manufacturing industries.

For further information, please contact **Paul Haynes on (0203) 642429**.

Newsdesk '91

Club News

North Ferriby United ARS meet at the North Ferriby United Football Club Social Room, Church Road, North Ferriby, 8pm. April 12 and May 3 are Nights on the Air, April 19 is The Trio TS-850 with Peter G3ZRS and the 26th is a Surplus Equipment Sale. Details from **Frank Lee G3YCC** on (0482) 650410.

Cheshunt & District ARC meet Wednesdays, 8pm in the Church Room, Church Lane, Wormley, Nr. Cheshunt, Herts. April 24 is a Natter Night. Details from **Roger Frisby G4OAA** on (0992) 464795.

Stourbridge & District ARS meet 1st & 3rd Mondays at the Robin Woods Community Centre, Scotts Road, Stourbridge. April 22 is a talk given by a Trading Standards Officer. Further details from **Dennis Body G0HTJ**, 53 Grove Road, Wollescote, Stourbridge, West Midlands DY9 9AE.

Loughton & District ARS meet in Room 14 is Loughton Hall, Rectory Lane, at 7.45pm. April 19 is 'What is PEP?' More details from **Mike Pilsbury G4KCK** on 081-504 4581.

Fylde ARS meet 2nd & 4th Thursdays, 7.45pm at the South Shore Lawn Tennis Club, Midgeland Road, Blackpool. April 11 is a talk by Steve Williamson G3WGU on his own choice of subject, the 25th is a talk by C. J. McMahon G6FCI with a 'Packet Radio Demo' and May 9 is a Club Equipment Sale. Details from **Eric Fielding G4IHF**, 6 Thornton Avenue, Lytham St. Annes, Lancashire FY8 3RL.

Sutton & Cheam RS meet 3rd Thursdays, 7.30pm at Downs Lawn Tennis Club, Holland Avenue, Cheam, Surrey. Natter Nights are 1st Mondays in the Downs Bar. April 13 is their Annual Dinner at the Stoneleigh Inn, Stoneleigh, the 18th is a Junk Sale and the 20th is a Visit to the National Remote Sensing Centre, Farnborough. Further details from **John Puttock G0BWV** at 53 Alexandra Avenue, Sutton.

Wimbledon & District ARS meet 2nd & last Fridays in St. Andrews Church Hall, Herbert Road, Wimbledon, London SW19. April 12 is a General Activity evening and the 26th is 'Keys and Keyers' by Tom Mansfield G3ESH. Any enquiries to **Chris Frost G0KEB** on 081-397 0427.

North Bristol ARC meet at S.H.E., 7 Braemar Close, Northville, Bristol. April 19 is a Home-brew Contest. Further details from **Chris Budd G0LOJ** on (0454) 616267.

Bury St. Edmunds ARS have a change of venue for 1991, they now meet at the West Suffolk College, (Room EO-40), Out Risbygate, Bury St. Edmunds, on the 3rd Tuesday of each month, at 7.30pm. Further details about the club from **Ian Capon G0KRL** on (0359) 70527.

Three Counties RC meet every other Wednesday, 7.30pm at the Railway Hotel, Liphook, Hampshire. April 24 is their AGM and May 8 is High Tech. Industrial Locations in the Three Counties by R. E. J. Seymour. For further details contact **Dave G4VKC**, 39 The Maltings, Liphook, Hants GU30 7DG.

Preston ARS meet Thursdays, at The Lonsdale Sports & Social Club, Fulwood Hall Lane, Fulwood, Preston. April 18 is an illustrated talk by Mr Andrews on 'The Abbey Walk' and May 2 is a Slide and Demonstration evening 'Bolton Mountain Rescue Team'. Details from **Eric Eastwood G1WCQ**, 56 The Mede, Freckleton, Preston, Lancs PR4 1JB. Tel: (0772) 686708.

Derby & District ARS meet Wednesdays, 7.30pm at 119 Green Lane, Derby. April 17 is The Packet Network and How it Works - an illustrated talk by Richard Hillier G4NAD, April 24 is a Video Show - including the RSGB Project Year Video, May 1 is May Day Junk Sale and the 8th is PACSATS - illustrated talk by Jonathan G4KLX. Further information about the Society is available from **Richard Buckley G3VGW**, 20 Eden Bank, Ambergate, Derby DE5 2GG. Tel: (0773) 852475.

Horsham ARC meet at the Guide Hall, Denne Road, Horsham, West Sussex. They have a Home-Brew evening on May 2. For further details, contact **Peter Stephens G8SUI**, at 11 Nutwood Avenue, Brockham, Betchworth, Surrey RH3 7LT. Tel: 073784 2150.

Bromsgrove ARS meet 2nd & 4th Tuesdays, 8pm at Lickey End Working Mens Club, 17 Alcester Road, Lickey End, Bromsgrove, Worcs (adjacent to junction 1, M42). Further details from **Mr D. Edwards G4ZWR**, 2 Mason Close, Headless Cross, Redditch, Worcs B97 5DF. Tel: (0527) 546075.

Clacton RC meet 1st & 3rd Wednesdays, 7.30pm at Eldorado Club, The Broadway, Jaywick, Clacton-on-Sea, Essex. They have a talk entitled Reminiscences of a Radio Amateur on April 17. Details from **Pete Neave G4DAN**, 59 Harwich Road, Mistley, Manningtree, Essex CO11 1NB.

Railway Gala Day

The narrow-gauge Romney Hythe and Dymchurch Railway in Kent has a Steam and Diesel Gala Day on May 19. It's hoped to have GB4RHR on air for this event - listen out for the whistles on the bands!

Details from:

Ian Bamford
8 Lower Road, Kenley, Surrey CR8 5NB.

Young Amateur of the Year Award 1991

The Radio communications Agency (RA) are continuing their sponsorship of the Young Amateur of the Year Award in 1991, which is presented for the most outstanding achievement by a young amateur radio enthusiast.

The 1991 award is open to anyone who is under 18 and is keen on construction, or interested in using radio and gaining operational skills, or using radio for a community service such as helping the disabled or in emergency communication networks or is actively encouraging interest in amateur radio, or is involved in amateur radio in any way, for example involvement in school projects.

The prize, for the most outstanding achievement between 1 August 1991 and 31 July 1991, will be awarded by the Radiocommunications Agency and presented at the Radio Society of Great Britain's (RSGB) HF Convention in September.

On top of the £250 cash prize awarded to the winner by the RA, each entrant will be presented with a copy of the RSGB's amateur radio log book. The winner and runners up will also have an opportunity to visit the RA's Radio Monitoring Station at Baldock in Hertfordshire. Continued support from the radiocommunications industry has resulted in

special additional prizes for the winner and runner up.

Last year's winner was 17-year old David Martin from Glasgow. As well as being co-founder and treasurer of YAGIS (Young Amateur's Group in Scotland), David had run a special event station for the Scout's 'Jamboree on the Air'. He was also a member of the Radio Amateur Emergency Network (RAYNET). David received a £250 prize, a certificate and several other prizes at the RSGB's HF Convention, held in Daventry. The runner up was 17-year old Simon Glanville from Coventry. Simon also received several prizes donated by the radiocommunication industry. Both David and Simon will be visiting the Radio Monitoring Station at Baldock as part of their prize.

The closing date for applications is 31 July 1991. The Award is open to any resident of the UK, the Channel Islands, or the Isle of Man, who has not reached his or her 18th birthday by the closing date. Candidates need not be holders of the Amateur Radio Licence.

Applications or nominations for the Award must be sent to:
The Secretary
Radio Society of Great Britain
Lambda House
Cranborne Road
Potters Bar
Hertfordshire
EN6 3JE.
Tel: (0707) 59015.

Australian QSL Bureau Alive And Well

The information published in the March issue of *PW*, regarding the incoming VK3 (Victoria) QSL bureau,

has turned out to be incorrect. The Wireless Institute of Australia has confirmed that the bureau is in operation and has

not been suspended in any way. Further details on the background to the incorrect report are published in 'Receiving You'.

Newsdesk '91

All Formats Computer Fair Comes To Birmingham

The Fair is of interest to anyone who uses a computer, especially when it comes to saving money. However, every Fair until now has been held at the New Horticultural Hall in London. Now, the first regional Fair is coming to the National Motorcycle Museum in Birmingham, on Sunday April 21, 10am to 4pm. Situated next to junction 6 of the M42, this is in the centre of the Midlands motorway network.

Bargains range from games and consoles to business systems. All formats of computer are catered for and there is a wide representation from user groups, specialist magazines and public domain libraries. The low cost of exhibiting produces many varied and interesting stands.

Further information from **John Riding on (0225) 868100.**



New Communications Centre

On Wednesday January 16, Mr Patrick McLoughlin MP, Parliamentary Under Secretary of State for Transport, opened a new communications centre near Heathrow to serve the licenced radio amateur, committed short wave listener and airband enthusiast.

Owned and run by Lowe Electronics Ltd., the largest distributor and retailer in the country of amateur radio equipment and specialist airband radios, the company has felt for some time that there is a need for a communications centre West of London to serve these specialised radio fields.

The new centre is at 6 Cherwell Close, Langley, Slough, Berks SL3 8XB. Tel: (0753) 45255. It is located just 15m from the main A4, and only 180m from junction 5 of the M4.

Mr McLoughlin made the first entry in the centre's Visitors' Book accompanied by the Lowe Electronics directors John Wilson G3PCY, Richard McLachlan G3OQT, Roger Geeson G3NJX and Ian Sneap G3ZYC.

If you require any further information, please contact:
**Mr Richard McLachlan
Lowe Electronics Ltd.,
Chesterfield Road
Matlock
Derbyshire
DE4 5LE.
Tel: (0629) 580800.**

Summer RAE Course

B & C Electronics are proud to announce that the 1991 Summer RAE Course begins on June 6, at a cost of £63.60.

The course fee includes tuition, books, folder, paper, calculator and refreshments at break time, but does not include the examination fee.

The course is run by Chris G8YPE who has eight years of experience in tutoring people through City & Guilds 765.

They offer free tuition until you pass, providing that the student takes every available examination.

For further details about the course, please contact **B & C on 021-475 2426.**

VHF News

As from Friday April 5, the Radiocommunications Agency have announced that radio amateurs in the UK can operate mobile on 50MHz and vertical polarisation. The permitted power level of 14dBW remains in force.

British Rail ARS

During the weekend of May 17-20, to celebrate 25 years of the British Rail ARS, the society are running a Special Event Station from The Sidings Hotel & Restaurant, Shipton, by Beningborough, Near York.

They hope to be active on 3.5, 7, 14MHz and 144MHz. The callsign to look out for is GB2RA. Further details from:
**G. Sims G4GNQ,
85 Surrey Street,
Glossop,
Derbyshire SK13 9AJ.**

Radio Listeners Guide 1991

The third edition of the essential book for all radio listeners, the *Radio Listeners Guide* has been published. 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. Tune to your favourite radio stations when travelling, or listen to one of the hundreds of stations you never knew existed. Hear local news, travel information and weather forecasts. In addition, the guide has features by the BBC and the Radio



Authority explaining what's new in national broadcasting.

Not only does the guide give you all the national, local and community stations in the UK, it also lists foreign stations that can be received in the UK.

The *Radio Listeners Guide* costs £2.95 plus 30p postage and is available from the publishers at the following address:

**The Radio Listeners Guide
Freeport
PDQ Publishing
PO Box 41
Didcot, Oxon OX11 8BR.**

New ITC Magazine

The Independent Television Commission's new quarterly magazine, *Spectrum*, successor to the IBA's journal *Airwaves*, was launched on March 7. Addressed both to broadcasters and to observers of the industry, its primary concern will be to air comment and debate on broadcasting policy and practice from a variety of viewpoints.

Features in the launch issue include a critical look at music on television by musician and journalist David Toop, a challenge to British film talent from ex-BSB Movie Channel Managing Director Andy Birchall, views on prospects for independents based in the regions and a perspective on Soviet media policies from Ukrainian broadcaster Alexei Sologubenko. Frank Willis, ITC Director of Advertising and Sponsorship, and Rachel Viney, ITC Religious Broadcasting Officer, discuss regulation in their specialist fields and Dr. Camel McLaughlin, ITC Senior Research Officer, reports on the latest annual Attitudes to Television survey.

Peter Brownbridge

Peter Brownbridge, the ebullient proprietor of Johnsons Shortwave Radio in Worcester, died at home on Saturday March 9 after a long illness.

Peter was one of those rare individuals who put his customers first. He would rather give them sound advice, even if it meant making less profit from the deal. Being

partial to a long chat, he would always drop in at the PW Editorial Offices when he was taking his annual holidays in Weymouth!

The business will be carried on, for the time being, by Anita, helped by Lara the dog.

Condolences to Peter's family from the staff at *Practical Wireless*.

Newsdesk '91

Neighbourhood Watch

New from Maplin Electronics is a complete single zone home burglar alarm kit. The DIY Neighbourhood Watch Security Alarm is simple to install, simple to use and is exceptional value for money. The unit will also ensure that any unwanted visitors will get a far from friendly reception

At the heart of the system is an on/off key operated microcomputer-based unit providing a fault indicator light. This will alert the household or office if any of the detectors fitted are activated. There's a time delay of 20 seconds to exit and 15 seconds to enter before the alarm is triggered. The system will

continuously monitor the tamper and personal attack circuits. There is an automatic bell cut-off after 20 minutes when the system resets itself.

The kit comprises: one microchip control unit, bell box and siren, four pairs of magnetic contacts, one personal attack button, one large pressure mat, one stair

pressure mat, anti-tamper microswitch, 50m of four-core security cable, cable clips and fixings, easy-to-follow instruction booklet and siren housing label.

The power for the system is by 12V battery (not supplied) which is housed in the bell box. The battery should provide many years of service, unless the siren

is sounded for long periods.

Maplin supply a vast range of detection devices which can be fitted to the system including passive infra-red detectors.

Price £54.95 (to include VAT). Order reference number is: XM97F DIY Alarm Kit. **Maplin Electronics**
Tel: (0702) 552911.

Radio Diary

* Practical Wireless & Short Wave Magazine in attendance

***April 14:** Trafford ARC will be holding their Great Northern Rally at G-MEX, City Centre, Manchester. Doors open 10.30am, rally closes 5pm. **Graham Oldfield 061-748 9804.**

April 21: Bury RS will be holding their Hamfeast '91 rally at the Castle Leisure Centre, Bolton Street, Bury. **Lawrence Jones G4KLT. Tel: 061-762 9308. PLEASE NOTE THE CHANGE OF DATE.**

April 21: Swansea ARS will be holding their 10th rally at the Swansea Leisure Centre, which is located on the A4067 Swansea-Mumbles coast road. Usual facilities will include trade stands, Bring & Buy, bookstall, h.f./v.h.f. demo station, full catering and licensed bar. Open 10.30am to 5pm. S22, talk-in by GB2SWR. **Roger Williams GW4HSH on (0792) 404422.**

***April 27/28:** The RSGB will be holding their National Amateur Radio Show at the National Exhibition Centre, Birmingham.

May 5: The 8th Anglo-Scottish rally will be held at Tait Hall, Kelso. Doors open 11am. All the usual attractions on this holiday weekend. Details from the rally co-ordinator **GMAUIB. Tel: (0573) 24654.**

May 6: Dartmoor RC have their rally at St. Annes Church Hall, Yelverton (A386), Devon. Doors open 10.30am. Trade stands, Bring & Buy, refreshments, parking. Talk-in on S22. **Dave G1YPD. Tel: (0752) 703101.**

May 12: Yeovil ARC have their 7th QRP Convention at the Preston Centre, Monks Dale, Yeovil. Doors open at 9am, admission is £1.50 which includes programme. All the usual traders, plenty of food and refreshments available. There will be four lectures during the day. **David Bailey at 7 Thatcham Close, Yeovil BA21 3BS.**

May 12: Royal Naval ARS have their rally at HMS Plymouth, Plantation Quay, Goven Road, Glasgow. Doors open 10.30am, admission £2 adults and £1 children + DAPs. There will be traders, Bring & Buy, displays, lectures, talk-in on S22. Admission allows you to wander around the ship until 9pm. Good family day out. Further details from **John Dundaf GM0OPS on 041-959 3385 (answer machine 24hrs).**

May 18: The Swindon Radio Rally is to be held at the Oasis Leisure Centre, North Star Avenue, Swindon, leave M4 at Junction 16. Doors open at 10.30am, trade stands, grand Bring & Buy, Repeater Group, etc, ample free parking. Talk-in by RAYNET on S22 from 0500hrs. For details contact **Jim G7GEA on (0793) 611859 or John on (0793) 619014.**

May 19: Mid-Ulster ARC have their annual 'Parkaneur' rally at the Silverwood Hotel, Lurgan, Co. Armagh. The rally will be open to the public from 12 noon. There will be the usual trade stands, Bring & Buy, bookstall, QSL bureau, etc. Talk-in on S22, 145.550. The proceeds of this rally will go to the Stanley Eakins Memorial Fund at Parkaneur, nr Dungannon. **Jim Lappin G1YGS. Tel: (0762) 851179.**

May 26: The Maidstone YMCA ARS are holding their biennial rally at the YMCA Sportscentre, Maidstone. As usual the rally will feature Trade and Special Interest Groups stands, refreshments and ample free parking. **Alan Judge G0NCW. Tel: Maidstone 750709.**

May 26: Plymouth Radio and Electronics Fair is being held at Plymstock School, Church Road, Plymstock, Plymouth, Devon. Doors open at 11am. Attractions include large Bring & Buy, RSGB bookstall, many trade stalls, RSGB Morse testing and refreshments. Talk-in on S22. **Jan Fisher G0IVZ. Tel: (0752) 340946.**

May 26: The 15th Annual East Suffolk Wireless Revival 1991 is being held at the Maidenhall Sports Centre, Ipswich, Suffolk. Attractions this year include Bring & Buy, car boot sale, radio society book stall, c.w. pile-up competition, vintage radio display, plus non-radio stalls, children's play area and model flying display. Refreshments available, admission is £1, ample car parking. Talk-in on S22. **Iain Moffat G1WCK, 30 Daimler Road, Ipswich, Suffolk IP1 5PQ.**

June 2: The Northampton Radio Club are holding their car boot sale at the rear of the Red Lion public house, which is on the A45, 400m from Junction 16 for the M1. There will be parking for over 500 cars. The entrance fee will be 50p per car or 25p per person. If you are selling, the fee is £6.50 in advance or £9 on the day. There will be a licensed bar open from 12 noon, there's food all day long as well as a Bring & Buy stand. Any bookings to **Paul G0HWC. Tel: (0327) 41267.**

***June 9:** The RNARS Rally will be held at HMS Mercury, near Petersfield. Gates open between 1000 and 1700. In addition to the dozens of Trade stands and the RNARS tent, there will be a Bring and Buy, a flea market offering tables for hire by the hour, a car boot sale, a large arts & crafts exhibition, radio-controlled power boats, cars and trains to mention but a few of the attractions. **Cliff Harper. Tel: (0703) 557469.**

***June 9:** Elvaston Castle Radio Rally will be held at Elvaston Castle Country Park, Derby. **Peter Neal (0332) 700265.**

June 9: The Norfolk RAYNET rally and car boot sale will be held at Barford, Norfolk. Car boots pitches £5, trade stands, refreshments, etc. Talk-in on S22 by G4GLI. **Pat Bates G0YD. Tel: (0692) 404593 evenings only.**

June 9: The Southend Rally will be held in the Rocheway Centre, Rochford, Essex. Car Boot pitches will be available, either pre-booked or on the day on a first-come-first-served basis. **Stephen Blinkhorn G1XGP. Tel: (0702) 712595 evenings.**

June 9: Mid-Lanark ARS are holding their annual Open Day at Newarthill C. E. Centre, High Street, Newarthill. There will be the usual traders plus some new ones, a Bring & Buy stall, catering facilities, raffle prizes and a lucky catalogue number. Talk-in on S22. They have applied to hold Morse tests as usual, applications must be made in good time to the relevant department at RSGB HQ. Doors open 11am. Admission/Catalogue is £1. **David Williams GM1SSA, 32/34 Carfin Street, New Stevenson, Motherwell, Scotland ML1 4JL. Tel: (0698) 732403.**

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.**

When I became interested in 70MHz, I looked at various options to get onto the band. For cost, this meant using a 144MHz transceiver driving a transverter. No commercial equipment was available that could be driven from 144MHz. A survey of available literature showed few published designs, although there were some available with a 28MHz i.f.

The Early Meon

In particular, the 'Meon' transverter(§) looked promising, if it could be adapted for the new drive frequency. This project allowed transmission and reception in the 50MHz band, with a 144MHz transceiver. An investigation into the potential design of equipment, immediately highlighted why few designs were available. This was mainly due to local oscillator (l.o.) breakthrough problems. After trials, I redesigned the original p.c.b. using pre-wound inductors to make the project more reproducible in performance.

Problems Overcome

To produce 70MHz from a drive of 144MHz requires a l.o. of 74MHz (144-70MHz). This is very close to the wanted frequencies of 70-70.5MHz. A filter, such as a Chebyshev or elliptic type with a sharp cut-off, would reduce the unwanted signal to an acceptable level. But, this filter would have many sections and be very difficult to align with simple test equipment. I considered that a rejection of at least 50dB below the wanted output, (50dBc), should be aimed for. There are no other troublesome mixer products, so a complex filter is not needed.

One aid to getting an acceptable answer, is to use a higher l.o. drive frequency. As the 70MHz band is only 500kHz wide, an input frequency of 145.5MHz to 146MHz would allow full coverage. Using this frequency range gives a higher l.o. frequency (75.5MHz). This higher l.o. frequency is appreciably further away from the 70MHz band. A tuned trap filter may be employed to remove a single spot frequency within a band of frequencies. The block diagram in Fig. 1, is the final result of the changes.

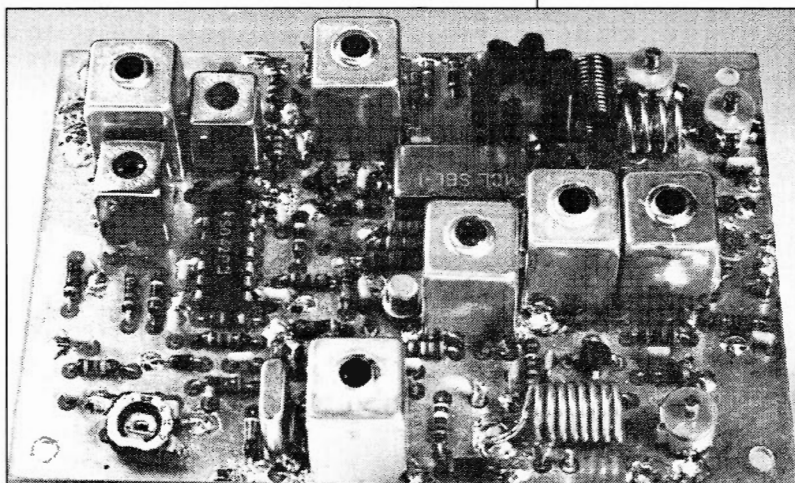
Filter Design

Design of a filter, incorporating a trap, is a little more complicated than a simple bandpass filter. The reactance of the trap circuit off-resonance may be

Meon-4

A 144-70MHz Transverter

Construction



considerable, and this has to be considered when designing the filter.

Using computer simulation of the filter was the solution adopted. A theoretical design for a two section band-pass filter with trap was created. This computer method, allows a trial and error method of changing each element, without recourse to building each new filter(§). The graphical results of an acceptable response are shown in Fig. 2, the computer generated theoretical response for this network. In practice the l.o. notch will not be as deep as this plot suggests, because of leakage and less than ideal components. Despite this, a notch depth of 40-50dB should be easily attained.

Transverter Design

The circuit in Fig. 3 is of the main transverter, a power amplifier will be presented later. The transmit chain, based on the 'Meon' circuit, has several changes made and includes the new notch filter components L3/C11. Most coils for the project are ready wound, screened, adjustable inductors. This reduces the number for trimmer capacitors in the design and makes for repeatability.

*Andrew Talbot
G4JNT wasn't put-off by the statement: 'it is almost impossible to use a 144MHz i.f. to drive a 70MHz transverter'. With carefully calculated design changes, he modified the well established PW Meon to work equally well on 70MHz.*

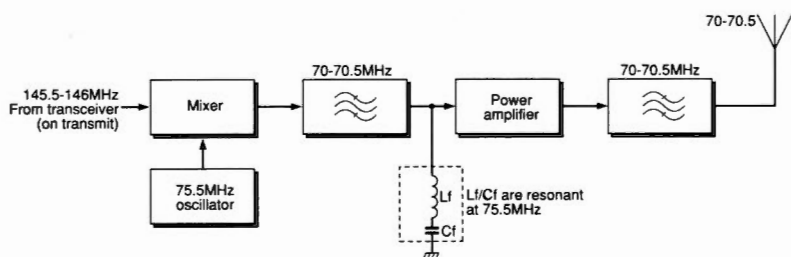


Fig. 1: Block diagram of the Meon-4. In general it's almost the same as its predecessor the 'PW Meon'.

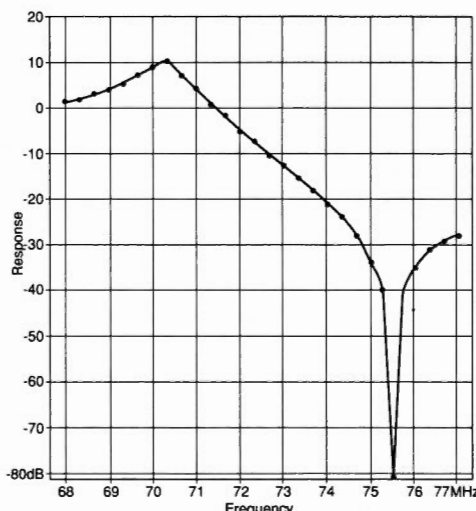


Fig. 2: This is the computer simulated and generated filter frequency response of the Meon-4.

Coil No	Turns	Wire s.w.g.	Coil Former	Remarks
L1	4.5	-	Toko MC120	0.14 μ H shielded with ferrite core
L2	2.5	-	Toko MC120	0.60 μ H shielded with ferrite core
L3	8.5	-	Toko S18	0.45 μ H molded white with ferrite core
L4	7.5	-	Toko S18	0.39 μ H molded violet with ferrite core tapped two turns up from the drain of Tr1
L5	12	20	5mm dia	self supporting close spaced
L6	4	16	6mm dia	self supporting close spaced
L7	7.5	-	Toko S18	0.39 μ H molded violet with ferrite core
L8	7.5	-	Toko S18	0.39 μ H molded violet with ferrite core tapped at 2 turns from earthy end
L9	8	16	6mm	inside diam tapped 2 turns from earthy end
L10	7.5	-	Toko S18	0.39 μ H molded violet with ferrite core
L11	7.5	-	Toko S18	0.39 μ H molded violet with ferrite core tapped at 2 turns from earthy end
L12	2	20	Ferrite	Fair-Rite ferrite bead type No. 24-43002402

Table 1: Inductors for the transverter board.

Local Oscillator

The local oscillator (TR3) employs a series resonant fifth overtone 75.5MHz crystal, running from a stabilised 8.2V rail. The oscillator chosen is a very reliable design. Take care, if you intend using this circuit at other frequencies, or with differing transistor types. The output purity and stability are dependent on just sufficient feedback for reliable starting. At other output frequencies the circuit values have to be changed. Feedback should also be reduced, if the wrong frequency is produced. When this feedback is correct, the circuit jumps in and out of oscillation at the correct frequency on adjusting L7. A buffer amplifier (TR4) follows the oscillator to increase the output to a suitable level for the transmit and receive mixers. This buffer produces about 40mW (+16dBm) of output. The higher level is needed for the transmit chain, but it's reduced by a 'Pi' network to the correct drive level for the receive mixer.

Transmit Chain

A resistor and p.i.n. diode attenuator accurately set the level of the 144MHz transmitted input. It also allows the later option of an automatic level control loop. If this option is not needed, replace the p.i.n.

diode with a resistor giving the optimum drive level. The mixer uses a Siemens SO42P active double balanced i.c. device. This provides mixer gain of a few dBs, and has the higher output impedance to drive the filter of L1-3. The trap filter of L3/C11 follows the mixer output and is in the gate of a m.o.s.f.e.t buffer amplifier, TR1. A second transistor, TR2 a 2N3866, following the m.o.s.f.e.t., raises the output to around 300mW at 70MHz at the output port.

Receive Chain

The receive chain is more conventional. A BF981 (TR5) low-noise m.o.s.f.e.t provides around 12dB of gain to feed a two section band-pass filter. A 3dB attenuator pad of R32-34 ensures both correct level, and termination at 50 Ω for the double balanced mixer (X1). A similar 5dB pad, R26-28 on the local oscillator port of the mixer, reduces the drive to the optimum of +7dBm for the SBL-1. At the output of the mixer, pins 3/4, termination of the mixer products are in two parts. The image frequency, between 5MHz and 5.5MHz, is separated via a small choke in series with a 47 Ω resistor. The desired frequency (145.5MHz) termination is provided by the v.h.f. transceiver.

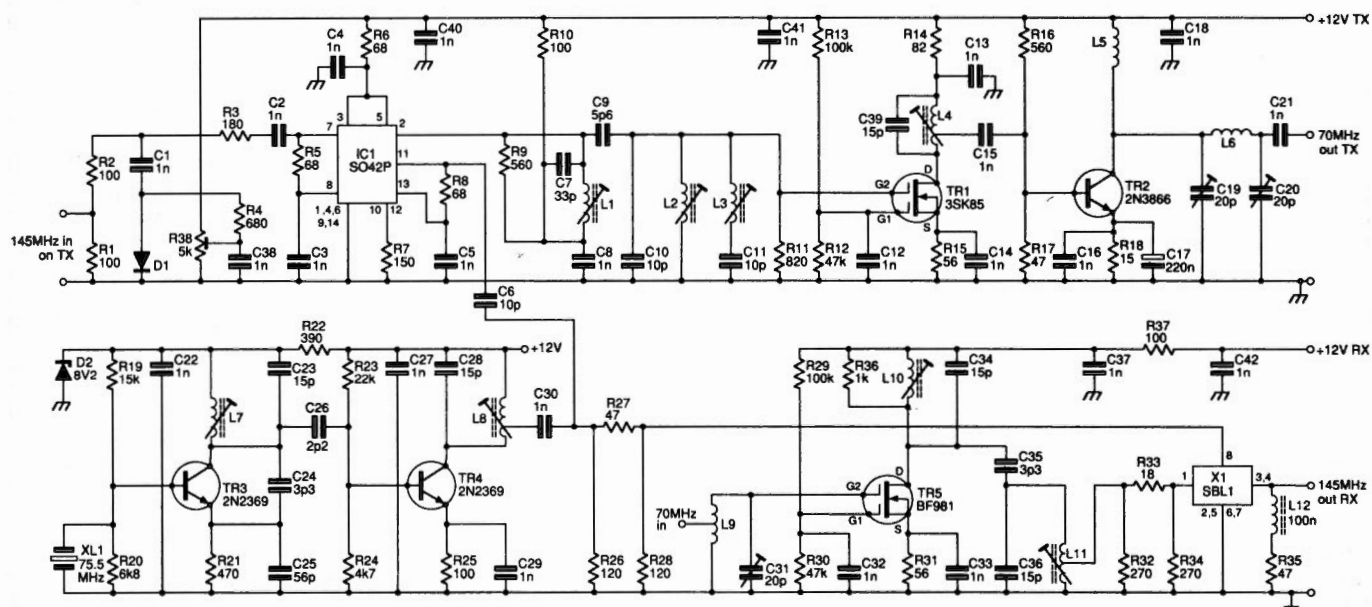
For a typical 144MHz transceiver no further amplification should be needed. If the receiver has particularly poor sensitivity, a conventional pre-amplifier could be added.

Construction

Printed circuit boards layouts and component placement diagrams for the transverter are shown in Fig. 4/5. The transverter p.c.b. is designed to fit across the width of a standard diecast box. This allows room for both the r.f. power amplifier and control circuitry. The transverter is on double-sided printed circuit board with the upper side used as a ground plane. Solder directly to the top layer of the p.c.b. those connections to be made to the negative rail. Do not forget to solder pins 1, 4, 6, 9 and 14 of the SO42P to the ground plane.

Remove the location tabs on each screened Toko coil. These can be spot soldered directly to the p.c.b. ground plane. It is helpful to mount the coils and their cans first. Soldering the screening-cans to the p.c.b. can be tricky with other components in place. Wire

Fig. 3: The transverter circuit diagram.



AMATEUR RADIO COMMUNICATIONS LTD.

AUTHORISED ICOM, YAESU AND STANDARD DEALER

HF TRANSCEIVERS

YAESU

- FT-1000 – Top of the range
FT-767GX – 2/6/70 & HF
FT-757GX – 12V General Coverage
FT-747GX – Ideal for mobile use

ICOM

- IC-781 – 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

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-3200 – Inc. Airband
DR-560 – Dual receive
DR-510 – Unbeatable prices

- C-528 – Extremely popular
DJ-560 – Great Value for money
IC-24ET – Airband/950 RX

SCANNERS/ HF RECEIVERS

ICOM

- IC-R9000 – Unbelievable
IC-R7000 – Can't be beat
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 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.

MICROWAVE MODULES • TONNA • JAYBEAM • SANDPIPER • BNOS • AKO • CAPCO • REVEX • STANDARD

RST

RST MAIL ORDER CO.
LANGREX SUPPLIES LTD,
1 MAYO ROAD,
CROYDON,
SURREY CR0 2QP.
SPECIAL EXPRESS
MAIL ORDER SERVICE

A231	£ p	EM34	P.O.A.	PY33	2.50	BAS8	6.00	6SC7	3.00
CL33	4.00	EM81	2.50	PR1	1.50	BASTG	8.50	6SG7M	2.50
DY967	1.50	EM87	2.50	PR2	1.50	BA76	2.00	6SL7	3.00
DY802	1.50	EN91 Mult	7.50	PR3	1.50	6AUSGT	5.00	6SK7	3.00
E88CC	6.95	EY51	3.50	PR8	2.00	6AU6	2.50	6SL7GT	4.50
E100F	4.50	EY96	1.75	PR500A	4.00	6AWBA	4.00	6SN7GT	4.50
E810F	25.00	EY98	1.75	PR800	1.50	6B7	4.00	6ST	3.00
EACB30	1.95	EY500A	3.00	PR301	1.50	6B8	4.00	6UBA	1.50
EB91	1.50	EZ80	1.50	QOV02-6	19.50	6BAG	1.50	6V6GT	4.25
EBF80	1.50	EZ81	1.50	QOV03-10	5.00	6B7A	5.00	6X4	3.00
EBF89	1.50	GY501	3.00	QOV03-10 Mult	15.00	6BEB	1.50	6X6GT	2.50
EBL31	£12.50	GZ32	8.50	QOV03-20A	25.00	6BHG	2.50	12AT7	2.25
EQ81	6.50	GZ33	4.50	QOV06-40A Mult	40.00	6B8	2.25	12AU7	2.25
EQC33	7.50	GZ34 GE	7.50	QOV12-12	10.00	6B86	2.00	12AX7	2.25
EQC35	7.50	GZ37	4.50	R18	4.00	6B7A	3.50	12AX7A GE	7.00
EQC36	2.25	GZ38	4.50	R19	3.00	6B7	8.00	125A6	2.50
EQC37	2.25	K166	15.00	SP41	8.00	6B8A	4.00	12B6	2.50
EQC38	2.25	K166 GEC	35.00	SP61	4.00	6B7	6.00	12B7A GE	6.50
EQC39	2.25	K777 Gold Lion		U19	10.00	6B86	4.50	12B7A GE	7.00
EQC40	3.50			U25	2.50	6B87	1.50	12C1	20.00
EQC41	3.50			U26	2.50	6B7	2.50	12HG7 12GN7	6.50
EQC42	3.50	K788	18.00	U37	7.50	6C4	1.95	30F1/2	1.50
EQC43	3.50	N78	9.00	U37	7.50	6C6	3.00	30P4	2.50
EQC44	3.50	OA2	2.70	UAB30	1.95	6C8A	3.50	30P19	2.50
EQC45	3.50	OB2	2.70	UBF89	1.50	6C8A	3.50	30P13	1.50
EQC46	3.50	OC3	2.50	UC42	4.00	6C8A	3.50	30P14	1.50
EQC47	3.50	OD3	2.50	UC481	2.50	6C8	3.50	30P14	1.50
EQC48	3.50	OC8	2.50	UC482	2.50	6C7 GE	8.25	572B	70.00
EQC49	3.50	OC8	2.50	UC483	3.00	6C8	8.00	805	90.00
EQC50	3.50	OC8	2.50	UC484	3.00	6C8	8.00	807	5.00
EQC51	3.50	OC8	2.50	UC485	3.00	6C8	8.00	811A	15.50
EQC52	3.50	OC8	2.50	UC486	3.00	6C8	8.00	812A	52.50
EQC53	3.50	OC8	2.50	UC487	3.00	6C8	8.00	813	27.50
EQC54	3.50	OC8	2.50	UC488	3.00	6C8	8.00	866A	25.00
EQC55	3.50	OC8	2.50	UC489	3.00	6C8	8.00	872A	20.50
EQC56	3.50	OC8	2.50	UC490	3.00	6C8	8.00	931A	25.00
EQC57	3.50	OC8	2.50	UC491	3.00	6C8	8.00	2050A GE	10.00
EQC58	3.50	OC8	2.50	UC492	3.00	6C8	8.00	5763	10.00
EQC59	3.50	OC8	2.50	UC493	3.00	6C8	8.00	5814A	4.00
EQC60	3.50	OC8	2.50	UC494	3.00	6C8	8.00	5842	12.00
EQC61	3.50	OC8	2.50	UC495	3.00	6C8	8.00	6080	8.50
EQC62	3.50	OC8	2.50	UC496	3.00	6C8	8.00	6146B GE	15.00
EQC63	3.50	OC8	2.50	UC497	3.00	6C8	8.00	652A GE	15.00
EQC64	3.50	OC8	2.50	UC498	3.00	6C8	8.00	6683B GE	16.00
EQC65	3.50	OC8	2.50	UC499	3.00	6C8	8.00	6973	11.00
EQC66	3.50	OC8	2.50	UC500	3.00	6C8	8.00	7025 GE	7.00
EQC67	3.50	OC8	2.50	UC501	3.00	6C8	8.00	7027A GE	12.50
EQC68	3.50	OC8	2.50	UC502	3.00	6C8	8.00	7195	10.00
EQC69	3.50	OC8	2.50	UC503	3.00	6C8	8.00	7581A	12.00
EQC70	3.50	OC8	2.50	UC504	3.00	6C8	8.00	7595	15.00
EQC71	3.50	OC8	2.50	UC505	3.00	6C8	8.00	7587	23.00
EQC72	3.50	OC8	2.50	UC506	3.00	6C8	8.00	7668	8.50
EQC73	3.50	OC8	2.50	UC507	3.00	6C8	8.00	8088	15.00
EQC74	3.50	OC8	2.50	UC508	3.00	6C8	8.00	8417 GE	11.50
EQC75	3.50	OC8	2.50	UC509	3.00	6C8	8.00		
EQC76	3.50	OC8	2.50	UC510	3.00	6C8	8.00		
EQC77	3.50	OC8	2.50	UC511	3.00	6C8	8.00		
EQC78	3.50	OC8	2.50	UC512	3.00	6C8	8.00		
EQC79	3.50	OC8	2.50	UC513	3.00	6C8	8.00		
EQC80	3.50	OC8	2.50	UC514	3.00	6C8	8.00		
EQC81	3.50	OC8	2.50	UC515	3.00	6C8	8.00		
EQC82	3.50	OC8	2.50	UC516	3.00	6C8	8.00		
EQC83	3.50	OC8	2.50	UC517	3.00	6C8	8.00		
EQC84	3.50	OC8	2.50	UC518	3.00	6C8	8.00		
EQC85	3.50	OC8	2.50	UC519	3.00	6C8	8.00		
EQC86	3.50	OC8	2.50	UC520	3.00	6C8	8.00		
EQC87	3.50	OC8	2.50	UC521	3.00	6C8	8.00		
EQC88	3.50	OC8	2.50	UC522	3.00	6C8	8.00		
EQC89	3.50	OC8	2.50	UC523	3.00	6C8	8.00		
EQC90	3.50	OC8	2.50	UC524	3.00	6C8	8.00		
EQC91	3.50	OC8	2.50	UC525	3.00	6C8	8.00		
EQC92	3.50	OC8	2.50	UC526	3.00	6C8	8.00		
EQC93	3.50	OC8	2.50	UC527	3.00	6C8	8.00		
EQC94	3.50	OC8	2.50	UC528	3.00	6C8	8.00		
EQC95	3.50	OC8	2.50	UC529	3.00	6C8	8.00		
EQC96	3.50	OC8	2.50	UC530	3.00	6C8	8.00		
EQC97	3.50	OC8	2.50	UC531	3.00	6C8	8.00		
EQC98	3.50	OC8	2.50	UC532	3.00	6C8	8.00		
EQC99	3.50	OC8	2.50	UC533	3.00	6C8	8.00		
EQC100	3.50	OC8	2.50	UC534	3.00	6C8	8.00		

Tel. 081-684 1166

Open daily to callers, Mon-Fri 9am-4pm - Closed Saturday

Fax: 081-684 3058



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

Telax

946708

ALL LISTENERS SHOULD READ SHORT WAVE MAGAZINE

IN THE APRIL ISSUE ON SALE NOW:

★ **FREE - Weather Watching** magazine inside - all about satellite & terrestrial weather watching. How to get started, what equipment you need and what you can see or hear.

★ **COMPETITION** - win one of the new Maplin 'Watch as you Build' radio kit with video instructions.



★ **REVIEWED -** The new Philips DC777 short wave car radio.

★ **PLUS -** All the regular features on Airband, Scanning, Weather Satellites, Data Modes, Utility Stations, Long Medium & Short Wave Broadcast Stations, Satellite Television, Propagation, Amateurs, DXTV and of course, the Junior Listener page for the younger reader.

Fig. 4: The 'earth' plane patterns for the transverter board.

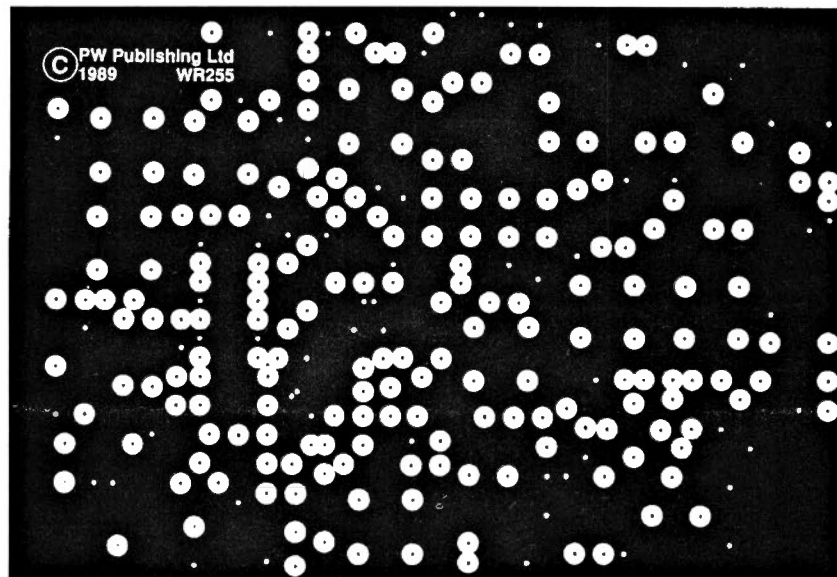
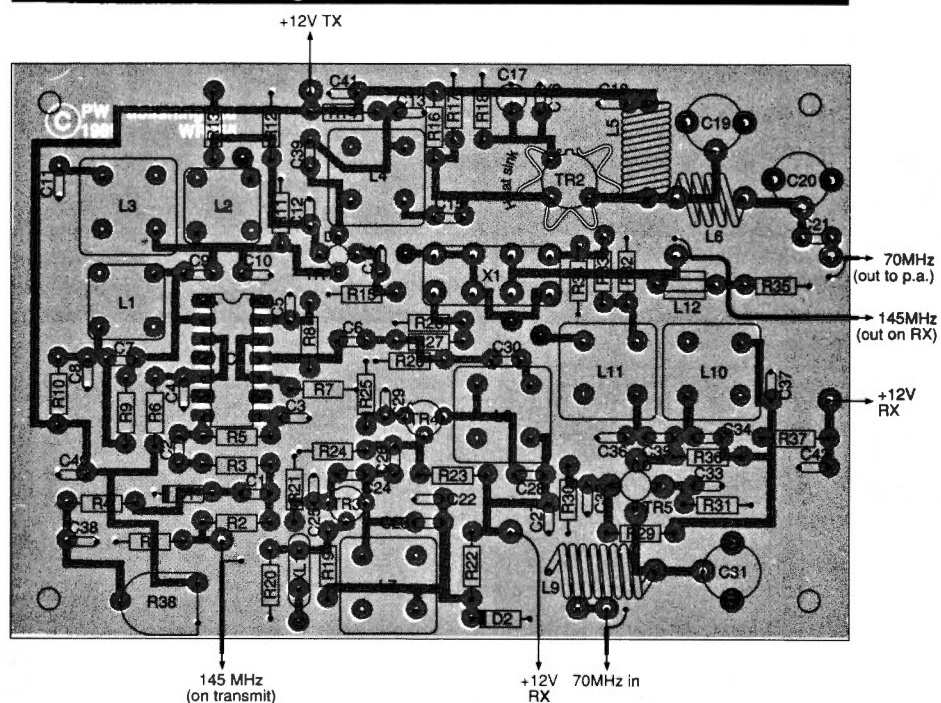
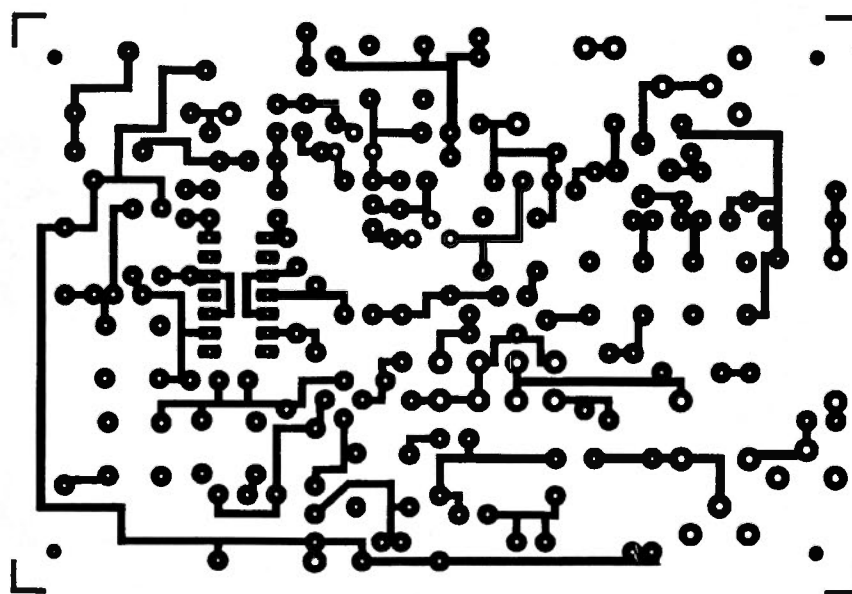


Fig. 5: Full-size component placement overlay for the transverter.



