

practical Wireless

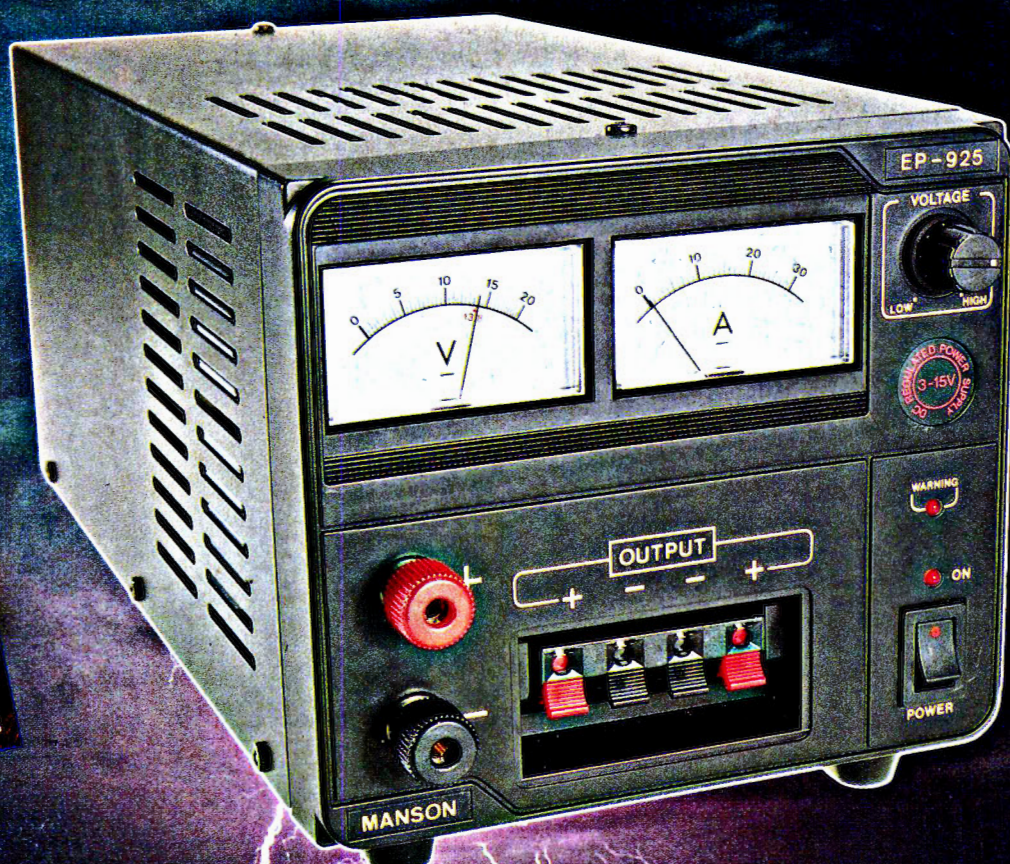
MAY 1992 £1.75

**FREE
INSIDE
THIS
MONTH'S
BUMPER
ISSUE**



**72-Page
Nevada
Catalogue
With £2
Voucher**
Total Value £4

**Reviewed
The Manson EP-925 Power Supply**



**Amateur Radio
On Holiday
Special
How To Get Your
Reciprocal Licence**

ISSN 0141-0857



**Plus
Competition, Getting Started The Practical Way,
Subscribers' Club, CB High & Low, Maths For
The RAE And Lots More!**

YAESU

UK Sole Distributor
 South Midlands Communications Ltd, S.M. House,
 School Close, Chandlers Ford Industrial Estate,
 Eastleigh, Hants SO5 3BY.
 Tel: (0703) 255111.

Same Again Sir?

In the battle of the stations, the FT-990 all-mode HF transceiver is the clear winner. Based on the same remarkable performance, ease of operation and the features of the FT-1000. The FT-990 is an extraordinary achievement, compare the advantages yourself. Feel the silky smooth tuning, hear the dual digital SCF (Switch Capacitance Filter) provide unsurpassed reception quality never before obtained. Be heard with the CPU controlled RF FSP (RF Frequency-Shifted Speech Processor) for the extra pile-up "PUNCH." See the lightweight and compact FT-990 with built-in AC switching power supply. The FT-990 is a true champion HF rig without compromise. Leave it only to Yaesu to offer powerhouse performance that leaves the rest far behind.



FT-990
HF All-Mode Transceiver

- ✓ **Dual VFOs With Direct Digital Synthesis (DDS):**
Two ten-bit DDS plus three eight-bit DDS.
- ✓ **High Dynamic Range:**
108dB. RF circuit design with quad FET first mixer similar to the FT-1000 as only Yaesu's unsurpassed tradition can provide.
- ✓ **CW 500Hz Crystal Filter (Included).**
- ✓ **Dual Digital SCF Filter and IF Shift, IF Notch:**
Superior interference reduction.
- ✓ **Automatic Mode-Dependant AGC Selection.**
- ✓ **Full and Semi-Break In CW Operation:**
With built-in iambic memory keyer with BFO offset and CW spot. Key jacks on both front and rear panels.
- ✓ **6 Function Multimeter.**
- ✓ **Adjustable RF Power Output:**
With internal heatsink and whisper-quiet temperature switched squirrel cage blower.
- ✓ **Adjustable Level Noise Blanker:**
For a wide variety of noises and woodpecker.
- ✓ **CPU Controlled RF FSP (RF Frequency Shifted Speech Processor):**
For better intelligibility and pile-up "PUNCH" for competitive situations.
- ✓ **High Speed Automatic Antenna Tuner:**
With 39 memories.
- ✓ **50 Memories:**
Independent ATU and mode/IF filter memory.
- ✓ **Multimode Selection on Packet/RTTY:**
Switchable FSK tone, RTTY shift and CW pitch.
- ✓ **Front Panel RX Antenna Selection:**
Allows quick switching.
- ✓ **Digital Voice Storage (DVS-2):**
Option provides instant playback of 16-second receive memory, plus two 8-second or 4-second "CQ contest" messages on transmit.
- ✓ **Built In Switching AC Power Supply:**
Reliable performance with significantly reduced size and weight.
- ✓ **Band Stacking VFO System:**
Each VFO register memorises your most recent operating frequency, mode, bandwidth and clarifier information for instant return to your favourite frequency and mode.
- ✓ **Accessories/Options:**
TCXO-2 (Temperature Compensated Crystal Oscillator), XF-10.9M-202-01 (2nd IF SSB Narrow 2.0kHz), XF-445C-251-01 (3rd IF CW Narrow 250Hz), SP-6 (External Speaker), MID-1C8 (Desk Microphone), YH-77ST (Headphones).

Performance without compromise

practical Wireless

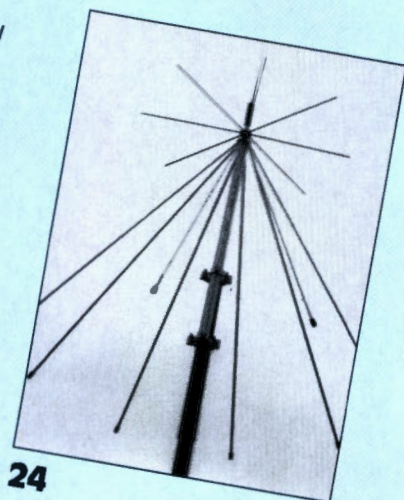
MAY 1992
(ON SALE APRIL 9)
VOL.68
NO. 5
ISSUE 1022

NEXT ISSUE (JUNE)
ON SALE MAY 14

LAST CHANCE
TO GET YOUR SUBSCRIPTION AT THE OLD
PRICE!
NEW RATES FROM MAY 14. SEE PAGE 50.

MAY 1992 CONTENTS

- 21** PW Review
**Manson EP-925 HIGH
CURRENT POWER SUPPLY**
by Richard Ayley G6AKG
- 24** PW SPECIAL ANTENNA OFFER
Save £10 on the Nevada WB
1300 Wide Band Omni-
Directional Antenna.
- 25** A Simple Inductance And
Capacitance Bridge - part 2
by Stephen Knight Bsc.
- 29** Getting Started-
The Practical Way
by Rev. George Dobbs G3RJV
- 34** On Holiday?
How to Get Your Reciprocal
Licence
- 37** CB High & Low
by 'Quaynotes'
- 38** Mathematics For The RAE
by Ray Fautley G3ASG
- 42** Reflections
by Ron Ham
- 44** Packet Panorama
Roger Cooke G3LDI
- 48** Satellite Scene
by Pat Gowen G3IOR



Cover Acknowledgement:
Lightning strike. Science Photo Library.

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/News

Sharon George

Editorial Assistant

Donna Vincent

Administration Manager

Kathy Moore

Accounts Manager

Alan Burgess

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 Sales (Poole Office)

Marcia Brogan

Poole (0202) 676033

FAX Poole (0202) 666244

Regular Articles

- | | | | |
|-----------|--------------------|--------------|-------------------|
| 67 | Advert Index | 13 | Keylines |
| 54 | Backscatter | 16 | Newsdesk '92 |
| 53 | Bargain Basement | 19,41 | Radio Diary |
| 64 | Book Service | 14 | Receiving You |
| 18 | Club News | 15 | Services |
| 15 | Competition Corner | 50 | Subscribers' Club |

INSIDE THIS MONTH'S BUMPER ISSUE
FREE 72-PAGE PULL-OUT
NEVADA COMMUNICATIONS COLOUR
CATALOGUE... WORTH £2

INCLUDING
A £2.00 DISCOUNT FOR ANY ORDERS OVER £10

Copyright © PW PUBLISHING LTD. 1992. Copyright in all drawings, photographs and articles published in *Practical Wireless* is fully protected and reproduction 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 PW Publishing Ltd., Enefco House, The Quay, Poole, Dorset BH15 1PP. Printed in England by Southernprint (Web Offset) Ltd., Poole, Dorset, Tel: 0202 622226. Distributed by Seymour, Winsor House, 1270 London Road, Norbury, London SW16 4DH, Tel: 081-679 1899, Fax: 081-679 8907, Telex: 8812945. Sole Agents for Australia and New Zealand - Gordon and Gotch (Asia) Ltd.; South Africa - Central News Agency. Subscriptions INLAND £19.00, EUROPE £21, OVERSEAS (by ASP) £22, payable to PRACTICAL WIRELESS, Subscription Department, PW 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 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 \$45 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. 08846.



Castle Electronics

Tel: 0384 298616

Fax: 0384 270224

PROBLEMS WITH YOUR RIG?

We are the major servicing/repair centre for all amateur, PMR and commercial radio equipment...

KENWOOD
YAESU

ICOM

MOTOROLA

Radius™

and all other major manufacturers

- ★ Suppliers of all these makes and offering a full service and spares back-up
- ★ Supply and installation of all PMR and commercial radio systems
- ★ Guaranteed 7 day turnaround (subject to spares availability)
- ★ Collection and delivery service available if required
- ★ Trade service enquiries welcome (special rates)



Castle Electronics are part of West Midlands Electronic & Communication Services Limited who are licensed credit brokers.



UNIT 3, "BAIRD HOUSE", DUDLEY INNOVATION CENTRE
PENSNETT TRADING ESTATE, KINGSWINFORD
WEST MIDLANDS DY6 8XZ



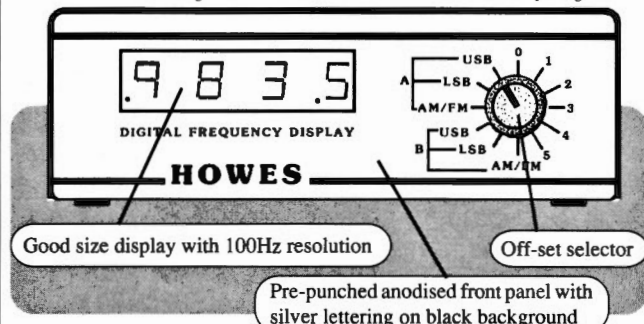
C.M.HOWES COMMUNICATIONS

Mail Order to: Eydon, Daventry,
Northants NN11 6PT
Tel: 0327 60178



NEW KITS!

DRAWING Showing DFD4 and PMB4 Kits in the new CA4M hardware package



The **HOWES DFD4** is an add-on Digital Readout for analogue receivers and transceivers. If you have an FRG7, an analogue FT101 or a similar type of rig, then the DFD4 has been designed with you in mind. The DFD4 is a frequency counter that can be programmed for any IF offset so it can be used with almost any radio, including the old Government surplus sets. It can also count down as well as up, so it is suitable for "reverse tuning" rigs too.

To make the DFD4 even more versatile, we now offer the **PMB4** Programmable Matrix as an optional kit. This enables you to switch between six different programmed offsets, so the DFD4 can be used with more than one radio, and to compensate for IF frequency differences when switching modes. Also new is the **CA4M** "hardware package". This contains a custom made case with pre-punched anodised aluminium front panel (see drawing above), plus switch, knob, BNC socket, nuts and bolts etc. to enable you to achieve a high standard of finish for your project.

DFD4 Kit: £39-90
PMB4 Kit: £9-90

Assembled PCBs: £59-90
CA4M Hardware: £19-90

HOWES QRP CW Transceiver



BUILD A QRP TRANSCEIVER!

To build a transceiver with our kits is a simple modular, step by step approach. You can start with the receiver, and then add on the transmitter at a later date if you wish. Various accessory kits are available to increase the facilities, these range from a simple signal meter for the receiver to extra filtering and of course, digital readout. We offer a matching range of "hardware packs" (case, knobs etc.) to enable your station to look as good as factory equipment! Whether you fancy a single band CW transceiver, or more complex dual band SSB/CW rig, all these kits are designed to be within the scope of the ordinary home constructor. The well thought out designs and the backing of professional RF test facilities mean you can build with confidence!

Single band 40 or 80M CW transceiver:

	Kit	Assembled
DcRx40 or 80 SSB/CW receiver	£15-90	£22-70
CTX40 or 80 QRP CW transmitter	£14-80	£21-80
CVF40 or 80 VFO for TX or TX/RX	£10-90	£18-40
CSL4 300Hz CW and narrow SSB Filter	£10-50	£17-40
DCS2 "S Meter" for receiver	£9-20	£13-80

CA80M Hardware pack (suits 40 or 80M): £29-90

You will also need two 50pF tuning caps (£1-60 each) plus a slow motion dial (£6-90).
Total price of transceiver in kit form (including caps and dial): £101-30.

PLEASE ADD £1-20 P&P for kits or £3-00 if ordering hardware.

HOWES KITS are produced by a professional RF design and manufacturing company. They contain good quality printed circuit boards 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. Normally all items are in stock and delivery is within seven days.

72 & 73 from Dave G4KQH, Technical Manager.

HF RECEIVER TECHNOLOGY

INNOVATION DESIGN MANUFACTURE TECHNICAL SUPPORT

HF-150 Compact Communications Receiver

£329 inc VAT

Designed as a logical alternative to the Japanese 'push button portables', the HF-150 places a 'real radio' within your price reach. Whilst reflecting the Lowe approach to simplicity of operation, the HF-150 nevertheless has all the features and facilities you need. This truly is 'Real Radio'.

Frequency coverage: 30kHz - 30MHz

Modes: USB/LSB/AM/Sync. AM (Selectable S'band)

IF Bandwidths: 2.5kHz & 7kHz

Tuning: 8Hz steps with variable speed

Memories: 60 holding frequency & mode



Aerial inputs: 600 ohms, 50 ohms & Hi-Z Whip

Power: 12Vdc from mains adaptor (supplied)

Case: All-metal light alloy case

Size: 185mm(W) x 80mm(H) x 160mm(D)

Weight: 1.3kg (less batteries)



HF-235 The Professionals' Choice

£1116 inc VAT

Frequency coverage: 30kHz - 30MHz

Modes: AM/LSB/USB/CW/NBFM (Sync AM optional)

Filters: 6 Input bandpass filters

Tuning steps: 8Hz - 125Hz (stepped by mode)

Construction: Fully floating chassis

Remote control: RS232C Computer interface (optional)

Memories: 30 holding a host of data

Tuning: Spin-wheel, keypad & MHz button freq. entry

Power supply: 110-120 or 220-240Vac 50Hz

Size: 483mm(W) x 88mm(H) x 320mm(D)

HF-225 Gateway to the World

£429 inc VAT



Frequencies: 30kHz - 30Mhz

Tuning: 8Hz steps.

Memories: 30 channels

Filters: IF filters for all modes fitted

Tuning: Keypad & spin-wheel

AM/FM Sync. Detector (optional)

Keypad for remote entry (optional)

Excellent quality at reasonable cost

LOWE ELECTRONICS LIMITED

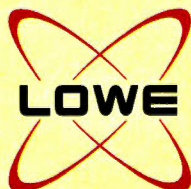
Chesterfield Road, Matlock, Derbyshire DE4 5LE Tel: 0629 580800 Fax: 0629 580020

Barry (S Wales): 0446 721304 *Bournemouth: 0202 577760 Bristol: 0272 771770

Cambridge: 0223 311230 Cumbernauld: 0236 721004 London (Heathrow): 0753 545255

London (Middlesex): 081-429 3256 Newcastle Airport: 0661 860418 *Closed on Monday

Sole appointed UK Distributor for KENWOOD Amateur Radio



WATERS & STANTON

0702 206835
or 204965

UK's LARGEST SELECTION OF HAM RADIO PRODUCTS

Don't miss our OPEN DAY! Sunday 10th May 1992

Clearance lines, Special Offers and our famous free booze and food!

HF TRANSCEIVERS IN STOCK YAesu - KENWOOD - ICOM



GENUINE UK STOCK! 12 MONTHS WARRANTY

KENWOOD DISCOUNT!

TH-77
2m/70cm
£395
Our price
£325!

We can offer plenty of advice on suitable aerials etc. And remember we can offer our own power supplies to match most rigs at half the price of the listed ones! Phone. We'll save you money.

STOP PRESS: New MFJ 20M QRP rig with 500Hz CW filter £179.95

TONNA BEAMS



VHF/UHF
All with "N"
connectors
"THE BEST"

6M	.....Price
20505 5 el	.....£59.00
2M	
20804 4 el	.....£32.00
20808 4 el	.....£41.00
20809 9 el	.....£39.00
20809 9 el	.....£39.00
20822 11 el	.....£95.00
20813 13 el	.....£55.00
20817 17 el	.....£69.00
70cm	
20909 9 el	.....£33.00
20919 19 el	.....£40.00
23cm	
20623 23 el	.....£39.00
20655 55 el	.....£55.00

Ask for free Tonna
colour catalogue and full
technical specification

Why Buy From Us?

We appreciate that some of you will be new to the hobby and may not have heard of us before. So what assurances can we give you?
When you buy goods from us you are buying from one of the oldest established retailers in amateur radio. We got where we are today by giving good, honest service, realistic part exchange deals and competitive prices. Our retail premises are stocked out with goodies and manned by staff who understand them. Most of us also hold current amateur radio licences. At Hockley we even have a 4 element HF beam on a tower for you to try your rig out on. Alternatively you can plug into our VHF/UHF log periodic or one of our co-linears, sit down and try the rig out, have a cup of coffee and ask as many questions as you like!
If you cannot visit us we fully understand your concern when dealing by mail order. That's why we offer probably the safest, worry free service in the business. We offer 24 hour delivery using Parcel Force. Every product is inspected before being carefully packed and every parcel is covered against loss or damage by our own insurers to the full value. There's absolutely no risk to you. And if in the unlikely event you do not find the goods acceptable to you we offer a full refund or exchange service provided we are notified within 5 working days of delivery and goods are returned in satisfactory condition. That's how we got to be where we are today and that's how you can get your goods tomorrow!

Peter Waters G3OJV/G0PEP

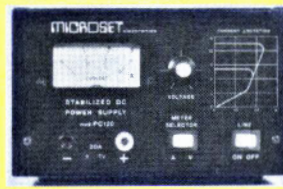
Discounts! DJ-560E 2m/70cm Our price £299!

We've got a batch of current dual band DJ-560's to offer at a discount price. Dual watch 2m/70cms. All factory fresh and guaranteed with extended receive coverage, DTMF, tone squelch etc. Send for colour brochure but hurry if you want to pick up a bargain!



MICROSET POWER SUPPLIES

AND
LINEARS



MAST HEAD PRE-AMPLIFIERS

PR-145	.....2M 100 Watt 16dB gain - 0.9dB NF	.....£75.00
PRH-145	.....2M 500 Watt 18dB gain - 0.9dB NF	.....£109.00
PR-430	.....70cms 100 Watt 15dB gain - 1.2dB NF	.....£85.00

MICROSET POWER SUPPLIES

PT-107	.....7 Amp 13.5V fully protected (non meter)	.....£49.00
PT-110	.....10 Amp 13.5V fully protected (non meter)	.....£69.00
PC-110	.....10 Amp 13.5V fully protected with meter	.....£89.00
PT-120	.....20 Amp 13.5V fully protected (non meter)	.....£119.00
PC-120	.....20 Amp 13.5V fully protected with meter	.....£149.00
PT-135	.....30 Amp 13.5V fully protected (non meter)	.....£149.00

AMPLIFIERS (with GaAsFET Pre-amps)

R-25	.....2M 1-4W in 30W max out SSB/FM	.....£79.00
RV-45	.....2M 3-15W in 45W max out SSB/FM	.....£99.00
R-50	.....2M 1-7W in 50W max out SSB/FM	.....£99.00
SR-100	.....2M 4-25W in 100W max out SSB/FM	.....£159.00
SR-200	.....2M 10-50W in 200W max out SSB/FM	.....£289.00
VUR-30	.....2M/70cms 1-6W in 20/30W max FM	.....£229.00
RU-20	.....70cms 0.8-3 in 15-20W max out SSB/FM	.....£119.00
R-432-90	.....70cms 6-12 in 80-90W max out SSB/FM	.....£389.00

Send SAE for full colour
Microset catalogue

MFJ Products from stock! 300W HF ATU



The MFJ-948 is a complete 300 Watt aerial matcher in one box. It will match coaxial, balanced feeder, and single wires. A dual needle VSWR/Power meter makes adjustment simple and a 3 way aerial switch completes the package. Fantastic value! **£129**

Other MFJ products:

MFJ-949D	ATU as above but with 300W dummy load	£149.00
MFJ-901B	ATU less switch load and meter. Super!	£69.95
MFJ-264	1.5kW dummy load. DC-650MHz	£69.95
MFJ-260B	300W dummy load DC-160MHz	£35.95
MFJ-816	HF 30/300 Watt power meter	£31.95
MFJ-812B	144MHz 30/300 Watt power meter	£31.95
MFJ-110	Fabulous world clock with map	£29.95
MFJ-32	Packet radio handbook. Super guide!	£8.95
MFJ-1286	Gray Line Graphics Programme for IBM	£32.95
MFJ-1281	Easy DX logging programme	£41.95
MFJ-1040	1.8-54MHz tx/rx preselector	£99.95
MFJ-1020A	Indoor active antenna station. 0-30MHz	£84.95
MFJ-1272B	TNC/Microphone interface	£36.95
MFJ-722	Super rx audio filter	£89.95
MFJ-752C	Tuneable audio filter	£109.95
MFJ-207	Antenna analyzer. Brilliant idea!	£99.95
MFJ-557	Self contained CW practice key and oscillator	£29.95
MFJ-407B	Electronic keyer. 8-5 WPM Self powered	£69.95
MFJ-931	Artificial HF ground unit. Ideal for flats etc.	£79.95
BY-1	Genuine Bencher Paddle. A precision product	£69.95
MFJ-704	HF Low Pass Filter	£39.95
MFJ-10B	Dual-time deck top clock. LCD Display	£19.95

Electronic Keyer £79.95

Model MFJ-407B is a budget price electronic keyer that is remarkable value. Operating from internal or external source it provides conventional or Iambic keying at speeds from approx 5-50 WPM. Controls include tone, speed, weight and volume. (Needs paddle key).



AMERITRON HF LINEARS

NEW
600 Watts
£699!
AL-811



This linear is incredible value. We have put it through its paces and it really stands abuse. 3 rugged 811A tubes provide up to 600 Watts output from 160-10m. A hurky mains transformer and full metering is included. Used by DX-peditions it has to be amazing value at **£699 inc VAT**

AL-80AX 1kW from 160-10m 3-500z tube. £1099.00.

Other Ameritron linears are available. Send SAE today.

DIAMOND

VSWR/POWER METERS

SX-100	.....1.6-60 MHz, 30W-300W-3kW	.....£99.00
SX-200	.....1.8-200 MHz, 5.20-200 watts	.....£69.00
SX-400	.....140-525 MHz, 5.20-200 watts	.....£79.00
SX-600	.....1.8-525 MHz, 5.20-200 watts	.....£125.00
SX-1000	.....1.8-1300 MHz, 5.20-200 watts	.....£165.00
SX-2000	.....1.8-200 MHz, 5.20-200 watts AUTO	.....£95.00
SX-9000	.....1.8-160 & 430-1300 MHz, AUTO	.....£190.00

BASE STATION ANTENNAS

CP-4	.....10-15-20-40m vertical with radials	.....£149.00
CP-5	.....10-15-20-40-80m vertical with radials	.....£199.00
CP-6	.....6-10-15-20-40-80m vertical with radials	.....£219.00
D-130N	.....Discose 25-1300 MHz, 50 FT cable	.....£84.95
CP-22E	.....2m 2 x 5/8 6.5dB gain omni directional	.....£49.95
D-707	.....Active rx. 1.5-1300 MHz 12V	.....£99.00

FIBREGLASS VERTICALS

X-50	.....2m/70cms 4.5/7.2dB gain 1.7m long	.....£59.95
X-300	.....2m/70cms 6.5/9dB gain 3.1m long	.....£99.00
X-500	.....2m/70cms 8.3/11.7dB gain 5.2m long	.....£119.00
X-700	.....2m/70cms 9.3/13dB gain 7.2m long	.....£219.00
V-2000	.....6m/2m/70cms 2.15dB/6.2dB/8.4dB 2.5m	.....£99.00
X-5000	.....2m/70cms/23cms 4.5/8.3/1.7dB 1.8m	.....£109.00

MOBILE ANTENNAS AND MOUNTS

NR-2000m	.....23cms/70cms/2m mobile whip PL259	.....£49.95
D-505	.....Active rx. antenna 1.5-1300MHz 12v	.....£69.00
NR-770R	.....2m/70cms whip PL-259	.....£35.00
NR-790	.....2m/70cms 4.5/7.2 dB gain 100 Watts	.....£48.00
SG-7900	.....2m/70cms 8.3/11.7dB gain 5.2m long	.....£68.00
DP-2HE	.....2m 1/4 wave whip PL259	.....£6.95
M-285	.....2m 5/8th whip PL259	.....£15.95
EL-2E	.....2m 7/8th deluxe whip L259	.....£33.95
NR-07C	.....70cms mobile whip PL259	.....£25.00
AM-L	.....Gutter mount fold over type	.....£12.95
EC-H	.....PL259/SO239 cable kit for DP-GL	.....£9.95
SP-M	.....Heavy duty magnetic mount with cable	.....£25.95

NEW "HARI" HF ANTENNAS

A great new range of antennas that are pre-tuned, beautifully engineered to professional standards and constructed of heavy duty, multi stranded, clear plastic coated wire. All antennas are balun fed and fitted with SO239 sockets.

W3DZZ 80/40 dipole	200W 34m L	.....£79.00
W3DZZ 80/40 dipole	1kW 34m L	.....£99.00
Windom 80/40/20/17/12/10m	200W 42m L	.....£49.00
Windom 80/40/20/17/12/10m	1kW 42m L	.....£69.00
Windom 40/20/17/12/10m	1kW 21m L	.....£59.00
Dipole 20/15/10m	200W 8m L	.....£79.00
Dipole 30/17/12m	200W 11m L	.....£79.00

Practical Wireless, May 1992



2m & 70cms Dual Bander DJ-580E

£369

inc VAT

The DJ-580E hand-held is the most advanced design ever offered to the radio amateur. Building on the winning formula of the DJ-560E, ALINCO have now reduced the size dramatically and introduced a combination of innovative features that will make your operating even more fun and certainly more versatile.

It goes without saying that ALINCO offer you all the standard features you expect from a hand-held including dual watch, dual controls, scanning, searching, priority, etc. Of course ALINCO's standard of engineering and reliability is now becoming the envy of its competitors. (They're also pretty envious of ALINCO's prices!) Naturally you get a full 12 month warranty including parts and labour. It's the extra features that really make this a winner.

For example you now have ALINCO's patented circuit that retains full operation with dry cells even when battery voltage falls by 50%. Great for emergency applications. You get a programmable auto power off feature, battery saver, digital telephone dialler and three output power levels. And we've only just started! Key in a special code on the keypad and your rig will turn into a fully operational automatic crossband repeater. Key in another code and you will open up the receiver for a.m. airband reception and frequency segments up to 995MHz! You can even use the DTMF feature to send and receive two digit code messages.

To learn more about the transceiver that has already taken the Japanese and American markets by storm, phone or write for a full colour brochure.



"The Most Comprehensive Specification Ever Offered!"

Available direct or from your local dealer

Auto repeater mode
AM Airband Reception
Expanded Receive to 995MHz

UK "Gold Seal" Warranty
Now with every unit
Look for the sign on the box!

Specification

Tx	144-146MHz 430-440MHz
Rx	AM 108-143MHz FM 130-174MHz FM 400-470MHz FM 810-995MHz
Steps	5, 10, 12.5, 20, 25kHz
Memories	42
Power Output	2.5/1.0/0.3 Watts 5 Watts with 12V DC
Scan	8 Modes
Tones	1750Hz plus DTMF Optional CTSS
Sensitivity	12dB SINAD -15dBu
Size	140x58x33mm
Weight	410g

Accessories Supplied

Ni-Cad pack, AC charger, belt clip, carry strap, dual band antenna.

WATERS & STANTON ELECTRONICS

22 Main Road, Hockley, Essex. Tel: (0702) 206835

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 9 am - 5.30 pm

Rail: Liverpool Street/Hockley or District Line/Hornchurch

SMC

South Midlands Co

Southampton (0703) 255111 Leeds (0532) 350606 Chesterfield (0532) 866111

FT890 MOBILE/BASE HF

Available
from stock



The FT890 is an exciting new all band multimode HF mobile/base transceiver from Yaesu. Designed to replace the very popular FT757GX and FT757GXII, the FT890 is a worthy successor.

Direct digital synthesis combined with a magnetic encoder provides silky smooth tuning, pure signals and as the digital synthesisers are driven from a single master oscillator both frequency accuracy and stability are guaranteed.

Optional accessories include:-

- FP800 Power supply.
- ATU2 Internal automatic ATU
- FC800 External automatic ATU
- DVS2 Digital voice storage system
- SP6 External speaker (base).
- SP7 External speaker (mobile).
- TCX03 Temperature compensated oscillator unit.
- MMB20 Mobile mounting bracket.
- XF455K 250Hz CW filter.
- YF100 500Hz CW filter
- YF101 2kHz SSB filter.

RAVE REVIEWS



FT990

- * Amateur bands Tx 160-10m
- * General coverage Rx
- * Power output up to 100W P.E.P.
- * Auto ATU and internal P.S.U.
- * 50 memories

Since its arrival in the UK the Yaesu FT990 has been hailed as a resounding success in both performance and ergonomics.

Central to the success of the FT990 is the many hours of extensive development by the engineering team at the Yaesu factory which ensures that all the very latest in circuit techniques are employed to benefit the operator. By the use of more sophisticated designs the actual operation of the transceiver can be made very easy and logical, whilst retaining the superb electronic performance expected from modern transceivers.

Almost all the people who have reviewed the FT990 agree that it is hard to beat at the price and they all suggest you try one.

A large number of amateurs are already enjoying the pleasure of operating a transceiver in a class of its own.

So why not join this group of happy people by trying one today at your local dealer!

See December 91 edition of P.W. for Rob Mannion's review
April edition of Radcomm for Peter Harts review

SMC HQ, S.M. HOUSE, SCHOOL CLOSE, CHANDLERS FORD INDUSTRIAL E

Carriage charged on all items as indicated or by quotation. Prices and availability subject to change without prior notice. Same day despatch whenever possible.

Communications Ltd. **YAESU**

246) 453340 **Birmingham** 021-327 1497 **Axminster** (0297) 34918

Look after your radio with **AMCARE**

Through **AMCARE** you can now insure for breakdown and/or loss/damage for your amateur radio equipment. Optional cover is available for loss/damage from unattended vehicle. Breakdown cover on its own is the best way to extend the warranty after the initial twelve month period at a very reasonable cost.

Full details available on request.

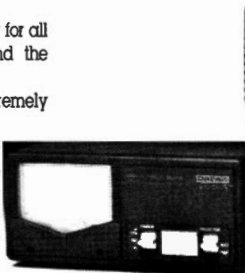
Scheme administered by Communications Support Ltd.

DAIWA POWER SUPPLIES

The Daiwa range of power supplies is proving very popular for all types of applications, both for the professional user and the hobbyist alike.

From the smallest 9A continuous PS120MkII, via the extremely popular 24A PS304, to the top of the range 32A continuous RS40X. All the Daiwa range of PSU's feature variable voltage from at least 3-15V and switchable voltage 1 current metering. Both the PS304 and RS40X have a cigar lighter socket, convenient for powering your handheld.

Also available from Daiwa are some good quality SWR/PWR meters and coax switches.



POWER SUPPLIES

PS120 M2	3-15v Variable	9A/12A max.....	£69.95	C
PS304	1-15v Variable	24A/30A max.....	£129.95	D
RS40X	1-15v Variable	32A/40A max.....	£189.00	D

COAX SWITCHES

CS201	2 Way SO239	DC-600MHz 1kW.....	£13.95	A
CS201G2	2 Way N	DC-2GHz 1kW.....	£27.50	A

SWR METERS

CN101	1.8-150 MHz	15/150/1500W.....	£59.95	B
CN103N	150-525MHz	20/200W N.....	£69.95	B

LINEAR AMPLIFIER

LA208H	2m 1.5-5W in	30-80W out.....	£159.95	C
--------	--------------	-----------------	---------	---



The CV730-1 'V' dipole is the latest in a line of dipoles from Creative Design. The use of the 'V' shape reduces the area needed for mounting the antenna which is insensitive to changes in height above ground and surrounding metallic objects.

All this for only £152.00D

6M BEAMS

New from Creative Design are a range of 6m beams, the CL6DX 6 element, CL8DX 7 element and CL6DXZ 8 element.

All these antennas are the result of long and continued research to achieve the best possible performance whilst remaining both cost effective and extensively robust.

CL6DX 6 ele 13dB	£117.50D
CL6DX 7 ele 14.3dB	£172.65D
CL6DXZ 8 ele 14.5dB	£235.00D

*Manufacturers figures.

ROTATORS

The RC5 series of rotators from Creative Design are built to meet the exacting standards required by both professional and amateur users. A range of models is available designed to cater for medium to large sized antennas. All the rotators are manufactured with high quality components allowing continued and reliable operations.

RC5-1	£223.75C
RC5-3	£280.00C
RC5A-3	£434.00C
RC5B-3	£689.00C
CK46 Rotary bearing	£35.75B

A-£1.95 B-£4.75 C-£6.60 D-£11.00 E-£16.50

The CREATE company has, for the past twenty years, been the leading manufacturer of amateur and commercial antennas (mainly HF) in Japan.

Now available to customers in the UK through South Midlands Communications, the appointed distributor are the popular CREATE HF beams to cover the 10/15/20 metre bands, HF baluns up to 10kW PEP and to exciting 10/15/40V dipole which has elements of only 19ft and is designed in such a way that it can be mounted in particularly awkward places. SMC also stock what must be one of the largest amateur antennas available, the 40 metre full sized beam, as well as 6 and 7 element and six metre yagis and professional quality log periodic antennas for 50-1300 and 105-1300MHz. CREATE also manufacture rotators to exacting levels of precision and these have virtually no back lash, quiet gears, variable speed and large torque. All are now available from SMC stock. Please contact us NOW for full details.

HF BEAMS

Introducing the NEW 316 series of DX Tribanders from Create which offer outstanding efficiency with High Q traps especially designed for 14, 21, & 38MHz. High grade materials are used to ensure long life, maximum reliability and light weight with no compromise in performance.

All beams supplied complete with balun	
CD318JR 4 ele 10-15-20M 750W PEP Gain 7:7:5:8dB F/B 18dB	£305.00D
CD318 4 ele 10-15-20M 2kW PEP Gain 7:8:8:5dB F/B 18:20:20dB	£357.00D
CD318B 5 ele 10-15-20M 2kW PEP Gain 7:5:9:9:5dB F/B 20:18:20dB	£459.00D
CL40B 4 3 ele Yag 40m 4kW PEP Gain 8dB F/B 22:18dB	£1120.00E
CL10 5 ele 10m 2kW PEP Gain 120dB F/B 24dB	£219.00D
CL15 5 ele 15m 3kW PEP Gain 125dB F/B 24dB	£325.00D
AFA40 2 ele 40m 2kW PEP gain 60dB F/B 20dB	£383.00D
714X 3 3/4 ele 15-20-40m 3kW PEP gain 7:9:10dB F/B 20:23:20dB	£815.00E
CV48 40M vertical 2kW PEP 500W PEP Radial wvts included	£214.50D
suitable for ground or roof mounting.	
AD385 matching network 40780M for CV48 remote switchable	£50.00B
CV730V-1 V dipole for 10-15-20-40 1kW-2kW PEP 19' ele	£152.00D
capable of being mounted anywhere	

UK appointed agents for:-

Yaesu, Daiwa, Comet, Create, Tokyo Hy-Power, Hokushin & Telereader.

Also suppliers of:-

AOR, Sony, JRC, Jaybeam, Drake Henry Linears, Toyo, Icom & Strumech

**STRUMECH
VERSATOWER**



MAIN STOCKIST
MOST POPULAR MODELS
IN STOCK

STATE, EASTLEIGH, HANTS SO5 3BY. TEL: 0703 255111 FAX: 0703 263507

possible. Up to £1000 instant credit subject to status written quotation on request. Yaesu distributor warranty, 12 months parts & labour

Vote for Dewsbury.

Ten years...that's how long we've been supplying you

SUPA-TUTA

To teach you
morse
quickly
£69.95



SUPA-TUTA PLUS

To teach you
morse with
keyer
£84.95



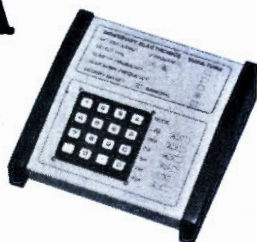
SUPA-KEYA

The most
friendly keyer
around
£99.95



SUPA-TUNA

Makes selecting
frequencies
easier
£67.50



Post & Packing £3.50
VAT included on all items at 17.5%

Stockists of DIAWA - VIBROPLEX - ICO

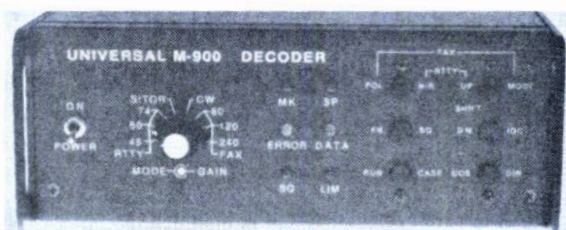
DEWSBURY E

**176 LOWER HIGH ST
WEST MIDLA**



Tel: (0384) 390063/371

UNIVERSAL M900



RTTY - CW - TOR - Fax
Decoder with fax to screen
decodes from receiver.

Price £590 inc. VAT

WAVECOM W4010



Top of the range semi
professional Decoder -
Up to 28 different codes
available. Free standing
or rack mounted. 12 volt
working. Just add
receiver and monitor.

For full details please
call or send large SAE

.....Ten more years!

with quality goods and service...here's to another ten!

- YAESU - KENWOOD - JRC - WAVECOM

ELECTRONICS,
MEET, STOURBRIDGE,
INDS DY8 1TG

28 Fax: (0384) 371228



UNIVERSAL M7000



Decodes RTTY - CW - FEC -
 FAX - ARQ - ASCII Packet -
 TDM - ARQE - ARQE3 - FEC A
 - ARQS - SWED - ARQ - VFT
 (TDM) also Fax to screen or
 printer.

Many other features.

£1030

STAR MASTERKEY

Low cost IAMBIC
 Morse Keyer.
 Requires paddle.

Price £59.95



CMOS MEMORY KEYER

IAMBIC Memory
 Keyer. 88 memories, beacon
 mode. Requires paddle. **£95.00**



EASY READER

from
£199.95



Low Cost Decoder - CW, RTTY,
 ASCII & FEC. Use with composite
 video monitor of UHF TV with our
 optional UHF modulator.

RTTY Baudot 45/50/75 baud • CW speed 2-99
 wpm • RTTY ASCII 110 and 200 baud • Automatic
 or manual speed selection • On screen tuning
 indication • Status line on screen giving mode,
 speed in use and printer on/off • Output to video
 monitor and printer (centronics/parallel)
 • Options: UHF TV output, RS232 output • Now
 with FEC (for Navtex etc)

STAR MASTERKEY MORSE KEYBOARD

From the makers of the world renowned
 STAR MASTERKEY MORSE KEYBOARD.
 Send perfect Morse as easily as typing a
 letter. It has never been as easy to send
 Morse.

Variable transmission speed 1-99 wpm or
 100-200-300-400 wpm for Meteor Scat
 operation.

4 Message Memories each of 255
 characters. 26 message memories each of
 127 characters. All memories stored on non
 volatile. Ram Messages stored for up to 5
 years. Indication of speed on 7 segment
 display. Indication of operating mode on
 leds. Sidetone and relay output for all types
 of transmitter. Full QWERTY keyboard with
 real keys. Metal cased for RF immunity.

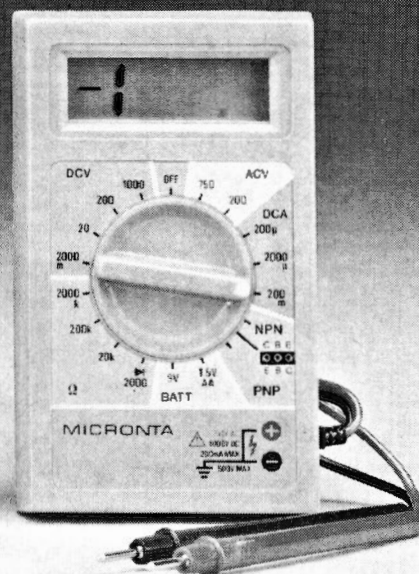
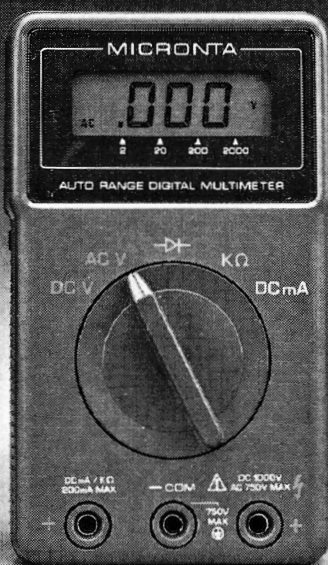


30 memories make sending morse
 easier than ever before. 1-99 wpm,
 100, 200, 3000, 400 wpm for
 Meteor Scat.
£199.95

MICRONTA®



MULTIMETERS



DUAL DISPLAY

£49⁹⁵

Autoranging. Large display plus 32-segment bargraph. Data hold, range control, diode and continuity check. Measures to 1000 VDC, 700 VAC, 10A AC/DC, resistance to 30 megohms. With moulded rubber holster. Requires 2 "AA" batteries. 22-167 £49.95

COMPACT AUTORANGE

£29⁹⁵

Autoranging. Features diode-check, auto polarity. Easy-to-read LCD display, low-battery indicator. Measures AC/DC volts, DC current and resistance. Fuse protected. Requires 2 "AA" batteries. 22-166 £29.95

MINI DMM

£22⁹⁵

Mini DMM. With built-in test leads. Measures 1000 VDC, 750V AC, 200mA DC current. Resistance to 2 megohms. Built-in transistor checker NPN/PNP hFE, 1.5 and 9v battery checker. Requires 9v battery. 22-9022 £22.95

Tandy®

ALL THE ACTION AS IT HAPPENS!

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

**PAY A
VISIT TO**

SUPER

HAMSTORES

**AVAILABLE AT SUPER HAMSTORES THIS MONTH;
A FULL RANGE OF WIDEBAND, HF, VHF, UHF, BASE-STATION,
MOBILE & HANDPORTABLE RECEIVERS.**

Whatever your requirements we will help you make the right choice.

WIDEBAND RECEIVERS

R9000.....	100kHz - 2GHz All Mode	£4080.00
R100.....	100kHz - 1856MHz AM/FM	£ 510.00
R1.....	100kHz - 1300MHz AM/FM	£ 349.00
AR3000A.....	100kHz - 2036MHz All mode	£ 765.00
AR2000.....	500kHz - 1300MHz AM/FM	£ 269.00
MVT7000	8MHz - 1300MHz AM/FM	£ 289.00
DJX1	500kHz - 1300MHz AM/FM	£ 269.00

HF RECEIVERS

R5000.....	100kHz - 30MHz All mode (VHF OPT)	£ 925.00
R71.....	100kHz - 30MHz All mode (FM OPT)	£ 875.00
R72.....	30kHz - 30MHz All mode (FM OPT)	£ 659.00

HF RECEIVERS CONTD.

R2000.....	150kHz - 30MHz All mode (VHF OPT)	£ 549.00
HF225	30kHz - 30MHz All mode (FM OPT)	£ 429.00
HF150	30kHz - 30MHz SSB/AM/CW	£ 329.00

VHF/UHF RECEIVERS

R7000.....	25MHz - 2GHz All mode	£1012.00
R7100.....	25MHz - 2GHz All mode	£1100.00
FRG9600	60MHz - 905MHz All mode	£ 520.00

AIRBAND RECEIVERS

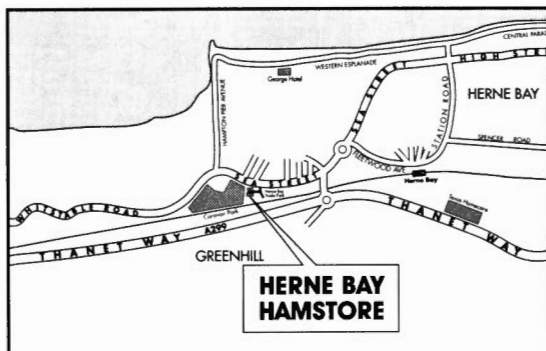
WIN108	108MHz - 142.975MHz AM	£ 178.00
MVT125	108MHz - 142.00MHz AM	£ 169.00

In addition, HAMSTORES stock a wide range of new transceivers plus a large selection of second-hand and ex-demo gear including; BARENCO, DIAMOND, COMET, SONY, AOR, LOWE, DRAE, CUSHCRAFT, AKD, KANGA KITS, MFJ, DEECOMM, CDR, ALLGON, TOYO, AEA, MET, ICOM, YAESU, KENWOOD, ALINCO, JRC ETC. Watch this space for more news,

73's, Chris G8GKC, Gordon G3LEQ and John G8VIQ.

Opening times for both stores: 09:00 - 17:00 Tuesdays to Saturdays

HERNE BAY



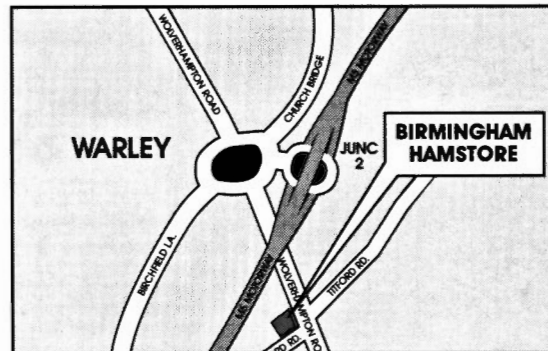
Unit 8, Herne Bay West Industrial Estate,
Sea Street, Herne Bay, Kent CT6 8LD
Telephone: (0227) 741555, Fax: (0227) 741742

Payment by Access, Visa and Switch. Part-exchanges welcome, finance can easily be arranged (subject to status). Interest free credit is available on selected new ICOM products.

If you cannot visit an ICOM HAMSTORE in person we operate an efficient, computer-based Mail order service. Stock items normally despatched within 24Hrs.



BIRMINGHAM



International House, 963 Wolverhampton Rd.
Oldbury, West Midlands B69 4RJ
Telephone: 021 552 0073, Fax: 021 552 0051

The only strings attached –



THE U.K.'S MULTI-BRAND AUTHORISED STOCKIST!

When buying from Martin Lynch...

OK so I'll admit – there are strings attached when you buy from Martin Lynch. But I don't think you'll complain. New or Secondhand – the "MONEY BACK GUARANTEE" applies. If the equipment is not as described, you can have your money back! No Quibble, no arguments. Nobody offers this kind of deal. Either visiting the shop or Mail Order, the rule still applies. You can't lose.

As an INDEPENDENT RETAILER I can continue to offer you unrivalled personal service. Backed up by the Authorised U.K. Distributors, you have total piece of mind. Phone today for your requirements, or call in at



Graeme G4XOF Martin G4HKS Val G4WIS Bryan

the shop in West London. I'm easy to find – just across the road from NORTHFIELDS UNDERGROUND on the Piccadilly line, (closest Ham Store to Heathrow by Tube) – only a few minutes from the M4/M1/M25.

LATEST EQUIPMENT IN STOCK!

YAESU FT 890

– AMAZING HF MULTIMODE WITH OR WITHOUT ATU.

YAESU FT990

– SEE LAST MONTH'S RADCOM FOR PETER HART'S REVIEW.

YAESU FT650

– 100W ALL MODE 10 & 6M TRANSCEIVER.

ICOM ICR7100HF

– THE ICOM U.K.'S APPROVED HF VERSION.

ICOM IC2/4SRE

– SINGLE BAND HANDIES WITH SCANNER!

ICOM ICW2E

– THE BEST DUAL BAND 'DOES EVERYTHING' HANDY

KENWOOD TM741E

– TRIPLE BAND WITH ALL THE MODS!

KENWOOD TM732E

– BEST VALUE DUALBAND MOBILE.

KENWOOD TS850S

– UNBEATABLE TRADE-INS ON THIS ONE.

KENWOOD TS450/690S

– WITH OR WITHOUT 6M – IT'S A WINNER.

★ ALINCO – I'VE GOT THE LOT, INCLUDING THE NEW DUAL BAND HANDIE! ★

73 MARTIN G4HKS

MARTIN LYNCH
G4HKS
THE AMATEUR RADIO EXCHANGE CENTRE



286 Northfield Avenue, Ealing, London W5 4UB. Tel: 081 566 1120. Fax (24 hr): 081 566 1207

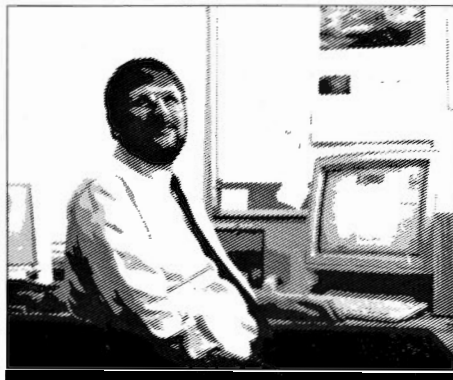
Tel: 081 566 1120 • SALES • SERVICE • MAIL ORDER

Please add £10.50 for 48 hr delivery.

SHOP OPENING HOURS: Tuesday - Saturday 10am-6pm.

24 Hour Sales HOT LINE 0860 339339 (after hours only).

Martin Lynch is a licensed Credit Broker – full written details on request. Typical APR 36.8%



73 DE Rob Mannion G3XFD

Practical Wireless readers, it seems, are caring people if the response to my recent 'safety in the shack' theme to 'Keylines' is anything to go by. I say this, because the response to my request for a replacement i.f. transformer for my damaged Electroniques front-end, was overwhelming!

Thank you all very much for your help. I'm extremely grateful indeed for the various bits and pieces that arrived in the post and via Rev. George Dobbs G3RJV's car at the London Amateur Radio Show! (Thanks George).

Unknown Reader

In the latter case, I'm anxious to hear from the unknown reader who 'phoned me, and then took the trouble to take equipment to Rochdale, which George G3RJV then delivered to me at the LARS. Unfortunately, I don't have a callsign or address to write to, so please let me know your name. I'd like to write to say thanks for the Electronique front ends that came wrapped in some unusual cabinets, and beautiful Eddystone dials!

Some of you were kind enough to take the trouble to 'phone to suggest where I could obtain replacement parts, and then sent them on to me! I even had a call from 'Mr Electroniques' himself, who I'm pleased to say is very much with us and active in the hobby although officially 'retired'.

You're all a wonderful group of people, and thanks to your generosity, I can get my transceiver going, and at least two school radio clubs will benefit, by having ready-built front ends for their amateur band receivers.

The effect of my editorial makes me think that there are a

lot of very useful, potential home-brew bits and pieces lying around in readers' shacks. This sort of gear, sounds like real 'Bargain Basement' material to me. I'd be very pleased to see more of this sort of item for sale in *PW* to help and encourage constructors. So how about it all you hoarders?