Full-size underboard track layout.



All the PCBs will be available from the PW PCB Service.

YAESU

ICOM

Authorised Dealer

MARTIN LYNCH

G4HKS

STANDARD

AMSTRAD

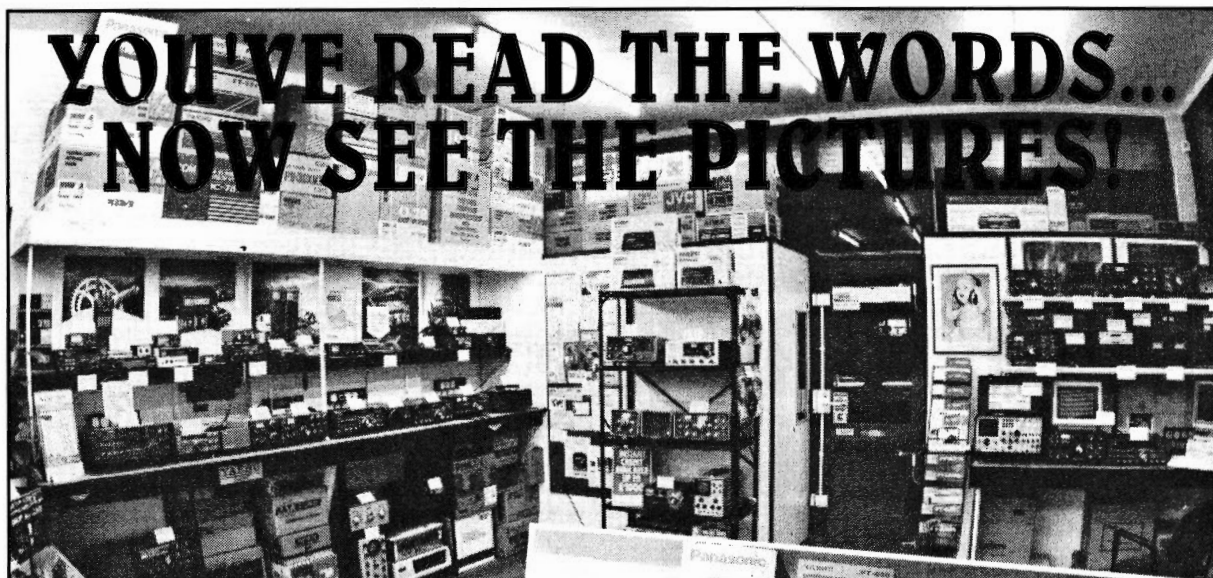
ALINCO

Authorised Dealer

THE AMATEUR RADIO EXCHANGE CENTRE

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

YOU'VE READ THE WORDS... NOW SEE THE PICTURES!



**THE LARGEST DISPLAY OF USED AMATEUR
RADIO EQUIPMENT IN THE COUNTRY**

BUYING OR SELLING... DIAL 081-566 1120 NOW!

THE COMPANY THAT BRINGS YOU THE LATEST TECHNOLOGY - FIRST !

SALES HOTLINE 021 552 0073 and HELPLINE 021 552 0051 (Office Hours)

ANOTHER RAYCOM PACKAGE

The **TOKYO HX-240** HF Transverter when coupled to an all-mode 2m rig will give you 50W on 80 to 10m. RAYCOM have put together this unique unit with the new YAESU FT290R11.

IT WORKS GREAT !



FT-290R II £429.00
TOKYO HX-240 £249.00
1/2 Size G5RV £ 14.95
12 Amp PSU £ 59.95
Nicads & Wall Charger £ 31.30
Total regular price £784.20

RAYCOM PACKAGE .. £699.00

YOU SAVE £85.20 !

Includes ALL D.C. and Co-ax leads
EXCELLENT HF AND VHF STARTER PACK
COME IN AND TRY IT FOR YOURSELF - YOU
WILL NOT BE DISAPPOINTED

FULL RANGE OF YAESU AND ICOM ALSO STOCKED

HP100E/AR1000

Exclusive to RAYCOM
Short wave converter Module

Made in the UK by AKD

Coverage 200kHz to 30MHz

HP100E with converter £299.00
HP100E no converter £249.00
Converter only £ 59.00

NOTE

HP100/AR1000 not purchased from RAYCOM requires modification to work with the converter Cost £15.00

THE UK SCANNER EXPERTS

WE HAVE SECURED LIMITED QUANTITIES OF THE NEW ICOM SCANNERS DIRECT FROM JAPAN - HURRY TO RESERVE YOUR ONE NOW !

The FANTASTIC ICOM IC-R1 and IC-R100

IC-R1 500kHz to 1300MHz £399.00
IC-R100 500kHz to 1800MHz £499.00

OTHER HIGH QUALITY SCANNERS FROM RAYCOM

BEARCAT UBC 50/55XL 66-88/136-174/406-512MHz £99.95
10 memories, channel review, including FREE charger worth £4.95
BEARCAT BC 70XLT 66-88/136-174/406-512MHz £149.99
20 memories, full frequency display, with FREE car charger kit worth £4.50
BEARCAT UBC 100XLT 66-88/118-174/406-512MHz £199.99
100 memories, airband, search, including FREE car charger kit worth £4.50
BEARCAT UBC 200XLT 66-88/118-174/406-512/806-956MHz £229.99
200 memories, top of the range, including FREE car charger kit worth £4.50
BEARCAT UBC760XLT 66-88/108-174/350-512/806-956MHz MOBILE £229.99
100 memories, 5 search bands, including FREE mains adapter worth £4.95
NEW JUPITER MVT 6000 mobile ONLY £329.00
25 to 550 MHz and 800 to 1300MHz, 100 Memories
JUPITER MVT 5000 Hand-held ONLY £249.00
25 to 550MHz and 800 to 1300MHz, 100 Memories
AOR 3000 base Limited Supplies available £699.00
0.1 to 2036 MHz, 400 mems, LSB/USB/CW/WFM/NFM/AM

MANY OTHER TYPES AND MODELS STOCKED - NEW AND USED.

SEND AN SAE FOR OUR LATEST USED LIST

URGENTLY WANTED - USED SCANNERS AND HAM GEAR, WORKING OR NOT.

ICOM IC-R7000



Listen to weather, fire, coastguard, TV, airband and many, many more. Wide frequency coverage provides you with all the channels you need to become a VHF and UHF listener. Frequency coverage is guaranteed from 25 to 1300MHz, but may extend on individual units to 2GHz! Features include:

- USB, LSB, FM, FM-N, AM
- 99 memory channels, keypad entry
- optional infra-red remote control
- variable speed scan and delay
- optional voice synthesizer
- six tuning steps
- sensitivity < 0.3µV for 10dB SINAD

Save £108! Raycom price £925

including FREE Royal 1300/AH7000 25 - 1300MHz discone complete with co-ax and plugs.

CHARGE IT!

Why not take advantage of the **RAYCOM Credit Card** and spread the payment for that scanner you've always wanted. Example: Yaesu FRG9600 MKV package £70 deposit and £28 per month (APR 36%). Call for a quote and written details! Licensed credit broker.

YAESU FRG9600

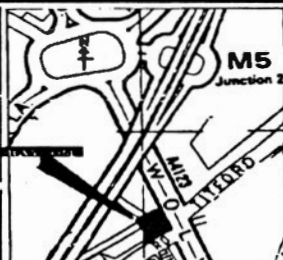


9600 standard 60-905MHz £469.00
9600 MkII 60-950MHz £499.00
9600 MkII pack 60-950MHz .. £545.00
9600 MkV 0.2-950MHz £625.00
9600 MkV pack 0.2-950MHz .. £699.00
Standard to MkII .. Upgrade £ 40.00
Standard to MkV .. Upgrade £149.00
MkII to MkV Upgrade £129.00
Packs include PSU and ROYAL 1300!

RAYCOM COMMUNICATIONS SYSTEMS LIMITED, INTERNATIONAL HOUSE, 963 WOLVERHAMPTON RD, OLDBURY, WEST MIDLANDS B69 4RJ. TEL 021-544-6767, Fax 021-544-7124, Telex 336483 IDENTI G.

RAYCOM
COMMUNICATIONS SYSTEMS LIMITED

Telephone **021 - 544 6767**



RAYCOM gives you more BUYING POWER

ALL MAJOR CREDIT CARDS ACCEPTED. BC, ACCESS, DINERS. INSTANT CREDIT UP TO £1000 (SUBJECT TO STATUS) WITH RAYCOM CREDIT CARD (APR 36%). INTEREST FREE CREDIT ON CERTAIN ITEMS AT MRP. CALL FOR MORE DETAILS.

ORDERING INFORMATION

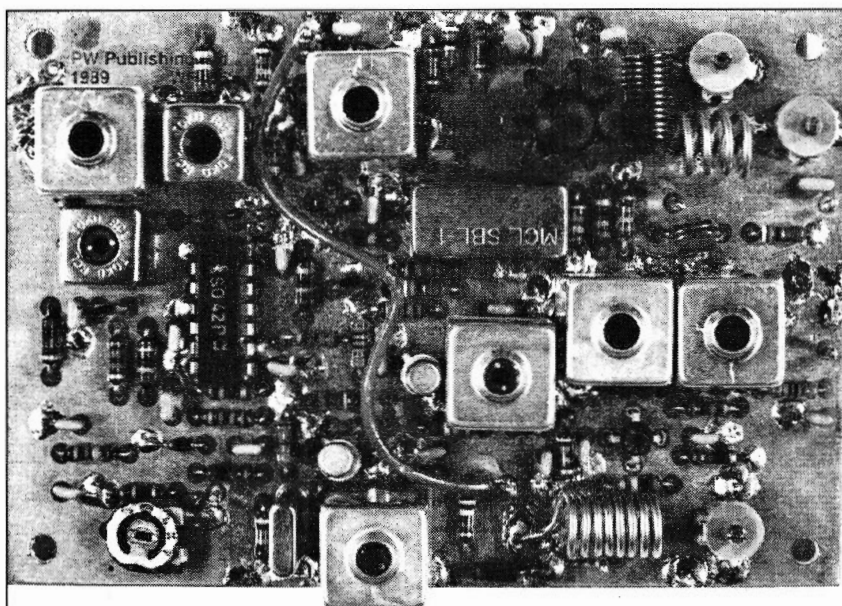
WE STOCK ICOM, YAESU, BEARCAT, MFJ, BUTTERNUT, CUSHCRAFT, AEA, NAVICO, STANDARD, TEN-TEC AND WELZ AMONG MANY OTHERS. SEND SAE FOR FULL LIST.

TEL: 021-552-0073

PHONE BEFORE 4PM FOR NEXT DAY DELIVERY BY COURIER (£15.00) - OR 2PM FOR DELIVERY BY POST (£10.00). PLEASE ALLOW TIME FOR CHECKS TO CLEAR. MANY OTHER ITEMS IN STOCK. PLEASE CALL FOR MORE INFO AND FOR EXTRA SPECIAL DEALS!

INFOLINE 0836-771500 5-9pm (week days)

OPENING HOURS 9-5.30 MON TO SAT, 7.30 DE RAY GAKZH, PETER GAEWO COLIN and JOHN on the phone.



Further Reading (§)

'The PW Meon 50MHz Transverter' by Dave Powis G4HUP & Sam Jewell G4DDK, published in *PW* October 1985.

Diode r.f. probe shown as part of 'PW Irwell Transceiver' by Rev. George Dobbs G3RJV, published *PW* January-March 1990.

‡ Not really further reading but, programs for circuit analysis on a PC (IBM 'clone'). At professional standard, Number One Systems Ltd. (Harding Way, Somersham Road, St Ives, Cambs. PE17 4WR) have Analyser II. While on the 'Shareware' side, PDSL (Winscombe House, Beacon Rd., Crowborough, Sussex TN6 1UL) have several programs in their catalogue, available for £2.

The completed *PW* 'Meon' project.

links, passed through the board, connect the earthy ends of L2 and L11, also pins 2, 5, 6 and 7 of the SBL-1.

Fit the m.o.s.f.e.t.s, by bending their tabs to fit through the holes in the p.c.b. Then orientate them in such a way that the identification number is on the top.

Alignment

Alignment of the main transverter is straightforward, but must be done in the order given. Make a simple power meter, with a 50Ω load resistor and diode detector. The simple r.f. probe as described in *PW* January '90 page 28 (§) is a useful starting point. The capacitor charges to the peak r.f. voltage across the 50Ω. Adding the forward diode drop of 0.6V, then squaring the resulting voltage and dividing it by 50Ω gives twice the peak power. The 'r.m.s. power' is half of this figure. This home-made low power meter can give remarkably accurate measurements down to about 7dBm input power (5mW & 0.11V).

Connect the r.f. probe to the output of the oscillator buffer at the junction of R26 and R27, and peak L7 and L8 for maximum i.o. output. The meter should read about 0.6V, corresponding to an output level of some 12dBm (16mW).

To set up the receive chain, connect the antenna to the input. Connect the 145MHz out to a transceiver tuned to 145.7MHz. Inductors L10 and L11 should be adjusted to maximise the noise level at the transceiver audio. This audio level should not change greatly between 145.5-146 MHz. If it does, 'stagger-tune' these inductors slightly to flatten the response. Inductor L9 may be roughly adjusted by peaking for maximum noise. This peaking, is then modified by listening to stations or beacons and adjusting for L9-L11 for the best signal-to-noise ratio. The best signal-to-noise ratio is not always at the loudest signal level.

The Buxton beacon GB3BUX in Derbyshire, on 70.05MHz can be heard, even on a simple antenna, in many parts of the country. Beacons provide an ideal tuning signal, but in heavily populated areas many spurious signals can be picked up and used. These are especially noticeable in the early evenings and at weekends. Poorly suppressed domestic and industrial equipment noise makes good tuning signals.

That's the transverter side of the 'Meon-4'. The companion 10W power amplifier and the switching circuitry will be described in Part 2.

PW

How Much £36 + p.c.b. + housing
How Difficult Intermediate +

Resistors

0.25W 5% Carbon Film

15Ω	1	R18
18Ω	1	R33
47Ω	3	R17, 27, 35
56Ω	2	R15, 31
68Ω	4	R5, 6, 8
82Ω	1	R14
100Ω	4	R1, 2, 10, 25, 37
120Ω	2	R26, 28
150Ω	1	R7
180Ω	1	R3
270Ω	2	R32, 34
390Ω	1	R22
470Ω	1	R21
560Ω	2	R9, 16
680Ω	1	R4
820Ω	1	R11
1kΩ	1	R36
4.7kΩ	1	R24
6.8kΩ	1	R20
15kΩ	1	R19
22kΩ	1	R23
47kΩ	2	R12, 30
100kΩ	2	R13, 29

Horizontal Skeleton Preset

5kΩ	1	R38
-----	---	-----

Capacitors

Miniature Plate Ceramic

2.2pF	1	C26
3.3pF	2	C24, 35
5.6pF	1	C9
10pF	3	C6, 10, 11
15pF	5	C23, 28, 34, 36, 39
33pF	1	C7
56pF	1	C25
1nF	24	C1-5, 8, 12-16, 18, 21, 22, 27, 29, 30, 32, 33, 37, 38, 40-42

Miniature Film Trimmers

2-22pF	3	C19, 20, 31
--------	---	-------------

Tantalum Bead 35V

0.22μF	1	C17
--------	---	-----

Semiconductors

Diodes

BA379	1	D1
BZY88C 8V2	1	D2

Transistors

BF981	1	TR5
2N2369	2	TR3, 4
2N3866	1	TR2
3SK85	1	TR1

Integrated Circuits

SO42P	1	IC1
-------	---	-----

Miscellaneous

X1 SBL-1 double balanced mixer, XL1 (75.5MHz) HC18/U 5th overtone crystal (1); circuit-board pins; inductors (see Table 1); die-cast enclosure (Electromail 509-254) (2); p.c.b.

(1) £8.40 (inc. p&p) from
Golledge Electronics
Merriott
Somerset
TA16 5NS
Tel: (0460) 73718

Circuit
Park Lane,
Broxbourne,
Herts EN10 7NQ
Tel: (0992) 444111

Maplin Electronics,
PO Box 3
Rayleigh,
Essex SS6 8LR.
Tel: (0725) 554161

Electromail
PO Box 33,
Corby,
Northants NN17 9EL
Tel: (0536) 204555

Icom IC-970E

Multi-band VHF and UHF Transceiver



Multi-band v.h.f. transceivers have been developing ever more features in recent years. The IC-970E is the latest offering from Icom and Mike Richards G4WNC took the opportunity to try it out.

The IC-970E is the latest multi-band, multi-mode transceiver to be introduced by Icom. In fact, the review model was the first one in the country.

In standard trim it comes equipped for full duplex operation on the 144 and 432MHz bands. However, this can easily be extended to give transceive coverage of the 1296MHz band plus receive only on 50 through to 905MHz.

The wide range of features make the IC-970E an extremely powerful transceiver that should meet the needs of today's most demanding amateurs. So I took a closer look to see just how it shapes up in practice.

First Steps

I must admit the IC-970E certainly looks impressive and is, in fact, a large and heavy transceiver. A contributory factor to this was the optional built-in a.c. power supply fitted to the review model. The standard model requires an external 13.8V 10A power supply.

The antenna connections were all made via the rear panel and good quality sockets were used throughout. The N-type connectors were used for all antenna sockets, except 144MHz where a SO-239 type was used.

The key jack provided was a 6.3mm stereo type, enabling connection of either paddles or a straight key. However, the iambic keyer is not included in the standard model, it's an optional extra.

There was also a standard 3.5mm external speaker jack that disabled the internal speaker when a jack was inserted. An additional feature here was that you could choose to split the main and sub-band audio signals.

This meant that, for example, you can direct 144MHz signals to the internal speaker while 430MHz signals use the external speaker. Besides these basic connections, there were a few others that gave access to some more advanced features of the IC-970E.

The first of these is the CI-V socket that enables computer control of the IC-970E. Before this can be used, an optional CT-17 level converter is required.

Just to ensure that you buy the Icom version, the details of the command language are in the CT-17 manual! One of the particular advantages of this computer control system, is that up to four transceivers or receivers can be connected to one computer. This provision has great potential for total control of the station by computer.

The two remaining sockets were for the connection of external equipment such as Packet TNCs or other specialist equipment. Facilities provided included squelch, modulator, detector output, 13.8V d.c. at 1A and an a.l.c. input.

Good Manual

With all modern and sophisticated transceivers, a good manual is essential to get the best from the rig. The manual supplied with the IC-970E is a very well presented 47-page, A4 sized, book.

The manual uses many diagrams and some clever indexing. One very clever idea is the use of a picture of the front panel, marked into sections with the relevant page number associated with each section.

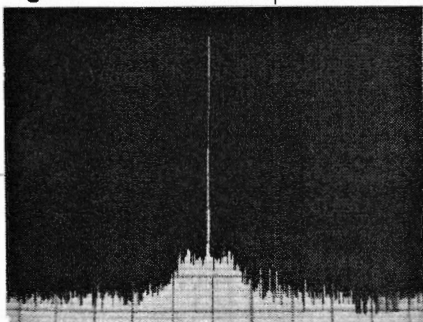
For people like myself who are impatient, the first few pages contained simple explanations of each control function. This provided enough information for the experienced operator to get on the air quickly.

The main core of the manual covered the operation in great detail with clear step-by-step instructions. The final sections of the book gave details of the fitting of the optional modules and some useful adjustment and maintenance details.

Logical Operation

Although the front panel of the IC-970E was extremely busy, the layout was in fact very logical and easy to use. The most obvious feature was the liquid crystal display unit.

Fig. 1.





STANDARD®

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.

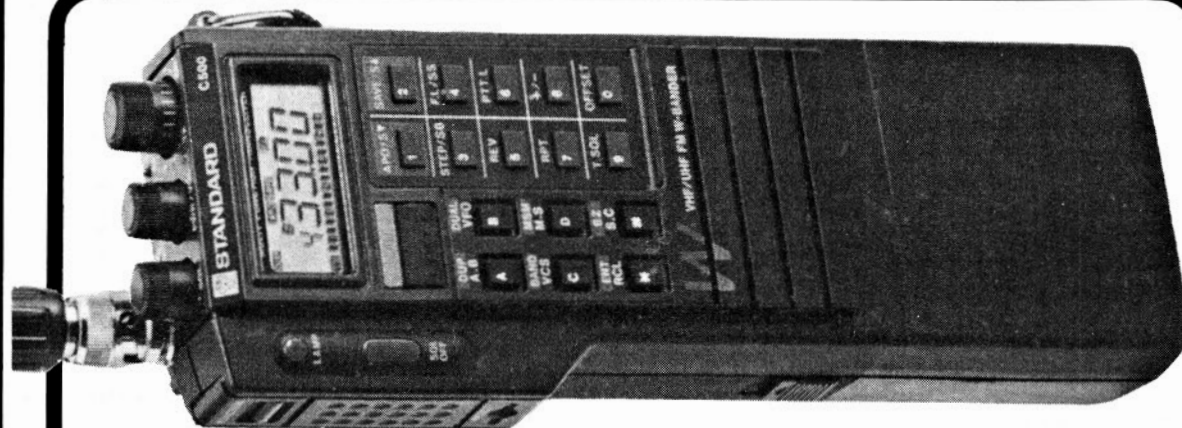
C150

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

- ★ Frequency range 144–148MHz (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 pushbutton frequency selection
- ★ PTT and keyboard locks (rotary knob is left active)
- ★ Sockets for external microphone, speaker and power supply
- ★ A comprehensive range of accessories is available, including DTMF and CTCSS
- ★ Size 124mm H x 55mm W x 31mm D

Reduced Price £199

★ ★ ★ ★ ★ ★ ★ ★ ★ ★



C500

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 £335, 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 144–148 & 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 QSY'ing
- ★ 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

Reduced Price £300
with CNB 111 Ni-cad Pack

★ ★ ★ ★ ★ ★ ★ ★ ★ ★



TRADE ENQUIRIES WELCOMED
PLEASE PHONE 071-450 9755
★ STRICTLY TRADE PLEASE ★

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

OPENING TIMES: 9.30am–5.30pm Mon–Fri. 10am–4.30pm Sat.



Normally 24hr despatch but please allow 7 days for delivery



NORMAN
G4THJ

**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

£159.00

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

£159.00

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 8953809 LEXTON G

PHONE 081-558 0854 081-558 1415

FAX 081-558 1298

24hr Hotline ansphone No: 081-558 0854

OPEN MON - FRI 9AM - 5.30PM

OPEN SAT - 9.30AM - 4.30PM

INTEREST FREE HP FACILITIES AVAILABLE

PROMPT MAIL ORDER



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

BIRMINGHAM N.E.C. SHOW SPECIALS

ICR1 ICR72 ICR71 ICR7000

CP12, HP4

ARA60 +

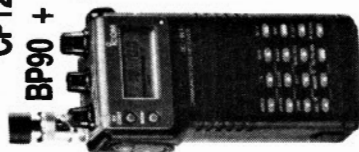
BP90 + 2 CASES

£389

£855

ARA1500

£999



ALL INCLUDING THE ABOVE ACCESSORIES

LARGEST U.K. ICOM DEALER

KENWOOD

R5000 inc ARA60 **£899**

TS440 inc ATU **£1150**

TS680 **£875**

TS850 inc ATU **£1295**

TH77 **£375**

YAESU

FT736

FT470

FT767

FT411

FT23

**SPECIAL
SHOW
PRICES**

LARGEST LONDON YAESU DEALER

NRD

NRD 525 .. **£899**

NRD 535 .. **£950**

AOR

AOR1000 Mk 3 **£229**

AOR3000 **£695**

AOR2515 **£575**

STANDARD

C528 AX700

C112 C5608

FEW ONLY

C500 **£299**

COME AND VISIT OUR TOTALLY REFITTED LONDON SHOWROOM

The display unit was used to convey most of the operational information from frequency and mode, right through to a signal strength scale for the sub-band. An important point with l.c.d. units is the illumination system used. The IC-970E handled this very well with a permanent back-light system. The brightness of the display could be varied by a small pre-set control, accessed from underneath the rig.

As the IC-970E is a multi-band unit, the user needs to be able to tune both of the active bands. The technique used is to define the two bands as main and sub bands. The main band is then tuned using a useful range of features, while the sub band could be tuned by the small **Sub Dial/RIT** control on the front panel. The main band frequency selection methods are very versatile and included manual, direct entry, scanning and memories. Of these procedures, the manual method, using the large knob on the front panel, is perhaps the most used. In common with all synthesised transceivers, the tuning is actually in steps rather than being continuous.

The tuning steps were fixed at 10Hz for s.s.b and c.w. but could be set at one of six rates between 5 and 100kHz for f.m. A useful extra is the ability to quickly select 1kHz or 1MHz steps for rapid tuning.

Another unusual, but useful, feature is the ability to switch the mechanical click-steps of the tuning knob. This facility is activated by a button on the front panel. The main use for this is on f.m. where channelisation makes continuous tuning inappropriate.

The facility is further enhanced by a pre-set option which automatically disabled the click-steps when the transceiver is set to modes requiring tuning steps of less than 5kHz. This meant that when switching between s.s.b. and f.m. modes, the click-steps were automatically switched in and out.

Keypad Entry

Direct frequency entry is also provided via the keypad on the front panel. The implementation is very straightforward and simple to use.

Included with this facility is an automatic trailing zero entry. This means that when the operator is entering 145.000MHz on the keypad, all that they've got to do is type in 145. The software does the rest!

All these features are supplemented by the provision of dual v.f.o.s on both the main and sub bands. The dual v.f.o.s can also be set-up to enable split frequency operation, i.e. transmitting and receiving on different frequencies in the same band.

User Memories

No self-respecting, microprocessor-controlled rig would be complete without provision for memory operation. It's no surprise to find that the IC-970E is equipped with a comprehensive set of memories.

Each band is provided with 99 main memories and two scan edge memories. Selection of the memory channels is very simple with two methods provided.

The first method uses the memory channel control on the front panel. This is a simple click control that increments or decrements the memory number.

However, if you want to tune directly to a specific memory, the memory number can be entered directly in much the same way as direct frequency entry. The only difference is that the **Function** key has to be pressed first.

Storing information in the memories is equally simple, all the operator has to do is select the appropriate memory and press the **Memory Write** button. This process automatically transfers the dial frequency into the selected memory.

Besides being able to store and retrieve frequencies from memory, it's also possible to use the memories as the basis for several scan modes.

Scanning Options

The IC-970E is provided with a very good range of scanning options that should help the user get the best from the rig. Besides the basic provision of being able to scan the memories of the main band, it's also possible to scan the sub-band and 1200MHz module (if fitted).

An internal switch determines the action taken by the receiver when it detects a carrier. There are two options available. The receiver can either abandon the scan or pause for ten seconds.

Although pretty basic in scanning terms, these options should prove adequate for most operators. In addition to the basic scanning there's also a very useful **Mode Scan**.

Operating this control sets the IC-970E scanning all memories with a common mode, the required mode being chosen and set by the operator in advance. This facility could be used to great effect for keeping an eye on favourite f.m. channels, without having to wade through the s.s.b. frequencies.

Programme Scan

The final scan mode is called **Programme Scan** and this is similar to the search facility provided on many more conventional scanners. In this mode, the IC-970E searched between two user-set frequencies in any one band. The search was continuous in that there is a flyback (roll-round) to the start of the search at the end of each sweep.

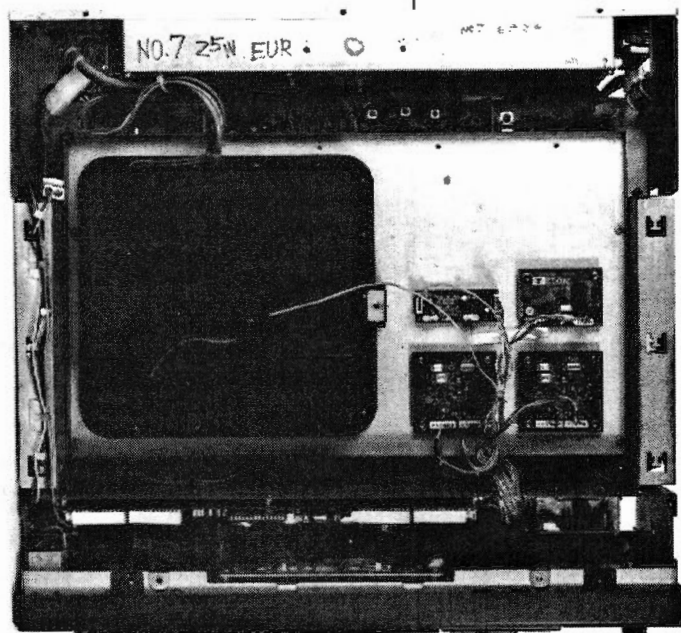
One useful extra is the provision of a feature that Icom has named the **Call** facility. This was in fact three additional memories, one for each band plus one universal.

Each of these memories could store both frequency and mode just like the normal memories. The difference is that they are accessed simply by pressing the **Call 1** or **Call 2** buttons on the front panel.

The obvious use of these buttons is for the storage of favourite calling channels. You could then use the main v.f.o. to select a suitable working frequency and

REVIEW

The intensive use of surface mount technology means that there is a lot of gear in a relatively small space.



REVIEW

The IC-970E has well laid-out controls.



use the Call memory to put out a CQ. When you receive a reply you can very quickly switch to the operating frequency.

Satellite Operation

The IC-970E is highly likely to be bought by those who have an interest in this fascinating area of amateur radio satellite operation. Icom have made sure that satellite users will not be disappointed, by including a host of useful features.

In its standard form, the IC-970E is ideal for Mode B 432MHz/144MHz operation. The addition of the optional 1200MHz unit enables full Mode L operation as well.

One of the features of satellite operation is the split frequency modes and this can present problems to conventional tuning systems. The IC-970E is very well equipped with options to cover just about every eventuality.

The first special facility is the provision of ten additional memories that can store the up and downlink frequencies plus the mode. This is a great starting point and makes the switching of modes very quick and easy.

Keeping Track

One of the problems created by using different up and downlink frequencies is that of tracking. The Icom has solved this difficulty by the provision of linked tracking between the main and sub bands. This tracking copes with all eventualities as it can be set for both normal and reverse tracking.

Paging Friends

The IC-970E is fitted with a few interesting features that could prove particularly useful for f.m. operators. The two main features are the pager and code squelch.

In simple terms, the pager lets you contact either an individual or a group of friends monitoring an agreed frequency. This is achieved using an identity code comprising seven dual-tone multiple frequency (d.t.m.f.) tones.

The system is rather ingenious and should prove particularly useful to those living in heavily populated areas. The code squelch is a simpler form of the pager system that only uses three d.t.m.f. tones.

When using this system, all users in the group use the same code and so will be able hear only stations using that code. The only worry I have is that the system encourages operators to transmit, without first listening to see if the frequency is clear.

Receiver Features

The IC-970E receiver is very well thought out and includes many facilities often only found on h.f. receivers. The provision of a very effective notch filter was one such feature.

The filter has a range of $\pm 1.5\text{kHz}$ with a useful notch depth of 25dB. There's also provision to switch between slow and fast a.g.c. time constants.

Although pulse interference is not normally too much of a problem on v.h.f. and u.h.f., the IC-970E also has a pre-set threshold noise blanker.

On the audio side, the single internal speaker is used to handle the output from all the fitted modules. However, by operating a front panel push button the audio could be split with the main band using the internal speaker and the sub band using the external speaker (if plugged in). There was also provision to adjust the audio quality via a simple rotary tone control.

Transmitting Features

The c.w. operator is very well provided for, with the option of an internal iambic keyer as one of the many advanced features. This keyer can be enabled and adjusted from the front panel, making operation very easy. The operator can also adjust the sidetone volume and break-in delay, which again is very useful.

For the 'phone operator there's a built-in speech processor with a variable compression level. This provides the operator with the flexibility to match the compression to the prevailing band conditions.

Output levels and the fine control have not been forgotten either! The adjustable r.f. power could be set over the range 3.5 to 25W on all operating modes.

Acid Test

A look through the operational features indicates that the IC-970E has been designed as a top flight transceiver. However, the acid test comes with the assessment of its performance in the lab and on the air.

Before carrying out the lab tests, I installed the IC-970E in my shack so that I could get accustomed to the operational features. I found all the controls to be very well laid-out with no awkwardly placed knobs or buttons.

Despite its obvious complexity, I found I was able to get to grips with most of the features without having to refer to the manual. The only exception to this was when I used the memories.

Sensitive Receiver

My first impression when I tuned around the bands was that this was a very sensitive receiver indeed. Stations that were barely readable on my equipment were lifted out of the noise by the IC-970E.

I was also pleased to see that it was equally at home operating in the presence of very strong local signals. The next stage was to try a few CQ calls and get comments on the transmission quality.

When using the transceiver I received good reports from all the stations I spoke to. This story was repeated through all the modes and bands. As the review model was fitted with the optional UX-R96 receiver, I was interested to see how it performed on p.m.r. and commercial broadcast station frequencies.

As expected, the n.b.f.m. performance of the IC-970E was comparable to that on the amateur bands. The airbands were tried next as they are very popular among listeners. The audio quality on these frequencies was again very good, well up to the standards of the best a.m. communications equipment.

Moving on to broadcast w.b.f.m. transmissions, the recovered audio quality, although good, was spoilt by the small internal speaker. Any operators seriously wanting to use the Icom for broadcast signals would be well advised to use a good quality external speaker.

Lab Testing

After such a good on-air performance I decided it was time to move into the lab and see just how the IC-970E shaped-up. My first measurements covered the receive sensitivity, where I prefer to use the 12dB SINAD measurement instead of the 10dB signal-to-noise measurements quoted by many manufacturers. I also use e.m.f./2 to define the input voltage level.

When measuring the IC-970E, I found myself making double checks of the test equipment as the results seemed too good to be true. The best sensitivity was obtained when the rig was switched to s.s.b. reception, resulting in a figure of 0.07µV for 12dB SINAD.

My test results represents -130dBm, which is quite remarkable and rivals the performance obtained from specially modified contest rigs. This level of performance also says a lot for the quality of the filtering employed.

Another remarkable feature was the consistency of the sensitivity, as it remained constant throughout the 144 and 432MHz bands. The f.m. performance was equally good with measured results of 0.13 and 0.14µV for 432 and 144MHz respectively.

The general coverage receiver was not quite up to the same levels of performance, but nevertheless was very good. The n.b.f.m. sensitivity varied from 0.16µV at 60MHz through to 0.44µV at 904MHz, the tail-off being gradual.

The w.b.f.m. performance followed a similar line, ranging from 0.56 through to 2.22µV at 905MHz. Finally, the a.m. sensitivity was measured at 0.29µV at 60MHz and 1.04µV at 905MHz.

This was a very fine performance in terms of sensitivity, but does not tell the whole story. One measurement that's extremely important is the third order intercept.

The third order intercept measurement gives an indication of how the receiver will cope with strong adjacent channel signals. It's quite common for receivers with high sensitivities to show up badly on the intercept test.

The IC-970E sailed through the intercept test with an incredible calculated intercept point of +8dBm. Considering the remarkable sensitivity, this is an excellent performance that makes the IC-970E a force to be reckoned with. The receive tests continued in many areas with the object of checking the performance against specification, and they were all successful.

Transmitter Testing

The transmit section was next to come under the microscope. The tests started with a simple power measurement that showed that the IC-970E equalled its specification in all modes.

Analysis of the purity of the transmit signals was carried out with the aid of a spectrum analyser. Spurious output was very low indeed, being better than -60dB on all bands.

The carrier rejection at better than -50dB, was also very good. To illustrate the purity of the output I've included a photo of the spectrum analyser screen in Fig. 1. In this test the Icom was delivering 25W into a dummy load at 432MHz.

As you can see from the range of tests carried out, the IC-970E is a superb transceiver.

Specification

Frequency range	144 - 146MHz 430 - 440MHz
Tuning steps	10Hz on s.s.b./c.w. 5, 10, 12.5, 20, 25 or 100kHz on f.m. All mode 1kHz/1MHz
Modes	A3J (s.s.b.), F3 (f.m.), A1 (c.w.)
Power supply	13.8V ±15%
Current drain	Receiver 2.5A, transmitter 9.0A
Antenna impedance	50Ω
Frequency stability	±3p.p.m.
Transmitter	
Output power	3.5 to 25W all modes
Spurious emissions	>60dB below peak output
Carrier suppression	>40dB below peak output
Unwanted sideband	>40dB below peak output
Receiver	
Sensitivity	s.s.b./c.w. <0.11µV for 10dB S/N f.m. <0.18µV for 12dB SINAD
Squelch sensitivity	s.s.b./c.w. <0.56µV f.m. <0.18µV
Selectivity	s.s.b./c.w. 2.3kHz/-6dB, 4.2kHz/-60dB f.m. 15kHz/-6dB, 30kHz/-60dB
Audio output	1.5W/8Ω at 10% distortion
RIT range	±9.99kHz
Notch filter	±1.2kHz/25dB
Dimensions	425mm x 149mm x 406mm
Weight	14.5kg

Summary

Quite honestly I've found it difficult to make any real criticism of this excellent transceiver. It's certainly big, but this level of excellence cannot be achieved in a small space!

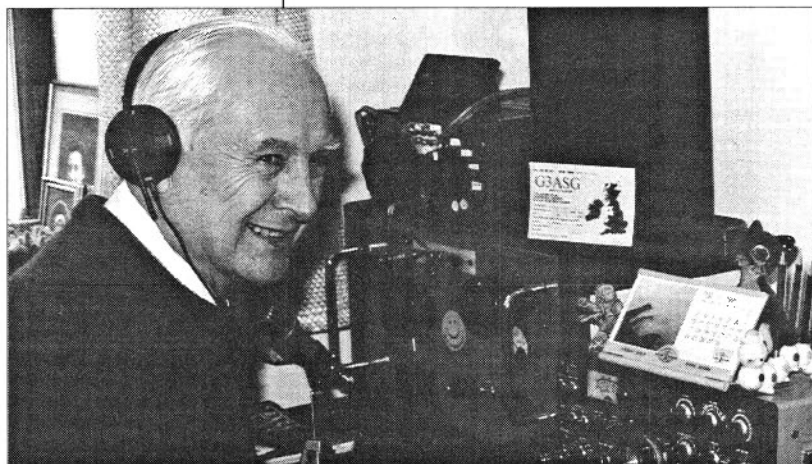
The price, although high, is not unrealistic for a transceiver that can boast such a fine performance. Anyone with a serious interest in satellite operation will find that the IC-970E has all they need, except for high transmit power.

I'm sure this transceiver will also find favour with contest operators. The basic performance is well up to the standard achieved by specially modified contest equipment.

Overall then, a truly superb transceiver that will, I'm sure, become a classic in time.

The IC-970E costs £1995.00 and the optional general coverage receive unit costs £275.00. An optional unit is available to cover the 1296MHz band. The IC-970E can be obtained from Icom (UK) Ltd., Sea Street, Herne Bay, Kent CT6 8LD. Tel: (0227) 363859 who I thank for the loan of the review transceiver.

REVIEW



In the third part of this series Ray Fautley G3ASG turns his hand to the manipulation of decimal numbers.

Before we carry on with this section, I think I'll put you out of your misery. The answers to last month's problems are shown here:

[illegible]

There were two deliberate surprises for you in that 'exam'. Answer (e) gave a negative number. This is like an 'Overdraft' at the bank, and I will deal more fully with what it means later in the series. Question (n) had two answers, as it was possible to see two questions. If you read 'one and five eighths', then the first answer is correct. Should you have read it as 'fifteen eighths' (one and seven eighths), then the second answer is the one you should have had. Answer (o), however has no exact answer, as it is a never-ending series of '3's'. The '∞' behind the last '3' means 'without end'. Recurring is the mathematical name given to results of this nature. This is said as, 'nought point three recurring'.

Did you have a hundred percent correct? I hope so.

If you had any problems with the questions, then send a (long type) s.a.e. to the editorial offices. We will send a copy of the solutions back to you. Please quote 'April Maths Problems' on one corner of the your covering letter.

This last example highlights one problem that may happen, and that is of accuracy. **Fractions are always accurate**, no matter how complex. Decimals **may be only a close approximation**. Accuracy problems occurs in other cases, such as with $1/6$ or $1/7$ or $1/9$.

Multiply Decimally

We turn now to the multiplication of decimal numbers. This is more difficult, the decimal point has got to go somewhere in the answer, but where?

Let's try to multiply 3.56×2.81

Rules for Multiplication of Decimal Numbers:

(i) Write down as if they were 356 and 281, **Completely Ignoring** the decimal points in the two numbers, and then use the multiplication method.

$$\begin{array}{r} 356 \\ \underline{281} \\ 356 \\ 28480 \\ \underline{71200} \\ 100036 \end{array}$$

(ii) Count how many digits there are **after** the decimal point in each number of the multiplication.

3.56 has 2 digits **after** the decimal point

2.81 has 2 digits **after** the decimal point

(iii) Add the totals counted in (ii) together:

(iii) Add
 $2 + 2 = 4$

(iv) This total of four is the number of digits AFTER the decimal point in the answer found in (i) which was 100036.

(v) Starting at the right-hand side of our number 100036 (just to the right of the '6') count four places to the left and that's where the decimal point goes:

10.0036

The answer then, is 10.0036 which wasn't too difficult was it?

Now we'll have just one more example of multiplication.

Multiply 0.0376×25.1 .

Using the rules,

$$\begin{array}{r} 376 \\ \underline{251} \\ 376 \\ 1880 \\ \underline{75200} \\ 94376 \end{array}$$

There is a total of five digits **after** the decimal points in the two numbers to be multiplied together so the answer is:

0.94376

The '0' in front of the decimal point indicates that there is no whole number in the answer, i.e. the answer is a decimal fraction.

Decimal Division

(i) Change **BOTH** numbers to **WHOLE** numbers by multiplying **BOTH** numbers first by 10, then by 100 or by 1000 etc, until **BOTH** numbers are **WHOLE** numbers:

Divide 23.0967 by 3.5 the result to be to 3 decimal places. That means there must be three digits AFTER the decimal point in the answer.

Multiplying **both** numbers by 10 gives us:

$23.0967 \times 10 = 230.967$ not a whole number

$3.5 \times 10 = 35$, which is a whole number

The decimal point after '35' has been put in to remind you that 35 is a whole number.

Multiplying **both** numbers again by 10:

$230.967 \times 10 = 2309.67$ still not a whole number.

$35 \times 10 = 350$, a bigger whole number.

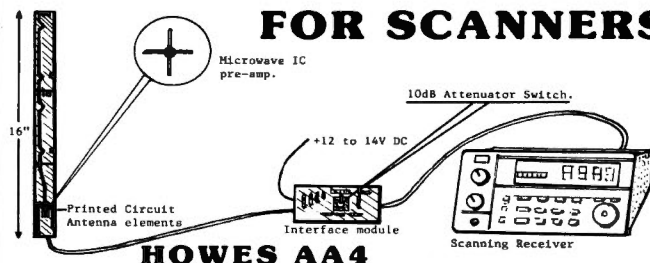
Multiplying both numbers again by 10:

C.M.HOWES COMMUNICATIONS

Mail order to: EYDON, DAVENTRY
NORTHANTS NN11 6PT
Tel: 0327 60178



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: £18.80

Assembled PCB modules: £24.90

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: £7.50

Assembled PCB: £11.50

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	£24.90	£36.90
DcRx54 4.45MHz Aircraft band (rescue etc)	£15.60	£21.50
DcRx20, 40 or 80M Single band amateur receivers.	£15.60	£21.50

DXR10 Hardware package: £14.00

DcRx Hardware package: £15.50

RECEIVER ACCESSORIES

CBA2 Buffer to enable use of DFD5 counter	£5.80	£8.90
CSL4 Sharp, dual bandwidth (SSB & CW) filter	£9.90	£15.90
DCS2 "S Meter" kit for above receivers	£8.90	£12.90
DFD5 Digital frequency counter/display	£39.90	£59.90
XM1 Crystal Calibrator, 8 marker frequencies	£16.80	£21.90

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: £25.90

Assembled PCBs: £35.90

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.

LOWE DOCKS AT BRISTOL

In addition to Heathrow, we have now opened our latest centre in Bristol to serve the South West.

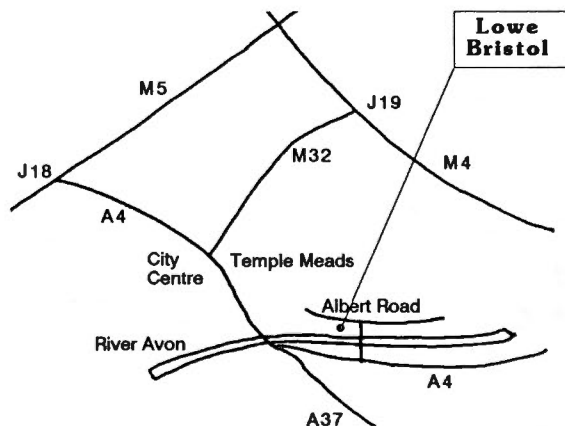
Similar to Heathrow, we are stocking a full range of communications equipment from transceivers, both commercial and amateur, to a large selection of VHF scanners and HF communications receivers.

There are full demonstration facilities in the showroom plus a fully equipped workshop to take care of any first line servicing problems on the spot.

Like all our branches, there is a selection of fully tested and guaranteed second hand equipment for you to choose from. The new centre is being managed initially by Dave, G6CXA, but we are looking for a full time manager, so we will welcome approaches from anyone who is interested in turning their hobby into a full time job.



TS-850S



HOW TO FIND US

The new Lowe Communications Centre at Bristol is just over the Totterdown bridge from the main A4 Bath road in St Philips. From the traffic lights on the A4, go across the bridge and turn immediately left at the 'T' junction. You will see the centre on the left in front of the river. Turn first left and park anywhere in front of it. Parking is free as you would expect at one of our shops. We are just 10 minutes from the end of the M32 motorway and a short walk from Temple Meads station.

LOWE ELECTRONICS LTD

Bristol: Unit 6, Ferry Steps Industrial Estate, Albert Road, St Philips, Bristol BS2 0XW. Tel: 0272 771770
Heathrow: 6 Cherwell Close, Langley Slough, Berks SL3 8XB. Tel: 0753 45255

AH ELECTRONICS

Est. over 20 years



RA121A SSB ADAPTOR

RACAL RA121A SSB ADAPTORS for use with the RA17 & RA117 receivers or any receiver with 100Hz IF output, switchable for USB/LSB, or independent sideband, CRT display to show lock condition when using ISB, clarifier control for use with SSB, outputs for 3 ohm speaker & 600 ohm for headphone or line use, size 19" rack panel x 5 1/4" high x 14" deep, supplied with manual, tested before despatch supplied in used condition. £99.00 carriage £13.00.

B40D COMMUNICATIONS RECEIVERS 640KHz to 30MHz, in 5 bands this model is the later version of the WW2 version and includes miniature type valves. SSB reception is possible by using the BFO & fine tune control, supplied in excellent condition & fully checked with circuit & full set of plugs, prices from £125.00 to £175.00 for one as new, carriage £25.00.

RACAL RA17 COMMUNICATIONS RECEIVERS 500KHz to 30MHz in 30 switched bands, variable IF bandwidth down to 100Hz, one of the best surplus receivers you can buy, ideal for the serious SWL or Radio Ham, supplied with manual & 3 months warranty prices from £270.00, carriage £25.00.

PYE PF2B FM HAND PORTABLES 136 to 150MHz ideal for 2 meters band, 2W watts output, supplied with circuit aerial & mic. (but no battery) £18.00, plus £2.00 post.

TEKTRONIX D465 PORTABLE OSCILLOSCOPES 100MHz bandwidth, with delay facility, all solid state. In excellent condition & tested. £399.00 carriage £15.00.

S.A.R.B.E. PERSONAL SURVIVAL TACTICAL PARA-RESCUE RADIO. 243MHz Tx/Rx, small body worn unit, consists of two units item 1, Transmitter/receiver item 2 speaker/mic. & aerial housing, battery unit not supplied.

PRICE £10.00 post £2.00, with circuits
SAE for full data on all of the above equipment.

151A BILTON ROAD, RUGBY, WARWICKSHIRE CV22 7AS
Phone 0788 576473. Eve. 0788 571066

Shop hours 9.30-1 p.m., 2.30-5 p.m. Closed Wednesdays

WANTED — WWII Command Rx's & Tx's BC453, BC454, BC455 etc. + control boxes & mounting trays. Top prices paid. W.H.Y.

**Please mention
Practical Wireless
when replying to
advertisements**

"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.



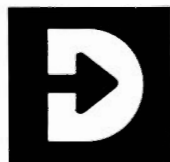
TOTAL COMMUNICATIONS

- Pye Motohone high band AM with mics & speaker.**
Ideal for 2m..... £20.00 ea. P&P
- Pye Motohone low band AM, 68-88MHz. Ideal for 4m with mics & speaker.**
Choice of 10..... £20.00 ea. P&P
- Pye Westminster AM high band with no mics or speaker.**
Ideal for 2m..... £20.00 ea. P&P
- Pye Westminster AM low band with no mics or speaker. Ideal for 4m.**
Choice of 5..... £20.00 ea. P&P
- Pye Westminster FM 82MHz to 102MHz (motorcycle units) ex-Met Police.**
Ideal for 4m. With control box but no mics or speaker.
Choice of 6 only..... £17.95 ea. P&P
- Pye Olympic high band AM with no mics or speaker. Ideal for 2m.**
Choice of 15. Only..... £17.95 ea. P&P
- Pye Olympic low band AM with no mic or speaker. Ideal for 4m.**
Choice of 10 only..... £17.95 ea.
- Pye UHF Signal Generator. Type SG5u, 400MHz to 470MHz.**
Ideal for the amateur shack — tested..... £39.95 ea.
Untested (choice of 50)..... £30.00 ea. P&P
- Pye Cambridge FM low band 68-88MHz. With mics & speaker.**
Ideal for 4m..... £15.00 ea. P&P

Many many more radios in stock! Phone 0379 788333. Self addressed envelope for Catalogue please.

UNITS 3 AND 4 THORNTON HALL, EYE, SUFFOLK, IP23 8HA.
HOTLINE 0379 788-333 TRADE SALES 0379 838 333

CALLERS WELCOME BY APPOINTMENT ONLY



D A T O N G
ELECTRONICS LIMITED

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

**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 —



2309.67 x 10 = 23096.7 still not a whole number.
 350 x 10 = 3500. an even bigger whole number.
 Multiplying **both** numbers again by 10:
 23096.7 x 10 = 230967 at last, a whole number.
 3500 x 10 = 35000. quite a big whole number.
 (ii) If you can do 'long division', all that is necessary to do is to divide 230967 by 35000:
 (iii) Where does the decimal point go in the answer?
 As 230967 is a whole number it can be written as: 230967.000 (Three '0s' as we require the answer to 3 decimal places).
 So we can write the long division sum like this:

$$\begin{array}{r}
 3500 \overline{) 230967.000} \\
 \underline{210000} \\
 20967 \\
 \underline{17500} \\
 3467 \\
 \underline{3150} \\
 317 \\
 \underline{315} \\
 2
 \end{array}$$

That's taken it far enough, for we have reached three decimal places. The answer is 6.599 to three decimal places.

Now as a form of 'homework' work out the following as an exercise. There are also one or two from previous issues. You should work them out yourself using the methods I've shown you. **No cheating with a calculator**

Tick the answer you think is the correct one from the four alternatives. The correct answers will appear in the next article.

- (i) The decimal equivalent of $\frac{1}{5}$ is:?
 a) 0.5 b) 0.25
 c) 0.2 d) 0.3

- (ii) The decimal equivalent of $8\frac{1}{4}$ is:?
 a) 8.6 b) 8.35
 c) 8.45 d) 8.25

- (iii) The decimal equivalent of $5\frac{3}{5}$ is:?
 a) 5.3 b) 5.6
 c) 5.75 d) 5.65

- (iv) The decimal equivalent of $11\frac{1}{8}$ is:?
 a) 11.125 b) 11.85
 c) 11.185 d) 11.825

- (v) $45.08 + 0.075 = ?$
 a) 45.15 b) 45.83
 c) 45.155 d) 45.875

- (vi) $5.006 - 0.45 = ?$
 a) 4.556 b) 4.61
 c) 5.015 d) 4.961

- (vii) $350.685 - 19.012 = ?$
 a) 330.673 b) 331.565
 c) 348.7838 d) 331.673

- (viii) $25.76 \times 1.007 = ?$
 a) 259.4032 b) 25.94032
 c) 2.594032 d) 25.77803

- (ix) $0.0087 \times 0.093 = ?$
 a) 0.08091 b) 0.008091
 c) 0.00008091 d) 0.0008091

- (x) $45.9 / 5.6 = ?$
 (answer to 4 decimal places)
 a) 8.1960 b) 8.0190
 c) 0.8196 d) 8.1964

- (xi) $4.771 / 0.085 = ?$
 (answer to be to 3 decimal places)
 a) 56.129 b) 5.612
 c) 560.129 d) 56.001

That's all for this month. Remember, keep busy and practice.

For the latest news of special event stations, rallies, what's on the bands - ring

Wireless-Line on 0898 654632

Up-dated every Friday

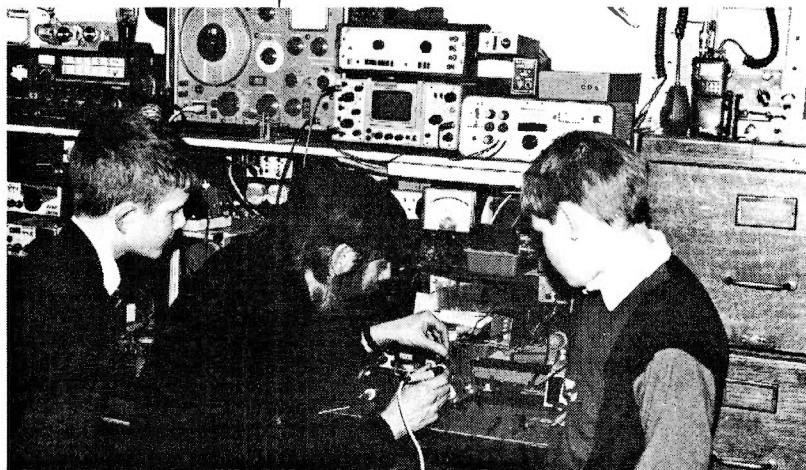
Do you want to hear the latest amateur radio news? What DX is about? The latest Satellite information? Mobile Rallies & Events, Times & Cancellations? All amateur radio news finds its way to the PW 'Newsdesk '91' every month - but did you know that by calling **0898-654632**, you can get a weekly up-date on the international amateur radio scene?

Running an amateur radio car boot sale this weekend? Spare places at your RAE class? Going on a DXpedition to a remote Island? Operating a special event station this weekend? Call **0202-678558** (answering machine after working hours) or write to Sharon George at the PW 'Newsdesk '91', give her the details and we'll include it in the magazine and Wireless-Line as soon as we can.

Wireless-Line - Your connection to Amateur Radio and news of your hobby. Call 0898-654632 Now - for your latest up-date on the news.

Calls charged at 33p off-peak. 44p at all other times. News & Information prepared by the staff of PW Publishing Ltd, Enefco House, The Quay, Poole, Dorset BH15 1PP.

Getting Started - The Practical Way



In the third part of his series for the radio newcomer, George Dobbs G3RJV looks at diodes, relays and saving your equipment from damage if you connect it incorrectly to a power supply.

I suppose that diodes could be called the definitive radio component. The first radio sets were crystal sets and the crystals can be considered as diode detectors.

For those of you who really want to try the most basic piece of radio technology, it's possible to make a simple radio receiver from just a diode and a high impedance headphone.

Connect the diode across the headphone terminals and join an antenna lead to one side and you should hear the loudest radio signal, or signals, in your area. It's even possible to go simpler than this!

You can make the diode from a piece of coke (the variant of coal - not the drink!), some types of old razor blade or some types of natural crystal. That's why the instructions for making the so-called 'fox-hole receivers' of World War II began: "... creep up to a tank and steal a pair of headphones". Everything else could be made from alternative materials.

Simple Device

The diode is a simple device with two connections. 'Di' actually means two, twice or double. The two connections to the diode are called the **cathode** and the **anode**.

The circuit symbol for a diode is shown in Fig. 3.1, below the typical example of a small diode. Notice that the cathode is marked with a stripe around the body of the diode. Getting the diode the right way round in a circuit, the correct **polarity**, is not only essential but is the key to way they work.

The operation and structure of the diode is outside the scope of this practical article, but many textbooks give a simple explanation of its structure and workings. For the moment, we're going to regard the diode as a rectifier and a one-way switch. This will enable us to build up a simple, but very useful, circuit.

For our practical purposes, we can say that the diode only allows an electrical current to pass one way. In fact, that's not quite true as we shall see later, but forget I said that for the moment!

The diagram, Fig. 3.2 (a & b), shows this particular property of the diode. If a battery is connected to a bulb, it does not matter which way the positive (+) and negative (-) terminals are joined, it will still light up.

However, if you place a diode in the battery and bulb circuit this changes the way the circuit works. If the cathode end of the diode is connected to the battery negative terminal, the bulb will light. But if the anode end of the diode is connected to the negative terminal it won't light. This simple test proves that in this application, the diode is effectively a one-way device.

Diode Rectifiers

The illustration in (a) Fig. 3.3, shows the diode in one of its commonest applications, that of a **rectifier**. This means that the diode is being used to turn **alternating electrical current (a.c.)** into **direct current (d.c.)**.

Also shown in (a) Fig. 3.3, is the alternating current (a.c.) on the left-hand side of diode. This is electrical current that 'swings' from positive to negative, either side of zero, with time. You've already come across a.c., at 240V, for this is what's available from our mains supply sockets at home.

Positive Pass

You can also see from (a) Fig. 3.3, what happens when a.c. passes through a diode. Only the positive half-cycles get through. This is a form of d.c., since it's all positive although it comes in ripples.

The next diagram (b), in Fig. 3.3, shows the action of a **diode bridge** which is a combination of four diodes connected as shown. This circuit is a little more complex, but it's a quite clever idea.

By following the direction that the diodes can pass current (conduction) you'll see that the bridge rectifies both halves of the a.c. input to produce a d.c. output with less 'ripple'.

Fig. 3.1. Anode Diode Cathode
Symbol

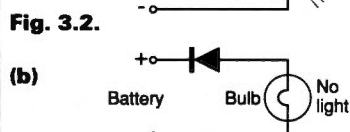
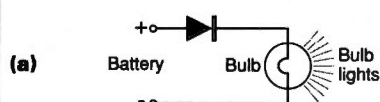


Fig. 3.3(a).

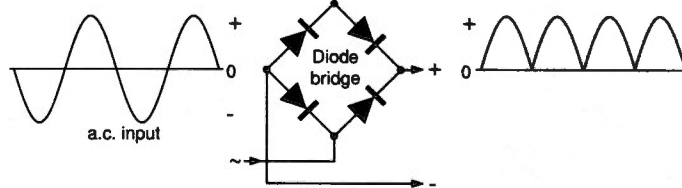
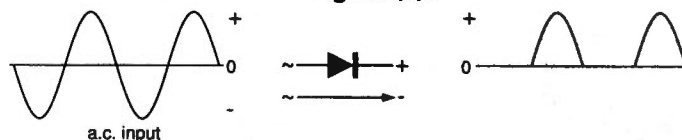


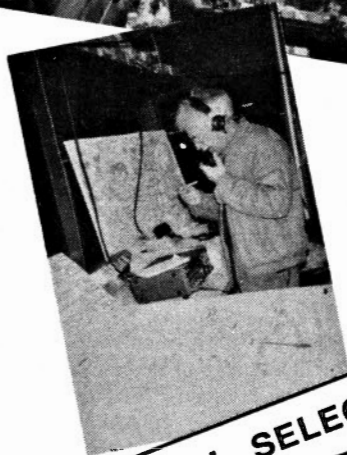
Fig. 3.3(b).

Thousands of people enjoyed this year's

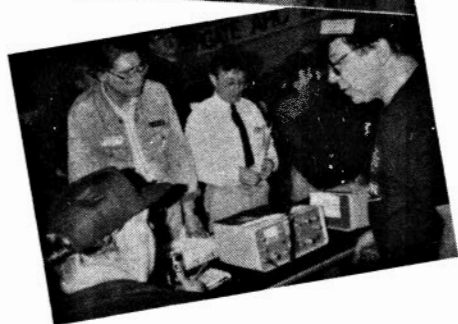
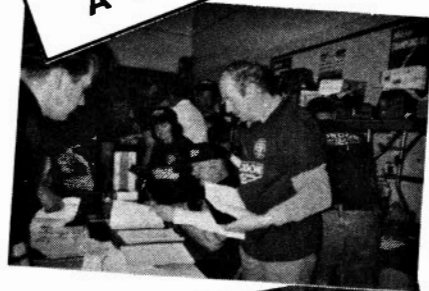
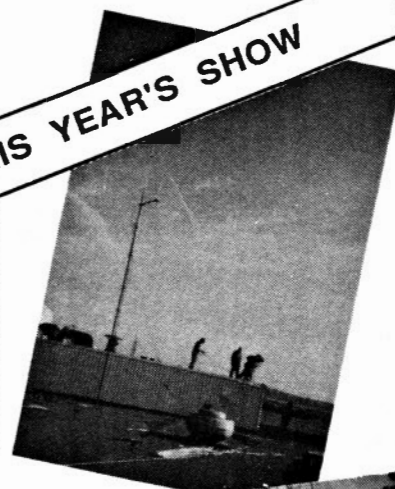
LONDON

AMATEUR RADIO SHOW

But if you missed it,
it's only 10 months to the next!

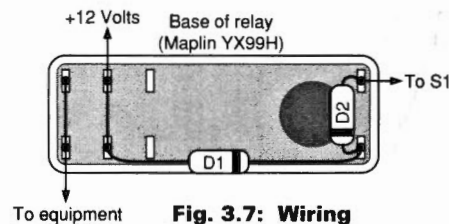
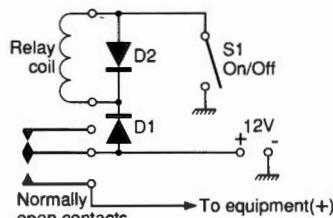
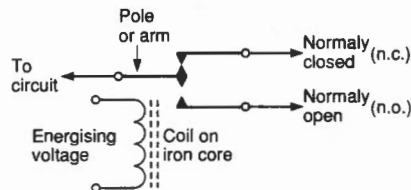
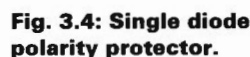


A SMALL SELECTION OF SCENES FROM THIS YEAR'S SHOW



Dates for your diary:
Saturday March 8th and
Sunday March 9th, 1992.

For further details and trade enquiries, contact
The Secretary, London Amateur Radio Show,
126 Mount Pleasant Lane, Bricket Wood,
Herts, AL2 3XD. Tel 0923 678770.



Rectification is one of the most useful applications of the diode. You'll become very familiar with diodes, their applications and principles as we use them in practical projects.

Protector Diodes

Electronic equipment needs to be connected to its power source in the correct polarity. In other words, the positive and negative sides of the supply must be wired up the correct way round.

A lot of modern amateur radio equipment is designed to run from a supply of 12V, or thereabouts. This often requires the user to provide an external power supply.

Unfortunately, it's sometimes possible to connect this supply the wrong way round, and this can bring disastrous results. A unique combination of Murphy's Law and bad luck seems to combine on these occasions. You can almost guarantee that all the most expensive devices in the equipment are those which blow when polarity is reversed!

Simple Method

A very simple way of providing protection is shown in **Fig. 3.4**. The diagram shows that a single diode can be added to the power leads, to prevent a reversed polarity connection.

The equipment only receives the power if the polarity is correct. Connect power the wrong way round and it simply does not get through the circuit. This is a very simple and practical way to protect a piece of equipment.

Voltage Drop

This simple method does have two disadvantages. The first is that there's a voltage drop across the diode. This 'drop' is the voltage required to get the diode to conduct and it's called the forward or barrier voltage.

In the case of a silicon diode, the type commonly used in this application, the voltage drop is 0.6V. So a 12V supply will only deliver 11.4V through a diode.

The other problem is that all the current required to operate the equipment passes through the diode. The chosen diode has to be able to pass whatever current is required. In some items of equipment, that would call for a large diode.

Bridge Protection

Incidentally, a full-wave diode bridge could be inserted in the power supply leads. This would mean

that the power supply could be connected either way round, but only the correct polarity would arrive at the equipment.

Perhaps you should sketch this idea out, and work out why the circuit works in this way. At first glance, the bridge circuit would seem to be the ideal polarity protection circuit until you look into it more carefully.

Unfortunately, the two problems we've already discussed (voltage drop and current limitations) still apply but even more so as there are now four diodes. There is a better method but to understand that, I have to introduce you to a new component, the **relay**.

The Relay

A relay is an electromagnetically-operated switch, a simple function diagram for which is shown in **Fig. 3.5**. A coil wound onto an iron core provides the electromagnet. An energising voltage causes the iron core to attract an arm, or pole, which then completes a circuit between a pair of contacts.

Change-over relays with two contacts are very common. In this type, when the coil is un-energised the contact which connects to the arm is called the **normally closed** contact (n.c.). The other contact is called the **normally open** (n.o.) contact. When the coil is energised, the arm closes the normally open contact and opens the normally closed contact.

Relay Types

The relay we've just looked at, acts as a change-over switch. Double-pole change-over and even triple-pole change-over relays are also available. The operating voltage of a relay depends upon the d.c. resistance of the coil, and this is governed by the number of turns and the gauge of wire.

There are dozens of types of relay, some designed for a.c. operation and some with anti-bounce contacts. There are also relays with contacts inside sealed protective cylinders.

The size and spacing of the contacts limits the voltage and the amount of current that the relay will switch. When you order a relay you'll have a wide choice of type and specifications. The specifications will state the operating voltage of the coil, the voltage and the current-carrying capabilities of the contacts.

Polarity Protector

The diagram in **Fig. 3.6**, shows a Polarity Protection Circuit using 2 diodes and a relay. This circuit has been around in amateur radio circles for many years.

I was introduced to the idea by Ian Keyser G3ROO. The circuit offers a considerable improvement on the simple diode protection circuits.

The amount of current that the equipment can draw through this circuit, depends upon the capabilities of the relay contacts. The diodes pass very little current so they may be small inexpensive types. The equipment has no contact with the power supply unless the supply polarity is correct.

Simple Operation

This circuit operates in a very simple way. The equipment is isolated from the supply positive lead by the normally open contacts. The supply positive also goes to the coil of the relay via a diode, D1. A single-pole on/off switch completes the circuit to energise the relay.

If the positive feed is connected to D1, it will switch the relay and close the contacts to allow the equipment to receive power. If not, power will not reach the equipment.

In this circuit, the diode D2 is placed across the relay contact to prevent high voltage build up as the electrical field builds up or decays. This effect, known as the 'back e.m.f.' and it's a common problem in relay coils.

The back e.m.f. is caused by the magnetic field building up or collapsing, when the relay supply is connected and disconnected. It can be particularly destructive when the supply is disconnected. The high-density magnetic field, focused around the relay core by the field core, collapses and can 'generate' (it's usually referred to as 'induced') a very high voltage.

This is the main reason why a set of contact 'points' on a car ignition system, will burn out very quickly if the protective capacitor stops working. It's also the

reason why you can get an electrical shock from a very low voltage circuit - so treat coils carefully!

Practical Wiring

The practical wiring of the relay base is shown in Fig. 3.7. This example uses a Maplin relay type YX99H. The relay has a 12V coil and the contacts are capable of switching 16A (amperes).

My choice of relay should cope with the majority of amateur radio equipment. For equipment which draws a lower current, a smaller relay can be used.

If you use a double-pole change-over relay, it's possible to connect the two sets of contacts across each other (in parallel). This will enable them to share the switched current.

Another cheaper alternative relay, could be an automotive type designed for use in cars. These rugged relays are for 12V (volts) operation and they can usually switch large currents.

Useful Circuit

The project shown in Fig. 3.6, is a useful little circuit that could be added at the back of any item of 12V powered equipment. It can also be included within home-made equipment to ensure that no damage occurs through reversed polarity connections.

That's the lot for this month. Get to work and protect your gear. See you next time!

Shopping List

Semiconductors

Diodes

1N914, 1N4148, 1N40001 or similar 2 D1, 2

Miscellaneous

Relay Maplin type YX99H or similar, switch on/off toggle type to suit.

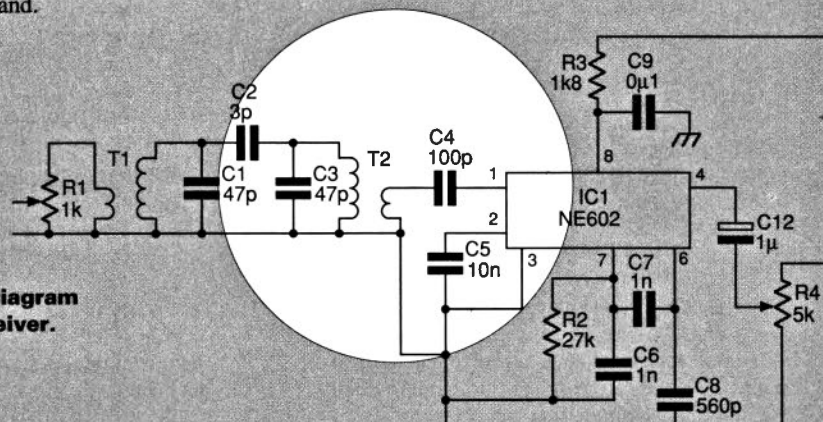
Errors & Updates

PW Sudden 3.5MHz Receiver
March 1991 Page 38

One small, rather niggely, mistake crept into the circuit diagram of the PW 'Sudden' on page 38. The Circuit diagram shows the input coupling capacitor to pin 1 of IC1, on the secondary of the preselector transformer T2. The secondary of this transformer is not used. The capacitor is actually connected to a tapping on the primary winding of T2. The p.c.b. overlay and layout are not affected by this change.

Readers considering building the PW 'Sudden' for the 14MHz band, should ensure that only the 10pF section of C11 is used. The tuning is otherwise a little sharp and sensitive. When built to the Rev. George Dobb's design, the stability is adequate enough to resolve s.s.b. speech on this band.

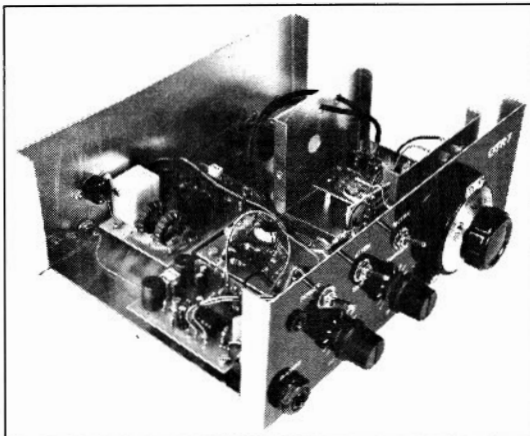
Part of the circuit diagram of the 'Sudden' receiver.



Our apologies to Rev. George Dobbs, and readers for this error.

Lake DTR-7

CW Transceiver Kit for 7MHz



Home construction and QRP go hand-in-hand. Mike Richards G4WNC, built the recently introduced Lake Electronics DTR-7 7MHz c.w. transceiver kit. Mike's constructional efforts produced a QRP outfit that should appeal to many constructors.

Having reviewed the DTR-3, the 3.5MHz c.w. transceiver kit from the same stable some time ago, I was pleased to have the opportunity to look at their latest offering.

The DTR-7 is a direct conversion c.w. transceiver featuring coverage from 7 to 7.1MHz. The unit is supplied either ready built or as a very comprehensive kit containing everything from the hardware through to connecting wire. The review model was supplied in kit form, so I'll start with details of that.

Important Instructions

With any kit the quality of the instructions is of paramount importance in ensuring the final quality of the kit. The instructions for the DTR-7 were contained on 28 loose-leaf, A4 pages.

The information contained in the documentation was very comprehensive. For home-brewers with limited construction experience, there's a very good section that provides a useful reminder on areas like resistor and capacitor identification.

There's also some very useful soldering tips illustrated with simple diagrams. This section concluded with some constructional notes and a few tips on how to go about fault finding.

The remaining documentation could be split into four sections. These various sections contained full circuit diagrams, parts list, building instructions and setting-up information and advice.

Modular Form

The level of detail in the documentation was very good, with each stage of construction well covered. The DTR-7 is built in modular form with separate p.c.b.s for the v.f.o., product detector, audio and r.f. power amplifier.

One great advantage of this approach is that construction can be spaced over several sessions with one or two p.c.b.s completed at each session. This technique also helps to minimise errors.

Self Contained Testing

Because each module is self contained, a certain amount of testing can be done prior to final assembly. By using this technique you can be reasonably sure that failure in the final unit is likely to be just a simple wiring problem.

Having now built two of these kits, I would strongly recommend that the construction is easier if it's spread

over five or six two-hour sessions. This helps to minimise errors and will result in a better quality unit.

The component standard used in the DTR-7 was very good, with all branded components and a good-quality glass fibre printed circuit boards. Although the p.c.b.s were not printed with a component overlay, clear layouts were supplied with the circuit diagrams.

Comprehensive Hardware

Anyone who has built kits will be aware of the importance of getting the hardware right. The Lake kit is very comprehensive in that all the metal work is supplied.

By metal work I mean the case, plugs, sockets, dial and all nuts and bolts. However, the user is required to mark and drill all the holes in the case.

Drilling the case is simplified somewhat as self adhesive sheets are supplied for the front and rear panels. Besides giving a very smart finish, these were used to mark the location of the holes in the panels. It's well worth taking extra care with the panel drilling, as this will determine the quality of the final finish.

Spreading The Load

The construction time for the review model was approximately ten hours spread over five days. At the end of this the DTR-7 worked first time!

With the basic construction complete, it was time to sort out the alignment. As the receiver is a direct conversion type, alignment is very simple. The only equipment you need is a frequency counter, voltmeter and a 7MHz signal source.

The first stage is to set the frequency coverage of the v.f.o. This involved the adjustment of three trimmer capacitors. There's one trimmer for each end of the band plus another to improve the tuning linearity.

The only complication with this adjustment is that the v.f.o. is mounted in its own screened box. Removal of the lid of this box changed the operating frequency of the v.f.o.

In practice, this is not a great problem, as the v.f.o. could be set slightly h.f. of the required frequency to compensate for the effects of the lid. A more professional solution would be to drill some adjustment holes in the top of the v.f.o. compartment.

The only other adjustment on the receive itself, is the need to tune the product detector. This involved the adjustment of two trimmers.

Transmitter Alignment

The transmit alignment was equally simple, with just the p.a. input circuit to tune. The p.a. stage was rated to provide 2W output. However, due to component variations, the full power may not be realised without some further adjustment. This required a simple trial and error adjustment of a resistor in the p.a. input circuit.

With the DTR-7 lined-up, the physical assembly was completed by fitting the top half of the case. The completed unit was very smart, as can be seen from the heading photograph.

Important Performance

The most important aspect is how it performs on-air, but I decided to run a few technical tests to enable comparison with more conventional equipment.

One of the problems with measurements on a direct conversion receiver, such as the DTR-7, is the lack of an automatic gain control facility. This means that the sensitivity is dictated by the gain of the receiver

Practical Wireless, May 1991

REVIEW

instead of the signal-to-noise ratio.

The result, when I tested the rig, was that a conventional 12dB SINAD measurement could not be made. This is because the recovered audio had dropped below the threshold of the measurement system before the 12dB SINAD point had been reached.

This result implies that the DTR-7 design could stand a little more gain without degrading the S/N ratio. As I wasn't able to measure the sensitivity in the conventional way, I applied some lateral thinking to come up with a new system!

Mike's Method

The solution was to key my Marconi signal generator with computer generated Morse. The generator output was then reduced to the point where the signal was just readable on the DTR-7.

This test produced a sensitivity of $0.4\mu\text{V}$ for the DTR-7. To provide a comparison, I tried the same test on my Icom 720A. This transceiver has a measured 12dB SINAD sensitivity of $0.2\mu\text{V}$.

Respectable Sensitivity

This new test gave a result of $0.07\mu\text{V}$ as the weakest signal that could be resolved. From these tests you could approximate the sensitivity of the DTR-7 at a respectable $1.1\mu\text{V}$ for 12dB SINAD. The method I used was perhaps rather crude, but it does serve as a useful form of comparison.

The r.f. output power of the DTR-7 was checked next and in supplied form gave just 1.1W. However, this was easily set to the rated 2W by the adjustment I described earlier.

These were very good measured results, especially when you consider the price of the DTR-7. The next stage was to see just how the DTR-7 performed on-air.

On The Air

For the on-air tests the DTR-7 was connected to my full size G5RV antenna via a Yaesu a.t.u. Tuning around the 7MHz band soon confirmed the sensitivity measured in the lab. There were many stations to be heard and the selectivity was plenty good enough to separate most of the signals.

Having confirmed that all appeared to be working well, I put out a CQ call on the QRP calling frequency of 7.030MHz. I was pleasantly surprised to make my first contact after only a couple of calls.

This contact was with another QRP operator located in Stratford-on-Avon. He was running about 2W from a Trio rig and was coincidentally using the Lake QRP a.t.u.

Although the QSO went well, he reported that my signal was drifting badly. This did, in fact, become apparent during receive, as I had to continually adjust the r.i.t. to keep the signal within the filter pass band.

A quick check of the v.f.o. p.c.b. didn't show any obvious problems, e.g. dry joints, so it was back to the lab. When I measured the drift using a frequency counter, I recorded a steady h.f. drift of 3.8kHz/hour. It's not surprising I was having to chase signals up the band!

Sensitive Capacitor

I felt confident that this problem must be due to a component fault, as the lower frequency DTR-3 transceiver was noted for its stability. After some careful checking I found that the fixed capacitor on the main tuned circuit (C4) was extremely temperature sensitive.

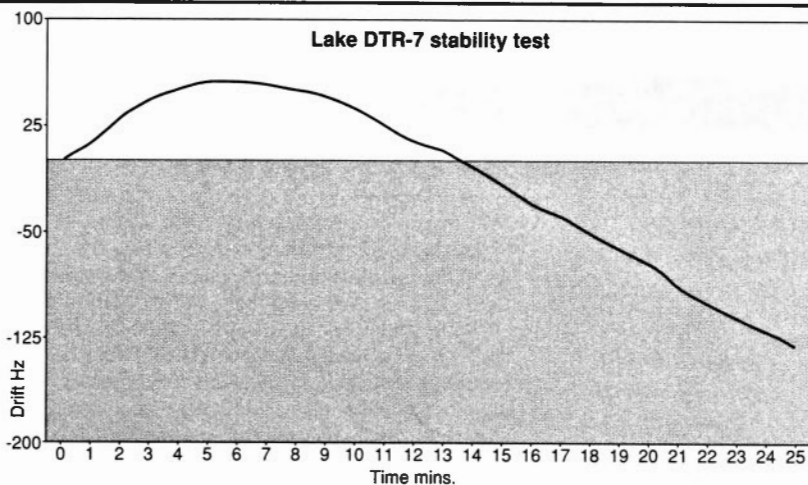


Fig. 1.

Replacing this capacitor cured the problem and resulted in the expected very good stability. To illustrate the new stability of the DTR-7, I've shown its performance in graphical form in Fig. 1.

This test shows the drift in Hz plotted over a twenty-five minute period following a five minute warm-up. As you can see the stability is excellent, particularly for a free running v.f.o. operating at this frequency.

You'll also note that, after an initial small h.f. drift, the review model settled down to a steady 8Hz/minute low frequency drift.

With the stability problem sorted out, operating the DTR-7 was a real pleasure. The audio filtering was very good and the sensitivity was perfectly adequate for the 7MHz band.

Improved Side-Tone

When I reviewed the 3.5MHz version, I criticised the side-tone levels. This has been corrected on the DTR-7 and I didn't experience any level problems.

However, the slow start-up of the multivibrator produced more of a squeak than a beep and that can hardly be considered a serious criticism!

On the audio front, the output level was more than adequate for headphone use. I also tried connecting a small speaker to the phones jack and found that the resulting volume was perfectly adequate for use in my shack.

Summary

The Lake DTR-7 was very similar to its lower frequency cousin the DTR-3. The construction was very straightforward, but does demand some familiarity with soldering techniques and components. The performance of the DTR-7 was very good and well up to the requirements of this type of QRP rig.

I have no hesitation in recommending the DTR-7 as very good value for money. The DTR-7 can be obtained direct from Lake Electronics, 7 Middleton Close, Nuthall, Nottingham NG16 1BX. The price is currently £84.50 in kit form and £135.00 ready built.

My thanks to Alan Lake for the loan of the review model.

PW

Specifications

Frequency range	7 to 7.1MHz
Mode	A1A (c.w.) only
Transmitter r.f. output	2W
Output impedance	50Ω unbalanced
Power requirements	12 to 15V
Power consumption	350mA transmit, 50mA receive
Dimensions	206 x 83 x 185mm

REVIEW

The Oscilloscope In Your Workshop

In the second part of his series on the 'scope in your workshop, Fred Judd G2BCX continues with a further look at frequency measurement of repetitive waveforms.

One of the applications dealt with in Part 1, was measuring of the frequency of different waveforms by using the 'time calibration' of timebase ranges. This time I'll begin with an extension of this application.

But before we go further, you should bear in mind that while it's adequate for some purposes, the technique cannot compete with the accuracy of a digital frequency counter. Frequency comparison is also a common application for a 'scope, and although this technique can only be as accurate as the signal source calibration, it can often prove useful.

Time To Frequency

Some examples of converting the 'time' of one cycle of any repetitive waveform to its recurrence frequency are provided in **Table 2.1**. (see also Part 1 of the series). Conversion is simple. Frequency is equal to - one second of time in milliseconds (1000ms), or in microseconds (1000000 μ s), as applicable, divided by the time taken (as appropriate) for the occurrence of one cycle of a waveform as measured on the oscilloscope.

CONVERSION EXAMPLES

Time in milliseconds of 1 cycle of Frequency (Hz)

ms	Hz	ms	Hz
10	100.0	60	16.7
20	50.0	70	14.3
30	33.3	80	12.5
40	25.0	90	11.1
50	20.0	100	10.0

Time in microseconds of 1 cycle of Frequency (kHz)

μ s	kHz	μ s	kHz
100	10.0	600	1.7
200	5.0	700	1.4
300	3.3	800	1.3
400	2.5	900	1.1
500	2.0	1000	1.0

1000 microsecond (μ s) = 1 millisecond (ms)

1 cycle per μ s = 1MHz.

Table 2.1: Conversion. Time taken for one cycle of a waveform to frequency. (Examples).

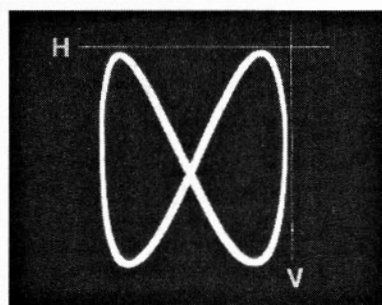


Fig. 2.1: A 2:1 Lissajous Figure. Fred explains frequency comparison using Lissajous Figures in the text.

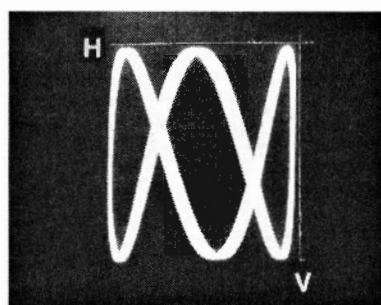


Fig. 2.2: A 3:1 Lissajous figure.

Frequency Comparison

The 'unknown' frequency of a signal with an alternating characteristic, (more or less any waveform), can be found by directly comparing it with the 'known frequency' signal from a calibrated generator. The 'known frequency' signal (f1) is connected to the X plates and the unknown signal (f2) to the Y plates.

Virtually all 'scopes have provision, by switching, for doing this. As the signals go through the amplifiers the magnitude of the display on the c.r.t. screen can be set as desired.

If the unknown frequency (f2), is the same as that of the known frequency (f1) then a single circular ellipse is formed. At other frequencies more complex patterns are produced. These are known as Lissajous figures, or patterns.

They're named after the French physicist who discovered the relationship (or ratio) between two different frequencies with the aid of tuning forks. With a 'scope, the ratio of f1 to f2 is found by counting the number of 'loops' touching a horizontal line on the graticule and dividing this by the number of loops touching a vertical line.

A simple 2:1 ratio pattern is shown in the oscillogram in **Fig. 2.1**. If the frequency, f1 is 1kHz then f2 = 2kHz. (1x2). If you turn **Fig. 2.1** sideways, it then becomes a 1:2 ratio pattern, in which case, with f1 as 1kHz, then f2 is 500Hz.

Another example is shown by the oscillogram in **Fig. 2.2** which shows a 3 to 1 ratio. If f1 were 1kHz then f2 would be 3kHz. With the page turned sideways as we've already tried, what would be the frequency of f2? If f1 = f2 the pattern will be a circle, but see later, my reference about 'phase difference'.

Note: The slight blurring of the trace in the reproduced oscillograms is due to the frequency of one of the signals changing very slowly. It's difficult to avoid this, even when you use high speed Polaroid film (3000ASA), a small camera aperture and a fast shutter speed.

Difficult Higher Frequencies

Frequency comparison by the Lissajous figure method becomes difficult at higher frequencies, unless the signal generators are very stable. It's also difficult when the frequency ratios become high, and in either case the signals cannot be locked using an XY display.

However, on some modern multi-trace 'scopes, signals of different frequency, on different traces, can be synchronised. In this case the number of cycles on each trace, in a given time across the screen, can be counted. They can then be related to one of known frequency. An example is shown by the oscillogram in **Fig. 2.3**.

Here's a check for you! If we assume the duration of the single sinewave (A) in **Fig. 2.3** as 1ms, what is its frequency and what's the frequency of the sinewave in B?

Phase Difference

If (f1) and (f2) are pure sinewaves equal in frequency and amplitude and also exactly in phase with each other, the resultant trace 'pattern' would be a stationary, diagonally orientated, straight line in one direction or the other, as in **Fig. 2.4**.

If the phase difference between the two signals is

Practical Wireless, May 1991

45, 135, 225 or 315°, the pattern will be elliptical. A perfect circle will be obtained if the phase difference is either 90 or 270°.

Such displays can only be stabilised for very short intervals. One of the two signals will change phase relationship with the other, and it will run slowly but continuously through all the phase angles from 0 to 360°. The display will then appear as a slowly changing figures as in Fig. 2.4.

Phase shift can, however, be displayed with a perfectly stationary pattern by using a sine wave fed directly to one of the Y inputs and simultaneously via a capacitive/resistive network, to the other Y input. During this operation the 'scope is switched to the XY mode.

The oscillogram in Fig. 2.5 was obtained with a 1kHz sine wave. Can you work out how 'OXO' was produced?

With a double-trace 'scope, approximate phase difference can be obtained with the reference signal on one trace, and the out-of-phase signal on the other. Both signals are synchronised.

The oscillogram in Fig. 2.6 shows two identical square waves with the signal B out of phase with the signal A by approximately 90°.

Phase difference often occurs between signals at the outputs of two different channels, when each is carrying the same signal derived from a single source. This may be due to additional capacitive or inductive components and/or an extra amplifier in one of the channels.