Constructional Bias

Although *PW* has a constructional bias, I fully realise that home-brewing equipment doesn't appeal to everyone. It's also true that even the keenest constructor will usually have some commercial equipment in the shack.

A glance through the pages of the magazine, will show that there's a very good variety of new commercially-made equipment available. This supply of sparkling, high-quality new equipment, along with a very healthy second-hand market, is an essential aspect of amateur radio.

Without advertising, and without readily available equipment, the radio hobby (and *PW* for that matter) would find it difficult to survive. However, I think that the time has arrived when we desperately need an 'injection' of cheaper new gear, to boost the amateur radio equipment market.

Expensive Pastime

Amateur radio equipment has never been cheap. Our hobby has always been known as an expensive pastime. The newcomer, if they aren't interested in kit-building or cannot obtain equipment on the second-hand market, needs a rather deep pocket.

What the hobby needs, is a

range of ready-made basic 'no frills' receivers and transceivers for h.f. operation. Surely it can be done? You only need to look at the equipment produced for the CB market to see that it is possible to produce simple, but reliable equipment for a much cheaper price than we're used to seeing.

To a certain extent, the v.h.f. and u.h.f. equipment market is quite well catered for. It's relatively easy for the v.h.f. operator to get on the air for less than £200. Nowadays, we've got several British designed and built v.h.f. rigs, and an h.f. receiver on the market. But what about the h.f. transmitting operator, who cannot afford to buy one of the many more expensive rigs on offer? What do they do?

Relatively Cheap

I would like to see a range of relatively cheap, easily serviced h.f. rigs on sale in this country. If amateur radio is to encourage new blood, we must have a plentiful supply of budget-priced, basic equipment.

There's no real objection (as far as I'm concerned) to having valves in equipment in this price range, and they can be very cheap to replace. Another factor, which most people know anyway, is that you can get away with 'murder' when it comes to mis-matching a valved 'final' amplifier. How many operators are there who can say (hand on heart!) that they've never endangered a p.a. stage?

Here in the *PW* office, despite our 'Bargain Basement' page, we still receive complaints from readers. They're not complaining about the service we offer, but they are complaining about the fact that they get 'killed in the rush', every time they try to chase the bargains.

The basic problem is that

everyone is trying to buy from what is, in reality, a very limited market. The supply of KW2000, 'As' and 'Bs' and the popular early Yaesu FT transceivers and other equipment is very limited. So, we really do need that 'injection' of budget-priced gear.

Privileged

As editor of *PW*, I'm in a very privileged position. It means that I have the opportunity to try out some really excellent equipment. Despite this, I'm very conscious that many of our readers, although they'd like to, cannot afford some of the equipment we review.

So, I'd like to take advantage of my privileged position and ask all the mainstream manufacturers and importers to consider the 'bottom end' of the market. I feel sure that, bearing in mind the expertise available, it is possible to produce more equipment to suit very limited purses.

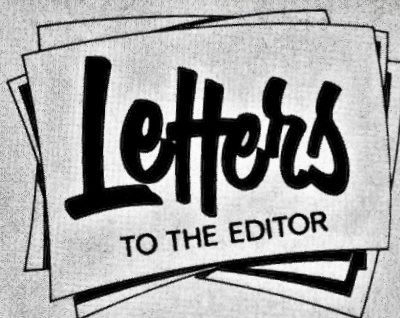
Hopefully, I'll get a response to my suggestion. You never know, I may even be able to review some budget equipment in *PW*.

Any manufacturer or importer, who is prepared to support the lower end of the market, can count on my support. Don't forget, that the radio amateur who starts off with a basic rig, may well 'trade up' later! This will be to everyone's advantage.

The budget-priced equipment will enter the equipment chain, and will continue to circulate. The addition of such equipment will complement the secondhand market, the quality kit trade and the high-performance stables.

In my opinion, the radio amateur will then be catered for in the best way possible. I think it's the only way forward for our hobby.

Receiving You



Send your letters to the editorial offices in Poole. They must be original, and not duplicated in any other magazine. We reserve the right to edit or shorten any letter. The views expressed in letters are not necessarily those of *Practical Wireless*. The Star Letter will receive a voucher worth £10 to spend on items from our Book, PCB or other services offered by *Practical Wireless*. All other letters will receive a £5 voucher.

Dear Sir

Thank you for a really excellent magazine, I have been a subscriber since 1956. I noted with great interest the Revex s.w.r. and power meter on the front cover of the March issue. The meter is particularly interesting, as

it's a p.e.p. type, covering 144 and 430MHz, and has a 400W capability.

I looked through the article for the UK supplier but in vain, can you help please? (How about a review of this one please).

Secondly, I am building a 4CX250B linear amp

THIS MONTH'S STAR LETTER

Dear Sir

In reply to your request as to what readers wish to see in *PW*, I can only agree with what Mr R. Morrall says in his letter (*PW* March 1992).

Briefly, I also would like to see more detailed explanations, with necessary mathematics, concerning all aspects of radio reception and transmission design. So many current electronics magazines appear to be little more than providers of reports on consumer electronics.

Let me add, that *PW* has no serious competitor here in France.

Robert Duncan
Chasseneuil, France

Editor's reply: Thanks for your letter and comments Robert. The *PW* team would be most interested to hear more from readers on the subject area Robert has mentioned. Would YOU like to see an article or articles discussing the entire design process (considering both practical and theoretical) considerations? Let's be hearing from you!

Dear Sir

Can I bring to the attention of those attending radio rallies, that some unscrupulous dealers are messing about with the junk on offer. I have noticed this particularly with computer motherboards and peripherals, but it no doubt happens in other areas.

The modern motherboard is fairly reliable, and lasts a long time. The average service organisation does not waste time over these, replacement AT boards cost about £60, so if the repair looks as if it will take longer than an hour, the board is scrapped and a replacement fitted.

If a dealer gets a couple of faulty boards, he has two options. He can sell them at the next show for £10 each, which is a reasonable deal for all parties concerned. The other option is that he can spend an hour or so, swapping chips between boards, and may get one of them to work, in the process identifying the faulty chips.

He can now sell the working board for much more, say £45. And what does he do with the faulty chips? The unscrupulous will plug them back in to the faulty board, hence giving the impression that the board is merely faulty, not full of 'duff' components. This also happens with hard disc drives.

I was caught at the recent show in the National Motor Cycle Museum. I was after some i.c.s and saw a board with what I was after.

At this time the board was virtually complete with only one missing chip. The dealer wanted too much, so I came back later and did a deal. I didn't check the board the second time, and it was only when I got home that I discovered that the processor and all the PAL chips had been removed since I last saw it.

A programmed PAL i.c. is no good to anybody without the board it came from. So the person who removed them, is left with some useless components and has totally sabotaged any chance I may have had of repairing it. There is no easy way of spotting this. You can sometimes tell if a board has been 'got at' by signs of screwdrivers use around the corners of the chip sockets, but there is no way of checking hard drives.

Let the buyer beware!

Kenneth S. Termie
Oadby
Leicester

Editor's comment: Sorry to hear about your problems Kenneth. I've no doubt that there are other comments waiting to be made on this subject. It would be interesting to hear something from a 'dealer' on this point, and I hope we get a response.

Dear Sir

Should I have read the small print more carefully? I note on re-reading 'Radio Diary' in the March issue of *PW*, that the entry for the Northern Cross rally didn't mention radio. It was right not to. Craft stands, computers and broadcast satellite gear yes, but no radio.

I travelled a long way to get there, as had a few radio traders, and I don't know who looked more 'brassed off'.

In fairness, the event was well run, well attended and I hope it did well for the club. But next time, can we have the radio stalls in a small room of their own, or tell them and us that its going to a computer fair!

M. Hodgkins G4HCC
Colne, Lancs

Editor's reply: It's best to get 'both sides of the story', so we contacted the organisers and here's their comments:

A reply from the Northern Cross Rally organisers. Thanks for the opportunity to comment on Mike Hodgkin's letter. We were interested in his comments as Northern Cross '92 was our first rally organised by the Wakefield & District Radio Society, and we have learned lessons for the future.

Regarding Mike Hodgkin's particular criticism, it's also one that concerned us at the planning stage, noting the trend at other rallies. As radio amateurs, we certainly wanted as many radio traders as we could get, 178 were invited and only 30 came. Two ceased trading between accepting and the day, which is a sign of the times.

The equivalent figures for computer dealers were 30 invited, with 16 attending. The radio traders who did come told us that business was good. Let's hope the news of this spreads.

Dave Gray G0FLX and Bob Firth G3WWF on behalf of the Wakefield & District Radio Society.

Practical Wireless, May 1992

PW October 1992 Issue

We particularly need reader's letters with memories of *PW* for the Diamond Jubilee issue. Get writing - it's your special celebration too!

for 430MHz I can manage the mechanical construction, but lack knowledge of the high voltage power supply construction. I am fully aware the high voltages and currents can kill, so please, no advice on that side!

I would be very pleased to see a *PW* project on this subject. I can follow the circuits okay, it's producing a p.c.b. design that causes me some difficulty. Clear details and diagrams would be a great help. Good sharp photos are a bonus, so how about it? Keep up the excellent standard of the magazine.

Paul Beaumont
Harrogate, North Yorks

Editor's reply:
Sorry Paul, the meter was from Waters & Stanton.

Dear Sir

I received my copy of the March issue of *PW*, and saw John Cushing G3KHC's item on a simple capacitor tester, on page 41. It's a very simple and useful device, and not too expensive if one is into salvage.

I tackled mine in a very similar way to John, except that I used a t.t.l. logic chip, an SN7400 with the last gate used as a buffer. It is voltage sensitive, and I opted for a regulator at 5V from a 9V battery to cover that problem.

The meter was a former 300V movement, less multiplier, so the design was fixed in one regard, with a 300pF basic scale. The case is a former wardrobe and hence is a nice shade of Walnut. The front panel is of Formica, with the lettering done with Indian ink pens and stencils.

The boxes were made by glueing and pinning it together as a complete affair, and then cutting the lid portion off, with a power-saw.

The merit of this method of testing modern components, is that the voltage applied to the capacitor under test, is almost certainly going to be within range. None of the foregoing should be taken as criticism of John's article, but as an endorsement of the usefulness and the ease of DIY.

Dennis Lisney G3MNO
Harrow, Middlesex

Editor's comment: Nice to hear from you Dennis, and I'm sorry we had to shorten your long and interesting letter, so that we could publish it. I found your tip about making a box complete, and then sawing the top off, to be so simple. I've never been able to make a decent lid to a box, but I'll be able to now!

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 past years are available at £1.80 each including post and packing. Binders, each holding one volume of *PW* are available price £5.50 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.

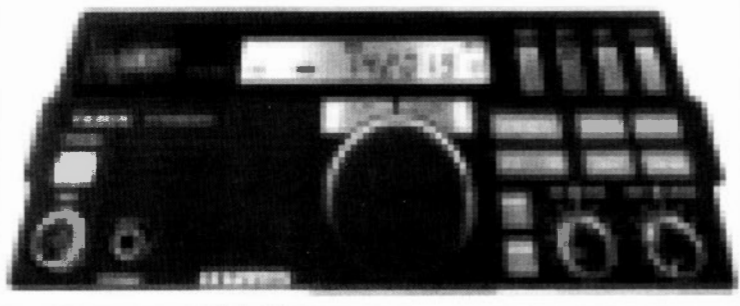
Components for our projects are usually available from advertisers. For more difficult items a source will be suggested in the article. The printed circuit boards are available, mail order, from the Post Sales Department.

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.

Spot The Rig!

Our art bod Steve Hunt has manipulated a pic of a rather famous piece of amateur radio equipment. Can you work out what model and make it is?



Name.....

Address.....

.....

.....

☐ Subscription ☐ Voucher

Send your entry (photocopies acceptable with coupon) to: May Spot The Rig Competition, *PW* Publishing Ltd., Enefco House, The Quay, Poole, Dorset BH15 1PP. Editor's decision on the winner is final and no correspondence will be entered into. Entries to reach us by May 22nd.

First Prize: One year subscription or £20 book voucher.

Two runners-up: Six months subscription or £10 book voucher.

I think that this rig is a...

Competition Services

Competition Corner
May '92

New Catalogue

Alpha Electronics plc now have available their new T & M Catalogue and price list for 1992. Nearly 200 test and measuring instruments are featured in 16 colour pages, together with their BS 5750 Repair and Calibration Service.

Products include insulation, continuity, earth loop, RCD and portable appliance testers, high and low voltage indicators and proving units, clamp meters, cable location and fault indicators, earth testers and milliohmmeters. A complete range of analogue and digital multimeters, oscilloscopes and power supplies are enhanced by many recorders and data loggers. Energy metering, monitoring and management equipment is also featured.

This free catalogue contains many 'standard' names, such as Megger, Robin, Clare, Avo, Rustrak, Edgcombe, Global, Northern Design, Seaward, Intek and Fluke.

For further information, please contact **Fred Hutchinson of Quiswood Ltd. on (0756) 799737.**



Adam Leisure Sponsor Scout Badge

Harrogate-based activity toys and electronic games company, Adam Leisure Group plc, are forging closer links with their consumers by sponsoring a new Scout badge.

The Scouts Radio Technicians' Badge is aimed at introducing Scouts to radio technology, and as part of the six week course, Scouts build radio equipment and learn how to communicate with it.

Six Northampton Scouts, who were the first to gain the new Badge, visited Adam Leisure's warehouse, service and distribution facilities at Wellesbourne, Warwickshire, and were given a tour of the facilities and a demonstration of the latest Grandstand Walkie-Talkie radio communicators.

The successful Scouts, who come from the Northampton Amateur Radio Group, are aged between 13 and 15 years old.

Ibrar Sheikh, Adam Leisure's quality manager, presented each of the Scouts with their Badge and a pair of Grandstand Walkie-Talkies. He also presented the group with a Morse tutor learning aid, which generates Morse code messages at different speeds.

**Adam Leisure Group plc.
Adam House
Ripon Way
Harrogate
North Yorks HG1 2AU.
Tel: (0423) 501151.**

South Dublin Radio Club

The South Dublin Radio Club are interested in twinning with other interested clubs with a view to having regular skeds on the air during their club night, which takes place most Tuesdays between 8 and 10pm. Any clubs interested, can write to **Pat Murray EI7HK, South Dublin Radio Club, Ballyroan Community Centre, Marion Road, Rathfarnham, Dublin 14, Ireland.** They welcome all replies!

The Greenweld Newsline

Because of the ever increasing amount of surplus stock being purchased, Greenweld are instigating a new service for all their customers - the Greenweld Newsline. By calling **(0891) 505121***, you'll get a recorded message giving details of stocks purchased during the last week. This will include items not advertised elsewhere because the quantity is too small. Every caller who places an order will be entitled to a Free Gift - details on line.

***Calls charged at 36p/min cheap rate, 48p/min other times.**

RNLI Appeal

During 1992, 1993 and 1994, The Worked All Britain Awards Group will be raising money in support of the Royal National Lifeboat Institution. The target being to raise enough money to buy a 'D' class 5m In-shore Lifeboat at a cost of £10 000. Once this figure has been achieved v.h.f. radio equipment will be aimed for at a cost of £865. This means that WAB will be hoping to raise £305 per month over the next three years. Any help you may offer will be gratefully appreciated.

Steve Bryan G1SGB will be organising yet another DXpedition, this time to the Orkney Islands. He shall be sailing from Stromness on 12 April 1992 on the Lighthouse maintenance vessel *MV POLE STAR*, where he shall be operating Maritime Mobile for the duration of the trip. He will be lifted by helicopter to some of the more remote lighthouses where he shall endeavour to operate as many bands as possible in the h.f. spectrum (using WAB Net frequencies). Some of the Islands where lighthouses are located have never before been activated and may not be again for quite a while.

Another group of WAB enthusiasts will be doing a mobile operation from John O'Groats to Lands End, and they will be looking for sponsorship and donations along the route. The WAB group hope you will take some part in their fund-raising, even if it's only a contact with the station.

If you or your club would like to take an active part in raising money for this event, please contact **Adrian Keeble G4HPU on (0206) 230860.**

Martlesham Radio Society

On 12 April 1992, Martlesham Radio Society are again holding a VHF Roundtable, which has become an established event in the v.h.f. operator's calendar, as has the Microwave Roundtable, organised by the same society.

The event is to be held at BT Laboratories, Martlesham Heath, Ipswich, Suffolk. Facilities offered include noise figure measurements for all v.h.f. bands; SINAD measurements for complete receivers; power measurement to several kW; measurement of isolation, cross talk, insertion loss of relays and attenuators, etc. All measurements will be performed using high performance test equipment. There will also be technical workshops and talks.

The VHF Roundtable provides an opportunity for a friendly get-together with fellow v.h.f. enthusiasts in amicable surroundings, with refreshments available and excellent car parking.

Admission is by ticket only, available by sending a s.s.a.e. to **Roy Smith G6GAU, 'Lykkebo', The Street, Burstall, Ipswich IP8 3DN.** When applying for tickets, please remember to supply the names of all applicants (BT Laboratories Security requirement).

Overseas visitors very welcome; the venue is close to the ports of Felixstowe and Harwich, approximately 70km from Stansted airport.

Waters & Stanton Open Day

Waters & Stanton will be holding their annual open day on Sunday 10 May, from 10am to 5pm. Last year was so successful they are aiming for something even bigger this year. There will be free food and free drink for everyone, plus a prize draw. Those needing talk-in should initially call G0PEP on 145.55MHz.

They will be offering some fantastic bargains and clearance lines on a wide variety of amateur radio equipment covering two floors of their premises. When they say bargains, they really mean it! But you will have to call in person to snap them up. Make it a date, Sunday 10 May for their crazy 'May Madness Sale'.

Solway Radio Club

During the month of April, the Solway Radio Club will be 20 years old. The G4BBX licence was issued on 11 April 1972. During the week-end of April 11 & 12, GX4BBX will be on the air on all bands and most modes. They will be issuing a special card and a diploma will be issued to those stations who work a given number of GX4BBX members during April.

Throughout 1992, G4BBX will be on the air on Wednesdays, which is their club night.

The Solway Radio Club actively promotes and encourages the novice licence. They have a number of novices training in the club, and if you hear them on the air, please call and say hello. For more details, please contact their secretary, **Marion Dockray G1PEN at 54 Kelsick Park, Seaton, Workington, Cumbria CA14 1PY.**



Marathon Runner Hopes For Wings On His Heels

Licensed radio amateur, Clive Dunnico G4YEN, of Leigh-on-Sea, Essex, is to run in the London Marathon on 12 April 1992, on behalf of the Winged Fellowship.

Clive will be raising money for the Winged Fellowship Trust, which provides holidays and respite care for over 5000 physically disabled people and their carers each year in five holiday centres in Essex, Redhill, Southport, Nottingham and Southampton.

As a member of the ADT-London Marathon team, Clive who is now 50-years old, has run several marathons raising tens of thousands for charity and is hoping to raise a substantial sum for Winged Fellowship. Sponsorship forms can be obtained from **Mrs Joan Brander, 58 College Road, Dulwich, London SE21 2LY**, where donations marked 'Dunnico Sponsorship' will be most gratefully received.

For further information, contact **Jane Popplewell on 071-833 2594.**

The Winged Fellowship Trust was established in 1963 with the aim of providing holidays for disabled people and respite care for their carers. There are currently five centres: Crabhill House in Surrey, Jubilee Lodge in Essex, Skylarks in Nottingham, Sandpipers in Southport and Netley Waterside House in Southampton. The Trust provides over 44 000 bed nights per year to disabled people and their spouse/carers. Apart from the permanent staff, the Trust also needs 4000 volunteers per year to help care for and entertain the guests. Winged Fellowship also organises overseas holidays (again with one to one care), for groups of nine or so, and Discovery Holidays which include UK camping and touring.

Making Waves On Thinking Day

Radio amateurs Richard Pearce G0PNY aged 15 (left), and John Williams G6GSV aged 16 (second left), explain radio communication to Crosland Hill, Huddersfield Guides and Brownies.

Richard and John are members of Denby Dale Radio Club, which helped the 10th Crosland Hill Methodist company to celebrate Thinking Day.

The day is celebrated annually by Guides, Brownies and Rangers across the world, as it marks the joint birthday of the movement's founders Lord and Lady Baden-Powell.

The Crosland Hill girls celebrated by getting in touch with other Guides across the country via the radio waves. They invited girls from other packs in the district to join them.

Thinking Day was also marked locally with a party attended by Rainbows, Brownies, Guides and Rangers from the Huddersfield Central South District.

The party, at Crosland Hill Methodist Sunday School rooms, had an international theme and included games, songs and crafts.

Time On Your Hands?

Volunteers are needed in many parts of the country to repair the RNIB's Talking Books for the Blind. **No, please don't skip this item - read on!**

These talking books are simple cassette players, and are a lifeline to 70 000 blind 'readers' throughout the country. From time to time, these players go out of adjustment and need simple repairs: simple to you, but not to a blind person.

The work is occa-

sional and seldom amounts to more than a couple of evenings in a week. You need basic electronic skills and circuit diagrams and full technical details are provided. If you would be prepared to do this rewarding task, please ring **David Finlay-Maxwell on (0484) 450982** work or **(0484) 604546** home. Or write for info to him at **D.F. Maxwell & Co., Prospect House, Huddersfield, Yorkshire HD1 2NU.**

Swindon & District ARC Telethon '92

The ITV Telethon will soon be upon us once again, and in support of the HTV Regional Appeal, Swindon & District ARC members are to spend 48 hours coaxing the World's radio amateurs out of the woodwork to make as many contacts with the station as possible over the period.

The special event station, GB4SRC, will be on the air, promotionally, from 14 May 1992, the main event starting at 1800hrs on Friday 29 May, until 1800hrs on Sunday 31st.

The station will be located at the Club shack at South Marston, Swindon and a Telethon QSL card will be sent to all contacts.

Sponsorship will be on a 'per call' basis, or by donation. There will be an opportunity to help swell the funds at the Swindon Rally on Saturday 16 May, at the Oasis Centre, Swindon. Just call in at the club stand and have your arm twisted!!!

The same call will be on the air again during June 5th to 7th, from the Lydiard Park Nostalgia weekend, where a great collection of steam engines, both stationary and mobile, classic vehicles and many other artifacts of bygone days will be gathered together. This is well worth a family visit if you can make it. Talk-in on 144MHz, if required. Details of the above event can be obtained from **Geoff G0DMZ QTHR, 1990-on.**

**Newsdesk
'92**

Club News

Please send in all of your 'Club News' items to Sharon George at the editorial offices in Poole.

Axe Vale ARC meet 1st Fridays, 7.30pm in the 'New Commercial', Trinity Square, Axminster, Devon. Further details from **Pat Cross G6GHH** on (0297) 33756.

Aylesbury Vale RS meet 1st & 3rd Wednesdays, 8pm in the Village Hall at Hardwick. April 15 is Peter Chadwick G3RZP on 'Linear Amplifiers'. Further details about the club from **Martin G4XZJ** on (0296) 81097.

Barr Beacon RC meet 1st Mondays and 3rd Wednesdays, 7.30pm at 112 Walsall Road, Aldridge, West Midlands. For further details, ring (0922) 36162.

Barnsley & District ARC meet Mondays in the radio club room and shack, at the rear of the Darton Hotel, Station Road, Darton, Barnsley. April 13 is a talk on 'Theatre Lighting' by Keith G8SVX, the 27th is a talk by G4JJ on 'Getting Started On Satellites', May 4 is an open talk on 1992 rally and the 11th is a talk on the RSGB by G4EJP Zone A council. For further information, ring **Ernie G4LUE** on (0226) 716339.

Basingstoke ARC meet 1st Mondays, 7.30pm at the Forest Ring Community Centre, Sycamore Way, Winklebury, Basingstoke. April 26 is a 2m Fox Hunt - OS185 - Fox: Spencer Naylor G0NIQ and May 4 is a social evening & Junk Sale. For further details, phone (0256) 25517.

Bedford & District ARC meet Thursdays, 8pm in the Allen Club, Hurst Road, Bedford. More details from **Gavin Carmichael, 15 Evesham Court, Avon Drive, Bedford MK41 7AJ**. Tel: (0234) 365660.

Blyth ARC meet Wednesdays, 7pm at Newsham Community Centre, Elliott Street, Blyth, Northumberland. All welcome. Details from **Keith Ritson G0PKR** on 091-237 1963.

Bradford ARC meet 2nd & 4th Thursdays, 8pm at the Polish Ex-Service Club, Shearbridge Road, Bradford, West Yorkshire. April 9 is a natter night, the 23rd is a discussion on the use of computers in amateur radio and May 14 is a committee meeting, plus arrangements for working G3NCA portable during the summer. **Charles Bolt G0AUX** on (0247) 494694.

Braintree & District ARC meet 1st & 3rd Mondays, 8pm at the Community Centre, Victoria Street, Braintree. **M. Andrews, 22 Arnhem Grove, Braintree, Essex CM7 5UQ**. Tel: (0376) 27431.

Brighton & District ARC meet 1st & 3rd Wednesdays, 7.45pm at the Roast Beef Bar, Brighton Racecourse, Elm Grove, Brighton. More details from **Harold Lunson G3WR**, 17 Tongdean Rise, Brighton, East Sussex BN1 5JG. Tel: (0273) 501100.

Bromsgrove & District ARC meet Fridays at Avoncroft Arts Centre, South Bromsgrove, Worcester. April 10 is Home-brew Constructors Compt. More details from **Joe Poole G3MRC** on (0562) 710010.

Bromsgrove ARC meet at Lickey End Social Club, Alcester Road, Burcot, Bromsgrove. April 14 is a night on the air, the 28th is Oscilloscopes (practical) and May 12 is their AGM. **Mr D. Edwards G4ZWR**, 2 Mason Close, Headless Cross, Redditch, Worcs B97 5DF. Tel: (0527) 546075.

Bury St Edmunds ARC meet 3rd Tuesdays, 7.30pm in Room ED-40 of West Suffolk College, Out Risbygate, Bury St Edmunds. April 14 is 'Digital Speech Generation' by Bob Price G8DTF and May 12 is 'The Sun' by L. M. Dougherty. For more details, contact **Ian G0KRL** on (0359) 70527.

Bury RS meet Thursdays, 8pm in The Mosses Community Centre, Cecil Street, Bury, Lancashire. 2nd Tuesdays are Lecture/Talk nights and other Tuesdays are general natter nights with the club's 'new' rigs on the air. More

details from **Colin Fox G3HII, 'The Lair', 5 Pinewood Crescent, Holcombe Brook, Ramsbottom, Bury BL0 9XE**. Tel: (0204) 883212.

Buxton Radio Amateurs meet at the Lee Wood Hotel, Buxton at 8pm. April 14 is Aerial Topics, the 28th is a QSL night and May 12 is a Video Show. For further details, contact **Derek Carson G4IHO** on (0298) 25506.

Charmwood Amateur Radio Contest Club meet Saturday lunch-time at The Priory Hotel, Loughborough. Dedicated to operating and demonstrating the joys of amateur radio and furthering the hobby. Listen on S17 or contact **Phil** on (0509) 232927.

Chelmsford ARS meet 1st Tuesdays, 7.30pm at Marconi College, Arbour Lane, Chelmsford, Essex. April 12 is Martesham RS Round Table, tickets G6GAU. More details from **Roy & Elie Martyr G3PMX & G6HKM**, 1 High Houses, Mashbury Road, Great Weltham, Essex CM3 1EL. Tel: (0243) 360545.

Conwy Valley RC meet 1st Thursdays, 7.15pm at The Studio, Penrhos Road, Colwyn Bay, Clwyd. May 7 is a talk by Dr. David Last and the 14th is a Visit to Pentir National Power Switching Station. For further details, contact **Mervyn Jones G4WNL**, 72b Princes Drive, Colwyn Bay, Clwyd LL29 8PW. Tel: (0492) 530725.

Cornish RAC meet at the Memorial Hall, Perranwell Station, Perranwell, nr. Truro, 7.30pm. For further information, please contact **Mr G. Bate**, 9 Tresithney Road, Cerharrack, Redruth, Cornwall TR16 5QZ. Tel: (0209) 820836.

Coulsdon ATS meet 2nd Mondays, 7.45pm at St. Swithun's Church Hall, Grovelands Road, Purley, Surrey. April 13 is a Surplus Equipment Sale and May 11 is 'Packet Radio For Beginners' by Peter Burton G3ZPB. **Andy Briers G0KZT** on (0737) 557198.

Coventry ARS meet Fridays, 8pm at Baden Powell House, 121 St. Nicholas Street, Radford, Coventry. For further details phone **Jon** on (0203) 610408.

Dacorum AR & TS meet 1st (informal) & 3rd (formal) Tuesdays, 8pm at The Heath Park, Cottrells, Hemel Hempstead. Further details from **Dennis Boast G1AKX** on (0442) 259620.

Denby Dale & District ARS meet at Pie Hall, Denby Dale, nr. Huddersfield, 8pm. More details from **Ivan Lee**, Clayton Lodge, Sunnyside, Edgerton, Huddersfield HD3 3AD.

Derby & District ARS meet Wednesdays, 7.30pm at 119 Green Lane, Derby. April 15 is 'Radar' - the early years by Denis Godfrey G0KIU, the 22nd is a Video Show, the 29th is a Cheese & Wine Party, May 6 is a Junk Sale and the 13th is 144MHz DF practice - Allestree Park, Derby. More details from **Richard Buckley G3VGY**, 20 Eden Bank, Ambergate, Derby DE5 2GG. Tel: (0773) 852475.

Derwentside ARC meet Wednesdays, 7.30pm in the Steel Club, 36 Medomesley Road, Consett, County Durham. Regular talks by amateurs and non-amateurs. Construction work overseen by Don G4LGA. Further details from **Geoff Derby G7GJU**, 60 Pine Street, Grange Villa, Chester-le-Street, County Durham DH2 3LX. Tel: 091-370 2032.

Dorking & District RS meet at The Friends Meeting House, South Street, Dorking, 7.45pm. April 28 is 'Polar Comms' by Laurence Howell G4MDA. More details from **John Greenwell G3AEZ** on (0306) 77236.

Dorset Police ARS. A new radio society. Membership open to anyone connected with Dorset police, such as all regular police officers, all special constables, civilian staff employed by Dorset police, immediate families of all the above and retired police officers resident in Dorset. Further details about membership from **Richard Newton, Ferndown Police Station, Ringwood Road, Ferndown BH22 9AF**. Tel: (0202) 552099 ext. 3198.

Dragon ARC meet 1st & 3rd Mondays, 7.30pm at the Four Crosses Hotel, Menai Bridge. April 20 is a general discussion and May 4 is Sale of Surplus Equipment. **Tony Rees G5WFMQ** on (0248) 600963.

Dronfield & District ARC meet 1st & 3rd Mondays, 7.30pm in Room 3 of Gladys Buxton School, Dakhill Road, Dronfield. On other Mondays, members meet socially, by arrangement at the Fleur-de-Lys Public House, Main Road, Unstone. More details from **Piers Oldham G7HRW**, 110 Green Lane, Dronfield, Nr. Sheffield S18 6FU. Tel: (0246) 290444.

Dundee ARC meet Tuesdays, 7pm in the College of Further Education, Graham Street, Dundee. April 21 is a Construction night, the 28th is a lecture on 'HF Propagation' by John Brannigan G4MHJ, May 5 is a construction night and the 12th is a lecture by George Allan G4MHYF, member of MEGS, the Morse Enthusiasts Group, Scotland. Further details from **George Miller G4MFSB**, 30 Albert Crescent, Newport-on-Tay, Fife DD6 8DT.

Dunstable Downs RC meet Fridays, 8pm at The Old Mill, West Street, Dunstable, Beds. April

24 is a talk on the 'Novice Licence', May 1 is Studio Lighting and the 8th is an informal. Further details from **Wendy Jefferson** on (0582) 451057.

Easington ARS (Co. Durham) meet Thursdays, 7.45pm at Southside Social Club, Easington Village. Further details from **Mr H. Walker G3CBW**, 20 Birchfield Drive, Eaglescliffe, Stockton-on-Tees, Cleveland TS16 0ER. Tel: (0642) 788280.

Echallford ARS meet in the Community Hall, St. Martin's Court, Kinston Crescent, Ashford, Middlesex, 7.30pm. April 9 is their AGM, the 23rd is 'Worked All Britain' by J. Fitzgerald G8XTJ and May 14 is a natter night. Further details from **P. Townshend G6PMT** on (0344) 843472.

Edgeware & District RS meet at the Watling Community Centre, 145 Orange Hill Road, Burnt Oak, 8pm. April 9 is 'AMTOR & SSTV' by Hank Kay G0FAB, the 23rd is an informal, G3ASR on air and May 14 is 'Advances In RF Power Semiconductors' by Graham Morris G3SGC. More details from **Howard Drury G4HMD**, 11 Batchworth Lane, Northwood. Tel: (0823) 822776.

Fareham & District ARC meet Wednesdays, 7.30pm in Portchester Community Centre, Westlands Grove, Portchester, Fareham, Hants. Details from **Rod Smith G0ERS** on (0705) 373572.

Farnborough & District RS meet 2nd & 4th Wednesdays, 7.30pm at Farnborough Community Centre, Meudon Avenue, Farnborough, Hants. April 22 is Your Radio Problems Solved night. More details from **Tommy Tomlinson G3UHW** on (0252) 515041.

Fylde ARS meet 2nd & 4th Thursdays, 7.45pm at South Shore Lawn Tennis Club, Midgeland Road, Blackpool. April 12 is an Equipment sale, the 23rd is an informal and May 14 is a DX Foxhunt. **Eric Fielding G4HF** on (0253) 726685.

Glenrothes & District ARC meet in their clubrooms, Provosts Land, Leslie, Fife, 8pm. Further details from **John Hardwick G4ALA** on (0592) 742763.

Gloucester ARS meet Wednesdays, 7.30pm at St. John Ambulance HQ, Heathville Road (off London Road), Gloucester at 7.30pm. April 15 is Packet Self-Help Group, the 22nd is Construction Group and the 29th is Home-brew Clinic. Further details from **Jenny Beckingham G7JUP** on (0452) 529533 ext. 2731.

Grafton RS meet 2nd & 4th Wednesdays, 8pm in Holy Trinity Club Hall at the rear of Holy Trinity Church, Granville Road, London N4. Further details from **Rod G0JUZ** on 081-368 8154.

Grantham RC meet 1st & 3rd Tuesdays at the Kontak Social Club, Barrowby Road, Grantham. Further details from **John Kirtan G8WWW**, 'Treetops', 13 Saltersford Road, Grantham, Lincolnshire NG31 7HH. Tel: Grantham 65743.

Great Lumley AR&ES meet Wednesdays, 8pm at Great Lumley Community Centre, Great Lumley, Nr. Chester-le-Street, Co. Durham. For more details, contact **Barry G1JDP** on 091-388 5936.

Halifax & District ARS meet 1st & 3rd Tuesdays, 7.30pm at the Running Man Public House, Pellon Lane, Halifax. April 21 is 'Marconi - The Vision Realised' by H. C. Scott MBE. For further details, contact **David Moss G0DLM**, Beechwood Lodge, Leeds Road, Lightcliffe, Halifax, West Yorkshire HX3 8NU. Tel: (0422) 202306.

Hambleton ARS meet in Room A5 of Northallerton Grammar School at 7.30pm. For more details, contact **Nigel Robertshaw G0NHM** on (0609) 776608.

Hoddesdon RC meet 1st & 3rd Thursdays, 8pm at the Conservative Club, Rye Road, Hoddesdon (side entrance). April 19 is a talk by Mark Francis, author of *The Secret Of Learning Morse* and new products from Waters & Stanton, the 30th is a social evening and so is May 14. Details from **Peter Fairhurst G0KLU** on (0992) 33036.

Hordean & District ARC meet 1st Thursdays, 7.30pm at Hordean Community School, Barton Cross (off Catherington Lane), Hordean, Hants. May 7 is EMC Update. For more information, contact **Stuart Swain**, 35 Mavis Crescent, Havant, Hampshire PO9 2AE. Tel: (0705) 472846.

Horseshoe ARC meet Wednesdays, 8pm at the Mill, Atwick Road, Hornsea. April 15 is RSGB Videos, the 22nd is 'Personal Computers' by Rick G1YVL, the 29th is a natter night, May 6 is an Open night and the 13th is Rig Check. Further information from **Jeff G4IGY** on (0964) 533331.

Horsham ARC meet at the Guide Hall, Denne Road, Horsham, West Sussex, 8pm. May 7 is a talk on 'Miniature Antennas' by G3LOD. Further details from **Peter Stevens G8SUI**, 11 Nutwood Avenue, Brockham, Betchworth, Surrey RH3 7LT. Tel: (0737) 842150.

Ilford Group RSGB meet Thursdays at 7pm. They do not teach, but will fully answer any questions that members ask. They offer training and guidance on how to build and test electronic

equipment, training on the safe use of tools, and how to solder, with full use of all test equipment. Members are encouraged to build equipment, which they can do in the workshop. The club takes part in NFD each year. For further details, please contact **J. Hooper** on 081-478 3741.

Ipswich RC. Contact **Mrs S. Elden G8HYE**, 124 Larchcroft Road, Ipswich IP1 6PQ.

Keighley ARS meet at The Cricket Club, Ingrow, Keighley, 8pm. April 9 is a Junk Sale. Further details from **Kathy Conlon G1IGH** on (0274) 496222.

Kettering ARS meet Tuesdays, 7.30pm at the Electricity Sports & Social Club, Eksdale Street, Kettering. April 14 is a talk by a speaker from 10th Tactical Reconnaissance Wing (USAF), aircraft-to-ground communication, possibly some exhibits. Further details from **Lan G0RVD** (but QTHR as G7EHM) on (0536) 514544.

Kidderminster & District ARS meet alternate Tuesdays, 8pm at The Queens Head, Wolverley, Worcestershire. For more details contact **Geoff Philpotts G7JIR**, 62 Emley Close, Stourport-on-Severn, Worcs DY13 0AH. Tel: (0299) 379229.

King's Lynn ARC meet Thursdays, 7.30pm at the 19th King's Lynn Scout HQ, North Runcton. Further details from **Derek Franklin G0MQL** on (0553) 841189.

Lothians RS meet on the 2nd & 4th Wednesdays, 7.30pm in the Orwell Lodge Hotel, Polwarth Terrace, Edinburgh. Further details from **Mel Evans** at 56 Southhouse Road, Edinburgh EH17 8EU or telephone 031-664 5403.

Loughton & District ARS meet in Room 14 of Loughton Hall, 7.45pm. For more details contact **Mike Pilsbury G4KCK** on 081-504 4581.

Louth & District ARC meet 3rd Tuesdays, 7.30pm at the Kings Head, Louth. More details from **Neil Bartholomew G0JXY**, The Bungalow, Main Road, Grainthorpe, Lincs LN11 7HX.

Maidenhead & District ARC meet at The Red Cross Hall, The Crescent, Maidenhead, 7.30pm. Details from **Neil G8XYN** on (0628) 25952.

Manchester & District ARS meet Tuesdays, 7pm at Simpson Memorial Community Association, Moston Lane, Manchester M10 9NB. Further details from **Roger Farley G0KTR**, 6 Cardigan Road, Hollinwood, Oldham OL8 4SF.

Mansfield ARS meet at the Polish Catholic Club, off Windmill Lane, Woodhouse Road, Mansfield. May 7 is their AGM. Further information from **Mary G0NZA** on (0623) 755288.

Midland ARS meet in Unit 22, 60 Regent Place, off Caroline Street, Birmingham B1 3NJ. Wednesdays are RAE classes and Thursdays are natter nights. April 21 is an RSGB talk, the 24th is an Atari night, the 27th is a computer night and May 10 is MARS Drayton Rally. For further details, contact **John Crane G0LAI** on 021-628 7632 evenings.

Milton Keynes & District ARS meet 2nd Mondays at North Bucks Youth Sports Hall, Haversham Road, Wolverhampton, Milton Keynes. On April 13 they have a Junk Sale and May 11 is 'Fighter Aircraft and Aces' by Stuart Lightfoot G0GOF. For more information, please contact **Julian Winsor G3FGB** on (0908) 611005.

Morecambe Bay ARS meet every other Tuesday, 7.30pm at the Trimpall Sports & Social Club, with Morse instruction each Tuesday during club meetings. For more details, please contact **J. Burrow G0NYD**, 36 Longfield Drive, Cragbank, Barnforth, Lancashire LA5 9EJ. Tel: (0524) 733212.

Nelson & District ARS meet Wednesdays, 7pm at Llancaich School Nelson. They also run a c.w. class at their meetings. Anyone wishing to find out further information is welcome to call in, or otherwise contact **Leighton Smart G7OLBI** at 33 Nant Gwyn, Trelewis, Mid-Glamorgan, Wales CF46 6DB. Tel: (0443) 411736.

Norfolk ARC meet Wednesdays, 7.30pm at 'The Norfolk Dimpling', The Livestock Market, Harford, Norwich. April 15 is an informal & committee meeting, the 22nd is a construction contest, the 29th is First HF NFD briefing, May 6 is a 'Real Radio' evening and the 13th is GB3NB repeater AGM. **Jack Simpson G3NJO** on (0603) 747992.

North Bristol ARC meet Fridays, 7pm at Self Help Enterprise, 7 Braemar Crescent, Northville, Bristol. RAE and Morse tuition is available for members. More details from **Tony G4RDX** on (0272) 513573.

North Ferriby United ARS meet Fridays, 8pm at the North Ferriby Utd. FC Social Club, Church Road, North Ferriby, East Yorkshire. April 17 is club station on the air, the 24th is Packet Nodes, Chris G6KIA, May 1 is Way ahead meeting, Ken G4VKK and the 8th is QFH or QFH - what are they talking about? Ken G4VKK. Further details from **Frank Lee G3YCC** on (0482) 650410.

North Wakefield RC meet Thursdays at The White Horse PH, Fall Ings Lane, East Ardsley, Nr. Wakefield. Morse classes start at 7.30pm and all are welcome, with the Novice class on Friday evening. More details from **John Hoban G0EVT**

on (0924) 825443.

Nottingham ARC meet Thursdays, 7.30pm at the Sherwood Community Centre, Mansfield Road, Nottingham. April 16 is a talk 'Operators Guide to 2m' by Alan G7DII, the 23rd is WAB Activity & Construction evening, the 30th is a talk 'Electromagnetic Compatibility' by Bob Peace G8SOZ, May 7 is Forum to discuss this summer fox hunts and the 14th is a talk by the Regional Liaison Officer, Mary GONZA. Further details from **Rex Beestall GOREX** on (0602) 733740.

Pontefract & District ARS have Morse classes on Mondays, Novice classes on Tuesdays and normal meetings on Thursdays, all at the Carleton Community Centre, 8pm. May 11 is their Annual Junk Sale. Details from **Colin Wilkinson** on (0977) 677006.

Poole RAS meet 2nd & last Fridays, 7pm at Lady Russell-Coates House, Lower Constitution Hill Site, Bournemouth & Poole College of FE. April 10 is their AGM. More details from **Vernon Cotton G3BCI**, 45 Branksome Hill Road, Bournemouth, Dorset BH14 9LF. Tel: (0202) 760231.

Preston ARS have a talk by Mr Green G8HLZ 'Decoding Systems' on April 16, a talk by Mr Dunkerley 'Windmill Land' on the 30th and a talk by Mrs Tomlinson 'Pageant Of Lancaster Priory' on May 14. Details of their meeting place and time from **Eric Eastwood G1WCQ**, 56 The Mede, Freckleton, Preston, Lancashire PR4 1JB. Tel: (0772) 686708.

Prudential ARS is open to all employees and ex-employees of the Prudential companies. All those interested in PARS should contact **David Dyer G4DNX** at 'Highbank Cottage', Underhill, Moulisford, Oxon OX10 9JH.

Reading & District ARC meet 2nd & 4th Thursdays, 8pm at The Woodley Pavilion, Woodford Park, Haddon Drive, Woodley, Reading. April 9 is 'Understanding Transceiver Specs' by Gary Clark G0BRK, the 23rd is 'G5RV and other Antennas' by John Crabbe G3WFM, May 9 is Support Christian Aid Walk and the 14th is HF NFD Planning, John Linfood G3WGV & Don Field G3XTT. More details from **Vin Robinson G4JTR**, 4 Hilltop Road, Caversham, Reading RG4 7HR.

Rochdale & District ARS meet Mondays at T. S. Froisher, Greenbank Road, Rochdale. Further details from **Brian** on 061-653 8316 or **Dave** (0706) 32502.

Rhyl & District ARC meet 1st & 3rd Mondays. For more details, contact **Ken Padley GW7IAR**, 67 Rosehill Road, Rhyl, Clwyd LL18 4TS. Tel: (0745) 338276.

Salisbury Radio & Electronics Society meet Tuesdays, 7.30pm at Grosvenor House Centre, Churchfields Road, Salisbury. April 14 is a natter night/Morse class/RAE class/committee meeting, the 21st is '10GHz For Beginners' or how to convert a Pye Cambridge by Martin Cranage G8DFA, the 25th is International Marconi Day, club stn at the Roving Kennels in Salisbury, May 5 is 'DX Packet Cluster' by Neil G4LDR and the 12th is a natter night/Morse class/RAE class. For further details, contact **Bert Newman G2FIF** on (0722) 743837.

Salop ARS meet Thursdays, 8pm at the Old Buck's Head, Shrewsbury. April 9 is a construction competition, the 23rd is 1st Fox hunt and May 7 is a Visit to RAF Cosford. Further details from **Glenda G1YJB** on (0939) 232090.

Sevenoaks & District ARS. On April 27, they have Colin Merry G4CDM of the Dartford Direction-Finding Club, to talk about direction-finding. Details from **The Secretary, c/o Sevenoaks District Council, Council Offices, Argyle Road, Sevenoaks, Kent TN13 1HG**.

Sheffield & District ARS meet Thursdays,

8pm at the Church Hall, Amthill Road, Sheffield, Bedfordshire. For further information, contact **Nigel G1JKF** on (0908) 274473.

Silverthorn RC meet Fridays, 7.30pm at The Chingford Community & Adult Education Centre, Friday Hill House, Simmons Lane, Chingford, London E4 6JH. More details from **Andrew Mowbray GOLWS** on 081-529 4489 between 5.30 and 6.30pm weekdays only.

Solihull ARS meet 3rd Thursdays in The Shirley Centre, 274 Stratford Road, Shirley, Solihull, West Midlands. For more details, contact **Colin Taylor G3USA**, 231 Robin Hood Lane, Hall Green, Birmingham B28 0DH. Tel: 021-777 9965 evenings or (0827) 53344 daytime.

South Dartmoor ARC meet Mondays, 8pm at South Dartmoor School, Balland Lane, Ashburton, Devon. This radio club has a committee of only one adult - the rest being school-age youngsters! Although anyone wishing to join in is welcome. For more details on this Novice-run radio club, contact **Peter Thornhill G6ZKQ**, 21 Elmbank, Buckfastleigh, Devon TQ11 0DX. Tel: (0364) 43433.

South Dorset RS meet 1st Tuesdays, 7.30pm in the Wessex Lounge of Weymouth Football Club. May 5 is club meeting and the 10th is the Yeovil ARC 8th QRP Convention. **Geoff Gwillian G4JJO**, 13 Overlands Road, Wyke Regis, Weymouth DT4 9HS. Tel: (0305) 781164.

South Notts ARC meet at Highbank Community Centre, Farnborough Road, Clifton Estate, Nottingham, or Fairham Community College, Farnborough Road, Clifton Estate. April 10 is Construction (Fairham College), the 17th is talk-in (S22) and a talk on 'Organising Contests' by Richard G4LPD, the 24th is on air, May 1 is a talk-in (S22) and open forum and the 8th is Construction (Fairham College). For further details contact **Ray G7ENK** on (0602) 841940.

Southgate ARC meet at Winchmore Hill Cricket Club Pavilion, Firs Lane, Winchmore Hill, London N21. April 9 is a Grand Surplus Equipment Sale, the 23rd is club construction project and May 14 is a lecture by Stan Woods, Marconi Historian, on 'Early Radar, part 2'. **Brian Shelton G6MEE**, 22 Berkeley Gardens, Winchmore Hill, London N21 2BA. Tel: 081-360 2453.

Spalding & District ARS meet Fridays, 8pm at The Riverside Centre, The Old Fire Station, Double Street, Spalding, Lincolnshire. Further details from **David Johnson**, 65 West Street, Bourne, Lincolnshire PE10 9PA. Tel: (0778) 425367 (6-7pm).

Spenn Valley ARS meet Thursdays, 8pm in Old Bank Working Men's Club, Mirfield. Alternate Thursdays are 'Noggin & Natter nights'. Further details from **Ian Barracough G7DWY** on (0484) 716453, early evening.

Stevenage & District ARS meet in Ground Floor Rear Suite, Sitec Building, Ridgeway Park, 7.30pm. April 14 is HF Packet primer and demonstration by Peter G6GTE, the 28th is D/F Antenna assessment by Alf G7KPV (outside activity), May 5 is a v.h.f. & h.f. night on the air and the 12th is Computer modification & enhancement (IBM clones, etc.). More details from **Peter G6GTE**, 48 Lincoln Road, Stevenage, Herts SG1 4PJ. Tel: (0438) 724991.

Stirling ARS meet Thursdays, 7.30pm at premises near Throck, Stirling. Details from **Brian Muleddy G6MKWL**, QTHR or on (0324) 36235.

Stockport RS meet 2nd & 4th Wednesdays, 7.45pm in Room 14 of the Dialstone Centre, Lisburne Lane, Offerton, Stockport, Cheshire. April 22 is Captain Thompson, Ex Queen Mary Captain and May 13 is 'Computers As Was/Today' by P. Stanley. Further details from **John Verity G4ECI**, 7 Adelaide Road, Bramhad,

Stockport, Cheshire SK7 1NR. Tel: 061-439 3831.

Stourbridge & District ARS meet 1st & 3rd Mondays, 8pm at Robin Woods Community Centre, Scotts Road, Stourbridge. Details from **Dennis Body G0HTJ** at 53 Grove Road, Wollescote, Stourbridge, West Midlands DY9 9AE.

Stratford-Upon-Avon & District RS meet 2nd & 4th Mondays, 7.30pm at the Home Guard Club, Main Road, Tiddington, Stratford-Upon-Avon, Warwickshire. April 13 is AGM & Surplus Sale, the 27th is 'What's On 80m' by John Allen G4PDP and May 11 is 'Computers In Amateur Radio' by John Price G4OIL. Further details from **Alan Beasley G0CJX**, 2 Ilmington Road, Blackwell, Shipston-on-Stour, Warwickshire CV36 4PE. Tel: (0608) 82495.

Stroud & District ARS meet fortnightly in the Minchinhampton Youth Centre. For more details, please contact **Dave Stallon** on (0453) 886964.

Sutton & Cheam RS meet 3rd Thursdays, 7.30pm at Downs Lawn Tennis Club, Holland Avenue, Cheam, Surrey with natter nights on 1st Mondays, in the Downs Bar. Meeting from beginning of May will be at Sutton United Football Club, The Borough Sports Ground, Gander Green Lane, Sutton, Surrey, with natter nights on 1st Thursdays. April 16 is a Junk Sale, the 28th is a committee meeting and May 7 is a natter night. More details from **John Puttock G0BWW**, 53 Alexandra Avenue, Sutton SM1 2PA.

Taunton & District ARC meet 1st & 3rd Fridays, 7.30pm in 'The Basement', County Hall, The Crescent, Taunton. Other Fridays informally for a natter and station operation, Morse code classes, etc. For further details, contact **Mr W. Lindsay-Smith G3WNI**, Way Close, Madford, Hemmock, Cullompton, Devon EX15 3QY. Tel: (0823) 680778.

The GB3ZH Repeater Group meet at Chiltern Communications, Lincoln Road, Cressex Industrial Estate, High Wycombe, Bucks, 8pm. Details from **Francis Rose G2DRT** on (0494) 814240.

The Submarine ARC submerge on Thursdays, 7pm at HMS Dolphin, Gosport, Hants. For more details contact **K. Fisher G6LXK** on (0329) 281174.

The Three Counties ARC meet every other Wednesday, 8pm at the Railway Hotel, Liphook Hampshire. April 22 is their AGM and May 6 is British Nuclear Fuels Ltd. their operations and the environment, speaker from BNFL. **Kevin Roche G8GOS** on (0420) 83091.

Thornbury & District ARC meet at the United Reform Church, Chapel Street, Thornbury, 7.30pm, talks start at 8pm. Morse practice sessions are held between 7.30 and 8pm. More details from **H. Cromack G0FGI** at Rose Cottage, The Naitie, Oldbury-on-Savern, Bristol, Avon BS12 1RU. Tel: Thornbury 411096.

Tor ARA meet Tuesdays, 7.30pm at the Ernest Bailey Community Centre, New Street, Matlock, Derbyshire. April 21 is their AGM, the 28th is a talk & demonstration by Derek Pearson G3ZOM of Jandek, on their range of kits for QRP operation and novice use and May 7 is a Buffet & Dance at the Duke of Wellington, Chesterfield Road, Matlock. More details from **Vince Shirley G0ORC** on (0773) 826747.

Torbay ARS meet Fridays, 7.30pm at the ECC Social Club, Highweek, Newton Abbot. April 10 is a club night, the 24th is monthly meeting, talk by SWEB and May 1 & 8th are club nights. More details from **Andy Stafford G4VPM** on (0803) 329055.

Trowbridge & District ARC meet at 8pm, in the Territorial Army Centre, Bythesea Road, Trowbridge, Wiltshire, 8pm. More details from **Ian Carter G0GRI** on (0380) 830383.

Verulam ARC meet 2nd & 4th Tuesdays, 7.30pm at the RAF Association Headquarters, New Kent Road (off Malborough Road), St. Albans, Hertfordshire. 2nd Tuesdays are their activity evenings and 4th Tuesdays are their main monthly meetings. More details from **Walter Craine G3PMF**, 5 The Crescent, Abbots Langley, Watford, Hertfordshire WD5 0DR.

Wakefield & District RS meet Tuesdays, 8pm in First Floor Rooms, Ossett Community Centre, Prospect Road, Ossett. **John Bailes G0MVA** on (0924) 260048.

West of Scotland ARS meet Fridays, 7.30pm at the Scout HQ, 21 Elmbank Street, Glasgow. For further details, please contact **John Power G6MKT**, PO Box 599, Glasgow G3 6QH.

Whitton ARG meet Fridays, 8pm at the Whitton Community Centre, Percy Road, Whitton, Twickenham. April 17 is new & used equipment advice from Alan Brackley of ARE Communications and the 24th is an AGM report from all officers and election of a committee for coming year. More details from **Ian G0DFN** on 081-894 9131.

Wiesbaden ARC - DA1WA - is a club mainly for US military personnel stationed anywhere near Wiesbaden, Germany. For more details, contact **Robert Kipp DJ0PU**, Hugelstr. 25, D-6070 Langen, Germany.

Wigtownshire ARC have meetings and RAE classes every Thursday, 7.30pm at the Community Education Office, Stranraer Academy. More details from **Ellis Gaston G6MHPK**, 3 Victoria Buildings, Cairnryan, Stranraer, Dumfries & Galloway DG9 8RA. Tel: (0581) 2202.

Wimbledon & District ARS meet 2nd & last Fridays in St. Andrews Church Hall, Herbert Road, Wimbledon SW19. April 10 is a general activity evening, the 24th is 'Oscillators' by George Cripps G3DWV and May 8 is a general activity evening. **Chris Frost G0KEB**, 61 Selbourne Avenue, Tolworth, Surrey KT6 7NR. Tel: 081-397 0427.

Winchester ARC meet 3rd Fridays, 7.30pm at the Red Cross Centre, Durngate House. Further details from **Malcolm Butler G0LMD**, 44 East Stratton, Nr. Winchester, Hants SD21 3DU. Tel: (0962) 89550.

Wirral ARS meet 1st & 3rd Wednesdays, 7.45pm at Ivy Farm, Arrow Park Road, Birkenhead, Wirral. More details from **Alec Seed G3F00** on 051-644 6094.

Woodpecker Radio Group meet Mondays, 8.30pm at Richmond Place Club, Edgar Street, Hereford. More details from **Chris**, PO Box 39, Hereford HR1 2YL. Tel: (0432) 352441.

Yeovil ARC meet Thursdays at Red Cross HQ, Grove Avenue, Yeovil, Somerset. April 9 is Construction & Operating, the 23rd is their 48th AGM, the 30th is Construction & Operating and May 7 is open discussion and preparation for QRP Convention, the 9/10th is Annual QRP Convention at Preston School and the 14th is 'An 80m Superhet Receiver' by G3PCJ. Further details from **Mike Woodford G0JVG**, Holm Wood, 5 Orchard Close, South Petherton, Somerset TA5 3JX.

Radio Diary continued on page 41

April 12: Cambridgeshire Repeater Group will be holding their Amateur Radio Rally at Philips Communications Systems - Catering Centre, St. Andrews Road, Chesterton, Cambridge. Doors open 10.30am. There will be a Junk sale, Bring & Buy, Auction. Further details from **Mike G6COQ** on (0223) 440373.

April 19: Centre of England Easter Sunday Radio & Electronics Rally will be held at the National Motorcycle Museum, Bickenhill, near the NEC (Jct. 6 M42). Doors open 10.30am, 10am for disabled visitors. Admission £1 (concession for RAIBC members and senior citizens). Over 60 traders, ample free parking, bar & restaurant facilities. Talk-in S22. Easter special: 'Spot The Egg' on many of the trade stands to win an easter egg. Details from **Frank Martin G4UMF** on (0952) 598173.

April 26: The Bury Radio Society are holding their Annual Rally/Hamfest at 'The Castle Leisure Centre', Bolton Street, Bury, Lancashire. More details from **Laurence Jones G4KLT** on 061-762 9308.

April 26: Lough Erne ARC have their 11th Annual Mobile Rally in The Killyhevlin Hotel, Enniskillen. Talk-in on S21. Contact **Alwyn G10BFD**, 15 Glenwood Gardens, Sligo Road, Enniskillen, County Fermanagh, Northern Ireland BT74 5LT. Tel: (0365) 323802.

April 26: Swansea ARS will be holding their 11th Annual Rally in the Swansea Leisure Centre on the Swansea-Mumbles Coast Road, the A4067, from 10.30am to 5pm. Usual attractions include trade stands, bookstall, Bring & Buy, operational h.v.h.f. stations, full catering. Talk-in on S22 via GB2SWR. Further

details from **Roger Williams GW4HSH** on (0792) 404422.

May 4: Dartmoor Radio Club Rally is to be held at St. Pauls Church Hall, Yelverton. Doors open at 10.30am. Free parking, usual traders, refreshments, Bring & Buy. Details from **George Spray** on (0822) 853885.

May 10: The 8th Yeovil QRP Convention will be held at The Preston Centre, Monks Dale, Yeovil, Somerset (via Preston Road and Larkhill Road, maps available from G3CQR, QTHR). Doors open 9am, entrance fee is £1.50 which includes program with lucky-draw number. GB2LOW 144MHz talk-in from 8.30am on channel S22. Further details of the QRP Funrun and Challenge from **Peter Burridge G3CQR**, QTHR or tel: (0935) 813054.

May 16: All Formats Computer Fair will be held at Sandown Exhibition Centre, close to M25, three minutes from Esher railway station, parking for 6000 cars. This is intended to be the regular future venue for the London fair. Further details from **John Riding** on (0225) 868100.

May 17: The 35th Northern Mobile Rally will take place in the Flower Show Hall at the Great Yorkshire Showground, Harrogate, north Yorkshire. Showground opens 10am, doors open 10.45am. Talk-in on S22. Bring & Buy, bar and cafeteria. Free parking and loads of stands. Entry and parking of Wetherby to Harrogate Road. Separate arrangements for disabled visitors off Hookstone Wood Road. Details from **Mike G0MKK** on (0423) 564353/507653 or FAX (0423) 520992 or @GB7CYM.

ARE

COMMUNICATIONS '92

"The shop with the smile"

8 Royal Parade
Hanger Lane, Ealing
London W5A 1ET
Tel: 081-997 4476
Fax: 081-991 2565

NOW
REVITALISED!

ARE are pleased to announce that we have re-opened under new ownership and now, with what must be the widest range of equipment ever offered from a single source in London – plus fantastic bargains in secondhand ex-demo, commercial and hire equipment! Also, we can cater for export to almost anywhere in the world.

REMEMBER, we are only a phone call away for good, honest friendly advice, a brochure you might need or just a chat.

73's – Alan and Jez.

OPEN MONDAY-FRIDAY 9.30-5.30 SATURDAY 9.30-1pm EASY PARKING AT THE REAR OF THE SHOP

YAESU FT990



POWER SUPPLY, ATU,
BUILT-IN

See Peter Hart's review in
April Radcomm

KENWOOD TS850S



ANOTHER WINNER
FROM
KENWOOD

Phone for ARE price.

ICOM IC-765



THE ICOM TRADITION
CONTINUES

Built-in PSU ATU
General coverage RX

AUTHORISED AGENTS FOR ALL MAJOR MANUFACTURERS

- * YAESU
- * KENWOOD
- * ICOM
- * DAIWA
- * TOKYO HY-POWER
- * AOR
- * JRC
- * SONY
- * ALINCO
- * STANDARD
- * COMET
- * HOKUSHIN
- * CREATE
- * DIAMOND
- * OSCAR
- * HIMOUND
- * HENRY RADIO
- * STRUMECH
- * DRAKE

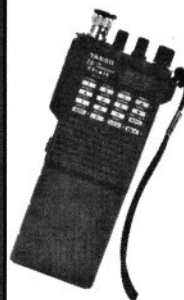
See all of these and us at
RSGB '92 stand C8

HANDHELDS

MOST HANDIS IN STOCK

NOW. FT470,
ICW2E, TH77E,
IC28E, 2SET,
2SRE, P2E,
2PET, FT23, 26,
415, 411, TH27,
C528 & UHF
MODELS

Call us for prices



MOBILES



FT5200, 2400, 212, IC3220,
2410, 229, TM741, 731, 241,
702, TR751, C5608
and many more

BASE STATIONS



IC970, IC275E/H, 475E/H
TS790, FT736R FT650
All options and accessories

Part exchange and equipment purchases welcomed! Credit facilities available subject to status. APR from 37.8%. Located next to Hanger Lane Tube Station (Central Line) and on the junction of the A406 & A40.

DON'T DELAY CALL 081-997-4476

The Manson EP-925

High Current Power Supply

Normally I use a customised version of the ubiquitous PW 'Marchwood' power supply design, which has variable output and current limiting. In this form, it provides me with a useful general bench supply when I'm in a home-brew mode.

The 'Marchwood' becomes a real 'work-horse' when higher power mobile transceivers are being reviewed. Obviously, this is the type of rig that Manson had in mind, when they produced their p.s.u.

The first thing that struck me when I unpacked the EP-925, were the two moving-coil panel meters which gave the unit an air of quality. The first meter is scaled 0-15V with a red marker at 13.8V. This is the terminal voltage of a fully charged 12V lead-acid car battery.

The second meter is scaled 0-30A. The EP-925 can supply 25A continuous at 15V and peak maximum of 30A.

Steel Case

The power unit is housed in a two-part steel case, which is finished in very respectable black satin finish paint. Judging by the durability of the surface, I'd say that the metalwork had been well primed before painting.

The front panel of the p.s.u., is the only section of the chassis constructed from plastics. Besides housing the two panel meters, the front panel has a pair of fairly heavy duty screw-down type terminal posts.

I felt that the terminals looked a bit on the light duty side for handling 25A continuous current. However, I need not have worried, as they proved adequate in operation.

In addition to the 'high current' output terminals, the power supply is fitted with two pairs of 3A quick-release clip fastening outlets. I know from experience with my own p.s.u., that this feature is useful.

Although it only appears to be a minor refinement, it can save a great deal of frustration. There's a finite limit to how many pairs of light duty wires can be twisted together, and trapped under one terminal post!

Voltage Control

Next to the panel meters is a voltage control potentiometer. This control gave me an uneasy feeling as I adjusted it, and I felt it was a little too easy to adjust.

Fortunately, the p.s.u. can only supply a maximum of 15V. This voltage level could be a bit tough on 6V equipment, but most mobile gear should survive an accidental brush of this control.

In my opinion, because this p.s.u. has no pre-settable current control, it has rather limited scope as a general bench supply. A screwdriver access type of control, to permit adjustment, would have been useful. After all, most operators are going to use this unit as a substitute mobile power supply, especially with all that current on tap at 13.8V.

The two l.e.d.s mounted just below the voltage control, operate as a power-on indicator in



conjunction with a rocker type mains on-off switch. They also act as a visual warning that the p.s.u. has folded-back into its over-current state.

Amazingly Quiet

The mains input lead (approximately 1.5m in length) plugs into the rear. There's also a well guarded and amazingly quiet 70mm instrument fan.

The fan, I later discovered, is a brushless d.c. type, and it must be under-run for such a hushed performance. The fan's operation is governed by an internal temperature sensor. The sensor switches on the fan in at 70°C and off at 40°C.

The fan provides forced cooling in conjunction with a reasonably sized grill, set back a little from the front panel. Using this method of cooling, obviously helps to keep the size down.

The overall sizes and weight of the p.s.u. are 150 x 150 x 305mm and 9kg. I felt that this power supply wouldn't be out of place in anyone's radio shack, as it has modest dimensions, for such a heavyweight specification.

Proportional Current Limit

Although there's not much information on the accompanying data sheet, the p.s.u. has a proportionally adjusted current limit facility. This, in simple terms, winds down the amount of current available with respect to the unit's voltage output level.

This, I can only guess, is done in preference to a fully adjustable limit. This is because there's little or no headroom for extra dissipation in the regulating devices, and as the manufacturers say, it helps to keep costs down.

To help the end-user, the makers provide a graphic representation of the facility. You'll find it on the A4-sized information sheet.

Value For Money

The EP-925 has obviously been built to a price. But that's not a criticism in itself, as the unit represents good value for money.

Despite this, I felt that the addition of some manual current control would have given the unit a much wider appeal, particularly in the small electronic business sector. The lack of this control, relegates the EP-925 to a (very good) 13.8V high current d.c. supply, with the added luxury of a variable voltage output.

There is by the looks of the front panel, a

Review

Power supplies are often something of an afterthought in most shacks, but if you're going to use any of the higher power mobile equipment outside of the car, a good p.s.u. is essential. With this in mind, Richard Ayley G6AKG, has tried the Manson p.s.u., to see if it's up to this demanding task.



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

H.F. TRANSCEIVERS

TS950SD	HF transceiver with auto ATU, all filters, DSP, SO2	2995.00
TS950S	HF transceiver with auto ATU	2299.00
TS850SAT	HF transceiver with auto ATU	1625.00
TS850S	HF transceiver without ATU	1475.00
TS450SAT	HF transceiver with auto ATU	1375.00
TS450S	HF transceiver without ATU	1220.00
TS690S	HF transceiver with 6 metres (50W)	1395.00
TS140S	HF transceiver without ATU	880.00
TRC70	HF transceiver for commercial use	1169.13
IC-781	HF all band, general coverage receiver, built-in ATU and PSU, spectrum scope	4595.00
IC-765	HF all band, general coverage receiver, built-in ATU and PSU	2550.00
IC-751A	HF all band, general coverage RX, 12V	1535.00
IC-735	HF all band, general coverage RX, 12V	949.00
IC-726	HF/6m, general coverage RX, 12V	1015.00
IC-725	HF all band, general coverage RX, 12V	779.00
FT1000	All mode HF transceiver, general coverage dual receive	2995.00
FT990	All mode transceiver, general coverage, mains PSU, auto ATU	1895.00
FT890	All mode transceiver, general coverage receive	1075.00
FT890TU	All mode transceiver, general coverage RX, c/w internal ATU	1250.00
FT747GX	General coverage receiver, ham bands transceiver	689.00
FT767GX	General coverage receiver, ham band transceiver	1685.00

VHF/UHF TRANSCEIVERS

TS790E	All mode tri-bander base station. 2m/70cm fitted. 23cm option unit	1595.00
TS711E	All mode 2m base transceiver	925.00
TR751E	All mode 2m mobile transceiver. 25W	625.00
TM741E	FM tri-bander with 2m and 70cm fitted. 10m/6m/23cm options	759.00
TM732E	2m/70cm FM dual band compact mobile transceiver. Dual receiver	595.00
TM702E	2m/70cm FM compact dual band transceiver. 25W/25W	495.00
TM531E	23cm FM compact mobile transceiver. 10W	415.00
TM441E	70cm FM compact mobile transceiver. 35W	345.00
TM241E	2m FM compact mobile transceiver. 50W	325.00
IC-229E	2m FM mobile 25W, 20 memories, 12V	299.00
IC-229H	2m FM mobile, 50W, 20 memories, 12V	349.00
IC-275E	2m transceiver, SSB/FM/CW, 25W, PSU	1090.00
IC-275H	2m transceiver, SSB/FM/CW, 100W, 12V	1060.00
IC-449E	70cm FM mobile, 35W, 20 memories, 12V	359.00
IC-475E	70cm transceiver SSB/FM/CW 25W PSU	1210.00
IC-475H	70cm transceiver, SSB/FM/CW, 75W, 12V	1275.00
IC-575H	6m/10m TX, RX, SSB/FM/CW 100W, 12V	1225.00
FT290R2	Transceiver 2m 2.5W multimode portable	429.00
FT690R2	Transceiver 6m 2.5W multimode portable	429.00
FT790R2	Transceiver 70cm 2.5W multimode portable	499.00
FT2400RH	Transceiver 2m 50 watt synthesised	349.00
FT212RH(B)	Transceiver 2m, FM, 45W synthesised	329.00
FT712RH	Transceiver 70cms, FM, 35W synthesised	359.00
FT5200	2m/70cm dual band transceiver 50/40W o/p	659.00
FT736R	Multimode VHF/UHF base c/w 2m. 70cms & duple	1395.00
FT650	Multimode 6m, 10m and 12m	1175.00
DR-112EM	2m FM 25W mobile transceiver	269.00
DR-112E	2m FM 45W mobile transceiver	289.00
DR-410E	70cms FM 35W mobile TX	329.00
DR-590E	2m/70cm FM 45/35W dual display	519.00

VHF/UHF HAND PORTABLE TRANSCEIVERS

TH26E	2m FM hand portable transceiver with PB10 battery	229.00
TH27E	2m FM mini hand portable transceiver with PB13 battery	239.00
TH46E	70cm FM hand portable transceiver with PB10 battery	259.00
TH47E	70cm FM mini hand portable with PB13 battery	269.00
TH77E	2m/70cm FM dual band hand portable transceiver. PB10 battery	395.00
IC-W2E	2m/70cm FM hand portable including Nicad	395.00
IC-2SE	2m FM hand portable including Nicad/charger	269.00
IC-2SET	2m FM hand portable, keypad entry DTMF	299.00
IC-2SRE	2m FM hand portable + wide band RX	425.00
IC-P2E	2m FM hand portable including Nicad/charger	259.00
IC-P2ET	2m FM hand portable including Nicad/charger	275.00
IC-2GE	2m FM hand portable including Nicad/charger	269.00
IC-4SET	70cm FM hand portable keypad entry DTMF	316.00
IC-4SRE	70cm FM hand portable + wide band RX	445.00
IC-P4E	70cm FM hand portable including Nicad/charger	275.00
IC-P4ET	70cm FM hand portable including Nicad/charger	299.00
FT26	2m handy c/w FNB28 NC28C	259.00
FT76	70cm handy c/w FNB28 NC28C	269.00
FT411	TX, RX synthesised 2m keypad c/w FNB17 Nicad	249.00
FT811	TX, RX synthesised 70cms keypad c/w FNB17	269.00



SG-230

SMARTUNER

HF ANTENNA COUPLER

SSB, AM, CW & DATA

FAST - INTELLIGENT - ACCURATE

OPERATES WITH ANY HF TRANSCEIVER

The Smartuner high technology coupler intelligently tunes any length antenna (8 to 80ft) in the HF band. The unit will operate with any HF transceiver within its specifications. The Smartuner switches 64 input and 32 output capacitance combinations plus 256 inductance combinations in a "pi" network resulting in over a half million different ways to ensure a perfect match for the transceiver; and, it remembers the frequency and the tuning values and will re-select these values in less than 10 ms next time you transmit on that frequency.



£385.00

inc. VAT
carr. £7.00

- MICROPROCESSOR CONTROLLED
- NON-VOLATILE MEMORY
- WATERPROOF
- B.I.T.E. INDICATOR
- FOR MARINE, AVIATION, HAM AND PARA-MILITARY APPLICATIONS
- 1.8 TO 30MHz RANGE
- 10 TO 150W INPUT POWER
- 10ms RETUNING TIME
- 8 TO 80ft ANTENNA (ALL Types)

Visa and Mastercard/Access Accepted

FT911	TX, RX synthesised 23cms keypad c/w FNB17	369.00
FT470	TX, RX synthesised 2m + 70cms keypad	409.00
FT415	2m keypad handy c/w FNB23 & NC28C	279.00
FT815	70cm keypad handy c/w FNB28 & NC28C	295.00
DJ-S1E	2m FM 2.5W 41 memories + drycell pack	179.00
DJ-F1E	2m FM keypad 2.5W 41 memories + AIR RX	239.00
DJ-460E	70cms FM keypad dial 2W 12V=5W	249.00
DJ-560E	2m/70cm FM 2W dual display/watch	299.00

RECEIVERS

R5000	HF high performance communications receiver	925.00
R2000	HF general purpose communications receiver	549.00
IC-R9000	100kHz - 2GHz receiver CRT display	4080.00
IC-R7100	25-200MHz receiver	1120.00
IC-R100	Wideband receiver	510.00
IC-R72E	General coverage receiver	659.00
IC-R72E	General coverage receiver, with back-up battery	689.00
IC-R71E	General coverage receiver	875.00
IC-R1	Hand portable receiver	349.00
FRG8800	Receiver 0.15-30.0MHz AM/CW/SSB/NBFM	665.00
MVT-7000	200kHz-1300MHz WFM/NFM/AM	289.00
Alinco DJ-X1	hand-held scanner 100kHz-1300MHz WFM/NFM/AM	269.00
AR2000	New hand-held receiver 500kHz to 1300MHz	269.00
AR1500	New hand-held scanner, 500kHz-1300MHz, WFM/NFM/AM/SSB!!	approx. 300.00
AR3000A	New base/mobile receiver with RS232. 100kHz-2036MHz, all modes	765.00
AR2800	Base/mobile receiver with SSB. 500kHz-600MHz and 800MHz-1300MHz with built-in Nicad	395.00
HF-150	HF communications receiver. 30kHz-30MHz. USB/LSB/CW/AM	329.00
HF-225	HF communications receiver. 30kHz-30MHz. USB/LSB/CW/AM AMS/FM (optional)	429.00
R550	Airband receiver. 40 memories with scan and search	129.00

SECONDHAND

REGENCY MX4200	VHF/UHF mobile/portable scanner	149.00
YAESU FT-790R1	70cms multimode	245.00
NRD-525	HF receiver (the best of the lot)!!	750.00
KENWOOD TM411E	25w 70cms mobile (superb condition)	245.00
AR-3000	HF/VHF/UHF scanner covering 100kHz-2036MHz, all modes (as new)	599.99
KENWOOD TH-205E	2M handheld	169.00
KENWOOD TR-9130	25w 2M multimode	340.00
LOWE HF-125	HF receiver c/w keypad, AMS/FM board, active antenna and port. case	315.00
NRD-535	HF receiver (only 3 months old)	879.00

DISCONES

SKYSCAN V1300	discone 25-1300MHz	49.95
SKYSCAN V1300	desktop discone	47.95
SKYSCAN	mag mount mobile scanning aerial	24.95

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

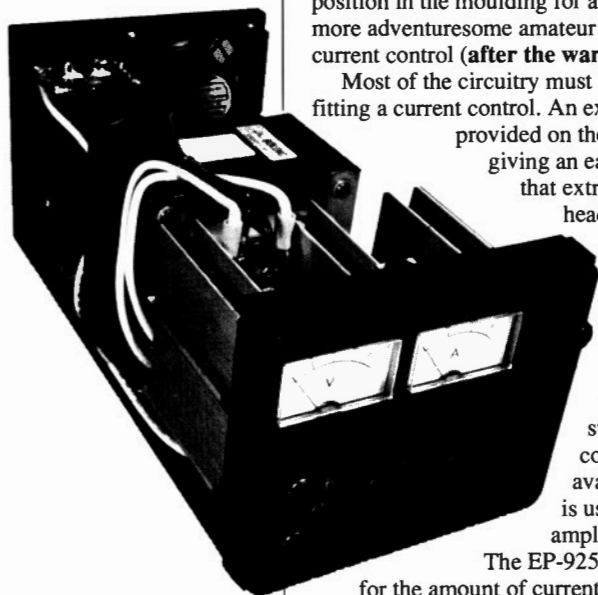
PART EXCHANGE WELCOME, ASK FOR KERRY G6IZF OR ANDY G4YOW

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



PHOTO ACOUSTICS



position in the moulding for an extra control. The more adventuresome amateur might fit his own current control (after the warranty has expired!).

Most of the circuitry must already be in place for fitting a current control. An extra set of holes is provided on the regulator heatsink, giving an easy route to adding that extra dissipation headroom I mentioned earlier.

High Standard

The interior of the unit reveals a high standard of construction. Every available inch of chassis is used to house the amply-rated components.

The EP-925 is a very compact unit for the amount of current that it can provide. The fact that the mains transformer occupied at least 50% of the chassis, came as no surprise.

The transformer is of the standard laminated design, and it's well finished. Knowing how much a transformer like this costs to make, I wondered how Manson managed to budget for such a high quality component.

I found the main smoothing capacitor sandwiched between the chassis and the transformer. This component raised an eyebrow, as it didn't look like a high ripple current device.

It's physical size is not large for the capacity, 47000 μ F, and the capacitor is terminated in large soldered tags. However, I may be doubting the component unnecessarily, as it is not marked that clearly.

Screw Terminations

Capacitors normally used for high-power applications, are almost always fitted with screw terminations to provide the necessary current handling. If electrolytic capacitors are used above their ripple current rating, they get hot and produce gas.

In time, they can 'dry out', causing them to lose capacity. Despite this, the capacitor is mounted near the main air flow from the fan, and it should be relatively free of this problem.

The diode bridge is mounted along with five 2N3055 'pass' transistors. Comprising of two sections of aluminium, the heatsink is mounted one section above the other.

This idea makes maximum use of the space left on the chassis. Rectification is provided by an integrated type, high current diode bridge and it's fitted with 'Lucar' spade terminations.

Good Practice

A capacitor is fitted across each diode in the bridge, and this is a good r.f.i. reduction method. In practice, the capacitor filters out the diode switching noise generated when the device is working hard.

In my line of work (e.m.c.), you often find that high current diodes produce a significant level of both radiated and conducted low frequency interference. This can be a real bind if you're a 1.8MHz DX fanatic!

The internal wiring is reasonably neat. All the heavy current connections are crimped, rather than soldered, with the exception of those to the smoothing capacitor.

The main control p.c.b is attached to the rear of

the front panel. The quality of the board is good, and the soldering is up to standard with no dry joints. Unfortunately, due to the way the p.c.b. is fixed to the front panel, I couldn't see what active devices are used to control the p.s.u.

Electromagnetic Compatibility

Nowadays, I work for an Electromagnetic Compatibility (e.m.c.) testing company. So, I thought I'd look for any vices the EP-925 might have, with regards to it being effected by high r.f. field strengths. Exploring this avenue, is not unjustified, especially as the unit is to power some fairly powerful r.f. equipment.

I must tell you immediately, that the field strengths used to conduct the following test, represent an almost worst case scenario. Unless you intend running the full legal limit on each of the bands mentioned, into in-shack antennas, the EP-925 should not deviate from its normal mode of operation.

Most of the effects I noted during the testing, caused the unit to fail safe. In other words the output voltage went down rather than up.

Only one amateur band provided different results. On 70MHz, with a signal level at 70V/m of a.m. modulated field, the unit lost all regulation and supplied around 16.5V.

Bad Practice

There's no need to worry though, as my test equates to running approximately 20W into a mag-mount antenna, stuck to the case of the p.s.u.! This would be bad practice anyway, as the unit represents a terrible groundplane at this frequency.

But speaking seriously now, I did notice some other minor effects at 50MHz. On this band, 50V/m caused a 2V drop in output, while 20V/m and 50V/m at 70MHz caused volts drop of 3V and 6V respectively.

On 144MHz, there was only a minor twitch at 100V/m, and no effects at all were noted at 430MHz. The h.f. bands (1 to 30MHz) were also clear of any effects. So, from my tests, it would appear that the EP-925 is an extremely tolerant piece of equipment when it comes to fairly high r.f. field strengths.

Full Load Performance

During my tests, the unit was run under full load (25A) for a period of 30 minutes. It coped very well, with no signs of overheating.

Towards the end of the test period, the ripple level was checked at 30A output and proved too low to measure. The regulation from no load, to full load, gave a very temporary 'droop' in output voltage in the region of 100mV.

The information sheet advises that the load is removed from the p.s.u., before switch on. So, I conducted a test to see the effect of the opposite course of action.

No ill effects were noted. Although, if the unit were to be switched on during a peak in the a.c. mains cycle, while under load, the mains input fuse could blow. This is because the EP-925 does not appear to be fitted with a soft-start circuit. Despite this, and providing the manufacturer's advice is followed, the need for such a circuit is unnecessary.

The front panel meters were checked against an AVO Model 8 test meter. Measured accuracy can only be described as more than adequate, as only small errors were noted across each meter's range. The errors were non-linear in nature, and impossible to quantify.

Summary

In my opinion, the EP-925 is a compact and unassuming power-house. It has enough capacity to deal with the majority of high power mobile amplifiers, as well as mobile 100W+ h.f. rigs. That's what I think this p.s.u. was designed for, and no doubt it's what people are queuing to buy them for.

The only thing that worried me was the seeming lack of an overvoltage crowbar circuit. This would operate if for some reason the output should go higher than 15V.

Most mobile equipment will cope with 15V, as this can easily be experienced in a car. This is the only real short-coming I can see with the EP-925. Anyone who is of a nervous disposition might think about building an extra unit to do provide over-voltage protection.

I think the EP-925 represents a good quality p.s.u., which is sensibly priced at £99.00

including VAT. My thanks go to AQL EMC Ltd., for the use of their test facilities. Thanks also to Lowe Electronics headquarters at Matlock, Derbyshire and their Bournemouth branch (for the loan of the review unit) and Richard G7HIP for his helpful comments.

Specification

Output voltage
Output current
Max output current

3-15V (adjustable)
25A @ 15V
30A

Output ripple and noise
Cooling
Input Fuse Rating
Dimensions
Weight

(5 minutes max.)
<10mV r.m.s.
Forced air
250V @ 5A
150 x 150 x 305mm
Approximately
9kg

Review

Antennas are always popular with our readers, particularly when they are offered at a substantial saving on the full retail price.

This month we are able to offer you a great deal on a top quality antenna from Nevada Communications.

Their WB 1300 is a superior, wide band, omni-directional, 8 plus 8-element, discone antenna, aimed at the scanning enthusiast and covering from 25MHz right up to 1.3GHz.

The antenna, which is British made, is supplied as a simple to assemble kit complete with the necessary hex wrench to tighten up the set screws holding the elements in place. Two aluminium mounting brackets are also supplied to enable the antenna to be clamped to any suitable vertical tube having a diameter of 25 to 52mm.

The coaxial feeder cable, which is not supplied, is connected to the antenna with an N-Type connector. This connection is well shielded as it is made at the base of the antenna inside the mounting tube. Of course, for the best results the feeder should be of the highest grade coaxial cable with minimum loss. The WB 1300 antenna can also be used on transmit on the 50, 144 and 900MHz and 1.2GHz bands.

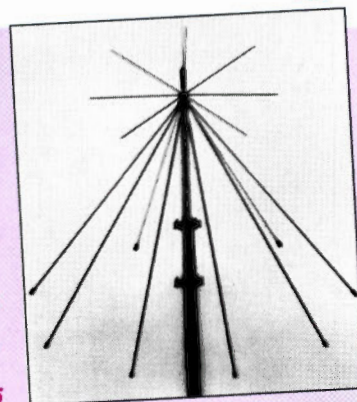
SPECIAL OFFER

Nevada WB 1300 Wide Band
Omni-directional Antenna

Save £10

Special Offer Price £49.95
post free.

Normal Retail Price £59.95



Specifications

Frequency Range

Receive: 25MHz to 1.3GHz

Transmit: 50, 144, 430MHz & 1.2GHz bands

Input Power: 200W

Input Impedance: 50Ω

Connector: N-Type

Dimensions: Height: 1.7m Weight: 1kg

(1)

To: Practical Wireless Special Offer (May)
FREEPOST, Enefco House, The Quay, Poole, Dorset BH15 1PP

Please send meNevada WB 1300 antennas @ £49.95 each.

Name

Address

.....

.....

.....

Postcode

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

Charge to my Access/Visa Card the amount of £

Card No.

Valid fromto

Signature

Tel:

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 antenna to you. Send the coupons, with your cheque, to: PW Special 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.

Offer only available to readers of PW in England, Scotland, Wales, N. Ireland, the Channel Islands, the Isle of Man and BFPO addresses. Orders are normally despatched within 28 days, but please allow time for carriage.

The closing date for this offer is 14th May 1992.

(2)

Name

Address

.....

.....

.....

.....

Postcode

If you do not want to cut your copy of PW, you **must** send the Antenna Offer flash as proof of purchase.

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

A Simple Inductance And Capacitance Bridge

Part 2



Construction

The power supply for the simple bridge, is itself uncomplicated. The circuit is shown in Fig. 2.1, and as you can see, it's a basic, Zener diode stabilised unit. The associated p.c.b. is shown in Fig. 2.5, with the other boards.

Now it's time to start on the next stage, the building of the bridge board. You'll find that this section of the project is slightly more involved.

This board eventually stands off, and is mounted behind the front panel. It's wise to mark out the two fixing holes and the holes for the main controls, S1 and R9 directly on to the panel before mounting any components. The photograph of the complete unit will help in this respect.

The Lorlin 12-way miniature switch (S1) mounts directly on to the board. The switch's tag-ended connectors have the tags neatly snipped off,

to leave the longest possible 'stumps'. A suitable design for the switch labels is provided in Fig. 2.3.

The small metal stop ring should also be removed from beneath the fixing nut. This allows the switch the full 12-position travel.

The board holes for the switch fitting should be accurately drilled out with a 2mm or a 1/16in drill. The control R9 is fitted to the board on the opposite side to the switch. Wire connections are then made to the three pads, which fall immediately below the potentiometer tags.

I advise that you use Veropins, inserted at the pads for the switching terminal lugs, and at each pad of the link position P1-P2. Use double-ended types for the off-board connections.

This is recommended because soldering to external positions from both sides of the board is

This month Stephen Knight Bsc., describes the final stages of his construction of his simple bridge design, and tells us how to complete the simplified calibration.

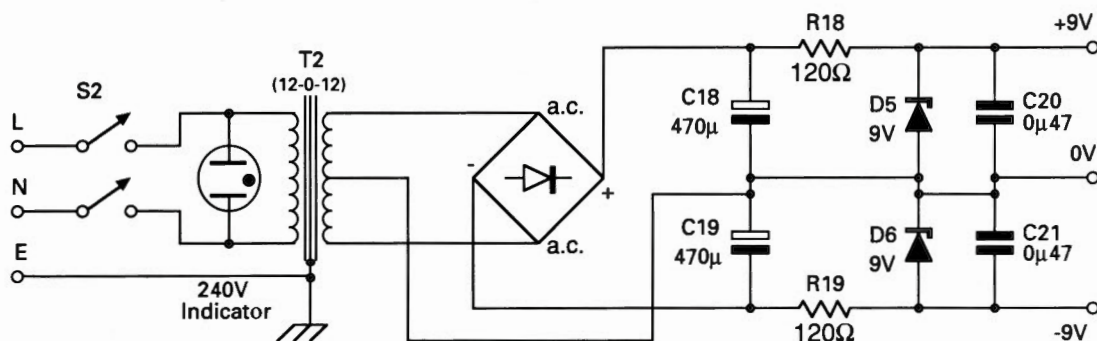


Fig. 2.1: The circuit diagram of the Zener diode-stabilised power supply for the Simple Inductance Bridge. The associated p.c.b. design appears in Fig. 2.5.

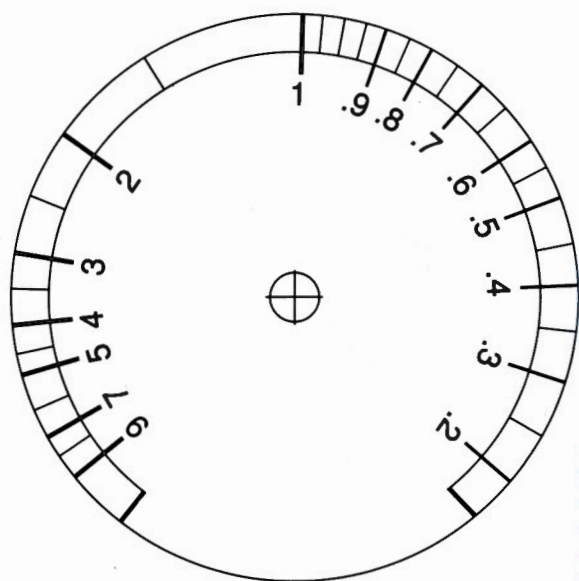


Fig. 2.2: The instrument's dial template design. See text for details on how to reproduce the design, as scale is important, as calibration accuracy is dependent on size-for-size reproduction.

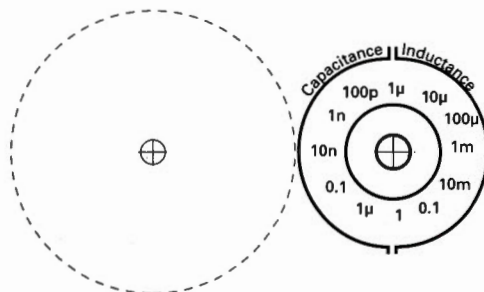


Fig. 2.3: Suggested design for the S1 switch panel. See text for switch mounting details.

dressler^{icom} KENWOOD

COMMUNICATIONS LIMITED

YAESU SR STANDARD

YAESU

FT5200 — FT736 — FT26
FT1000 — FT76 — FT757GX
FT990 — FT747GX — FT767

SPECIALISTS IN DRESSLER ACTIVE RECEIVE ANTENNAS

ARA 1500

50-1500MHz
'N' Type Connection
Gain 11.5dB
Noise 3.0dB
Intercept point 3rd order + 21dbm
£163.00
Now with fully tuneable interface.

ARA60

30kHz to 60MHz up to 100MHz.
Size: 940 mm high
64 mm diameter
Gain: 11dB
Intercept point 3rd order + 44dbm
£163.00

YUPITERU/AOR

MVT 7000£279
AOR 3000A£725
A new model
AOR 1000 (1 only)£229
AOR 2000£259

ICOM

IC781
IC970 E/H
IC725
IC726
IC2SE
IC2SET
IC765
ICR100
ICW2
IC2SRE
IC7100
IC2410
IC4SRE
ICR9000

**IC-P2ET
P4ET**

*NOW IN
STOCK*
£ RING

SHINWA SR001

'Fantastic price'

Remote control
full feature
receiver
£299

JRC

NRD535D

inc ECSS + band
with + 1kHz filter**£1690**

NRD535

inc ARA60**£1095**

KENWOOD

R5000 TH77
TS9505D TH27
R2000 TM741
TS790E Lowe HF225
TS850 TS450
including ATU including ATU

TS450
Inc.
ATU



FREE!

*matching Kenwood PSU
when you buy*

TS850S£1475
or
TS450S£1220

ALINCO

DJX1£259
DJF1 Both
DJS1 stocked

**Microset 2m linears
special prices**

PRE-OWNED UNITS

FGR9600 .....£375	ICR7000 .....£700
MX8000 .....£370	ICR7000HF .....£750
R5000 SOLD £650	FRG7700 .....£295
ICR1 .....£295	AOR200 .....£175
Sony PRO80 .....£200	SX400 .....£349
Tandy PRO38 SOLD £50	SX200 .....£175
Grundig Satellite£?	Uniden XL175 .....£170
NRD525 SOLD £725	IC275E .....£875
ICR71 .....£675	IC475E .....£775

Stock changing daily. All covered with a FREE warranty

Phone for latest prices and offers

**191 FRANCIS ROAD
LEYTON · E10 6NQ · LONDON**

**TELEX 8953609 LEXTON G
PHONE 081-558 0854 081-556 1415
FAX 081-558 1298**

24hr Hotline ansaphone No: 081-558 0854

**OPEN MON - FRI 9AM - 5.30PM
OPEN SAT - 9.30AM - 4.30PM**

**INTEREST FREE HP FACILITIES AVAILABLE ON
MANY ITEMS 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
Stuart (Bromley, Kent) 081 313 9186



"A GENUINE PRICE FROM A GENUINE DEALER"

made at these points. The link P1-P2 (see main circuit, Fig. 1.4 in Part 1) should be left open for the time being.

Maplin Case

The case I used was a Maplin two-part unit measuring 200 x 100 x 125mm. The front panel drilling requirements can be gauged from the photographs.

The front panel legends can be done in rub-off lettering or stencil. The spacing of the two 9.5mm holes for the shafts of S1 and R9 is critical, as are the two fixing holes for the bridge board.

I suggest you use the board itself as a template as mentioned earlier. Before fitting any of the boards, attach the three input terminals, which should be spring-loaded types.

The off-board wires that go to the respective input terminal tags, should be kept as short as possible. **They must not be twisted together!**

Board Mounted

The bridge board can then be mounted behind the panel using 6BA screws and 30mm spacers, checking that the control shafts pass centrally through their respective holes. By using grommets with a 6.5mm centres in these holes, they will act as soft bearings for the shafts.

A touch of non-mineral oil is useful here, for making smooth-turning controls. You will, incidentally, need a shaft extender for potentiometer R9.

The remainder of the front panel components can now be fitted, including the on-off switch S2, and the 50 μ A meter M.

The oscillator and null-detector boards are mounted on short spacers on the base of the box, the positions being in no way critical, while the power board (see the photograph in Fig. 2.4) is mounted, again using two screws and spacers on the back wall of the case.

Oscillator Check

When all the internal interconnections have been made, the first thing to be done is to check that the oscillator IC1 is working. This is done by adjusting preset R3.

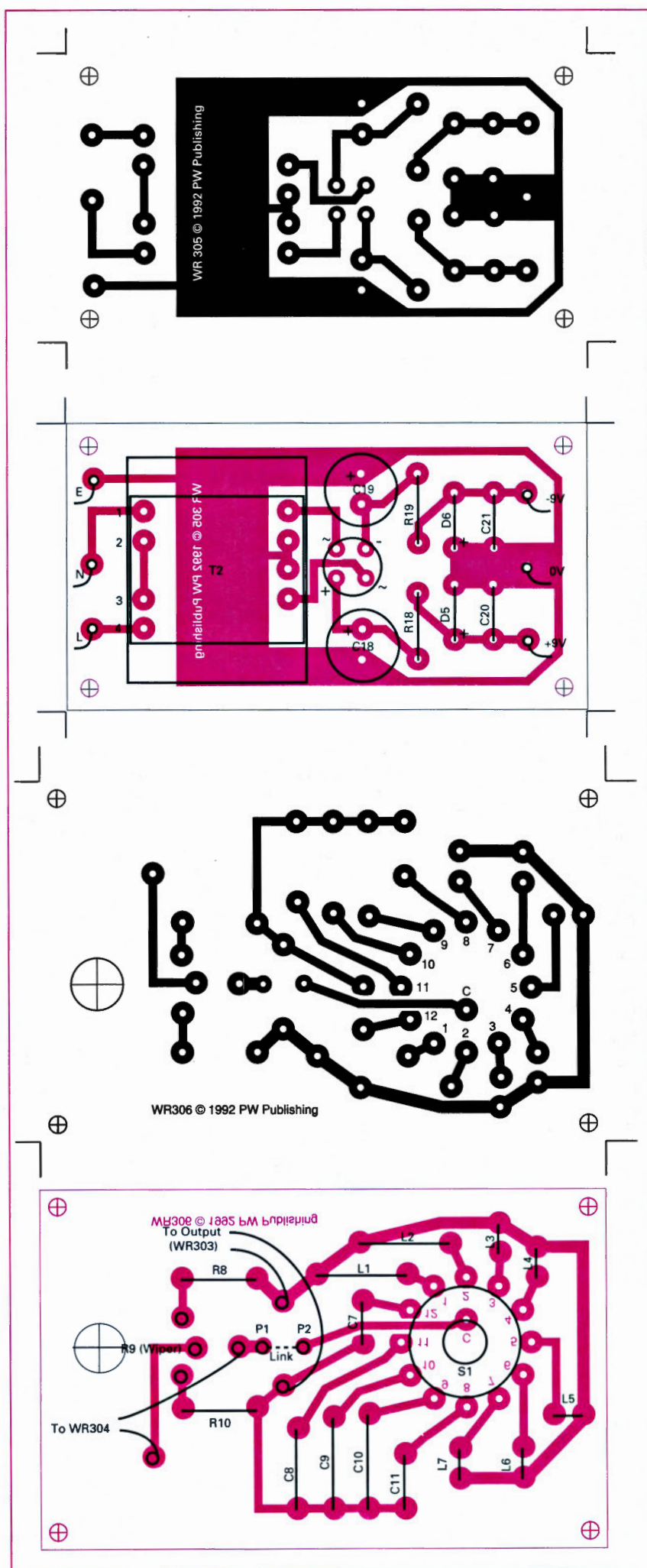
An oscilloscope is the best way to test the oscillator. The oscilloscope will also check the impedance matching transistors Tr1 and Tr2, by displaying the waveform across the primary of T1.

Start off the tests with R3 at its mid position, and you should get a sinewave output at pin 6 of the i.c., of about 6V peak-to-peak amplitude. The frequency is not important, but adjustment of R3 should enable a stable sinewave without visible distortion to be obtained.

The setting of R3 is not critical. For those without a 'scope, setting it to mid-position should give you a suitable output.

What is important, of course, is that the oscillator is working. The instrument will work with a distorted waveform, but it won't work at all if the oscillator isn't performing!

Fig. 2.5: The p.c.b. designs for the Simple Inductance Bridge, showing power supply, and bridge unit p.c.b. designs, copper track lay-outs and associated component over-lays.



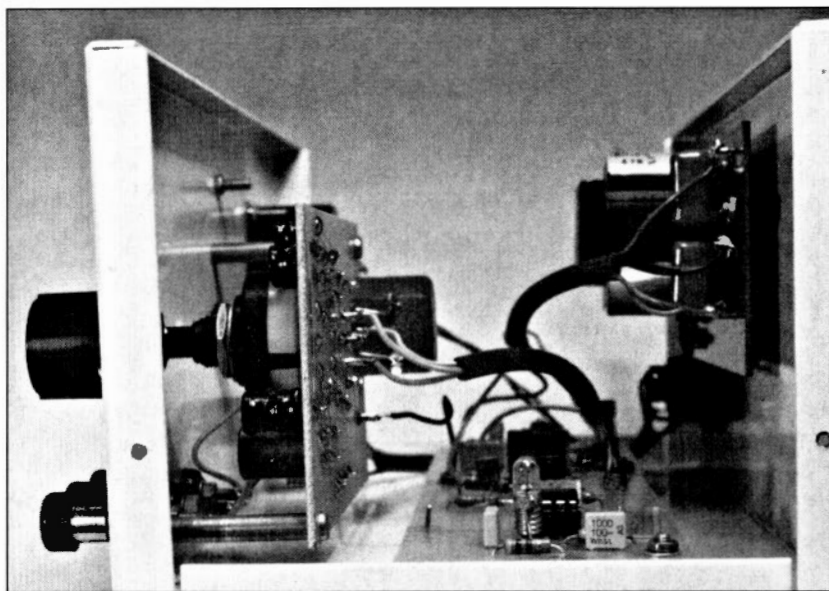


Fig. 2.4: Photograph showing method of mounting bridge-board, stand-off mounts, inter-wiring and the power supply panel which is fixed on the rear casing.

The Calibration

Turning now to the calibration, you might be pleased to know that this has been done for you! Unless you are a purist, you need no further equipment to see things through.

First of all, fit a suitable knob to the range switch shaft, so that with the switch turned fully anti-clockwise, the knob pointer indicates the $1\mu\text{H}$ position on the range selection. It should then turn correctly through the other 11 positions, stopping fully clockwise on the 100PF capacitor position.

The main control scale design, which you'll eventually fit on to the shaft of the potentiometer R9, is given in Fig. 2.2. After a number of experiments on prototypes, I found that this scale gave consistent results within an estimated error of about 3%, provided that the specified potentiometer is used.

The scale cannot be guaranteed to match any alternative potentiometer. This control was chosen because it has a 2% linearity tolerance, and wide mechanical and electrical rotation angles.

So, if you use the same potentiometer, the calibration is already done. By doing it this way, the rather tedious marking of a scale against external standards is avoided!

The Scale

Next, photocopy the scale (or reproduce it in some way) and glue it on to a 75mm diameter disc of thin aluminium, say 18-20s.w.g., with the centre point accurately marked. You can use card, but this does tend to buckle in time, and aluminium (or thin Perspex) seems the best bet.

Now, having got the disc prepared in this way, glue or screw to it, perfectly centrally, an instrument knob of about 28-35mm diameter. The complete dial can then be fitted, when required, to the extension shaft (cut to a suitable length) of R9.

You now need two resistors of 1% tolerance or better. The actual value of these resistors doesn't matter, but 100Ω is suitable and the closer they are matched the better.

Turn the shaft of R9 to about mid-position (no dial yet fitted) and connect one of the resistors across Cx terminals (shown as 'Capacitance' in the circuit Fig. 1.4 in Part 1) and the other across the Lx terminals (shown as 'Inductance' in Fig. 1.4 in Part 1). The range switch position is immaterial at this stage.

Now turn the shaft of R9 very carefully, to produce a minimum reading on the meter. Without disturbing the shaft position, slip on the scale and then fix it in position using the knob grub screw(s) or collet clamp.

Ensure that the central figure 1 on the scale, is exactly in line with the indicating mark on the panel. Then re-check. This is a tricky part of the procedure, but a steady hand is all that is basically needed.

If everything seems to be okay up to this point, the work is completed. Next, switch the unit off, remove the test resistors and solder a link of wire across the Veropins at P1-P2 (see main circuit in Fig. 1.4 in Part 1) on the bridge board. The instrument is now ready for use.

Making A Measurement

All that has to be done in making a measurement, is to connect the inductor (or capacitor) to the appropriate pair of terminals (Cx or Lx). Then set the range switch to a suitable position, and turn the main control knob until a minimum reading is obtained on the meter.

You may have to search through the range switch positions if you don't have a clue as to the probable inductance value of your inductor. Don't be deceived by what looks like a minimum reading coming up, but which reaches the end stop of the control without actually reversing its direction.

There must be a definite reversal of direction by the meter pointer. The best accuracy is obtained when the 'balance' occurs within the central 50% or so of the scale calibration, say, within the range 0.3 to 4.0.

All you have to do is to multiply the range switch scale by the factor on the main scale. For example, if you find a 'balance' at 0.75 with the range at 10mH, the inductance being measured is $10 \times 0.75 = 7.5\text{mH}$.

Theory And Practice

In theory, this bridge should measure inductors from $1\mu\text{H}$ to 10H, and capacitors from 1pF to $10\mu\text{F}$. In practice, the range of inductance measurement is about $5\mu\text{H}$ to 5H, and of capacitance from 10pF to $5\mu\text{F}$.

There's not much point in taking any measurement below $5\mu\text{H}$ or 10pF at its face value. This is because of stray inductance and capacitance, which is bound to vary from model to model.

In my prototype these quantities measured at $1.7\mu\text{H}$ and 2.3pF respectively (on a high precision laboratory instrument!). At the other end, the 1H standard coil used is stated to have an accuracy of 10%, (it was actually under 4% on test) and a $1\mu\text{F}$ capacitor with an accuracy better than 5% is not easy to get hold of.

PW

Anyone willing to have a go at calibrating their own scale from external standards, can get the information from me, if they'd like to write via the PW office. I hope that your bridge will make inductance and capacitance identification easy for you in the future!

Getting Started - The Practical Way

Construction

The first radio set I built had the following 'ingredients': a toilet roll former for the coil, a diode made from a scratched blue Gillette razor blade, and a single wartime surplus headphone. The toilet roll was the hardest bit to find because most people, at least the ones I knew, used neatly cut squares of newspaper on a nail!

However, I really did begin the hobby by winding a coil, although nowadays many projects use ready-made coils or inductors. I suspect that this may be because writers of articles know, like me, that readers often come unstuck when attempting to wind their own coils. I don't know why this should be, as it really is easy, and I even find it quite therapeutic.

Using The Dip-Meter

Last month, I described the building of a dip-meter to check the frequency of a tuned circuit. Now it's time for you to learn how to use this most useful instrument.

Assuming that the tuned circuit consists of a coil (inductor) and a capacitor, the diagram Fig. 1, shows the method of using the dip-meter to check the resonant frequency. There are three types of inductor in common use in amateur radio, and these are shown in the photograph on page 32 (the 'screened can' type is shown with the can in place and removed).

If the inductor is a coil wound on a cylindrical former, the method in Fig. 1(a) is used. The tuned circuit is made up from the inductor (L) and a capacitor (C).

The frequency can be measured with the inductor and capacitor in place on a circuit board. It can be done this way, but I usually find it easier to check the inductor before it's placed in the circuit board. I do this by soldering in the appropriate value of capacitor for the circuit.

The Method

The method used, is to switch the dip-meter on, and bring its coil close to the inductor which is to be measured. Aligning the instrument and the inductor 'end on', as shown in the diagram, aids good coupling.