There are however, other methods of measuring phase difference. It can be done with the aid of special equipment and an oscilloscope, to an accuracy of plus or minus a degree or so. I'll be showing some examples later in the series.

Plotting Frequency Response

Plotting the overall frequency response of a high quality audio amplifier, tone control or filter with a conventional audio frequency (sinewave) generator and voltmeter, can be very tedious and time consuming. The same applies when plotting the responses of tape recorders, graphic equalizers, radio frequency amplifiers, bandwidths of a tuned circuits and that of an antenna relative to its operational frequency band.

This task can be done much more quickly with frequency sweep generators, synchronised with a 'scope, or pen chart recorder. Better still, the plot provides a more or less 'instant visual' record.

I must emphasise however, that the equipment used for this application must function to a very high degree of accuracy.

For the examples shown in the illustration, the 'scope was a dual-trace model, the Advance OS250. I designed and built the auxiliary equipment, audio and r.f. sweep generators, each employing a beat frequency oscillator system and ramp voltage control systems to the specifications required.

Audio Applications

The sweep generator used for the examples shown, provided an output signal of 1V (r.m.s.) over the range 10Hz to 100kHz \pm 0.1dB. The sweep time was approximately 10s.

The oscillogram, Fig. 2.7, is typical and shows the frequency response of a high-fidelity amplifier to be virtually flat from 20Hz to 20kHz. The marker at 1kHz was to ensure alignment of the sweep with the logarithmic graph.

Double exposure photography was used to produce the oscillograms. First the graph over the c.r.t. screen

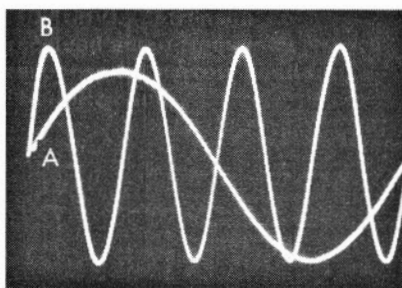


Fig. 2.3: Frequency comparison (A) Time of one cycle measured. (B) Four cycles of unknown (?) frequency (see text).

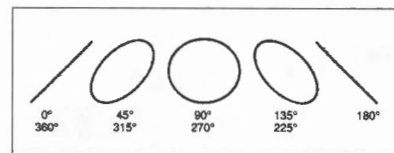


Fig. 2.4: Phase difference patterns with sinewave signals as explained in text.

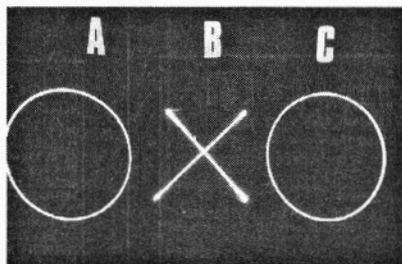


Fig. 2.5: Can you work out how this was done? (see text).

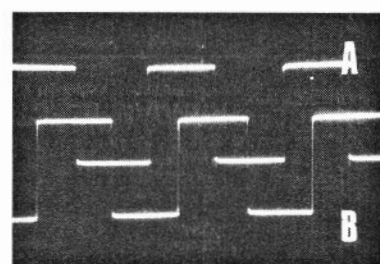


Fig. 2.6: (A) Squarewave of frequency f1. (B) Squarewave of frequency f2, leading (or lagging) (A) by approximately 90°.

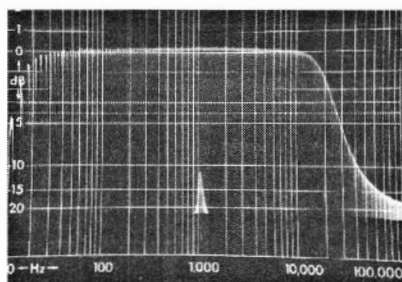


Fig. 2.7: Overall 'flat' frequency response of a high-fidelity audio amplifier using the frequency sweep technique. Marker frequency is at 1kHz. (see text for further details).

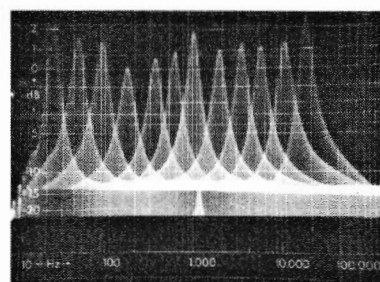


Fig. 2.8: Frequency response of a 'Graphic Equaliser' (using frequency sweep technique) with all controls set for maximum 'lift' (+10dBV).

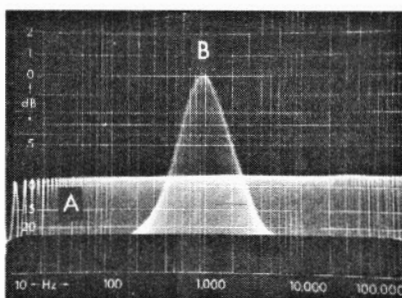


Fig. 2.9: (A) frequency response of the sweep generator (\pm 0.1dBV). (B) transmit-to-received audio frequency response for narrow band f.m. (144MHz band).

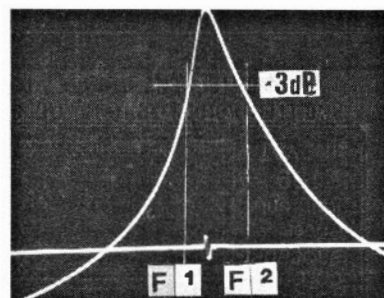


Fig. 2.10: Frequency (bandwidth) response of a 144MHz antenna to -25dBV using a v.h.f. frequency sweep technique. Usable bandwidth f1 to f2 (2MHz) is to the -3dBV points (see text).

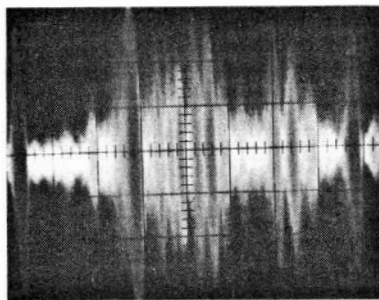


Fig. 2.11: Occupation of the 3.5MHz amateur band displayed on a 'scope by using a swept frequency receiver. See text for reference to signals and analysis, etc.

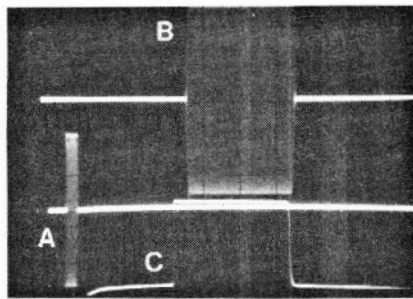
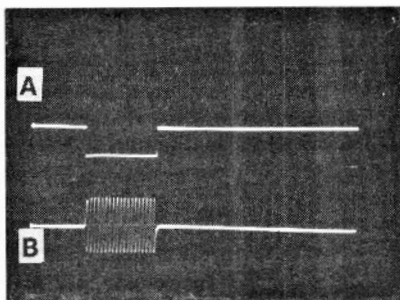


Fig. 2.12: Using a line sampler to obtain (A) format of pulsed r.f. transmission reference duration of display timebase. (B) measurement of same pulse (150µs) using expanded timebase. (C) pulse initiating squarewave (see text).

Fig. 2.13: (A) Initiating squarewave. (B) 1kHz (gated) pulse with exact number of complete cycles.



and then the actual display. Another example is the oscillogram in Fig. 2.8, which is the response of a graphic equaliser with all the controls set at maximum.

Interesting Application

Operators of narrow band 144MHz transceivers may well be intrigued with the oscillogram in Fig. 2.9. The trace (A) is the audio signal sweep, 10Hz to 100kHz from the generator.

This signal was fed into a 144MHz transceiver microphone input at an appropriate level and transmitted. The trace (B), is the audio response from a second transceiver. This is a typical 'transmit to received' narrow band f.m. audio response based on the usual centre audio frequency of 1kHz.

Radio Frequency Examples

The first radio frequency example uses an r.f. sweep frequency generator for visualising the bandwidth of a transmitting antenna for 144MHz. The oscillogram in Fig. 2.10 shows this to be relatively wide, when it's plotted to -25dBV (extreme left and right ends) from the 'marked' band centre on the lower trace.

This plot is well beyond the limits of the band itself. The usable portion of the response is to -3dBV between F1 (146MHz) and F2 (144MHz).

The v.s.w.r. was 1:1 at the marked band centre, and was not above 1.5:1 at the -3dBV points. The same method can be used for 'visual' antenna v.s.w.r. versus bandwidth performance, tuned circuit and r.f. filter responses, etc.

Band Occupation Analysis

Some time ago I carried out an analysis of the

occupation of the 3.5MHz amateur band. The analysis was over a period of several weeks and involved the use of a swept frequency receiving system (sometimes referred to as a panoramic receiving system).

The system was linked with a 'scope so that photo's of single sweeps, like that of Fig. 2.11, could be taken as required. All the large amplitude signals are 'commercial' stations of one kind or another. Between, but mostly beneath these, are regular amateur s.s.b. and c.w. transmissions.

The final analysis, which was very detailed, plus a selection of oscillograms, similar to the one shown, were sent to the Radio Regulation Dept of the DTI on behalf of UK radio amateurs. They were also published in *Practical Wireless*, in April 1985, but no acknowledgement was ever received from the DTI.

Line sampling

Next, we'll look at checking the shape and width of r.f. pulse transmissions, as well as other types of amplitude modulation, at the actual transmitting frequency, with the aid of a 'line sampler'. The sampler is a simple device for taking a small amount of signal from a transmission line between the transmitter output and the antenna. (Circuit and constructional details later).

The sampler consists of a very short section of 50Ω coaxial line with a built-in loop. The signal is picked up by this loop and is fed via an attenuator to a 'scope.

The oscillogram, Fig. 2.12, shows (A) the transmitted pulse relative to the time between pulses. For accurate measurement of the pulse duration and uniformity of shape, a faster timebase speed (50µs per division) is used so that the pulse appears as at (B) with a good shape and a width of 150µs. The carrier frequency of the pulse is at a frequency of 6.5MHz.

Time Errors

I should mention at this point, that the leading edge of the pulse-initiating square-wave, (C) in Fig. 2.12, starts about 25µs before the leading edge of the r.f. pulse at the transmitter output. Why? I hear you ask!

The answer is simply because the r.f. pulse itself is produced at an earlier stage in the transmitter, i.e., at the master oscillator. The signal then passes through low level amplifiers and into the final power output stage, which delivers a 2kW pulse for ionospheric sounding purposes.

Small time differences of this nature may also become 'serious time errors' in pulse 'radar type' transmission and reception or similar applications. For example, 25µs may not seem much, but it's actually the time taken for a radio wave to travel to a distance of approximately 6.9km.

Time errors may also become important in low (audio) frequency applications. The oscillogram B, in Fig. 2.13, is a 1kHz audio pulse used for measurements connected with acoustics.

For this application it was important that the pulse started on a positive half-cycle and ended as negative. The rise time and fall time of the initiating square pulse, A, could not be greater than 1µs.

Time measurement of this nature depends very much upon the accuracy of the 'scope timebase calibration and accurate interpretation of the c.r.t. display.

That's the lot for now. Next time we're going to look at phase measurement, harmonic distortion in audio amplifiers, simple waveform shaping circuits (with oscillograms), Z or brightness modulation, video waveforms and photographing c.r.t. displays.

Practical Wireless, May 1991

SPECTRUM FAX TRANSCIVE OR RECEIVE ONLY

Our FAX programs now cater for the three popular line speeds, 60, 120 and 240 lines per minute. As always, received screens can be saved to tape, and/or sent to your printer.

Everything you need to receive FAX£40.00
Complete Transceive System£75.00

(Alternatively, we can still supply the 120 lines per minute only systems for £33 and £63 respectively)

We offer a generous trade in allowance to customers wishing to up-grade their systems. Ring or write for details.

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

J. & P. ELECTRONICS LTD.

VISA

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



ENTERPRISE RADIO APPLICATIONS LTD.

VISA



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

All products British made & Guaranteed for 2 years

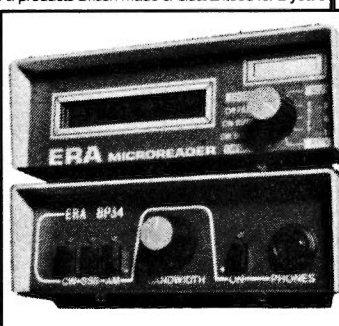
MKII MICROREADER £154.95

A small self-contained unit that decodes Morse & RTTY without using a computer. Displays text from amateurs, Press Agencies, Shipping, etc. Selectable shifts & auto baud & polarity.

BP34 AUDIO FILTER £99.50

Simply the most powerful active filter you can buy. 34 Orders of filtering removes noise & interfering signals allowing you to hear the weak DX. A must for keen CW OPS, contest groups, etc. Exceptionally flat passband is ideal for data & cleaning up FAX signals.

ALL PRICES INCLUDE VAT & POST/PACKING.
Ring or write for more details personal callers by appointment.



TX-3 RTTY CW ASCII TRANSCIVE

High performance, low cost. Unbeatable features. BBC, CBM64 tape £20, disc £22. SPECTRUM tape £35, +3 disc £37 inc adapter board. VIC20 RTTY CW program tape £20. All need our TIFI interface or a terminal unit.

GX-2 FAX SSTV TRANSCIVE

All modes of FAX and colour/mono SSTV. Review in March 90 Amateur Radio. 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 & March 90 Amateur Radio. 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 TIFI interface. SPECTRUM software-only version £25. TIFI 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 £6, 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.)

VISA

Fron, Upper Llandwrog, Caernarfon LL54 7RF Tel: (0286) 881886.

THE 34th NORTHERN MOBILE RALLY 19th MAY 1991

at the GREAT YORKSHIRE SHOWGROUND,
HARROGATE, NORTH YORKSHIRE

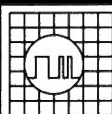
Gates open at 10am. Doors open at 10.45am.

Admission by program £1. Children FREE Car parking FREE

100's of traders including special interest groups,
local clubs and many more.

Organised by Ripon & District Amateur Radio Society "RADARS" meetings
each week, Thursday 7.30pm, at The Bunker, rear of Ripon Town Hall.

Rally Manager, Mike GOMKK,
Telephone: Daytime (0423) 564353
Evenings (0423) 507653.



SUREDATA AMSTRAD REPAIR AND SECOND USER SALES

This month we have added an extra phone line so that you can contact us after hours and at weekends for buying and selling Second User AMSTRAD PCs and PCWs, 0831 616519.

The Chancellor is at it again with VAT but we are doing our bit to keep down inflation, our 3.5" 720K internal drive kits for the 1512/1640 are still £70 inclusive of delivery and VAT.

We've also got ribbons for Amstrad printers, phone for price. Don't forget our AMSTRAD REPAIR service, it's our main business. 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)

SGC SG-230 SMARTUNER

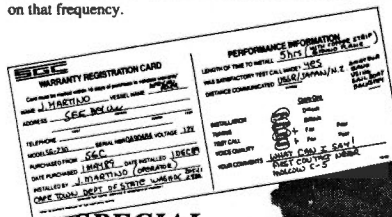
HF ANTENNA COUPLER

SSB, AM, CW & DATA

FAST - INTELLIGENT - ACCURATE

OPERATES WITH ANY HF TRANSCIVER

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 (44) 945-65716, Communications Centre (44) 908-610625 and Cap.Co Limited (44) 948-74717.

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

G4CLX

SUPA-TUTA

To teach you Morse — quickly

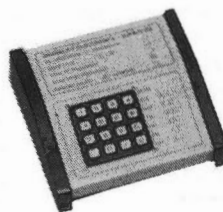
£69-95



SUPA-TUNA

makes selecting frequencies easier (for Kenwood range)

£67-50



SUPA-TUTA PLUS

To teach you Morse with Keyer

£84-95



NEW

STAR MASTERKEY

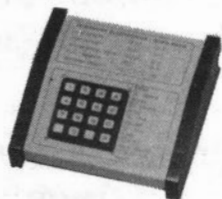
Low cost electronic Keyer, featuring Dot Dash Memories **£59-95**



SUPA KEYA

The most user friendly keyer around

£99-95



NEW

CMOS MEMORY KEYER

features full Iambic operations, may be used with single/twin paddle, 8 memories

£95-00



VIBROPLEX



Original Deluxe

£96-88

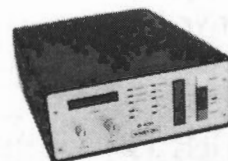


Iambic Deluxe

£90-89

NEW

WAVECOM W-4010



Decodes Morse, standard Baudot, Bit inversion, ARQ, FEC, ASCII, Packet etc.

£996-20 without FAX

£1099-54 with FAX

ALL PRICES INCLUDE V.A.T.

ALL PRODUCTS WILL BE AVAILABLE AT THE N.E.C.
COME AND SEE US ON OUR STAND FOR DEMONSTRATION

A STAMPED ADDRESSED ENVELOPE WILL BRING YOU DETAILS OF ANY OF THESE PRODUCTS.

Stockists of DAIWA — VIBROPLEX — ICOM — YAESU — KENWOOD — JRC — WAVECOM

Dewsbury Electronics, 176 Lower High Street, Stourbridge, West Midlands DY8 1TG

Telephone: Stourbridge (0384) 390063/371228

Fax: (0384) 371228

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



Piping Up On 144MHz

There have been countless articles, in magazines aimed at the radio enthusiast, dealing with the subject of antenna construction. These projects have ranged from multiple element beams, to the simplest form of antenna, a length of wire cut to a theoretically calculated measurement.

The wire method requires just a few inexpensive and readily available materials and is easy to adjust. However, a multi-element beam made from aluminium or stainless steel rod will be considerably more expensive, harder to make and will probably not react well to experimental changes in design.

Despite this, especially at v.h.f. frequencies, the reasonably compact beam antenna will offer useful gain and null patterns and is usually chosen in preference to a simple wire dipole design.

Problem Wires

Constructing an experimental antenna made from copper wire, for example, might not cost a great deal, but a beam antenna made in this way would have the mechanical strength of a length of cooked spaghetti. Conversely, aluminium might be stronger, but if the experimental design ends up being scrapped, the financial loss could easily deter the experimenter from further ideas.

As an inquisitive home-brewer with limited financial resources, I've endeavoured to find a way around these problems. Fortunately, I have recently discovered a material that assists greatly in my quest to save money and experiment at the same time.

My magical discovery is pvc conduit. Not the oval type buried in your house walls, but the heavy gauge round type of conduit used to encase surface wiring in light industrial applications. The type that I have used is manufactured and supplied by Walsall Conduits Ltd., and it's available in black or white, easily obtained in 20 and 25mm sizes four metres long, and marked HG BS6099-2-2 with the manufacturers code CP113 or CP114 for the sizes mentioned.

Conduit Support

I use the conduit to support, enclose and protect 2.5mm² wire elements in experimental antenna designs. The tube is quite cheap, (about £4 per length) and there are several inspection fittings, boxes and couplers available in the same material.

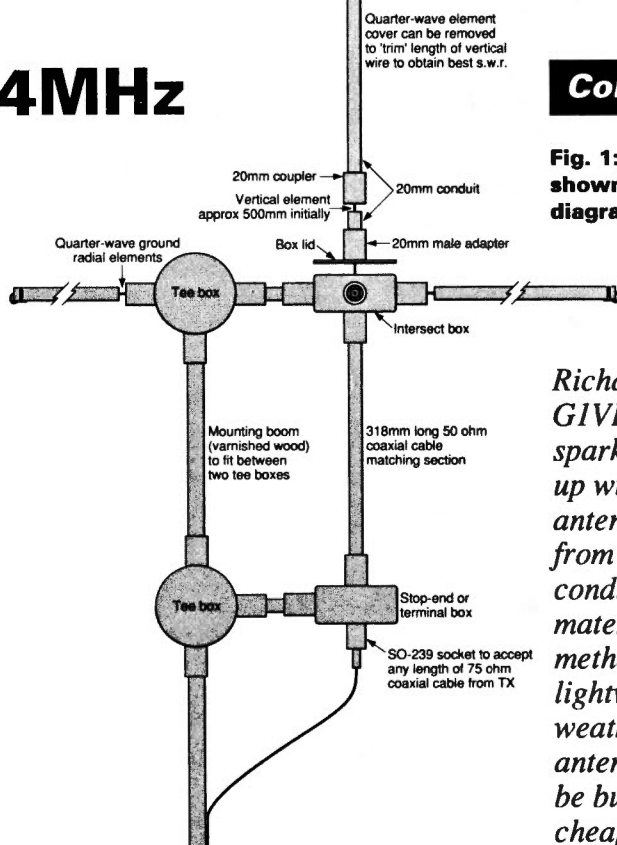
The conduit is very easy to work. It may be cut with a small hacksaw and securely joined with the correct pvc cement (glue). Care should be taken when using this cement, it gives off fumes. **It's best to do this particular job outside** and well away from naked flames.

Another useful benefit with this material is, that with a bending spring (about £5) the conduit can be bent up to about 120°, retaining the bend afterwards. The 25mm conduit and fittings will slide, trombone fashion, over the 20mm tube and it is easy to realise an experimental 'beam' shape that's adjustable in all directions.

Inexpensive Elements

The tubes can house inexpensive copper wire elements, that may be scrapped with little financial or material loss if the design fails to please. Alternatively,

Practical Wireless, May 1991



Construction

Fig. 1: The antenna shown more diagrammatically.

Richard Barrett GIVFV is a bright spark. He's come up with the idea of antennas made from electrical conduit trunking material. The method results in a lightweight, weather-proof antenna that can be built simply and cheaply.

if the antenna works to your satisfaction the assembly can be fixed to provide a permanent addition to your antenna array.

Of course, quad or delta shapes are easily made in the same way. Although I claim no antenna design expertise or originality, the photograph shows one of my early efforts, a 144MHz quarter-wave whip antenna with four ground radials.

The antenna elements are made from cheap 2.5mm² copper wire, with a 318mm section of 50Ω coaxial cable between the bottom of the vertical element and the SO-239 socket. Any length of 75Ω coaxial cable may be attached to feed the antenna from the transmitter, as the short length of UR-76 cable or similar acts, as a matching section.

Using a couple of extra fittings, I included a method of attaching the antenna to a varnished wooden pole. The v.s.w.r. in the finished antenna is 1.2:1 at 145.500MHz, increasing slightly to 1.35:1 at band edges due to the small diameter of the elements used. Despite this, at the end of the day a robust and effective antenna was constructed for less than £5!

Further Designs

In addition, more complicated designs are planned for the near future. I think that the only limit will probably be that imposed by the imagination of the constructor, and the urge to 'have a go'.

The antenna I've shown you could be made in about an hour or so using a minimum of handtools and parts. There are no critical dimensions. The most 'technical' stage involves snipping 5mm or so from the vertical element to tune the antenna. If you refer to the diagram and photograph, construction should pose few problems.

Construction

After preparing a 318mm length of RG-58, or similar cable, for the matching section, five 500mm element covers should be cut from the 20mm conduit.

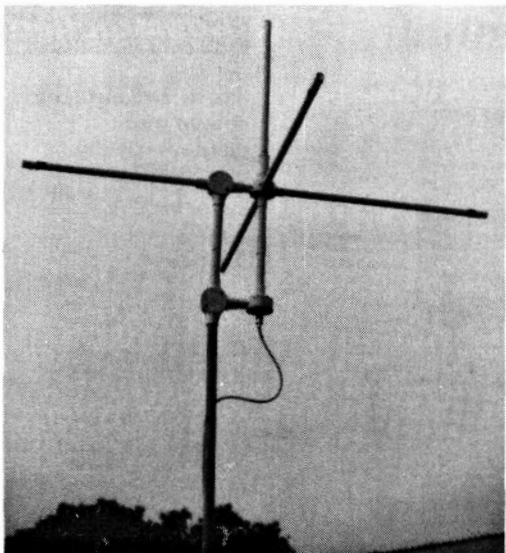


Fig. 2: The completed antenna on test.

Next, you should cut a fairly accurate 20mm hole in the bottom of the stop-end box.

A hole to take an SO-239 socket may then be made in another box lid, to which the RG-58 matching section can be soldered. The other end of the matching section should then have the core connected to the bottom of the vertical element. Solder the screen to all four of the ground-plane radial elements.

Make certain that the radial and vertical elements don't make contact with one another, to avoid possible damage to your transmitter. The 2.5mm² bare copper wire elements can all start off at

about 500mm in length. After construction is completed, the transmitter and s.w.r. meter should be connected and you're ready to start testing.

Antenna Adjustments

To start the adjustments, you can carefully remove 5mm or so from the top of the vertical elements. With this method, the s.w.r. can eventually be brought down to perfectly acceptable levels for safe use of the antenna.

Of course, if you go too far with this process it's easy to start again. You simply cut another length of vertical element and start the process off once more.

I've no doubt anyone who has discovered to their cost that they have snipped too much from a stainless steel whip, will appreciate the reduction in tension brought about by this cheap and effective method.

To finish off, you should seal the box lids with a suitable sealant against moisture not forgetting the exposed ends of the plastics tube. Your new weather-proof, and inexpensive, simple antenna will then be complete!

How Much?

£5-8

How Difficult?

Beginner

Shopping List

Plastics conduit from electrical suppliers (see text for details), various junction boxes and end fittings, pvc cement (see safety warning), heavy gauge copper wire, coaxial cable for connections and matching, plugs and sockets to suit. **Note:** Many of the plastics components can be used more than once. Suitable solvents can be obtained from the conduit supplier to remove fittings fixed with cement. Care should be taken when handling the pvc cement and solvents. The use of a suitable barrier hand-cream is advised (available from chemists and hardware shops).

PW

Now you can buy and sell your equipment in the new PW 'Bargain Basement' readers' advertisement feature for only £2.35! (Free Service To PW Subscribers' Club Members).

The rules are simple. You can advertise any radio, electronic or associated equipment for sale or wanted, **PROVIDED** it can be licensed, and be legitimately used in the UK. You could raise money for your new transceiver or w.h.y., by advertising your video camera or other consumer equipment for sale in 'Bargain Basement'.

The advert itself must not exceed 30 words, plus 12 words for the address. You must enclose your full address, post code, telephone number and call sign where appropriate. Subscribers' Club Members must include the dispatch label bearing their address and subscription number to qualify for their free advert.

All adverts **MUST** be typed or handwritten in **BLOCK CAPITALS** and be accompanied by the corner flash printed in **PW**, a £2.35 cheque (payable to PW Publishing Ltd.) and a stamped, addressed postcard if you would like an acknowledgement. No corner flash or label - no advert! (photocopies not acceptable).

All adverts will be used in strict rotation. No trade adverts accepted and no responsibility will be taken for errors. Please make your requirements as clear and concise as possible.

Address your adverts to: Donna Vincent, PW 'Bargain Basement', Enfield House, The Quay, Poole, Dorset BH15 1PP.

BARGAIN BASEMENT

FOR SALE Uniace 400 934MHz transceiver, £150. Harvard 27MHz 40 ch hand-held with NiCads, £50. Yaesu FT-207 144MHz handie, £120. Malcolm. Tel: (0202) 889981.

FOR SALE TS-440 transceiver complete with a.t.u., filters, voice synth & MC60A, £900. 50MHz 6-el beam, £55. Dayton speech processor, £45. Fluke multimeter top of the range type with built-in charger, £165. G7ESE. Tel: (0202) 823511, or 813812.

WANTED Eddystone EA12. Mr G. Leese, Barnsley. Tel: (0226) 288718.

FOR SALE Icom IC-781, £3000 (sorry no offers), carriage £15 extra. Mr R. Surman G3FPD, April Rise, Cox Green, Rudgwick, Horsham, West Sussex RH12 3DE.

FOR SALE Yaesu FT-2700RH dual-band mobile un-used, £350. Icom IC-47E 430MHz band mobile, £235. Bearcat 200XLT scanner, £185. Fortop TVT435/R television transceiver, £80. Dragon packet/RTTY/c.w. system, £99. Could deliver/demo (S. East). G4XCA. Tel: (0273) 582823 evenings only.

WANTED Various types of aircraft equipment, controls, instruments, manuals etc., for The Godfrey Manning Aircraft Museum. Godfrey G4GLM, 63 The Drive, Edware, Middlesex HA8 8PS. Tel: 081-958 5113 (weekday evenings).

FOR SALE 144MHz all-mode station - TR-9000, B09, PS20, SP120 - mint - g.w.o. - original cartons and all accessories. Jaybeam vertical collinear C5/144MHz and 5-el Yagi with UR-67 cables. Prefer cash, buyer collects, £350. Bob Radford G3GPB, 21 Farm Close, Ringwood, Hants BH24 1RZ. Tel: (0425) 471677.

WANTED Codar Radio Company equipment: AT5, T28, PS250S, CR70A, PR30 etc., for working museum of 1960/70s amateur equipment. Needed urgently Spectrum 48K Plus computer, and also Yaesu FIF232C Cat interface. John Hackett G0OAF, 42 Central Avenue, New Basford, Nottingham NG7 7AF. Tel: (0602) 606552.

WANTED A clean copy of *Second Thoughts on Radio Theory* by Cathode Ray, at any reasonable price. John Hughes, 6 Claypotts Terrace, Broughty Ferry, Dundee DD5 1LE. Tel: (0382) 79665.

FOR SALE Labgear colour bar generator. Labgear crosshatch generator. Heath, scope 5in 10MHz, offers on either. **Wanted** Old type h.f. receiver. Mr M. Stevenson, 124 Green Lane, Eastwood, Essex SS9 5QJ. Tel: (0702) 522929.

FOR SALE Pocom AFR-2010 c.w.- RTTY all-mode decoder, £510. Also Kantronics Kam all-mode with WEFAX £210. Mr B. Dale, Cimbri Glimpse, Powfoot, By Annan, Dumfriesshire DG12 5PS. Tel: (04617) 324.

The PW Speed-Brush

The Key To Successful Morse

Construction

The novice licence is to be introduced very soon. My simple project will be of interest to anyone who hopes to take the five words per minute Novice Morse test. I've no doubt that any other operator learning or 'brushing up' their Morse will find it useful.

Popular Circuit

The circuit I've used for the PW 'Speed-Brush' is based on the popular 555 oscillator. This design is perhaps the most popular circuit for a Morse practice oscillator and it works well.

By extending the p.c.b. the circuit becomes a novel and very useful combined Morse key and oscillator. The p.c.b. must be of glass fibre for bending strength as it's the brush-like extension of the board that gives the project its name!

Building The Brush

The p.c.b. layout is very simple and can be made by using a marker pen as the etch resist. The large areas can be masked with plastic tape. If you don't want to tackle the job of making a p.c.b., the PW PCB Service has a suitable board on offer at £4.76.

Four 20 x 3 mm wood screws hold the p.c.b. above the wooden base. The base is soft wood 170 x 100 x 20mm, the ideal source of the wood is from floor-boarding off-cuts. If you can't get off-cuts, or you

want to build the 'Speed-Brush' as a club project - a local builders' merchant will be able to sell you some.

The contacts are 6BA (3mm) nuts and bolts. One screw fixes through the p.c.b. and contacts the earth plane. The other screw fixes through the base. A suitable soldering tag provides a fixing to a wire to take the 9V battery (positive) terminal.

Setting Up

The unit is very simple to set up and use. The tone of the oscillator is set by adjusting R1, a 50kΩ potentiometer. Apart from the tonal adjustment - that's it!

No on-off switch is needed as the key part of the unit operates as its own switch. Battery life should not

With the introduction of the Novice Licence in mind, Steve Ortmyer G4RAW has come up with a delightfully simple combined practice oscillator and Morse key. It should prove useful to both beginners and more experienced operators.

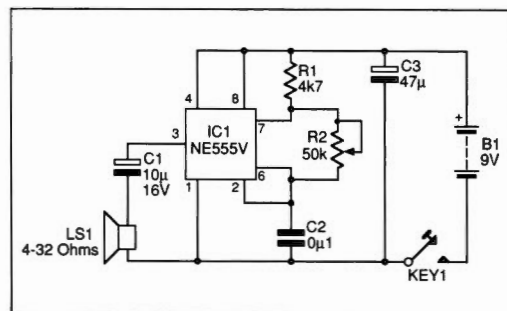


Fig. 1: Circuit diagram of the PW 'Speed-Brush'.

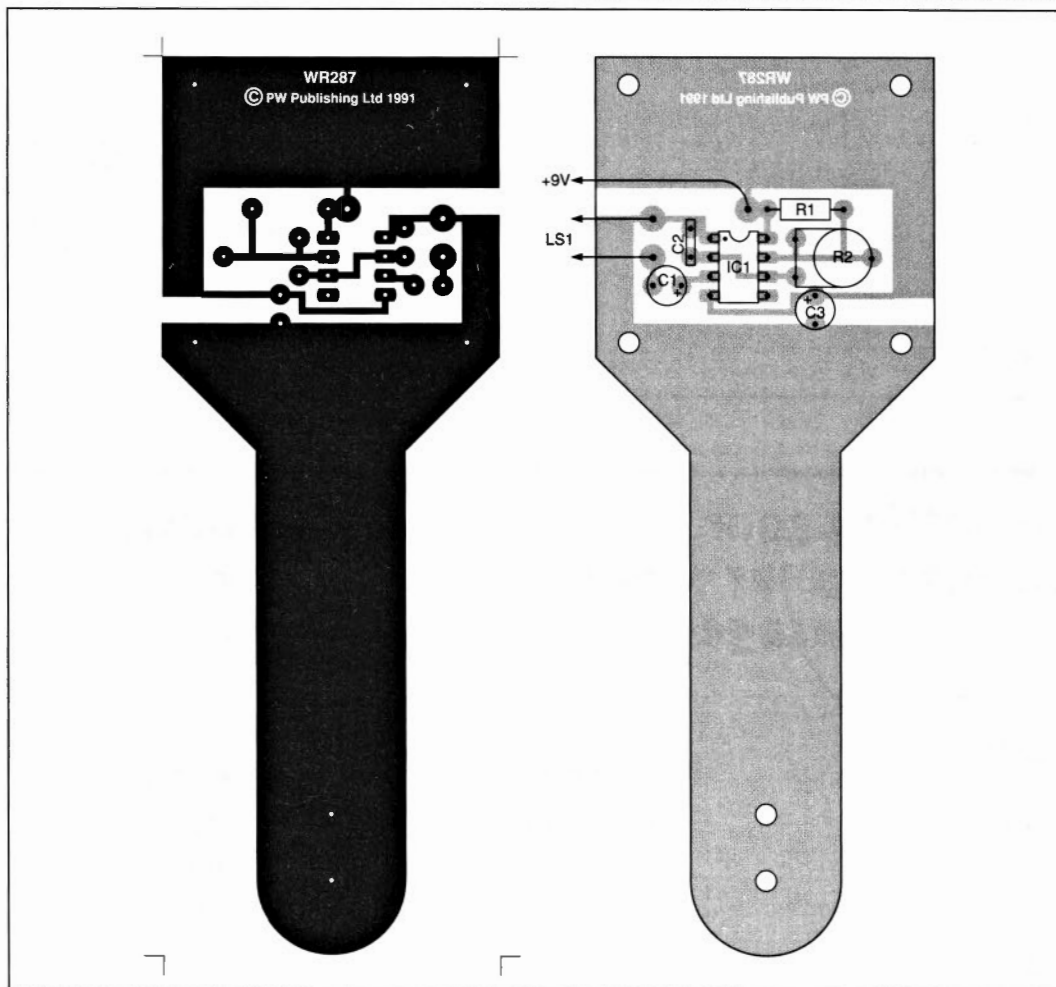
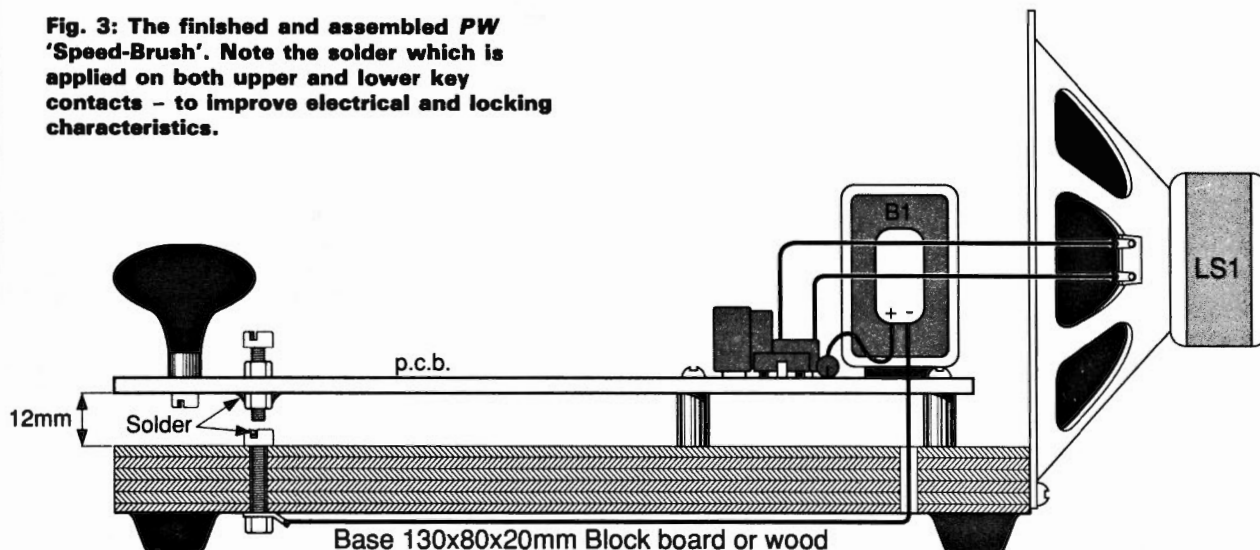


Fig. 2: The p.c.b. track details and overlay for the Morse key project.

Fig. 3: The finished and assembled PW 'Speed-Brush'. Note the solder which is applied on both upper and lower key contacts - to improve electrical and locking characteristics.



How Much ?

About £10 -
depending on your 'junk' box.

How Difficult?

Beginner.

Shopping List

Resistors

Metal film 1%, 0.25W
4.7k Ω 1 R1
Variable pre-set
50k Ω 1 R2

Capacitors

Miniature ceramic
0.1 μ F 1 C2

Miniature Electrolytic
10 μ F 1 C1

Integrated circuit

NE555V 1 IC1

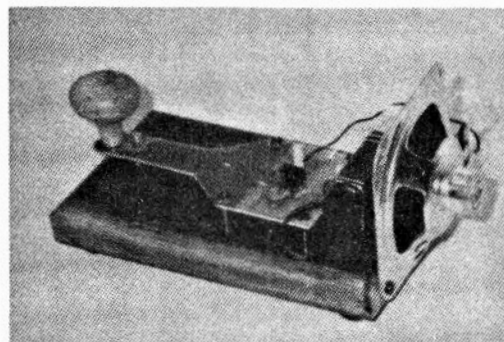
Miscellaneous

Battery (9V PP3 type), battery connector, loudspeaker of between 4 and 32 Ω (speaker can be obtained from a scrap receiver) and suitable knob for key. (small wooden knob, bathroom cabinet-size is suitable). Wood for base (see text).

be a problem either because the oscillator unit only draws a few milliamps. The actual current drawn will depend on the impedance of the speaker used.

At first sight the absence of the normal 'back stop' for the Morse key itself, looks as if it's a drawback. However, in operation you don't even notice it and the key is easy and pleasant to use.

Happy keying - and the best of luck with your Morse practice!
PW



The completed 'Speed-Brush'.

**Be sure of getting your copy of PW each month.
Place this regular order form with your
newsagent... today**

Dear Newsagent, Distributed by Seymour
please reserve / deliver my monthly
copy of PRACTICAL WIRELESS

NAME

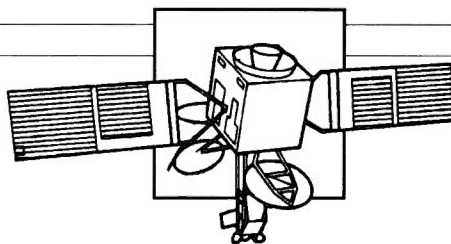
ADDRESS

.....

.....

Signed

**If you can't see PW on the
bookshelf at your local outlet,
please call the Editorial Office in
Poole and we will talk to our
distributors to find out why!**



SATELLITE SCENE

by Pat Gowen G3IOR

This month Pat Gowen G3IOR, writes about the long awaited RS-12 and RS-13 satellites which were finally launched on February 5th.

It was announced in mid-January that the long-awaited RS-12/13 launch was to come about at 0412UTC on 22 January 1991, prior to the postponed launch date given for RS-14.

The long-awaited RS-12/13 combination was finally successfully launched at 0236:45UTC on February 5 into a 1019.319km apogee, 960.638km perigee, 82.9293° inclination, 104.87° period orbit, with an increment 26.34° west per orbit. By 1500UTC the next day most of the RS-12 satellite's sub-systems were checked out by the command station RS3A, with RS-13's check-out following on February 21.

Below are the frequencies used, some of which now appear to be slightly higher than as measured prior to launch.

Parameter	RS-12	RS-13
MODE A uplink	145.910-145.950	145.960-146.000
downlink	29.410-29.450	29.460-29.500
beacons	29.4081/29.4543	29.4582/29.5043
MODE K uplink	21.210-21.250	21.260-21.300
downlink	29.410-29.450	29.460-29.500
beacons	29.4081/29.4543	29.4582/29.5043
MODE T uplink	21.210-21.250	21.260-21.300
downlink	145.910-145.950	145.960-146.000
beacons	145.9125/145.9587	145.8622/145.9083
MODE KA uplinks	21.210-21.250	21.260-21.300
	145.910-145.950	145.960-146.000
downlinks	29.410-29.450	29.460-29.500
beacons	29.4081/29.4543	29.4582/29.5043
MODE KT uplink	21.210-21.250	21.260-21.300
downlinks	29.410-29.450	29.460-29.500
	145.910-145.950	145.960-146.000
beacons	29.4081/29.4543	29.4582/29.5043
	145.9125/145.9587	145.8622/145.9083

Table 1.

Both auto-answering ROBOTS are on modes A, K, T, KA and KT. The RS-12 h.f. uplink is on 21.1291MHz alternating with the v.h.f. uplink on 145.8308MHz, with the corresponding downlink(s) on 29.4543MHz (measured at 29.4566MHz) and/or 145.9587MHz. RS-13's uplink alternates on 21.1385MHz and 145.8403MHz, with the corresponding downlink(s) on

29.5043MHz and/or 145.9083MHz.

The new satellite has not been without its initial problems. The attenuators commanded into circuit made low power access of both the transponder and ROBOT difficult. Dense 'E' ionisation not only gave the wipe-out intrusion from strong

terrestrial f.m. users in the 29MHz space exclusive downlink passband, but also made downlink attenuation so severe that signals could not be heard until the satellite was above 12° elevation.

As if these problems were not enough, the COSMOS-2123 NAVSAT was also under test. Its 149.9MHz transmission not only completely blocked both the transponder and ROBOT uplinks, but introduced RTTY-like signals over the entire downlink passband.

I was only able to make three QSOs in the first two weeks of operation! Hopefully, by the time you read this news, all systems will be fully operational and usable.

RS-14/OSCAR-21 Flies

The RS-14, the joint AMSAT-U-Orbita RM-1 and the AMSAT-DL RUDAK-II, is now operational as OSCAR-21. It was first postponed to January 7, then January 20. Finally it blasted off from the Northern Cosmodrome at Plesetsk at 1159:52

on January 29. The 145.821MHz c.w. telemetry was commanded on just three days later. The A-O-21 period is 104.8368 minutes, inclination 82.947°, and the increment 26.3350°W per orbit.

This satellite too is having problems. While the initial telemetry looked very good and the systems all seemed functional, on March 6 the RUDAK RTX2000 onboard Digital Signal Processing Unit giving f.m. speech on 145.983MHz was placed on for test.

The signals were very strong, and could be heard fully quieting on a hand-held. It said (quote) "I am completely operational and all my systems are functioning perfectly" although they weren't!

Uplink command work is now progressing, which will hopefully, restore full function of all systems by the time that this news is read.

The basic details of this new satellite have already been published in *PW*, but if you require full details, send an s.a.e. to the editorial offices.

The identifiers and Keplerian element sets for both the new satellites now in orbit and operational are as follows: (Tables 1-3).

Remember, if you need the latest updated Keplerian element sets for all the other satellites just send in a large s.a.s.e. marked 'Keplerian Elements PSE' to the editorial offices.

Packet In Space

Musa U2MIR, continues to be active on 145.550MHz f.m., and is now on packet radio also. We all expected to wait until the 'AREM' experiment commenced in late March or early April before we heard any packet radio from MIR. Despite Boris Stepanov UW3AX stating "...the end of January..." and Musa saying on January 17 "...packet radio tomorrow..." we all knew it could not be. Happily,

DC Power Consumption	RS-12	RS-13
All systems off	4.6W	3.5W
All systems on (maximum output)	35W	25W
RF output power:		
Beacon and ROBOT (low/high)	0.45/1.2W	0.45/1.2W
Transponder TX (29 or 145)	approx. 8W	approx. 8W

Table 2.