The object of the exercise, is to make the inductor (the one we're checking) absorb energy from the dip-meter coil as it oscillates. When the windings on both coils are placed as shown, and as you tune over the dip-meter range, you should notice a distinct 'dip' on the instrument's meter. This should occur when the frequency of the oscillator in the dip-meter matches the frequency of the tuned circuit being measured.

Some care may be required in placing the dip-meter, and taking readings. If the windings are too close, the coils might be 'over-coupled', and you might get a 'double dip', which would give an inaccurate measurement.

If the windings are too far apart, the coupling will not be enough, and you'll get a poor dip, or no dip at all. In practice, it's worth moving the dip-meter coil around a little, until one clear dip is obtained.

The frequency reading obtained, will depend upon the accuracy of the dip-meter's tuning scale. Even the expensive commercially-made dip-meters, are often only crudely checked when it comes to frequency calibration.

Care And Time

The home-brewed dip-meter's frequency accuracy, depends upon the amount of care and time taken in its calibration. Despite this, a far better indication can be had if the dip-meter is connected to a digital frequency meter.

Many enthusiasts have frequency meters nowadays. If you use this method, all you do is use the frequency reading from the frequency meter.

The diagram, Fig. 1(b), shows the technique used when the inductor is a toroidal coil. This is the type of inductor wound on a toroid-shaped core.

Toroids are 'doughnut' (or 'Polo Mint') shaped formers. The advantage of this type of former, is that the

inductance field is kept within the circle of the core. The disadvantage is that it's not really possible to take measurements, just by probing with the dip-meter near to the coil. In this case, the dip-meter must be coupled to the inductor.

The easiest method is to couple the toroidal winding to the dip-meter coil, using link windings. Energy can be put into, or taken out of a coil winding, by means of a link winding (a smaller winding placed over, or alongside the main winding).

The diagram, Fig.1(b) shows how this done. A couple of turns are added over the toroidal winding, and this is connected by a pair of wires, which ends in several turns wound loosely over the dip-meter coil.

Energy Transferred

Using the link-windings, the energy can then be transferred from the dip-meter coil to the toroidal inductor. Again, it's possible to 'over couple' the windings, and in some cases only a single turn may be required. It may only need the wire passing through the centre of the toroid, to achieve the coupling necessary.

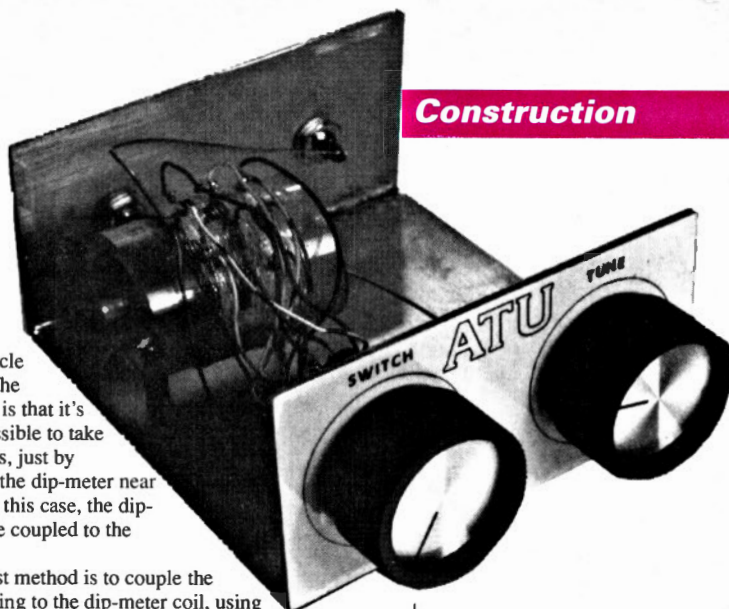
A special case is shown in Fig. 1(c), but it's one which is common to modern radio projects. It arises because some designs make use of the convenient Toko range of inductors, which are mounted in aluminium screening cans. These are difficult to measure on a dip-meter because the former and windings are contained within the screening can.

Many of these inductors have a link winding already built into the 'canned' coil. Usually the main winding has a tap, in the form of a take-off point on part of the winding.

Fortunately, this allows us to identify the main winding because there are three pins on that side of the can. The side of the can with two pins is the link winding.

A pair of wires are then attached to these pins, and they are connected to a two-turn coil on the dip-meter coil winding. This follows the procedure for the toroidal inductor, only using an existing link winding.

Editorial note: Many manufacturers produce 'canned' inductors. The method G3RJV describes can be used to identify the resonant frequency of any inductors of this type, provided the connections to the 'coupling' winding can be discovered. In practice, this is not difficult and the 'coupling' winding can soon be found.



This month, as a follow-on to the dip-meter project, the Rev. George Dobbs G3RJV tells us how to use the 'dipper', talks about coils, 'dips' and windings, and finishes off with a practical project.

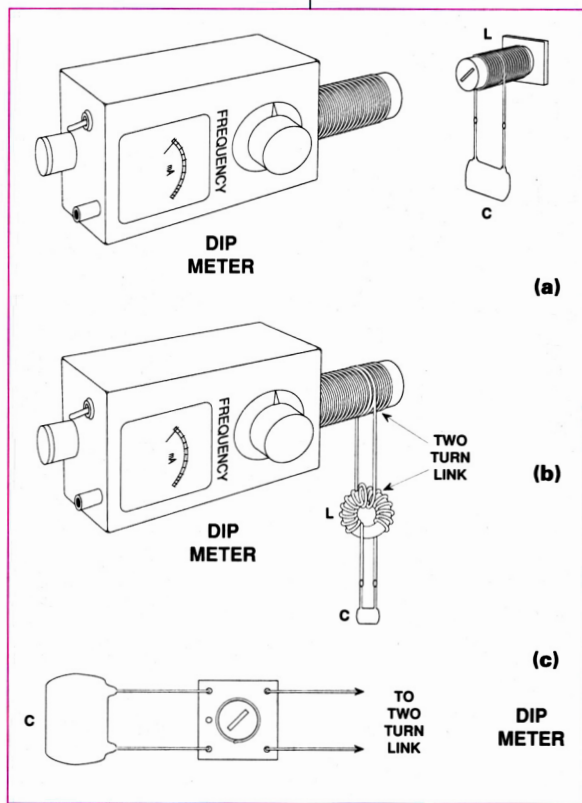


Fig. 1: The dip-meter in use. See text for special method used in Fig. 1(c).

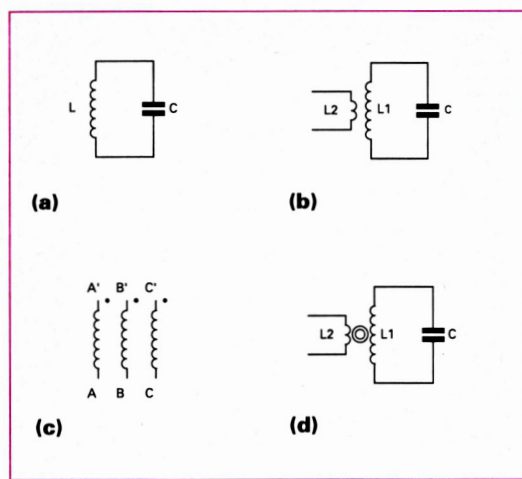


Fig. 2: The main types of circuit representations of inductors.

lower the frequency and the higher the value of capacitor, the lower the frequency. Close winding the coil lowers the frequency, spacing the turns increases the frequency.

Other factors can influence the inductance of a coil winding. Usually coils with only a few turns are wound with thicker wire, and the length of the winding also influences inductance. Such coils may also be 'air-spaced'. This means that they're wound on a cylinder which is then removed, and the coil left in a free air-space form.

Some coil formers have cores (sometimes called slugs). For this purpose, there are several types of material that can be used. The most common type being iron dust (or powder) or ferrite (a ferro-magnetic compound).

These materials increase the inductance of the coil winding. Often they're arranged so that you can screw them in and out of a coil former, and this effectively provides adjustment, by varying the inductance of a coil winding.

Circuit Representations

In Fig. 2, the main types of circuit representation of inductors are shown. The example in Fig. 2(a), is a simple tuned circuit with an inductor and a single capacitor.

The circuit in Fig. 2(b) is a tuned circuit with a link winding, which is an additional, smaller, winding to couple the tuned circuit to another part of the circuit. The diagram, Fig. 2(c), shows a trifilar wound inductor.

The trifilar type is so called, because three wires are twisted together, and then wound on the former or core. The dots mark the beginning of each winding, and in this case, the beginning of one winding is connected to the end of another. Multi-wire windings will be used, and explained in detail later in this series.

The diagram, Fig. 2(d), shows a tuned circuit, which has in this case an extra winding, wound on a toroidal core. Often these cores will be indicated on the circuit diagram by the addition of lines running alongside the coil symbol.

Not Difficult

Winding a coil is not difficult. The correct gauge or diameter of wire is selected, and using a cylindrical former, begin near the base of the former. The beginning of the winding must be anchored firmly. There may be a fixing tag to which this can be soldered, if not a little pvc tape will often do the job.

Simple Instrument

The dip-meter is a simple instrument to use. The best way to become familiar with its use, is to make up some tuned circuits and check their frequency.

The photograph (page 32), show the mains types of inductor found in radio circuits. There are a few simple principles to remember about inductors in tuned circuits and I think it's time to discuss them now!

To start with, the frequency of the tuned circuit depends upon the inductance of the coil and the value of the capacitor.

The more turns on the coil, the

Wind the wire around the former, keeping the wire taut, and make clean turns which don't overlap or cross each other. Close winding (side-by-side turns) is the commonest, and easiest, for coil winding.

When the correct number of turns have been made, secure the end of the winding with another piece of tape. Place this tape on the unused section of the former, rather than over the winding.

The wound turns must now be secured. Some constructors use dope or modelling adhesive, but I think the 'secret weapon' is bee's wax!

Excellent Stuff

Bee's wax is excellent stuff for securing almost anything in electronic construction. It melts on the tip of a soldering iron **without messing up the tip**.

To use this method, melt some bee's wax with the tip of a soldering iron, and then let it drip onto the winding. Next, carefully stroke the soldering iron tip along the winding.

The wax will flow and cover up the winding, holding the turns in place. It's even possible to remove turns from the winding later, by gently pulling the wire out of the wax coating.

I also use bee's wax to hold cores firmly in formers. Melt a little into the thread of the core and it binds the core to the inside of the former. The core can still be adjusted, but it will remain securely in place after 'trimming'.

Some inductors have link windings. These are often used to couple the windings to another part of the circuit. The commonest way to add a link winding, is to wind it over one end of the main coil.

Link windings are usually smaller than the main winding. It is also usual to add the link coil over the end of the main winding that goes to ground, or earth, in the circuit. Unless the instructions say otherwise, add a link winding by carefully winding it over the bottom end of the main windings.

Toroid Cores

Many construction projects in amateur radio publications make use of inductors wound on toroid cores. These are the little doughnut (or 'Polo Mint') shaped formers with the coil wound around the circumference, looping in and out of the hole.

Toroids aren't complex. They're only formers made of magnetic material, either ferrite or powdered iron.

They have two main advantages, in that the core material provides higher inductance with a smaller number of turns and coil is self-shielding. This means that no metal can or other enclosure is needed to keep the magnetic field away from other parts of the circuit.

Broadband Transformers

Usually, the ferrite cores are used for broadband transformers and inductors. The powdered iron cores are used for tuned circuits.

Take care when using surplus toroids, as many are seen on radio rally and junk sale stalls. Unfortunately, these are almost always ferrite and most amateur radio applications are for powdered iron cores. To be on the safe side, it's better to get the correct cores from a reliable source.

Most amateur radio applications use toroid cores made by Micrometals. They're distributed by Amidon Associates, both are United States-based companies, and either names may appear in articles.

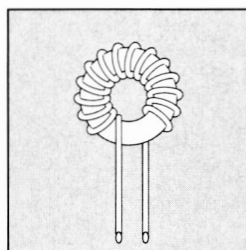


Fig. 3.

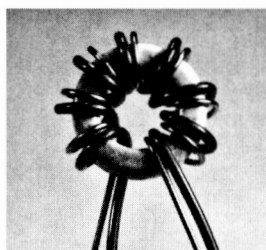


Fig. 4(a).

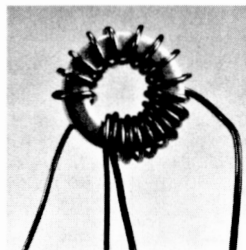


Fig. 4(b).

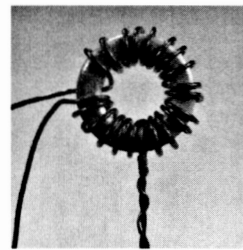


Fig. 5.



C500

New low price of
£335*

*including
CNB III
Ni-Cad Pack
and Charger.



STANDARD®

C150

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

£199 Special Offer



C528 Dual Band Hand Held £379

Standard have done it again! You all know how popular the C500 is, well now here is their latest dual bander - the C528 (not to be confused with the Japanese only version, the C520). The European version has all the facilities that you want in a base station, let alone a hand held!

- ★ Direct 13.8M in for 5 Watts out
- ★ Programmable offsets
- ★ VHF 2.5W, UHF 2W with CNB151 NiCad pack
- ★ Coded paging function
- ★ Dual Displays
- ★ Various scanning modes
- ★ Power save function
- ★ Programmable step sizes
- ★ Multiple memories
- ★ 144-146 VHF, 430-440UHF, 800-975 Rx only
- ★ Priority Channel
- ★ Separate Vol. and Squ. Controls for each band
- ★ Tone Squelch (option)
- ★ 2m & 70cm
- ★ 5 Watts output
- ★ Repeater Function

C168 C468 Series

- World's smallest full-keyboard handheld

- 5W RF power
- Intelligent scan
- Cloning feature
- DTMF paging and code squelch



- 40 memory channels/200-channel memory unit available
- Unsurpassed 0.158µV sensitivity (12dB SINAD)

C168 – £269

C468 – £279

Please remember, we are the sole authorised importer of Standard equipment in the UK and we are able to offer a full back-up service and spares from stock.

We are a main agent for Icom, Kenwood, Yaesu, Alinco and all popular brands of scanning receivers, SWR meters and aerials, plus a large selection of plugs and sockets.

400 EDGWARE ROAD, LONDON W2

071-723 5521 Fax 071-402 9305

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



Normally 24hr despatch but please allow 7 days for delivery



**NORMAN
G4THJ**

Lee Electronics

Coded Designation

These cores have a coded designation to indicate a particular core. The **T** or **FT** says if the core is a Toroid (powdered iron) or Ferrite Toroid.

The next number states the outer diameter in hundredths of an inch. The last number, following a hyphen, indicates the mix of the material and its appropriate frequency range.

Material mix will affect the magnetic characteristics of the core. The mix is also colour coded, in the case of the powdered iron cores.

A common example is the T50-2. Following the coded designation, this a powdered iron core, with an outer diameter of 0.5in, using '2' mix material, with the core sprayed red. This may seem complex, but amateur radio articles in magazines and books usually state the exact toroid core required for each inductor.

Winding Easy

Winding toroidal inductors is easy. Every time the wire passes through the centre of the core counts as **one turn**.

Despite the simple process, there are correct and incorrect ways to put the required number of turns on the core. For example, it's recommended that a gap of some 30° be left between the beginning and the end of the winding, see Fig. 3.

Adding a link winding to a toroid inductor is shown in Fig. 4 (a) and (b). In the case of broadband transformers, it's common to space the link winding over the whole of the main winding coil.

Sometimes, it's possible to add the winding in the gaps between turns on the main winding. Small link windings on tuned circuits, are

usually added at the grounded end of the main winding. This is sometimes called the 'cold end'. These can sometimes also be added between the turns on the main winding.

How Long?

A piece of wire has to be cut to go through the hole of the core but how long should it be? Take heed, it's easy to waste a lot of wire in the process!

The easiest way to work the required length out, is to try a couple of turns, and measure the length of wire used. Then from the total number of turns, you work out how much wire will be needed for the coil. (Add a little to be safe!).

Toroidal cores can break if they're dropped or misused. But never fear, if it's a clean break, and you have no spare cores, glue it back together with modellers cement. The core makes no electrical connection.

Making A Tapping

Some circuits involve making a tapping in a coil winding. A tap is a take-off point, between the beginning and end of the winding. The diagram in Fig. 5, shows how this can be achieved. The usual method is the twisted loop shown in Fig. 5.

Begin winding the coil in the usual way. When you reach the required number of turns where the tap is to be made, hold the last turn firmly with the thumb and pull out

about 10mm of wire.

This length of wire is pulled out at right angles to the former, looped back on itself and a few twists are added to make the wire tight against the former. The winding is then completed.

The end of the twisted lead is scraped clean of enamel using a hobby knife, and it should then be tinned with the soldering iron. This provides the tapping point.

Alternative Method

There is an alternative method and this uses a single loop, which is made at the tapping point (just one twist). This is also scraped clean and tinned. The photograph of the a.t.u. on page 33 shows this method.

The loop then requires a connecting wire to be soldered in place. This method is useful when several tapings are required on a coil and space is at a premium.

Warning! It's vital not to scrape too much enamel off the wire, because the lack of insulation could cause shorted turns on the coil.

Simple Calculations

Generally, this series does not deal with the mathematics of electronics. Despite this, I'm going to describe a very simple calculation, which can work out the number of turns required on a toroid, to produced a required inductance.

Some circuits quote the value of inductance required for a particular application. This is simple to translate to a winding on a toroid.

The chart, Table 1, shows the inductance obtained for 10 turns on some common toroids. I have only quoted the '2' and '6' mix for the common sizes. These are the usual ones used for tuned circuits on the h.f. amateur radio bands. The table shows core mix, colour code and the value in μH (micro-Henries) per 10 turns for four sizes of toroids.

The Formula

The formula is shown below Table 1 (page 33), and if the required inductance, L , is known and the value of inductance for 10 turns, L_{10} , for a particular core, the number of turns required can be derived.

Don't worry, it really is very easy to use the formula. To find out, let's follow it in calculator key-strokes.

Let's say that an inductance of $0.75\mu\text{H}$ is required and it's to be wound on a T37-6 core.

Take up thy calculator, follow these steps and we'll start!

- Step 1:** Enter 0.75
(0.75 displayed)
- Step 2:** Press divide
(0.75 displayed)
- Step 3:** Enter 0.3 (Value 10t on T37-6)
(0.3 displayed)
- Step 4:** Press = sign
(2.5 displayed)
- Step 5:** Press Square root key ($\sqrt{}$)
(1.5811388 displayed)
- Step 6:** Press \times and enter 10 (multiply by 10)
(15.811388 displayed)

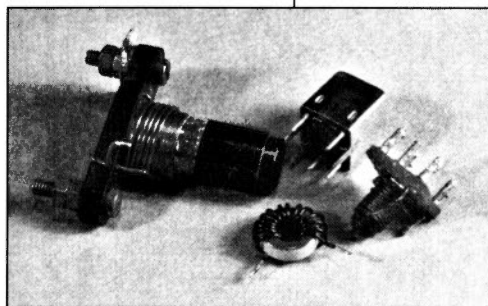
Answer: The core requires a coil of 16 turns to give $0.75\mu\text{H}$ (we round-up the 15.811388 to 16).

What Gauge?

What wire gauge is required? Often articles or projects state the number of turns, without the gauge of wire being given.

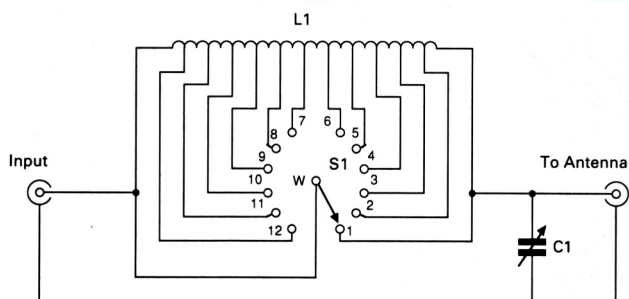
The best guide is to use the thickest gauge of wire that will nicely fill the core giving the 30° gap I mentioned earlier. The chart, Table 2 (page 33), gives the **maximum** number of turns of a range of wire gauges which will fill particular cores.

This chart refers to a **full core**. Use the gauge lower than the full core value, to obtain the required gap in the winding. To be really safe, two gauges smaller can be used. The higher the gauge number, the smaller the wire size.



The three main types of inductor found in radio circuits.

Fig. 6: The circuit of the a.t.u., C1 can be any 250-500pf variable capacitor.



Simple Project

Now it's time for a simple project. This month we're going to build an L-Match antenna tuning unit (a.t.u.).

An a.t.u. is a vital part of any amateur radio set-up. The a.t.u. matches the impedance of an antenna to the input impedance of a receiver, or the input and output impedance of a transceiver.

Most receivers and transceivers have an input impedance of 50Ω, the a.t.u., using a combination of inductance and capacitance, makes the antenna appear to be 50Ω.

For many people an antenna is simply a 'piece of wire stuck in the back'. This a.t.u. will help the receiver or transceiver to accept an end-fed piece of wire and provide a good match.

The L-Match requires a good range of inductance and capacitance. In the circuit, Fig. 6, a variable capacitor is used and a tapped coil provides a range of inductance. A single pole 12-way wafer switch, allows 12 values of inductance to be provided by one coil winding with tappings.

The Coil Former

The coil is wound on a 25mm former. Any good insulated material will serve as a former. I used a piece of plastics tube.

The tappings were made using the single loop method, because there are 11 of them to fit along the winding. I also offset the placing of the tappings along the length of the coil to allow more space.

The capacitor is a Polyvaricon type with all sections used, this is fine for a receiver a.t.u. It can also be used for a transmitter with power up to about 5W. Any 200 to 500pf variable can be used.

In fact, the a.t.u. is ideal for QRP (low power) or novice operation on the amateur bands. However, at higher power levels above 5W, a better insulated, air-spaced variable capacitor will be required.

The photograph shows the layout of my prototype. I used three pieces of scrap p.c.b. blank sheet to make a base, and a front and back panel. The wiring is simple and direct.

Table 1.

Inductance for 10 turns on Micrometals Toroids

Core Mix Number	Colour Code	Core Size Prefix (μH/10t)				Frequency Range
		T37	T44	T50	T68	
-2	Red	0.40	0.52	0.49	0.57	1 to 10MHz
-6	Yellow	0.30	0.42	0.40	0.47	10MHz upwards

Formula for number of turns: $N = 10\sqrt{L/L_{10}}$. Where N = number of turns, L = required inductance, L₁₀ = inductance at 10 turns (from Table 1 above). All values of inductance are in μH.

Table 2.

Maximum Number Close Wound Turns On Core

Core Type Number	Internal diameter in inches	Wire Size In s.w.g.					
		20	22	24	26	28	30
T37	0.20	13	17	22	28	35	42
T44	0.224	15	20	26	32	39	47
T50	0.298	21	27	35	43	53	64
T68	0.360	26	34	43	53	65	78

Simple To Use

The a.t.u. is simple to use. It's placed, between the receiver and the antenna. The receiver is then tuned to the desired frequency.

Next, with the capacitor set about half way, rotate the switch until you think the signal is at its loudest. Fine adjustment can then be made with the capacitor for the best reception. It's also good idea to make a scale on the control knobs so that settings for favourite bands or frequencies can be marked.

Well, that's the lot for this time. But keep building, learning and having fun!

Shopping List

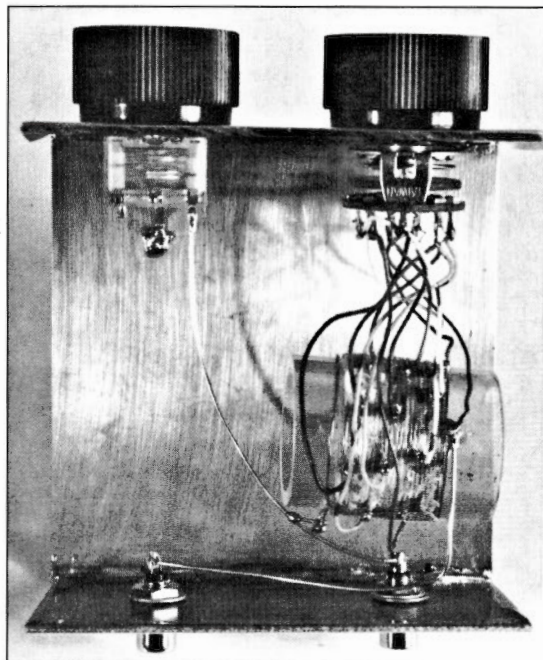
Former (25mm see text) for coil, 22s.w.g. enamelled copper wire for inductance winding, Polyvaricon variable capacitor for C1 (Maplin Electronics FT78K or similar). One single-pole, 12-way wafer switch for S1. (Maplin Electronics 7773Q or similar type suitable). Plugs, sockets and control knobs to suit.

Toroid cores are available from: **CirKit Distribution Ltd, Park Lane, Broxbourne, Herts EN10 7NQ. Tel: (0992) 444111** catalogue from W. H. Smith Ltd.

CirKit also supply the Micrometals full RF Toroid Catalogue Stock: 02-55003.

Bonex, 12 Elder way, Langley Business Park, Slough, Berkshire SL3 6EP. Tel: (0753) 49502 also supply the Micrometals range of toroids.

A useful Catalogue of Micrometals toroids can be obtained from: **Ferromagnetics, PO Box 577, Mold, Clwyd CH7 1AH.**



Photograph showing the layout for the a.t.u. project, by G3RJV.

Errors & Updates

A Simple Capacitor Checker March 1992 (p41-43)

In the circuit diagram of Fig. 1 the junction of capacitors C1-5 should be connected to pin 11, the gate output pin, of IC1b. In the photograph of the overlay Fig. 2 the lead marked 'To junction C1-C5' must be connected one hole to the right, in position N19 (and not position N18 as shown).

The integrated circuit IC1 is mounted with pin one at the bottom left as shown in the photograph. If this is marked with a notch, then this notch is to the left. We apologise for the indistinct reproduction of this area around IC1 in the photograph.

**Going abroad
this year? Want
to take your rig
and perhaps
become one of
those 'exotic'
calls? To help
you in your
vacation plans,
the PW team
have compiled
a list from the
basic
information
available, to
help you on the
way to that
reciprocal
licence.**

On Holiday? How

To start off, the following countries either offer reciprocal licences, in other words a bilateral agreement, or visitors' licences (unilaterally), or have implemented CEPT TR61-01 to radio amateurs from the United Kingdom.

The UK Licence

The current UK licence conforms to the CEPT Recommendation TR61-01. This makes it much easier for British amateurs, who visit other European countries which have also implemented this recommendation.

Those countries which have implemented the agreement, have the letters CEPT against them in the list. At present not all CEPT countries have implemented the recommendation. However, the list given below was correct at the time we were preparing to go to press.

Mobile Or Portable

If you are visiting a CEPT country, and intend to operate only a mobile or portable station (which includes station powered from mains electricity at a temporary fixed location, such as a hotel), or the station of another amateur, then you should apply to the address given for a copy of their licensing conditions.

You should then take these conditions, your UK licence and current licence

validation document (if it has been renewed) with you to be permitted to operate. You must comply with the foreign regulations and your UK licence, whichever is the more restrictive.

For example, the UK licence permits operation on 70MHz, but most foreign countries do not. In this case the foreign regulations prevail, and you may not operate on 70MHz in these countries.

Kilowatt Operation

Some countries permit operation at 1kW, but the UK licence (at the time of writing) doesn't. In this case, your UK licence prevails and you may not operate at this power level.

Please also note that the CEPT agreement, limits a UK Class B licensee to operation on 144MHz and above.

If you are staying longer, intend to stay in something other than a hotel or similar, or wish to gain the privileges of a host licence, you will still need to apply for a reciprocal licence.

Reciprocal And Visitors' Licences

Applications should be made to the addresses provided, but please allow plenty of time (between one and six months depending on the country).

Country & Contact address

Andorra
Delegation Permanent pour l'Andorre,
Prefecture des Pyreness Orientales,
66 000 PERPIGNAN, France.

Australia +VK9
Assistant Secretary,
Licensing Policy & Operations,
RF Management Division, PO Box 6444,
St Kilda Road Central, Melbourne, Victoria
3004. Tel: 010 61 03 266 8921. Telex 37503.
High Commissioner,
Australian High Commission,
Australia House,
Strand, London WC2B 4LA.
Tel: 071-379 4334.

Austria (CEPT)
P & T Direktion,
AIs Fernmeldebehörde I. Instanz, OE1, 3, 4
(Wien Vienna), Nierosterreich (Lower
Austria and Burgenland respectively,
A-1011 Wien, Dr Darl
Lueger Platz 5. OE2, 5 (Salzburg and
Oberosterreich (Upper Austria)
A-4010 Linz, ZollamtstraÙe 1. OE7,
9 (Tirol and Vorarlberg in Innsbruck).
Austrian Embassy,
18 Belgrave Mews West,
London SW1X 8HU. Tel: 071-235 3731.

Barbados
The Telecomms Engineer,
Ministry of Transport,
Works and Telecomms.,
East-West Boulevard,
Pine Bridgetown, Barbados.
Tel: 010 1 809 42 62669.
Class A only.
High Commissioner,
Barbados High Commission,
1 Great Russell Street, London
WC1B 3NH.
Tel: 071-631 4975.

Bahama Islands
Telecommunications Corporation,
PO Box 3048, Nassau.
High Commissioner,
Bahamas High Commission,

Bahamas House,
10 Chesterfield Street,
London W1X 8AH. Tel: 071-408 4488.

Belgium (CEPT)
Rigides Telegraphs et des Telephones,
Service National de Controle,
du Spectre des frequences,
Tour TBR (7eme etage),
Boulevard E Jacquain 186,
1210 Brussels.
Belgian Embassy,
103 Eaton Square,
London SW1W 9AB. Tel: 071-235 5422.

Brunei
Controller of Telecommunications,
Telecommunications Headquarters,
Bandar Seri Begawan, Brunei.
Class A only.
High Commissioner,
Brunei Darussalam High Commission,
49 Cromwell Road,
London SW7 2ED. Tel: 071-581 0521.

Bolivia
Radio Club Boliviano, PO Box 2111, La Paz.
Class A only.
Bolivian Embassy, 106 Eaton Square,
London SW1W 9AD.
Tel: 071-235 2257/4248.

Botswana
Botswana Telecomms Corporation,
The Mall, Gaborone.
Telex: 2252 Botswana.
Class A only.
High Commissioner,
Botswana High Commission,
6 Stratford Place,
London W1N 9AE. Tel: 071-499 0031.

Bulgaria
Bulgarian Federation of Radio Amateurs,
PO Box 830, Sofia-C.
Class A only.
Embassy of the Republic of Bulgaria,
186-188 Queen's Gate,
London SW7 5HL. Tel: 071-584 9400/9433.

Canada
Head Office: 300 Slater St,

Ottawa, Ontario K1A 0C8.
High Commissioner,
Canadian High Commission,
Macdonald House,
1 Grosvenor House,
London W1X 0AB. Tel: 071-629 9492.

Chile
Radio Club de Chile,
Casilla 13630, Correo,
Santiago, Chile.
Class A only.
Embassy of Chile,
12 Devonshire Street,
London W1N 2DS. Tel: 071-580 6392/7.

Columbia
Ministerio de comunicaciones,
Bogota DE1.
Class A only.
Colombian Embassy,
3 Hans Crescent,
London SW1X 0LR. Tel: 071-589 9177.

Costa Rica
Radio Club de Costa Rica,
TIORC, Apartado 2412,
Edificio Crystal,
Cly3a, Ctl,
San Jose, 1000 Costa Rica.
Tel: 010 506 21-69-03.
Class A only.
Costa Rican Embassy,
Flat 1, 14 Lancaster Gate,
London W2 3LH.
Tel: 071-723 1772/9630.

Cyprus
Senior Telecomms Officer,
Ministry of Comms & Works,
Nicosia, Cyprus.
Tel: 010 357 24 02268.
High Commissioner,
Cyprus High Commission,
93 Park Street,
London W1Y 4ET. Tel: 071-499 2810.

Denmark (CEPT)
Post-og Telegrafvaesnet,
Radioteknisk Tjeneste,
Tilddelssektionen,
Islands Brygge 83C,

DK-2300 Copenhagen S.
Class A only.
Royal Danish Embassy,
55 Sloane Street,
London SW1X 9SR. Tel: 071-333 0200.

Dominican Republic
Direccion General de
Telecomunicaciones,
Santo Domingo, Dominican Republic.
Class A only.
Honiera Consul-General,
Honorary Consulate General,
539 Martins Building,
Water Street, Liverpool L2 3TE.
Tel: 051-236 0722.

Falklands Islands
The Postmaster,
General Post Office,
Port Stanley, Falkland Islands,
South Atlantic.
Government Representative,
Falkland Islands Government Office,
Falkland House,
14 The Broadway,
London SW1H 0BH. Tel: 071-222 2542.

Finland (CEPT)
General Directorate of Post & Telecoms,
PO Box 529,
SF-00101 Helsinki, Finland.
Finnish Embassy and Consulate,
38 Chesham Place,
London SW1X 8HW. Tel: 071-235 9531.

France (CEPT)
Direction des Telecommunications des
Reseaux Exterieurs,
Centre de Gestion des
Radiocommunications,
Boite Postale 75,
F-94002 CRETEIL, CEDEX.
Tel: 010 33 14 595 33 00.
French Embassy,
58 Knightsbridge,
London SW1X 7JT. Tel: 071-235 8080.

The Gambia
GAMTEL (Licensing Authority),
Banjul, The Gambia. Attn: M M Cham,
Licensing Officer.

To Get Your Reciprocal Licence



**High Commissioner,
Gambia High Commission,
57 Kensington Court,
London W8 5DG. Tel: 071-937 6316.**

Gibraltar
The Wireless Officer,
General Post Office,
104 Main Street, Gibraltar.

Germany (CEPT)
Deutscher Amateur Radio Club,
International Affairs,
Postfach 1155, D-3507 Baunatal 1.
**Embassy of the Federal Republic of
Germany,
23 Belgrave Square,
London SW1X 8PZ. Tel: 071-235 5033.**

Greece (CEPT)
Ministry of Telecoms.,
Directorate of Communications Technology,
49 Syngrou Avenue,
GR-11780 Athens, Greece.
**Embassy of Greece,
1A Holland Park,
London W11 3TP. Tel: 071-727 8040.**

Grenada
Wireless Officer,
Ministry of Communications & Works,
St George's, Grenada, West Indies.
**High Commissioner,
Grenada High Commission,
1 Collingham Gardens,
London SW5 0HW. Tel: 071-373 7808.**

Guatemala
Direccion General de Radio Sub Director,
General del la Direccion,
General de Radiodifusion y Television
Nacional,
5a Avenida 13-18 Zona 1,
Guatemala City, Guatemala.

Class A only.
**Embassy of Guatemala,
13 Fawcett Street,
London SW10 9HN. Tel: 071-351 3042.**

Hong Kong
Officer in Charge,
Telecommunications Branch,
19th Floor, Sincere Building,
173 Des Voeux Road,
Central, Hong Kong.
**Commissioner, London Office,
Hong Kong Government Office,
6 Grafton Street,
London W1X 3LB. Tel: 071-499 9821.**

Honduras
Direccion de Radio Nacional, Hondutel,
Tegucigalpa,
Honduras.
Class A only.
**Embassy of Honduras,
115 Gloucester Place,
London W1H 3PJ. Tel: 071-486 4880.**

Hungary
Frekvencia Gazdalkodasi Intezet,
Ostrom U, 23/25, H/1012 Budapest.
Class A only.
**Embassy of the Republic of Hungary,
35 Eaton Place,
London SW1X 8BY. Tel: 071-235 4048/7191.**

Iceland
The Icelandic Post & Telecommunication
Administration,
Amateur Guest licensing,
Attn: Mr Gustav Amar,
Landssimahusinu vid Austurvoll,
101 Reykjavik, Iceland.
Tel: 010 354 1 26000.
**Embassy of Iceland,
1 Eaton Terrace,
London SW1W 8EY. Tel: 071-730 5131.**

India
Ministry of Comms,
Sanchar Bhavan,
20 Ashoka Road,
New Delhi 110001, India.
Class A only.
**High Commissioner,
Indian High Commission,
India House, Aldwych,
London WC2B 4NA. Tel: 071-836 8484.**

Indonesia
Organisai Amatir Radio Indonesia,
Jalan Pecenongan No 69,
Jakarta.
Class A only.
**Indonesian Embassy,
38 Grosvenor Square,
London W1X 9AD. Tel: 071-499 7661.**

Ireland (Eire)
Radio & Broadcasting Division,
Dept of Communications,
Scotch House, Hawkins Street,
Dublin 2. Tel: 0001 718211.
**Irish Embassy,
17 Grosvenor Place,
London SW1X 7HR. Tel: 071-235 2171.**

Israel
Ministry of Communications,
PO Box 29107, Tel-Aviv 61290,
Israel.
**Embassy of Israel,
2 Palace Green,
Kensington,
London W8 4QB. Tel: 071-937 8050.**

Italy
Either:
ARI, Reciprocal Licensing Department,
Via Giorgione 16, I - 40133 Bologna,
Italy. Tel: 010 39 51 389502 (English spoken
after 8pm GMT);

or
Ministero Delle Poste E Delle
Telecomunicazioni,
Direzione Centrale dei Servizi Radioelettrici,
Divisione 6 - Sezione 4,
Viale Europa 160,
I-00100 Roma/Eur RM.
**Italian Embassy,
14 Three Kings Yard,
Davies Street,
London W1Y 2EH. Tel: 071-629 8200.**

Jamaica
Headquarters,
Posts and Telegraphs Dept,
South Camp Road,
Kingston, Jamaica.
Class A only.
**High Commissioner,
Jamaican High Commission,
1-2 Prince Consort Road,
London SW7 2BZ. Tel: 071-823 9911.**

Jordan
The Director General, Telecommunications
Corporation,
PO Box 1689,
Amman, Jordan.
**Embassy of the Hashemite Kingdom of
Jordan,
6 Upper Phillimore Gardens,
London W8 7HB. Tel: 071-937 3685/7.**

Kenya
Kenya Posts and Telecommunications,
PO Box 30301,
Nairobi, Kenya.
Class A only.
**High Commissioner,
Kenya High Commission,
45 Portland Place,
London W1N 4AS. Tel: 071-636 2371.**

Liechtenstein
(CEPT)
Regierung des Fürstentums Liechtenstein,
FL 9490 Vaduz, Liechtenstein.

Lebanon
Ministere des PTT,
Direction generale des telegraphes et
telephones,
Bir Hassan, Beirut,
Lebanon.
Class A only.
**Lebanese Embassy in London,
21 Kensington Palace Gardens,
London W8 4QM. Tel: 071-229 7265/6.**

Liberia
Ministry of Post & Telecommunications,
Monrovia, Liberia.
Class A only.
**Charge d'Affaires,
Embassy of The Republic of Liberia,
2 Pembridge Place,
London W2 4XB. Tel: 071-221 1036.**

Luxembourg (CEPT)
Administration des Postes et Telecoms,
Boite Postale 999,
Luxembourg-ville,
Luxembourg.
Class A only.
**Embassy of Luxembourg,
27 Wilton Crescent,
London SW1X 8SD. Tel: 071-235 6961.**

Malagasy
Ministere des postes et
telecommunications,
Antananarenina,
Tananarive, Malagasy.

Malta
Inspector of Wireless Telegraphy,
Wireless Telegraphy Branch,
Castille, Valetta, Malta.
Tel: 010 356 225231/224901.
**High Commissioner,
Malta High Commission,
16 Kensington Square,
London W8 5HH. Tel: 071-938 1712.**

Mauritius
The Director, Telecommunications Dept,
Edith Cavell Street,
Port Louis, Mauritius.

Class A only.
High Commissioner,
Mauritius High Commission,
32-33 Elvaston Place,
London SW7 5NW. Tel: 071-581 0294.

Monaco (CEPT)
 Direction generale des telecommunications,
 16 Boulevard de Suisse,
 Monte Carlo.
Consulate General of Monaco,
4 Audley Square,
London W1Y 5DR. Tel: 071-629 0734.

Morocco
 Ministere des PTT,
 Division des telecommunications,
 Rabat, Morocco. **Class A only.**
Embassy of The Kingdom of Morocco,
49 Queens Gate Gardens,
London SW7 5NE. Tel: 071-581 5001/4.

Montserrat
 The Ministry of Communications and
 Works, General Turning Road,
 Plymouth, Montserrat, West Indies.
Class A only.

Netherlands (CEPT)
 PTT Centrale Directie,
 Radio Control Service,
 PO Box 570, NL-9700 AN Groningen,
 The Netherlands.
 Tel: 010 31 506 02514. Telex: 77154.
Royal Netherlands Embassy,
38 Hyde Park Gate,
London SW7 5DP. Tel: 071-584 5040.

Netherlands
Antilles
 Radio Controle Dienst,
 Landsradio, Schouwburgweg,
 Apna-gebouw, Curacao,
 Netherlands Antilles.
 Tel: 010 31 631111.

New Zealand
 In advance:
 Telecommunications Division (Radio),
 Post Office Headquarters,
 Wellington, New Zealand.
High Commissioner,
New Zealand High Commission,
New Zealand House,
Haymarket,
London SW1Y 4TL. Tel: 071-930 8422.

Nicaragua
 Jefatura de Comunicaciones,
 Managua, DN, Nicaragua.
Class A only.
Embassy of Nicaragua,
8 Gloucester Road,
London SW7 4PP. Tel: 071-584 4365.

Nigeria
 Nigerian Amateur Radio Society,
 PO Box 2873, Lagos,
 Nigeria.
Class A only.
High Commissioner,
Nigeria High Commission,
56-57 Fleet Street,
London EC4Y 1JU. Tel: 071-353 3776.

Norway (CEPT)
 Norwegian Telecommunications Admin,
 Radio Inspection Office,
 Boks 6701, St Olavs Plass, Oslo 1,
 Norway. **Class A only.**
Royal Norwegian Embassy,
25 Belgrave Square,
London, SW1X 8QD. Tel: 071-235 7151.

Oman
 Royal Omani Amateur Radio Society,
 PO Box 981, Muscat, Oman.
Class A only.
Embassy of The Sultanate of Oman,
44A/B Montpelier Square,
London SW7 1JJ. Tel: 071-584 6782/3/4.

Panama
 Ministerio de Gobierno y Justicia,
 Direccion Nacional de Medio de
 Comunicacion Social,
 Apartado Postal 1628, Zona 1,
 PANAMA, Republic de Panama.
Embassy of The Republic of Panama,
119 Crawford Street,
London W1H 1AF. Tel: 071-487 5633.

Paraguay
 Radio Club Paraguayo,
 Casilla Postal 512,

Asuncion, Paraguay.
Class A only.
Embassy of Paraguay,
Braemar Lodge,
Cornwall Gardens,
London SW7 4AQ. Tel: 071-937 1253.

Peru
 Ministerio de Transportes y
 Comunicaciones,
 Av 28 de Julio 800,
 Lima, Peru.
Class A only.
Peruvian Embassy,
52 Sloane Street,
London SW1X 9SP. Tel: 071-235 1917/2545.

Philippines
 Planning Division,
 Telecommunication Control Bureau,
 5th Floor, Delos Santos Building,
 Quezon Avenue, Quezon City,
 Philippines.
Embassy of the Philippines,
9a Palace Green,
London W8 4QE. Tel: 071-937 1600/9.

Pitcairn & Henderson
 Amateur Radio Section,
 Radio Regulatory Div.,
 Department of Trade & Industry,
 Waterloo Bridge House,
 London SE1 8UA.

Poland
 Główny Inspektorat Państwowej Inspekcji
 Radiowej via the national society - Polski
 Związek Krotkofalowcow,
 Zarząd Główny, PO Box 320, 00-950
 Warszawa 1.
Embassy of The Republic of Poland,
47 Portland Place,
London W1N 3AG. Tel: 071-580 4324.

Portugal
 Direccao dos Servicos de
 Radiocomunicacoes,
 Rua do Conde Redondo 79-1,
 1189 Lisboa, Portugal.
 Telex: 12595 RACTEX P.
Portuguese Embassy,
11 Belgrave Square,
London SW1X 8PP. Tel: 071-235 5331.

Romania
 The Ministry of Transport and
 Telecommunications,
 Bd Dinicu Golescu nr 38R-7,
 Bucharest, Romania.
Class A only.
Embassy of Romania,
4 Palace Green,
London W8 4QD. Tel: 071-937 9666.

St. Lucia
 Police HQ, Castries,
 St Lucia.
High Commissioner,
St Lucia High Commission,
10 Kensington Court,
London W8 5DL. Tel: 071-937 9522.

Seychelles
 Telecommunications Dept.,
 Ministry of Education,
 Information and Youth,
 Mont Fleur, PO Box 48,
 Republic of Seychelles.
Class A only.
High Commissioner,
Seychelles High Commission,
Box No. 4PE,
111 Baker Street,
2nd Floor, Eros House,
London W1M 1FE. Tel: 071-224 1660.

Singapore
 Telecom Authority of Singapore,
 PO Box 399,
 Killiney Road PO, Singapore 9123.
Class A only.
High Commissioner,
Singapore High Commission,
9 Wilton Crescent,
London SW1X 8SA. Tel: 071-235 8315.

Solomon Islands
 The Controller of Posts and
 Telecommunications,
 GPO, Honiara, Solomon Islands.
Class A only.
Honorary Consulate,
19 Springfield Road,
London SW19 7AL.
Tel: 081-946 5552.

South Africa
 Postmaster General, Private Bag X74,
 0001 Pretoria,
 South Africa.
 Tel: 010 27 12293-1171.
Class A only. Embassy of The Republic of
South Africa,
South Africa House,
Trafalgar Square,
London WC2N 5DP. Tel: 071-930 4488.

Spain (CEPT)
 Sr Ing Jefe de los Servicios de
 Telecomunicacion,
 Direccion General de Correos y
 Telecomunicacion,
 Subdireccion General de
 Telecomunicacion,
 DCHA, Madrid-14, Spain.
Spanish Embassy,
24 Belgrave Square,
London SW1X 8SA. Tel: 071-235 5555.

Sri Lanka
 Office of the Director of Telecomms,
 5th Floor, Telecomms HQ,
 Lotus Road, Fort, PO Box 503, Colombo 1,
 Sri Lanka.
Class A only.
High Commissioner,
High Commission for the Democratic
Socialist Republic of Sri Lanka,
13 Hyde Park Gardens,
London W2 2LU. Tel: 071-262 1841.

Suriname
 Vereniging van Radioamateurs in Suriname,
 PO Box 1153,
 Paramaribo, Suriname.
Class A only. (All correspondence direct to
this address)

Swaziland
 The Director of Posts and
 Telecommunications,
 PO Box 125,
 Mbabane, Swaziland.
Class A only.
High Commissioner,
Kingdom of Swaziland High Commission,
58 Port Street,
London SW1X 0AE. Tel: 071-581 4976/8.

Sweden (CEPT)
 Televerket Radiodivision,
 Tillstanskontoret, S123 88 Farsta, Sweden.
Swedish Embassy,
11 Montagu Place,
London W1H 2AL. Tel: 071-724 2101.

Switzerland (CEPT)
 Generaldirektion der PTT,
 Radio und Fernseh abteilung,
 CH-3000 Berne, Switzerland.
Embassy of Switzerland,
16-18 Montagu Place,
London W1H 2BQ. Tel: 071-723 0701.

Syria
 Direction generale de L'establissement des
 postes et des telecommunications,
 Damascus, Syria.
Embassy of The Syrian Arab Republic,
8 Belgrave Square,
London SW1X 8PH. Tel: 071-245 9012.

Tonga
 The Superintendent,
 Telegraph & Telephone Department,
 PO Box 46, Nuku'alofa, Tonga.
Class A only.
High Commissioner,
Tonga High Commission,
36 Molyneux Street,
London W1H 6AB. Tel: 071-724 5828.

Turkey CEPT only.
Turkish Embassy,
43 Belgrave Square,
London SW1X 8PA. Tel: 071-235 5252.

United Nations
 Station Manager IARC,
 International Amateur Radio Club,
 Box 6, Place des Nations,
 CH-1211 Geneva 20, Switzerland.

Uruguay
 Radio Club Uruguayo,
 PO Box 37, Montevideo, Uruguay.
Class A only.
Embassy of The Oriental Republic of
Uruguay,
48 Lennox Gardens,
London SW1X 0DL. Tel: 071-584 8192.

USA
 Federal Communications Commission,
 Personal Radio Division,
 Gettysburg, Pa 17325.
United States Embassy,
24 Grosvenor Square, London W1A 1AE.
Tel: 071-499 9000.

USSR (CIS)
Note: (See recommendations below)
 Radio Sport Federation of USSR,
 Box 88, Moscow D-362,
 USSR.
Class A only.
Ambassador, Embassy of the Russian
Federation,
13 Kensington Palace Gardens,
London W8 4QX. Tel: 071-229 6412.
Due to the recent changes in the former
USSR, (Now known as the Commonwealth
of Independent States) facilities and
concessions cannot be confirmed at time of
going to press. Individual enquiries
recommended.

Vanuatu
 The Director of Posts & Telecomms,
 Dept of Posts & Telecomms,
 Vila, Vanuatu.
Class A only.

Virgin Islands
 Telecommunications Officer,
 Ministry of Communications,
 Works & Industry, Government of BVI, Road
 Town, Tortola, British Virgin Islands.
Class A only.

Western Samoa
 Director, Post Office and Radio,
 Chief Post Office, Apia, Western Samoa.

Zimbabwe
 PO Telecom Corporation,
 Main Post Office Building,
 2nd Floor (Baker Ave entrance),
 PO Box 8061,
 Causeway,
 Harare,
 Zimbabwe.
Class A only.
High Commissioner High Commission of the
Republic of Zimbabwe,
Zimbabwe House,
429 Strand, London WC2R 0SA.
Tel: 071-836 7755.

**The PWteam hope you
 find the information you
 need on the list, and
 that you enjoy your
 holiday abroad. Don't
 forget that you're an
 'ambassador' for
 amateur radio, and
 you'll get the most out of
 your trip. Bon voyage!**

In last month's column I dealt with the safety aspect of 27MHz mobile antennas. So, this time I thought perhaps it would be a good idea to look at a few notes about coaxial cables and the old, old problem of s.w.r.

Did you know for instance, that if the s.w.r., measured between the transceiver and the coaxial cable to the antenna, is only a fraction higher than 1:1 (unity) it will always be higher at the antenna! Why? (think about it but don't worry about it!)

Coaxial Cable

A suitable and commonly used coaxial cable for 27MHz mobile, or base station antennas is (M)UR43, or an equivalent. The length of cable used for 27MHz, even for base station operation, will normally be too short to offer much attenuation.

Attenuation is a form of resistive loss inherent in all coaxial cables. In fact, even with a cable run of 10 to 15 metres, the loss factor will be a little more than 0.5dB, which we can virtually ignore. *(M)UR43 and (M)UR67, or equivalents, are NOT suitable for 934MHz. More on this next month.*

Wise Buy

By the way, it's always wise to buy a little more cable than you need anyway, say an extra two or three metres. Although it may be a little too long, don't cut it!

I'm giving you this advice because a change in base station antenna and height, or a change in vehicle at some time, may require a little more cable. If the cable used to feed your base station antenna is too long, it can be coiled up as shown in the photo, Fig. 1.

It can then be hung on the wall outside, or indoors. For a mobile installation, you can coil the cable up and stow it away inside the 'boot' or under a seat.

If a length of coaxial cable is too short, you can join the required extra length by using suitable r.f. plugs and a dual (socket) coupler.

Do not make a join in coaxial cable by soldering inner and outer conductors, or by using electrical block connectors and covering with insulating tape. Oh yes, people do use methods like that, and then they wonder why the s.w.r. won't come down!

Standing Wave Ratio

Standing wave ratio, and its measurement, is a controversial subject especially with radio amateurs! And now it's time for you to see how easy it is to lose nearly half the precious 4W of r.f. power from your rig!

First, let's assume that your coaxial cable has no loss. In that case none of the power going to the antenna would be lost and neither would the level of received signals be reduced.

What follows now, assumes that you have a s.w.r. meter connected between the transceiver and the coaxial cable. The meter may be a Practical Wireless, May 1992

CB HIGH & LOW

By 'Quaynotes'

This month 'Quaynotes' looks at the thorny old (and much misunderstood) problem of s.w.r. and how to tackle it successfully, and reminds readers that he welcomes your letters.

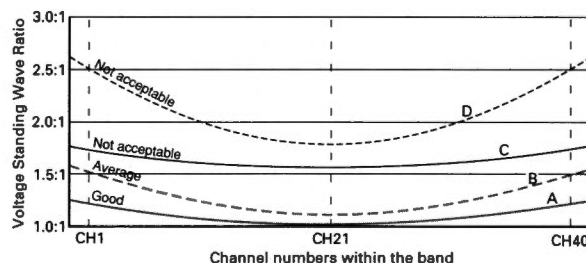


Fig. 2: Some examples of s.w.r. versus bandwidth responses. The example marked 'good' means exactly that. The 'average' is acceptable, but those marked NOT acceptable are to be avoided (see text).

dual movement type, with 'Forward' for your 4W of power on one meter, and the actual s.w.r. reading on the other.

If it's a single meter, dual pointer type, one pointer should be 'reading' the power and the other the s.w.r. The other common type is the single meter, switched selection instrument. In this case, the same meter movement reads both the forward power (when it's selected) and then the 'reflected' power, which is given as a ratio on the pointer scale.

Antenna Adjustments

If you have made the necessary adjustment(s) to the antenna, and have obtained a s.w.r. ratio of 1:1, or unity, or very close to it at the mid-band frequency (channel 21), you have done well! All your rig's 4W will then be reaching the antenna. If this also has no self-loss, then all 4W will be radiated.

However, perhaps you can't get that magical 1:1 reading. (If anyone tells you it doesn't

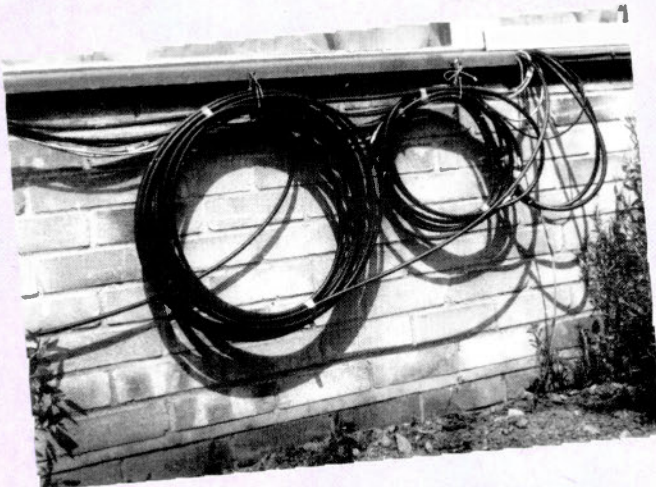


Fig. 1: Do not cut coaxial cable if it's slightly over length (see text). The extra cable should be coiled up, as shown in the illustration. It won't cause any appreciable loss and that extra metre or so, may be required later.

matter, ignore their comment!). What reading have you got?

Firstly, I suggest that you take a look at Fig. 2, which shows different s.w.r. versus bandwidth read-outs. You can plot your own 'curve' on a similar graph format (copy that from Fig. 2). You can also use the same graph for the CEPT 27MHz CB band. All you do, is just change the frequencies.

Curve Close

The curve marked 'good' on the graph in Fig. 2, is about as close as you will get across the whole band. The reason for this is simple, and it's because the antenna tends to exhibit a small mismatch, as the frequency is changed from 'mid-band' to one higher or lower. The curve marked 'average' is acceptable, but the other two shown on the graph aren't!

Let's take a closer look at the lower 'not acceptable' curve. This plot is indicative of a fairly flat antenna bandwidth response, but the mid-band s.w.r. is about 1.6 to 1 higher at each end of the band. This means, (we're still assuming there's NO cable loss), that the r.f. power arriving at the antenna will be in the region of 3.3W. Think about that!

Now, we'll take a look at the upper 'not acceptable' curve. This shows it's nearly 1.8 to 1 at band centre but each 'end' is over 2.5 to 1!

At mid-band, the power at the antenna is a fraction over 3W and at the band ends a little under 3W. A quarter of your power is lost!

Do Something!

Don't just think about that unnecessary loss of power, it's time to do something! To help you, here's a checklist:

- Have you properly carried out the required adjustments to the antenna to obtain minimum s.w.r.?
- Perhaps the antenna is poorly designed and adjustment for a minimum s.w.r. reading is not effective.
- The coaxial cable, although new, may be of poor quality.
- The cable may be of the wrong impedance in other words, it may not be 50Ω.
- You may be using old cable that has seen better days.

Incidentally, this approach applies to operating on 934MHz. At this frequency, the coaxial cable MUST be a good quality, VERY LOW LOSS grade.

What next? There's been a lot of grumbling about those who jam up the conscientious 4W output limit f.m. operators, with single sideband and amplitude modulation (s.s.b. and a.m.). These operators often use high power linear amplifiers (the so-called 'after burners'). Can we do anything about it? Unfortunately, there's no more space this time, so I'll talk about it next month. Cheerio for now.

Quaynotes

Mathematics For The RAE

This month Ray Fautley G3ASG takes a look at the complex world of mathematics associated with sinewaves, and the relationship between sinewaves and their frequency.

First this month, we'll take a look at the relationships which exist between the different ways of expressing the amplitude of a sinewave. The diagram, **Fig. 19(b)**, shows a sinewave (it could represent a voltage or a current waveform) with the relative levels of peak, r.m.s., and peak-to-peak indicated.

If we were to look at the waveform of the ordinary domestic electricity supply on an oscilloscope, the shape we'd see on the screen, would be just like the curves shown in **Fig. 1**.

Warning note! Please don't try this, as the voltage involved is dangerous!

After the warning, it's back to our example! The maximum swing from + (positive) through zero to - (negative) is known as the peak-to-peak amplitude of the wave. It's quite logical to call it that, isn't it?

It would be easy to measure the peak-to-peak amplitude of such a voltage on an oscilloscope. But it's **not so easy** on a meter.

An a.c. voltmeter is normally calibrated to read the r.m.s. value of the voltage, and it's this value which is most commonly used. I think that a word or two about r.m.s. is necessary here, so we'll take a quick look.

The term r.m.s. stands for the phrase Root Mean Square. Not much wiser? Don't worry, forget the theory here, and just try to remember the following: that the r.m.s. value of a voltage or current, is equivalent to that value of direct voltage or current (d.c.) which has the same heating effect if connected to a resistive load.

As always, an example is the best way to understand the problem. We'll take our domestic mains as a convenient example.

Our domestic electricity supply is quoted as being 240V r.m.s. This means that its heating effect, when applied to a resistive load, is the same as that of a 240V battery, or a 240V d.c. supply.

What really concerns us, is the relationship between the **peak**, **r.m.s.** and **peak-to-peak** values of the alternating wave, and this is not very difficult to understand.

Peak-To-Peak

The peak-to-peak amplitude of an a.c. signal is twice the **peak amplitude**, this is shown clearly in **Fig.1(a)**. The r.m.s. amplitude of an a.c. signal is 0.707 times the peak amplitude also shown in **Fig. 1**.

It's not necessary here to prove this statement

theoretically, although it can be shown mathematically to be true. You'll probably be pleased to know, that for RAE purposes, you only need to learn the following relationships:

$$(i) V_{r.m.s.} = 0.707 * V_{peak}$$

$$(ii) V_{peak-peak} = 2 * V_{peak}$$

and so we can see;

$$V_{peak} = \frac{V_{rms}}{0.707}$$

From (i) above $V_{r.m.s.} = 0.707 * V_{peak}$, it follows that:

(iii) $V_{peak} = V_{r.m.s.} * 1.414$ (as 1.414 is the reciprocal of 0.707).

Practical Example

As a practical example, we'll take the 240V r.m.s. mains voltage again.

$$V_{peak} = 1.414 \times 240 = 339.4 \text{ or near enough } 340V_{peak}$$

$$V_{peak-to-peak} = 2 \times V_{peak} = 2 \times 340 = 680V_{peak-to-peak}$$

If that bit has sunk in, the following worked example should be easy!

On an oscilloscope, a sinewave measures 75mV peak-to-peak. What is its r.m.s. value?

From (ii) above $V_{peak} = 0.5 * V_{peak-peak}$

and from (i) $V_{r.m.s.} = 0.707 * V_{peak}$

and so $V_{r.m.s.} = 0.707 * 0.5 * V_{peak-peak}$ or $0.707 * 0.5 * 75mV = 26.5mV$.

Let's look at just just one more example. What is the peak value of a 17V r.m.s. sinewave?

From (iii), we have $V_{peak} = V_{r.m.s.} * 1.414$, so the answer is

$$V_{peak} = 17 * 1.414 = 24V$$

Sinewaves And Frequency

Another feature of a sinewave is its frequency. The frequency of a sinewave is the number of whole cycles of the waveform, that occur in a time period of one second.

Again, for convenience we'll take the mains supply as an example. The supply frequency is given as 50Hz. Now 1Hz means **one complete cycle occurring during a time period of one second**. So, 50Hz means **50 complete cycles occurring during a time period of one second**.

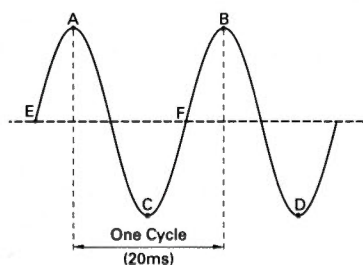


Fig.1(a): A sinewave, with relative levels of peak, r.m.s. and peak-to-peak indicated.

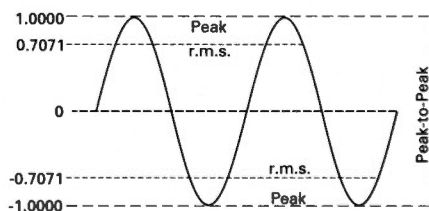


Fig. 1(b): The British 'mains' supply standard of 50Hz, provides a convenient example of a sinewave. The term 1Hz means that one complete cycle takes place during a time period of one second. So, the term 50Hz means that 50 complete cycles occur during a time period of one second.

ELECTRONICS VALVES & TRANSISTORS

Phone for a most
courteous quotation
081-743 0899

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

COLOMOR (ELECTRONICS) LTD
170 Goldhawk Road, London W12 8HJ
Telex: 917257 Fax: 081-749 3934

THE VINTAGE WIRELESS BOOK LISTING

Published regularly containing 100s of out of print, old and collectable wireless and TV books, magazines etc. Send four first class stamps for next copy of £2.50 for next four issues.

SCOOP PURCHASES

EARLY WIRELESS By Anthony Constable. This excellent book retraces the paths of history which culminated in the final appearance of the wireless and TV books. Much information for the wireless historian. 167 illustration and laminated boards. Brand new. £8.50 + £1.75 p&p.

TECHNOLOGY IN WAR By Kenneth Macksey. *SCOOP PURCHASE* - An informative work which identifies the impact of science and technology in weapon development. Includes key developments in electronic warfare, evolution of the tank, submarine, rocket, aeroplanes etc. Large format. 224 pages, many wartime photos and outstanding artwork published at £12.95, our price £10 post free.

SECRET WARFARE THE BATTLE OF CODES AND CIPHERS By Bruce Norman. A detailed outstanding work with emphasis on the development of modern intelligence and the use of codes and ciphers. Throws light on top secret strategies of code breaking including WW2 strategies. Includes a history of codes. Clear and concise analysis. Extensive use of diagrams one of the few books on cryptography previously unpublished material. Brand new. £4.95 including post.

VINTAGE VALVES A listing of new and unused valves of all types 1925 to 1975. SAE for list with your requirements. **WANTED:** PRE 1975 wireless books, magazines, catalogues any printed material relating to wireless.



CHEVET BOOKS



Dept PW, 157 Dickson road, Blackpool FY1 2EU Tel: (0253) 751858.

ENTERPRISE RADIO APPLICATIONS LTD.

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

SO YOU THINK YOUR CW IS BAD!

Even if you don't, your
CW could probably be better.

But don't despair as the ERA REFORMER has been designed to solve the bad sending problem. With the REFORMER you choose how good you want your sending to be! Set it low to retain your characteristic or high to reform your sending to near perfect 'machine' morse even from a straight key!

This microprocessor based system is fully automatic and has many unique features such as the key ahead buffer that ensures a steady output despite pauses in keying. Stored messages can be recalled from memory directly from the key! Space limits description, full details on request. **£95.00.**

MK II MICROREADER

The long awaited MkII Microreader upgrade is now available including the following modes:- SITOR / NAVTEXT / AMTOR plus many other improvements. **£20.00.**



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



Cirkit TESTING



TM SERIES MULTIMETERS

D-MM Good Value!

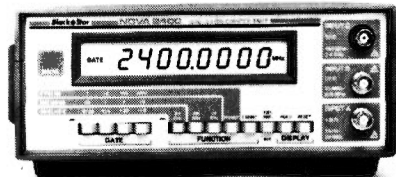
The TM series of low cost meters, with 3½ digit LCDs, full overload protection, strong ABS case and packed with features. Supplied with test leads, battery and manual.



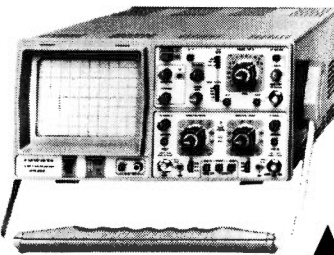
TM 5315	DC current (10A) continuity and diode test	56-05315	£19.99
TM 5365	Capacitance and frequency (200kHz) ranges	56-05365	£36.50
TM 5375	Frequency range (20MHz) and HFE test	56-05375	£36.95
TM 115	AC & DC current (10A), HFE and continuity test	56-00115	£32.50
TM 135	Capacitance and temp. ranges (inc. probe)	56-00135	£45.95
TM 175	Frequency (15MHz), capacitance ranges with HFE, diode, continuity and LED test.	56-00175	£53.60
TM8020	3¾ digit display, frequency (4MHz), capacitance (40µF), AC + DC current to 20A	56-08020	£54.76
TM8030	3¾ digit display, frequency (4MHz), temperature (inc. probe), AC + DC current to 20A	56-18030	£59.96
7705	Capacitance meter, 1pF to 20,000µF	56-07705	£39.82

BLACK STAR

Top quality, UK made,
frequency counters and
generators.



Jupiter 2010	2MHz function generator plus 20MHz freq. counter	56-12010	£233.00
Orion	PAL TV pattern generator	56-01600	£269.00
1410	Video Monitor Tester	56-01410	£527.00
Meteor 100	100MHz counter	56-00100	£128.08
Meteor 600	600MHz counter	56-00600	£158.63
Meteor 1000	1000MHz counter	56-01000	£209.15
Apollo 100	100MHz counter/timer	56-10100	£381.88
Nova 2400	2.4GHz counter	56-02000	£351.33
Jupiter 500	500kHz function generator	56-00500	£129.25
Jupiter 2000	2MHz function generator	56-02001	£175.05



HAMEG 'SCOPES

All Hameg scopes
are supplied with
two x 10 probes,
mains lead,
manual and
2 year
warranty.

HM203-7	Dual channel, 20MHz	56-52037	£397.15
HM205-3	Digital storage, 20MHz sampling	56-52053	£716.75
HM604	Dual channel, 60MHz	56-56040	£716.75
HM1005	Triple channel, 100MHz	56-01005	£930.60

Full details of all the above are included in our comprehensive catalogue, £1.70 (inc. P&P).

All the above are currently in stock and available for immediate delivery. Standard P&P £1.20, next day delivery £4.60.

All prices include VAT (at 17.5%)

Cirkit



Cirkit Distribution Ltd.
Park Lane, Broxbourne, Herts EN10 7NQ.
Telephone (0992) 444111.

LINEAR AMPLIFIERS

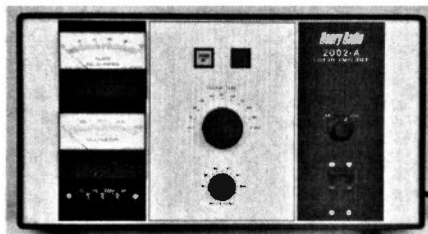
SMC have built up over many years a vast experience of linear amplifiers. We have seen many different models and manufacturers come and go during this time and many inferior products.

We at SMC feel we have possibly the best selection of the most popular high quality linear amplifiers, all available at very reasonable prices.

We are able to service all of these items in-house and have a comprehensive range of spares should anything go wrong. Listed below are details of the linear amplifiers we keep in stock.



HL2K



2002A



SAGRA -600

Henry Radio

2002A	2m 3CX800A7 800W out PEP (typical) 13dB gain	£1495.00
2004A	70cm 3CX800A7 700W out PEP (typical) 13dB gain	£1495.00
3002A	2m 8877 1600W out PEP (typical) 10dB gain	£2750.00
3K Premier	HF 3CX1200 1800W out PEP (typical) 13dB gain	£3059.00
5K Classic	HF pair 3CX1200 3kW out PEP (typical) 14dB gain	£3950.00

Tokyo Hy-Power HF

HL100B/10	21-28MHz 10W-100W out	£182.00
HL100B/20	14MHz 10W-100W out	£182.00
HL100B/80	3.5MHz 10W-100W out	£182.00
HL1K	160-10m 1kW PEP input 2x4CX250B	£899.00
HL2K	160-10m 2kW PEP input 2x3-500Z	£1450.00

Tokyo Hy-Power VHF

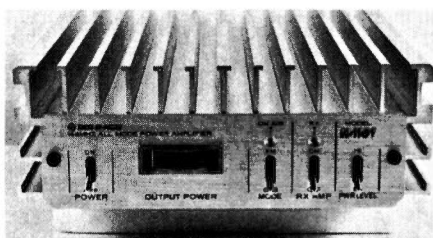
HL37V	2m 3W-32W pre amp	£90.95
HL62VSX	2m 5/10/25W in 50W out pre amp	£169.00

HL110V	2m 2/10W in 100W out pre amp	£220.00	C
HL180V	2m 3/10/25W in 170W out pre amp	£299.00	C
SAGRA600	2m 15-25W in 600-700W PEP output 2x4CX250B	£839.00	E
HL66V	6m 10W in 50-60W out pre amp	£131.75	C
HL166V	6m 3/10W in 80/60W out pre amp	£255.00	C
HL1K/6	6m 10W in 500W PEP output 2x4CX250B	£899.00	D
HL36U	70cm 6/10W in 25-30W out pre amp	£138.00	B
HL63U	70cm 10/25W in 50W out pre amp	£220.00	C
HL130U	70cm 3/10/25W in 120W out pre amp	£397.00	C
HL1240U	23cm 2/10W in 40W out MGF 1202 pre amp	£529.00	C

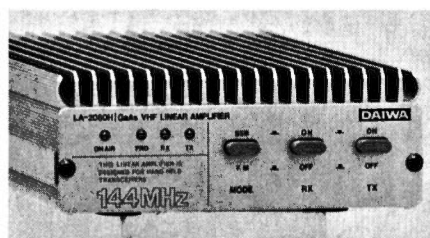
Daiwa

LA2080H	2m 1.5-5W in 30-80W out pre amp	£159.95	B
DLA80H	2m/70cm 0.5W-25W in 80W out		
	2m 60W out 70cms in MGF 1302 pre amp	£339.00	C

"Ideal for dual band handie or mobiles"



HL110V



LA2080H

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-5pm Tues-Fri
9am-4pm Sat

Exminster (0297) 34918
Reg Ward & Co. Ltd
1 Western Parade
West Street
Exminster
Devon EX13 5NY
9am-5.20pm Tues-Sat

One complete cycle is shown on Fig. 1(a), between points A and B, C and D, or E and F.

The relationship between frequency and time is:

$$\text{frequency (Hz)} = \frac{1}{\text{time}(t)}$$

Where f is the frequency of the waveform in Hz (Hertz) and t is the time period for one complete cycle in s (seconds). Transposing gives us a time/frequency relationship of:

$$\text{time}(t) = \frac{1}{\text{frequency (Hz)}}$$

Taking the 50Hz mains supply again, the time

period is $1/50\text{Hz}$, which is 20 milliseconds (20ms).

A different example; what is the frequency of a waveform having a time period of one microsecond ($1\mu\text{s}$) for one complete cycle?

From the frequency/time relationship we have frequency is $1/\text{time period}$. This gives

$$f = \frac{1}{1\mu\text{sec}} = 1\text{MHz}$$

That's all for this time, I hope I've taken some of the mystery out of sinewaves for you!

Radio Diary continued from page 19

May 17: The 'Parkanaur' Rally will be held at the Silverwood Hotel, Lurgan, Co. Armagh. Doors open 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 Parkanaur, near Dungannon. This is a very worthy charity, and they hope to see a really good turn out of everyone interested in all aspects of radio and electronics. Details from **Jim Lappin** on (0762) 851179.

May 24: The Plymouth Radio & Electronics Fair by the Plymouth Radio Club will be held at Plymouth Comprehensive School, Church Road, Plymouth. Over 25 stalls selling electronic, computer and radio components. Many second-hand bargains for the enthusiast. Free parking, Bring & Buy, club station on the air, bookstall, hot & cold buffet and grand raffle. Doors open 11am, admission is £1 at door. For further information, phone **Plymouth 787181**.

May 24: The 16th East Suffolk Wireless Revival 1992 is to be held at the Maidenhall Sports Centre, Ipswich, Suffolk. Among the main attractions this year will be Bring & Buy, car boot sale, book stall for RSGB books and vintage radio display. Suffolk Data Group, satellite/e.m.e. prediction service, antenna measurements, BYLARA, RAIBC, Scout Radio, RAYNET stands and Ipswich Area Novice and RAE Exam bookings. All the usual traders, plus non-radio stalls and children's play area. Refreshments and bar available. Lots of other attractions, providing an enjoyable day out for all the family. The price of admission (including ample car parking) is £1. Talk-in on S22 (GB4SWR), listening out on GB3PO (R2) and GB3IH (R84). Send an s.a.e. for free maps. Doors open 10am. **Bob Baal 67HZV, 14 Gainsborough Road, Felixstowe, Suffolk IP11 7HS, or via packet, G4YQC @ GB7MXM. Trader enquiries only to Syd Mason G0JMY, 367 Norwich Road, Ipswich IP1 4HA, tel: (0473) 748515.**

***May 30/31:** The RSGB will be holding their eighth National Amateur Radio Show at the National Exhibition Centre, Birmingham.

June 7: The Northampton Radio Club will be holding their Radio Computer & Electronics Rally at the rear of the 'Red Lion' public house, (500 yards from junction 16 of the M1 motorway). This year there will be room for four times more stalls, as they have booked an extra field just for parking. Doors open 10am. Pub and cafe will be open all day. Talk-in on S22 and on GB3NH (RB3) and 1.933MHz. All enquiries to **Paul Young** on (0327) 41267.

June 7: Bury St. Edmunds ARS Car Boot Sale will be held at the Scout Pavilion, Stanton. Doors open 10am until 4pm. Admission free. Light refreshments available. £3 per car boot. Talk-in on S22. Send an s.a.e. for a free map. Details from **G0MEV QTHR. Tel: (0358) 50271.**

***June 14:** Royal Naval ARS have their Annual Mobile Rally at HMS Mercury, nr. Petersfield, Hants. There will be dozens of trade stands; a Bring & Buy; flea market; radio-controlled power boats and trains; local radio clubs and repeater groups; children's rides and amusements; vintage fire engine; TV detector van; ices and refreshments; arts and crafts' exhibition; two Grand raffles; spectacular arena displays and other attractions, making this a great day out for all the family. Talk-in on 144 and 430MHz, free parking and picnicking, free admission for children, adults £1.50, no dogs except guide dogs. For full details, contact **Cliff Harper G4UJR, 34 Neva Road, Bitterne Park, Southampton SO2 4FJ. Tel: (0703) 557469.**

June 20/21: Preston 'Guild' Hobbies Fayre is to be held in and around the grounds of Tulketh High School, off Tag Lane, Preston. One of the largest local exhibitions of crafts, hobbies, pastimes and sports, staged in the north-west. The fayre runs for two days, with the Preston ARS flying the flag for 'amateur radio' and 'amateur electronics'. Any profits from this event will be split between local charities and Tulketh High School. Trade stands and activities cover everything from armchair hobbies to the super-adventurous, with something for everyone, whatever age group. **Eric Eastwood G1WCQ, 56 The Mede, Freckleton, Preston, Lancashire PR4 1JB. Tel: (0772) 686708.**

June 21: Danby Dale & District ARS will be holding their Rally at Salendine Nook High School, Huddersfield. Easy access from M62, junction 23 eastbound, junction 24 westbound. Doors open 11am. Usual traders, craft stalls, etc. Bar, catering, car boot sale, Bring & Buy, ample parking. Talk-in S22 and SU22. Details from **Philip G4FSD on (0484) 644827.**

June 27: The Brentwood International Amateur Radio & Computer Rally will be held at Brentwood International Centre, Dodinghurst Road, Brentwood, Essex. Major suppliers and manufacturers of radio equipment, computers, accessories, antennas, computer software and second-hand gear. Easy access from M25 motorway junction 28, and A12 trunk road. Fully signposted by the AA. Bar and cafe serving hot meals and drinks all day. Bring & Buy area. Massive car park, easy access for the disabled. Rally information centre on site. Talk-in on S22 and SU22. Doors open 10.30am to 6pm. Details from **CLPK, 18 Litchfield Close, Clacton-on-Sea, Essex CO15 3SZ.**

June 28: The 35th Longleat Amateur Radio Rally (follow the brown signs for 'Longleat House' from Wincanton, Wiltshire). An extensive trade exhibition, featuring over 140 companies. A large craft fair, RSGB bookstall and membership services stand. Over 20 national and local amateur radio clubs. Bring & Buy. Beer tent and plenty of on-site catering. Free parking right by the rally. Camping and caravanning facilities by the rally all weekend. All the attractions of the Longleat Estate available. Details from **Shaun G6VPG on (0225) 873098.**

June 28: The Bromsgrove ARS will be holding their second Mobile Radio Ham Rally & Car Boot Sale at the Lower Wick Country Fair, the location being on the Worcester to Malvern Road, rear of Bennetts Dairy. Doors open 9am to 6pm. Tables for Boot Sale are £4. Entry to fair & rally is £1 per person. Details from **Dave Edwards G4ZWR on (0527) 546075.**

Practical Wireless, May 1992

July 5: King's Lynn ARC will be holding their Rally at The Corn Exchange, King's Lynn, Tuesday Market Place. Doors open 10am. Further details from **Derek Franklin G0MQL on (0553) 841189.**

July 5: The York Radio Rally will be held in the Tattersall Building, York Racecourse, Knavesmire, York. Doors open 11am (10.30am for disabled visitors). Entrance fee £1. Ample free parking. Amateur radio, electronics and computers, arts and crafts. Morse tests. Licensed bar and cafe. Talk-in on S22. Further details from **Dave Moreland G7FGA on (0904) 790075.**

July 5: The 1992 Newport ARS Junk & Boot Sale will take place at the usual venue - Brynllas House in Newport. Opening time is 10.30am (10am for disabled), and there will be a talk-in on S22 by G0NRS. Light refreshments will be available. There will also be a raffle, with various prizes. Entry is by ticket, cost 25p. Further information, and applications for pitches from **Kevin Snelling GW7BSC, QTHR on (0633) 262488**, please phone between 6 and 7pm weekdays only.

July 11: The Cornish Rally will be held at Penair School, St. Clement, Truro. Further details from **Mr B. Thomas G0NNR, 'Creekside', Greenbank Road, Devoran, Nr. Truro, Cornwall. Tel: (0672) 862046.**

July 12: The Newcastle Amateur Radio, Electronics & Computer Fair will be held in the Sports Hall of Queen Elizabeth's Grammar School, as last year. There will facilities for a flea market outside, a talking station on 2m and there is lots of free parking. If anyone would like to bring things to sell from the boot of your car (electronics/radio only please), you will be able to, for a small fee. Any information can be obtained from **Tony Nightingale on (0507) 522482**, or send an s.a.e. to The Area Youth Office, Horncastle Youth Centre, Cagthorpe Building, Cagthorpe, Horncastle, Lincs LN9 6HW.

July 19: The 9th McMichael Rally and Car Boot Sale will be held at the Haymill Youth and Community Centre, Burnham Lane, Slough (near Burnham Railway Station). For more details, contact **Neil G8XYN on Maidenhead (0628) 25952.**

July 25/26: Norfolk ARS are planning a 2-day event. Details from **Sheila G0KWP. Tel: (0603) 618810.**

July 28: The Rugby ATS 4th Annual Amateur Radio Car Boot Sale will be held at the BP Truckstop on the A5, three miles east of Rugby and just two-and-a-half miles north-west from junction 18 of the M1 motorway. Open from 10am, admission is £1 per car and facilities include a good cafeteria and toilets. Talk-in on S22 by G86CBS. Pitches are £7 pre-booked or £9 on the day. Further details from **Peter on (0455) 552449** or for bookings ring **Kevin on (0203) 441590.**

July 28: Scarborough Amateur Radio Society will hold their Radio, Electronics and Computer Rally at the Spa, South Forshore, Scarborough. Doors open 11am. Many traders, Bring & Buy, refreshments and bar. Details from **Ian Hunter G4UQP on (0723) 376847.**

August 23: The West Manchester Radio Club's 'Red Rose Rally' will be held at the Bolton Sports & Exhibition Centre, Silverwell Street, Bolton (town centre). All the usual trade stands, societies, Bring & Buy, etc. All at pavement level. Refreshments available all day and bar. Doors open at 10.30am for disabled and 11am for general public. Admission £1, children free. Further details from **Dave G1100 on (0204) 24104 evenings only.**

September 6: Preston ARS will be holding their 25th Annual Rally at the University of Lancaster, as in previous years. The university is located south of Lancaster and the entrance is on the A6 trunk road. From the M6 leave at junction 33 on to the A6 and proceed north for approximately three miles. Trade stands, club/repeater stands, large Bring & Buy, snack bar, lunchtime restaurant, licensed bar, free prize draw and free parking on campus. Doors open 11am (10.30am for disabled). Details from **George Earnshaw on (0772) 718175.**

September 6: Vange Amateur Radio Society will be holding their Annual Rally at The Laindon Community Centre, Laindon High Road/Aston Road, Laindon, Basildon, Essex. The centre is only a short walk from Laindon Railway Station on the Fenchurch Street to Showbury Lane. Doors open from 10.30am to 4.30pm. Admission 75p. Featuring many traders, Bring & Buy, refreshments and a free raffle. Talk-in on S22. Approach roads will be signposted. For further details contact **Mike Musgrave G4MYT on (0268) 543025** or **Doris Thompson on (0268) 552606.**

September 6: Milton Keynes & DARS will be holding their 8th Car Boot Rally at Cranfield Airfield (south side), Cranfield, Bedfordshire MK43 0AL (off J13 or J14 of the M1). Talk-in on S22, G8MKC. For further details, contact either **Ray G1LRU on (0908) 660798**, **Tony G6WXM on (0908) 316435** or **Dave G3ZPA on (0908) 501310.**

September 13: BARTG's 1992 Rally will be held in Sandown Park Exhibition Centre, Esher, Surrey. More details from **Peter Nicol G8VXY, 38 Mitten Avenue, Rubery, Rednal, Birmingham B45 0JB. Tel: 021-453 2676.**

September 13: Telford Amateur Radio Rally will be held in The Telford Exhibition Centre, Telford, Shropshire. Doors open 10.30am. Admission £1. Traders' stands, flea market, restaurants, bars, free parking. More details from **John Bumford G0GTN, 19 Bowdley Avenue, Telford Estate, Shrewsbury SY2 5UQ.**

* Practical Wireless & Short Wave Magazine in Attendance.

Reflections

Ron Ham 'reflects' on the old days when valves were commonplace in TV and radio equipment, takes a look at the well-known '18' set, and winds up with your reports.

Let's forget the low-consumption semi-conductors which make up the high-tech equipment that we enjoy using today, and think back to a couple of periods in time, when radio and television, of the valve era, played an important role. Forty years ago our Queen came to the throne, and 50 years ago the British and Commonwealth armies were fighting in several theatres of war.

However, in those days, the heart of all radio equipment was a number of current hungry, glass envelope valves. For instance, in the late 1940s, many televisions, like the 9in PYE in Fig. 1, were only single channel (on 45MHz) and used about 15 ex-wartime EF50 valves. Some were still scribed with 'AM' (Air Ministry) labels and their service number (VR91).

Briefly, 'V' valve 'R'ceiving (type) 91 was an indirectly heated, state-of-the-art, v.h.f. amplifier which required 6.3V at 0.3A to heat its cathode and up to 250V, at 10mA, for its anode. In my opinion, had the government not released huge quantities of such valves at the end of the war, the manufacture of television receivers would not have been as fast as it was.

Coronation Day

Because we were there at the time, Joan and I were among those interviewed by South Coast Radio in February, for a programme celebrating the 40th year of the Queen's reign, and we were asked to recall our memories of coronation day in June 1953. Like many TV and radio engineers, I was busy installing sets during the run-up period ready for the big day and in some cases fitting magnifiers to the 9in sets!

Not many people had a television receiver at that time and most of those who did, invited neighbours into their homes to watch the event. We spent the day with my parents where the dining room had been 'modified' to seat about 17 people. A 9in Mullard console, similar in style to Fig. 1, was elevated on a box at one end of the room, and a table at the other

end carried a multitude of sandwiches that Joan and mother had made early that morning.

The room was darkened so as to get the maximum brilliance from the small black and white picture. Food was still partially rationed then, so the visitors previously contributed various ingredients towards the sandwich pile. Around 0900 I had a call to adjust a set that, like ours, had been moved for the day and when I had finished the customer was so pleased that she gave me a 2lb packet of sugar. You can imagine how delighted mother was when I arrived home with this 'bonus' to add to the festivities.

Several of our guests had not seen television before, and they were amazed to think that they were actually watching something that was taking place, "in London", 96km away. A grand account of this outside broadcast is given from page 75 to 88 in the BBC publication *Richard Dimbleby Broadcaster*. Although this was published in 1966, you may still find a copy in a second-hand book shop or in your public library.

The '18' Set

In every battle from the deserts of North Africa to the jungles of Burma, wireless communications between the infantry, artillery and their mobile support units was essential. The largest of the 'portable' transmitter/receivers was WS.18 (Wireless-Set. 18), which could be stood down on its flat base, Fig. 2, or carried as a back-pack.

The webbing for the shoulder straps and the waist band was attached to the carrying handle (top centre Fig. 2) and the 'back' shaped metal at the bottom of the case (Fig. 2) respectively. Provision was made, for practical reasons, to change the angle of the antenna by 'clicking' around a socket on the side of the set (centre right Fig. 2).

One ex-soldier from a Far East campaign told me, "I used to carry the B—— thing" and "the aerial was always getting caught up in the trees", another said, it was very heavy and awkward, "especially if

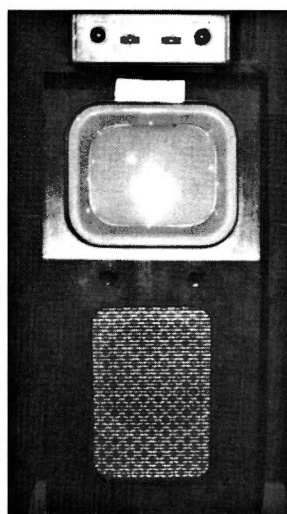


Fig. 1: Pye TV.

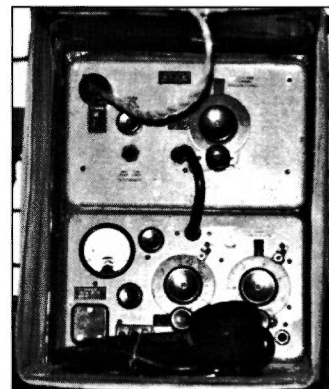


Fig. 3: WS.18 front view.

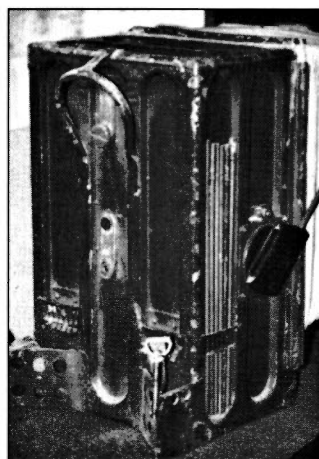


Fig. 2: WS.18 rear view.

you had a BREN-gun as well." The electrical length of the antenna was adjusted by adding short sections of interlocking copper rod, drawn from a store on the sides of the casework (centre Fig. 2).

The main framework, measuring around 18 x 10in had a canvas hood fitted to the front, (far right, Fig. 2) to act as a weather shield. The separate receiver and sender units (behind the hood in Fig. 3) are each secured by a large 'coin' slotted screw (centre rear panel, Fig. 2) for easy removal.

A specifically designed 'all-dry' battery giving about 160V high-tension and 3V low-tension, was

housed in the base of the cabinet which meant removing the sender chassis to replace the battery. This entails detaching the small 4-pin plug at the top of the panel which provides the power for the receiver (centre lead, Fig. 3), a large 4-pin plug (bottom, Fig. 5), which connects, via a socket in the cabinet, to the battery and, of course, undoing the securing screw.

Imagine doing this under battle conditions, or perhaps replacing a faulty or broken valve when either chassis had to be removed by the same process.

A padded metal case of spare valves, like Fig. 4, with instructions in the lid, was supplied in the 'signals satchel' for emergency repairs. The WS.18 has a limited frequency coverage of 6 to 9MHz, clearly scribed on the receiver and the sender's (master oscillator) slow-motion tuning dials (Fig. 3). The transmit frequency of the two valve sender, is selected on the right hand dial. The r.f. output, measured on the meter, is matched to the number of rods by selecting a position on the antenna switch, (right of the meter, Fig. 3) and peaked up by rotating the left hand sender dial.

In addition to a spare battery and valves, the signals satchel contained the headphones, microphone and Morse key. These were plugged-in at the top left of the receiver and the



Fig. 4: Spare valves for WS.18.

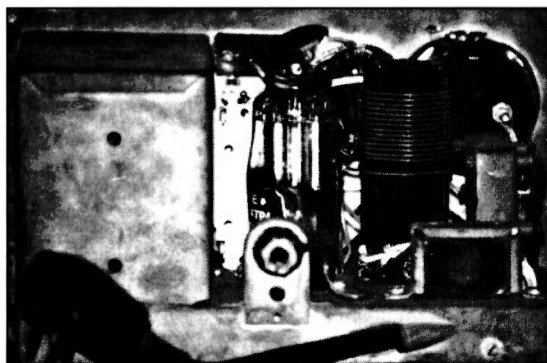


Fig. 5: WS.18 TX chassis.

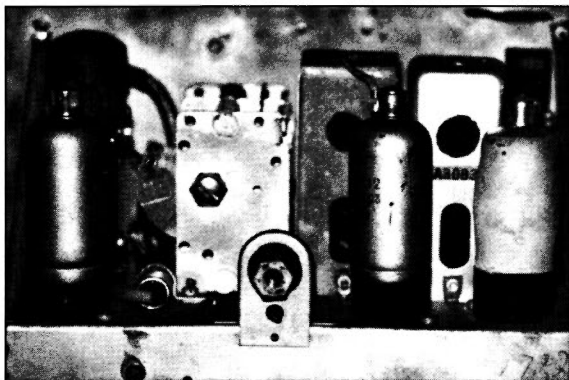


Fig. 6: WS.18 RX chassis.

bottom left and right hand sides of the sender (Fig. 3) respectively. The receiver is a simple superheterodyne, Fig. 6, (upper unit, Fig. 3) using four directly-heated valves, each requiring 2.0V at 0.05A for its low-tension and about 120V at 1.0mA high-tension. The filament in the sender's p.a. valve (ATP4) wanted 2.6V at 0.3A and its anode required 150V at 32mA high-tension. The specially designed 'A'rmy 'T'ransmitting 'P'entode four valve is prominent at the rear of Fig. 4 and the centre of Fig. 5.

When in use, the WS.18 had a range of between eight and 16km and the operator could communicate with the infantryman's WS.38 and/or Canadian WS.58, the WS.46 commando set, and the more powerful WS.19 fitted in armoured cars and tanks. Signals from all of these sets, could be monitored at a base station on the army communications receivers type R103, R107 and R109.

Although at the end of hostilities a large number of '18' sets were retained by the military and used for many years by the TA and the cadet forces, an equally large number

were sold on the surplus market and operated by amateurs on the 7MHz band.

Information

Not all the information that I gather for my columns in *PW* and *SWM* comes verbally or via your letters. There are times when I need to make reference in a public library or to write text away from home, especially if I am working with Joan in the County Records Office. Therefore I required a portable word-processor that was user-friendly and would easily transfer my 'outside' work to the Amstrad PC2286 when I got home.

My choice was the Tandy WP-2, Fig. 7, with its IBM/PC transfer software and connecting cable. In the Tandy catalogue, it's the WP-2 at £229.95, the transfer program at £14.95 and the cable at £9.95. Although the machine runs on four 'AA' type batteries, a special a.c. adapter is available from them at £9.95. The built-in 100 000 word spell-checker and the 200 000 word thesaurus attracted me to the WP-2, and its 32k (expandable) RAM is

adequate for my needs. I immediately found the full-size 62-key 'QWERTY' keyboard a joy to use, and being about the size of an 'A4' pad, it easily fits my brief-case. Serial and parallel input/output ports and a DIN socket for a cassette tape-recorder are fitted to the rear panel.

Although on-screen help is provided by pressing a specified key, more detailed instructions are given in the 150 page *Owner's Manual* supplied with the WP-2.

This, like the two page *Transfer User Guide* is well thought-out and easy-to-follow.

In my case the transfer software is loaded on the Amstrad's hard-disk, in a directory entitled 'WP2', which I call up, when required, by typing CDWP2 (ENTER) at the 'C' prompt followed by WP2LINK (ENTER) at the next 'C' prompt.

Auto Saved

Once the text is written it is automatically saved when the WP-2 is switched off and is retained in the memory by a CR2430 lithium battery, which has an approximate three year life. On arrival home and before switching either computer on, I connect Tandy's link-lead (back left, Fig. 7) to the RS232 ports on the Amstrad and the WP-2.

Next, after booting-up both machines I call up the transfer software on the PC and select item 1 "UPLOAD FROM WP-2" from the menu. Briefly, I then command the WP-2 to make an ASCII file of the wanted text and by following a sequence of key-codes the data transfer is quickly carried out.

Between ourselves readers, I make a crib-card to remind me of the codes and, as a precaution against 'sods-law', I do not erase the text from the WP-2 until it is safely filed and backed-up on the PC.

Observations

Now it's time for observations.

In January, Ron Livesey (Edinburgh), using a 2.5in refractor and 4in projection screen, located five active areas on the sun's disc on days 4, 5, 7, 9, 22, 25 and 26, six on the 11th, 12th and 28th and seven on the 10th and 31st. From his observatory in Sevenoaks, Cmdr Henry Hatfield, using his spectrohelioscope, observed four sunspot groups, 17 filaments and nine small quiescent prominences at 1240 on February 3 and his 136MHz radio telescope recorded large individual bursts of solar noise on the 2nd and a continuous noise storm on the 3rd.

Auroral

It's auroral time next, and Ron Livesey, the auroral co-ordinator for the British Astronomical Association, received reports of 'glows' overnight on January 1, 3, 4, 7 and 8, 'quiet arc or band' on the 13th, 'ray bundles' on the 11th, 29th and 30th and 'active, moving, pulsating' on the 3rd, 13th and 26th, from observers mainly in Scotland and on the Ocean Weather Ship 'Cumulus'. Doug Smillie (Wishaw) heard weak auroral reflected radio signals on the 144MHz band on the 8th, 29th and 30th.

Magnetic

On the magnetic side, the variety of magnetometers used by Tony Hopwood, Ron Livesey, Karl Lewis (Saltash), David Pettitt (Carlisle) and Doug Smillie between them recorded some magnetic activity on January 1, 3, 4, 5, 10 to 16 inc. and 26 to 30 inc. Doug has an interesting article, with constructional details, about his magnetometer and auroral observations on pages 16 to 20 inclusive in the February *Journal of the British Astronomical Association*.

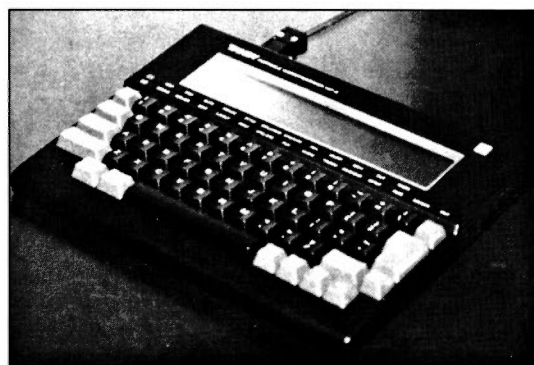


Fig. 7: The Tandy WP-2.

PACKET PANORAMA

Roger Cooke G3LDI takes a look at a new magazine for packet radio fans, provides an insight on the Canadian packet scene, and gives you news of an important date for your diary.

I've got news of a relatively new magazine this time. The magazine has the delightful (and very apt) title of *Cluster Duster*, following on from the instigation and licensing of the now well established DX Clusters.

The *Cluster Duster* is edited by Maurice King G3XKD, and the first issue was in March 1991. Produced on a laser printer, it has a very acceptable appearance, with articles from amateurs from home and abroad.

This is yet another DX-orientated magazine for the avid DXer, complemented by the *Cluster*, it makes working DX a fine art in comparison to what it was some 30 years ago!

Basic Guide

There is another basic guide to packet radio, entitled *Packet Radio Primer*, which is written by Dave Coomber G8UYZ, and Martyn Croft G8NZU. It's written in such a way as to encourage the beginner, and give them the confidence needed to dive into what seems a most complex subject.

It's almost an 'Enid Blyton' style of book, which tends to encourage the reader along in a humorous way. This is done without thrusting too much jargon at them all at once.

Almost without realising it, the reader is learning all the basics needed to connect their TNC, computer and radio together, and have fun on the air. The basic connection is discussed, together with the settings of TNC parameters, using both a PMS and a BBS and how to read and leave messages.

Then, the structure of a packet, with some basic protocol information follows. This is so that an understanding of how packet works can be easily grasped. This is closely followed by a discussion of Nodes, Packet Clusters and how to use them.

Final Selection

The final section is given to BBS commands, although not all are covered. It covers RS232 connections and provides a glossary

of TNC commands, plus some commonly-used terminal software. The last two pages are taken up by the 'Packet Guidelines', which should be read by everyone.

The title says it's a primer. As such, it is a very useful book for the raw beginner to read, before they become embroiled in what is, after all, a very complex subject.

It depends how deep a hole you want to dig for yourself! The old rule still applies though: 'If you find yourself in too deep, stop digging!'

The primer is not intended as a reference book. But if you are thinking of getting into packet radio and have been frightened off so far, reading this book will allay all your fears. Go on, buy it, read it and do it!

News From Canada

News comes from Canada, sent by Barry Winch VE3NAV, of the 56kbaud links that I saw in action during my visit. Watching data move at 56kbaud is very impressive, especially when it's full duplex, and it seems to be catching on.

Some experimental links are operating in the UK, but not quite to the extent that seems to be happening elsewhere. However, given time and dedication, plus a fair amount of money, I feel sure that it won't be too long before we have a similar operational capability.

I must thank Barry McLarnon VE3JF, of the Ottawa ARC Packet Working Group, who wrote the information on the Canadian scene. Barry comments on the Canadian 144MHz bandwidth, comparing it to the UK. He also says that most of the packet channels are busy!

Canadian Comments

Barry says "the 144MHz band over here is 4MHz wide, so we have a few more packet channels available. Packet channels tend to start at 144.91MHz and go at 20kHz steps up to 145.11MHz (I think). 145.01 is THE packet channel. It is still the primary v.h.f. frequency for inter-city forwarding, and as such is ridiculously congested.

"Progress is being made in

moving the intercity forwarding to 220MHz and 440MHz, where higher speeds, typically 9600 and 19.2kbps can be used. These links are usually restricted access".

Ottawa Area

"The Ottawa area is served by one major node site, plus a number of subsidiary nodes. The major 'hub' site, at Carleton University, is the home of the Hydra packet switch.

Hydra actually consists of two separate systems. The switch itself ('hydra-gw'), which is a PC AT running KA9Q NOS, currently has four ports.

Two of these are 9600bps serial interfaces into the 144MHz NET/ROM nodes OTTAWA (145.07 LAN) and CAPITL (145.01). The third port, uses an Ottawa PI board* (see details below), to interface into the 56kbps LAN, which is served by a full-duplex cross-band repeater (220.55MHz in, 433.55MHz out) at the same site.

Finally, there is an 'ethernet' port which is connected to the Carleton campus 'ethernet'. Also on the 'ethernet' is the second part of Hydra, a Sun-2 workstation, which is a Unix system with a large amount of disk storage.

This system will be the platform for developing various services for the amateur packet community. In addition to various servers such as on-line call-book look-up, the possibilities include a gateway into the Internet itself.

Full Duplex

"The 56kbps full-duplex network is, as far as we know, the only one of its kind in the world. It began as a high-speed LAN for the 'power users', but it has evolved to a combination LAN/local backbone network.

This goes against the conventional wisdom of keeping LANs and backbones separate, but it is successful because there are no hidden transmitters, and the capacity is more than sufficient to handle both functions. When the 56kbps network begins to get congested, our

plan is to 'twin' the cross-band repeater with a second one, using additional 100kHz channels in the same bands.

It is remarkably simple to add a second repeater in this way. The antennas and r.f. gear can be shared between the two repeaters, with power combining/splitting done at the 28-30MHz i.f. of the 56kbps modem."

Hydra Switch

"The 56kbps network provides the link from the Hydra switch to the three Ottawa area BBS stations (VE3JF, VE3NAV and VE3KYT), to users on two additional LAN frequencies (144.91 and 145.03MHz), and to a conference node. This network offers an easy means of 'spreading out' the 1200bps 144MHz traffic, so that low-speed users can continue to get adequate access to the network.

A user on the 56kbps network can attach a two metre port to his station, and open up a network access port on a new frequency for users in his area. This is what you might call a 'cellular LAN' approach.

In a traditional LAN with a wide-coverage node, modelled after voice repeaters, you have too many users, too many hidden transmitters, and therefore many collisions and terrible 'throughput'.

In a cellular LAN with more limited coverage, you have fewer users, and since they are located in a smaller area, less chance that they are hidden from each other. An additional benefit comes from the fact that the cellular nodes are located at home stations, and therefore are easier to maintain".

Basic Model

"The basic model for network development in the Ottawa area therefore is:

1: A central switch with expandable capabilities, and offering access to various services for network users.

2: One or more high-speed, full-duplex repeaters which link the

J. BIRKETT

SUPPLIERS OF ELECTRONIC COMPONENTS

SMALL 3 GANG POLYCON VARIABLE CAPACITOR. 340+340+340pF @ £1.95.
P.C. BOARD with 4 Variable Voltage Regulators LM317T, 1-LM340KC-12, 1-10,000uF 15v.w., 1-Heat Sink, 4-LEDS @ £1.00 (p&p £1.20).

P.C. BOARD with 2-MJ10006, 2-Heat Sinks, 2-Thyristors (S.C.R.'s), 2-Heavy Current Diodes, 2-Heavy Currency Chokes @ £1.00 (p&p £1.50).

SEALED LEAD ACID BATTERIES YUASA Type NP106 6 volt 10A.H. @ £4.50 (p&p £3.30) Dry Fit Type A200 208-305 8 volt 3A.H. @ £2.95 (p&p £3.30). Dry Fit A200 212-305 12 volt 3A.H. @ £4.50 (p&p £3.30) Nicads Varta 2500K Stack of 5 (6 volt), will fit in C Type Battery Holder @ 75p. All batteries tested.

SCREW TERMINAL ELECTROLYTICS. 10,000uF 25v.w. @ 50p, 15,000uF 40v.w. @ 75p.

BRIDGE RECTIFIER 100 PIV 25 amps @ £1.30.

MAJOR COMPONENTS FOR SHORT WAVE CRYSTAL SET as described in December Short Wave Mag. with info. @ £3.80.

PHILLIPS R.F. POWER FET. 400MHz, 15 watt, 24 volt, BLF244 with data and circuit @ £9.95. Two for £15.50.

NUT FIXING FEED THRU'S 500v.w. 500pF, 1000pF, 4700pF. All at 65p each.

1m. APPROX. OF 50 OHM COAX with 2 N Type Plugs fitted for £1.50.

COIL CRYSTAL OSCILLATOR 5.6MHz @ £1.50, CRYSTAL FILTER 68.545MHz @ £2.50.

AIR SPACED VARIABLE CAPACITOR C804 Type 5pF @ £2.50, 15pF @ £2.50, 25pF @ £2.50, 50pF @ £2.50.

FETS. 2N3819 @ 25p, J304 @ 20p, J230 @ 20p, BFW11 @ 30p, BFW12 @ 30p, 2N3823 @ 30p, 2N3824 @ 30p. Dual Gate 3N201 @ 80p, 3SK88 @ 60p.

NEW STOCK OF AIR SPACED VARIABLE CAPACITORS. 500-500pF @ £3.50, Medium size with VHF Panel attached 350-350pF @ £3.95.

ACCESS AND BARCLAY CARDS ACCEPTED. P&P 60p under £5, over free, unless otherwise stated.

C.M. HOWES KITS available by post and for callers.



25 The Strait
Lincoln, LN2 1JF
Tel: 520767

Partners J.H.Birkett
J.L.Birkett

COMMODORE 64 PACKET

PACKET ON THE COMMODORE, WITHOUT A TNC!

Yes, it's true, you can run packet on a Commodore 64 without the need for a costly TNC. We offer a dedicated packet modem, together with a free copy of an excellent public domain program on disc or tape. This really is the inexpensive way to get on the air with Packet Radio.

MODEM with FREE SOFTWARE ONLY £50.00

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

J.B.P. ELECTRONICS LTD.