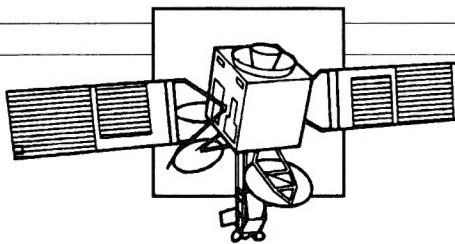
Fig. 1



Fig. 2.

Parameter	OSCAR-21	RS-12/13
Catalogue No:	21087	21089
Epoch Year:	91	91
Epoch Day:	53.22001973	49.93251436
Inclination:	82.9472	82.9239
Right Ascension:	318.7973	191.7413
Eccentricity:	0.0034188	0.0028095
Argument of Perigee:	218.7400	248.5878
Mean Anomaly:	141.1310	111.2279
Mean Motion:	13.74342424	13.73856783
Decay:	1.09E-06	1.12E-06
Orbit:	323	190

Table 3.



we were all wrong, as on Saturday evening of January 19 and the following day up came U2MIR calling CQ on packet on 145.625 and 145.675MHz!

Musa U2MIR, who is UV3AM, has been reported active by many stations all around the world initially using his normal 145.550MHz speech f.m. frequency for packet, this being the joint popular packet frequency in the USSR. He had a heavy schedule of EVA external work on MIR from January 20, but had told Boris that he would be back in force from February 1. However, he left his U2MIR-1 mailbox on, later moving to 145.325MHz to avoid the continuous blocking caused by the multitudes of earth-bound amateurs calling him.

Ian McAvoy G0NKA of Lincoln, saw on his screen at 1538:19 'U2MIR*>F3NW-1 [C,P]'. Later, at 1448:53 on February 4, using 25W from his 736R to a 9-element beam on 145.550MHz, Ian managed to connect, sadly this soon followed by a 'disconnect'. Joe Kasser W3/G3ZCZ of Silver Spring, Maryland noted brief connects from W2RS, N8IGJ, N9AB, WB9CEU and others, and that some were using the MIR space station system as a digipeater.

Colin Grellis G1YIL of Dorset spotted activity throughout a whole day's passes, and sent in printer copy of Musa's CQs and connect packets with DF4TA, I0LYL, G6ZRU, DL1SBY, F9XG and F6EXK. Fred G6ZRU managed two 'connects' to U2MIR-1 whilst competing with his other locals G6CSX and G0BAF. Both times, Fred received the prompt 'Logged on to U2MIR's Personal Message System' but retired out on both occasions! Fred also noted connects also to I0LYL, F6EXK, HB9RSQ, DD1UU, DL1SBY and DF4TA.

Stuart G6FTB, received Packets from U2MIR containing the message 'CQ, HELLO FRIENDS'. Like the vast majority, Ray Solfer W2RS, found that due to the QRM in Musa's receiver it was impossible to use the mailbox. While unable to access myself, I monitored over three passes connects with an additional number of European stations, logging IK5EHR, IK3ASM, DF4TA, G8AFG, GM0KDC, LA1K and DG2SBL.

One of the lucky ones is Martin EI3FI on the West coast of Sligo, who gets a full two minutes of access before MIR comes under the

hammering from all of Europe. He has connected to U2MIR-1 at least once daily since his first connect on January 30. Martin is one of the few in Europe who has been able to receive Musa's 'J' list, and quotes some very amusing messages, e.g. "Ed to Musa....How's the weather up there?" plus another from a KA call: "Hi Musa ... don't drop in!"

Should you be fortunate enough to have the opportunity to use it, here are the U2MIR-1 mailbox requirements as given in response to the the 'H' help command:

B(ye) B [CR] disconnects you from PMS.

H(elp) H [CR] or ? [CR] displays this help file.

J(log) J [CR] displays a list of callsigns heard (optional date/time)

K(ill) K n [CR] deletes message number n (only to/from your callsign).

KM(ine) KM [CR] deletes all READ messages addressed to your callsign.

L(ist) L [CR] lists the ten latest messages.

M(ine) M [CR] lists the ten latest messages to/from your callsign.

R(ead) R n [CR] reads message number n.

S(end) S (callsign) [CR] begins a message addressed to (callsign).

Subject: max 28 characters ending with [CR].

Text: End each line with [CR]. End message by typing/ex [CR] or CTRL-Z [CR] at the beginning of a new line.

SR(eply) SR n [CR] Sends a reply to message n prompting only for text.

V(ersion) V [CR] displays the software version of the PMS system.

Musa is now using a donated Icom-228A transceiver that can run up to 25W, a lap-top computer, and a Pac-com TNC-220 with a mailbox addition that permits multi-station access. Changes are planned for this that will permit more stations simultaneous access. Consideration is also being given to split frequency and cross-band operations, as Musa will soon have a 430MHz hand-held.

Boris Stepanov UW3AX, the RSF 'Ham in Space' project coordinator, informs us that amateur radio training courses for the MIR cosmonauts are presently being organised for the next crew due to take over MIR in May. One of these will be the British 27-year old 'JUNO' mission cosmonaut Helen Sharman visiting MIR for a week. She will

have the callsign GB1MIR and will be making good use of this for educational contacts with many university, school and college club stations through the medium of amateur radio before she returns back home to earth with Musa U2MIR and Victor U9MIR, the mission commander.

Although Boris has been handling most of the QSLs for the U-MIR operations to date, he is a very busy person and suggests that your QSL to UA6HZ should obtain a faster response than cards via Post Box 88 in Moscow. The address to send to is: Valery Agabekov UA6HZ, Box 1, 375600 Yessentuki, USSR. You will not have to wait for the return of Musa in May, as several who have made QSOs, e.g. G6SVJ, have already received their cards from Boris.

Re-Entry Contest

SALYUT-7 the 40 metric tonne one-time pride of the USSR Space Fleet, with its attached COSMOS-1686 module, launched in April 1982, manned until November 1985, finally came to rest at 34.9°S/63.8°W, mainly in Argentina at 0347UTC on 7 February 1991 during orbit number 50200. The contest for the prize of the complete set of Soviet space stamps and certificate to the forecaster nearest to predicting the UTC time and date of the re-entry, proved to be very

popular, with over one hundred entries coming in from all parts of the world.

Estimates ranged from mid November to early March, and some even put the decay time to the nearest second. The winner was Mike Bilow N1BEE of Rhode Island. His February 7 0330UTC prediction was just 17 minutes earlier than the event! Mike, read Celestial Mechanics at the University of Rhode Island, yet modestly puts his success down to "pure luck"!

Second came Hazel Kerrison of Norwich, shown with OM Sid G3MFQ in Fig. 1, who plumped for February 7 at 0419UTC and so was thus only 32 minutes late in prediction.

Chris Wallis G3CMV, of Ickleford, near Hitchin in Hertfordshire came third, having gone for 0824 on February 7. All of the above will receive diplomas, as seen on Fig. 2, and duplicates of the space stamp series, a few of which are shown in Fig. 3.

Very close 'runners up' included LA4XC, G4ODC, G4BDW, W3/G3ZCZ, G3LDI and his son Robert, KA6UCD, G3CDK, G3MFQ, G4CUO, G4FKC, PA0DLO, G3RWL, N5WX, G0BAF, G4ULS, VE3EFX and WB6LLO, all of whom gave predictions far superior to those estimates given by the 'official' non-amateur agencies themselves. I shall be covering some of the interesting findings and techniques of satellite re-entry in a future treatise.

Good Reading

For those who could not attend, or who could not manage to write 154 pages of notes, the *Proceedings of the AMSAT-UK Colloquium* now published by AMSAT-UK will fill you in on the many and wide ranging papers produced, and provide lots of good reading on may satellite related topics. Details are to be had for a s.a.s.e. to Ron Broadbent G3AAJ, AMSAT-UK, London E12 5EQ. This years Colloquium will be held from July 25-28 at the University of Surrey. If you wish to attend, write to AMSAT-UK at G3AAJ QTHR with a s.a.s.e., who will send you costings and a booking form. PW



Fig. 3.

STUDENT SPONSORSHIP

WOOD & DOUGLAS, a UK independent company specialising in Radio Communication Engineering in the VHF, UHF and Microwave spectrum, is now seeking candidates for sponsorship through Higher Education as part of their ongoing student sponsorship policy.

If you are considering a career in radio engineering, have an active interest in radio as a hobby and are expecting to enter full time University or Polytechnic training in Autumn 1991, then WOOD & DOUGLAS could have a package that will suit both your financial and industrial training needs.

Please enquire in writing initially giving full details of your personal situation, subjects under study and any placement offers received to date.

Send your details to:
Student Sponsorship
Wood & Douglas
Lattice House
Baughurst, Basingstoke
Hampshire RG26 5LL



WOOD & DOUGLAS

VHF/UHF COMMUNICATIONS PRODUCTS

THE KITS WITH ALL THE BITS!

Guaranteed complete to the last nut!

Single Band CW QRP Tx/Rx

160m £87.50 80m £81.00

40m £84.50

- ★ VFO ★ Sidetone ★ Audio filter
- ★ RT
- ★ Very detailed instructions
- ★ Black steel case with printed panel

ANTENNA TUNING UNITS

TU1 Kit — £39.25 Ready Built — £54.50
TU2 Kit — £48.50 Ready Built — £68.50

- ★ Large dia. coil ★ High grade capacitor ★ Built in balun ★ Circuits to match your antenna ★ Up to 30 Watts of CW ★ TU2 has sensitive QRP/SWR meter
- ★ TU1 is ideal for SWL

QRP SWR METER

- ★ Specially designed for QRP ★ HF 1-30MHz
- ★ Can be set down to 1/2 watt for FSD
- ★ Ideal for milliwatting ★ Low insertion loss 0.2dB
- TUA1 Kit — complete with case & meter £17.00

CARLTON (Receiver)

80-40-20m Dc Rx

- ★ Receives USB, LSB and CW ★ Very sensitive and selective ★ Simple modular construction
- ★ 12-14 volt battery operated ★ Printed facia
- Kit complete with case — £66.50

PSU 15 REGULATED POWER SUPPLY

- ★ Ready built ★ Mains Input ★ 13.8V @ 1.5A output ★ Ideal for DTR3 & 'Carlton' ★ Fully protected
- Supplied ready built — £49.50

Send SAE for brochure or call Alan G4DVW on 0602 382509

LAKE ELECTRONICS

7 Middleton Close, Nuthall, Nottingham NG16 1BX
(callers by appointment only)



AERIAL TECHNIQUES

Fine selection of SCANNERS in stock!

AOR, Bearcat, Regency and ICOM at attractive prices

AR-1000 Handheld Scanner

- ★ 1000 Channels ★ 500kHz-600MHz continuous
- 805-1300MHz continuous ★ AM, FM (narrow & wide)
- ★ Complete with NiCads and mains charger

£249

incl free fully insured delivery!

ICOM IC-R1

Micro-size handheld scanner 150kHz/1300MHz

Phone for price

We can supply the full range of AOR Scanners (SAE details)

Plus full range of Revco Discones, air/marine antennas, rotators and all aerial hardware.



11 Kent Road, Parkstone, Poole, Dorset BH12 2EH.
Tel: 0202 738232
Fax: 0202 716951

Send 75p for our PRO/AM catalogue



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"/>
GCSE/GCE/SCE over 40 examination subjects to choose from		<input type="checkbox"/>	

Name

Address



International Correspondence Schools, Dept. EES51 312/314 High Street, Sutton, Surrey SM1 1PR.
Telephone 061-643 9588 or 041-221 2926 (24 hours)

QUARTZ CRYSTALS

QuartzLab MARKETING LTD

P.O. Box 19 Erith Kent DA8 1LH

Telephone: 0322 330830

Fax: 0322 334904

Telex: 8813271 GEOMS-G

(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 £2.55 EACH FOR 2 OR MORE

TX CRYSTALS

12MHz 30 & 40pF

RX CRYSTALS

44MHz Series Res

14/15MHz 30pF

Scanner Crystals

SR9 crystals £2.50

TX 8.78250 RX 29.7800

HC6 £2.85 FOR ONE CRYSTAL £2.65 EACH FOR 2 OR MORE

TX CRYSTALS

4MHz 30pF

RX CRYSTALS

44MHz Series res

TX 8.78250 RX 29.7800

70CM CRYSTALS £6.50/pc or £3.35 each.

For Pye 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 HC18/9 AT £3.35 each.

22.000, 38.666, 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

7.168MHz (For 1750 Hz Tone), 10.245 (for 10.7 I.F.)

3.2768 4.000 5.0688 10.245MHz 15.00000

YAESU CRYSTALS FOR FT101's FT801 & 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

FREQUENCY RANGE

1.5 TO 2.0MHz

2.0 TO 6.0MHz

6 TO 21MHz

21 TO 25MHz

OVERTONES

3rd OVT 21.00 TO 65.00MHz

5th OVT 60.00 TO 110.00MHz

5th OVT 110.00 TO 125.00MHz

7th OVT 125.00 TO 175.00MHz

PRICE

£8.00

£5.80

£5.35

£7.85

£5.35

£8.00

£8.75

£11.80

DELIVERY: Approx. 2 weeks.

Unless otherwise requested fundamentals will be supplied for 30 pf load

capacities and overtones for series resonate 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.

CRYSTALS 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 & PO's to QSL LTD.

PRICES INCLUDE P&P and VAT

SYON TRADING 16 THE RIDGEWAY

FETCHAM, LEATHERHEAD, SURREY. KT22 9AZ
Tel. 0372 372587 Callers by appointment only

1N4001	5p	2N3053	30p	BF494	15p	78L regs	35p
1N4002	5p	2N3055	50p	BFY50	30p	78 regs	45p
1N4003	5p	2N3819	35p	LM317T	75p	555	30p
1N4004	5p	BC107	12p	LM380	£1-25	741	20p
1N4005	5p	BC108	12p	LM723	45p	400mW	
1N4006	6p	BC109	15p	MJE2955	80p	Zener 10p	
1N4007	7p	BC183	10p	MJE3055	70p		
1N4148	4p	BD131	35p	TIP31	30p	For lists	
1N5400	10p	BD135	30p	TIP32	30p	send 9x6	
1N5408	16p	BD138	30p	TIP41	40p	SAE	
2N2222A	25p	BD140	30p	TIP42	40p		
2N2905	30p	BF241	20p	VN66AF	£1-65		

ALSO STOCKED :- Malsor Kits - Nevada Products - Spectrum Kits - Resistors - Capacitors - Diodes - Switches - Regulators - Cable Semiconductors - Connectors - ACCESS: VISA: CHEQUE Components & Amateur Radio Equipment Purchased

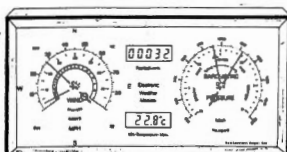
Professional WEATHER MONITORING at low cost

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 peddle key, £35.00 ex stock.

TWO-METRE LINEAR/PRE-AMP. Sentinel 40: 14x power gain, e.g. 3W-40W (ideal FT290 and Handhelds), £125.00. Sentinel 80: 6x power, e.g. 10W in, 60W out, £135.00. Sentinel 100: 10x 100W out, £165.00.

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.

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 Linear & PSU's

★ ERA Microreader & BPS4 Filter, SEM Products ★

★ Full range of Scanning Receivers ★

AERIALS, Tonna, Full Range of Mobile Ants, Jaybeam

BRING YOUR S/H 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

ARC-44 AIRBORNE T/Rx compact unit intended for use in Helicopters freq 24 to 51.9 Mc/s in 100Kc steps mode FM nom o/p 8 watts into 50 ohm comprises T/R, Control Chan Sel Box, Dynamotor unit, req 24/28v DC at 5 amps uses min & sub min valves with circ details. £38 also available with 8ft whip & matching unit at £54.

SCOPES ADVANCE OS2200A. General purpose dual trace bench scope with storage modes, spec as normal scope DC to 25 Mc/s at 10 Mill/V Cm TB 2 Sca Cm to 0.1 Ua Cm. T.B. delay, TV Line & F sync etc checked with book. £195 further gen on request.

CRL BRIDGE UNIVERSAL (CT530) lab type high resolution bridge Wayne Kerr type B221 covers wide range of CRL & Z & G with low Imp adaptor checked with leads Inst at £95 also CT375 Bridge similar but less functions at £65

AIRCRAFT VHF T/Rx STR.37 compact unit covers 116 to 135.95 in 50 Kc channels reqs 24/28v DC size 6x4" by 10" deep fitted Vol & Sq controls as AF out for phones (will work spk) checked on Rx with connec details. £65 Tech H/Bk available at £9.50.

BENCH POWER UNITS for 240v provides two DC stab O/P of 0 to 30v at 2 amps on ac circ can be used as single 4 amp or series connec 0/60v at 2 amp fitted dual Amp meters & cal volts controls in case size 13x9x17" tested. £45

Above prices include Carr/Post & VAT.

Goods ex equipment unless stated new.

2x22p stamps for List 46/1

A.H. SUPPLIES

Unit 12, Bankside Works, Darnall Rd, SHEFFIELD S9 5HA.

Phone. 444278 (0742)

ANTENNAS TONNA (F9FT)

50MHz	144/435MHz	THE VHF/UHF ANTENNA SPECIALIST
5 element.....£50.71(a)	9 & 19 element Oscar.....£81.07(a)	POWER SPLITTERS
144MHz	1250MHz	2 way 144MHz.....£48.36(b)
4 element.....£29.39(a)	23 element.....£81.07(b)	4 way 144MHz.....£57.53(b)
4 element crossed.....£37.26(a)	4 x 23ele - stacking frame - power splitter.....£175.00(a)	2 way 435MHz.....£45.69(c)
9 element fixed.....£33.12(a)		4 way 435MHz.....£55.76(c)
9 element portable.....£35.19(a)		2 way 1250MHz.....£38.35(c)
9 element crossed.....£62.10(a)		4 way 1250MHz.....£43.36(c)
13 element.....£49.06(a)	23 element.....£32.29(b)	2 way 1296MHz.....£38.35(c)
17 element.....£66.24(a)	4 x 23 ele - stacking frame - power splitter.....£175.00(a)	4 way 1296MHz.....£43.36(c)
	55 element.....£49.27(a)	2 way 2300MHz.....£38.35(c)
435MHz	4 x 55 ele - stacking frame - power splitter.....£258.00(a)	4 way 2300MHz.....£43.36(c)
9 element.....£38.43(a)		
19 element.....£38.64(a)		ANDREW HELIAX
19 element crossed.....£42.44(a)		LD4-50A.....£5.10/m
21 element 432MHz.....£47.81(a)		'N' Connectors.....£20.00(c)
21 element ATV.....£47.61(a)		
	2300MHz	TELESCOPIC MASTS - STACKING FRAMES - COAXIAL CABLE - ROTARY TORS ETC.
	25 element.....£43.47(b)	

All prices include VAT. Please add carriage (a) £5.50 (b) £2.20 (c) £1.20. U.K. MAINLAND ONLY ACCESS or VISA cardholders telephone your order for immediate dispatch. Callers welcome, but by telephone appointment only, please. Send 50p for our catalogue which contains the full specifications.

RANDAM ELECTRONICS (P)

SOLE U.K. DISTRIBUTOR

FREEPOST, ABINGDON, OXON, OX14 1BR.
Tel: (0235) 523080 (24hrs)



J. BIRKETT

RADIO COMPONENT SUPPLIERS

25 The Strait Lincoln, Tel. 520787 (L22 1JF)

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

VARIABLE CAPACITORS. Air spaced 15+15pF @ £2.50, 10+10+20pF @ £1.50, 100+200pF @ £2.50, 200+350pF @ £2.50, C804 Type 25pF @ £2.50, 50pF @ £2.50.

MULLARD X-BAND 10.68MHz DOPPLER MODULE CL8900 @ £7.95.
R.F. POWER MODULES PHILLIPS 6Y32 66-68MHz 12 Volt 10 Watt @ £18.95, MITSUBISHI M5710A 150MHz 12 Volt 25 Watt With Data @ £17.95.

NEW POWER TRANSISTORS. 2N3055 @ 5 for £2.00, 80Y90 @ 5 for £2.00.

STORIO FM TRANSCIEVER BOOT MOUNTING 2 Channel Mid Band With Loudspeaker and Control Box @ £9.00 (P.&P. £4).

WIRE ENDED DIODES BY127 1300 PV 1 Amp @ 10 For £1.00.

TANTALUM BEAD CAPACITORS. 10w., 47uF, or 15uF. Both 15 For £1.00.

200 0.1uF 63v.w. DISC CERAMICS. @ 200 For £1.95.

VOLTAGE REGULATORS. M78 T12CK 12 Volt 3 Amp @ £1.85, LM 2930T8 8 Volt 1 Amp @ 50p.

BOOT MOUNT TRANSCIEVERS FM MID-BAND With Loudspeaker and Control Box @ £7.95 (P.&P. £4).

STORIO FM TRANSCIEVER BOOT MOUNTING 2 Channel Mid Band With Loudspeaker and Control Box @ £9.00 (P.&P. £4).

MOTOROLA UHF DASH MOUNTING TRANSCIEVER with Mike @ £28.00 (P.&P. £3).

STORIO SYNTHESISED FM TRANSCIEVER Boot Mounting Mid Band With Loudspeaker and Control Box @ £10.95 (P.&P. £4).

R.F. POWER FETS MRF 136 2 to 400MHz 15 Watt With data @ £9.95, BLF244 2 to 400MHz 15 Watt with data @ £9.95. SRFE 1131 High Power. No Data @ £13.95. SRF 1618 High Power. No Data @ £9.95.

PHILLIPS CAPACITORS. P.C. Type 0.1uF @ 20p each, 10 For £1.50.

AIRCRAFT TRANSMITTER Type M7, **AIRCRAFT RECEIVER** Type M11 or M12, Control Unit, No Cables Or data £25.00 The Three Items (P.&P. £5).

VALVE HOLDERS. 876 @ 25p, 89A @ 25p, UX5 @ 25p, PL504 Type Ceramic @ 30p.

FETS 2N3819 @ 25p, J304 @ 20p, **TRANSISTORS** BS107 @ 12 For £1, 2N2222A @ 25p, 2N618 @ 25p, 2N 2369A @ 25p, BC 148 @ 100 For £1.20, BA317 @ 100 For £1.

ACCESS and BARCLAY CARDS ACCEPTED. P&P 60p under £5. Over Free. Unless Otherwise Stated.

C.M. HOWES AND WOOD & DOUGLAS KITS. Available By Post and For Callers.

Reflections

This month, Ron Ham reminds us about the potential hazards that exist with the highly explosive gas-air mixtures which can devastate freshly-charged car batteries - and you if you don't take care!

Around this time last year I talked about the use of rechargeable accumulators in an article about the change of receiver low tension supplies from 2V 'wet' to 1.5V 'dry' cells. When 12V is required, as for a car, six of the 'wet' cells are wired together in series ($2V \times 6 = 12V$) and fitted into an outer casing to form a battery.

If one cell gives trouble, then the performance of the whole battery suffers. The little story that follows will emphasise this point, and also serve as a further warning that accumulators must always be treated with care.

The incident began while I driving home on a rainy winter's evening with the heater fan, head and fog tail lamps, rear window heater and windscreen wipers gobbling up current. I had noticed, that although the alternator was generating, the battery condition indicator kept dropping to 11V, although all the electrics were working properly.

Obviously the alternator was carrying the load with little help from the four year-old battery. On arriving home I disconnected the battery and put it on charge overnight (with stoppers out of course).

The next morning, after some 15 hours of low current charging, I refitted the battery in the car. A few minutes later a loud 'bang' occurred after I'd used the starter. When I checked the battery, I found that the casing had burst open at one end and split along the top.

I think this happened because one of the cells had an intermittent connection (the reason for the sudden drop in volts) and after a long period of charging, it, like the other cells, was venting gas. Consequently, the high current drawn by the starter motor caused the faulty cell to 'arc-over' which, in turn, ignited the gas. Apart from a text-book lesson, it cost me £41 for a new battery!

Observations Solar

At 1115 on February 1 Patrick Moore (Selsey) made a drawing, Fig. 1, with his special apparatus, of the large sunspot group which he observed almost on the centre of the sun's disc. The sharp rise in solar flux during the last week in January, seen on Neil Clarke's computer print out, Fig. 2, suggests that the group was active as soon as it appeared on the eastern solar limb around the 25th. Prior to this the

daily number of solar flux units for the month had hovered around the 200 mark.

Neil also sent a graph, Fig. 3, showing the fluctuations in the earth's magnetic field for January. He reports that the Ap index during the month was very quiet, with only five days when it was above 10.

Ern Warwick (Plymouth) heard a burst of noise on 28MHz lasting several minutes from 1230 on the 26th, and others again at 1323 on February 1 and 1015 on the 6th. On the 1st, Cmdr. Henry Hatfield (Sevenoaks), using his spectrohelioscope, located three sunspot groups, 11 filaments, five quiescent prominences and a small flare. He told me that one of the groups was very large, with possibly 16 spots. On the same day his radio-telescope recorded individual bursts of radio noise on 136 and 1297MHz. Henry, Fig. 4, is an active astronomer and apart from designing and building his spectrohelioscope and two radio-telescopes, he had a book published by Butterworth entitled *Amateur Astronomer's Photographic Lunar Atlas*. He is a past President of the British Astronomical Association for whom he currently holds the post of treasurer.

The 28MHz Band

Judging by the propagation log sent in by Ern Warwick, the 28MHz band was very active during the period January 26 to February 25. He logged signals almost, daily, from tiny beacon transmitters in the Americas, (PY2AMI, WC8E, W3VD, W8UR, W9UXO), Canada (VE3TEN), Europe (DF0AAB, DL0IGI, EA3JA, HG5GEW, IY4M and OH2TEN) and South-Africa (ZS1LA, ZS5VHF, ZS6PW) and less frequently from Australia (VK2RSY, VK5WI and VK6RWA), Scandinavia (LA5TEN) and South-America (LU1UG).

Ern also reports hearing 'echos' on the signals from ZS6PW on January 30 and February 16, and fast-fading on ZS6PW and Z21ANB on February 5. I've a personal 'soft-spot' for the Norwegian beacon (LA5TEN). This is because, way back in November 1979, I sent in the first report of its signals and the beacon-keeper, Pal Justinaes LA5PN, modified one of his own QSL cards, Fig. 5, to mark the occasion.

Pal told me that LA5TEN, with its tiny 0.3W output to a 5/8λ ground-plane antenna, was radiating from his home near Oslo and that it had also been heard by LA2PH/MM near Florida, USA.

Beacons

Looking at beacons from another direction, I had an interesting letter from Bob Cooper, Jr. ZL0AAA (Houhora) in the most northern portion of New Zealand. Bob heard the UK 28MHz beacons GB3RAL (Rutherford Appleton Laboratory) on February 1, 4, 5, 6, 8, 9, 13 and 15 and G0MVL on the 1st, 5th and 6th. "Recently", wrote Bob on the 17th, "the first beacon to appear, as early as 0525UTC, is OH2TEN followed within 15-30 minutes by DL0IGI, DF0AAB, EA3JA (et al)."



Fig. 1.

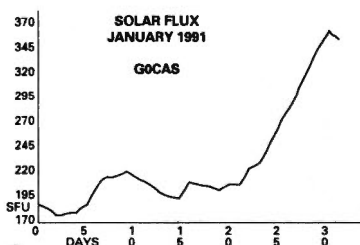


Fig. 2.

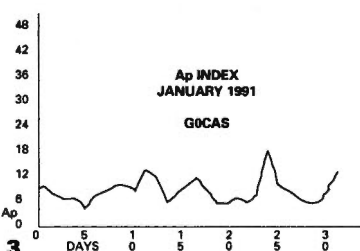


Fig. 3.



Fig. 4.

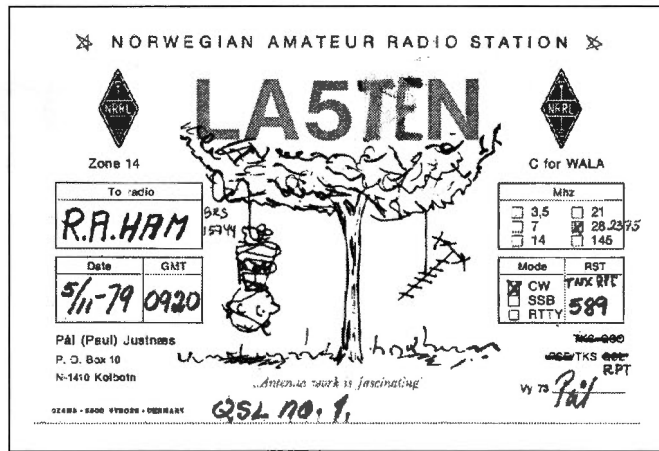


Fig. 5.

Band I Observations

Bob continued "The same 'pattern' appears on 40-50MHz as well; far north, then gradually south. By the same token, as late as 1430UTC, EA3JA may still be in (with IY4M, 5B4CY et al) while further north stations are gone".

Simon Hamer (New Radnor) received smeary and distorted television pictures, between 40 and 60MHz, from Australia, China, Malaysia, Thailand and the USSR via 'F2' openings on the 2nd and 4th, and from Australia and New Zealand on the 4th. Simon has received confirmation of his reports from the latter television stations.

The sought-after DX in this region came again for Simon on the 7th when he caught one of those brief bouts of winter Sporadic-E. He logged pictures from Denmark on Ch. E3 (55.25MHz), Finland and Iceland on Ch. E4 (62.25MHz) and Czechoslovakia and the USSR on Ch. R2 (59.25MHz).

John Woodcock (Basingstoke) heard utility stations from the USA, at the lower end of Band I, on January 30 and February 3, 5 and 6. By allocating a few memory buttons to these vision channels, readers

with scanning receivers should get an early warning of Sporadic-E when the television synchronising pulses (a low pitched variable buzz) appear on one or more of those frequencies.

The most vulnerable frequency to even the mildest Sporadic-E disturbances are Chs. E2 (48.25MHz) and R1 (49.75MHz). Such advanced information can be a great help to operators on the 50MHz amateur band. By the time you read this, the start of the 1991 Sporadic-E season (May to August) should not be far away, when you can expect 'rock-crushing' signals to suddenly appear on frequencies between about 20 and 150MHz.

Rising Signals

Within this range, radio amateurs can look for DX in the 21, 28, 50, 70 and 144MHz bands. The broadcast station enthusiasts however, have Bands I & II for TV DXing and the East-European band (66-73MHz) and the European Band II (87.5-106MHz) for those rare signals. A typical example of a Sporadic-E opening is the television test-card from Iceland, Fig. 6, received on Ch. E4, by me while

one such disturbance was in progress.

Tropospheric Observations

While the high atmospheric pressure (30.5in - 1032mb) was beginning to fall on the 4th, Simon Hamer took advantage of a tropospheric opening and logged pictures in Band III (175-230MHz) from Denmark, Norway and Sweden and in the u.h.f. band from Germany and all of Scandinavia.

Computing Techniques

Over the past five years, I've prepared my text for this magazine on an Amstrad PCW computer, Fig. 7 (left), using the word processor package Locoscript 1 that was supplied with it. The completed work is then sent on a 3in diskette to our editorial offices in Poole where they transfer the information to their own computer system.

About 18 months ago I added a 3.5in external disc-drive, (small shelf top centre Fig. 7) and fitted the extra 'chips' to upgrade the memory from 256 to 512K on each of the PCW8256 machines used by

Joan and myself.

The additions gave us a larger disc-storage capacity, up to 720K, and of course compatibility, so that we can, as often happens, carry out work for each other. Last June I installed an Amstrad PC2086D, (right Fig. 7) with a high resolution colour display, a pair of internal 3.5in drives and a Commodore MPS 1230 printer.

Words And Pictures

Although I use the Windows 'paint' program, packed with the 2086, for the drawings that periodically appear in my columns, I decided to use Locoscript PC for word processing. The next problem was transferring my numerous Locoscript 1 files from the PCW to the PC and, if need be, back again. However, I solved this by purchasing the '2 in 1' (version 2) software package from Moonstone Computing, Strathclyde Business Centre, Clyde Street, Clydebank G81 1PF, Scotland.

Briefly, the program's easy-to-follow on screen instructions make the transfer of text-files simple and, not only does it format both PCW and IBM-PC discs, it also provides a very good disc manager. The program alone costs £29.95 including post and packing and VAT.

Software Bridge

The same company's advert in the March 1990 8000 PLUS magazine (page 28) will show that the program is supplied free of charge when you purchase a second 3.5in drive from them, for the PCW8256 or 9512 machines. This external drive assembly sells for £99.95 plus £3 carriage. It is of course essential that you have 3.5in drives on both computers.

PW

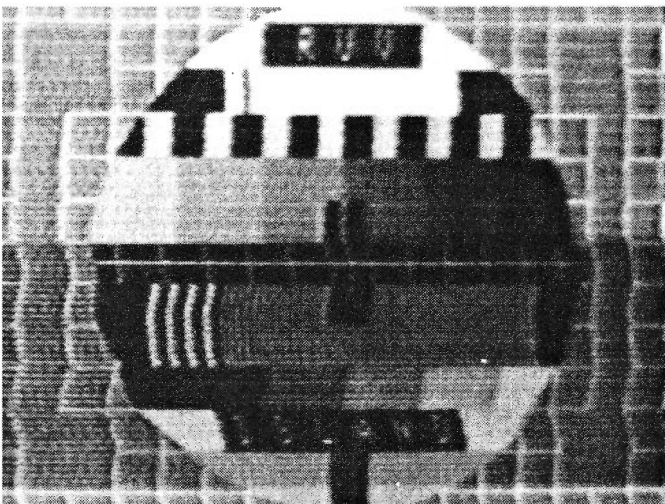


Fig. 6.



Fig. 7.

KW COMMUNICATIONS LTD

CHATHAM ROAD, SANDLING, MAIDSTONE ME14 3AY

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

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	
MVT500	Scanner RX 25-1300MHz hand held	£275.00	
MVT6000	Scanner RX 25-13MHz Base/Mobile	£345.00	
R100	Wideband RX	£489.00	
R700	Wideband RX	£989.00	
FRG9500(M)	60-950MHz	£499.00	
RS35	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	
R1	Hand portable Receiver	£595.00	
R171	General Coverage HF Receiver	£855.00	
FRG 8800	General Coverage HF Receiver	£549.00	

BUTTERNUTT (U.S.A.)

Item	Description	Price incl. VAT	P/P
HF6VX	6 Band Vertical	£179.09	
HF2V	80/40m Vertical	£142.00	£4.00
A1824	18 & 24MHz Add on Kit	£36.85	£2.00
STR 11	HF6V Radial Kit	£38.50	£2.00
NPS	Mounting Post HF6 & HF2	£5.00	£2.00
20MRK	HF2V 20m Add on Kit	£33.50	£2.00
30MRK	HF2V 30m Add on Kit	£33.50	£2.00
TBR160S	160m Add on Kit for HF6 & HF2	£84.48	£3.00
2MVCV	3db 2m Colinear	£33.99	£3.00
2MVCV	5db 2m Colinear	£83.99	£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 Antenna	£37.08	£4.00
153CD	Cushcraft 15-3CD 3E1 25m Beam	£140.08	£8.00
154CD	Cushcraft 15-4CD 4E1 15m Beam	£140.08	£8.00
203CD	Cushcraft 20-3CD 3E1 20m Beam	£236.61	
204CD	Cushcraft 20-4CD 4E1 20m Beam	£328.70	
215WB	Cushcraft 15E1 2m Yagi Antenna	£98.99	£8.00
4216XL	18 Element 2m Boomer	£121.90	£8.00
A3SS	Cushcraft 3 Ele Tribander SS	£324.02	
A4S	Cushcraft 4 Ele Beam Antenna	£291.85	
A50-6	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	£259.01	
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	£226.49	£3.00
MFJ1701	6-way Antenna Switch	£30.30	£2.00
MFJ1704	4 Position Ant Switch	£66.41	£2.00
MFJ202B	RF Noise Bridge	£63.20	£2.00
MFJ204B	Antenna Noise Bridge	£33.50	£2.00
MFJ260	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 Benchner	£146.25	£3.00
MFJ422BX	Electronic Morse Keyer W/O Benchner	£76.46	£3.00
MFJ484C	Grandmaster Memory Keyer	£162.32	£3.00
MFJ722	CW/SSB Filter	£78.46	£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	£22.14	£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	Toyco 30W 1-500MHz Dummy Load	£10.20	£2.00
T100	Toyco 100W 1-500MHz Dummy Load	£45.00	£2.00
T200	Toyco 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	Toyco Coaxial Switch 2 way 2.5kW 1-1500MHz SO239	£18.50	£2.00
SA 450N	Toyco Coaxial Switch 2 way 2.5kW 1-500MHz 'N'	£26.00	£2.00
DRAE UHF	UHF 3 position Antenna Switch 'N'	£24.15	£2.50
DRAE VHF	VHF 3 position Antenna Switch 'SO239'	£16.69	£2.50

VSWR/POWER METERS

Item	Description	Price incl. VAT	P/P
W180	Koyo 15/60W 2m In-Line VSWR	£32.81	£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 1.5/50W 2m	£24.60	£2.00
K 100	Koyo 2kW 1.8-60MHz	£78.88	£2.00
K 200	Koyo 200W 1.8-60MHz	£61.55	£2.00
K 400	Koyo 200W 140-525MHz	£63.65	£2.00
Y 1E	Toyco 120W 3.5-1500MHz	£37.00	£2.00
T 435	Toyco 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 70-680MHz	£29.95	£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	£978.00	
IC-726	HF All Band, General Coverage Rx + 8m	£989.00	
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	£365.00	
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-4E	70CM FM Handportable inc Nicad/charger	£310.00	
IC-4SET	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	
AT940	Auto ATU	£444.88	
TS140	HF 9 Band Gen. Cov. TX/Rx	£985.00	
TS680S	HF/6m TX Gen. Cov. Rx	£1,138.81	
TS440	9 Band TX General Cov. Rx	£222.49	
PS50	H/Duty PSU	£208.67	
AT230	All Band ATU/Power Meter	£238.00	
TH25	NEW 2m H/Held	£289.00	
TH45	NEW 70cm H/Held	£398.00	
TH75	NEW 2m/70cm H/Held	£215.26	
TH205	2m H/H	£252.13	
TH215	2m H/H Keyboard	£599.00	
TH751	2m 25W M/M Mobile	£685.00	
TM701	NEW 2m/70cm FM Mobile	£675.00	
TM721	2m/70cm FM Mobile	£289.00	
TM231E	NEW 2m FM Mobile 50/10/5W	£318.00	
TM431E	NEW 70cm FM Mobile 35/10/5W		

TEN TEC (U.S.A.)

Item	Description	Price incl. VAT	P/P
TT 562	Omni V HF Transceiver CW/SSB/FM 200 9 bands	£1,900.16	
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	£50.49	£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	£680.00	
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	HF Transceiver	£2,995.00	
FT767	Budget HF Transceiver	£1,599.00	
FT747GX	Mk II HF Transceiver	£859.00	
FT757GX	20A P.S.U.	£969.00	
FP700	Manual ATU	£219.00	
FC700	Heavy Duty 2m P.S.U.	£149.00	£3.00
FT757HD	2m Mini H/H	£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	£239.00	
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	270cm 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	£166.67	£4.00
CD4511	Hy Gain for up to 8.5 sq. ft. wind load	£236.80	
HAM4	Hy Gain for up to 15 sq. ft. wind load	£325.60	
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	£219.00	£5.00
G600RC	Offset lead unit, 3 wire, rotary dial control	£49.50	£4.00
AR200XL	Yaesu twist and switch control	£78.00	
G250	Kenpro Stay Bearing	£19.95	£4.00
KO308	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

PACKET PANORAMA

World-wide packet. News this month, from Roger Cook G3LDI, of activity from all corners of the globe.

Activity in Western Canada

Fred Wyatt VE7DFW and I have a weekly 'sked' on 21MHz. s.s.b. Fred, pictured in Fig. 1, visited me a couple of years ago along with Dave VE7DFS. They stayed a few days to look around the Norfolk area. Since then, Fred has become active on packet and takes quite a strong role in the running of the Victoria Amateur Packet Association.

Thanks to Fred, at the moment I'm the only 'G' member of VARPA and for that honour I appear at the top of the monthly members list. The fact that the list is in alphabetical order is purely accidental of course! The group now boast a membership of 82, and the only non-Canadians are SP5TAO and myself. The Secretary of VARPA is Paul Johnson VE7DHM, and his address is Sheringham Pt Rd. RR 2 Sooke BC, Canada VO5 1NO.

I suppose the membership for overseas amateurs is a little pricey at \$38.50, but you do get a solid brass lapel badge to wear proudly on your coat!

A regular news-letter, *Connect Request*, is edited by Larry Joe VE7DIE, pictured in Fig. 2. This newsletter is devoted entirely to packet related matters and appeals to both the hardened packeteer and the newcomer alike.

Connect Request covers such items as: 'How to Start in Packet', 'Introduction to TCP/IP', 'What is Amlink', 'Net/Rom explained' and so on. The publication also handles subjects appealing to the pioneer types, with emphasis on the new

high-speed, full duplex repeater linking at 56kb. This makes our 9.6kb links look positively slow!

An extensive software library is available including Public Domain (PD) and Shareware as well as specially written programs. It was Fred who, some time ago, encouraged me to run 'MSYS'. Having started with version 1.05, I'm now running 1.10, as are several other local BBS sysops. In fact, I've already passed the program around to other sysops in other parts of the country.

The program is quite versatile, having its own Node, capable of running and forwarding with TCP/IP, database search facility, built-in editor and lots more.

Packet in Cyprus

By the summer of 1991, Cyprus will have its first node 5B4CYP-1. Every amateur on the Island is anxiously waiting its arrival. The source of this latest news is an update coming from Costis 5B4TX:

"This node is not going to be just any old node. Hopefully, it will be one piece of a link which will speed up traffic on the v.h.f. network. We have been planning this for just under two years. Let me explain. Most sysops know the call 4X1RU Jim, who is one of the transatlantic gateways into the USA, Roger, GB7LDI, being the other. As far as I know, Manos (SV1IW) is working on getting organised in Rhodes, Crete and, of course, Athens.

"Thus we will have a link from the USA into Israel, then into Cyprus, (conditions permitting), from Cyprus to Rhodes, then on to

Table 1. Packeteers in China.

Name	Call-sign	Club	Equipment
Meng Chao	BZ1FB	BY1PK	KAM, AST286, TS-940S, TH7DX
Gong Kelu	BZ1AG	BY1SK	PK232, IMB-PC, DRAKE-7, 4-ELE YAGI
Li Yan	BZ1PYL	BY1SK	
Wang Baokang		BY1QH	PK232, PC/XT, IC-750, 4-ELE GAGI
Sun Hongqi		BY3CC	PK232, PC/AT, TS-820S, DIPOLE
Chen Rong	BZ4AYL	BY4AA	PK80, PC/XT, TS-940, TH7DX
Ni Kangwei	BZ4AR	BY4CPA	PK80, PC/XT, IC-750, DIPOLE
Zheng Zhengwen	BZ4CW	BY4ALC	PK232, PC/XT, TS-820, 4-ELE YAGI
Ni Feng	BZ4RDX	BY4WNG	PK232, TRS-80, IC-735, 3-ELE YAGI
Cheng Xiaosu	BZ4RCC	BY4WNG	
Ling Tao	BZ4ROM	BY4WNG	
Li Wensheng		BY4WNG	

Note: BY1 located in Beijing, BY3CC Tianjin, BY4AA BY4ALC BY4CPA Shanghai, BY4WNG Nanjing. At present no BBS in China, so we use VS6UF as our home BBS.

Crete, and from Crete into Athens, completing a direct link into Europe.

"This will take a very heavy strain off the h.f. network and hopefully enable a quicker and more efficient feed of both bulletins and personal mail. The only problem occurs during the winter months. For about two to three months, the link between 5B4 and 4X dies a sudden and dramatic death, but we are working on that problem and hopefully will soon have the solution.

"Packet radio is growing steadily here in Cyprus, and once the node is in place, Cyprus will become even more active on the packet scene and more people from all over the world will find out where Cyprus is. The reason I say this is because all mail sent to the UK from Cyprus seems to reach its destination without any problems. However, mail from the UK to Cyprus seems to get lost en route. So, please, all sysops in the UK, please put 5B4 and ZC4 in your forward files toward Roger GB7LDI.

"We presently have 3 BBSs here. The main one, 5B4TX-6, sits on 21MHz/144.675MHz and is operated by myself (Costis). Jon the Syop of 5B4ZL-6 operates on 144.675MHz at Troudos at 1746m ASL. ZC4BBS-6 is a new BBS which is presently being activated on v.h.f. but still undergoing tests. It is hoped to put this on h.f. also. Its location is Dhekalia on the British Eastern Sovereign Base Area. The sysop there is Steve.

"Jon Carp 5B4ZL, who lives on Mount Troudos was kind enough to activate both a BBS and digipeater. He links most of the Island so that most of the amateurs now have access to at least one BBS.

"Here are a few callsigns of packet-active 5B4s: 5B4DV, 5B4ES, 5B4FN, 5B4FZ, 5B4MD, 5B4NC, 5B4QA, 5B4SF, 5B4TX, 5B4UZ, 5B4WF, 5B4XA, 5B4YU, 5B4YX and 5B4ZL". Thanks for the news from Cyprus Costis! Costis, by the way, is responsible for the distribution of the SV9AIZ BBS program and plays an active role in HFNET.

Activity in China

A file received recently from VS6UF quotes a letter from Meng BZ1FB, giving some idea of how packet is spreading. I found it quite difficult to believe when reading some of the equipment involved. Obviously most of it is operated from a club station and I would imagine there is a fair bit of pent-up enthusiasm from some of the younger students out there. The mainly club stations, are shown in Table 1.



Fig. 1: Fred Wyatt VE7DFW.



Fig. 2: Larry Joe VE7DIE.

PACKET PANORAMA

Starting Frame

A few hints from Peter G0GSZ, regarding Lan-Link. Peter and I have sent out dozens of disks to Europe, South Africa, Cyprus, Australia and quite a few to the UK!

WARNING: Lan-link will not work correctly on all TNCs (if any) having only three wires connected in the RS232 lead. I have made up a lead with pins 1-8 and pin 20 connected at each end, and this seems to work fine with just about anything.

BEACON: To remove the Lan-link beacon and display your own, go into the parameters menu, [Esc - p], press I to switch the beacon OFF, then press U to upgrade. Then Exit from Lan-link and re-load in the normal way. As long as you have 'programmed' your TNC with your beacon text, etc, it's ready to go!

CAPTURE to DISC and AUTOMATIC LOGBOOK ENTRY not working: If you're using a KAM TNC and only have the normal five pins connected on your RS232 lead, then the 'DCD FLAG' in the parameters menu [Esc - p then X] must be OFF. If you're using any other TNC or, if you're RS232 lead has more wires connected, then the DCD flag should be set to ON. Remember to press the U to upgrade and exit. You should then reload so as to implement any changes.

MAIL SNATCH: If you find that, although you've already told Lan-link that your home BBS is (for example) GB7LDI, and you can see the header from that BBS showing MAIL for you, and you still can't get the ZAP BBS to work - take another look. Check again the header coming from your home BBS. In some cases, instead of the beacon header saying GB7LDI (or whatever) it may say, something like, LDIBBS! This is what Lan-link looks for!

LAN-LINK.SYS: Is a file which is read by Lan-link on first running. If you've been given a copy of LL by a friend he may have modified this file to suit his TNC. This is fine if your TNC is the same. If it's not the same - you could have problems! If you intend editing the file yourself then **READ THE MANUAL!** This is the place to find the answers to just about all the questions you may have. Also, don't forget the file README158, and the APPNOTES 1, 2 and 3. If you don't have a full copy of the distribution disk, send me a formatted disk plus postage and I'll send you an up to date copy of the full set of program files. The only other thing to remember with this file is that if you do edit it - **don't leave any blank lines.**

REGISTRATION: I know you want to. If you do this will encourage Joe, to do even more work on this already superb program, by writing more upgrades. Arrangements have been made for UK users to register easily. The contact is: Terry G0BIX, P.O. Box 75, Chatham, Kent. or, Tel: 0634 687168.

RTTY BUG: This has been fixed and v1.59 will be out soon I think.

RAM: Rumour has it that Lan-link won't work if you only have a 512K machine, it WILL, but Lan-link needs 450K so, as long as you only have the MS DOS system files loaded (and you are NOT using MS DOS 4.01) you should be ok. If needs be, put Lan-link on a floppy disc formatted as a system disc (i.e., format A:/s), switch off the machine and re-boot with this disc in drive A:. Better still, upgrade the computers memory.

MESSAGES to JOE via PACKET RADIO: If you do send any packet messages to Joe please do not make them of a commercial nature, i.e.: do NOT mention money or cost, etc. At least one sysop is removing such messages from his box, before they even get to Joe, so you won't get a reply as Joe will never get your message. Be careful with your wording.

South American Packet

The packet activity in South America today, is widespread, although the main activity is in countries like Argentina, Chile, Venezuela and Peru. In Brazil, packet radio is recent, and at present they are creating v.h.f. nets in the cities of Rio de Janeiro, Brasilia, Porto Alegre and Sao Paulo. In these cities there are already h.f. and v.h.f. Gateways with entry in QRG 14.103MHz:

Rio de Janeiro: PY1CYL-4 (KA-node, gateway to 145.090MHz) PU1JUD (BBS-WORLI, 28.113MHz and 145.090MHz)

Sao Paulo: SPNET-4 (KA-

node, gateway to 145.030MHz) PY2QE (BBS-WORLI, 14.105MHz and 145.030MHz), PU2NPQ (BBS-WORLI, 145.030MHz)

Brasilia: PT9KC-4 (KA-node, gateway to 145.010MHz), PT2PO-4 (KA-node, gateway to 145.010MHz)

Porto Alegre: PAE010:PY3SS-8 (NET/ROM, in experience)

See Fig. 3 for the Rio De Janeiro Net, Fig. 4 for the Brasilia Net and Fig. 5 for the Sao Paulo Net.

That's it for this month, please send any news, information, hints, and brickbats, etc., to G3LDI QTHR, @GB7LDI or tel: (0508) 70278.

73 and happy packeting de Roger G3LDI.

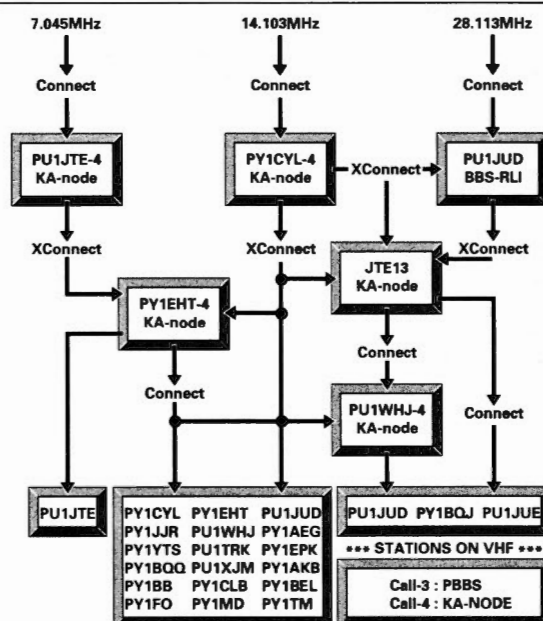


Fig. 3.

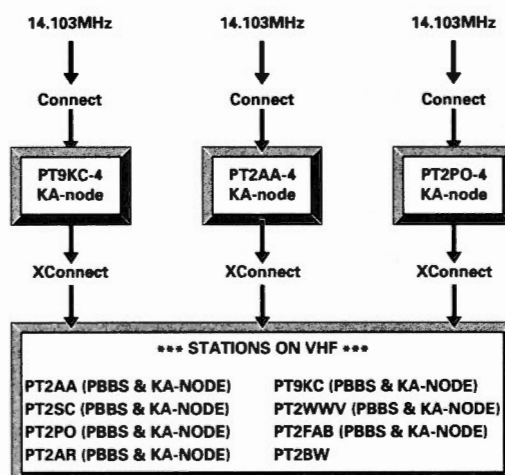


Fig. 4.

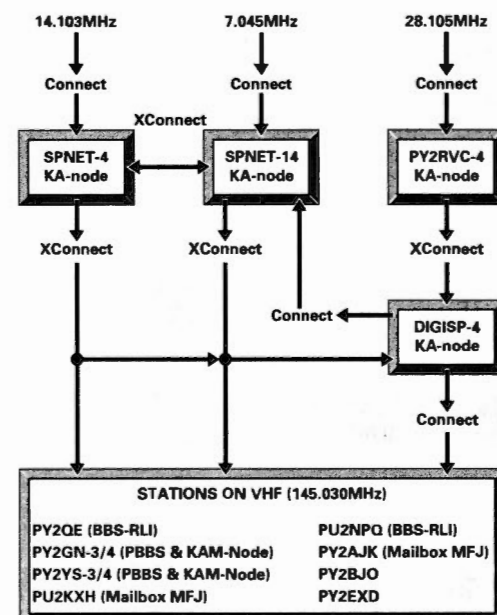


Fig. 5.

Several of the more enlightened TV repeater groups sent me their newsletters. These often contain valuable nuggets of information, which I am happy to relay here to a wider audience. In addition, their publicity receives a bit of a boost. So, many thanks to the Rugby, Severnside and Kent groups for their good work. I've also 'acquired' a copy of the Home Counties News Sheet this time, I can pass on some of their news as well. As for the other groups, I must assume they went into hibernation for the winter, but how about putting me on your mailing list?

Men Of Kent

The Kent Television Group seems to be going from strength to strength, with 14 paid-up collaborators. They number G4BBH, G8SUY, G8GHH, G8GHP, G4AYT, G4GJA, G4CZJ, G8NVH, G4DVG, G1FWR, G4GUO, G4BFS and G3OGX. As this is not an exclusive club, more will be very welcome. On the technical front, it was decided to adopt the Teletron logic for the repeater on account of its simplicity. This was duly purchased from BATC club sales.

A prototype vision switcher (CQ-TV 141) was also constructed, to complement the Teletron as used on GB3ET. The next item required was the sync' detect circuit, a suitable one being found in CQ-TV 144 using the NE567 PLL.

This was their first failure! On examination with the 'scope, it was found that a small amount of video was still present on the syncs upsetting the NE567, and causing it not to detect 15.625kHz. More head scratching and another circuit was found to take place of the transistor in front of the NE567 (CQ-TV 138). With a quick circuit mod a 1458 op-amp was installed and tested and bingo! It worked better than hoped, sync' could still be detected even when the video had disappeared into the noise. This mod' is now being built into the final board.

Another problem encountered was the tone oscillator filter circuit, (CQ-TV 144) for the c.w. ident' tones coming out of the Teletron board. Overshoot was suffered on the rising edges, causing the Morse to sound clicky and very unnatural (just like computer generated Morse!). A new approach was pursued using a 741 op-amp in an active band-pass filter circuit. This has proved to be very successful and will be incorporated into the final logic board. Circuit details can be obtained from G8SUY.

The p.a. block (using an Icom SC1040 kindly donated by ICOM UK), was constructed and soak tested for 36 hours, producing a continuous, healthy and clean 19W for the duration of the test. Further site tests have been proposed and will be reported in due course. If you cannot wait you can always ring Andy G8SUY on Faversham (0795) 531541.

Having agreed that the proposed repeater would be sited at Whitstable, the purchase of antennas was the next logical step. The group has decided on two Alford slots. The s.w.r. on the trial system has turned out to be excellent, and the performance was far better

FOCAL The World of ATV POINT

Andy Emmerson G8PTH

Spring is sprung, the rally and contest season is upon us and it's time for another round-up of ATV news. A quick peep in the filing cabinet finds a pile of letters, so let's air them without further ado (count the cliches in that sentence!).

than expected. A final decision on this matter has yet to be made.

Home Counties News

The High Wycombe repeater's antenna system has been completely replaced with a new set of flat plates, made by Dave G3MPS before he emigrated to Australia. These are about 3m higher and are giving much improved results to the east.

The black brick p.a. lost power and has been replaced. So far so good, with the repeater back on full power. A new experimental feature on the repeater, is an additional sound carrier on 5.7MHz. This relays 144.75MHz whenever the repeater is on, making 144MHz talkback easier, and this has proved useful.

Recently Mike G8LES built a transmitter for G8CKN to use during GB2RS news broadcasts. Tests show that on just 2W, Roy can produce a P4 picture on GB3HV, which is not bad for 56km! Initially Mike will relay Roy's pictures to the repeater, so that he can insert captions and photos, etc.

The first experimental (not properly scripted) news broadcast took place on Sunday 6 January, with G8CKN transmitting directly to the repeater. This revealed a couple of technical problems which should not be difficult to resolve.

After this, the club will send a tape and letter to the RSGB to formally start the service. This will be the first time that GB2RS news has been televised and it marks a great achievement for

the club and ATV in general. Well done Home Counties Group and to G8LES for getting Roy on the air, his activities certainly ought to create new interest in ATV.

German ATV Club

The latest newsletter from the German ATV club indicates there's trouble brewing. They are seriously considering ceasing their affiliation to their national club DARC, the equivalent of the RSGB. The cause of these bad relations is that the DARC is apparently unable to reconcile the wishes of narrowband-mode users with wideband amateur television. It appears that the 70cm band in Germany is being reduced by 2MHz. The DARC is reportedly not prepared to allow the ATV, packet and RTTY representatives to take part in the necessary replanning of the band.

This does not augur well for the future, and we must all hope something practical does emerge in the end. In the meantime, the 'threatened' groups have united. The AGAF (the ATV club) has linked up with the packet radio groups IGAF, Ampack-Bayern and Nord<>Link to form a common strategy to protect the interests of 'technically experimental radio'. This is an excellent move, and one which could well be copied elsewhere.

New Lancashire ATV Operator

Phil Trippear G6GLD, hails from

Royton near Oldham in Lancashire. He is just setting up an ATV station with a Sony b/w TV, Microwave Modules converter, and 6-element cubical quad antenna. I didn't know you could get 70cm quads, but he says it all works well, probably on account of the 183m a.s.l. location. He says "I always look forward to your ATV page in P.W. It's excellent, I wish there was more of it". So do I Phil, so do I, but thanks for the kind words.

SSTV Revival

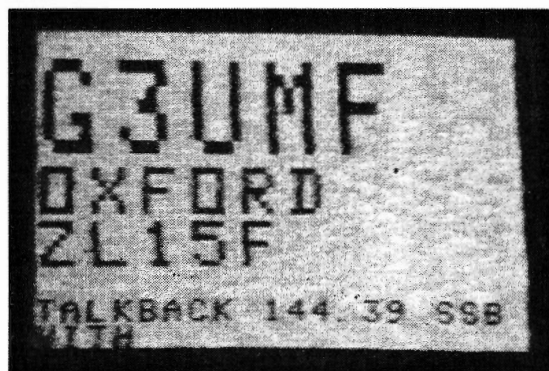
"Just to let you know there is life on SSTV ..." So starts a letter from Eric GW8LJJ. There's a qualification of course, and that's the news of that life comes from South Wales. History tells us the Romans and Anglo-Saxons made life so unpleasant for the Celts in England, that they withdrew to the relative safety and isolation of Wales. So, perhaps it's the Principality which will become the last stronghold of SSTV in Britain! Be that as it may, I'll allow Eric to resume his tale.

"The latest newcomer is Bill GW0C10. His QTH is Aberbargoed and he used a Spectrum to view SSTV, until he saw the receive set-up of Cecil GW8MTJ at Blackwood, Gwent. Bill has now thrown his Spectrum away! Cecil has built the G3WCY/G4ENA converter and has separate transmit and receive units. The latest development is a sampling camera (1970s) with extra mods of his own. I have seen pictures from his system, both over the air and direct, and I am impressed with the results. In fact I think my 'digital' receive system limits the results seen!

"Bob GW30VD of Abercarn, Gwent, used a computer but abandoned it long ago in favour of the, yes, converter circuit; again the same method has been adopted of using separate TX and RX methods.

Glen GW7GTW, of Maes-y-cwmmer, mid-Glamorgan used to have a Spectrum, so did Keith GW8TRO and Peter GW4EAI, both of Pontllanfraith. (I could have said Blackwood but I felt you probably needed another Welsh word for your vocabulary! [dead right, Eric, I've actually bought a Welsh language cassette course!]). Not much seen of Keith with his 'separates', nor of Peter with his receive converter. Glen is our local SSTV repeater. He's the only one who can receive anything from me down in the 'well' of Barry, but he cannot pick up anything from Bob. So Bob sends his SSTV pictures to Cecil, who records them and then plays the recording via 144MHz to Glen, who records them and plays the results over the air to me. Then I transmit SSTV pictures to Glen, and the whole process is reversed. By the time Bob receives my pictures I've gone to bed!

"My set-up consists of separate receive and transmit converters, but I'm also playing with a sampling camera. I would never use a computer for SSTV, and Cecil doesn't even have a computer. We sit on 144.500MHz most evenings and weekends, and would welcome any SSTV contacts. Yes, even computer graphics until you get 'converted'. Hope this will be of some interest."



New Zealand

The world's best letter writer, **Mike ZL1ABS**, has been at it again. This time he has sent a list of printed circuit boards for many video and r.f. projects, all ATV-related. The list is five pages long, and several old favourites from *Television* magazine (all the test pattern generators) are included. You might well find something useful here, and the boards would not cost much to post from New Zealand. I'll be happy to send you a copy of the list in return for two unused second class stamps plus an s.a.e. My address is 71 Falcutt Way, Northampton NN2 8PH.

Software Matters

Some while back I mentioned a package called 'AVT Master', and remarked that it was little short of fraudulent that the UK importer charged

the US dollar price, only in pounds. With a nearly two-to-one exchange rate this is indefensible and of course, there has been no explanation offered. Accordingly, Mr Everall G6FTA, is wondering if he should order it from the USA, but has heard a tale that the American version won't work in the UK. He finds this unlikely, but wonders if anyone can say for definite and why. If you know please give him a ring on (0992) 27166 - and don't forget to tell us as well!

Old Film

I'll repeat this plea since nobody has responded - yet! If anyone has any old film of ATV activity of more than 20 years ago, please let me know. The archives of ATV are pretty thin, and unless we preserve material now it will be lost forever. Please drop me a line if you can help - all costs will be refunded.



Despite the impression you might get from these pictures, amateur television is not the exclusive province of G3 stations. Anyone can join in!



0202 665524

PCB 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, Enefco 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. Always check the latest issue of PW for the current details of price and availability. Please enquire for p.c.b.s not listed here.

Board	Title of Article	Issue	Price £
WR287	MORSE KEY (speedbrush)	MAY 91	4.85
WR255	MEON-4	MAY 91	6.76
WR283	SUDDEN RECEIVER	MAR 91	4.54
WR282	REPEATER TONEBURST	FEB 91	5.10
WR281	HIGH VOLT REG PSU	JAN 91	4.70
WR276-80	MARLAND SET (7 BOARDS)	SEPT 90	21.96
+263/4	TRANSMITTER		
WR272	NICAD RECYCLER	JUNE 90	7.06
WR275	LOW VOLTAGE ALARM	JUNE 90	6.49
WR273	VALVE PSU	MAY 90	7.00
WR274	RX ATTENUATOR	MAY 90	5.84
WR271	PRODUCT DETECTOR	APRIL 90	5.05
WR270	BADGER CUB	APRIL 90	5.04
WR269	GLYME	FEB 90	6.83
WR268	IRWELL (r.f. p.a.)	FEB 90	6.12
WR264	IRWELL (relay)	FEB 90	5.10
WR263	IRWELL (vfo)	JAN 90	6.12
WR267	FORTYNINER	JAN 90	6.12
WR266	TUNED ACTIVE ANTENNA	JAN 90	5.71
WR265	TUNED ACTIVE ANTENNA (psu)	JAN 90	5.71
WR262	REPEATER TIME-OUT	DEC 89	4.92
WR261	AM TX FOR 1.8MHz	NOV 89	6.63
WR260	10MHz RECEIVER	OCT 89	5.10
WR259	10MHz RECEIVER	OCT 89	5.10
WR258	10MHz RECEIVER	OCT 89	5.10
WR257	LOW BATTERY WARNING	SEPT 89	6.00
WR256	ACTIVE FILTER	AUG 89	7.10
WR254	TX CONTROL FOR MOBILE USE	JULY 89	5.18
WR253	TS9405 MODIFICATION	JUNE 89	5.65
WR252	TWO TONE OSCILLATOR	MAY 89	6.65
WR251	RF OPERATED RELAY	FEB 89	3.87
WR250	DC/AC POWER CONVERTER	JAN 89	3.29
WR249	"MARLBOROUGH" MF CONVERTER	DEC 88	4.70
WR248	"BADGER" 144MHz RECEIVER	OCT 88	9.29
WR247	ZENER DIODE TESTER	AUG 88	3.63
WR246	"PORTLAND" RF VOLTMETER	JULY 88	3.66
WR244	PRACTICE MORSE KEY	JULY 88	3.02
WR245	STOPBAND FILTER FOR PW BLENHIEM	JUNE 88	2.96
WR243	VHF MONITOR RECEIVER (AUDIO)	APRIL 88	2.35
WR242	"ORWELL" VARICAP TUNE OPTION	MAR 88	6.12
WR241	"ORWELL" MED. WAVE RECEIVER SET	MAR 88	
WR240	"	"	9.29
WR239	"	"	
WR238	"OTTER" 50MHz RECEIVER	JAN 88	7.25
KANGA	HIGH STABILITY VFO (see issue)	OCT 87	-

Board	Title of Article	Issue	Price £
WR236	"BLENHIEM" VHF CONVERTER	SEPT 87	7.14
WR235	MAINS ON/OFF FOR BATT RADIOS	SEPT 87	3.05
WR234	SIDE-TONE OSCILLATOR	JUNE 87	2.75
WR233	"DOWNTON" F-V CONVERTER	JUNE 87	3.98
WR232	"AXE" SIGNAL TRACER	MAY 87	
WR231	"	"	9.40
WR230	"	"	
WR228	"BLANDFORD" RECEIVE CONVERTER	APRIL 87	
WR227	"	"	9.90
WR226	"	"	
WR298	"ITCHEN" LCR BRIDGE	APRIL 87	5.97
WR225	"WOODSTOCK" SW CONVERTER	MAR 87	4.18
WR219	MASTHEAD PRE-AMP PSU	FEB 87	2.55
WR218	MASTHEAD PRE-AMP FOR 144MHz	FEB 87	4.28
WR224	"WESTBURY" BASIC WOBBULATOR	JAN 87	3.57
WR214	MOD SRX-30D (AUDIO)	DEC 86	3.05
WR223	HIGH-IMP MOSFET VOLTMETER	DEC 86	2.96
WR222	"TAW" VLF CONVERTER	NOV 86	5.92
WR216	LF BANDS ACTIVE ANTENNA	NOV 86	2.44
WR220	GET STARTED LOW-COST CONVERTER	OCT 86	2.44
WR215	SIMPLE 50MHz CONVERTER	SEP 86	3.67
WR213	MOD FRG-7 (CARRIER Osc)	JUN 86	2.75
WR210	"ARUN" PARAMETRIC FILTER	MAY 86	8.27
WR211	"MEON" FILTER (SMALL)	APR 86	3.16
WR209	SIMPLE AUDIO OSCILLATOR	MAR 86	4.38
WR208	RF SPEECH PROCESSOR	MAR 86	4.18
WR207	CRYSTAL CALIBRATOR	JAN 86	2.13
WR206	RTTY/MORSE MODEM (Plug-in)	JAN 86	2.85
WR205	RTTY/MORSE MODEM	JAN 86	5.51
WR203	SIMPLE CAPACITANCE METER	OCT 85	2.85
WR199	"MEON" 50MHz TRANSVERTER	OCT 85	6.83
WR202	ECONOMY UHF PRE-SCALER	SEP 85	3.77
WR201	ADD-ON BFO	AUG 85	2.55
WR200	LOW-COST CRYSTAL TESTER	JUL 85	2.55
WAD302	BATTERY CHARGER CONTROLLER	JUN 85	3.05
WR197	"COLNE" (Osc/Converter)	JUN 85	3.98
WR198	"COLNE" (Product Det/Audio)	MAY 85	3.98
A005	"COLNE" (VFO)	APR 85	3.16
A004	"COLNE" 3.5/114MHz RX (RF Amp)	APR 85	3.16
WAD249	MOD FRG-7 (BFO)	FEB 85	3.05
WAD280**	TRIAMBIC KEYS	FEB 85	7.25
WA002	"TEME" (RECEIVER)	JAN 85	6.68
WA001	"TEME" (VFO/DOUBLER)	DEC 84	5.29
WR178	DART (Audio / change)	DEC 83	3.05
WR177	DART (p.a.)	NOV 83	3.05
WR176	DART (v.f.o.)	NOV 83	3.05
WAD246	"DART" FOLLOW-UP	DEC 84	4.07
WR196	"TEME" 7/14MHz WRP (TX)	NOV 84	3.77
WR195	STABLE TONEBURST	NOV 84	2.65
WR189/92 Pair	BUG KEY WITH 528-BIT MEMORY	OCT 84	8.68
WR185	AUTO-NOTCH FILTER	JUN 84	6.63
WR183	TOP-BAND DF RECEIVER	APR 84	6.63
WR179	TRANSCIVER VOX UNIT	MAR 84	7.86
WR161	"MARCHWOOD" 12V 30A PSU	JUL 83	4.28
WR165 ect set	"SEVERN" 7MHz QRP TX/RX	-	15.21
WR169	"SEVERN" (TRANSMITTER)	JUL 83	6.63
WR168	"SEVERN" (CH.OVER/SIDETONE)	JUL 83	6.63
WR166	"SEVERN" (RECEIVER/AUDIO)	JUN 83	6.63
WR165	"SEVERN" (VFO)	JUN 83	5.31
WR167	RTTY TERMINAL UNIT FOR ZX81	JUN 83	7.96
WR160	LMS REGENERATIVE RECEIVER	FEB 83	5.31
WR156	REPEATER TIME-OUT ALARM	NOV 82	5.31
WR143	ATV CONVERTER	APR 82	7.25
WR144	IAMBIC KEYS	MAR 82	6.63
WR126	"EXE" 10GHz TRANSCIVER	AUG 81	7.86
WR095	TRANSCIVER POWER SUPPLY	SEP 80	3.92
WR068	AF SPEECH PROCESSOR	JAN 80	5.31

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 NO GAPS! 400 memories£765.00

Icom R1 The world's smallest scanner. 150kHz - 1300MHz.
100 mems. AM/FM & WFM modes. Full range of accessories
in stock.....£399.00

LOW NOISE WIDEBAND PRE-AMPS (25 - 2100MHZ)

Jim M-100 for use with TX/RX£79.95
Jim M-75 for use with RX only£69.95
Jim M-50 fixed 18dB gain no filters£49.95

Kenwood

TS850SD H.F. Transceiver - w/without ATU. General coverage
RX plus many more features - this new model is now
in stock and has to be heard to be believed£ PHONE

TS950DS Kenwood flagship - dual receiver with digital
processing - internal ATU - full details available.....£3199.00

TM731E dual band mobile£655.00

TR751E 2m -m/mode£599.00

TM241E H/PWR 2m FM£289.00

** This is only a small selection - many more in stock **

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

Icom

As mainstream dealers for all of Icoms products, we carry a
good cross selection of their popular models. Don't forget!
we do offer good p/x terms so why not save money and
make way for that new H.F. rig this year.

IC-765 HF all band gen. RX£2499.00

IC-255 E/H - 2m base - m/mode£1199.00

IC-229E - 2m mobile - 25 watts£325.00

IC-2400E - dual band mobile£635.00

*IC-2SE *IC-4SET *Icom WB1 *IC-735 *IC-24ET

Trading Post

With the ever increasing prices of new equipment more and
more of us are turning to second-hand and used equipment.
Here's a sample of our current models:-

FRDX400 RX£245 FT790 70cms m/m£325

TS430S£625 FRG9600 boxed£375

FT7B c/w 160m£345 TS930S c/w auto ATU v.g.c.£1095

Atlas 210 & VFO rare£385 FRG7 gen. cov. receiver. Clean£185

FT208 H/held 2m£100 ERA Micro, as new£135

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

Trading Post

FT708 70cms H/held, boxed.....£125* SX200 base scanner, am/fm

Standard C5800 2mtr mobile switchable£125

m/mode£325 Realistic Pro 32 h/held£130

Lowe SPX30 Gen. Cov. Receiver£165 Sony 2001 Portable s/w rx£199

FT290R 2mtr m/mode Portable£345 Regency 850E h/held£120

TH21E H/held c/w DC conv/battery£150 Fairmate HP100E h/held£199

Kenwood TH27 2m H/H£195 Pro 2021 base scanner, choice of 2£135

TOKYO 80m mono bander, boxed£245 MVT-5000 base/mobile£189

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

NEVADA MS1000 The worlds 1st mobile 1000 channel scanner.
Modes AM-FM-WFM. Specs similar to HP200 - additional:-
AF Scan facility & remote cassette record option.....£279.00

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

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-5000 H/held (25-550 MHz, 800-1300 MHz), 100
memories, c/w all accessories.....£249.00

MVT-6000 Base/mobile version of the MVT-5000 h/held
supplied with all accessories and AC adaptor.....£299.00

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

This month 'Quaynotes' starts off by answering a query on the Swiss 934MHz proposals, and then your letters and comments. For 27MHz operators there's the chance of winning a new CB loop antenna - and all you've got to do is think of a suitable name for the antenna!

As usual, the first job I've got to do in this month's column is to thank you for writing. I'll try my best to write individual replies where I can, but because many of your letters are so interesting it's best to reply via the column.

A good example to start off with at the 'high end' is a fascinating letter from **Bill UK1550** in Dorchester, Dorset. As a keen 934MHz man, Bill wants to know the source of my information about the proposed Swiss 'top end' u.h.f. allocation. So keen was Bill to know - he sent in two letters!

Well Bill, and the various other writers along with the people who, (so I've been told) were bending the *PW* Editor's ear at the London Amateur Radio Show, my sources aren't secret. In fact they were broadcast all over the world by Swiss Radio International. I also read about the proposals in a German-language radio magazine.

Swiss Letter

To try and finally sort out the details about the proposals the Swiss authorities have - I've written to them asking what frequencies they intend to use and what constraints there are planned. So, as soon as I have any news to pass on to you - it will appear on this page.

The many letters and comments passed on to me via the *PW* office tell me, that 934MHz operators are pleased that the 'CB High & Low' is adopting a positive approach to the 934MHz allocation. I can only back up your comments by my own in stating that surely - the only way is forward!

Mick Miller UK569, who also holds the amateur radio callsign of G7EGX, writes from Leigh-on-Sea in Essex with some favourable comments about operating standards on 934MHz. These are, he says, higher than on the amateur 144MHz band. Mick also went on to explain how the 934MHz Club organisation works, with each area representative writing articles for the magazine and reporting to the club secretary.

Rounding off his letter, Mick tells us about the Essex Area 934MHz Club Group's rally which is to be held on Sunday August 4, near Southend. Mick invites anyone wanting more information to call him on (0702) 512814 or write direct to: The 934 Club UK Secretary, PO Box 934,



By 'Quaynotes'



Fig. 1: Bill Reynold's 934MHz station in Kettering.

Featherstone, Pontefract, West Yorkshire WF7 6YZ.

To round off the 'high end' this time I must mention **Bill Reynolds** in Kettering, Northamptonshire. Bill has been a keen 934MHz operator since 1983 and his homebase rig is shown in **Fig. 1**. Bill says that there are three other 934MHz operators in Kettering. However, the most interesting item he enclosed was a printout of his slow scan television (SSTV) working on 934MHz. Can we have more details Bill? It sounds fascinating.

Thanks also for the letters and cards from **Frank Fuller UK933** and the many others. I'll try and contact you all, or quote from them in the column as soon as I can.

Scene On Twenty-Seven

Again, thanks for all your letters. It seems as though many CB operators regard themselves as being forgotten in the past by *PW*. Well, that's as maybe, but you're not forgotten now!

I've had an interesting letter from **Wyn Mainwaring** from deep inside 'Welsh' Wales. Wyn, who holds the amateur radio callsign GW8AWT, is wondering if there is a diplexer unit available that can

sort out 27MHz and 144MHz. This (hopefully) would enable one antenna to operate on either or on both bands.

Speaking for myself Wyn, I've never seen or heard of a combined 27 and 144MHz antenna. It's possible (in the same way we used to do with Band I and III TV antennas!) to use the same feeder cable for both antennas with a diplexer. However, there's a price to pay in the form of insertion loss in the diplexers at each end of the coaxial cable feed. Don't forget that you will need two diplexers, one to combine the two antenna signals and the other to separate them at the rig end.



Loopy Competition

No, I'm not going loopy! But there's a chance for you to win one of the recently introduced CAP.Co. 27MHz loop antennas. The antenna is deservedly proving popular, so much so that I only took delivery of the review model ten days before the May deadline (full review next issue).

However, CAP.Co. aren't too sure if their name for the loop antenna (it's called the 'Hi-Gain DX Exterminator') 'fits the bill' in the way a name should. All you have to do is think of a suitable name for the loop, bearing in mind what it can do. Firstly, the loop antenna can operate efficiently while mounted low down, it can 'null out' interference, and being fairly small, can be mounted inside an average-sized roof space.

So, have a go, avoiding names that have already been used and may be copyright to other products. Send your entry to CB Loop Competition, CB High & Low, Practical Wireless, Eneco House, The Quay, Poole, Dorset BH15 1PP, by 9 May 1991 enclosing the corner flash from this page. The competition will be judged jointly by the *PW* Editor Rob Mannion, and the proprietors of CAP.Co. Ltd. Their decision will be final and no correspondence will be entered into.

Best of Luck!

Fig. 2: You could win a CAP.Co. 27MHz loop antenna like this one!

Back-Scatter

HF Bands

Reports to
Paul Essery GW3KFE

287 Heol-y-Coleg, Vaynor, Newtown, Powys SY16 1RA

I've got a mixture of news for you this month. Mainly it's about the prolonged spell of good conditions, which has gone on now for quite a while and seems to be continuing for the while. Secondly it's about the clerk of the weather whose rain clouds hereabouts have kept me out of the garden - thanks, pal! The other, important, item of news that I must include is that the information about the Victorian incoming QSL bureau in Australia (March PW), has turned out to be incorrect. The Wireless Institute of Australia (see 'Receiving You') have corrected the report and it's good to know the bureau is fully operational. Sorry about that folks, and I apologise to all concerned for misinforming you with information which was published in good faith.

The Bands

Conditions weren't just good at h.f., but very reasonable on the lower bands. People who played in the contest weekend, February 16/17, certainly got the works, plenty of sunspots plus very quiet geomagnetic conditions. To keep tabs on what goes on by the week, listen to your local RSGB News broadcasts on Sundays and top this up daily by a listen to WWW or WWWH as appropriate.

Between now and the time this appears, I'll be bending a close ear to the receiver for signs of Jim Smith appearing from Bangladesh S2, and ET2A who is said to be there till April-end. One snag is that the ET2A licence is written in the Ethiopian language and I understand that the ARRL is looking round for a translation. Still with upcoming operations, I must mention the South Sandwich operation by 4K1ZI; there seems to be some doubt both on the Russian and the UK sides about the legality of this one. A pity if it turns out to be South Sandwich Slim, because this is currently one of the most wanted countries on the DXCC list.

The 1.8MHz Band

It's interesting to notice how the news of our local Powys radio club net (1932kHz plus or minus QRM, 1900 on Tuesday evenings) has got around and brought people in to join us. We do enjoy our 'visitors' but on a recent evening I went QRT only to be told later that I'd missed a GM from up in Shetland by ten minutes!

Down in Minster, on the Isle of Sheppey, G2HKU puts a good signal out. On s.s.b. ON7BW, GW3JPT, GW0JAI, GW4GNY and on c.w. E17M, GM3PFO, DL0OV, PI4COM, EI9FK, DL1PM and OY2J.

Short wave listener Roy Merrill (Dunstable) noted some 80 assorted European/UK stations on c.w. One Sunday evening N2RM was noted pounding away for 15 minutes before Europe awoke to his presence. In addition a weak N5 and a W8 were noted but they failed to rise much above the noise. On the s.s.b. front, perhaps the prize catch was the GM3YXN/M who was heard to complete with GM4CAZ/P and then put a CQ out 'lost in Glen Garry in the Western Highlands'. However,

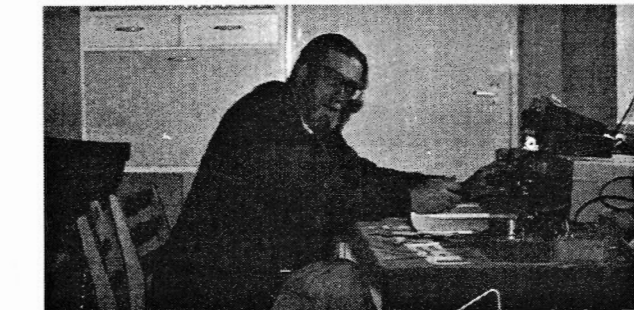


Fig. 1: Paul Essery GW3KFE operating the Powys Amateur Radio Club station.

although he was a thumping signal in Dunstable no one was heard to come to his rescue. He also noted the Powys net on 1.932.

Down on the coast, G3BDQ (Hastings) was another of the many to join our net, and in addition John had the odd session of an evening, in which he worked among others T77V, OY9JD, CT3M and A92BE in Bahrain.

The 28MHz Band

From the lowest to the highest band, and of course, here there is no doubt the good conditions have helped no end. For example, G2HKU mentions that his 4W rig was enough to UA6BCE and N3HKU. On the big box the key was paddled at 9J2B0, K5NA, N4UB, N4AR, 4X4NJ, N3RS, VE3DXR, N6QR, K4LTA, N3RD, W6OV, N7BG, W6DU, K4FU, KNOV, W9GW, N2KW, K4BAI, K8EJ, H8DA, NR70, K4XU, W6THN, N3RS, CO1HJ and PZ1DW/4.

Turning to another key paddler, ON7PQ (Kortrijk), we find Pat has VQ9AB, 9U5QL, T30DS, TJ1CW, JF2POF/JD1 and 8J8WUS/8.

Now to some s.s.b. Don G3NOF (Yeovil) found the band open to N. America till as late as 2300. The G3NOF signal attracted

attention from CE0ZCD, FO0IGS, FY0EK, HC1EEV, HK3MAE, HL1AHS, HL9HH, KL7KC, VP2V/VE5RA, TJ1CW, UA4HTT/RV4L, UW0CW, UZ0FWA, VE7DGI, VS6BX, XE2XA, XF0C (Clarion Is.), YJ8RN, ZW0MI (Melo Is), ZX0MXK (Sao Sebastao Is), 5T5HH, 6Y5/N4YBF and 9Y4SF.

Angie G0HGA (Stevenage) mentions she is down to QRP temporarily and in the process of revamping antennas in order to ease a TVI problem; meanwhile just 10W to the long-wire was good enough to raise WW2P, K1TN and UA3QOM.

Short wave listener Harold Wood (Manchester) uses a Philips 2935 receiver, a home-brew a.t.u. and some 10m of wire on this band; VP2VE, VO1SA, YV1DRK, 5T5/N5JRC, 5N6JHM, A71CD, YV5ENI, ZF2PZ/P8, ZF1HJ, 5Z4FM, XE2GG, XE2NLD, 7X2BK, CU2BQ, DF2RQ/ZZ, ZS6TJ, VU2PS and VP2MR.

The 3.5MHz Band

Firstly I should mention mention the QRP gang. On behalf of the G-QRP and OK QRP Clubs, G8PG notes that the last East-to-West QRP Weekend, held last September, brought in fifty logs. Apparently many more stations than that were active. All the comments have been noted and I

understand that the 27-29 September 1991 event will take into account the useful suggestions from entrants. I've also been told that the rules will appear fairly soon. One thing I do know for certain, is that the event will be open to anyone prepared to use c.w. with an input of 5W or less.

Now to G0KRT in Welling, Kent. Eric continues with his DTR3 at 2W output and Howes receiver, plus an end-fed 25m wire which is operated against a counterpoise. The QRP stations worked included G0JWA, G0IYY, G3INZ, G3LGX, G4CZB, G4GIY, G4TZX, GW3ITT, while FE6DTX, G0ENV, G0EFP, G3ATH, G3OZT, G3PUQ, G4DNC, G4MDQ, G4MZL, G40XK and G4ZGK were all using normal power levels.

Over to G0HGA again. Angie mentions Y21SL/A, DL1DJL, LY1BW1, UV1AZ, G0DTM, G4ZMH, G4FKH, G40EC, G3EUK, G4BJM, G3JUT, GW3COI all with 20W to the W3EDP. With 10W to her rig, she managed G0FYP, G4JBD, G3TLB, G4SES, G0GZN, G0KWD and DK6HN.

Turning to ON7PQ, Pat keyed with ZC4CZ, J6LTA, CO8LY, VK2OI, U18AA and UJ8JL.

Oddments

A letter from Kevin Walton 9M2ZZ/N4RMF notes that he is back home and active with the N4RMF call, from Culpeper, Virginia. However, he still has some 9M2ZZ cards and will answer requests sent to him at: Kevin L. Walton 9M2ZZ/N4RMF, PO Box 316, Culpeper, Va 22701-0316, USA.

According to W6OAT, NCDXC is pressing the DXCC Desk to give separate country status to North and South Korea. Their reasoning is that although there has never been any activity from N. Korea since 1948, they believe that some Soviet operators may well be game to attempt to activate N. Korea in the relatively near future. Thanks *The DX Magazine* for this information.

WARC Bands

Pride of place and welcome to a new reporter. Mary G0ZNA, (Kirkby-in-Ashfield) got her ticket on September 1 last year, and after a sniff round the bands has decided that 18MHz suits her fine! Her first three contacts on h.f. were on this band, by way of VK5AWG, VK6ADU and ZL1CCS on September 10-11. Since then she has such goodies as JA2VPO, VK3EO, FG5BG, FM5WD, VP9HE and T77J, all s.s.b. - but the first ZL on the key has been achieved too. On the equipment side Mary has a TS-440S plus a half-sized G5RV antenna.

Down in Yeovil G3NOF notes that 24MHz has increased in popularity of late with a big increase in the USSR stations using the band. On 18MHz Don found AL7I, RA2FF, KB0NL and VE8QL. The list is longer on 24MHz, including A71AL, A92BE, AL7I, CT3FT, EA9TL, FG5BG, G4WXA, HL1IUA, HP3FL, HF0POL (S. Georgia), JA2KSI, JA3BFL, JA4DND, JA6CUH, JH2UUL, JH5AVM, KB0NL (N. Dakota), KL7XD, KP2A, LX20X, N7JUN, OD5CX, OY9JD, PY3TD, RD7DZ, TG9AJR, UA4HTT/RV4L, UA9SAW, UF6DZ, UG6LQ, UL7TC, UO5BG,



Fig. 2: The well-known contributor to 'HF Bands', Pat Parmentier ON7PQ from Kortrijk in Belgium. Pat's essentially a c.w. operator, and is just completing the toughest of all awards 5BWAZ - with all the outstanding ones on 3.5MHz.

Back-Scatter

UW9SR, UZ0AXX, VE8QL, VK1FT, VZ/WD4FSY, VK1FT, VK4CEK, VK6GU, VK8GN, VP2E/NOLMD, VU2RX, W7MAD (Montana), ZB2IT, ZP5SR, 6W1QJ, 8P9FC and 9H1MF.

On 24MHz, says ON7PQ, he worked VP2EXX, A22AA, FM5WD, HK7AAG, CO6DD, K8MFO/6Y5, OH0BBF, TJ1CW, FH5EJ. On 18MHz, K8MFO/6Y5, VP2V/W2GUP, TJ1CW, 9Q5UN, PJ9JT, VK9LM and CU2AK. Which left 10MHz to produce C9EC, FH5EJ, ZD8VJ, 9Q5UN, UJ8KA, ZC4CZ, J6LTA, K8MFO/6Y5, CO1RH, JW9VDA, 9M6UY, T30DS and CU2AK.

For G2HKU an interesting c.w. contact on 10MHz was with Rod Newkirk W9BRD, of QST fame, LA8UC and K2QPR/4. As for 24MHz, Ted found AB5X, 9Q5UN and W2BA.

The 7MHz Band

From his base in the north-west, **G3LPS** (Blackburn) kicks off here. Eric is another correspondent to note how 'conditions' have appeared thanks to the high spot-count and low geomagnetic level.

Interesting c.w. QSOs included UA0QFC who gave the temperature as -32°C (Brill!), U18IZ, YC0HML/3, K6DC several times, 8P6AU, RA9LBH, JA7IC, ZLOAAD/ZL7, P4 Y, UG6GDA several times, RA9AAV, C30CAG, UA0ACG, YQ3R, W7XR, AD6C, KT7G, W6TC (long path), UJ8JI, JA7BXS, JR1ATQ, JA3FKK, JH7XM, W6TSQ, UA9LQ, AA5DX/MM near KH9 (this one was tough copy due to the presence of an echo on the signal), 4X/YU400, U18IZ, UM8MTT, 4K2/UV3CC, N7UA, VE7SV, UA0ACG, UM8MTT again, N6DKP, RA9OU, V85AA, JA1CXG, JS6CDB, JA0ARJ, RV45/RA3AUU, PYSAJE, PT2DMS, UF6FEI, UA0YO and UV9G/UA9XBE.

Now to G2HKU who notes c.w. to JA4JKR, VP2E/NR1R, K2LE, EA6ZY, H18A, CT3CU, N4AR, K3ZO, NN8R, W8OZM and WB8YJF.