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



R.A.S. (Nottingham)

G6XBH G1RAS 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
Barencost Mast Supports, DRAE Products, BNOS Linears & PSUs
★ 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 am to 5.00 pm

Tel: 0602 280267

R.A.S. (Nottingham)

R.A.S. (Nottingham)

SUREDATA

AMSTRAD REPAIR AND SECOND USER SALES

COMPUTING and RADIO

We have some new goodies for the PCW 8256/8512/9512 owner - 3.5" internal and external drive kits to upgrade or replace 3" drives in existing equipment, and if you are a total black box operator, we can also do the fitting. Phone us for price and availability.

We are getting many phone calls from Amateurs wanting a cheap PC route into packet radio, and we hope by the time this ad appears to have sourced some new PC1512/SD Mono with printer at £265 inc VAT and 12 month warranty, also some Olivetti DM200 printers at £109 inc. VAT - so phone and put your name down for one.

73 John G3TLU

SUREDATA

TELEPHONE & FAX: 081-902 5218
SECOND USER HOTLINE: 0831 616519 (after hours)

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

R.A.S. (Nottingham)

Quality MORSE KEYS

from R.A. KENT ENGINEERS

The LEADING British manufacturer of top quality Morse Keys — renowned throughout the world for their outstanding performance and reliability.

SOLID BRASS MORSE KEY
Base 8" x 3" Weight 1kg
£42.50 (Assembled)
£34.95 (in kit form)
P. & P. £3.00

TWIN PADDLE MORSE KEY
Base 4" x 3" Weight 1.5kg
£53.95 (Assembled)
£43.95 (in kit form)
P. & P. £3.00

SINGLE PADDLE MORSE KEY
Base 4" x 3" Weight 1.5kg
£44.95 (Assembled)
£36.50 (in kit form)
P. & P. £3.00

All Kent keys use shielded ball race bearings which are renowned for their superiority over keys using plain and bush type bearings. Kent keys are available in ready assembled or kit form. The kits take less than an hour to assemble with no special tools required.

KEYS OF UNBEATABLE QUALITY AT UNBEATABLE PRICES!
Please write, phone or fax for further details.

R. A. KENT (ENGINEERS)
243 Carr Lane, Tarleton, Preston, Lancs. PR4 6YB
Telephone: Hesketh Bank (0772) 814998 Fax: (0772) 815437

TX-3 RTTY CW ASCII TRANSCIVE

High performance, low cost. Unbeatable features. BBC, CBM64 tape £25, disc £27. SPECTRUM tape £40, +3 disc £42 inc adaptor board. VIC20 RTTY CW program tape £20. All need our TIF1 interface or a terminal unit.

GX-2 FAX SSTV TRANSCIVE

All modes of FAX and colour/mono SSTV. Review in July 91 Rad Com. 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. Review in July 91 Rad Com. 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. SPECTRUM tape £40, +3 disc £42 inc adaptor board. All need our TIF1 interface. SPECTRUM software-only version £25. TIF1 INTERFACE for best HF & VHF performance with our software. Kit £30, ready-made and 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 for any SPECTRUM computer to a dot matrix printer. FAX £80 or WX SATS £99, both £139.

Also MORSE TUTOR £8, LOGBOOK £8, RAE MATHS £8 for BBC, CBM64, VIC20, SPECTRUM. BBC LOCATOR with UK, Europe, World maps £10.
All available on disc £2 extra. Full info available on everything. Please ask.
PRICES INCLUDE VAT AND P&P BY RETURN

technical software (P.W.)

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

RADIO SHOPPER

TELEPHONE: 0782 283388

FACSIMILE: 0782 283723

YAESU

FT1000D	HF Full Spec	3225.00
FT1000	HF Std Spec	2499.00
FT990	HF New	1660.00
FT767GX	HF Mid Price	1525.00
FT757GX	HF 12 Volt	875.00
FT736R	2m/70cm xcvr	1425.00
FT212RH	2m Mobile	299.00
FT5200	2m/70 Mobile	575.00
FT76R	70cm H Held	260.00
FT26R	2m H Held	255.00
FT470	2m/70cm HHeld	389.00



SCANNERS

AOR2000	269.00
AOR2500	419.00
AOR2800	395.00
AOR3000a	765.00
JRC-535	1095.00
Nevada MS1000	279.00
Fairmate HP200	269.00
Bearcat 760XLT	235.00
IC-R7000	950.00
ICR71	765.00

ACCESSORIES

We have available simply too many accessories to list inc Antennas, Linears, PSU's, Cases, Manuals, Spares, Software, TNC's, etc. We also stock C M Howes Kits. Why not give us a ring with your requirements. **REMEMBER** we have a huge selection of **NAMED BRANDS** for supply.

KENWOOD

TS950SD	HF Digital	2825.00
TS950S	HF Std Spec	2425.00
TS850AT	HF 12v inc ATU	1495.00
TS850S	HF 12v no ATU	1295.00
TS690S	HF 12v Mid	1150.00
TS450AT	HF 12v inc ATU	1150.00
TS450S	HF 12v no ATU	995.00
TM741	2m/70cm Mobile	635.00
TM241	2m Mobile	315.00
TH77	2m/70cm H Held	430.00



COMPUTERS

We are a **MAJOR IMPORTER** of high quality computers and have some great deals for you, just take a look at these **SAMPLE** prices.

286-16 40Mb 1Mb Ram VGA	£ 799.00
386-33 40Mb 2Mb Ram SVGA	£ 999.00
486-33 105Mb 4Mb Ram SVGA	£1399.00
SVGA Monitor 14"	£ 249.00
105Mb Hard Disk (IDE)	£ 235.00

All software, printers and peripherals are available, just contact us and we'll surprise you.

ICOM

IC781	HF w/Disp	4225.00
IC970	2m/70cm Base	1750.00
IC735	HF 12 Volt	775.00
IC725	HF 12 Volt	649.00
IC726	HF + 6m 12v	925.00
IC475	70cm Mobile	995.00
IC229H	2m Hpwr Mob	349.00



ALINCO ELECTRONICS

DJF-1E	2m H Held	239.00
DJ162	2m H Held	199.00
DJ560	2m/70cm HH	299.00
DJX1	H Held Scnr	269.00

FULL ONE YEAR WARRANTY

All products carry a **FULL 1 YEAR WARRANTY** and are new & Boxed. We reserve the right to repair or **REPLACE** at our option. Faulty Goods must be returned to us in the original packaging and carriage paid. We do not guarantee that any product is suitable for any particular need, and all products is purchased on this basis. Your rights under the Sale of Goods Act are not affected by these terms.

PART EXCHANGE: We are dying to get hold of your clean and working equipment and we **GUARANTEE** that our **COST TO CHANGE** will be the lowest you have ever seen. Remember - we are not part of the UK dealer cartel and we sell for prices which are more in line with world markets.

ORDERING

You can order by Telephone or FAX. All prices **INCLUDE VAT. INSURED** next day service by 12.00 is £15.00 inc VAT. Access & Visa are welcome, however there is a 2.5% surcharge for this facility. **SPECIAL HAM CLUB PRICES** available. Education & Corporate orders are accepted on receipt of written order. Some items may take up to 14 days delivery if not in stock. **Office hours Mon-Fri 09.00 to 17.30 Sat 09.00 to 13.00**

Tel: 0782 283388

Radio Shopper

Fax: 0782 283723

Access

378 Waterloo Road

Hanley, Stoke on Trent ST1 5EH

VISA

PACKET PANORAMA

switch to the other area nodes, as well as to some individual users.

3: A number of low-speed, limited-coverage network access nodes, on different frequencies, with the frequencies re-used as appropriate. Each frequency has one, (and only one) node for a given 'cell', so that there is no node-to-node traffic on these frequencies".

Main Departure

"The main departure from this model at the moment, is on 145.07MHz. This is where the OTTSAT node, which serves as the access point to the Calgary-Ottawa 'wormhole', resides in addition to the OTTAWA node.

The OTTSAT node is expected to be removed from this frequency sometime in the near future, and it will either be added to the 56kbps LAN, or provided with a dedicated point-to-point link from Hydra".

High Priority

"Improving the links to other areas, is a high priority for the Packet Working Group. Other than the Calgary link, all out-of-town linking remains dependent on the grossly overloaded 145.01MHz network.

One reason we have been slow to upgrade these links, other than our pre-occupation with the local high-speed network and switch developments, was the possibility of obtaining additional satellite links, from the OTTSAT gateway to Montreal, Toronto, and possibly other points.

This has failed to materialise, and although chances are still good that something may happen, it is clear that we can no longer afford to wait. Furthermore, we should not let the possibility of using commercial satellite channels for some of our links, divert us from the goal of building an autonomous fully-connected amateur network".

Backbone Links

"We are anxious to work with neighbouring groups to install backbone links for trunking packet traffic between Ottawa and the surrounding areas. We do recognise that any collision-free backbone link, even if only 1200bps, would be Practical Wireless, May 1992

** The PI board is an IBM PC compatible, synchronous interface card for high-speed packet radio interfacing. It was designed by Dave Perry VE3IFB, and is good for operation up to 57600 bits-per-second. The PI card offers the following features: Dual channel operation, one high-speed d.m.a., one low-speed non-d.m.a., IBM PC, PC-XT and PC/AT compatibility. Low-speed driver socketed to allow for RS-232 or TL levels. Available driver for KA9Q NOS.*

a vast improvement over using 145.01MHz, and would do a reasonable job of handling the current volume of BBS mail.

However, we also feel that we should aim for much higher performance. Not only will the amount of mail and bulletin traffic increase quickly as the link capabilities improve, but users will require more throughput for applications such as file transfers and logging into remote servers.

We feel that 9600bps should be regarded as a minimum standard for a trunk linking two major network nodes, and our preference would be to have 56kbps on these links before long. We would therefore urge that network planners who feel that it is not feasible to go to the higher speed immediately, at least give serious consideration to providing an easy upgrade path".

Upgrade Path

"Providing an upgrade path involves two key issues:

1: Selecting a band (or bands) in which at least 100kHz bandwidth channels are available. This means putting the link on a frequency above the two metre band!

2: Designing sufficient margin into the link, such that it can be upgraded to 56kbps without changing the antennas and feeds.

With regard to the second point, there is a convenient rule of thumb. In order to work adequately at 56kbps, the link will require approximately 10dB more margin than is needed for 1200bps a.f.s.k.

For example, if a link works okay at 1200bps with low-gain omni-directional antennas at each end, then replacement of the antennas with small Yagis, should provide sufficient margin for upgrading to 56kbps, assuming the same power

"There are a number of reasons

that the Ottawa working group has a strong preference for using the WA4DSY 56kbps modem in linking projects. After working with the modem for nearly three years, we have a good deal of experience with it, and a high degree of confidence in its capabilities and reliability.

It offers much higher value in terms of bits-per-second per dollar of investment than the lower-speed modems, and its higher throughput means a longer lifetime before obsolescence. It's very easy to deploy, since it is a self-contained r.f. modem, which does not have to be interfaced to standard radios.

Its 28MHz i.f. is simply converted to v.h.f. or u.h.f. using a standard transverter, or separate receive and transmit converters, in the case of full duplex. And it will run full duplex with no difficulty, unlike some lower-speed modems.

The use of speeds of 56kbps or more necessitates the upgrading of nodes with more capable packet switch hardware than the TNC-2. Like the Ottawa Hydra switch, a multiport node can be configured fairly inexpensively around a PC AT-class machine.

The TNCs can be retained to handle the low-speed nodes. For major node sites with multiple 56kbps (or higher speed) ports, a more attractive proposition is the Grace PackeTen packet switch board. The latter board can make use of the PC as a host, so again there is a clear upgrade path if a PC is used for the switch".

So, that's what's going on across the Atlantic! Thanks for the interesting news from Canada Barry, and we look forward to hearing more from you.

Norfolk Barbecue

Now it's time to return to more domestic matters! Once again the Norfolk AX25 Group are organising

their annual barbeque, purely as a fun day for the family, with a slight leaning toward the hobby (grilled p.c.b. and 'chips' perhaps? Editor).

This year it is being held on June 28th, starting 11am until late pm. The Maitre de Cuisine au Jardin is Paul G4VLS. There's loads of food, ice-cream and drinks, all for £5 per adult. However, children between 7 and 12 years will cost £3 ('un-cooked'), and the under seven's can come for free but we don't guarantee they won't end up on the menu!

'Uncle Pat' Gowen G3IOR, is in charge of games for the children. As a special treat, Geoff 'Biggles' G4ODC, will be performing daring aerobatics with his competition standard radio-controlled aircraft. Bookings by the end of May, at the **LATEST please!**

The barbeque will be held at my QTH, at Swardeston, Norfolk (QTHR). There's talk-in available on S22, or on u.h.f., 433MHz, via GB3NR. Lots of parking, and it's off the main road.

We're looking forward to seeing some of you at the great Swardeston 'Cooke-in', but **please do book early!**

Swapping Programs

There's just enough space left to mention that David G0JVF @ GB7SDN, would be interested in swapping programs for the BBC Electron. There does not seem to be many of these machines about, although a local here in Norwich has one. There seems to be even less in the way of software for this machine. If anybody can help David, please send him a packet message.

I'd also like to see a few more photographs with information for the 'Sysop of The Month' spot. Please send them to G3LDI QTHR.

Before I close, I'm sorry that we don't have room for the detailed 'Clive' commands in the column. However, if you send a large s.a.e. to Tex Swann G1TEX at the Poole office, he'll send you a photocopy. So, that's it for another month, 73 and happy packeting de Roger, G3LDI @ GB7LDI QTHR, tel: (0508) 70278, or FAX on (0603) 787534.

UoSAT Operations

From Jeff Ward G0/K8KA, of the University of Surrey Spacecraft Engineering Research Unit team, comes news that amateur radio operations have now moved from UoSAT-3 (OSCAR-14) to UoSAT-5 (OSCAR-22).

Amateurs will now have 512Kbytes of program memory permitting 800 message capacity, two amateur-radio uplinks (145.900 and 145.975MHz), no downlink frequency switching, and more directory entries. This means that messages will be longer lived, as the default lifetime of these can be increased to seven days for bulletins, while recommending shorter lifetimes for other forms of mail.

What is more, if uplink activity is concentrated on what was the old UO-14 uplink, e.g. 145.975MHz, and 145.900MHz is just used for overflow, interference on 145.900 to AO-13 users and the microsats is reduced. Geoff says: "I think that the best way to divide uplink activity is to have broadcast requests and other PB operations on 145.900, while uploaders use 145.975MHz. I know that this would be difficult for automated stations, and don't expect everyone to comply, but if manned stations try to do it, then it will improve performance for everyone".

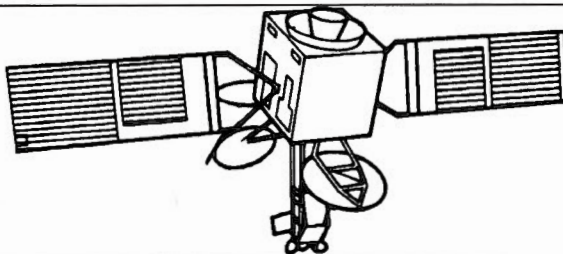
Price To Pay

As Geoff points out, there is a price to pay for this transition. Most notable is the conflict between c.c.d. users who want to download large c.c.d. image files and BBS users who just want to get their mail. University of Surrey (UoS) are looking into on-board JPEG compression for the images, and this potential disadvantage will be balanced by the advantages outlined above.

Discernible Difference?

Dave Hulatt G4WFK, a regular UoSAT user, has yet to find that the change has done anything about easing the QRM uplink troubles, as he has yet to be able to notice any discernible difference at all. He remains convinced that the main problems are brought about by 'alligators' and undisciplined operators.

He writes: "UoSAT-5 has other hidden problems, which give difficulties to myself and many other users. The problem is that decoding the downlink is a degree more difficult. The reasons behind this are apparently transmitter design. The UoSAT-3 employs a crystal controlled transmitter which



Satellite Scene

by Pat Gowen G3IOR

This month Pat Gowen G3IOR, covers the UoSAT changeover, and the reasons behind it. Pat also gives some bad news on band intrusion and the bleak 'RS' satellite future, balanced by some good news of RS-12's amazing DX possibilities.

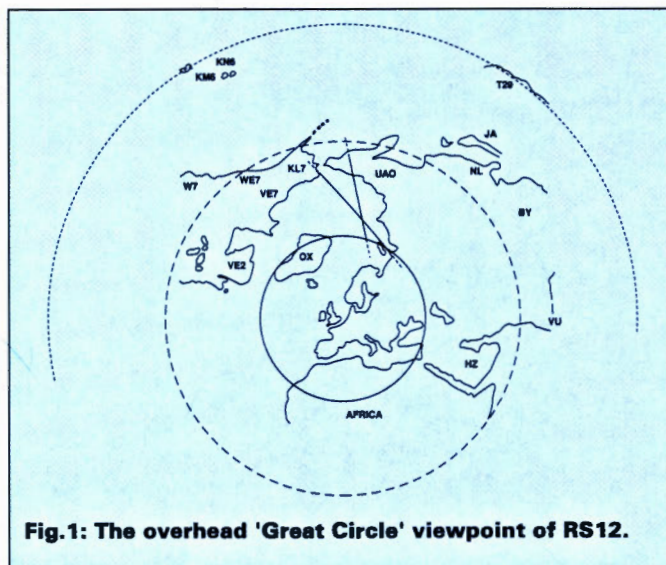


Fig.1: The overhead 'Great Circle' viewpoint of RS12.

generates a far better 'eye' on the downlink beacon. On the other hand, the quality of UoSAT-5, which employs a p.l.l. transmitter, does not generate the desirable characteristics users have become accustomed to with UoSAT-3. Ultimately, this resulted in further 'butchering' of my FT-736R to try and compensate for this inferiority".

Marked Improvement

Dave recommends that a marked improvement can be made on the FT-736R (which transceiver the vast majority of users employ) by simply removing C82, which resides on the receiver unit, and that a further improvement results when C25 on the G3RUH 9K6 Modem is changed to 1µF.

The Bad News

There's bad news from Andy Mirinov, who controls the RS-10/11 and RS-12/13 satellites from the RS3A command station, who tells

us that due to the loss of the DOSAAF funding, he is now employed on alternate weeks. Leo RA3AT, earlier head of RS3A has already left.

The residual remaining funds will run out by May. If no satellite command control is possible, RS-10/11, RS-12/13 and the new single satellite transponder planned for launch in late April, with the six others in the pipeline, will cease.

French Decision

The French administrative decision to give the exclusive use of 144.000-144.050 and 145.950-146.000MHz to Olympic Team communications, and the ban on the use of it to radio amateurs over wide areas for the duration of the games was unprecedented. Whilst any administration has this power over its own nationals, this is normally only applied in times of emergency, and then with discretion.

To allow the use by non-amateurs of both the highly

sensitive 144MHz e.m.e. band, and the international Amateur Satellite Service at the time of the WARC meetings, shows the vulnerability of some of our most important parts of the amateur radio spectrum. Indeed, the Olympic traffic has been heard causing QRM on FO-20 by G3CAG.

Sub-Horizon Tests

When the m.u.f. at our latitude was up to 50MHz earlier this year, Roger Cooke G3LDI, David Johnson G3MPN and myself, all near Norwich at 52.700N 358.750W, carried out a series of RS-12 'K' mode sub-horizon tests that provided some fascinating satellite propagation findings. We were all armed with high gain low angle h.f. beams on 21MHz and 29MHz giving e.r.p.s of some 1kW, and we used c.w. to aid identification and measure the tonal degradation. Using 21.214MHz as an uplink and 29.415MHz for a downlink, we kept in touch with each other on 145.425MHz voice f.m., so phasing our calls and relaying our downlinks to each other for comparison.

Early Passes

We first took early morning passes from 80° to 34° azimuth and found that there was little or no audible pre-acquisition of signal (pre-AOS) audibility of the beacon or our transponded signals. It was AOS plus two minutes before the beacon, with severe tonal degradation, came above the noise. Our own downlinks did not appear until three minutes after calculated AOS, and only then as very rough hissing notes.

As the satellite elevated above our horizon, our signal returns improved to about T6, then degraded again, disappearing with the beacon one minute prior to the calculated loss of signal (LOS) time. Four minutes after the calculated LOS the beacon re-appeared simultaneously to our own downlinks, with the tone improving rapidly all the time.

We all copied each other's signals perfectly, and found the strongest and cleanest signal returns up to 17 minutes post horizon, when the satellite was on the opposite side of the pole heading down the Bering Sea between Alaska and Kamchatka toward British Columbia.

After this peak the signals then gently weakened to go below the noise. Following south to north passes were equally good, but with the excellent transponded returns always slowly fading out as RS-12 went over the far tip of Sakhalin Island.

Fig. 2: Side view of RS-12 orbit track.

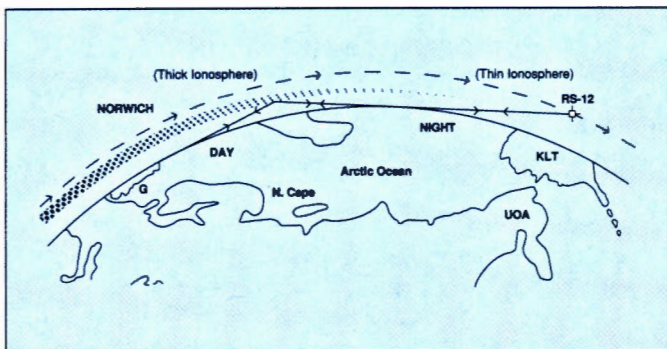
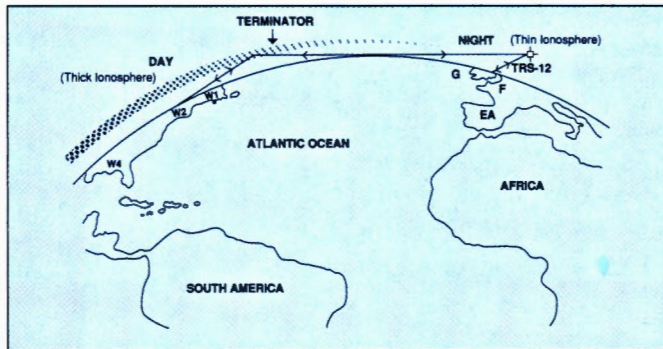


Fig. 3: Showing the terminator at 2142-2152UTC.



Auroral Hiss

Over a series of days, we found that our signals were invariably and consistently a rough 'auroral' hiss at low angles. Improving to typical h.f. auroral and polar flutter returns as the satellite approached the northern LOS horizon, where it usually disappeared before returning well post horizon, with improving strength and tone. We noted that stations located in southern England such as John G3FBN and Don G3BGM tonally degraded first, whilst GM stations and those to our north, such as Gordon G3DDG in Durham, remained almost T.9, far less tonally effected, when David, Roger and I had very rough notes indeed.

It was also very noticeable that our 21MHz signals transponded to the downlink on 29MHz, were far more tonally degraded than the 29.407MHz beacon or the 29.453MHz ROBOT. Sadly, although we were often within range of JA, KL7, W7, VE and UA0, no-one was on the satellite from the other side of the pole apart from a few stations using the uplink band for local u.s.b. contacts, who were not listening for transponded signals on 28MHz.

Late Passes

Late afternoon and early evening passes could just as well have been via u.h.f. or v.h.f. satellites, as they demonstrated the more typical true AOS and LOS times, showing no sub-horizon activity whatsoever, and very little tonal degradation. However, later in the evenings after 2200UTC, when both 28 and 21MHz were totally dead, we were able to work W1, 2, 8 and 9 stations, who were using the self-same propagation as we had been earlier in the day.

Results Sent

The results of our findings were sent to **John Branegan GM4IHJ**, who calculated the F₂ ion density decrease as the satellite and the reflective layer approached the dark polar and opposite areas, and so explained the phenomena of the path that we were using. John provided, as computer graphics, the UK overhead great circle viewpoint of the tracks shown in Fig. 1 and the side view of the orbit tracks as seen in Fig. 2. In Fig. 1 the inner circle around the UK is the normal horizon, and the outer circle that of the first refraction zone. The two tracks show that we had sub-horizon access first when the satellite was over Novaya Zemlya, and until it was out over Alaska for the first pass of 1155 AOS and beyond eastern Siberia for the second of 1334UTC AOS. Note that this puts both Hawaii and Papua New Guinea within range!

If we now look at Fig. 2, we see the side view of the signal track at the last moment of access. The dense solar illuminated ionosphere as far as the northern Russian Federation was able to re-angle our signals, so that they then went through the far thinner ionosphere in darkness further north to the satellite over Alaska.

The reverse was true also, as the satellite signal was able to penetrate downward through the low attenuating thin ionosphere over Alaska. It was then, by earth skimming chordal hop, able to produce refraction from the underside of the more dense ionosphere between Norway's north cape and the UK.

Late Evening Paths

Late evening DX paths to the west were achieved when the satellite was over eastern Europe, a long way below the American

horizon, but within normal line-of-sight of the Norfolk stations. At this time both 21 and 28MHz were devoid of ionospherically propagated signals, and the band was dead.

As Fig. 3 shows, the terminator at 2142 - 2152UTC when W's were worked was well across the other side of the Atlantic, new with the dense ionosphere new over the USA, and absent over Europe. Whilst the American stations would have been able to work stations direct on 21 or 28MHz in mid-Atlantic, they would not have been able to make QSOs with Europe at that time.

At this time the 21MHz uplink signal leaves America, refracts from the sunlit ionosphere over the eastern seaboard, propagates downwards towards earth, skims the surface, and then rises to penetrate the very thin ionisation layer to 'see' the satellite over eastern Europe. The satellite 29MHz downlink return then follows the reverse path, going through the thin ionosphere to the ionised F₂ layer off the USA and Canada, then to refract down to the north American stations.

DX Possibilities

John pointed out that in fact, had they only been active, the DX possibilities were good. We could have worked right across to W0, W6 and W7 at that time.

He explains: "Contacts of this type take place when one station and the satellite are on the night side of the world, whilst the other station is across the terminator under a daytime ionosphere. With this alignment, provided the satellite is above a thin night time ionosphere either one or both of the two stations in QSO can be on the daytime side of the world. Several ionospheric hops beyond the terminator, on the simple proviso

that 21 and 29MHz propagation exists for both of them along the full length of the path along the terminator and that the satellite is near enough to the terminator to 'see' across into the daylight dense ionospheric zone. There is therefore no reason as to why more distant stations should join in QSOs of this type. Operators should therefore concentrate on two patterns:

1 Listening for distant stations beyond and on their own side of the terminator, when they are in daylight and the satellite is just over the night side of the terminator.

2 Listening for distant stations located on the day side of the terminator, when the operators station is inside the satellite footprint, above the station horizon and the satellite is on the night side of the terminator, but no more than some 3000km from the day-night terminator."

From Proof To Practice

So, GM4IHJ's calculated path theories were put to the test and proved! Within a week I worked a UA0 in zone 19 and WA6BDA in California. VE7DFW is hearing Europe, LA4XC Harry Jensen worked JA, and short wave listener **Jan Andersen OZ-DR2197** of Skagen, Denmark has been hearing JA, VE7, W7, VK5, VU and YS as well as many European signals sub-horizon. As the summer brings extended illuminated paths, contacts with the far east and the west should become easier still.

Regularly updated sets of Keplerian elements for all OSCAR's, the 'RS' satellites, MIR, UARS, and all of the weather satellites are freely available to readers who send a large s.a.s.e. to Donna at the *Practical Wireless* editorial offices in Poole, Dorset.

Bye for now, more *Satellite Scene* next month.

PW SUBSCRIBERS' CLUB

Be sure of your copy every month and qualify for the Subscribers' Club as well. Special offers and discounts are normally available to all members, including those abroad.

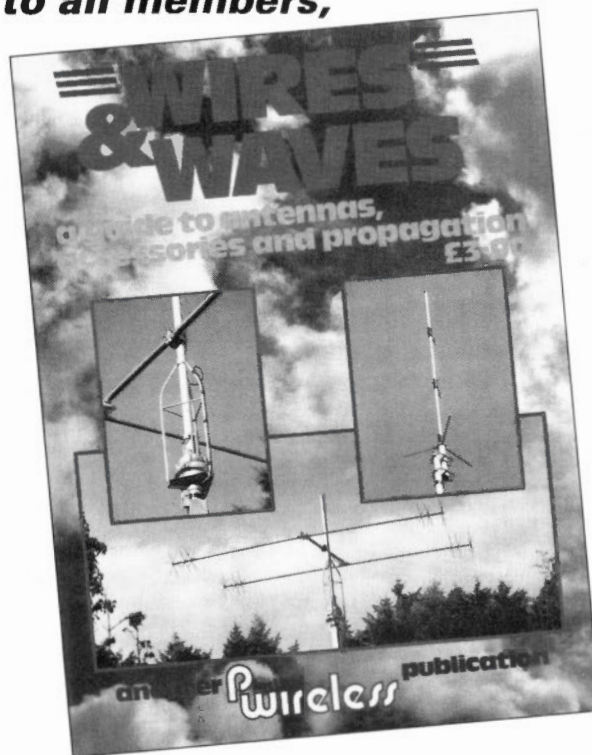
If you have a subscription, you will know all about the *Practical Wireless* Subscribers' Club. If you don't, read on! Membership is free and automatic for all subscribers, and it's our way of saying 'thank you' to all those who have enough faith in their favourite magazine to pay for it 'up front'.

This month *Practical Wireless* Subscribers' Club members have the opportunity to buy one of our very popular reprint books at a bargain price. The book on offer, *Wires And Waves*, is packed with re-printed articles from *PW*, with a practical antenna theme. You'll find practical designs for antenna, accessories, antenna-related equipment and theoretical articles.

This 150-page book has articles such as a 'Mini-X Beam For 10 meters', 'DX Dipole For Restricted Sites', 'Slim Jim Antenna for 28MHz', 'Ring Beam for 144MHz', a 'Vertical V Antenna', and many more! Authors include well-known names such as Fred Judd G2BCX, R. A. Penfold, Tony Smith G4FAI, and there's even an article by the editor G3XFD! (but don't let that put you off!).

Normal price for this ever-popular reprint book is £3, plus £1 post and packing. But Subscribers' Club members in the UK can buy it for £1.50 including post and packing, and overseas members can buy it for £2 including post and packing (surface mail).

So hurry! Join the Subscribers' Club and don't miss the opportunity for some really good reading, practical ideas and lots of antenna-related projects for a bargain price!



To: PW Publishing Ltd., FREEPOST, Enefco House, The Quay, Poole, Dorset BH15 1PP.

Credit Card orders taken on (0202) 665524

SUBSCRIPTION RATES

PRACTICAL WIRELESS 1 YEAR

- ☐ £19.00 (UK) ☐ \$45* (USA)
☐ £21.00 (Europe)
☐ £22.00 (Rest of World)

SPECIAL JOINT SUBSCRIPTION WITH SHORT WAVE MAGAZINE. 1 YEAR.

- ☐ £34.00 (UK) ☐ £37.00 (Europe) ☐ £39.00 (Rest of World) ☐ \$75* (USA)
 * \$ cheques only please.

Please send me.....Wires & Waves(s)

☐ @ £1.50 (UK) inc. p&p. ☐ @ £2.00 (overseas) inc. p&p.

Name.....

Address

.....

.....Postcode

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

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

Card No.

Valid from.....to.....

SignatureTel:.....

If you do not want to cut your copy of *PW*, a photocopy of this form is acceptable.

KW COMMUNICATIONS

Chatham Road, Sandling
Nr Maidstone, Kent ME14 3AY

Telephone: 0622 692773

Fax: 0622 764614

Instant credit available
Mail/telephone order by cheque
or credit card (E & OE)

It's nice to see all this shiny new equipment in the mags, isn't it? However, we know that the latest gear doesn't always appeal, especially to those with tight budgets. Thus we have a growing selection of pre owned equipment, all fully tested and warranted so you have the opportunity to indulge without incurring the wrath of the bank manager – send a large SAE for the latest up-to-date list.



YAESU FT-747
from £659



ICOM IC-725
from £779



KENWOOD TS-450S
from £1220



ICOM W-2E
£395



KENWOOD TS-850S
from £1475



YAESU FT-Z90RII
from £429

**Best
part exchange
deals in the country
KW – your one stop
amateur shop.**



KENWOOD TH-7TE
£395



ICOM IC-735
£1000



KENWOOD TS-950
£2995



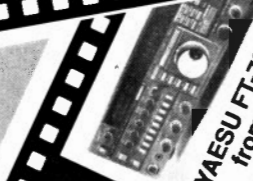
ALINCO DJ-590E
from £519



AOR 3000A
£765



YAESU FT-1000
from £2995

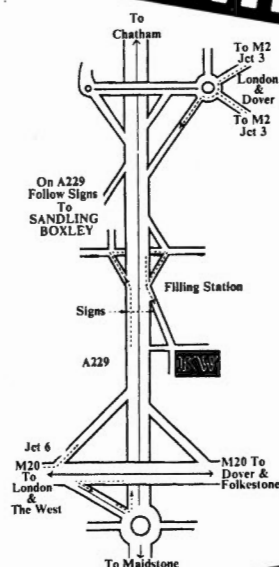


YAESU FT-736R
from £1395



ALINCO DJ-560E
now £299

Don't forget – we stock a wide range of accessories including antennas, mounting hardware, cables, connectors, mobile mounts, SWR meters, PSU's, morse keys, coax switches, rotators, scanners and receivers, microphones, headphones and much much more!



OPENING HOURS:

MONDAY-SATURDAY
9.30am-6pm

MONDAY
open 10am

SATURDAY
close
5pm

KW has been serving radio amateurs in Kent for many decades – a tradition the new KW will be continuing! Be you man of Kent or Kentish Man, everything for the amateur is right here in the heart of the country. A quick look at a map will also show how easy we are to get to from other areas. Sussex Man and Surrey Man will find us via the M25/M20 network and convenience for the M2/A2 route makes it ideal for London Man to leave the problems of the City behind. The Queen Elizabeth II bridge at Dartford also means that Essex Man can reach us very quickly.

Our showroom is bright, warm and comfortable, allowing you to relax whilst browsing through our latest books, checking out the latest accessories or trying out a new rig on air before you buy. For those unable to visit we offer a speedy mail order service to get goods to you quickly. Unfortunately you will miss out on the refreshments and the charm, wit and experience of our sales staff! Rest assured we always do our best however you contact us!

We look forward to serving you. 73's Tom G6PZZ

R7

SPECIALIST ANTENNA SYSTEMS LTD

17B2

If you need an ANTENNA – give us a call – we offer the BEST CHOICE

CUSHCRAFT

Market leaders in the U.S.A.
High quality product range.

Best selling R5 and R7 HF Verticals. Beams from 40m to 70cm
– Ask for the CUSHCRAFT Catalogue

MIRAGE

KLM

VHF and UHF Linear Amplifiers and Pre-Amplifiers.

Beams from 80m 3-element to 70cm
30 element and the popular 'Oscar'
Satellite Antennas.



'EGGBEATER' OMNIS (RHC Overhead, Horizontal at Horizon)
AND HIGH PERFORMANCE VHF/UHF BEAMS

BUTTERNUT (U.K.) LTD Please ask for more information

DOWN EAST MICROWAVE 23 and 13cm RX/TX KITS AND LOOP YAGIS

* MFJ * HYGAIN * YAESU ROTATORS * JAYBEAM * REVEX * DATONG * MET * DAIWA *
TONNA * AAA (Cap. Co) * A.T.U.'s * CABLES & CONNECTORS * MASTS & CLAMPS

PLEASE SEND LARGE S.A.E. FOR OUR FULL DETAILED PRICE BOOKLET



SPECIALIST ANTENNA SYSTEMS LTD

Radfords Field, Maesbury Road, Oswestry, Shropshire SY10 8EZ
Phone: 0691 670440 Fax: 0691 670282



Bredhurst

electronics



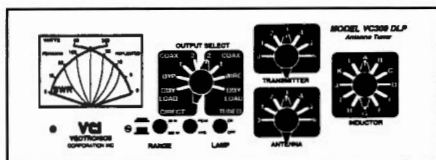
BREDHURST ELECTRONICS LTD.

High Street, Handcross, W. Sussex RH17 6BW
(0444) 400786 Fax (0444) 400604

SITUATED AT THE SOUTHERN END OF THE M23 – EASY ACCESS TO M25 AND SOUTH LONDON

VECTRONICS

300W Antenna Tuners



Match almost any real antenna from 1.8 to 30MHz including verticals, dipoles, beams and whips. For balanced line a 4:1 balun is included. Model VC300 DLP includes 300W dummy load and peak reading capability. Both feature a precision dual-needle meter.

VC300 £129.95

VC300DLP £159.95

AERIAL ACCESSORIES

	£12.95	£3.00
50m 16SWG H/Drawn Copper Wire		
Small ceramic egg insulators	.65	.25
T' piece polyprop dipple centre	2.40	.25
Deluxe dipole centre, 259 socket	9.35	2.00
Self-amalgamating tape	4.35	1.00
300 R slotted feeder, per metre	.58	.10
450 R slotted feeder, per metre	.50	.10
URM67 50R low loss coax per metre	.95	.25
URM76 50R coax, per metre	.40	.10

SPIRO ANTENNA PRODUCTS

PB1	1:1 Balun 2kW P.E.P.	17.95	2.00
LC160	160 mtr antenna shortener (pair)	24.95	2.50
LC80	80 mtr antenna shortener (pair)	23.95	2.50
T15	21MHz traps 1kW (pair)	39.90	2.50
T20	14MHz traps 1kW (pair)	39.90	2.50
T40	7MHz traps 1kW (pair)	41.90	2.50
T80	3.5MHz traps 1kW (pair)	41.90	2.50

PALOMAR

RX-100	noise bridge	69.95	2.50
P-405	receiver pre-amplifier	129.95	2.50
PF-300	scf audio filter	139.95	2.50
PB 50-W	balun, 1:1, 1.5:1, 2:1, 3:1, 4:1, 5:1, 6:1, 7.5:1, 9:1, 12:1, 16:1	26.95	1.00

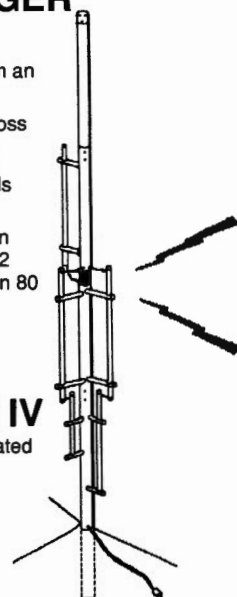
CHALLENGER DX-VI

- Launches RF from an elevated GAP
- Eliminates earth loss
- Comes pre-tuned
- Uses only 3 radials @ 25 feet
- Total bandwidth on 40,20,15,12,10,6,2 metres, 130kHz on 80 metres

£229.95

VOYAGER IV

- From GAP, dedicated LF antenna now available
- 80kHz on 160, entire band on 80,40 & 20 metres



Phone for prices on Kenwood Icom Yaesu, and our wide range of accessories

BREDHURST ELECTRONICS LTD HIGH ST, HANDCROSS, W. SUSSEX RH17 6BW
Open Monday–Friday 9am–5.30pm Saturday 9.30am–4.30pm

Books for radio amateurs
NAVCO

ELLIOTT ELECTRONICS
for the Radio Enthusiast

MICROWAVE MODULES
INSTANT HP AVAILABLE
WHILE STOCKS LAST

OSY OLD MAN TO

AERIAL ACCESSORIES AND MASTS

JAYBEAM AMATEUR ANTENNAS

RIGS, ANTENNAS, SWR BRIDGES, POWER SUPPLIES, TEST GEAR, COMPONENTS, MORSE KEYS, COAXIAL CABLES, ROTATORS, MICS, PLUGS AND SOCKETS, SWITCHES

Call us on (0533) 553293
OR COME AND LOOK AROUND AT
60 Hinckley Road, Leicester LE3 0RB

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
£179
inc. VAT

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

Antex Temperature Controlled Irons

... keep down the cost of soldering.

An economic range of soldering irons for the small to medium sizes assembly lines.

Apart from the low cost, Antex Temperature Controlled soldering irons offer so much more. For instance, the Antex A545 controls temperature electronically, not by magnetism or changing bits.

Temperature selection is in the handle. Although an Antex U500 power supply is available, Antex A545 Irons can be used with any 24V 50 watt supply.

Antex irons are also earthed for extra safety. Antex also supply

'Soldip' Solder Pots in 2 sizes.

Simple
Temperature
Adjustment in handle

Available from
leading electronic
distributors or send
for details of the
whole Antex range.

ANTEX

Antex Electronics 2 Westbridge Industrial Estate, Tavistock, Devon PL19 8DE Telephone: (0822) 613565 Fax: (0822) 617598

BARGAIN BASEMENT

Write your advertisement in BLOCK CAPITALS - up to a maximum of 30 words plus 12 words for your address - and send it together with your payment of £2.35, and corner flash or subscriber dispatch label to: **Donna Vincent, PW Bargain Basement, Enecfo House, The Quay, Poole, Dorset BH15 1PP.**

Subscribers must include the dispatch label bearing their address and subscription number to qualify for their free advert.

Advertisements from traders, apparent traders or for equipment that is illegal to possess, use or which cannot be licensed in the UK, will not be accepted.

No responsibility will be taken for errors.

For Sale Yaesu FRG-7 receiver and instruction manual, original spec - in excellent condition, £110 o.n.o. Tel: (0704) 76662.

Wanted Coder p.r. 40 pre-selector, reasonable price. E. Rowe, 11 Thornstone Drive, Irby, Wirral, Merseyside L61 4XR. Tel: 051-648 3031.

For Sale Yaesu FT-101 MkII, no mods, ex condition, original mic, with h/book, complete with Jaybeam 3-band vertical antenna (new), good first rig, buyer collects, £300 no offers. P.W. Sobye G0PNM, Bodmin, Cornwall. Tel: (0208) 76286 anytime.

Wanted Service manual with circuit and parts list for Telegquipment oscilloscope 720, beg, borrow

for copying against deposit, or buy. All expenses paid. R. F. C. Owen, Crawley. Tel: (0293) 520172 ext. 242, office hours only.

For Sale Commodore 64 + RX-4 software cassette and TIF Interface, ready to use. Also some games and two joy-sticks, v.g.c. all for £150. Pat. Tel: (0933) 313969.

For Sale CTE frequency counter 10Hz - 1.3GHz, £50. Sky-Scan discone with Howes mast-head pre-amp, £35. 10m RX-TX with DTI cert, £45. Linear amp 3-30MHz 200watt p.e.p., £45. Andy. Tel: Cambeltown, Scotland (0586) 552496.

Wanted Working British Mk 123 RX/TX with associated accessories. Tel: Norfolk (0366) 500867 evenings.

For Sale FT-290 with NiCads, case, Heatherlite mobile mike, £195. FT-301 h.f. transceiver with FP-301 p.s.u./speaker, £280. Differential a.t.u. components, £40. Chris G4YTI, Huddersfield. Tel: (0484) 846721 evenings.

Wanted Yaesu FT-625 RD or Icom 551D (50MHz band). Jose Manuel, R. Dr. Henrique M. Gomes 16-4A, 1600 Lisboa, Portugal. Tel: 01-7588283.

For Sale ADR-3000 scanner only six months old, hardly used bargain, £525. Tel: Bangor (0248) 351819 after 6pm.

For Sale FT-101B all non-WARC bands 18-30MHz plus 10MHz, c.w. filter, mic, handbook. Recent new p.a.s. v.g.c., £200. Phillips D2935 g.c., portable, digital display, memories, b.f.o., etc., mint, £90. Tony G4DFP, Manchester. Tel: 061-736 3187 after 5pm.

For Sale Marconi video sweep geny. TF-1099 100Hz-20MHz with markers, £40. **Wanted** 717A valves and any other old types. Tel: (0702) 522929.

For Sale Midland 77-805 UK CB inc. NiCads, £55. Sky-Scan desk top 1300 antenna 25-1300MHz, £35. Comprehensive RAE correspondence and revision material, £28. Items boxed as new (o.n.o.'s considered). Tel: Exeter (0392) 73714 after 6pm.

For Sale Crystals. 50p each, postage 20p (3+ postpaid). All frequencies in kHz. 368.64, 2016, 2995.83, 5350.0, 6027.51, 6063.54, 6144.0, 6408.33, 7168, 8104.61, 8125, 8650, 10100.0, 10691.0, 11118.8, 12358.3, 17103.3, 33200, 33955.56, 86569.0. Grant G8CGK. Tel: (0989) 62715.

Exchange Mamiya 645, 1.9 80mm lens, 1/4 grip, prism and w/level finders, 3 x 120 inserts, all perfect for best h.f. transceiver offered. Will deliver/collect reasonable distance from Newbury. Nigel G0DTQ, QTHR. Tel: (0488) 39544.

For Sale Yaesu FRG-7700 plus FRV-7700 and FR-7700. Good condition. Manuals, £200 o.n.o. Buyer collects or will deliver 60 miles. Tel: Weston-Super-Mare (0934) 418829 after 6pm.

Wanted Yaesu FRG-7000 general coverage communications receiver 250kHz - 30.075MHz. All modes, in good working order, reasonable price. E. J. Mayes, 3 Radford Street, Mainton, Workop, Notts S80 2NH.

For Sale Kenwood TS-520S transceiver plus AT-200 a.t.u., very good condition, buyer collects, £365 o.v.n.o. G3QJL, QTHR. Tel: Rugby (0926) 812621.

For Sale Hewlett Packard oscilloscope 180A, 150MHz bandwidth, 5mV sensitivity. Also 90MHz plug-in module, all in good working order. Complete with operating and service manuals, £140 o.n.o. Tel: (0278) 429481.

For Sale Icom R7000 receiver with h.f.-mod: TV-7000 receiver adapter. SP-20 speaker. D-130N Discone Antenna wideband reception, bargain, £700. Buyer collects. Tel: (0695) 28945.

For Sale Yaesu FT-757GX h.f. transceiver, Yaesu FP-757HD power supply, Yaesu MH1B8 hand-held mic. All items boxed and with manuals. Equipment in good condition only used on QRP work, £565. Tel: (0373) 66112.

For Sale Complete set of seven books for the radio amateurs examination home study course. All that is required to pass the examination to gain your licence, only £50. Vic. Tel: (0579) 348127.

For Sale Yaesu FT-707 h.f. rig with 1.8MHz filter plus Yaesu FP-707 p.s.u. and Yaesu FTV-107R transverter with 144MHz module, all in good condition, £495 o.n.o. Dave GW6UXT. Tel: (0654) 710382.

For Sale Yaesu FT-757GX, immaculate condition, £575. FC 757AT, £200, prefer no splits. Two AEL 813s, brand new with bases, £45. G6M0DB, QTHR. Tel: (0436) 76486 after 5pm.

For Sale Trio 510 h.f. transceiver, mic and manuals, £100 o.n.o. Atari 800XL disk-drive 1050

and tape recorder and software, £120 o.n.o. Tel: (0522) 721897.

For Sale Vintage equipment: 'National Frequency' receiver, £120 o.n.o. Open to offers on: AVO meter (Automatic Coil Winder and Electric Equipment Co), Weston model E772 analyser, Collaro studio tape recorder. Tel: 081-951 3171.

For Sale Icom PS55 13.8V/20A mains p.s.u. (brand new) - matches 275/735 etc., rigs, £145. Paul G4XHF. Tel: (0293) 515201.

Wanted Circuit diagrams/service sheets, manuals or any info on telegquipment oscilloscopes types D33 and S43. Will reimburse any costs. Mr A. Couchman, 3 Manor Grove, Sittingbourne, Kent ME10 1LT. Tel: (0795) 475958.

Wanted Eddystone 750. Also interested in 870, 880/24 and Eddystone accessories. Tel: Barnsley (0226) 288718.

Wanted Working MK123 TX-RX with accessories. Tel: Norfolk (0366) 500867 evenings.

For Sale Yaesu FT-23R 2m hand-held. Little used including charger, £160. G3WGF, QTH Doncaster area. Tel: (0709) 588398.

For Sale Bearcat hand-held UBC 100XL, 100 memories, v.g.c., manual and charger boxed, £100 o.n.o. Cliff, Wiltshire. Tel: (0380) 813745 evenings.

For Sale Yaesu FC757AT automatic a.t.u. All bands 'Ham' manual and cable, £240 (cash). W. Lee, GW0ESU QTHR.

For Sale Sony ICF-2001D receiver air/f.m./l.w./m.w./s.w. Excellent condition cost £300 when new, bargain at £160. Paddy. Tel: (0752) 894275.

For Sale FT-480R multi-mode inc. m/mount and manual, £240. Ham international MM2 converted 28MHz with DTI authority inc. mic, £125. FT-DX401 h.f. TX/RX, p.a. gone, spares or repair inc. manual, £50. GOLDM, Gosport. Tel: (0705) 528162 evenings and weekends only.

READERS' ADS
MAY 1992 COUPON

Back-Scatter

HF Bands

Reports to
Paul Essery GW3KFE

287 Heol-y-Coleg, Vaynor, Newtown, Powys SY16 1RA

Except for some working on my long wire specimen of the genus Best Bent Wire, I've been QRT this month, still awaiting parts for the beam. However on the very morning I started this offering the first bits surfaced...so, there is hope yet!

Conditions

Conditions on the bands have been anything between superb and awful depending on the chosen date and time! However, when the 'awful' befalls, you can progress the rebuild of the station a.t.u., or look on the computer to see what the dimensions ought to be for a Yagi array; I fed in '23 elements at 1.8MHz' at one stage - enough raw material for a lifetime of dreams!

At this very moment, the sun is shining and a deckchair in the garden seems the best option. But as the locals say 'If you can see the hills, it's going to rain, but if you can't see 'em it IS raining!'

Alex UA6LHB

Further to my note last time about Alex UA6LHB, GODAS writes to say he has just had a long letter from him in Rostov-on-Don. Alex seems to be having a bit of a time of it. The rig has a problem he can't cure, the computer has crashed swallowing all his address-book file, and to crown it all his car was bumped by a military truck so no compensation! A few letters from his friends in UK wouldn't come amiss!

Hospital Tests Ted

Another one in the wars is **Ted G2HKU**; there's no firm news pending the result of hospital tests, but Ted says his daughter's suggestion of an 18-year-old Swedish au pair to cheer him up left him cold - he didn't, he says, feel up to it! That definitely sounds ominous!

The 28MHz Band

Despite the hospital tests, Ted G2HKU in Sheppey can go in the shack and so on 28MHz c.w. Ted booked in W5XJ, K4XU/O, W1RAN, K8NW, K2LE, K5ZD/3, ZP6CW, K2VUI, K1NA, OY3QN, N2KW, K6DC, K2SX/1, N3RS, K1JKS, W3VT, N5TP, K8EJ, K8ZH, N9SW, K5MA, K3ZO, WD8AUB, N3RD, K1RH, K4EFZ, W2GW, EA8QO, 4X1FC, 4X4NJ, W2BA, N3RS, W3LPL, K5NA, KC9T, K4FU, ZP6CW, W6JNX, N3JF, W6OV, K8ZH and W4DZH.

Up in Auckengill, Wick, **Don**

GM3JDR keyed with ZS6BID, BY8AC, T14CF, PY1BYK, Z21FN, VS6BG, VU2ROI, ZA1TAC, YV5DTA, JAs and Ws.

Next **Angie G0HGA** from Stevenage, who mentions K2QIL, K1WJB, K2MFY, WF1W, WF3T, W3DKT, WD8QBP, WX8Q, W4IF, W4FOA, WB4LOU, W4G4ILW, KM9PK, W9AND, W9ACU, YN/SM00IG, J37M, UA9FXW, UA9KW, and the usual smaller fry.

Now a new reporter by way of **Alan GORCI** in Grantham; Alan has 10W to a 5/8l vertical at 11m, with which he managed UV1AD, UV9UBE, 4J1700JJ, W2PPG, WF1F, HK3MAE, SV1BJT, U05GQ, UJ8JCO, PT7WX, CN8EC, WA4WTG, W1IDP, UL7PLJ, IT9KDA, CP6RW, ES1WW, WP4VU, 9H1DE, 4Z4DX, 4X4JU, W3DKT, W7OF, EA6ST/7, EA9IB, LY1DR, C56/G3RZ, UZ9CWA, K2PS, VU2JJQ, CU2DW, P43FM, 4U1UN, H18MTL, N1FOJ/T, W6KKT, AP2MYC, JY3ZH, 7X2VZK, KC4TLK, UH8EA, JA7OWD, YL3FW, N3HBT, 9K2ZZ, C6A/G4AMLKA1YUB, 5B4ES, PJ2WG, J69BB, VP5JM, YS1EJ, UF6VBZ, UD6DFR, VY2OH, CO8LY, HZ1AB, HL1XP, P43TAT, ZS1UW, VE3EFP, VE3DTV, K8SWZ, JA1SGX, BV2BT, KA0SMR, WP4EPA, JA7SN, JH8BOE, JH0BBS, LU8XW, 8P6BL, T77M, P21DY, J73VE, K3AQH, P30JE, UH7E/P/UA9SMG, 7X2DG, K2P0F, PT7WZ and of course the smaller fry as well.