As always c.w. was the preferred mode at ON7PQ. Pat thus made it to 9M8AX, 4K1A, VK4VB/Z2, 9U5QL, 9X5HG, Z21HQ, T30DS, 9Q5UN, ZK1XL, VK9LM, 9H3JR, 9M6UY and LU6EF.

Yet another c.w. fan is G3BDQ, who notes his QSOs with UJ8JJK, UL7PIG,

JA0KAZ, JH3JPM and JA4KGR.

G0HGA also prefers this mode. Her QRP c.w. on this band got out to K2MGR, W3VT, NJ8G, KT10, VE1AAY, UL7PGA, K1ST, NQ2D, K3ZO, EA6ZY and J6LTO for a new one on the band.

The 21MHz Band

Just a couple of contacts for G2HKU. Ted found K4LTA and PJ2JP.

Pat at ON7PQ managed 3D2QB, ZW0MI, 9U5QL, X29A, T30DS, ZK1XO, 3D2AG and TJ1CW.

Both the above were on c.w., so now we turn to G3N0F, who offers s.s.b. contacts with A22AA, BZ4DFJ, HSOAIT, P29NMD, VK9LM, VP5DM, WB6UMC/9K (Kuwait Airport), W7LXR and 9U5QL.

The 14MHz Band

G2HKU notes just one s.s.b. contact, with ZL3FV, but on the key he notes N4UB, 4X4NJ, K2LE, W10T, W1RAN, N3RD, K4LTA, KN0V, N3EA, K9QVB, K4FU and HK3HY.

At ON7PQ, the log entries read: 9J2SZ, T21CE, V63BH, ZK1XO, T30CT, 4K2/UV3CC, A41JV, A22GH, FR4FP, AT0NRO, T30DS, 9M8WB, VK9LM, K8MFO/6Y5, 9M6UY and T32AF.

A92C, BV2AR, BV2FB, BY1QH, DU1KT, FG5BG, HB0/DF3UB, JT1CS, RJ0J, ST0DX, T30A, T30DR, VKs, 4K4/UA0KBZ (Wrangel Is), 5H3DC, 7X2VZK, 7Z1AB and 9U5QL all fell into the lap of G3N0F.

Meanwhile G0NZA does occasionally change from 18MHz and on 14MHz Mary managed to break her duck by way of YV5ENI.

In Hastings G3BDQ was trying his half-wave doublet as a vertical against ground and he found VK2GV, U18AA and - best of the bunch - OE8NOK/ZL5 in Antarctica.

So there it is for another time! Deadline for the next lot to arrive no later than May 1 and June 1. My address can be found at the head of the column. Meanwhile, enjoy yourselves and I'll be delighted to hear from some more new contributors to join our happy band!

Solar Data for February 1991

The last week of January saw an upsurge in solar activity, with flares occurring on January 21, 23, 25, 27, 29 and 31. The solar flux measured a level of 367 units on January 31, the highest so far for cycle 22. The magnetic storm activity during this period was the cause of a 'Scottish type' aurora on February 1. The quieter side of the sun was in view between February 4-17, but even so a number of major flares were observed on February 7 and 8. During this period, those with suitable viewing equipment were able to see some very large sunspot groupings. **But please don't try viewing the sun directly yourself!** From February 18, the more active side of the sun rotated into view again with much flare activity being reported. At 1600UTC on February 19, another 'Scottish type' aurora was observed in central England. The quiet side of the sun started to come into view from February 25 and the solar activity declined.

The solar flux index see-sawed from 367 units on January 31 down to 175 units on February 10, it then climbed back up to 311 units by February 24. At the end of the month it had reduced in value to 233 units. The daily geomagnetic A index fluctuated greatly during the month, alternating every 5 days or so from values of 3-5 up to values around 10-20. A peak value of 21 units was recorded on February 1, other active days being the 8th and 12th when the A index measured 17.

The increase in February's solar indices lends more credence to the predictions of the past few months of a second 'relative maximum' or at least an extended maximum for Solar Cycle 22. It still does not appear

that the increases in activity and solar indices seen over the past several months will be enough to overtake July 1989 as the solar maximum.

Propagation Forecast

It's difficult to predict accurately what will happen during the period April-May. There is certainly an increased likelihood of auroral propagation which may affect the v.h.f. bands between 50-144MHz. I advise you to listen to transmissions from WWV giving the 3-hourly geomagnetic K index. This information is given at 18 minutes past the hour, the figure at 1518UTC being particularly useful in gauging whether an aurora is impending or indeed already in progress. If you can't get away with a communications receiver and a long wire in the office, you could telephone 0101 303 497 3235 for the latest solar terrestrial indices. A K index of five or greater is a sign to stop work and nip out before the boss finds you! During this period, the first indications of the summer Sporadic-E season should also be noticed. This will normally effect the 50-70MHz bands but always be prepared for the unexpected. You won't be able to predict

these openings, it's really a case of being in the right place at the right time. The trans-equatorial path, on 50MHz, may possibly allow contacts into southern Africa and perhaps South America. Look for openings to ZS6 around 1000UTC or 1600UTC and those to CX/PY around 1300UTC or 1900UTC.

The 50MHz Band

The conditions on 50MHz were fantastic! Great! I worked all continents in three hours! The band was in tremendous shape during February with openings nearly every day. During the middle of the month the band was open for 12 consecutive days. Propagation was especially good to Oceania and Africa although there were some openings to Asia and North and South America. The excellent conditions continued through to at least the first week of March allowing many stations to work into Australia, Philippines, Guam, Argentina, Uruguay and Brazil but more of that in next month's column.

I start off this month with details of the openings into Oceania and Asia. The first reported opening was on February 5 at 0900UTC when KG6UH/DU1 (PK04) in

Manila was heard by G3RFS and G3HBR. From 0945UTC, VK3AMZ and VK30T also became audible in the UK. This opening was the prelude to five continuous mornings of propagation, mainly to the Philippines but occasionally to Australia and Japan. Among the DX stations worked from the UK during this period were KE9A/DU3, KE0SC/DU3, JR6WPT and JR6WXY. No far eastern DX appeared to have been heard in the UK on February 11, but amazingly **Bob Cooper ZLOAAA** (RF65) reports that his c.w. signals were copied by DK2EG (JN59) at 0821UTC. This is the first time that 50MHz signals from New Zealand have been heard in Europe. An in-depth, three page analysis of these results were published in the February edition of the *Six Metre and Up DXER*, a monthly newsletter that's written by G4VXE and myself. In the UK, openings to DU and VK resumed again from February 15 lasting until the 19th. Callsigns mentioned most often included KG6UH/DU1, VK30T, VK4ALM and VK6JJ. **Ela Martyr G6HKM** (ESX) also worked VK8ZLX (PG66) on the 15th and VK8GF (PG66) on the 19th. **Geoff Brown GJ4ICD** (JER) heard, on February 19, V73AT on the Marshall Islands, in the Pacific Ocean, working VS6WV! He was peaking 529 at 1000UTC. Geoff heard him again on February 25 but despite signals being quite strong a QSO was not completed. Only one European station, I0DLP, has so far managed to work V73AT.

It seemed there was hardly a day during February that didn't support propagation into Africa. All the regulars were there, TR8CA, TU20J, TU2UR, TU4DH, 3X1SG, 6W1QC and 9L1US. A welcome addition to the growing numbers active in Africa was TL8MB (JJ94) operating from the Central

Back-Scatter

VHF Up

Reports to
David Butler G4ASR
Yew Tree Cottage

Lower Maescoed, Herefordshire HR2 0HP

Back-Scatter

African Republic, but be quick, as he leaves there during May. Cards go via his home call sign FD1JJK.

There were also a number of openings into South Africa during the month. On February 2, around 1115UTC, the ZS5SIX beacon (50.321MHz) was heard in southern England. About 20 minutes later, ZS5DW (KG50), popped up and worked a number of UK stations before disappearing around midday. The Ascension beacon ZD8VHF was S9+ prior to this event. Another opening, on February 16, between 1215-1330UTC, gave many UK stations contacts with ZR6EMN, ZS6SS, ZS6LN and ZS6WB.

Geoff GJ4ICD worked PT7NK and PZ1AP and heard PJ4E on February 1. He also worked PY0FF (HI36) on the 4th and heard him again on the 12th and 22nd. There seemed only to be one good day during the month that allowed contacts to be made into South America. This was on February 12, when between 1250-1340UTC, OA8ABT, PT7NK and YV5ZZ were all busy working many UK stations. The French Guyana beacon FY7THF (50.039MHz) was reported to have been heard on February 1, 3, 6 and 11.

Propagation into North America was quite good on a number of days, most correspondents mentioning the openings on February 3 and 24. Ted Collins G4UPS (DYN) worked K8ATQ (EN91), K8MFO, W8IDU (EN83), W8W8M (EN72), WZ8D (EM79) and W90EH (EM79) and many others between 1530-1630UTC on February 3. Of course, all this action was not restricted to the UK alone. Johan Van de Velde ON1CAK reports that this opening was one of the best he has heard since coming on the band, contacts being made with W1-4, W8 and VE. The F2 conditions were also excellent on February 24, between 1145-1500UTC, with many UK stations making contacts into W1-3 and VE. Apart from the American and Canadian activity during the month, a few operators managed to work KP2A (Virgin Islands), on February 1, 3 and 11.

If you've run out of countries to work on 50MHz, you could try listening on 28.885MHz for a spot of crossband activity. The Radio Club Pane Djukic YU1ANT in Belgrade is now capable of receiving on 50MHz, using a Yaesu FT-726R transceiver and dipole. They expect to have a 4-element Yagi in use for the Sp-E season.

Ralph 4X4IF has in the past worked a large number of UK stations, with 28/50MHz crossband capability. He reports that negotiations, regarding operation on 50MHz, have proved successful and that he is now active on the band. Access will only be available to those with an extra class licence, power limited to 25W output, in the frequency band 50.100-50.150MHz. His first UK opening was on February 15 when he worked G18YDZ at 0900UTC.

Jon 5B4ZL passes on the good news that the Cyprus authorities have also granted 50MHz operating privileges. The regulations exactly match the UK allocations, 50-52MHz, at a power level of 20dBW e.r.p.

The report that 4X4 and 5B4 have now

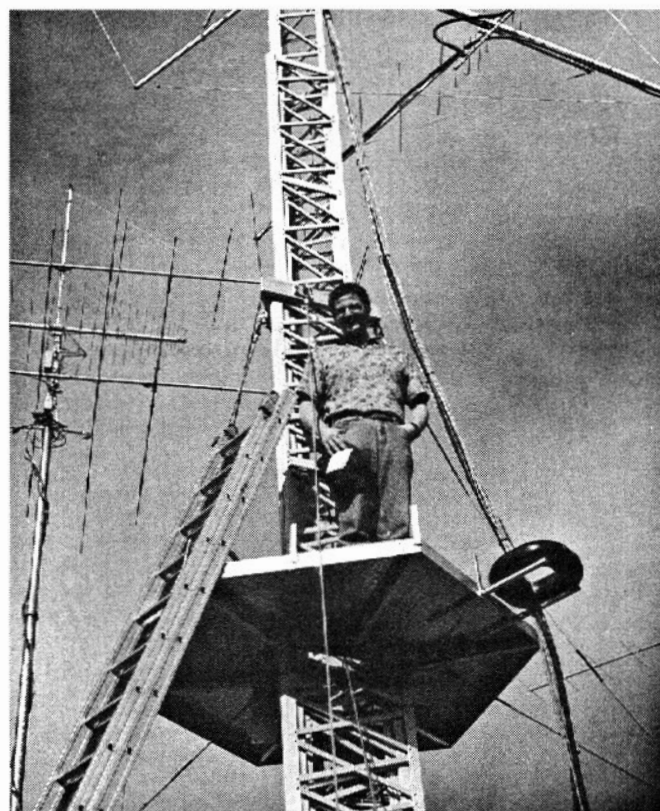


Fig. 1: Dan Gautschi HB9CRQ who is proposing to start a 144MHz EME Newsletter.

joined ZC4 in allowing 50MHz operation, means that the UK has three Asian countries within Sp-E range. Good news for those that have worked VK, DU or KG6 and are looking for the difficult continent!

The 70MHz Band

In the March issue of *PW* I gave details of the new 70MHz band plan which came into force on 1 March 1991. According to Neil Lasher G6HIU, national mailbox coordinator, this has caused a little consternation among some packet radio operators. I reported that 70.3125, 70.325 and 70.4875MHz are all packet radio usage and indeed this is correct. It's the term 'usage' that has been mis-understood. This is only meant to imply the general use of these frequencies. It is very similar to saying that a certain part of the band is used for f.m. telephony without being specific about the actual use of each channel. And so it was the case with the 70MHz band plan as published. To be specific, 70.3125MHz has been allocated by the v.h.f. committee, of which I am a member, for packet radio usage. However, the data communications committee have yet to decide exactly what to put on there. If you have any suggestions, please contact G6HIU. Regarding the other frequencies, 70.325MHz is mainly used for DX clusters and 70.4875MHz is used for mailboxes, forwarding and user access.

Between January 29 and February 25, I operated from my home QTH using the call sign GB4MTR. During this 28 day period, I made 87 QSOs on 70MHz with 56 different stations. Despite the poor prevailing conditions, s.s.b. contacts were made all over the UK, from the Isle of Wight (G8DDY), up to Aberdeen (GM0FRT), and over to

Belfast (G14SJB/P). I also aired the call on 50MHz contacting stations in DU, TL, VE, W, 3X and 9L.

John Bruce G14SJB (DWN) is well known to many 70MHz operators for his portable activities from County Down, especially during the recent cumulative contests. Following comments from a number of stations, he has agreed to operate from the much wanted counties of Fermanagh and Tyrone. He will operate from one of these during the 70MHz w.a.b. contest on June 9 and from the other one during the Trophy contest on September 29. John mentions that he now has a 5-element Yagi up at home, and despite the poor take-off to the east and south, hopes to make some contacts in a northerly direction via aurora. He runs an FT-290R into an RN Electronics transverter giving about 25W output.

The 144MHz and 430MHz Bands

There has been very little feedback regarding 144 and 430MHz, despite tropo conditions being excellent into central Europe on a number of days during January and February.

Gerry Schoof G1SWH reports working GM3JFG (IO77), for a new country and county, on December 30. He is hoping to work the Scottish station on 1.3GHz, maybe this year, as GM3JFG has now increased his cavity amplifier output to 70W.

Being honest G6HKM confesses to have spent very little time on 144-430MHz, most of the time having been spent chasing the DX on 50MHz. She contacted her first GM of the year, GM8ORG/P (DGL), on 144MHz, during the contest on March 2-3.

The same contest enabled 12 counties and three countries to be contacted on the 430MHz band.

Steve Damon G8PYP (DOR) found time not only to work the DX on 144-430MHz, but also to complete WAC on 50MHz by working VK6PA (OG89) on March 3. Tropo conditions on January 28 were good, Steve working DB8KJ, DC6KI, ON4ANH and PA3EPA on 144MHz and PBOAHX on 430MHz. DJ9QL (JO31) was also contacted but was subsequently lost as signals faded into the noise.

VHF News

Dan Gautschi HB9CRQ, shown in Fig. 1, is proposing to start a monthly e.m.e. newsletter catering for the 144MHz enthusiast. The bulletin would cover activity reports, station news, sked requests, technical information and anything else to do with 144MHz e.m.e. You can telephone Dan on 01041 6471 5544 for further details.

This year's Scandinavian v.h.f./u.h.f. meeting will be held in the resort village of Seljes (KP13SR) in western Finland between June 7-9. A number of UK operators normally attend this traditional meeting comprising of lectures and discussions. You can get more information from Ari Naappa OH6CL by telephoning him on 010 358 68 29475. Finland by the way, is two hours ahead of UTC.

If you can't make Finland, then why not Italy? Following the signing of CEPT recommendation TR 61-01 by the Italian national society ARI, UK amateurs can now operate in Italy without a special reciprocal licence. Class A licensees will use the prefix IK and Class B licensees will use IW. In this latter case, operators are restricted to 10W power input. Operation is allowed on all v.h.f. bands, including mobile operation. Ideal for the Sp-E season!

The Polish v.h.f. manager SP5CCC has provided details of the SP VHF award. All contacts, even mobile or portable, made on 144MHz and above from 1 January 1992 are valid. There are no restrictions to mode or bands used and no QSL cards are required. The award is also available to s.w.l.s. To make your claim you must contact stations in the Polish districts SP1-SP9. There are 3 award classes available.

Class 1: 50 different Polish stations in six districts, where 15 contacts must be over a minimum distance of 200 km.

Class 2: 35 different Polish stations in four districts, where 10 contacts must be over a minimum distance of 100 km.

Class 3: 25 different Polish stations in two districts.

The application, together with 10 IRCs should be sent to Tomasz Ciepielski, P.O. Box 19, 03-996 Warsaw 131, Poland.

Beacon and Repeater News

A new 50MHz beacon to listen for is ZP5AA operated by the Radio Club of Paraguay. Located in Asuncion (GG14), the 5W beacon commenced operation in January on 50.0245MHz. It was heard by a number of stations in southern England around 1330UTC on March 9.

You are more likely to hear the new

Reg Ward & Co. Ltd. 1 Western Parade, West Street, Axminster, Devon, EX13 5NY.

Telephone: Axminster (0297) 34918

Yaesu

icom

KENWOOD

FT1000	HF Transceiver	2995.00 (10.00)
FT7B7	HF Transceiver	1899.00 (10.00)
FEK7B7(10)	2m Module (7B7)	179.00 (3.00)
FEK7B7(10)	70cm Module (7B7)	225.00 (3.00)
FEK7B7(10)	6m Module (7B7)	179.00 (3.00)
SP7B7	Speaker	89.95 (3.00)
FT747GX	Budget HF Transceiver	899.00 (10.00)
FT757GX	MkII HF Transceiver	969.00 (10.00)
FP700	20A P.S.U.	219.00 (4.00)
FC700	Manual ATU	149.00 (3.00)
FP757HD	New 2m 45W P.S.U.	259.75 (4.00)
FAS14R	Remote Aerial Switch	80.00 (3.00)
FT738	2/70cm 45/35W Base Stn.	1359.00 (10.00)
FT74700	2m/70cm Dual Band FM Mobile	875.00 (7.00)
FT2900MkII	MkII Super 290 2m Multimode 2.5W	1175.00 (3.00)
FT680MkII	MkII 6m M/Mode 2.5W	429.00 (5.00)
FT2311R	23cm FM Transceiver	475.00 (5.00)
FT211RH	2m 45W FM Mobile	309.00 (5.00)
FT212RH	New 2m 45W FM Mobile	349.00 (5.00)
YHA15	2m Helical	8.50 (2.50)
YHA44D	70cm J wave	12.50 (2.50)
MMB15	Mobile Bracket	14.55 (2.50)
FT411	2m H/H Keyboard	225.00 (3.00)
FB711	70cm H/H Keyboard	239.00 (3.00)
FT470	2m/70cm Dual Band H/H (Body only)	389.00 (3.00)
FT23R	2m Mini H/H	209.00 (3.00)
FT73R	70cm Mini H/H	229.00 (3.00)
FB8B	Nicad Battery Pack (23/73)	34.50 (2.50)
FB8B	Nicad Battery Pack (23/73)	34.50 (2.50)
FB8B	Nicad Battery Pack (23/73)	87.85 (2.50)
NC18C	Charger (23/73)	17.71 (2.50)
SMC28	Charger (23/73) 13A Plug	17.71 (2.50)
NC28	Charger (23/73)	17.71 (2.50)
NC28	Base Charger (23/73)	89.00 (3.00)
PA4	Car Adaptor Charger (23/73)	24.15 (2.50)
MM12A2B	Speaker Mic	31.05 (2.50)
MM18A2B	Speaker Mic Miniature (23/73/727)	31.05 (2.50)
FR8900M	60.950MHz Scanning RX	609.00 (8.00)
PA4C	Power Supply for 9600	29.00 (2.50)
NC9C	Charger	11.50 (2.50)
PA3	Car Adaptor/Charger	21.85 (2.50)
YMA24A	Speaker Mike	31.05 (2.50)
FR8800	HF Receiver	649.00 (8.00)
FRV800	Converter 11B-175 for above	100.00 (3.00)
FR7700	RX ATU	59.00 (3.00)
MM18B	Hand 600 Bpm mic	21.00 (3.00)
MD18B	Desk 600 Bpm mic	75.00 (3.00)
MF1A3B	Boom mobile mic	25.00 (3.00)
YH77	Lightweight phones	19.99 (3.00)
YH55	Padded phones	18.99 (3.00)
YH1	Lightweight Mobile H/ant-Boom mic	28.75 (3.00)
S82	PTT Switch Box 280/790	22.00 (3.00)
SB10	PTT Switch Box 270/2700	22.00 (3.00)
FL2025	25W Linear	115.00 (3.00)
FL9020	5m 10W Linear	109.00 (3.00)

IC785	HF Transceiver	2499.00 (10.00)
IC751A	HF Transceiver	1500.00 (10.00)
IC735	New HF Transceiver	978.00 (10.00)
IC726	HF/6m base stn.	989.00 (10.00)
IC725	HF Base Transceiver	759.00 (10.00)
AT100	100W ATU (751/745)	365.00 (5.00)
AT150	150W ATU (735)	315.00 (5.00)
PS55	Ext PSU (735)	185.00 (5.00)
IC505	50MHz multi-mode portable	529.00 (5.00)
IC229E NEW	2m 25W FM Mobile	329.00 (5.00)
IC75E	2m New Mini Handheld	279.00 (5.00)
IC275E	New 2m 25W Base Stn IC75E	1069.00 (8.00)
IC45E	70cm H/Held	310.00 (5.00)
IC24ET	70cm 10W M/Mode	365.00 (5.00)
IC400	2m/70cm Dual Band H/Held	817.00 (5.00)
IC2400	2m/70cm FM Dual Band Mobile	635.00 (5.00)
ICR71	Gen Cov RX	858.00 (8.00)
IC7000	VHF/UHF Scanner	989.00 (8.00)
AH7000	25-1300MHz Discone	92.00 (4.20)
SP3	Ext Speaker	61.00 (4.00)
CK70	DC Cable (R70/R71)	7.00 (2.50)
EK257	FM Board (R70/R71)	41.00 (2.50)
GC5	World Clock	43.00 (3.00)
AC2	Waterproof Bag all Icom H/H	14.38 (2.50)
BC35	Desk Charger	70.15 (3.00)
BP4	Battery Pack 8.4V (2/4E/02/04E)	28.90 (2.50)
BP5	Empty Battery Case (2/4E/02/04E)	9.20 (2.50)
CP1	Battery Pack 10.8V	60.95 (3.00)
DC1	12V Charge Lead BP3/7/8	6.90 (2.50)
HM46	DC/DC converter operates from 12V	18.40 (2.50)
HM8	NEW Mini speaker mic	24.15 (2.50)
HS51	Speaker/Mic	21.85 (3.00)
LC41	Headset inc PTT/Vox unit	41.25 (2.50)
LC42	IC32 = BP3	9.20 (2.50)
LC42	IC32 = BP5	9.20 (2.50)
SM8	1.3A/800uA BP Base Mic	82.00 (3.00)
R1	150kHz-1300MHz RX	399.00 (5.00)
R72 NEW	HF RX	645.00 (10.00)
R100	500KHz-1800MHz	499.00 (5.00)

TS8505	NEW HF Transceiver	3199.00 (10.00)
TS140	HF 9 Band Gen. Cov. TX/RX	862.00 (9.00)
TS8808	HF/6m TX Gen. Cov. RX	965.00 (9.00)
TS440	9 Band TX General Cov RX	1138.81 (9.00)
AT440	Auto/ATU	144.82 (4.00)
PS50	H/Duty PSU	222.49 (4.00)
AT230	All Band ATU/Power Meter	208.87 (3.00)
PS430	Matching Power Supply	173.78 (4.00)
SP430	Matching Speaker	40.81 (4.00)
TL922	10/160 2xW Linear	1495.00 (10.00)
TH28	2m H/Held	249.00 (5.00)
TH46	70cm H/Held	289.00 (5.00)
TH77	2m/70cm H/Held	389.00 (5.00)
TH205	2m H/H	215.28 (5.00)
TH215	2m H/H Keyboard	252.13 (5.00)
TR751	2m 25W M/M Mobile	599.00 (6.00)
TS790	VHF/UHF Transceiver	1495.00 (9.00)
R2000	Gen Coverage HF/RX	589.00 (5.00)
VC10	11B-174MHz Converter (R2000)	161.94 (3.00)
VS000	General Coverage HF/RX	875.00 (9.00)
VC20	11B-174MHz Converter (R5000)	167.21 (3.00)
TM701	2m/70cm FM Mobile	468.00 (5.00)
TM731	2m/70cm FM Mobile	665.00 (5.00)
TM241E	2m FM Mobile 50/10/5W	289.00 (5.00)
TM441E	70cm FM Mobile 35/10/5W	318.00 (5.00)
SMC30	Speaker/Mic TH214/2800	28.31 (3.00)
MC43	8P Desk Mic	22.22 (3.00)
MC80A	8P Desk Mic	86.22 (4.00)
MC80	Electric Desk Mic	63.96 (3.00)
MC85	Desk Mic Audio Level Comp	89.00 (4.00)
MC43	8P Flat Mic	22.22 (3.00)
MC38	4P Flat Mic	21.72 (3.00)
MC55	Mobile Mic (6p.o. 8p)	52.87 (3.00)
LF30	HF Low Pass Filter	32.28 (3.00)
HS8	Lightweight Hiphones	24.36 (3.00)
HS5	Deluxe Hiphones	37.54 (3.00)

C W Keyers

SWR/PWR Meters

HI-MOUND		
HK702	Straight key (adjustable tension)	42.75 (3.00)
HK703	Straight key (adjustable tension)	49.68 (3.00)
HK704	Straight key (adjustable tension)	28.35 (3.00)
HK705	Straight key (adjustable tension)	28.25 (3.00)
HK706	Straight key (adjustable tension)	28.98 (3.00)
HK707	Straight key (adjustable tension)	25.48 (3.00)
HK802	Straight key (Deluxe-Brass)	99.95 (3.50)
HK803	Straight key (Brass)	89.95 (3.50)
MK703	Squeeze key	37.00 (3.00)
MK704	Squeeze key	24.99 (3.00)
MK705	Squeeze key	32.78 (3.00)
MK706	Squeeze key	35.00 (3.00)

HANSEN		
JD110	1.5-150MHz	16.50 (3.00)
017/8	3.5-150MHz	26.85 (4.00)
Y550	1.6-50MHz	93.15 (3.00)
Y5500	140-525MHz	81.85 (3.00)
Comet CM420	140-150/430-450	36.00 (4.00)
Comet CD120	1.8-200MHz	75.00 (4.00)
Comet CD160H1	6-50MHz	89.00 (4.00)
Comet CD700D14	525-5MHz	78.00 (4.00)

Miscellaneous

STARMASTER		
Dewbury	Electronic Keyer Unit (No Paddle)	54.70 (4.00)
Dewbury	Electronic Memory Keyer (No Paddle)	95.00 (4.00)
AR200XL	Light Duty	49.50 (6.00)
G250	Light Duty	78.00 (6.00)
G400	Medium Duty	149.00 (6.00)
G400RC	Medium Duty (Round Face)	179.00 (6.00)
G600RC	Medium/Heavy Duty	235.00 (6.00)
G2000RC	Heavy Duty	445.00 (6.00)
G500A	Elevating Rotator	199.00 (6.00)
GR5400B	Azimuth/Elevating	345.00 (6.00)

SMCS 2U	2 Way SO238 Switch	18.95 (4.00)
SMCS 2N	2 Way 1/1 Size Switch	23.50 (4.00)
Comet CSW20	SO238 switch	25.95 (4.00)
T25	30W Dummy Load	11.25 (3.00)
T100	100W Dummy load	49.00 (3.00)
T200	200W Dummy load	65.00 (3.00)
WAI	Wavemeter 120-450MHz	24.95 (2.50)
PK232	Packet/RTTY Terminal	299.95 (4.00)
Detong D70	More Tutor	64.95 (4.00)
Detong FL2	Audio Filter	99.95 (4.00)
Detong FL3	Audio Filter/Autotouch	149.95 (4.00)
Detong ASP	Processor 4pin	94.95 (4.00)
Detong ASP	Processor 8pin	94.95 (4.00)
Detong AD370	Active Antenna	79.95 (4.00)

Antennas

DSC770	70-700MHz RX Diacone	24.95 (4.00)
D130	26-1300MHz Diacone	75.00 (4.00)
Jaybeam	TB3 Mast 3e HF Tribander	348.45 (8.00)
Creative	CD318 JR 4e HF Tribander	399.00 (8.00)
Creative	CD318 4e HF Tribander	349.00 (8.00)
CA2X4KC	2/70cm Mobile	39.95 (3.00)
WX1	2m/70cm Base Fibre Glass	64.99 (5.00)
WX2	2/70cm Base Fibre Glass	75.50 (6.00)
CF416Max	2/70cm Duplexer	25.50 (3.50)
CA2X4Max	2m/70cm Base Fibre Glass	99.95 (5.00)
TDHP	10/8cm trapped dipole	49.00 (6.50)



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
(£&OE)

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, Backfastleigh, Devon TQ11 0DN

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! Only £561 + 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.



Castle Electronics

SUPPLY, REPAIRS AND SERVICING OF AMATEUR, PMR AND RADIO COMMUNICATION EQUIPMENT

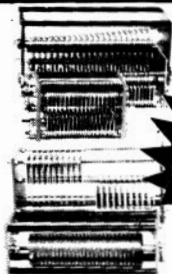
- ★ Visit our new premises and service facilities. Open Weekdays 9-5pm. Saturday 9-1pm. Suppliers of amateur & PMR radio equipment. Loan/Hire units available for equipment in for service if required.
- ★ Experienced Technical Staff.
- ★ Guaranteed 7 day turnaround. (Subject to availability of Spares).
- ★ Trade Service Enquiries Welcome.
- ★ Carriage arranged.

Unit 3, Baird House, Dudley Innovation Centre, Pensnett Trading Estate, Kingswinford, West Midlands D76 8XZ

Telephone: (0384) 298616.

Fax: (0384) 270224.

BUY THE BEST — BUY



See us
at
N.E.C.

CAP.CO

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

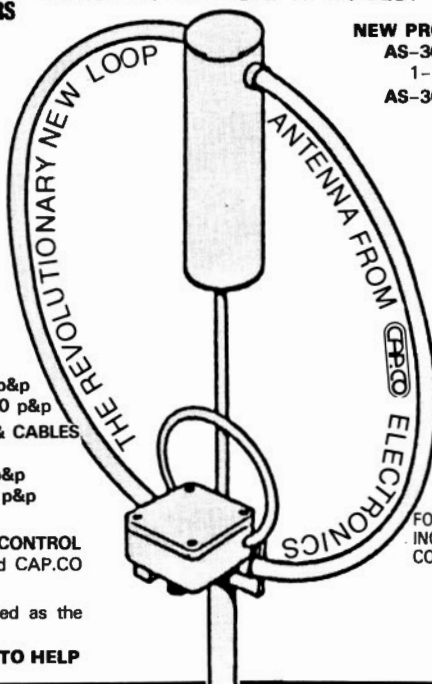
NEW PRODUCT

REMOTE AERIAL & TRANSCEIVER COMPUTER CONTROL

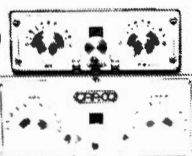
You can now control both your transceiver and CAP.CO
Antenna from a keyboard — send for details

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

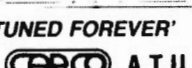
ANY QUERIES — ASK US — WE WOULD LIKE TO HELP



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

RECEIVING ONLY MAGNETIC LOOP ANTENNA

Incorporating Transmitting Loop Technology,
these Set-Top units give reception that must be
heard to be believed.

RMA-1 COVERS 1.5–7.0MHz (INC. AMPLIFIER)
£85.80 + £5.00 p&p

RMA-2 COVERS 7.00–30MHz
£49.40 + £5.00 p&p

(See JUNE ISSUE of Short Wave Magazine for review)

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

SPECIAL NOTICE TO READERS

Although the proprietors and staff of *PRACTICAL WIRELESS* take reasonable precautions to protect the interests of readers by ensuring as far as practicable that advertisements in *PRACTICAL WIRELESS* are bona fide, the magazine and its Publishers cannot give any undertakings in respect of claims made by advertisers, whether these advertisements are printed as part of the magazine, or are in the form of inserts.

While the Publishers will give whatever assistance they can to readers having complaints, under no circumstances will the magazine accept liability for non-receipt of goods ordered, or for the late delivery, or for faults in manufacture. Legal remedies are available in respect of some of these circumstances, and readers who have complaints should address them to the advertiser or should consult a local Tradings Standards Office, or a Citizen's Advice Bureau, or their own solicitor.

Collector's ISSUE 1 NOW ON SALE

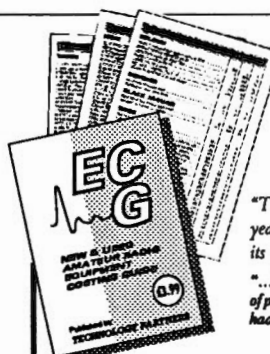
The NEW & USED Equipment Costing Guide is dedicated to amateur radio enthusiasts...

The A to Z of New and Used Prices

"The motor trade has had its 'Glass's Guide' for many years... Now it's time the Amateur Radio World had its own 'pricing guide'..."

"...I was delighted to learn of the proposal to print a definitive list of prices for second-hand amateur radio equipment... such a guide had been needed for a long time..."

John Wilson G3PCY - Love Electronics



Published by:
TECHNOLOGY PARTNERS
(G4KXH, G0HII, G1ZMQ)
P.O. Box 82, Lytham St Anne's FY8 2EN
Tel: 0253 62925 • Fax: 0253 798006

No 1 Collector's Edition
£2.99 POST FREE



Produced by Radio Amateurs for Amateur Radio

TENNAMAST for TILTOVERS

GM60AL – GM4VHZ – GMONHH

Our wind up, tilt-over Tennamasts are ideal for HF and VHF beams. Designed and professionally built by amateurs for amateurs, they are safe and easy to use, slim, elegant and economically priced from £215. Immediate delivery.

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



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 8HN

Fax 081-749 3934.

Back-Scatter

Swedish beacon SK6SIX operating on 50.080MHz especially during the Sp-E season. Located in J057QJ, the beacon transmits alternately at power levels of 1W and 10W into a vertical dipole.

Following the changes to the 70MHz band plan, the UK beacons are to be moved within the new beacon sub-band, 70.000-70.030MHz. The proposal is that GB3BUX will operate on 70.000MHz, GB3REB on 70.010MHz, GB3ANG on 70.020MHz and GB3CTC will change its call sign to GB3MCB and operate on 70.025MHz. It must be stressed that these are proposals, and that the moves, if they take place, will take some time as the licensing formalities have to be completed beforehand.

Is it a beacon or is it a repeater? The Bedford 1.3GHz unit GB3BW has returned to service following a rebuild. In common with all similar microwave systems, it transmits continuously as a beacon when not being used as a repeater. It operates on channel RM6, the transmit frequency being 1297.150MHz.

Until recently all UK repeater and beacon licensing, irrespective of mode or band has been administered and paid for by the Radio Society of Great Britain. A decision has been made by the RSGB Council to pass on some, but not all, of the administration charges directly to the repeater groups and have requested that such groups should contribute £25 per year towards the administrative costs of each repeater unit. Personally, I think this move is regrettable, but even so, it is probably a sound judgement based on correct financial accountability. However, I hope that this decision does not effect the technical innovations of specialist groups involved with a.t.v. or microwave repeaters, or indeed the packet radio or voice repeater network. Now, more than any other time, is the need for users of these units to contribute to their running costs. All repeaters or packet mailboxes have system operators. Find out who runs the unit that you use. Join your local repeater or DX Cluster group and contribute to its upkeep.

Meteor Scatter

Fancy a sked with Yugoslavia? Ivo YT3ET can be active on either c.w. or s.s.b.

every day from 2100-0500UTC. He is located in JN65TX and runs 300W to a 16-element Yagi with an MGF1502 l.n.a. To arrange a schedule, simply pick up the telephone and dial 010 38 65 21217.

Sonny Horsfall G7DCT was kind enough to supply me with a copy of a program he has written for high speed c.w. on an IBM p.c. or compatible. It is especially tailored for the m.s. enthusiast and allows transmit speeds up to at least 2000 letters per minute. Keying of the transmitter is via the computer parallel printer port, making it cheap and easy to construct. Further details can be obtained from G7DCT, 2 Temple Walk, Halton, Leeds LS15 7SQ.

Meteor Showers

The following data, concerning meteor showers occurring during April-May, will help you determine in which direction to beam at specific times and when the shower is below the horizon.

The Lyrids meteor shower will be encountered between April 18-25, peaking on Monday 22nd. Between 0200-0400UTC beam north-east or south-west, 0400-0700UTC beam east or west, 0700-0800UTC beam south-east or north-west, 0800-1000UTC beam north or south. The shower radiant is low between the hours of 1400-0200UTC and is therefore not usable for meteor scatter.

The Eta Aquarids meteor shower will be encountered between April 21 and May 12, peaking around May 7. The actual peak is rather broad with several sub-peaks. This is a very complex meteor stream and prediction of maximum activity is difficult. However, between 0400-0600UTC you should beam south-west or north-east, 0600-1000UTC beam west or east, 1000-1200UTC beam north-west or south-east. This shower does not give very good results on the north-south path. The stream is below the horizon between 1700-0400UTC.

The Piscids meteor shower will be encountered between May 5-10, peaking on Wednesday 8th. Between 0500-0600UTC beam south or north, 0700-0900UTC beam south-west or north-east, 0900-1300UTC beam east or west, 1300-1500UTC beam north-west or south-east. The shower radiant is below the horizon

from 1800-0500UTC.

The Nu Piscids shower is similar to the Piscids. It is encountered by the earth between May 6-14, peaking on Thursday 9th. The best times/directions are one hour earlier than those stated above.

DXpedition Update

Herve F1HRY will be active from IN78 between April 28 to May 9. He is primarily there for 144MHz c.w. meteor scatter during the Eta Aquarids, Piscids and Nu Piscids showers but you should be able to find him also via tropo. He will be running 250W into a 16-element Yagi.

The Brazilian Natal DX Group are planning to activate St. Peter and St. Paul Rocks (PY0S) between May 1-10, on 50MHz. Cards for the expedition will be handled by Karl Leite PS7KM.

Between May 18-27, Peter PA3BIY will be on holiday in Norway, and plans to operate from some rare squares, such as JP30.31, 32, 39 and 41. As he is uncertain of arrival times and QTH, he will not make schedules in advance. Peter hopes to have an h.f. rig with him to be able to take skeds on the v.h.f. net but if that is not possible he will operate mostly random on 144.148MHz. Speed will be 1200 l.p.m. with LAPA3BIY transmitting the first 2.5 minute period. When operating random, between 0200-0700UTC, he will announce the QRA square by calling 'CQ DW LAPA3BIY'. He will be running 300W into a 9-element Yagi.

QRZ Contest!

The REF e.m.e. contest has a different format this year. Different bands are being used on separate weekends. Unfortunately, the 50, 144 and 1296MHz leg has been and gone, but there is still time to catch the session dedicated for 430MHz, 2.3GHz and up on April 20-21.

The ARRL 50MHz Spring Sprint contest will be held on May 25-26. Although it is unlikely that signals from North America will be heard in the UK, it is always worth while knowing in case the unexpected happens!

A 24 hour 144MHz contest commences at 1400UTC on May 18. There are entry

categories for single and multi operators and for the s.w.l.

A multi-band contest, 430MHz-24GHz, will take place on May 4-5 between 1400-1400UTC. A reasonable amount of continental activity is anticipated during this event.

An RSGB 1.3GHz fixed station contest has been scheduled to run between 1600-2200UTC on Sunday April 14. Both single or multi-operator stations may enter.

A Mayday microwave ATV contest, organised by the BATC, will run between 0001-2359UTC on Monday May 12. It is intended for fast scan television on all bands from 1.3GHz and up.

Scandinavian activity contests will be held on the following dates. 50MHz activity on April 23 and May 28, 144MHz on May 7, 430MHz on May 14 and Microwaves on April 16 and May 21. All band sections run between 1700-2100UTC. You can obtain a full set of rules by sending me a stamped addressed envelope.

QSL Information

KE9A/DU3: via WB9YXY. Rt 1, Box 173, Endeavor, WI53930, USA.

KE0SC/DU1: K. Keehner. NSD Box 33, FPO San Francisco, CA96651.

KG6UH/DU1: Capt. L. Anciaux. USNR, USCINCPACREP-LNO, US Embassy Manila, APO San Francisco, CA96528.

KJ6WO/DU3: G. Gardner. Box 42, FPO San Francisco, CA96651. USA.

KG6DX: J. Chalmers. 93 Gardenia Ave. Latte Heights, Guam 96913.

TU2QJ: G. Piejougeat. PO Box 634, Gagnoa, Ivory Coast.

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.

Domestic and international media are now winding down following the cessation of hostilities in the Gulf. BBC World Service, which had added many extra hours to English and a variety of language services, resumed its normal pattern of broadcasting on Saturday March 9. This enables the introduction of a new World Service in English schedule from the beginning of April. Details of some of the new programmes and times are given in the European section of this column.

It will take some time before either Radio Kuwait or Radio Baghdad return to the air in their pre-war state. It is unclear at present what damage has been wrought in terms of transmission facilities, but it is

Back-Scatter

Broadcast Round-up

Reports to Peter Shore via the PW Editorial Office

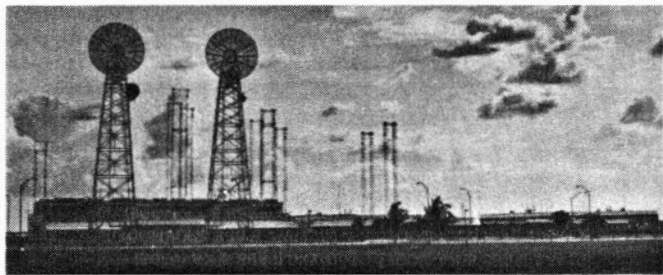
likely that the apocryphal picture printed in the February edition of *PW*, was released during the war. The Kuwaiti authorities have asked the BBC to assist with the construction of a new television facility, but it is clear that international broadcasting is low on the list of the

Emirate's priorities in relation to the restoration of basic services. Radio Baghdad's domestic service on short wave has settled down to four regular channels which have been in operation for some weeks. Details appear in the African and Middle Eastern section.

Terrorism rarely afflicts international broadcasting facilities, but the Voice of America's Philippine relay station was the target for bombers from the rebel New People's Army at the end of January. A 4.5kg bomb was discovered in the VoA compound, but did not explode. A bomb several years ago destroyed much of the building housing Radios Free Europe and Liberty in Munich. Since then security at the broadcasting centre in the English Garden has been much tightened.

Broadcasts in English are proliferating from a number of stations in the Soviet Republics. Radio Riga and Radio Alma Ata both have regular English language news bulletins, and others may follow suit. A

Back-Scatter



run-down of the newest stations and their frequencies appears in the European section.

There is still no news on Radio Canada International's future. The latest speculation is that the Department of External Affairs will foot the bill for the radio service, but not to the full Can \$20 million which it costs to run at present. The station's output could be reduced to solely English and French, with all other languages dropped (even Arabic, despite the Gulf situation), or in the worst case scenario (to use a military term!) make no programmes itself, and simply relay the Canadian Broadcasting Corporation's domestic output.

In Hungary, there are worries that Radio Budapest will be cut by around a half in the summer. We first brought you news of the review of the station's output late last year, and now, it seems that Italian, Turkish and Spanish language transmissions will end. The twice weekly DX programme, which receives some 18 airings in all, may be cut. Protests can be sent to the Director of Programmes, Radio Budapest, Budapest, Hungary. Another broadcaster affected by the world-wide recession is the religious station WYFR, based in Okeechobee, Florida. Cuts of around 25% are expected, since the station is not receiving sufficient income from its listeners to allow it to keep a full schedule in operation.

Finally, anyone wishing to take a last minute Spring-time break in Spain should look no further than the European DX Council's 25th Conference which takes place from May 17 to 20 just outside Barcelona. Full details are available from the Council's UK office at PO Box 4, St. Ives, Huntingdon, Cambs PE17 4FE.

European Stations All times GMT(=UTC)

Could the spy numbers stations be back in business? Discovered on 3.37 u.s.b. at 1845 on March 11 was the old favourite lady reading German numbers repetitively. This is the first time I've come across her for some months, and indeed I suggested in the middle of 1990 that following the reunification of Germany these transmissions were no more. Any suggestions as to where they might be coming from at the moment, and has anyone any other times and frequencies to report?

Continuing unrest in Albania, combined with the mass exodus of Albanians to Italy, means that Radio Tirana is something to keep a careful ear to. The English service is heard at 1830 on 9.48 and 7.21, and at 2230 on 9.76, 9.66, 7.215 and 1.395MHz. Radio Austria's *Short Wave Panorama* returned on Sunday March 3. It had been off the air during the Gulf War to

enable extended news coverage to be broadcast. Hosted by David Hermges, it can be heard at 1130 and 1430 on 13.73 and 6.155MHz.