Over the water to **Pat ON7PQ** (Kortrijk) who is all c.w. and offers YS/K8LA, AA4NC/KP1, AP/WA2WYR, 3D2UU, 7Q7XX, WL7E, JA1NUT, ZD8OK, J88AQ, J7/DL6LAU, ZF2HM, FG/IK3HAQ, 8P9CP, TU4SR, V73AZ, VK9XM, AC8W/AH0, KL7QR, ZY0FX and VC8DR.

Operation on sideband is **Don G3NOF's** mode from Yeovil, and he used this band for C56/G3RZ, CP6RP, JE3TXA, KA2IMX/KH2, OD5SK, SV0IL (Crete), V31KX/VOA, W7CFL (Utah), W7XY (Arizona), XX9AW, YV5DUW, 4K2CC, YV5DUW, 4K2CC and 9K2ZZ.

Leighton Smart GW0LBI sticks to his last, and this time reports OKZHMA, HA7JHF, WA8OA, UA6YX, K2ONP and WE1F, all on the low power. Antennas by the way are a 62m end-fed, a trap dipole, and on the h.f. bands monoband dipoles.

John Heys G3BDQ in Hastings, notes what a super month it has been on 28MHz (naturally, that's why my beam came down!) s.s.b.; stations worked included CN8NS, 9K2ZZ, BZ9AAA/5, BY5RT, BY8AL, RH2E/RA3AQK, 6Y5PF, T12DX, C56/G3RZ, FH3AS (Mayotte), 9K2TC, 3DA0AY, 9K2TC, UI8DAA, UJ8KAA, AP2MYC, HZ1MM, ZD7CW, 7Q7JL,

HL1XP, 4K2CC (Franz Josef), many S9-plus JAs, VKs and ZLs.

The WARC Bands

On the WARC bands, again Ted G2HKU leads off and again its all c.w. On 18MHz we find SP5EXA, while on 24MHz the tally was LZ1NK, W1HT and 4Z4DX.

Don GM3JDR found U0AL, 7P8RQ, N6QR, OY1H, ZL1UB, VQ9QM, RY0U, 4J7GWB, ZA1TAC, 4X4DK on 10MHz while 18MHz gave 4K3BB, JW5NM, RC9WAZ, JA and W. Turning to 24MHz he logged KN4UG/C6A, A430JF, VP2EST, FS4PL, V47UY, JA and Ws.

At **Vince 9H1IP's** (M'Scala, Malta) QTH, operation on 24MHz yielded IT9EUT for a bit of real short-skip, 3X0HNU, A22AA, 4N7Zz (Croatia), VP2V/KB5GL, VP2V/W5ZPA, VP5WA2B0T, WA4DAN/KP1 and KW2P/KP1 (both Navassa), Y1IRM, YN/SM00IG and J8/G0GPX; dropping down to 18MHz found 7P8EN, 8P6EM, WP4JOE, A22AA, ZD7AY, 8P6QY, 5N0CEP, 5V7JG, VP2V/W5ZPA, Z21HJ, KW2P/KP1 (Navassa) and TA1AL.

Now to Don G3NOF and s.s.b.; on 18MHz he noted 3A2LF, and on 24MHz C07JC, FG5BG, FM5CD, FM5WD, FS/JE2HCJ, FY5FA, HZ1AB, JA7JH, KP2C, NL7JZ/AM/HZ, RL7PEO, R05DP, SV0VOA, UI8DX, UJ8KA, VP2MR, VS6CT, XX9AW, Y1IRM, YV2BYT, ZA1TAH, ZB2AZ, 3C1EA, 4K2CC, 5N0AIP, 5U7M, 5V7JG, 6Y5EW, 7Q7MM, 9K2WR and 9X5NH.

The best-kept secret of amateur radio is 10MHz! says G0K0Z in Thirsk, who stuck on this band only and keyed with 9M2AX, 4J4GC, 5B4OG, 4K2CC, PZ1DY, JJ1TEA, JA0AWF, ZL4HB, VK3MR, ZL2AGY, VP2V/W5ZPA, OY2H, ZA1TAH, KL7U, JJ1VKL/4S7, JA8GQZ and 9K2MU.

On again to ON7PQ: Pat sticks to his key and this method netted him P4/K1MD, 5U7M, 5T5CJ, T77C, 5V7JG, 8Q7XX, TA4/DK7PE, 4K2CC, UJ8KA, 4K3BB, TR8GL, VK9XM, AC8W/AH0, KL7QR, ZY0FX, VC8DR, VP2E/DK2UY and FR5GL.

This call leaves John G3BDQ to wrap up with the following s.s.b. contacts on 24MHz: AP2JZB, 6Y5EW, Z21HJ, KP4DAL, A92BE, XE/DJ6OV, plus a couple on the key in 7N1ULX and JR0BAQ.

The 1.8MHz Band

On 1.8MHz, it's John G3BDQ first; who notes all Europe, plus TA1KA/2, TA4/DK7PE, OH0AM, T77C, HX1LVL from the Winter Games, 5U7M for a

band new one, 4X4NJ, VO1A, OY8JD, N2RM, WB2Q, K2KIR, W3BGN, W3LPL, N4AR, K4TEA, K5UR (Arkansas), W8AH and KD9SV.

The QRP from Leighton GW0LBI in Trelewis, went out to GI3LFH, SM6CTQ, EA3KU, GD4BEG, all c.w., while the sideband signal got to GI3PDN, EI9FK and DL7UCW.

Angie G0HGA found eight new countries in the CQ WW 1.8MHz contest, and heard her first VK while listening to the FOC Marathon.

Finally for this band, Ted G2HKU mentions no contacts but wonders if it is his imagination...is the noise level on the band getting higher these days? Ted rarely gets a night when the noise level is tolerable.

The 3.5 and 7MHz Bands

Now it's time to look at 3.5 and 7MHz. Ted G2HKU notes U05N and 4X4NJ on 3.5MHz, while on 7MHz K1JKS, N3RS, FY0EK, ZA1KF and UZ9XOU were netted. All c.w.

Again all-c.w. at GM3JDR. Don netted QSOs on 3.5MHz with JA7IJJ, JA1CGM by long path, J79DX, W5QN, WB4FDT/5, PJ2AM, CO8DY and OX3CS. The 7MHz band got a bashing though: ZL2RA, ZL3ABV, ZL2UV, ZL1AZE, VK3YD, VK3BYE, VK7RG, J37M, H18A, JW0C, 3X0HNU, CX1BBL, UW1ZC/JW, EM3W, CO8RCD, CM2AF, CO2MA, CO2VG, GW3INW/HK3, UZ0AB, UA0JB, UA9JBX, PY6XO, PY1EAS, PR7PO, PU2FON, PY8AQL, PY4ZO, PY8RR, PY1AIM, PY1BYK, PY1SA, PY7MG, PY1DZV, PP5MN, 9N1MM, 9N1HMB, YV5QN, J79DX, VP2EY, LU1EPQ, LU2BRG, YV4AU, T14CF, OA4AMM, 4K4/UA12FQ, KG6GUN, K7LJ, N7MC, K7ABV, K6DC, K6RK, W6JZH, WA6BMB, K6RG, K6DT, K7RO, N6TV - the Ws between 1400-1500UTC via long path.

Angie G0HGA is all but QRT again on 3.5MHz, due to complaints of computer r.f.i., but she did work all around Europe; the W7IW/10 must have been a bit of an anti-climax though! On Forty W03Z, K1VMI, WA1IWD, WR10, W4GCW, KA2DEV, K1JD, W2QM/4, UA0SPB twice, UA0ALQ, UA9GE, UV9AAA, 4K3/UW10G, UL8LWA, UL8GAK, RH2/RA30A and EA8BUJ who is ex-G3BNF.

All 7MHz is the game at **Eric GOKRT** in Worcester Park, Surrey; 1W of c.w. from a Lake DTR7 does the business, with two-way QRP to three Gs, IK1DHA, ON5UP, DJ8TA; other contacts included DJ8TA again, DK8ND, DL4XQ, DL7LX, EA1DDX, IK2ERA, IV3HR0, OE1PRB,



D A T O N G
ELECTRONICS LIMITED

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

For products you can rely upon to give amazing results

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

All our products are designed and made in Britain.

Orders can be despatched within 48 hours subject to availability.



— VISA AND ACCESS WELCOME —



MAKE YOUR INTERESTS PAY!

Over the past 100 years more than 10 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 100 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 **FREE INFORMATION** 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

Name _____ Address _____

ICS

International Correspondence Schools, Dept. EE552
312/314 High Street, Sutton, Surrey SM1 1PR, or 041-221 7373 (24 hrs.)

ALAN HOOKER

SLIMLINE

£24.95 + £2p+p

HEAVY DUTY

£29.95 + £2p+p

Allows you to safely mount your hand-held or mobile radio where you can see the controls...

- Mounts any single flat surface.
- Adaptable to any vehicle or station use.

Made of high quality aluminium.

THE 'RIG SAVER'

APPROVED DEALER FOR

KENWOOD ICOM YAESU AOR

42 Nether Hall Road, Doncaster, South Yorkshire, DN1 2PZ
Telephone: Doncaster (0302) 325690



FREE WITH ANY NEW VHF/UHF HANDHELD OR SCANNER

KENPRO HANDHELDS

TWO JAPANESE HANDHELDS THAT REPRESENT OUTSTANDING VALUE FOR MONEY, IDEAL FOR -

- ☐ Packet Radio Operation
- ☐ The Novice Licence Holder
- ☐ VHF or UHF Repeater Operation
- ☐ Point-to-point Communications

KT-44 70 CM HANDHELD

- ☐ Covers the full 70cm Amateur Band
- ☐ UK repeater operation with 1.6 MHz offset and 1750 KHz tone burst
- ☐ Excellent transmit and receive audio quality
- ☐ 1 Watt RF output high power 150 mW RF output low power
- ☐ Supplied with UK battery charger
- ☐ 1 year full guarantee.....**£159**

KT-22 2 MTR HANDHELD

- ☐ This has become one of our most popular handhelds - one of the lowest cost handhelds on the market, yet it's Japanese manufacture ensures superb performance.
- ☐ Covers the full 2 mtr band
- ☐ UK repeater operation with 600 KHz offset and tone burst
- ☐ 1.5W (high) 150 mW (low) RF output
- ☐ Supplied with UK charger
- ☐ 1 year full guarantee.. **£149**



WE CARRY HUGE STOCKS OF AMATEUR RADIO, SHORTWAVE AND SCANNING RECEIVERS.

TOP PRICES PAID FOR USED EQUIPMENT.

GENEROUS PART EXCHANGE ON YOUR OLD EQUIPMENT.

HERE IS A SMALL SELECTION OF OUR USED EQUIPMENT - ALL FULLY GUARANTEED!

FT-790 70cms Portable All mode. v.g.c inc carry case. **£325.00**

ICOM Micro 2E 2M handle. 2 ni-cads and chgrs. good starter. **£135.00**

AKD 2M mobile FM Trans. Boxed as new cond. V.G.C. **£150.00**

Yaesu FT-23R 2M Handheld. Boxed 6 Mths G/Tee.....V.G.C. **£185.00**

CT1600 2M Reconditioned. Handheld Thumbwheel Freq. Control. **£125.00**

Realistic Pro37. 200 Channel H/Held Scanner. As new. **£175.00**

Fairmate HP200E. All Boxed C/W Manuals. Upto 1300MHz cont. **£199.00**

Sony Air 7 Handheld Airband Receiver. offers around. **£185.00**

Nevada MS1000 Base/Mobile Scanner. Exc. Cond. G/Tee. **£215.00**

Regency 7000 Base/Mobile Scanner. Very Sensitive Radio. **£215.00**

Fairmate HP2000 'The ultimate' in handheld scanners full 1000 memories. v.g.c. but tatty box **£215.00**

AOR AR3000A The best base station scanner money can buy All mode 150KHz - 2.1GHz Ex-demo model **£699.00**

Yaesu FT480R 2 Meter Multi-mode choice of 2 both in good cond. **£325.00**

Yaesu FR101 Receiver c/w ext. Spkr Ham Bands only. Ex.cond. **£275.00**

Trio R1000 S/W Receiver. Digital display with timer. Very clean. **£350.00**

Azden PCS-6000 2M mobile with Airband RX. As new. Boxed cond. **£225.00**

Yaesu FT-2700RH. Dual Bander Mobile. Boxed. Good cond. **£325.00**

Trio TR2300 2M Port-a-pack. 1 Watt output. c/w ni-cads & charger. **£117.00**

NAG 144XL 2M Base Amplifier 2.5 in for 250 Watts out...S.O.B. **£225.00**

Trio R2000 Rx. Good middle of the road receiver. Avg. Cond. **£450.00**

Icom R72 Gen. Cov. RX almost new still U/Glee. Bargain. **£500.00**

Tokyo Hy-Power HT115 15m SSB mobile Rig. VGC Boxed. **£225.00**

Delta one 934MHz Transceiver 1Yrs G/Tee Re-con model. v.g.c. **£299.00**

Pac-Comm Handipac .TNC Boxed with all manuals. Under 6mths old. **£155.00**

Yaesu FRG7 Good old faithful receiverStill going! **£175.00**

NOW AVAILABLE OUR NEW 72 PAGE COLOUR CATALOGUE - JUST £2!!!

NEVADA COMMUNICATIONS

189 London Rd, Portsmouth PO2 9AE. Fax 0705 690626

HOTLINE 0705 662145

USE YOUR CREDIT CARD FOR SAME DAY DESPATCH

Back-Scatter

SP5JJR, UV6LSX, ON4KEP, ON5RR, OK1FPS, LA3JHA, PA3FPP, YT3KO, YU4IEF and YU3CCD, so the countries worked tally continues to rise. Eric's antenna is a 26m top with a quarter-wave counterpoise.

Now it's back to GW0LBI; Leighton keyed with 2W0AAI, OK1VOY, OK1PVA, and used the mike for G0JMF. This was on 3.5MHz; but on 7MHz there was just ON4NO on c.w.

Over to Pat ON7PQ, and this time 7MHz first: 7P8EN, FS4PL, BV2TA, VU/HA5BUS, JJ1VKL/4S7, WA4DAN/KP1, 7Q7XX, 9K2ZZ, OA4AWE, 3X0HNU, DU1COO, KL7U, AA5K/AH0, V2/WJ20P, JW5NM, ZD8OK, HS0ZAI, KH6CD, KD7P/NH7 and TR8XX. Turning to 3.5MHz he logged 7P8EN, JH1RES, 4Z4DX, W85FC, VS6WV, ZS3VC, CN8TV, SV9BGH, YY2SS, TI4SU, N6ND, K6NA, ZL4KX, KB2S/6Y5, SU1HV, CZ2SS, TI2PZ, PJ2AM, TA4/DK7PE, YK1CW, JW0E, 4K3OQL, K7EG, ZY0FX, ZD8Z, 8P9CP, ZF2KE, VQ9QM, 9M2AX, XE3ARV, HF0POL, CO8LY, V2/WJ20, 4K2MAL, FM5BH and OA4MM.

The 14 & 21MHz Bands

Don GM3JDR starts off on 14 and 21MHz. He keyed with DU3HF, 4K3/UW10G and VK6VK on 14MHz while on 21MHz he logged ZL1CH, UA0QE, UA0FJ, 4K3/UW10G, 4K3/UA10L, BZ10K, 4K2CC, 4K3OLL and ZL3OE.

Next it's G2HKU who again stuck to his key; 14MHz saw Ted work W1RAN, K4LTA, K8ZH, W2XN, N2KW, W8EGB, K4XU/0, EA6ZY and 3A2LF; for 21MHz it was K10T, N4LS, W4YE, K3ZO, W1RAN, N4XR and KA4IFF.

At Angie G0HGA the key supplied WA1FXB, N2IF (an ex-local), WB3EPC, W4ZD, W2QM/4, AA4GQ, N5VV (New Mexico), K9UIY, K9QVB, W9FST, KM9W, K9CLO (Indiana), N5FB, KA9ZZT, AB4UM, K7RIE, K0HB, W9GXR, VE2XCT, JW0C, J37ZR, YV1NX, EA6ZY, and lots of smaller fry, with BV4CT at 1530UTC for a 'gotaway'. Turning to 21MHz we find W4HT, K1RM, K2DXE, WA2SON, N3FOP, W9NTM, KB7SO (Arizona), JA1QSS, JA1CQC, ZD8LI, UA9TQ, UA9XJV, UA9XBH, RA9AAV, and a

short-skip GW.

Now it's time for s.s.b., driven by G3NOF; Don used 14MHz for A22BW, A41JR, AL7S, AP2AU, BV2CR, CU2AX, CU2YA, FK8CP, J28GG, JT1BV, KH6WU, P29UV, SV0VOA, TK5FF, TU2ZB, VC8CB, VU2DVP, VU2JQ, XW1QL, ZL2AAI, ZS1DZ, 3A/F9UW, 4K3/RZ10A, 5H3DC, 8Q7DV, 8Q7PV, 9J2EG and 9J2SZ; all between 1500 and 1900. As for 21MHz, here the scalps included AA7FV, BZ4RBV, C6/G4AML, EG7BVI, HF0POL (S. Shetland), KL7GLS, NI6H, T3OA, TR8GL, VP2E/DK7UY, XW1QL, 3D2AG (Rotuma), 4K3/RZ10A, 5N0AIP and 9Q5TE.

Leighton GW0LBI tried s.s.b. on 14MHz QRP to raise K1RU WA2YVA; the c.w. KF8QE, N4DN and GM3XUW.

It was mostly sideband on 21MHz for John G3BDQ, by way of UI8TAA, 7X2VXK, UA9QCP, RH2E/RA3QAK, BV5AP, BV5BG, LU8XW; but VK7RY, BV3BI, VU/HA5BUS and RL7PJI were on c.w.

Finally ON7PQ; Pat tried 14MHz c.w. for 3D2UU, N0TG/KP1, 3D2WZ, OD5/LA4GHA, KD7P/NH7,

WA2C/WP4, NH0/N8CC, HS0ZAA, VS6WV, 7P8FE, F05JR, V63AX, 9M2FR, FK8FG, T32BW. As for 21MHz, it turned up 9K2TK, A35DX, DF2UU/KH8, AA4NC/KP1, 3D2UU, VK9XM, J77UY, KH0/K8AQM, JE7LHT/JD1, 5R8GW, ZD8Z and A22GH.

Contests

Just a couple of contests to mention this time; March 28/29 for the CQ WW SSB WPX Contest; April 18/19 for the SARTG WW AMTOR contest, and then the CQ WW SSB WPX Contest weekend May 30-31. Not of course to forget NFD on the first weekend in June.

That's the lot for this time. Send your lists to reach me by April 1, May 3, and June 1 at the address given at the head of the piece. Thanks.

Solar Data For February 1992

During the last week of January there were a number of significant flares, the largest being an X1/3B on the 26th and an M4.9/2B on the 30th. Major solar storms were reported on January 26 and February 2 and between February 3-9, 11 M-type flares were recorded. An impressive long duration M4.3/2B flare also erupted in a favourable position on the Sun at approximately 1052UTC on February 6.

Magnetic storms occurred on February 3 and February 8, and in the period between February 10-16, 10 M-type and one X-type flares were reported. More magnetic disturbances occurred between February 17-23 with 14 M-type flares during the period. It was therefore hardly surprising that a number of auroral events took place on the v.h.f. bands during February! Propagation on the 50MHz band was also exceptional, especially during the first three weeks of the month.

Solar flux levels increased from a low of 152 units on January 18 to 303 units on January 31, declining to 198 units by February 14, but picking up again to 255 units on February 25. The geomagnetic A index, measured at Boulder, was at sub-storm levels during the first week of February, reaching 48 units on February 3, 45 units on February 8-9 and 46 units on February 10.

It then remained generally quiet for most of the month but became

Back-Scatter

VHF Up

Reports to
David Butler G4ASR
Yew Tree Cottage

Lower Maescoed, Herefordshire HR2 0HP

active again reaching 40 units on February 20, 64 units on the 21st and 20 units on February 22. Between February 26-29, it measured 38, 42, 41 and 28 units respectively, certainly a very magnetically disturbed period.

Auroral Events

As predicted, activity via auroral modes of propagation was very prevalent during February. In central England, events were recorded on February 1, 2, 3, 8, 9, 20, 23, 24, 25, 26, 27 and 29th. Some of the openings were fairly large scale, allowing contacts up to 2000km to be made on the 144MHz band.

Martin Andrews GM6VXB (IO97) thought that the aurora on February 1 was quite good, and from 1550UTC he made s.s.b. contacts on the 50MHz band with stations in DL LA, OY, OZ and SM. He passes on the news that he expects to have a 50MHz station operational from an oil rig in locator JD18, and that he will be active during alternate two week periods.

During the aurora on February 1,

Ela Martyr G6HKM (JO01) worked GM3XOQ (IO99) on the Shetland Islands plus three other GM stations. More 50MHz QSOs were made on February 8 with LA4TE (JO59), SM3EQY (JP81), SM6BZC (JO67), SM6HYG (JO58) and G, GD, GM, GW, DL, ON and PA.

An event on February 9 found GI7FOD (ID74), GM4IGS (IO75) and GM4OGI (IO85) on the 50MHz band and GM0GDL (IO86) on the 144MHz band. Ela made many 50MHz contacts during the widespread opening on February 20 including DL6NF (JO33), EI2EFB (IO64), OZ7JV (JO45), SM7FJE (JO65) and stations in G, GM, GI, GW, ON and PA. Up on the 144MHz band s.s.b. contacts were made with EI3GE, GM7IKA, GM7JED, GM7KDW and GM0HSU.

On February 1, I made c.w. QSOs with GM3WTA (IO87) and SM5MIX (JO78) on the 144MHz band and s.s.b. contacts with GM6VXB (IO97) on both the 50MHz and 70MHz bands. A weak event, on February 2, found EI4DQ (IO51) and G8RZ (IO84) on the 144MHz band but conditions were very much better on February 8, with c.w. contacts being made

with HB9DFG (JN37), HG0HO (KN07), LX2PA (JN39), OE2UKL (JN69), OE3XHF (JN76), OE5KE (JN78), RB5PA at 1900km, SP20FW (JO93), SP7JSG (K001), YU2EZA (JN86) and YU3ZW (JN86). QSOs were also made from my QTH (IO81) with DL, F, ON and PA stations. An event on February 9 produced GM4AFF (IO87) and GM4DIJ (IO85) on the 70MHz band, GM4ISM (IO85) on the 50MHz band and OZ1AZZ (JO57), SM4IVE (JO79), DL, EI, G, GM and PA on the 144MHz band. This band also gave me c.w. contacts with GM4DJS (IO85) and LA6VBA (JO48) on February 24 and in a much better event on February 26, between 1845-2045UTC, c.w. contacts with I1DMP (JN35), OE3JPC (JN88), RB5PA, SP20FW, YU2EZA and many DL stations.

John Regnault G4SWX (JO02) also made the most of the opening on February 26 and between 1955-2057UTC he worked many 144MHz stations including HB9DBM, HB9DFG, HG8CE, I1DMP, I1JTQ, IK1ODO, OK3KMY, OK3LQ, SP20FW, SP4MPB and YU1WP. John caught an excellent widespread opening on February 29, (why do these good events always occur when I'm at an RSGB v.h.f. committee meeting?) the best of the bunch being ES2XM (K029), OH3EX (KP20), OH5LK (KP30), RB5PA (K021) and UZ2FWA (K004).

Meteor Scatter

Conrad Farlow G6ZTU is now active on meteor scatter using both

Back-Scatter

c.w. and s.s.b. His 144MHz station consists of an FT707, LT2S, 4CX1000A amplifier, a mast-head l.n.a. with 0.5dB n.f. and four 9-element Yagis. During the Geminids shower in December, he worked DL5MAE, EA3BTZ, HA7AJ, HG7ULP, OK1IBL and YU7EF. He also heard EA2LY, EA3IH, IK0SMG and OH2AV.

The Quadrantids shower in early January was even better and Conrad contacted EA3FLN, EA6FB, FC10DA, HA5PT, HA7P, HG8CE, IW1AZJ, IK2DDR, IV3HWT, IK4DCO, IW5AVM, ISJUX, IK0BZY, OE3JPC, SM3BIU, SP9EWA, SP9EWU, YU2PT, YU3XY, YT3ET and UV1AS at 2048km.

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 Tuesday 21st around 2130UTC. 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 on Monday May 4 around 2030UTC. 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.

Moonbounce

Apologies for giving the wrong date, last month, of the REF e.m.e. 'moonbounce' contest, but the details given in a Scandinavian magazine were totally inaccurate. Hopefully, the information in *Radio the REF Revue des Radioamateurs Francais*, should be correct and although you've missed the first leg, held on March 14-15, there is time to prepare for the second leg on May 9-10. The chart, Fig. 1, gives details of moon rise and moon set when you may hear DX signals with your conventionally mounted antenna system.

Despite running a modest e.m.e. set-up of four 9-element Yagis, G6ZTU has worked over 40 stations and heard three two-Yagi stations in three months of operation. Contacts made in December included IW5AVM, OE3UP, OH5Y, OH7PI, OK1MS, OZ4MM, SM2CEW, SM5MIX, N1BUG, K2GAL, KA5AIH, WB5LBT, W5UN, W7HAH, KB8RQ, AF9Y, K9MRI and KO1FL. New stations worked, or initials as the e.m.e. brigade call them, in January, were DL3BWW, DL8DAT, HB9CRQ,

II1ANP, I1KTC, IK2DDR, KI3W, N5BLZ, K6MYC, K7CA, LA9NEA, OE5EYM, ON7RB, PA3DZL, PA3FSA, PA0JMV, RB5AL, SM3PWM, SM5FRH, SM7BAE, VE1BVL, VE7BQH and ZB0T. It is interesting to note that four of the stations, IK2DDR, PA0JMV, RB5AL and VE1BVL were using only two Yagis.

The G4SWX reports that European e.m.e. is booming, and that at least five new stations are appearing each month on the 144MHz band. During January, e.m.e. contacts were made with DK1KO, DL5MAE, DK9ZY, Y23RD, EA3DXU, F3VS, HG1YA, IK2EAD, IK3MAC, IV5AVM, LA6HL, OE3UP, OK1MS, PE1DAB, PA3FJY, SM2CKR, SM5FRH, SM5MIX, SK7AX, SM7BAE, N5BLZ, W5UN, WA6MGZ, N8AM, K9MRI, RB5PA, UA4NM, UA4NX, RA6HHT, UG6AD, UA9SL and ZB0T.

Results were equally good during February, and to give you a picture of the real activity that presently exists in Europe, I have included both worked and heard reports from G4SWX. Note also that much activity now occurs during the week, and not just at the weekend as used to be the case.

On February 8, despite an intense aurora, QSOs were made with IT90WA/2 and W5UN. American WA6MGZ was called on random, but got John's call sign as G4IWX! February 14 found KB5IUA for initial 162 followed, on February 15, by HB9DBM, I2FAK, ISJUX, LA9NEA, RB5AL, UA9XEA and VK3AMZ. Stations heard on the 15th included HB9CRQ, I1KTC, OE5EYM, OK1MS, OZ4MM, PA3FSA, UA4NX, RA6HHT, UA9FAD and UA9SL.

On February 16, contacts were made with GM4AFF, HG1YA, IK2DDR and SM0PYP with the following being heard, DJ6CA, F3VS, I2FAK, LA8YB, LA9NEA, LA0BY, OZ4MM, K1WHS, K2GAL, N5BLZ, W5UN, KB8RQ, AF9Y, RB5AL and UA9XEA. The 17th got IK2EAD and W2UHI in the log book with DK1KO, HB9CRQ, HB9SV, IK1MTZ, I2FAK, K3HZO and LA9NEA being heard.

Contacts on February 18 included DL3BWW, IK2EAD and RA6HHT with G3IMV, LA9NEA, OE3UP, SM7BAE and UA9XEA being heard. IK1MTZ was worked on the 19th with VK3AUU being heard for 30 minutes with a pile up of 10 stations. Not bad for a Wednesday

evening! Other stations heard included LA8YB, LA9NEA, PA3BXH, RA6HHT, RB5AL and RB5PA.

One QSO was made on February 20, with DF8LC for initial 170, the stations being passed over being DK9ZY, G3IMV, G3LQR, IK2EAD and RA6HHT. Since 1988, G4SWX has attempted 573 e.m.e. QSOs of which 453 were completed, a 79% success rate. A total of 170 stations have been worked on the 144MHz band, with 110 being worked without any prior scheduling. So far, two single-Yagi and nine two-Yagi stations have been worked. As John mentions, the 1990s are the decade of everyman's e.m.e!

The 50MHz Band

Propagation during the first few months of 1992 on 50MHz were tremendous, with a number of stations hearing or working all continents in under 30 minutes! On many days the band opened up to Australasia, allowing numerous low power stations to work the ultimate in DX with comparative ease.

Mark Trotman G1FYC (IO81), picked up a number of new countries during January by working YV5ZZ on the 2nd, CN8ST on the 3rd, OK1DIG on January 4 and K8EFS on the 6th. During this US opening he also made s.s.b. QSOs with KA2RDO, WA3DJG, K3QMX, N8MLE and K9HMB.

Terry Chaplin G1UGH (JO02) made his best DX so far, VK6PA (OG89) at 16624km, during an opening on February 16. Other good contacts included PT7NK (HI06) on February 20 and TR8CA (JJ40), ZS6PJS (KG46) and 4X1IF (KM72) on February 22.

Jim Smith G0OFE (IO90) thought February was a very interesting month making many

contacts via F2, Sp-E and aurora. He heard TU4DH on February 2 and some W8s on February 6 but was unable to work them. On February 7 he managed to catch K1DZS, K1TOL, VE1MQ and VE1DX before the band closed at 1650UTC. Conditions on February 8 were very good with Jim hearing KG6UH/DU1, VK5BC and many VK6s in the morning and HC1BI, KP4A and P43AS at midday. At 1410UTC he worked HI8A after which the Caribbean signals faded and a large scale aurora commenced. Conditions on February 15 were described as 'spotty', but KG6UH/DU1 was eventually worked for a new one and UL7GCC was also heard but he disappeared under the pile-up! Towards the end of the month a number of new countries were worked including ZD8LI and 4X1IF on February 22, UL7GCC on February 23 and EI5FK via aurora on February 26 for country no. 80.

At my QTH, events on January 6 and February 8 were the highlights of a very interesting winter season. On January 6, following a day of intense European Sp-E activity, the band opened up to North America. What made this opening particularly interesting was the fact that propagation was most definitely via Sp-E at the UK end of the path.

In a westerly direction this propagation mode is preferred at my QTH, as the Black Mountains are located only a few kilometres away and received signals are very much stronger if they arrive via the E-layer, rather than the corresponding F-layer path. Between 1708-1856UTC I made 42 QSOs with stations located in all US call areas apart for W6 and W7. The ARRL locator map, Fig. 2, shows the extent of the opening stretching over as far as K5FF and W5FF (DM64) in New Mexico at a distance of 8000km.

The second opening worthy of note occurred on February 8 when, between 1135-1210UTC, contacts were made with VK6AKT, VK6HK, VK6JJ, VK6KRC, VK6KZ, VK6RO, VK6SQ,

SATURDAY MAY 9			SUNDAY MAY 10		
UTC	AZ	EL	UTC	AZ	EL
0000	281	09	0000	268	13
0030	286	05	0030	273	08
0100	292	00	0100	279	04
1130	74	02	1300	84	03
1200	79	06	1330	90	08
1230	85	11	1400	96	12
1300	91	15	1430	102	16
1330	97	19	1500	108	21
1400	103	24	1530	115	25
2230	250	26	2230	235	28
2300	256	22	2300	242	24
2330	262	17	2330	248	20

Fig. 1: Moon rise and moon set times during the REF e.m.e. contest.

VK6WD and VK6YU, all stations being located in the area DF77, DF78 and OF88. Incidentally, I found VK6RO up on 50.250MHz calling CQ on f.m., as the QSL card in Fig. 3 shows.

This leads very conveniently to a letter from the man himself, **Graham Rogers VK6RO**. He reports that this opening lasted over five hours, from 0814-1330UTC and that contacts were made with 12 countries and 71 stations, 40 on s.s.b. 23 on c.w. and eight on f.m. He claims that a QSO with G0JHC at 1154UTC on February 8 was the first Australia to UK f.m. contact on the 50MHz band. Graham mentions that Perth is the most remote capital city in the world, and that the opening was the biggest he had experienced in over 40 years!

The 144MHz Band

Tropo conditions on the 144MHz v.h.f. and u.h.f. bands, were remarkably good during January and February, with an extended opening to the northern coast of Spain covering a large area of the UK and excellent propagation into central Europe lasting for many days.

On February 6, **GW6TEO** (I071) heard a number of very strong s.s.b. stations situated on the north coast of Spain and managed to work EA1YV (IN52) and EB1EFC. On February 7 he worked EA1DAV (IN63) and EA1DKV (IN53). He then went on to work, from 1330UTC, 48 stations in DL, PA and SP, the best DX being SP1HLE (J073) at 1357km. Gordon mentions that it was very difficult to work stations to the east because of the very strong signals from Spain on the side of the beam!

Terry G1UGH (J002), made the most of the good conditions by working DL6HCE and OJ9YE on January 31, EA1TA (IN53), EA1TJ (IN63) and F1CYB (JN17) on February 5, EA1CJT (IN63) on the 6th and DK1MG (JN39) and EB1DSD (IN63) on February 8.

The tropo duct from the northern coast of Spain continued through the UK up to I093, enabling John Hill G7CLY in Humber to work, on February 6, EA1CJT, EA1DKV and EA1TA.

Mary Lowe G0NZA (I093), had just finished working a local mobile station on February 6

around 1815UTC, when she was surprised to hear EA1CFF (IN53) and by moving to 145.325MHz, an f.m. contact was made with station located in La Coruna. Mary uses a Trio TR751E running 25W into a 5/8 over 5/8 colinear antenna.

Derek Moore G1THG (I080) mentions that his QTH in Dorset is not very good to the south because of local hills rising to 280m, and therefore he couldn't work any of the EA stations. However, in other directions he was able to work GD4XTT (I074), GM0PMW/P (I085), DK0OG (JN68), DL0WAE (J042), F6IPR/P (JN27) and HB9RCJ (JN37).

Ralph Sachs G2CZS (J001) missed the good conditions on January 31, but did catch DG1BCU (J042), DG1JL/P (J031), DJ5PG (J033), DL6IC (J043) and DG9BDV (J033) on February 1, DL0WU (J031) on February 2 and DJ9YE (J043) and DG0KW (J064) on February 7.

Paul Bradbeer GM7GUC, reports that the 144MHz band has been very quiet at his QTH in Fife. Not only that, but on a recent portable outing, the high winds got the better of his mast! Paul can often be found on s.s.b. at the weekends operating from one of the local high points. He uses an Icom IC275H, 100W and a 12-element ZL beam antenna. He is hoping to get active on either the 430MHz or 1296MHz band and is looking at sources of transverter kits for these bands. Can anyone help him please?

Alex Younger G1WNH, is a newcomer both to the v.h.f. bands and to this column. He suggests that it would be useful if a chart could be published in *PW* giving details of radio gear, power output and antenna systems used by readers of this column, so that others could judge which is the best combination to use for working DX stations on the v.h.f. bands. In principle, this may sound a good idea but in practice it's not quite as simple as that!

To work consistent DX on the v.h.f. and

u.h.f. bands, you will require a good antenna, a reasonable amount of power and experience. A good QTH is also very useful but not essential. Experience is probably the major component of successful DX working, but it takes a number of years and you never stop learning!

The 430MHz Band

Richard Girling G4FCD (I091) reckons that 1992 has got off to a tremendous start having, by the end of February, worked as many countries on the 144, 430 and 1296MHz bands as in 1991! The 430MHz band was open to Spain on February 5, 6, 8 and 22 allowing contacts to be made with stations located in IN53, 63 and 73.

The best tropo conditions occurred on January 31-February 1 with over a 100 stations in DL, OZ and SM worked on the 430MHz band and OZ1GEH and SM7ECM worked on the 1296MHz band. Conditions were also good into northern Germany on February 7, the best DX being DL1SUN (J053) on both the 430 and 1296MHz bands.

Geoff Brown GJ4ICD, reports that on January 30 he copied the Manchester repeater GB3MA at S9 and then went on to work G0MOK on f.m. using a simple colinear antenna. The beacons GB3MLY and GB3ANG were S9+ for most of the day, but there was very little to work on the band. However, during the evening, activity increased and contacts were made with DC7MH (J062), DF8LC (J053), Y21TC (J063) and OZ1BJF (J075). The band remained open on January 31 and over 300 s.s.b. contacts were made with stations in OZ and SM.

The Microwave Bands

Tropo conditions on the s.h.f. bands were especially good during the periods of foggy weather at the beginning of 1992. On January 31, G6HKM made 23 QSOs on the 1296MHz band, working many stations in Germany and the Netherlands. Elia also contacted OZ1GEH (J065) and G6YXT in Devon. Propagation was still good on the following day allowing s.s.b. QSOs to be made with DK5WO (J030) and PE1MII, who was only running 100mW.

Rik Royall G8ESB (I094) reports that his most interesting contact recently on the 1296MHz band was with **Alice Blackwell 2E1AIZ**. She is the daughter of G4PMK and can regularly be heard on the band. Rik

also mentions reports that he has a regular schedule with G6JQV (I092) at 1900 hours on Monday, Wednesday and Friday and at 1830 hours on Tuesday and Thursday. They start on 432.210MHz and then QSY to 1296.190MHz and although G6JQV has only a few watts on the 1296MHz band, they can normally make a QSO.

Do any other readers have regular schedules on these bands?

Write in and let me know and I'll publish details in this column.

VHF News

Details have been received of the 1992 Scandinavian v.h.f. meeting being held in Angelholm, (J066KG) Sweden, between June 5-8. The radio club SK70L is set in a forest alongside a sandy beach, where self-catering coastal chalets are available at special rates. If you fancy a short holiday, maybe taking the family, send me a s.a.e. and I will provide full details.

If you can't make it to Sweden, why not try the Weinheim v.h.f. meeting later in the year? It is located near Heidelberg (JN49) and will be held between September 18-20. Contact me if you want further information.

Expedition Update

Steve Bryan G1SGB, is hoping to be active from the Sule Skerry lighthouse during April. He will be active on the 144MHz band, concentrating mainly on WAB.

The expedition to Georgetown, Guyana (GJ06) by G3JVL, G3SED, G4CCZ and G4CVI is taking place between April 20 to May 22. The group will be very active on the 50MHz band.

Beacon And Repeater News

A new v.h.f. repeater GB3LG, located at Lochgilphead, Argyll, is now operational on channel R3. Contact A.Fraser GM3AXX for further details.

QRZ Contest!

The leading stations in the RSGB 144MHz fixed station and AFS contest held in December were G4HUP (1st), G4DHF, G3XDY and G1LSB in the single operator section and G4ANT (1st), G4KUX, G4DSP and G0LIP in the multi-operator section. Winners of the affiliated societies section were Spalding and District, followed by the Martlesham DX and Contest Group, Sutton and Cheam Radio Society and the Rugby Amateur Transmitting Society.

An RSGB contest covering all bands from 430MHz to 24GHz is being held on May 2-3 between 1400-1400UTC. There are sections for single operator, multi-operator and listeners. The contest exchange consists of callsigns, RST, serial number and locator. The 430MHz Trophy contest will run during the first eight hours, 1400-2200UTC on May 2. There are sections for the single operator fixed station, single

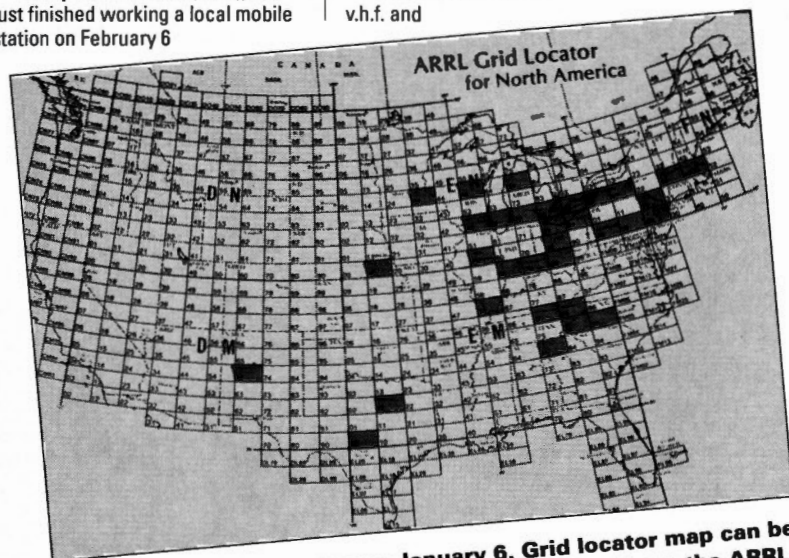


Fig. 2: 50MHz opening on January 6. Grid locator map can be obtained from the ARRL.

AVO Model 8 multimeter with case and leads£40
 500V Meggers£35
 Navigational gyroscope assemblies. Bausch and Lomb
 twin turret large bench microscope.....£250
 240V/110 1kW transformers (not cased)£25
 A quantity of government surplus instruments, oscilloscopes, etc.
 Send SAE for lists. VAT extra.
AC ELECTRONICS, 17 Appleton Grove, Leeds LS9 9EN Tel: (0532) 496048

IBM PC SOFTWARE BY G4BMK

RTTY, AMTOR, CW (Tx and Rx) SSTV, FAX, Audio Analyser (Rx only). See review PW June 1990 page 66. A high performance multimode program for IBM PC compatibles, £80 complete. Any mix of modes to your choice - send SAE for details and prices.

ATARI ST

RTTY, AMTOR, CW and Analyser for Atari ST/STE works with hi-res or medium res display. £49. Printed manual £5. Use with ST5 Versaterm etc, or our matching built T.U. £56. State call sign, if any, and disk size with order. Add £1 p&p.

GROSVENOR SOFTWARE (PW)

2 Beacon Close, SEAFORD, East Sussex, BN25 2JZ Tel: (0323) 893378

TENNAMAST for TILTOVERS

GM60AL - GM4VHZ - GMONHH

Our wind up, tilt-over Tennamasts are now better than ever. We continue to expand the range, and now galvanise all our masts to BS729. They are safe and easy to use, slim, elegant and economically priced.

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, Beith, Ayrshire KA15 2HT

AIRCRAFT RADIO ARC-44 F.M. T/Rx covers freq. 24/51.9 Megs in 280 100Kc chan. Tx nom. 8 watts into 50 ohm for use on 26VDC nom. 5 amps. Inst. comprises T/Rx Control Box & Dynamotor unit with circs. £38, also available with 8ft. fibre glass whip Ae & Ae matching unit £54. **ACCEPTOR UNITS** made by Marconi for use with Army R234, Rx covers freq. 2/29 Megs in 4 bands with direct cal. dial as two tuned circs. per band, nom. 75 ohm in/out on 19" panel. £32. **VHF A/CX T/Rx STR.37** compact unit for use on 26V DC, covers freq. 116/135.9 in 50 Kc steps with o/p for ph or spk, tested with connec. £68. **BRIDGE CRL** Services type CT492 general purpose CRL Bridge Meter Ind. with Auto Balance portable battery operated, reqs. 9v. As 7 ranges per function decade scale meter 0 to 10 Res FSD 10 ohm to 100 Meg, Cap 10pF to 10uF, Ind 100 Oh to 100 Hs also provision for leakage, in case size 11x9x8", tested with book. £95. **WATTMETER** CT443 Small low power absorption type w.m. for use on 50 ohm systems freq. 1 Kc to 1Gz as three ranges 100/300 Mill/W & 1 watt direct cal. meter in case 7x8x7" with front cover tested. £45. **VARIAC ASS** 240/270v 2 amp variac with both manual and motor drive 24v DC on base ass. with limit swts and clutch etc. £33. **FREQ. CONV.** Racal RA.70 converts 100 Kc O/P IF from Rx to 14KC to adapt to PV78 FSK conv. would adapt to other freqs. self-contained unit on 19" panel with valves p.u. etc with circ. £26. **SWITCH** UNIT Rotary coax swt 50 ohm T/Rx as 1 pole 6 way selection with N type sks with 1/2 shaft, some plugs with swt. £28. **ARMY Rx R234** 2/27 Megs in 25 bands large unit in 4ft rack AM/SSB/DSB/CW/FSK, further details on request. £195. **NAVY** Tx large units, 2-30 Megs, 8 bands. £125, also VLF Rx assembly 10/200 Kc, no power unit or info, £65. Both items callers.

Above prices inc. carr. & VAT. Goods Ex equipment unless stated new. 2 x 24p stamps for list 49.

A. H. SUPPLIES

Unit 12 Bankside Works,
 Darnall Road, Sheffield S9 5HA
 Phone: (0742) 444278

PACKET/DIGITAL RADIO

"KANTRONICS VERSION 5.0 UPDATE NOW IN STOCK"

EXCITING NEW PRODUCTS FOR 1992!

Over the past year we have spoken to many of you at radio rallies and telephone to find out the sort of products you want to see in 1992. As a result we have come up with what we feel are interesting new additions to our already extensive range (the UK's biggest).

OUR NEW 4 PORT PC-TNC.....

For those with really serious applications in mind by the time you read this ad our new FOUR port PC card will be available. The impressive specifications includes:
 Port 1 - VHF/UHF 1200 baud
 Port 2 - HF (300) & VHF/UHF 1200 Baud
 Port 3 - 9600 baud (licensed from G3RUH of course)
 Port 4 - Hi-speed/PSK header

The world standard G8BPQ networking software has already been written for the card and is of course provided free of charge with the card together with a modified version of the excellent BayCom terminal for those who just want to get out there and enjoy packet at it's best. **AVAILABLE NOW!**
 Phone/write for details

OUR AMAZING MINI-PAK SYSTEM....

If you are not using packet yet and you own a PC you ought to be seriously considering our Mini-Pak system. At under £80 it represents excellent value and uses an especially prepared version of the excellent BayCom software (under license). **AVAILABLE NOW!** Phone/write for details.
 SEE MARCH 91 HRT REVIEW!

If it's in stock (and it usually is) we will despatch it the same day.

NOTE: Prices include VAT, carriage extra.

Siskin Electronics Ltd

2 South Street,
 Hythe, Southampton,
 SO4 6EB.
 FAX: 0703-847754



NEW! 40M QRP TX/RX KIT

COMPLETE TO THE LAST NUT!

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

* CASE AND ALL HARDWARE INCLUDED *

DTR7 - KIT £87.50 READY BUILT £140.00

Post, packing & insurance £3.00

Send SAE for Brochure or call Alan, G4DYW on 0602 382509



LAKE ELECTRONICS

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



QUARTZ CRYSTALS

QuartzLab

MARKETING LTD

P.O. Box 19 Erith Kent DA8 1LM

Telephone: 0322 330830

Fax: 0322 334904

Telex: 8813271 GECOMS-G

(Attention QUARTSLAB)

An SAE with all enquiries please

STOCK CRYSTALS

CRYSTALS FOR 2 METRES
 HC25 £3.00 FOR ONE CRYSTAL OR £2.75 EACH FOR TWO
TX CRYSTALS
 12MHz 30 RX CRYSTALS
 44MHz Series Res RO-R7, S8-S23
 14/15MHz 30pF Scanner Crystals
 SR9 Crystals £4.00
HC6 £3.30 FOR ONE CRYSTAL OR £3.00 FOR 2 OR MORE
TX CRYSTALS
 4MHz 30pF RX CRYSTALS
 44MHz Series res RO-R7, S20-23
4 METRE CRYSTALS FOR 70.26 IN HC6/U AT £3.60 each or £7.00 per pair
 TX 8.78250 RX 29.7800
70CM CRYSTALS 7.00 pair or £3.60 each
 For Pye P22 & P270 series and FDK MULTI U11 SU20 RB0 RB1
 RB2 RB3 RB4 RB5 RB6 RB7 RB8 RB9 RB10 RB11 RB13 RB14 RB15
 Also for MULTI U11 ONLY SU16 SU18
CONVERTER CRYSTALS IN HC18/U AT £3.70 each
 22.000, 38.666, 42.000, 96.000, 116.000
FREQUENCY STANDARDS £3.70 each
 HC6/U 1000kHz 10.000MHz
 HC18/U 7.000MHz 10.000MHz 10.700MHz 48.000MHz 100.000MHz
TONEBURST, I.F. & MPU CRYSTALS IN HC18 £2.80 each
 7.168MHz (for 1750 Hz Tone), 10.245 (for 10.7 I.F.)
 3.2768 4.000 5.0688 10.245MHz 15.0000
YAESU CRYSTALS FOR FT101 etc £5.00 each
 Many available ex stock (A list is available on request - please send S.A.E.)
 Full list available on request, please send S.A.E.

MADE TO ORDER CRYSTALS

FUNDAMENTALS	PRICE	FREQUENCY RANGE	OVERTONES	PRICE
1.5 TO 2.0MHz	£7.00	3rd OVT 21.00 TO 60MHz		£3.35
2.0 TO 4.0MHz	£8.00	3rd OVT 60.00 TO 75MHz		£3.50
4.0 TO 6.0MHz	£5.50	5th OVT 60 TO 110MHz		£3.00
6 TO 22MHz	£5.35	5th OVT 101.00 TO 126MHz		£3.75
22 TO 26MHz	£7.65	7th OVT 125.00 TO 175MHz		£12.00
		9th OVT 170.00 TO 225MHz		£12.20

Unless otherwise requested fundamentals will be supplied for 30 pf load capacities and overtones for series resonant operation.

HOLDERS - supplied for crystals above 2MHz

HC6/U & HC33/U 1.5-175MHz
 HC18/U & HC25/U 2-175MHz
 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. Add 50% to the cost of made-to-order crystals for 5-day service.

CRYSTALS SOCKETS HC25 £0.35 each 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

RSGB'92

National Convention and Amateur Radio Exhibition

**Saturday 30 May &
Sunday 31 May**

**HALL 7, NATIONAL EXHIBITION
CENTRE, BIRMINGHAM**

- Large Trade Exhibition
- Morse Tests (Saturday only, by appointment with RSGB)
- Lecture Programme (Saturday only)
- Radiocommunications Agency Stand
- Novices Meeting Point
- All Stands Under One Roof
- Unlimited Free Parking
- Kantronics Packet Seminar (Saturday only)
- Membership Liaison Area
- Specialist Advice from RSGB Committees



Opening Times:

Saturday 30 May, 10 until 6

Sunday 31 May, 10 until 5

Talk-in on 2 metres, S22

(Access for disabled at 9.30 am both days)

Entrance fee: £3. Concessionary: £1.50
(includes free parking and shuttle service to Hall 7).

Children under 12 years of age accompanied by an adult are admitted free of charge.

Organised by the RSGB Exhibition and Rally Committee.

**Trade stand enquiries welcome to E and R Chairman,
Norman Miller, G3MVB, 178 Warley Hill, Brentwood,
Essex CM14 5HF (tel: 0277 225563).**



**Radio Society of Great Britain
Lambda House, Cranborne
Road, Potters Bar, Herts. EN6 3JE**

SANGEAN ATS 803A

(Direct key-in world receiver
with quartz alarm clock timer)

Specifications and features

★ 150-29.999 continuous tuning with no gaps. Phase locked loop-double conversion Superheterodyne ★ Full shortwave/AM/SSB 150-29999kHz no gaps! + FM87.5-108 mono/stereo ★ Five tuning functions: Direct press button frequency input auto scanning, manual scanning memory recall and manual tuning knob ★ Built-in clock and alarm. Radio turns on automatically at preset time and frequency. ★ Large digital frequency display. ★ Fourteen memories - nine memory channels for your favourite station frequencies. Last setting of mode and waveband stored in five memories. ★ Direct press-button access to all 12 shortwave broadcast bands. ★ Two power sources - battery or AC mains adaptor. ★ General coverage of all AM bands in LW/MW/SW (dedicated broadcast band coverage on all versions), plus of course the FM band for quality sound broadcasts in headphone stereo. ★ SLEEP function turns the radio on or off after an adjustable time of 10-90 minutes. ★ Separate BASS and TREBLE controls for maximum listening pleasure. ★ External antenna jack for better reception. ★ Adjustable RF GAIN control to prevent overloading when listening close to other strong stations or if there is interference. ★ New improved wide/narrow filter (6/2.7kHz) ★ BFO control (Beat Frequency Oscillator) enables reception of SSB/USB/LSWB (single side band) and CW (Morse Code) transmissions. ★ Illuminated display to facilitate night-time use. ★ Designed for both portable and desk top use. ★ Five dot LED signal strength indicator.

DIMENSIONS: 29.2cmx16.0cm (11.5inx6.3inx2.36in).

OUTPUT: 1200mW (10%THD) WEIGHT: 1.7kg (3.75lbs) without batteries.

Wide/narrow filter switch.

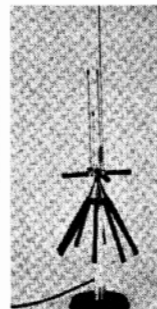
£109.95 + £5 check, test and p&p.