Transmissions from the French language international service of Belgium, run by RTBF, ended on Sunday March 10. The service, directed primarily to French-speaking Africa, was stopped as a result of budget cuts. Broadcasts from BRT continue in Dutch and other languages.

Radio Sofia in Bulgaria offers interesting listening, with much useful news about the country and its relations with neighbouring Balkan states. English is broadcast:

0730 on 17.825, 15.16, 11.765MHz
1930 on 15.33, 11.66 and 9.70MHz
2130 on 15.33, 11.66 and 9.70MHz
2230 on 15.33 and 11.68MHz

Radio Netherlands has a new listener contact programme. It started on Friday April 5, and it's called *Sounds Interesting*. Host Dorothy Weirs is looking for suggestions of what listeners want to hear in the show, and can send their suggestions to her at the station. The address is PO Box 222, 1200JG Hilversum, Holland.

Radio Norway introduced a new schedule on March 31. English from Oslo is on Saturday and Sunday at:

1200 on 21.695 and 17.82MHz
1300 on 11.86 and 9.59MHz
1500 on 17.79 and 15.305MHz
1600 on 21.705MHz
1700 on 9.655MHz
1800 on 17.755MHz
1900 on 17.73 and 15.175MHz
2000 on 15.165MHz
2200 on 21.705MHz

The new schedule brings with it two new programmes. *Scandinavian Business Report* is a monthly programme hosted by American business journalist Beverly Stephansen, whilst the *Arts Programme*, another monthly feature, will bring news of the arts in Norway and the Nordic countries.

Some new feeder channels have been appearing for Soviet domestic services. A Mayak (Moscow Second Programme) feed has been traced to 19.035 u.s.b. at 0700, whilst Moscow First Programme is heard on 16.265 in parallel with 14.41MHz at various times of the day. Roy Merrill in Dunstable corrects an error which crept in to one of his reports a couple of months ago. The frequency for his unidentified Moscow service should have read 3.384MHz, and he traced two parallel channels of 6.155 and 13.71MHz, both apparently active from at least 1730 until 2130 or thereabouts. All this was before the start of the M91 schedule period at the

beginning of March, and although Moscow external services continue to use 6.155MHz (noted with an interval signal at 1829GMT), there is no sign of the accompanying channels in the early evening. Roy says that the identification was "something something Radiostantsa." Roy has also heard Radio Kiev's domestic output on a new channel of 9.72MHz, noted whilst he was looking for SLBC in Sri Lanka. He has checked it with the known 6.005 and 6.02MHz, and mentions that the interval signal and identification 'Govorit Kiev' were at the quarter hour. This certainly confirms that it is Kiev home programmes (it must be one of the few, if not the only, station to have news on the quarter hour).

Frequencies for Radio Vilnius changed at the beginning of March. The station's broadcast at 2300 is now on 9.71 (via the Lithuanian transmitter) and on 11.77, 11.86, 15.18, 17.69 and 17.72MHz. Meanwhile, the neighbouring Baltic state of Latvia now has English broadcasts on Radio Riga. It is heard on 5.935 at 2130 daily. Tallin Radio in Estonia has English on Mondays at 2130 on 5.925 also at 2130. There is a medium wave channel of 1.035MHz in parallel.

From Kazakhstan comes Radio Alma Ata, which has English at 0130 on Monday, Wednesday and Friday on 5.915MHz.

Yugoslavia is another country sliding towards civil war, with Serbs fighting Croats, and the police and army attempting to crush revolt. The head of Belgrade Television was dismissed on March 12 since he was according to protesters, wrapped up in the Communist past of the country. R. Yugoslavia broadcasts in English at:

1930-2000 on 6.165 and 15.165MHz
2200-2245 on 15.165, 6.10 and 5.955MHz

BBC World Service underwent some changes at the beginning of April, with a new schedule introduced, including a new edition of *News Hour* at 1300. The 2200 placing for this current affairs flagship programme has been advanced by one hour to 2100. The weekly communications programme *Waveguide* is now heard on Saturday at 0905, Monday at 0530, Tuesday at 1115 and Thursday at 0130.

African and Middle Eastern Stations

Radio Baghdad's domestic Arabic service is now using four channels for most of the time. They are 8.35, 7.35, 4.60 and 3.98MHz.

There is still no sign of Saudi Arabia on the two channels believed to be currently in use - 9.705 and 9.72. Indeed, 9.72 now has Radio Moscow World Service in English at 2000. Any offers from anyone out there?

Africa No. 1 in Gabon has a two minute English newscast at 1258 when the station is on the air on 17.63 and 9.58MHz.

R. Zanzibar has been heard on a measured frequency of 11.7343MHz, reports Roy Merrill, at around 1730 until 1815 or later. The programme at this time is a relay of the Radio Tanzania, Dar-es-

Salaam transmission, and identifies as such in Swahili. The SIO noted lately has been 332.

Trans World Radio Swaziland appears to have moved from 15.12MHz at 1800, to East Africa in English, and is now using 9.60MHz to 1845.

Asia and the Pacific

Radio New Zealand International has moved from 17.675 to 17.77MHz, with a schedule currently:

1800-2111 on 15.13MHz (Sunday to Friday)

2111-0630 on 17.77MHz (not Sunday)
0630-1110 on 9.70MHz (not Sunday)
0000-0630 on 17.77MHz (Sunday only)

During the evening 15.13 has Moscow in English, from what sounds like a Far Eastern transmitter - it's very watery! There's no trace of New Zealand at 2000, for example.

A test transmission comes from KFBS Saipan on 9.475MHz with a request for reception reports. The station is best heard around sign-off at 2059.

The Sri Lankan Broadcasting Corporation in English at 2000 until 2130 is heard after 2030 on 15.12 with a strong signal, but suffers from adjacent channel QRM. There is no sign of the alternative channel of 9.72MHz which is now used by Moscow in English.

North, South and Central America

Radio For Peace International has been heard weakly on 7.3745MHz u.s.b. at 0545 Sundays with programmes from Radio New York International. It is also heard on 13.630MHz between 2010 and 2200 with poor overall reception, and occasionally on 21.564MHz at around 1900.

Radio Diffusora Nacional da Columbia from Bogota, on both 11.8216 and 17.8631MHz can be heard from as early as 2145 with relative clarity, although the 25m outlet is cluttered. Programmes are a mixture of studio dialogues, news and music, and the station identifies as 'Aqui Colombia' or 'La Radio Diffusora Nacional da Colombia'.

RAE Buenos Aires in English to North America at 0100, is on 11.71MHz, heard in the UK although somewhat watery.

Radio Nacional de Chile in Santiago on measured 15.1392MHz in Spanish, weak and fluttery from 2108, but improves steadily to a peak around 2200.

ICI BRUXELLES
LA VOIX DE L'AMITIE

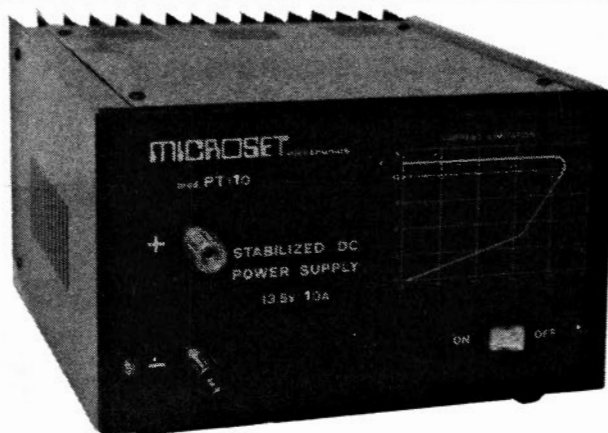


STATION

O
R
U

Special Offer

The Microset PT110 Power Supply & A £5 Gift Voucher for £64!



Save £5.00 on the Microset PT110 Power Supply. Normal price £69.00... plus receive a £5.00 Gift Voucher to spend on Microset Products.

Microset power supplies and v.h.f. amplifiers have rapidly earned themselves a reputation for reliability and great value for money.

The Microset PT110 power supply is a ruggedly built unit measuring 200 x 270 x 130mm and it provides 13.5V output at 10A continuous rating. The measured stability is better than 0.7% for a 10% mains voltage change and 0.4% for load changes from 0 to 100%.

The PT110's circuitry is fully protected against over-voltage, over-current and short circuit, so it may be used with confidence. No radio enthusiast's shack or workshop should be without a general purpose power supply and if you have a mobile rig, this is the ideal way to provide a power unit for base station operation.

Guaranteed - With Gift Voucher

Each Microset PT110 is fully guaranteed for 12 months, parts and labour, and the price includes free carriage and insurance right to your door. Further more, each unit sold comes with a £5 gift voucher that can be used against any other Microset product. How's that for *PW* special value!

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 Power Supply to you. Send your coupons with your cheque to: *Practical Wireless*, Power Supply Offer (May), 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 only to readers of *PW* in England, Scotland, Wales, N. Ireland, the Channel Islands and Isle of Man. Orders are normally despatched within 28 days, but please allow time for carriage. The closing date for this offer is 9 May 1991.

(1)

To: PRACTICAL WIRELESS, Power Supply Offer (May),
FREEPOST, Enefco House, The Quay, Poole, Dorset BH15 1PP

Please send me.....Power Supplies @ £64 each

Name.....

Address.....

.....Post code.....

☐ 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.....

.....Post Code.....

Power Supply May 1991

If you do not wish to cut your copy of *PW* you must send this flash with full details and remittance. PW Publishing Ltd., Poole, Dorset (Reg. No. 1980539, England)

PW MAY 1991
POWER SUPPLY OFFER

Book Reviews

Transmission Line Transformers

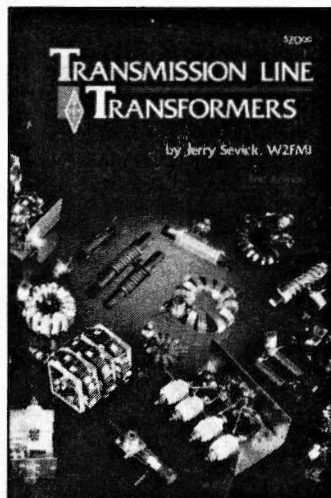
Jerry Sevick W2FMI

American Radio Relay League (publishers) ISBN 0-87259-296-0

270 pages, price £13.50

Available from **PW Book Service**, 85p post and packing

This is the second edition of Jerry Sevick's book. The book covers a most intriguing and confusing (to many of us) area of our hobby. It does so in a way that will enable anyone with a modicum of skill to make a balun, and be able to make the most of that precious radio frequency energy. On the other hand, and despite the practical approach, even the most proficient r.f. engineer will find much to help and guide him. The only criticism that can be laid against this book is the title, as the contents are far more comprehensive than it conveys. A good buy for your workshop and library.



The Satellite Book - A Complete Guide To Satellite TV Theory And Practice

John Breeds (Editor)

Swift Television Publications ISBN 1-872567-01-0

300 pages, £27

Available from **PW Book Service**, 85p post and packing

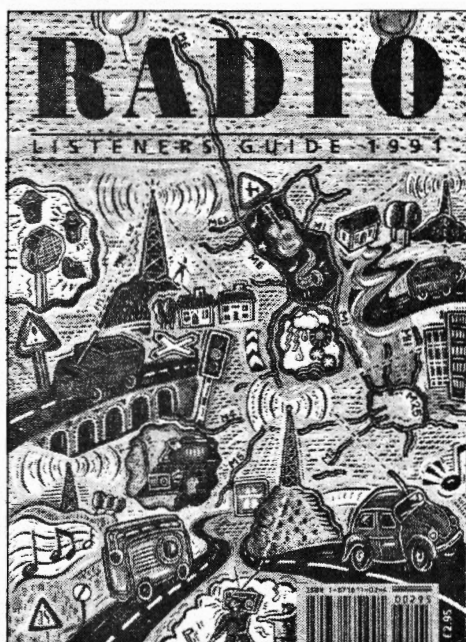
This book must be one of the most comprehensive manuals on offer for professional and enthusiast alike. In format, it's a large softbound book, packed with information ranging from satellite 'footprints' (coverage and service areas) to the mathematics and practicalities involved with the super-high frequencies used in satellite broadcasting. For the intending practitioner in the techniques, the section on SMATV (satellite master antenna Television) is also very useful. An excellent textbook with some useful practical advice.

Radio Listeners Guide 1991

Clive Woodyear (Editor)

PDQ Publishing, ISBN 1-871611-02-4

56 pages, £2.95



Available from **PW Book Service**, 85p post and packing

This handy little guide is useful for the technical enthusiast and the listener seeking entertainment from their radio. For the v.h.f. Band II DX enthusiast, the v.h.f. maps and frequency guides are simple and uncluttered. The *Radio Listeners Guides* should be sold with every new radio bought, as it will help anyone find a great deal more to listen out for. Handy, useful and a definite aid to getting the most out of your radio in the UK.

Down in the doldrums?

You won't be at the NEC

For the NEC show only, **PW** gives you more to spend on your hobby.

Save £1.50 on Transmission Line Transformers. Now only **£12.00.**

Save £1.50 on Weather Satellite Handbook. Down to **£12.00.**

IARU Radio Maps, down to £4.00.

Save £3.50 on each of the North American, and the International Listings callbooks. Now just **£16.00 each.**

We can also supply the full range of Babani Books. These low-cost, value for money books cover many topics, not just radio.

Look out for more special offers that will be available on the day and Come and see what we have to offer on the PW stand at the

NEC during the weekend of April 27/28th



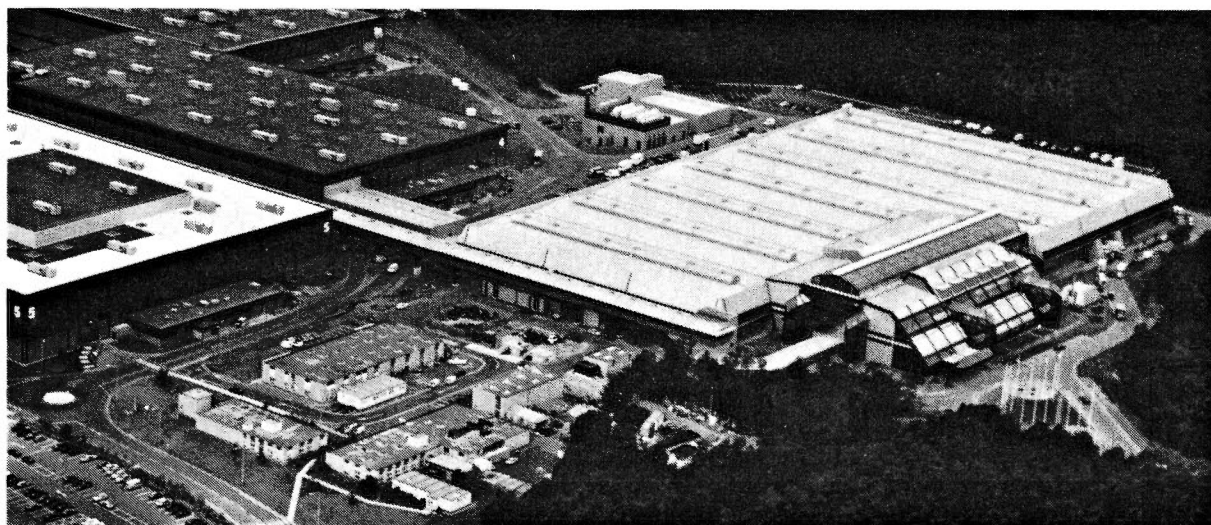
RSGB 1991 National Convention and Amateur Radio Exhibition

at the

NEC

Saturday 27 April - Sunday 28 April

HALL 7, NATIONAL EXHIBITION CENTRE, BIRMINGHAM



RSGB 1991 LOTTERY PRIZE DRAW!

- Launch of Novice Licence
- RSGB Committee Representation
- Lecture Programme (Saturday only)
- Large Component Stand Area
- Large Trade Exhibition
- Morse Tests (Saturday only, by appointment with RSGB)



Opening times:

Saturday 27 April, 10 until 6
Sunday 28 April, 10 until 5

Talk-in on 2 metres, S22

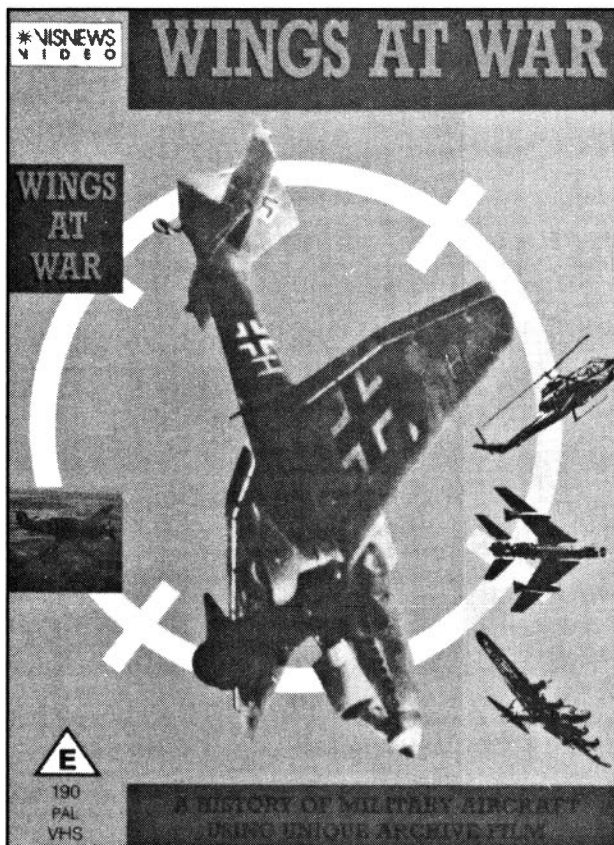
Entrance fee: £3. OAP's, disabled and children: £1.50, (includes free parking and shuttle service to Hall 7).
Children under 12 years of age accompanied by an adult are free of charge.
Concessionary rates for groups of 25 or more.

Organised by the RSGB Exhibition Rally Committee.

*Trade Stand enquiries welcome to ERC Chairman, Norman Miller, G3MVV,
178 Warley Hill, Brentwood, Essex, CM14 5HF (tel: 0277 225563).*

PW SUBSCRIBERS' CLUB

If you have a subscription then you will know about the *Practical Wireless* Subscribers' Club. If you do not have a subscription then doubtless you will be wondering just what this new 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 two special offers for *Practical Wireless* Subscribers' Club members. The radio hobby and an interest in aircraft history and technology often go hand-in-hand. It's with this in mind that this month we offer club members a different, but very interesting choice of video programmes. They are *Wings at War*, capturing the story of military air power from World War 1 to Vietnam, and *Wings: The Jet Age*, the story of the jet aeroplane using a unique blend of archive and original material to trace the path of progress to the modern supersonic aircraft.

As a member of the *Practical Wireless* Subscribers' Club you can obtain your own copy of *Wings at War* for £12.25 and *Wings: The Jet Age* for £9.50. Both prices include VAT and Post & Packing.

The closing date for this special video offer is 31 May 1991. Please mark your orders PW Subscribers' Club April, PW Publishing Ltd., FREEPOST, Enefco House, The Quay, Poole, Dorset BH15 1PP.

This offer is limited to one copy of each video per subscriber and your order must be accompanied by your Subscriber Number or a subscription order using the form printed below. We regret that only *PW* Subscribers' Club members can apply.

SUBSCRIPTIONS TO PRACTICAL WIRELESS

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 1YEAR

- ☐ £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 March 1991

Subscription to commence with issue dated.....

- ☐ Please send me *Wings at War* at the special Subscribers' Club price of £12.25 inc. P&P.
- ☐ Please send me *Wings: The Jet Age* at the Subscribers' Club price of £9.50 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

**Credit Card Orders
can be taken on
(0202) 665524.**

Signature.....

If you do not want to deface your *PW*, a photocopy of this coupon will be acceptable.

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	£182.97
TBR160S 160M add on kit	£35.16
HF5B Triband Mini Beam	£240.11
NEW RS 5 Band Vertical	£268.72

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
20-3C2 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 Broomer	£38.95

ANTENNA TUNERS

Kenwood AT230	£213.20
MFJ 962B 1.5kW Tuner	£246.24
MFJ 949C 300W Versatuner	£168.41
MFJ 941D watt Basic	£107.28
MFJ 1601 Random Wire Tuner	£45.97
Kenwood AT250 Automatic Tuner	£373.95
TEN TEC "254" 200 Watt Antenna Tuner	£153.26
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
AR900 Hand-Held	£203.33
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	£178.61
AR1000 Hand-Held	£254.41

SWR/POWER METERS

SX200 1.8-200MHz	£86.42
SX400 140-525MHz	£80.72
V510 1.6-300MHz	£80.72
DIAWA CN410M 35-150MHz	£63.06
DIAWA CN460M 140-450MHz	£66.82
NS660P 1.8-150MHz + PEP	£117.50
KOYD-100 1.8-80MHz	£76.62
KOYD-200 1.8-200MHz	£61.31
KOYD-400 140-525MHz	£63.34

DUMMY LOADS

MFT300 Watt D. load	£34.23
TenTec 300 Watt Dummy Load	£26.72
L20 20 Watt Dummy Load	£22.48

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 160-10M 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 5 days a week. 24 Hour Mail Order Service.

Goods normally despatched by return of post.

POSTAGE-CARRIAGE EXTRA AT COST.

Phone 0942-676790.

STEPHENS JAMES LTD.

47 WARRINGTON ROAD,
LEIGH, LANCs. WN7 3EA

D130N Wideband Diacone Antenna	
25-1300MHz	£81.72
6 Metre 3 El Beam	£26.56
50M Copper Antenna Wire	£7.10
HS50B 1-1 kW Balun	£25.12

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 or 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 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

SERVICE INFORMATION

PANASONIC

NV-230 svce man	VCR	2.50
NV-370 oct description	VCR	1.00
NV-370 svce hints	VCR	1.50
NV-688 svce hints	VCR	1.50
NV-688 svce man	VCR	3.50
NV-688 train. man	VCR	2.00
NV-777 svce hints	VCR	1.50
NV-777 train. man	VCR	3.00
NV-788 svce hints	VCR	1.50
NV-788 svce man	VCR	3.50
NV-788 train. man	VCR	2.00
NV-810EG/B/E/O svce man	VCR	3.00
NV-830E/EG/B svce man	VCR	3.00
NV-850 svce hints	VCR	2.00
NV-850 train. man	VCR	1.50
NV-2000 svce man	VCR	3.50
NV-7000E/B svce hints	VCR	3.00
NV-7000EM svce manual	VCR	3.50
NV-7200 svce hints	VCR	2.00
NV-7800 svce hints	VCR	2.00
NV-7800 train. man	VCR	3.00
NV-8400 svce man	Port. VCR	3.00
NV-8600E/B/A svce man	VCR	3.50
NV100/NV-V10 svce man	Port. VCR & timer	3.50
NV100E/EG/B suppl. man	Port. VCR	1.00
NV180 train. man	VCR	2.00
NV180E svce man	Port. VCR	3.00
NV200 svce man	VCR	2.50
NV300/333/340 suppl. man	VCR	1.00
NV3000/NV-B30 svce man	Port. VCR & timer	3.50
TC-2203 svce man	CTV	2.50
TC-2204 svce man	CTV	1.00
TC-2205 svce man	CTV	1.50*
TC-2207 svce man	CTV	2.00
VW-ET180 svce man	VCR tun/timer	1.50

PHILIPS

520 series svce info	CTV	3.00*
2021 svce man	VCR	3.00
G26C583 svce man	CTV	2.50
G26C584 svce man	CTV	2.50
G26C586 svce man	CTV	2.50
K30 chassis svce info	CTVs	1.50
K30 chassis svce man	CTV	2.50
N1500 svce man	VCR	4.00
N1502 svce man	VCR	4.00
N1512 svce man	VCR	4.00
N1515 svce man	VCR	4.00

PHILIPS CONT

N1543 svce man	VCR	4.00
N1545 svce man	VCR	4.00
VR2000 svce man	VCR	3.50
VR2005 svce man	VCR	3.50
VR2010 svce man	VCR	3.50
VR2020 svce man	VCR	3.50
VR2073 svce man	VCR	3.50
VR2075 svce man	VCR	3.50
VR2340 svce man	VCR	3.50
VR6462/00F svce man	VCR	3.00
VR6920 svce man	VCR	2.50

PYE

CT70/71 svce man	CTV	2.50
KT3 chassis svce man	CTV	3.00
System 4 tech. svce man	CTV	10.00
Rank Arena Teletext AC6333 svce man	CTV	1.50

TECHNICS

SL-BD2 svce man (vtable system)	1.00
SL-BD3 svce man (vtable system)	1.00
SL-BD21 svce man (vtable)	1.00
SL-D4/(K) svce man (d. drive vtable)	1.00

Abbreviations:

Svce	Service
Man	Manual
Train	Training
Suppl.	Supplement
Port.	Portable
CTV	Colour TV

**LOTS MORE SHEETS
ETC. AVAILABLE.
FOR FULL LIST SEND
SAE TO ADDRESS
BELOW.**

Postal Orders and Cheques made payable to:

PW PUBLISHING LTD

PO Box No. 21, Enefco House, The Quay, POOLE, Dorset BH15 1PP

ARE
COMMUNICATIONS
THE SHOP WITH THE SMILE



Brenda
G4VXL



Bernie
G4AOG

**WITH OUR EVER INCREASING SALES OF
SECOND-HAND EQUIPMENT - WE ARE
ALWAYS ON THE LOOKOUT FOR NEW
STOCKS - SO BEFORE PARTING WITH THAT
MUCH LOVED RIG, GIVE US A RING AND
WE WILL MAKE YOU AN OFFER.**

**ALSO WE WILL SELL YOUR EQUIPMENT ON
A COMMISSION BASIS - THAT WAY YOU
MUST BE BETTER OFF, PHONE US AND ASK
FOR DETAILS. OUR NEW FACILITIES INCLUDE
CAR PARKING AT REAR AND LOTS OF FRESH
COFFEE ON THE COUNTER.**

**REMEMBER WE GIVE GUARANTEES WITH
OUR SECOND-HAND RIGS.**

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

Opening Hours Monday-Friday 8.30-6.00
NOW OPEN SATURDAY 9.00-3.00pm
Car parking at rear of shop.

The books listed have been selected as being of special interest to our readers. They are supplied from our editorial address direct to your door. Some titles are overseas in origin.

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 Practical Wireless, 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

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

SCANNERS (Third Edition)

Peter Rouse GU1DKD
A guide for users of scanning receivers, covering hardware, antennas, accessories, frequency allocations and operating procedures. 245 pages. £8.95

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. £8.95

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

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

THE SATELLITE EXPERIMENTER'S HANDBOOK (USA)

A guide to understanding and using amateur radio, weather and TV broadcast satellites. 207 pages. £7.50

1934 OFFICIAL SHORT WAVE RADIO MANUAL

Edited by Hugo Gernsback
A fascinating reprint from a bygone age with a directory of all 1934 s.w. receivers, servicing information, constructional projects, circuits and ideas on building vintage sets with modern parts. 260 pages. £10.15

HIGH POWER WIRELESS EQUIPMENT

Articles from Practical Electricity 1910-11
Edited by Henry Walter Young
A reprint of interesting practical articles from the early days of radio. 99 pages. £8.95

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 semiconductors, 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 (BP92)

The aim of this book is to provide an in-expensive but comprehensive introduction to modern electronics. 209 pages. £3.50

TELEVISION

THE ATV COMPANION

Mike Wooding G6KQM
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

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

A TV-DXERS 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

3rd Edition. Keith Hamer & Gerry Smith
Completely revised and expanded, this is a handy reference book for the DXTV enthusiast. Over 200 photographs of Test Cards, logos, etc., world wide. 60 pages. £4.95

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. £11.99

THEORY

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

FILTER HANDBOOK A practical design guide

by Stefan Niewiadomski
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

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

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

Wes Hayward W7ZOI 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. 260 pages. £8.95

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

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 deals with a wide range of practical electronic applications. 250 pages. £8.95

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. £8.99

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 1990

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. £4.95

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 former activities of utility stations providing information in 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 plus 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
Aircraft channels by frequency and band, main ground radio stations, European R/T networks, 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 GU0W
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

THE COMPLETE VHF/UHF FREQUENCY GUIDE

1980 - 1991
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. Julian Baldwin G3UHK and Kris 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. £1.50

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. £8.95

VHF/UHF AIRBAND FREQUENCY GUIDE (Updated)

A complete guide to the airband frequencies including how to receive the signals, the frequencies and services, VOLMET and much more about the interesting subject of airband radio. 74 pages. O/P

WORLD RADIO TV HANDBOOK 1991

Country-by-country listings of long, medium and short wave broadcast and TV stations. Receiver test reports. English language broadcasts. The s.w.l.'s bible. £17.99

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. £4.90

AMATEUR RADIO

The ARRL UHF/Microwave Experimenters' 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. A must for your bookshelf! 446 pages. £13.50

AMATEUR RADIO CALL BOOK (RSGB)

Spring Edition
Now incorporates a 48-page section of useful information for amateur radio enthusiasts. 310 pages. £7.70

AMATEUR RADIO SATELLITES the first 25 years

Arthur C. Gee G2UK
This souvenir publication mainly a pictorial account of the pattern of developments which have occurred over the last 25 years. 34 pages. £2.25

AN INTRODUCTION TO AMATEUR COMMUNICATIONS SATELLITES BP290

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. D. 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 GWJGA, used by thousands of successful RAE candidates in their studies. Plus other useful articles for RAE students. 96 pages. £1.50

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

PRACTICAL GUIDE TO PACKET OPERATION IN THE UK

Mike Mansfield G6AWO
Aimed at all user of packet mode being an excellent introduction and reference manual. Spiral bound to lay flat 91 pages A4 sized. £6.95

RADIO AMATEUR'S GUIDE TO RADIO WAVE PROPAGATION

(HF Bands). F. C. Judd G2BXC

The how and why of the mechanism and variations of propagation in the h.f. bands. 144 pages. £8.95

THE 1991 ARRL HANDBOOK FOR THE RADIO AMATEUR

This is the 66th 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. £16.95

*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 COMPLETE DXER

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 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. £8.70

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 OSL bureau and much more. Over 1400 pages. £19.50

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

ALL ABOUT VHF AMATEUR RADIO (USA)

W. I. Orr W6SAI

VHF/UHF propagation, including moonbounce and satellites, equipment and antennas. 172 pages. £7.95

YOUR GATEWAY TO PACKET RADIO

Stan Horzapa WA1LOU

What is packet radio good for and what uses does it have for the 'average' amateur? What are protocols? Where, 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

RADIO AMATEUR'S MAP OF NORTH AMERICA (USA)

Shows radio amateur prefix boundaries, continental and zonal boundaries. 760 x 638mm. £2.95

IARU LOCATOR MAP OF EUROPE DARC

This multi-coloured, plastics laminated, map of Europe shows the AIRU ('Maidenhead') Locator System. Indispensable for the v.h.f. and u.h.f. DXer. 682 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 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-polar projection. Also includes the table of allocation of international call sign series. £3.50

DATA REFERENCE

INTERNATIONAL TRANSISTOR EQUIVALENTS GUIDE (BP85)

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 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

NEWNES RADIO AMATEUR AND LISTENER'S POCKET BOOK

Steve Money G3FZX

This book is a collection of useful and intriguing data for the traditional and modern radio amateurs, as well as the short wave listener. Topics such as AMTOR, packet radio, SSTV, Computer communications airband and maritime communications are all covered. 160 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

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 (BP239)

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

CONSTRUCTION

COIL DESIGN AND CONSTRUCTION MANUAL (BP 180)

B.B. Benbani

Covering h.f. coils to power transformers this 100 page pocket sized book is crammed full of information and tables for the constructor. 110 x 175mm 100 pages. £2.50

FURTHER PRACTICAL ELECTRONICS CALCULATIONS AND FORMULAE (BP144)

F. A. Wilson

Covering Maths, digital maths, electrostatics, electromagnetics and all forms of electronic calculations, with many worked examples, of amplifiers, noise, feedback etc. 450 pages, 110 x 175mm. £4.95

HOW TO DESIGN AND MAKE YOUR OWN P.C.B.s (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, including constructional details of designs by Rev. George Dobbs G3RJV for transmitters and transceivers from Top Band to 14MHz, and test equipment by Tony Smith G4FAL. 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 mainsdriven power supplies, including the P.W. 'Marchwood' giving a fully stabilised and protected 12V 30A d.c. 48 pages. £1.25

QRP NOTEBOOK

Doug DeMaw 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

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

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. 192 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. £6.75

*NOVICE ANTENNA NOTEBOOK

Doug DeMaw 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 28CX 16-element beams for 2m, and the famous "Slim Jim", designed by Fred Judd G2BXC. 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

WIRES & WAVES

Collected Antenna Articles from PW 1980-1984

Antenna and propagation theory, including NBS Yagi design data. Practical constructional details of 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. 180 pages. £3.80

W1FB'S ANTENNA NOTEBOOK

Doug DeMaw W1FB

This book provides lots of designs, in simple and easy to read terms, for simple wire end tubing antennas. All drawings are large and clear making construction much easier. 124 pages. £5.95

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

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. £8.75

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

Mark 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

NEW BOOKS JUST IN:

Rescue£9.99

Satellite Book£27.00

Transmission Lines£13.50

For details see page 72.

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 FT101ZD, 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 lead and manual £60.00, new Larkspur Morse keys £12.00. A range of Amstrad and Spectrum Computers. New ex-MOD whip antennas will tune to 2M £5.50, large selection of war and post-war manuals. All prices include P&P. Tel: Wolverhampton 20315.

Antennas

ALTRON SM30 WALL MOUNT telescopic mast. Brand new. £245.00 Telephone: 081-500 0795.

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 advertising rates for clubs.

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 WORLDS LARGEST SELECTION OF SERVICE MANUALS
NOTE:- Over 200 separate Titles of Technical books are always in stock, over 1/2 are exclusive to TIS!
CTV SERVICING by KING - £14.95, VCR SERVICING by BEECHINGS - £25.00, Ku-BAND SATELLITE TV - £25.00

SERVICE MANUALS VISA

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.

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.

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

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.

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

Miscellaneous

G2VF RADIO PROJECTS Easy to make and not expensive. SAE details. RYLANDS, 39 Parkside Avenue, Southampton SO1 9AF.

HEATHKIT U.K. Spares and Service Centre. Cedar Electronics. 12 Isbourne Way, Broadway Road, Winchcombe, Cheltenham. Glos. GL54 5NS. Tel: 0242 602402.

VHF COMMUNICATIONS The worlds foremost VHF/UHF microwave magazine £12.00 per year for four issues. VHF COMMUNICATIONS, 5 Ware Orchard, Barby, RUGBY CV23 8UF.

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.

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.

For Sale

WEBSTER CHICAGO USA Electric memory model 288-IR RMA 375. Working order. Offers: Box No. 23, PW Publishing, Enefco House, The Quay, POOLE, Dorset BH15 1PP.

KENWOOD TS440S and PS50, 6 months old £950. ICOM IC-R100 and AH-7000 Antenna. Both 4 months old, £325. John G01AQ. Tel: (0924) 270940.

VARIOUS LINEAR AND HIGH. Current switched mode power supplies. (0600) 2498 GWOMSW.

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 4.5ins. £96 inc VAT. Carr £6

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

144MHz to 2500MHz Cavity Wavemeter.

One Wavemeter to cover the VHF/UHF Bands 144MHz to over 2500MHz. Don't get caught without one.



100Hz WAVEMETER KIT

Write to: P. Sergeant G4ONF, 6 Gurney Close, Costessey, Norwich. Tel: (0603) 747782



NOTICE TO ADVERTISERS

Would intending and existing advertisers please note that *Practical Wireless* has an editorial policy not to accept advertising for surveillance and 'bugging' transmitting and receiving equipment.

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. (Tel: 0542 7384).

IBM/COMPATIBLE SHAREWARE 10,000+ FILES. Send £1.50 for comprehensive catalogue on disk. Cheapest prices! AK SHAREWARE, 54 Sheldrake Road, Mudeford, Dorset BH23 4BP.

COMMODORE AMIGA 500 SOFTWARE. "Amateur Radio Specials" five disks full of programs related to "The" hobby. Send £12 to Les Trembeth, G4HBU, 30 Fairview Road, Kingswood, Bristol, BS15 2UT. Send S.A.E. for list.

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.

VINTAGE RADIO & AUDIO ENTHUSIASTS:- Contact us for components, valves, service sheets, radios & amplifiers. Mail order to anywhere - over the counter retail Saturday only. Send £1.50 for 1991 catalogue & sample newsheet. **THE VINTAGE WIRELESS COMPANY**, Tudor House, Cossam Street, Mangotsfield, Bristol BS17 3EN. Tel: (0272) 565472 or Fax: (0272) 575442. All major credit cards accepted by letter, PHONE OR FAX.

1947 ROBERTS MAINS PORTABLE L/M/S. Excellent condition and performance. Offers (0962) 854833.

INDEX TO ADVERTISERS

AH Supplies	54
AJH Electronics	34
ARE Communications	8, 75
Aerial Techniques	53
Amateur Radio Communications	21
Arrow Radio	6
Birkett, J	54
Cap.Co	68
Castle Electronics	67
Characteristics	34
Colomor	68
Datong	34
Dewsbury	46
Dressler Communications	28
ERA	45
Howes C.M communications	33
ICS Intertext	53
Icom (UK)	2, 3, Cover iii
J & P Electronics	45

Johns Radio	75
KW Communications	57
Lake Electronics	53
Langrex Supplies	21
Lee Electronics	27
London Amateur Radio Show	37
Lowe Electronics	33
Maplin Electronics	Cover iv
Martin Lynch	23
Nevada	62
Northern Mobile Rally	45
PW Publishing	75
PWT Electronics	67
Photo Acoustics	10
Quartslab Marketing	53
R & D Electronics	54
RAS Nottingham	54
RSGB	73
RST Valve	21

Radio Shack	80
Random Electronics	54
Raycom	24
SEM	54
SGC	45
SRW Communications	67
Short Wave Magazine	21
South Midlands Communications	Cover ii, 4, 5
Stephens James	75
Suredata	45
Syon Trading	54
Tandy	7
Technical Software	45
Technology Partners	68
Tennamast	68
Total Communications	34
Ward Reg & Co	67
Waters & Stanton	9
Wood & Douglas	53

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 9SP
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)

TO FILL THIS BOX
call

MARCIA

on

(0202) 676033

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.



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.

47 Trevarthian Road,
St. Austell,
Cornwall PL25 4BT
Tel: 0726 65418
Voice Bank: 0426 961909

PLEASE MENTION
PRACTICAL WIRELESS
WHEN REPLYING TO
ADVERTISEMENTS

SOUTH YORKSHIRE

P.A. Electronic Supplies



NEW COMPONENTS KITS TRANSISTORS I/C
AND SURPLUS EQUIPMENT MAIL ORDER
CATALOGUE SEND CQ/PO FOR £1.50

98 Rawmarsh Hill
Parkgate
Rotherham
South Yorks
S62 6EX

Open Six Days
Mon to Sat
Phone (0708) 527108

VISA

RADIO SHACK



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



MEGA MULTIBAND!

IC-970E, 144/430MHz BASE STATION



Designed for the serious operator on the 144, 430 and 1200 MHz 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-bander for 144MHz and 430MHz bands. Optional units expand its capabilities to 1200MHz or wideband receiving from 50-905MHz.

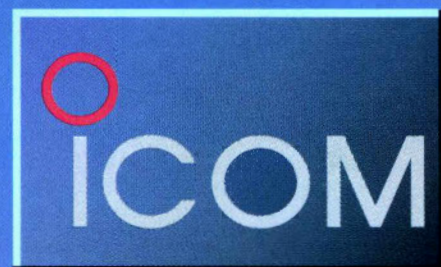
Communications via satellite has never been easier, the IC-970E automatically tracks uplink and downlink frequencies as the tuning control is rotated. There are also ten specific memory channels for satellite frequencies.

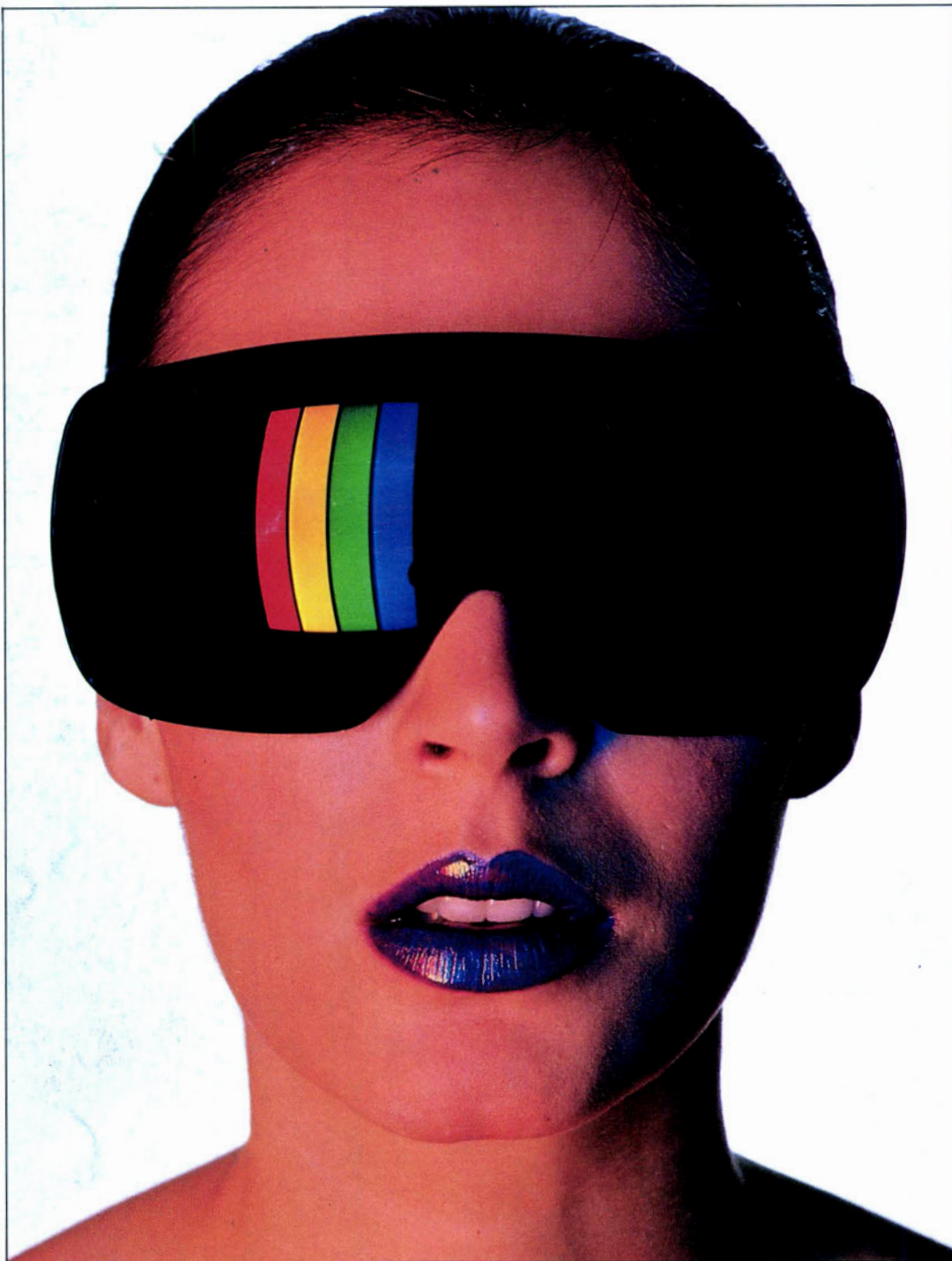
The dual-band watch allows you to receive both MAIN and SUB band audio simultaneously. There are multiple scanning systems on MAIN and SUB bands plus 99 memories, an easy to read central display and Icom's DDS system. Features that go together to make the 970E one of the most comprehensive multi-band transceivers available.

For more information and your local Icom dealer post to:
Icom (UK) Ltd. Dept PW Sea Street Herne Bay Kent CT6 8BR
Telephone: 0227 741741 (24hr). Facsimile: 0227 360155

Name/address/postcode.....

Call sign:.....Tel:.....Dept: PW





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

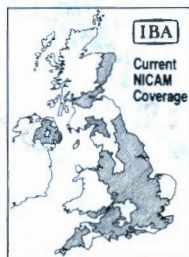
sound! You don't settle for second best with television picture quality, why settle for second best in television sound quality? Nicam sound is the new high quality digital stereo sound system, pioneered by BBC, ITV and TV/video manufacturers. In fact so good is Nicam it is comparable to the superb sound 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 £8.95; 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 £1.28, 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 98p or a SCART/Peritel lead JW36P at £4.95. An infra-red remote control kit is also available LP20W at £29.95.

Complete kit LP19V only £139.95 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.