SKY SCAN

**Desk Top Antenna
Model Desk 1300**

Built and designed for use with scanners. Coverage: 25 to 1300MHz. Total height - 36ins - 9ins at widest point. Comes complete with 4 metres of RG58 coax cable and BNC connector fitted. Ideal indoor - high performance antenna and can also be used as a car antenna when your car is static. REMEMBER YOUR SCANNER IS ONLY AS GOOD AS YOUR ANTENNA SYSTEM!

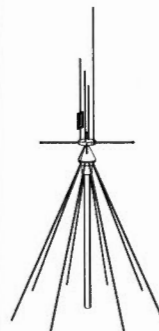
£49.00 + £3.00 p&p



SKY SCAN V1300 Antenna

Most discons only have horizontal elements and this is the reason that they are not ideal for use with a scanner. Most of the transmissions that you are likely to receive on your scanner are transmitted from vertically mounted antennas. The Sky Scan V1300 discone has both vertical and horizontal elements for maximum reception. The V1300 is constructed from best quality stainless steel and aluminium and comes complete with mounting pole. Designed and built for use with scanners.

£49.95 + £3.00 p&p



SKY SCAN Magmount MKII

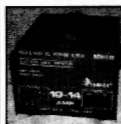
For improved performance, wide band reception, 25 to 1300MHz. Comes complete with protective rubber base, 4m RG.58 coax cable and BNC connector. Built and designed for use with scanners.

£24.95 + £3.00 p&p



SAMLEX®

Regulated 13-8V DC power supply
WITH SHORT CIRCUIT PROTECTION



**Model RPS1210
10-14 amp.
£49.95 +
£5.00 p&p**



**Model RPS1215
15-20 amp.
£69.95 +
£5.00 p&p**

S.R.P. TRADING

Manufacturers and distributors of communications equipment

Unit 20, Nash Works, Forge Lane, Belbroughton, Near
Stourbridge, Worcestershire.

Telephone: (0562) 730672 Fax: (0562) 731002

Showroom opening times: Monday - Friday 9.00-5.30 pm

Saturday 9.00 - 1.00 pm.

Callers welcome.



operator portable, all others and listeners.

On May 16-17 between 1400-1400UTC, an RSGB 144MHz contest is being held for single operator fixed stations, single operator portable, all others and listeners. An interesting departure is that there will be a separate, six hour duration event, for single operator fixed stations. Operation may take place, without any breaks, for any continuous period of six hours starting on the full hour, for example, 0200-0800UTC. Especially useful if you have TV! The contest exchange consists of callsigns, RST, serial number, locator and county.

Whilst on the subject of contest exchanges, it is good practice to give the information in the following way. "G9XYZ, you're five seven, zero twenty-two, in Italy Oscar eight one Mike X-ray, seventeen kilometres north-east of Abergavenny, from G9ZYX over." In this way you follow the format of the standard v.h.f. log sheets. It can get a little confusing



Fig. 3: Australia to England on 50MHz f.m.!

when you receive, "G9XYZ, you're a good signal, five and nine on my meter. The location here is three miles north of Epping, in the county of Essex. I don't know my QRA but the WAB is tango lima five zero. I hope you've got that OK. Oh! By the

way you're zero zero one. Is that a roger!"

Summer microwave contests have been scheduled by the RSGB microwave committee to take place between 0900-2100UTC on the following Sundays, April 26, May 24, June 14, July 19, August 16, September 13, October 3-4, the latter to coincide with the IARU

contest arranged for the same weekend.

Scandinavian activity contests will be held between 1800-2200UTC on the following dates, 50MHz on April 28 and May 26, 144MHz on May 5 and June 2, 430MHz on April 14

and May 12, Microwaves on April 21 and May 19. A full set of rules can be obtained from myself on receipt of a s.a.e.

Deadlines

Please send your letters to reach me by the end of the month. I always write up the column in the first week of the following month. Don't forget that I can also receive messages via packet radio at my mailbox GB7TCM and I can also be contacted at my DX cluster GB7DXC.

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. They will all be returned to you.

144MHz QRB Table Top distances (km)

Tropo 3160	GM4YXI
Aurora 2143	G4YTL
Sp-E 3080	GOEVT
Meteor3100	GW4CQT

Back-Scatter

Broadcast Round-up

Reports to Peter Shore via the PW Editorial Office

I have reported about Esperanto and Latin broadcasts in this column over the last year. Now comes news from the Head of Radio Finland's External Service that YLE, Finnish Broadcasting, is to publish a book of the Latin news broadcast by the station since it started in 1989. The book, called *Nuntii Latini* will be available from YLE in Helsinki. However, Swiss Radio International in Berne is to stop Esperanto broadcasts at the end of March, since the station believes that English is now more widely spoken in the eastern part of Europe, where the largest following of the language was.

Satellite continues to increase its role in international radio here in Europe. Radio Sweden will be on Astra 1A by the end of March, and anyone who can pick up Tele-X at 5° east, which carries Scandinavian television services, will also be able to receive Radio Sweden. There's a new line-up of times for European listeners from March 30, and details are in the European Stations section. Meanwhile Swiss Radio International is pressing ahead with its plans to use Astra 1A so if you have a dish, keeping scanning the audio sub-carriers.

The changes in the former Soviet Union are still having knock-on effects to the external services of the Republics. There are more and more disputes over who should pay for the use of transmitters. Stations such as Radio Vilnius are suffering particularly badly at present, as they cannot afford the huge rates being demanded by the Ukrainians and others for use of transmitters on their territories. Some of the latest frequency news for Vilnius and Kiev is carried in the European Stations section.

A new relay station for Radio Exterior de Espana is nearing completion in Costa Rica to serve

the Americas. Meanwhile old transmitters used by Radio Independent Spain, which operated during the Spanish Civil War, may be used soon by REE for European services. The four transmitters are in Romania, and are rather antiquated but believed to be serviceable. More details soon.

If you like to keep an eye on propagation conditions on the short wave bands you might like to know what the predicted sunspot numbers are for the first part of 1992. February to July's predictions are: 129, 126, 123, 121, 119 and 117. The margin of error is ± 31 . The actual average for January 1992 was 149.

If you've been wondering what the new Sony ICF-SW77 receiver is like, here's your answer! The new set, retailing at around £330, is the replacement for the ICF-2001D which has been around since the mid 1980s. The new set is similar in size and offers continuous coverage on a.m. from 1560kHz to 30MHz, as well as v.h.f.-f.m. with stereo through personal headphones.

The synchronous detector mode first seen on the 2001D, is also on this set but is easier to use. There is an annoying feature associated with it, though, for every time the synchronous detector circuit locks, the bass of the audio is cut, leaving a very difficult signal to listen to. There are 162 memory channels, 82 of which are pre-programmed with

the frequencies and operating times of the major international stations. A sophisticated clock and timer facility allows the set to be switched on automatically, and if a cassette recorder with a remote start socket is connected, will start recording for you. The new Sony is a reasonable performer, although sensitivity is not all it could be. A more detailed report will appear in a future edition of *PW's* sister magazine, *Short Wave Magazine*.

European Stations all times GMT(=UTC)

Radio Austria has been carrying out s.s.b. tests on 9.875MHz to North America between 0000 and 0300. These are heard clearly in the UK in German, English and French.

Croatian Radio continues to air short English newscasts on 9.83 and 7.24MHz noted by Roy Merrill at 0902 and 1303. Later broadcasts are inaudible because of heavy QRM.

Radio Vilnius wants listeners to FAX reception reports to them on Vilnius 660526.

Radio Ala, the Russian station which predominantly broadcasts folk music, has moved to 6.015, noted in parallel with 5.04MHz at 2200.

Radio Sweden makes changes to its English programme times on March 30. The first broadcast will now be at 1330 and the evening one hour English block will move from 1930 to 2030GMT to take account of

the time change in Europe. The English service will also be carried on Astra advises George Wood, presenter of *Mediascan*, which is heard on Tuesdays.

Radio Kiev in the Ukraine has English transmissions at 2200 on 9.785, 7.38, 6.02 and 5.96MHz and again at 0100 on 17.69, 17.605, 9.86, 7.40, 7.24 and 4.825MHz.

African And Middle Eastern Stations

Roy Merrill has been hearing the Angolan clandestine station, 'The Voice Of The Resistance Of The Black Cockerel'. It signs on 9.70MHz at 0440 with poor signals in the UK. Much better reception is offered at 1754 on 7.10MHz. The station identifies in Portuguese as A Voz da Resistencia do Galo Negro, often abbreviated to VORGAN. The identification comprises a cock-crow repeated twice, followed by a nine note organ phrase and Portuguese id, repeated until a brass band interlude at 1758 with a YL announcer and a further chorale. The evening transmission can rate up to SIO 333 with BBC QRM from 7.105MHz. Since the beginning of the year the schedule has run from 1645 to 2300, and is more difficult to detect. Signals tend to disappear by 2000 at the latest.

The RDN Tchadienne in N'djamena can often be heard on 6.165MHz in parallel with 4.9047MHz from 0426. A four second chord on the balafon, repeated twice at 10 second intervals, precedes the National Anthem and id in French at 0430. The channel is marred by the Breda carillon of Radio Netherlands from Bonaire, reports Roy Merrill.

Radio Ghana's External Service has been heard weakly by Roy Merrill signing on in English at 0644 on cluttered 6.135MHz.

Radio Kuwait is back on short

wave. There's a relay of the Arabic domestic service heard:

0400-1305 on 6.055MHz
1315-2345 on 11.99MHz

A broadcast to North America is on the air daily at 1700 for an hour on the old Radio Kuwait faithful frequency of 15.05MHz. An interview with the Head of the External Service of Radio Kuwait broadcast on Radio Netherland's *Media Network*, revealed that at the moment the station has only very limited capacity. It hopes to be back with a 24 hour-a-day schedule by the end of March, and to start the English service again by Independence Day on February 21. More news next month, but do let us have any reports to the *PW* Editorial Office in Poole.

Radio Nigeria in Kaduna is often heard with Hausa language programmes on 6.09MHz at 0530 with SIO up to 434. There are commercials for businesses such as the Universal Bank of Nigeria.

Radio Suid Afrika and R Orion have been regularly and clearly heard on 4.81MHz in Afrikaans initially from as early as 1715. Later R Orion rates up to SIO 332 in English until well after midnight.

Asian and Pacific Stations

Radio Alma Ata has increased English coverage with a new

transmission at 2030 to 2100, on many of its domestic second channel frequencies including 5.035, 5.26, 5.96, 5.97 and 9.505MHz. The station has been heard by Roy Merrill identifying as Radio Alma Ata World Service.

Despite the cutbacks of relays by transmitters in the former Soviet Union used by countries such as Afghanistan, Laos still has a French service relay apparently coming from Russia. Try at 1100 on 15.19 or 17.86MHz. Radio Afghanistan, meanwhile, is just about audible on 9.535MHz.

New Zealand will be heard on 11.735 between 1700 and 2200 from the end of March.

Radio Pakistan has English to Europe:

0800-0845 on 21.52 and 17.9025MHz
1100-1120 on 21.52 and 17.9025MHz
1700-1800 on 15.55 and 11.57MHz

The station was also noted by Roy Merrill on January 4 at 1015 on 21.52 and 17.9025MHz with commentary of the 3rd test between Pakistan and Sri Lanka with frequent mentions of the sponsors the Pakistan Tobacco Company

Back-Scatter

(who make Wills cigarettes).

The FEBC Manila service has English at 1530 on 11.995MHz offering European reception up to SIO 323.

American Stations

Radio Havana Cuba's English to Europe service has been noted:

2000-2100 on 17.705 and 9.76MHz

2200-2300 on 7.215MHz

Some frequencies would appear to come from the former Soviet Union, so it seems that relays of Moscow continue from transmitters in Cuba.

The HCJB service in Quito now uses a slightly lower frequency for its single sideband transmissions from an old Swiss PTT transmitter operating with 30kW, and it's possible to hear it in Europe throughout most of the day, with an SIO of 232 noted at around 1100. It's on the air 24 hours on 21.455 upper sideband, with English heard:

0030-0430 on 21.455-u.s.b., 15.155 and 9.745MHz
0500-0700 on 21.455-u.s.b., 11.925MHz
0700-0830* on 21.455-u.s.b., 11.73 and 9.585MHz
0730-1130 on 21.455-u.s.b.,

11.925 and 9.745MHz
1130-1600 on 21.455-u.s.b., 17.89 and 11.925MHz
1900-2000* on 21.455-u.s.b., 17.79 and 15.27MHz
2130-2200* on 21.455-u.s.b., 7.79 and 15.27MHz

Frequencies noted with an asterisk are beamed to Europe.

Station WCSN is noted on new 13.615MHz from 0800.

Station WWCR can be heard on 7.435MHz in the early morning with a DX programme at 0435 on Sundays and 0705 on Mondays, with a Sunday evening repeat at 1605 on 15.69MHz.

QSL card from WSHB.



A card promoting Radio Finland's latin news.

RST

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

AZ31	1.50	EL360	10.50	PL802	8.00	SAS8	6.00	ES27	3.00
CL33	4.00	EM24	10.00	PY33	2.50	SAS73	9.50	ES28	2.50
DY86/7	1.50	EM81	4.00	PY81	1.50	GAT6	2.00	ES29	3.00
DY86/7	1.50	EM84	4.00	PY82	1.50	SAUSGT	5.00	ES30	3.00
EB8CC	1.50	EM87	4.00	PY83	1.50	SAU6	2.50	ES31	4.50
E180E	1.50	EM89 Mull	7.50	PY86	2.00	SAWBA	4.00	ES32	4.50
E180F	25.00	EY51	3.50	PY500A	4.00	6B7	4.00	ES33	3.00
E180F	1.50	EY86	1.75	PY800	1.50	6B8	4.00	ES34	1.50
EAB8C8	1.50	EY88	1.75	PY801	1.50	6BA5	1.50	ES35	4.25
EB81	1.50	EY500A	3.00	QOV02-6	19.50	6BA7	5.00	ES36	3.00
EBF80	1.50	EZ800	1.50	QOV03-10	5.00	6BE6	1.50	ES37	2.50
EBF89	1.50	EZ81	1.50	QOV03-10 Mull	15.00	6BH6	2.50	ES38	2.25
EBL31	12.50	GY501	3.00	QOV03-20A	25.00	6B6	2.25	ES39	2.25
ED81	6.00	GZ32	6.50	QOV06-40A Mull	40.00	6BH6	2.25	ES40	2.25
EC833	7.50	GZ33	4.50	QV05-12	10.00	6B7A	3.00	ES41	7.00
EC835	6.50	GZ34 GE	7.00	R18	4.00	6B7	4.00	ES42	2.50
EC835	2.25	GZ37	4.50	R19	3.00	6BR8A	4.00	ES43	2.50
EC835	2.25	KT61	7.50	SP41	6.00	6B57	6.00	ES44	6.50
EC835 Siemens	2.25	KT66	20.00	SP61	4.00	6BW5	4.50	ES45	7.00
EC835	3.50	KT66 GEC	35.00	U19	10.00	6BW7	1.50	ES46	20.00
EC835	4.75	KT77 Gold Lion	P.O.A.	U25	2.50	6BZ6	2.50	ES47	6.50
EC835	2.00	KT88	15.00	U26	2.50	6C4	1.50	ES48	1.50
EC835	1.50	N78	8.00	U37	7.50	6C5	3.50	ES49	3.00
EC835	3.00	DA2	2.70	UAB8C80	1.50	6C8BA	3.00	ES50	2.50
EC842	3.00	082	2.70	UBF89	1.50	6C8GA	5.00	ES51	1.50
EC842	3.00	OC3	2.50	UCH42	4.00	6CL6	3.75	ES52	1.50
EC842	1.50	OD3	2.50	UCH81	2.50	6C57 GE	5.25	ES53	300B(PR)
EC842	1.50	PD86	2.50	UCL82	2.00	6C6H	8.00	ES54	70.00
EC842	1.50	PD86	3.00	UCL83	3.00	6CWA	8.00	ES55	50.00
EC842	1.75	PD92	2.50	UF89	2.00	6D6	3.00	ES56	5.00
EC842	1.50	PD97	2.50	UL41	10.00	6DQ5 GE	12.00	ES57	15.00
EC842	2.75	PD900	2.50	UL84	2.00	6DQ6B	9.50	ES58	12.00
EC842	5.00	PD900	2.00	UY41	4.00	6EA8	3.00	ES59	27.50
EC842	5.00	PD92	1.50	UY85	2.25	6EHS	1.50	ES60	25.00
EC842	4.50	PD96	2.50	VR105/30	2.50	6F9	3.50	ES61	20.00
EC842	2.50	PD97	2.50	VR150/30	2.50	6G8B	4.00	ES62	25.00
EC842	4.50	PD902	2.50	Z759	35.00	6H6	3.00	ES63	10.00
EC842	3.50	PD905	1.75	Z803U	25.00	6H58	4.95	ES64	57.63
EC842	1.50	PD905	1.75	ZD21	3.50	6J5	3.00	ES65	4.00
EC842	1.50	PD9200	3.00	3B28	20.00	6J6	8.50	ES66	7581A
EC842	1.50	PL82	2.00	4CX250B EIMAC	62.00	6J7	4.00	ES67	60.80
EC842	1.50	PL83	3.00	5R4GY	6.00	6JB6A GE	15.00	ES68	15.00
EC842	2.15	PL84	2.00	5U4G	5.25	6JE6C	12.50	ES69	15.00
EC842	2.00	PL85	2.50	5V4G	4.00	6J5G5 GE	11.25	ES70	16.00
EC842	2.00	PL86	2.50	5Y6GT	2.50	6K50T	3.00	ES71	6.73
EC842	1.75	PL805	2.50	5Z3	4.00	6K7	4.00	ES72	7.00
EC842	2.50	PD500	6.00	5Z4GT	2.50	6K8	4.00	ES73	12.50
EC842	7.50	PL200	2.50	630L2	1.75	6K8B GE	11.95	ES74	10.00
EC842 Philips	12.50	PL200	2.50	6A87	3.00	6L6G	8.50	ES75	12.00
EC842 Siemens	4.00	PL81	1.75	6A86	4.00	6L6GCSYL	9.50	ES76	15.00
EC842	4.00	PL82	1.50	6AK5	4.00	6L6G Siemens	4.50	ES77	23.00
EC842	25.00	PL83	2.00	6AL5	1.50	6L6G GE	9.50	ES78	10.00
EC842	1.50	PL84	2.00	6AM6	1.50	6L7	3.50	ES79	15.00
EC842	2.25	PL504	2.50	6AN5	5.00	6L6	12.50	ES80	11.50
EC842	2.75	PL508	5.50	6AN8A	4.50	607	4.00		
EC842	4.00	PL509	6.00	6AQ5	3.25	6RHH8/6KX8	12.00		
EC842	2.00	PL519	6.00	6AR5	25.00	6SA7	3.00		

Prices correct when going to press

Tel: 081-684 1166 Open daily to callers Mon-Fri 9am-4pm - closed Saturday Fax: 081 684 3056

Valves, Tubes and Transistors.

Over 6000 types available from stock.

Terms C W O and Visa and Access cards accepted.

Orders despatched by return.

Quotations for any types not listed S.A.E.

Post and packing £1.00 per order + VAT

Telex 946708

Automatic Solution

Enthusiastic airband listeners are well aware of the usefulness in making tape recordings of communications. However, for some time the physical connection of an automatic tape recorder has proved difficult due to problems of complex interfacing and incompatibility. In response to this, AOR have manufactured a connecting lead to provide an "Automatic Solution" to your recording requirements.

Whether attended or not, the AR3000A will switch On/Off a tape recorder when an 'active' channel or frequency has been located then clears. This enables you to have a second listen to 'brief transmissions' and provides a permanent record of communications. If unattended, the AR3000A plus tape recorder enables you to return home with the knowledge that nothing has been missed. This facility also lets you review the day's communications within a matter of minutes.

The ready-made lead is called the AOR CR400 and will plug directly into a suitable cassette tape recorder. Although we do not suggest a specific tape recorder, make no model, we have tested the compatibility of the Realistic CTR-82 (Tandy) cassette recorder. It works very well in conjunction with the AR3000A / CR400 and the effectiveness cannot be questioned.

The AR3000A has a built-in real time clock and timer circuit to further add to its flexibility. You may program the receiver to switch on and start monitoring at a preset time while unattended.

The AR3000A offers an extremely wide frequency coverage from 100 kHz to 2036 MHz in all modes AM, NFM, WFM, USB, LSB, CW. The 400 memory channels and rapid rate of search and scan makes the receiver ideal for searching the vast frequency expanse of the UHF airband and saves hours of manual tuning.

R.R.P. AR3000A £765.00, CR400 £9.99, including VAT.

All Trade Marks acknowledged. If you are unable to obtain supplies of AOR products from your local dealer, you may order directly - we have a fast mail order service.

AOR (UK) LTD. Adam Bede High Tech Centre,
Derby Road, Wirsbworth, Derby DE4 4BG.
Tel: 0629-825926 Fax: 0629-825927

E&OE A subsidiary of AOR Ltd Japan

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	(15.00)
FT990	NEW HF Transceiver	1895.00	
FT707	HF Transceiver	1895.00	(10.00)
FE747(2)	2m Module (747)	185.00	(4.00)
FE747(7)	70cm Module (747)	235.00	(4.00)
FE747(6)	6m Module (747)	185.00	(4.00)
SP767	Speaker	71.47	(4.00)
FT747EX	Budget HF Transceiver	699.00	(10.00)
FT757GX	MkII HF Transceiver	1035.00	(10.00)
FP700	20A P.S.U.	223.75	(6.00)
FP757HD	Manual ATU	155.00	(6.00)
FAS14R	Heavy Duty 2m P.S.U.	254.37	(6.00)
FT738	Remote Aerial Switch	83.95	(4.00)
FT520	270cm 45/25W Base Stn.	1395.00	(10.00)
FT290MCI	2m/70cm Dual Band FM Mobile	859.90	(10.00)
FT290MHI	MkII Super 250 2m Multimode 2.5W	429.00	(6.00)
FT290MHI	MkII 6m M/Mode 2.5W	429.00	(6.00)
FL2025	25W Linear	119.00	(3.00)
FL5029	6m 10W Linear	112.00	(3.00)
YTA15	2m 45W FM Mobile	329.00	(6.00)
YTA40	2m Helical	8.88	(2.50)
YTA40	70cm 1/2 wave	12.77	(2.50)
MM15	Mobile Bracket	14.55	(2.50)
FT790	70cm Multimode	499.00	(6.00)
FL7025	70cm 25m Linear for above	142.85	(4.00)
FT76	250W 70cm H/Field	259.10	
FN99	Nicad Battery Pack (23/73)	29.30	(2.50)
FN810	Nicad Battery Pack (23/73)	35.25	(2.50)
FN811	Nicad Battery Pack (23/73)	55.33	(2.50)
NC18C	Charger (23/73)	18.09	(2.50)
SMC28	Charger (23/73) 13A Plug	18.09	(2.50)
NC28	Charger (23/73)	18.09	(2.50)
NC29	Base Charger (23/73)	78.50	(4.00)
PAG	Car Adapt Charger (23/73)	24.88	(2.50)
MH12A28	Speaker Mic	31.73	(2.50)
MH18A28	Speaker Mic Miniature (23/73/272)	31.73	(2.50)
FRG900M	69-950MHz Scanning RX	969.90	(10.00)
PAAC	Power Supply for 9600	25.54	(2.50)
PAG	Car Adapter/Charger	22.32	(2.50)
YMA4A	Speaker Mike	35.19	(2.50)
FRV800	HF Receiver	965.00	(10.00)
FRV800	Converter 119-175 for above	99.95	(4.00)
FR1770B	RX ATU	60.78	(3.00)
MH18B	Hand 600 8pin mic	24.75	(3.00)
MD13C	Desk 600 8pin mic	50.95	(3.00)
MF1A3B	Beam mobile mic	28.50	(3.00)
TH77	Lightweight phones	28.42	(3.00)
YH65	Padded phones	23.42	(3.00)
YH1	Lightweight Mobile H/est-Beam mic	29.38	(3.00)
SB10	PTT Switch Box 270/2700	22.95	(2.50)

IC705	HF Transceiver	2560.00	(10.00)
IC751A	HF Transceiver	1535.00	(10.00)
IC735	HF Transceiver	949.00	(10.00)
IC725	HF/6m base stn.	1915.00	(10.00)
IC725	HF Base Transceiver	775.00	(10.00)
AT150	150W ATA (735)	335.00	(6.00)
P555	Ext PSU (735)	195.00	(6.00)
IC220E	NEW 2m 25W FM Mobile	299.00	(6.00)
IC275E	2m New Mini Handheld	299.00	(6.00)
IC275E	2m 25W Base Stn	1099.00	(10.00)
IC48E	70cm Handheld	394.80	(8.00)
W2E	NEW 2m/70cm Handheld	395.00	
IC2409	2m/70cm FM Dual Band Mobile	Special price (8.00)	
IC2220E	270 FM Mobile	499.00	(6.00)
IC271	Gen Cox RX	875.00	(10.00)
IC7000	VHF/UHF Scanner	1012.00	(10.00)
IC-R7109	25 - 2900 MHz receiver	1129.00	(10.00)
AH7000	25-1300MHz Discone	84.29	(4.00)
SP2	Ext Speaker	65.59	(4.00)
CK70	DC Cable (R70/R71)	8.18	(2.50)
EC257	FM Board (R70/R71)	43.93	(2.50)
BP83	Battery Pack 7.2V (SE SERIES)	38.58	(2.50)
BP90	Empty Battery Case (SE SERIES)	10.75	(2.50)
BP94	Battery Pack 72,1000m AL (SE)	74.03	(3.00)
CP12	12V Cigar Lead (SE SERIES)	12.72	(2.50)
DC1	DC/DC Converter operates from 12V	18.40	(2.50)
HM48	NEW Mini speaker mic	24.15	(2.50)
HSS1	Headset Inc PTT/Vox unit	42.15	(2.50)
LCB1	Case 2 Set	8.94	(2.50)
SM6	1.5m, 500u, 8P Base Mic	87.87	(3.00)
R1	150kHz - 1300 MHz RX	349.00	(6.00)
R72	NEW HF RX	959.00	(10.00)
R100	500KHz-1800MHz	910.00	(5.00)

TS958SD	NEW HF Transceiver	2995.00	(10.00)
TS450	General Cover TXCR	1220.00	(10.00)
TS450	HF Gen. Cov. TXCR	1475.00	(10.00)
TS600	NEW HF + 6m TXCR	1395.00	
PS52	H/duy PSU	249.00	(6.00)
AT230	All Band ATU/Power Meter	219.00	(6.00)
PS50	Power Supply	229.00	(6.00)
SP51	10/150 2Kw Linear	65.95	(4.00)
TL222	2m Handheld	1495.00	(10.00)
TH28	70cm Handheld	229.00	(6.00)
TH48	2m/70cm Handheld	259.00	(6.00)
TH77	NEW 2m Handheld	395.00	(6.00)
TH27	70cm Handheld	239.00	(6.00)
TH47	2m 25W M/M Mobile	299.00	(6.00)
TS791	VHF/UHF Transceiver	825.00	(10.00)
TS790	Gen Coverage HF/RX	1695.00	(10.00)
R2090	General Coverage HF/RX (R2090)	549.00	(10.00)
VC10	118-174MHz Converter (R2090)	165.00	(4.00)
R5090	General Coverage HF/RX	825.00	(10.00)
VC20	118-174 MHz Converter (R5090)	175.00	(4.00)
TM702	NEW 2m/70cm FM Mobile	495.00	(6.00)
TM741E	2m FM Mobile 50/100W	759.00	(10.00)
TM241E	70cm FM Mobile 35/10/5W	325.00	(6.00)
MC50	4P Desk Mic	47.95	(4.00)
MC50A	8P Desk Mic	92.95	(4.00)
MC50	Electric Desk Mic	56.95	(4.00)
MC85	Desk Mic Audio Level Comp	101.95	(4.00)
MC43	8P Flat Mic	22.95	(3.00)
MC35	4P Flat Mic	22.95	(3.00)
MC55	Mobile Mic (Sp. o. Sp)	54.95	(3.00)
LF30A	HF Low Pass Filter	33.95	(3.00)
H88	Lightweight Headphones	29.50	(3.00)
H85	Desk Headphones	38.95	(3.00)

C W Keyers

HI-MOUNT	Straight key (adjustable tension)	50.75	(4.00)
HK 702	Straight key (adjustable tension)	28.75	(4.00)
HK 706	Straight key (adjustable tension)	29.50	(4.00)
HK 707	Straight key (adjustable tension)	29.00	(4.00)
HK 707	NEW Mini speaker mic	27.00	(4.00)
HK 902	Straight key (Deluxe-Brass)	190.00	(4.00)
HK 903	Medium Duty (Brass)	91.50	(4.00)
MX 703	Squeeze key	37.00	(4.00)
MX 704	Squeeze key	26.50	(4.00)
MX 706	Squeeze key	35.75	(4.00)
STARMASTER	Electronic Keyer Unit (No Paddle)	59.95	(4.00)
Dewsbury	Electronic Memory Keyer (No Paddle)	95.00	(4.00)

Rotators

AR200XL	Light Duty	50.50	(6.00)
G250	Light Duty	70.75	(6.00)
G409	Medium Duty	152.00	(6.00)
G409C	Medium Duty (Round Face)	182.85	(6.00)
G609C	Medium/Heavy Duty	240.00	(6.00)
G2909C	Heavy Duty	454.00	(6.00)
G500A	Elevating Rotator	203.00	(6.00)
GR5400B	Azimuth/Elevating	383.90	(6.00)

SWR/PWR Meters

HANSEN	Oscar 1718	3.5-100MHz	27.45	(4.00)
Yaseu	Y560	1.5-60MHz	95.00	(3.00)
Yaseu	Y560	140-525MHz	83.90	(3.00)
Comet	CM420	140-150/430-450	38.75	(4.00)
Comet	CD120	1.8-200MHz	76.90	(4.00)
Comet	CD160H	1.8-60MHz	90.85	(4.00)
Comet	CD270D	140-525 MHz	79.95	(4.00)
Diawa	CM101	1.8-150 MHz 15/150 MHz 15/150/1500	69.95	(4.00)
Diawa	CM103N	150-525 MHz 20/200m	69.95	(4.00)

Miscellaneous

Miscellaneous			
CS201	3 Way SO239 Switch	13.95	(4.00)
CS201GS	2 Way 1/2 Size Switch	27.50	(4.00)
Comet CSW20	SO239 switch	26.50	(4.00)
T25	30W Dummy Load	11.00	(3.00)
T100	100W Dummy Load	50.00	(3.00)
T200	200W Dummy Load	98.50	(3.00)
WAI	Wave meter 120-450MHz	27.84	(3.00)
Datong D70	Morse Tutor	94.95	(4.00)
Datong FL2	Audio Filter	99.95	(4.00)
Datong FL3	Audio Filter/Autotune	140.95	(4.00)
Datong ASP	Processor 4 pin	94.95	(4.00)
Datong ASP	Processor 8 pin	94.95	(4.00)
Datong ASG70	Active Antenna	70.95	(4.00)

Antennas

D130	25-130MHz Discone	75.85	(6.00)
Jaybeam	T83 Multi 3e HF Tribander	463.10	(10.00)
Creative	CD316 JR 4e HF Tribander	365.90	(10.00)
Creative	CD316 4e HF Tribander	357.00	(10.00)
GPV5S	2m Colinear	46.49	(6.00)
W21	2m/70cm Base Fibre Glass	50.90	(6.00)
W32	2m/70cm Base Fibre Glass	76.85	(6.00)
W34	2m/70cm Base Fibre Glass	101.16	(6.00)
CF416MN	2m/70cm Duplexer	26.00	(4.00)
OBTDHP	10/90m Trapped dipole	55.78	(6.00)



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



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

STOCK ITEMS USUALLY
DESPATCHED WITHIN 48HRS

DELIVERY/INSURANCE PRICES
IN BRACKETS
(E&OE)

SHORT WAVE MAGAZINE

DATA MODES ISSUE
Typhoon Watching - Guam
Starting in Data Mode
More Advanced RTTY
Dewsbury DM-1000 Reviewed

Capture the Action at Airshows with the New Yupiter VT-225 FULL TEST REPORT INSIDE

Regular Features:
Airband, Scanning, Junior Listener, SSB Utility, Listening, Propagation and Broadcast Enthusiasts

The UK's biggest, brightest and most readable monthly magazine for the radio enthusiast.

The April issue, now on sale at your newsagent, features the ever-popular Data Communication Modes such as RTTY and FAX, plus a review of the Dewsbury Easy Reader.

The brand new Yupiter VT-225 airband scanner is the subject of the main review.

All the regular columns are still there, including Airband, Scanning, Junior Listener, Info in Orbit, DXTV Roundup, Pirates, Propagation, LM&S, SSB Utility Listening, Amateur Bands Roundup, Satellite TV and, of course, Decode.

Everyone should be reading **Short Wave Magazine** - including you!

PW BOOK SERVICE

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.



0202 665524

HOW TO ORDER

POST AND PACKING: add £1.00 for one book, £2.00 for two or more books, orders over £40 post and packing free, (overseas readers add £1.75 for one book, £3.50 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, Eneco House, The Quay, Poole, Dorset BH15 1PP.** Please make your cheques payable to Short Wave Magazine, payment by Access, Mastercard, Eurocard or Visa also accepted on telephone orders to Poole (0202) 665524. Books are normally despatched by return of post but please allow 28 days for delivery. Prices correct at time of going to press. Please note: all payments must be made in Sterling.

O/P = Out of print, O/S = Out of stock.

RADIO

AIR & METEO CODE MANUAL 10th Edition

Joerg Klingenfuss
Detailed descriptions of the World Meteorological Organisation Global Telecommunication System operating FAX and RTTY meteo stations, and its message format with decoding examples. Also detailed description of the Aeronautical Fixed Telecommunication Network amongst others. 289 pages. £15.00

HIGH POWER WIRELESS EQUIPMENT Articles from Practical Electricity 1910-11

Edited by Henry Walter Young
A reprint of interesting practical articles from the very early days of radio. 99 pages. £6.85

PASSPORT TO WORLD BAND RADIO 1992

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 language of broadcast stations by frequency. 384 pages. £14.50



RADIOTELETYPE CODE MANUAL 10th Edition

Joerg Klingenfuss
This book gives detailed descriptions of the characteristics of telegraph transmission on short waves, with all commercial modulation types including voice frequency telegraphy and comprehensive information on all RTTY systems and c.w. alphabets. 96 pages. £8.00

RESCUE

Paul Beaver & Paul Berriff
This book follows the life and conditions of rescue helicopter crews. This is not drama, this is real life and it makes a true impression of the rescue services for the reader. There are transcriptions of air/ground and between crew dialogues, a summary of the main distress and rescue radio frequencies and helicopter base locations. 192 pages. £9.99

SCANNERS (Third Edition)

Peter Rouse GU1DKD
A guide for users of scanning receivers, covering hardware, antennas, accessories, frequency allocations and operating procedures. 245 pages. £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. £10.95

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

WORLDWIDE HF RADIO HANDBOOK

Martyn R. Cooke
This book lists high frequencies used by aircraft and aeronautical ground stations. Divided into sections, Military, Civil, etc. The book should be easy to use. £8.95 O/S

1934 OFFICIAL SHORT WAVE RADIO MANUAL

Edited by Hugo Gernsback
A fascinating reprint from a bygone age with a directory of all the 1934 s.w. receivers, servicing information, constructional projects, circuits and ideas on building vintage radio sets with modern parts. 260 pages. £10.15

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. 266 pages. £8.95

ELECTRONICS SIMPLIFIED - CRYSTAL SET CONSTRUCTION (BP92)

F. A. Wilson
Especially written for those who wish to take part in basic radio building. All the sets in the book are old designs updated with modern components. 72 pages. £1.75

THE SIMPLE ELECTRONICS CIRCUIT AND COMPONENTS Book One (BP62)

The aim of this book is to provide an inexpensive but comprehensive introduction to modern electronics. 209 pages. £3.50

INTERFERENCE

INTERFERENCE HANDBOOK (USA)

William R. Nelson WA6FGQ
How to locate and cure r.f.i. for radio amateurs, CBers and TV and stereo owners. 253 pages. £9.50

AMATEUR RADIO

AN INTRODUCTION TO RADIO WAVE PROPAGATION (BP293)

J.G. Lee
How does the sun and sunspots affect the propagation of the radio waves which are the basis of our hobby? They affect the ionosphere, but differing frequencies are treated differently. Find out how to use charts to predict frequencies that will be the most profitable. What effect will noise have on the signal? Find out with this book. 116 pages. £3.95

W1FB's QRP NOTEBOOK 2nd Edition

Doug DeMaw W1FB
The new improved and up-dated 2nd edition of this book, covers the introduction to QRP, construction methods, receivers, and transmitters for QRP. This workshop-notebook style publication, which is packed with new designs for the keen QRP operator, also covers techniques, accessories and has a small technical reference section. 175 pages. £7.95.

THE ARRL HANDBOOK FOR RADIO AMATEURS 1992

The 1992 edition of this extremely useful

reference book contains much new material. Packed with information, it's one of the most useful books available for the modern radio amateur.

Approx. 1000 pages. £16.95

AN INTRODUCTION TO VHF/UHF FOR RADIO AMATEURS (BP281)

I.D. Poole
An excellent book to go with the new Novice or full call sign. Nine chapters and an appendix deal with all aspects and frequencies from 50 to 1300MHz. 96 pages. £3.50

W1FB's DESIGN NOTEBOOK

Doug DeMaw W1FB
This book is aimed at the non-technical amateur who wants to build simple projects and obtain a basic understanding of amateur electronics. 195 pages £8.50

QRP CLASSICS

Edited by Bob Schetgen KU7G
Operating QRP is fun. This book increases the enjoyment by showing you how to build items that you can be proud of. The can hold their own against the 'Kenyaecom' rig, and come much cheaper too. Extracts from *QST* and the *ARRL Handbook*, superbly packed in. 274 pages. £9.95

W1FB'S HELP FOR NEW HAMs

Doug DeMaw W1FB
This book covers everything from getting acquainted with new equipment to constructing antennas, station layout, interference and operating problems to on-the-air conduct and procedures. 155 pages. £6.95

ALL ABOUT VHF AMATEUR RADIO (USA)

W. I. Orr W6SAI
VHF/UHF propagation, including moonbounce and satellites, equipment and antennas. 172 pages. £9.50.

AMATEUR RADIO CALL BOOK (RSGB)

1991 Edition
Now incorporates a 122-page section of useful information for amateur radio enthusiasts as well as details on UK amateurs. 429 pages. £7.20

AMATEUR RADIO SATELLITES the first 25 years

Arthur C. Gee G2UK
This souvenir publication is mainly a pictorial account of the pattern of developments which have occurred over the last 25 years in amateur radio satellite operations. 34 pages. £2.25

AN INTRODUCTION TO AMATEUR COMMUNICATIONS SATELLITES 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 as well as setting up a station. 150 pages. £3.50

HINTS AND KINKS FOR THE RADIO AMATEUR

Edited by Charles L. Hutchinson and David Newkirk
A collection of practical ideas gleaned from

the pages of *QST* magazine. 152 pages. £4.95

HOW TO PASS THE RADIO AMATEURS' EXAMINATION (RSGB)

Clive Smith G4FZH and George Benbow G3HB
The background to multiple choice exams and how to study for them with sample RAE papers for practice plus maths revision. 88 pages. £6.70

PASSPORT TO AMATEUR RADIO

Reprinted from PW 1981-1982
The famous series by GW3JGA, used by thousands of successful RAE candidates in their studies. Plus other useful articles for RAE students. 96 pages. £1.50

PRACTICAL GUIDE TO PACKET OPERATION IN THE UK

Mike Mansfield G6AWD
Introduces the concept of packet radio to the beginner. Problem areas are discussed and suggestions made for solutions to minimise them. Deals with the technical aspects of packet taking the reader through setting up and provides a comprehensive guide to essential reference material. 140 pages. £7.95

PRACTICAL IDEAS FOR RADIO AMATEURS

Ian Poole G3YWX
Offers a wealth of hints, tips and general practical advice for all transmitting amateurs and short wave listeners. 128 pages. £5.95

RADIO AMATEUR CALLBOOK INTERNATIONAL LISTINGS 1992 70th Edition

The only publication listing licensed radio amateurs throughout the world. Also includes DXCC Countries list, standard time chart, beacon lists and much more. Over 1400 pages. £19.50

RADIO AMATEUR CALLBOOK NORTH AMERICAN LISTINGS

1992 70th Edition
Listings of US amateurs (including Hawaii) as well as Canadian amateurs. Also contains standard time chart, census of amateur licences of the world, world-wide QSL bureau and much more. Over 1400 pages. £19.50

RADIO AMATEUR'S GUIDE TO RADIO WAVE PROPAGATION (HF Bands)

F. C. Judd G2BCX
The how and why of the mechanism and variations of propagation in the h.f. bands. 144 pages. £15.00

THE ARRL OPERATING MANUAL

Another very useful ARRL book. Although written for the American 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 *OST* 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. £5.95

THE ARRL UHF/MICROWAVE EXPERIMENTER'S MANUAL

Various Authors
A truly excellent manual for the keen microwave enthusiast and for the budding 'microwaver'. With contributions from over 20 specialist authors. Chapters covering techniques, theory, projects, methods and mathematics. 446 pages £14.50

THE COMPLETE DX'ER

Bob Locher W9KNI

Now back in print, this book covers equipment and operating techniques for the DX chaser, from beginner to advanced. 187 pages. £7.95

THE RADIO AMATEUR'S QUESTIONS & ANSWER REFERENCE MANUAL. 4th Edition

R. E. G. Petri G8CCJ

This book has been compiled especially for students of the City and Guilds of London Institute RAE. It is structured with carefully selected multiple choice questions, to progress with any recognised course of instruction, although it is not intended as a text book. 280 pages. £7.95

THE RAE MANUAL (RSGB)

G.L. Benbow G3HB

The latest edition of the standard aid to studying for the Radio Amateurs' Examination. Updated to cover the latest revisions to the syllabus. 132 pages. £6.70

YOUR GATEWAY TO PACKET RADIO

Stan Horzepa 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. £8.95

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 £10.95

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 £10.95

NEWNES ELECTRONICS POCKET BOOK 5th Edition

Presenting all aspects of electronics in a readable and largely non-mathematical form for both the enthusiast and the professional engineer. 315 pages. Hardback £10.95

NEWNES RADIO AMATEUR AND LISTENER'S POCKET BOOK

Steve Money G3FZX

This book is a collection of useful and intriguing data for the traditional and modern amateur as well as the s.w.l. Topics such as AMTOR, packet radio, SSTV, computer communications and maritime communications are all covered. 160 pages. £9.95

NEWNES RADIO AND ELECTRONICS ENGINEER'S POCKET BOOK 18th Edition

Keith Brindley

Useful data covering math, abbreviations, codes, symbols, frequency bands/allocations, UK broadcasting stations, semi-conductors, components, etc. 325 pages. Hardback £9.95

POWER SELECTOR GUIDE (BP235)

J. C. 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

TOWERS INTERNATIONAL TRANSISTOR SELECTOR Update 4

This book has already established itself as the most user-friendly short-form transistor characteristics/substitution book on the market. This latest version has data on over 29 000 US, British, European and Japanese transistors and now includes a surface-mount cross-index. 432 pages. £19.95

FAULT FINDING

MORE ADVANCED TEST EQUIPMENT CONSTRUCTION (BP249)

R.A. Penfold

A follow on from *Test Equipment Construction (BP248)* this book looks at digital methods of measuring resistance, voltage, current, capacitance and frequency. Also covered is testing semi-conductors, along with test gear for general radio related topics. 102 pages. £3.50

HOW TO USE OSCILLOSCOPES & OTHER TEST EQUIPMENT (BP267)

R.A. Penfold

Hints and ideas on how to use the test equipment you have, to check out, or fault find on electronic circuits. Many diagrams of typical waveforms and circuits, including descriptions of what waveform to expect with particular faults, or distortion in audio amplifiers. 104 pages. £3.50

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

TELEVISION

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

Edition 3

Keith Hamer & Garry Smith

Completely revised and expanded, this is a very handy and useful reference book for the DXTV enthusiast. Over 200 photographs of Test Cards, logos, etc., world wide. 60 pages. £4.95

THE ATV COMPENDIUM

Mike Wooding G6IQM

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

CONSTRUCTION

COIL DESIGN AND CONSTRUCTION MANUAL (BP160)

B.B. Babani

Covering audio to r.f. frequencies, this book

has designs for almost everything. Sections cover such topics as mains and audio output transformers, chokes and r.f. coils. What is the required turns ratio? This book will show you how to find out. Text and tables. 160 pages. £2.50

RADIO/TECH MODIFICATIONS NUMBER 3

This book is intended as a reference guide for the experienced radio technician. Produced for the US market it contains modification instructions for a wide variety of scanners, CB rigs and amateur equipment including Alinco, Icom, Kenwood, Yaesu and other makes. 160 pages. £9.95



SIMPLE ELECTRONIC CIRCUIT AND COMPONENTS (BP62)

F.A. Wilson

Components, circuits, formulae and radio matters are dealt with in this book. A book to fill in the gaps that appear when taking the RAE or the Novice course. Also eminently suitable for anyone wishing to study at home. 209 pages. £3.50

ADVANCED SHORT WAVE SUPERHET RECEIVER CONSTRUCTION (BP276)

R.A. Penfold

A general purpose receiver to build, from antenna to audio, described in understandable English. 74 pages. £2.95

HOW TO DESIGN AND MAKE YOUR OWN PCBs (BP121)

R. A. Penfold

Designing or copying printed circuit board designs from magazines, including photographic methods. 80 pages. £2.50

INTRODUCING QRP

Collected articles from PW 1983-1985

An introduction to low-power transmission (QRP). This book includes full constructional details of a variety of designs by Rev. George Dobbs G3RJY for transmitters and transceivers covering Top Band to 14MHz, together with test equipment by Tony Smith G4FAI. 64 pages. £1.50

MORE ADVANCED POWER SUPPLY PROJECTS (BP192)

R. A. Penfold

The practical and theoretical aspects of the circuits are covered in some detail. Topics include switched mode power supplies, precision regulators, dual tracking regulators and computer controlled power supplies, etc. 92 pages. £2.95

POWER SUPPLY PROJECTS (BP76)

R. A. Penfold

This book gives a number of power supply designs including simple unregulated types, fixed voltage regulated types and variable voltage stabilised designs. 91 pages. £2.50

PRACTICAL POWER SUPPLIES

Collected articles from PW 1978-1985

Characteristics of batteries, transformers, rectifiers, fuses and heatsinks, plus designs for a variety of mains driven power supplies, including the PW "Marchwood" giving a fully stabilised and protected 12V 30A d.c. supply. 48 pages. £1.25



SHORT WAVE COMMUNICATIONS

Peter Rouse GU1DKD

A new book from the word-processor of this best-selling author. Covers a very wide area and so provides an ideal introduction to the hobby of radio communications. International frequency listings for aviation, marine, military, space launches, search and rescue, etc. Chapters on basic radio propagation, how to work your radio and what the controls do, antennas and band plans. 187 pages. £8.95

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 (BP248)

R.A. Penfold

Describes, in detail, how to construct some simple and inexpensive, but extremely useful, pieces of test equipment. 104 pages. £2.95

50 (FET) FIELD EFFECT TRANSISTOR PROJECTS (BP39)

F.G. Rayer

50 circuits for the s.w.l., radio amateur, experimenter or audio enthusiast using f.e.t.s. 104 pages. £2.95

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 HAND BOOK

Joe Pritchard G1UQW

Shows how radio amateurs and listeners can 'listen' to signals by reading text on a computer screen. This book also covers the application of computers to radio 'housekeeping' such as log-keeping, QSL cards, satellite predictions and antenna design as well as showing how to control a radio with a computer. 368 pages. £14.95

MAPS

IARU LOCATOR MAP OF EUROPE DARC

This multi-coloured, plastics-laminated, map of Europe shows the IARU ('Maidenhead') locator system. Indispensable for the v.h.f. and u.h.f. DXer. 692 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. £5.00

QTH LOCATOR MAP

This full colour map has been produced by members of one of the Hungarian Amateur Radio Clubs for v.h.f. and u.h.f. amateurs in Europe. The map is based on the Maidenhead Locator System and also the main v.h.f. and u.h.f. beacons with their locator, power output, height above sea level and modulation system. 970 x 670mm. £5.95

RADIO AMATEUR'S MAP OF NORTH AMERICA (USA)

Shows radio amateur prefix boundaries, continental boundaries and zone boundaries. 760 x 636mm. £3.50

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. £3.50

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. £4.50

Classified Ads

To advertise on this page see booking form below.

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

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 TISI
CTV SERVICING by KING - £14.95, VCR SERVICING by BEECHINGS - £25.00, Ku-BAND SATELLITE TV - £25.00

SERVICE MANUALS

We can supply Service Manuals for almost any type of Equipment. Televisions, Video Recorders, Amateur Radio, Test Equipment, Vintage Valve, any type of Audio Equipment, Military Surplus etc. etc.
All makes and models supplied from the 1930's to the present. Originals or photostats supplied as available.
FREE repair and Data Guide with all orders or SAE for your copy.

MAURITRON TECHNICAL SERVICES (PW),
8 CHERRY TREE ROAD, CHINNOR,
OXON, OX9 4QY

Tel: (0844) 51694 FAX: (0844) 52554

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 JX121, Tuition House, London SW19 4DS. Tel: 081-947 7272 (9am-5am) or use our 24hr Recordacall service 081-946 1102 Quoting JX121.

HEATHKIT EDUCATIONAL PRODUCTS/UK DISTRIBUTOR Spares and Service Centre. Cedar Electronics. 12 Isbourne Way, Broadway Road, Winchcombe, Cheltenham. Glos. GL54 5NS. Tel: 0242 802402.

Miscellaneous

DIY INEXPENSIVE RADIO PROJECTS. Easy to make. SAE. RYLANDS, 39 Parkside Avenue, Southampton SO1 9AF

INTERESTING DEMONSTRATIONS, talks, discussion, refreshments bargains, questions answered. Regional meetings. Magazine by post. Electronic Organ Constructors Society. 87 Oakington Manor Drive, Wembley, Middlesex Tel: 081-902 3390.

Computer Soft/w & Hard/w

COMMODORE COMPUTERS (+4, C16, 64, 128). "MICROCOM" CW/RTTY TX/RX with superb Morse tutor. "TURBO LOG" ultimate high speed station log. "MICROCOM INTERFACE" ready built. S.A.E. to:- Moray Micro Computing, Enzie Slackhead, Buckie, Moray AB5 2BR. (Telephone: 0542 7384).

IBM/COMPATIBLE SHAREWARE 10,000+ FILES. Send £1.50 for comprehensive catalogue on disk. Cheapest prices! AK SHAREWARE, 54 Sheldrake Road, Mudeford, Dorset BH23 4BP.

MORSE PRODUCTS for PC and ATARI

PC MORSE TRAINER, the ultimate PC tutor. Send/receive, including foreign, punctuation, and procedural. £37.50. Write/phone for superb FREE demo of our latest program. ATARI 520/1040/STE all resolutions. Highly commended, the MORSE MASTER program lets you train under realistic on-air conditions. £32.50. Both products supplied with interface cable for key.

BOSCAD Limited, 16 Aytoun Grove, Baldridgeburn, Dunfermline, FIFE KY12 9TA, Tel: (0383) 729584 evenings.

Please mention
Practical Wireless when
replying to
Advertisements.

Components

J. A. B. Electronic and RF Components. (Toko coils etc) & Kits for many mag projects. Callers 1180 Aldridge Road, (rear Queslett Motors), Great Barr, Birmingham. Tel: 021-368 6928 for opening times. Our 1992 MAIL ORDER catalogue lists over 3000 products send £1.25 for your copy & discount vouchers.

TEST EQUIPMENT MAINTENANCE

Spare Parts, Service Manuals and a comprehensive repair service now available for all makes of Test Equipment (Scopes, Generators, PSU's, AVO's, Counters, DMM's 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 + Fax: (0480) 214488

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.

ORDER FORM FOR CLASSIFIED ADS PLEASE WRITE IN BLOCK CAPITALS

The prepaid rate for classified advertisements is 42 pence per word (minimum 12 words), box number 70p extra. Semi-display setting £13.90 per single column centimetre (minimum 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.

Please insert this advertisement in the Issue of Practical Wireless (if you do not specify an issue we will insert it in the next available issue of PW) for insertion/s. I enclose Cheque/P.O. for £..... (42p per word, 12 minimum, please add 17.5% VAT to total).

Name

Address

Telephone No.

Box Number @ 70p: Tick if appropriate ☐

Category Heading:

Valves

NEW BOXED VALVES TV/Radio some early types.
SALE: (0222) 761265.

Wanted

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, Oakdene Industrial Estate, Near Horsham RH13 8AZ. Callers please phone for appointment. Tel: (0403) 865105. FAX: (0403) 865106. Telex: 87271.

TEST GEAR, Computers, Computer Surplus, Amateur. Bought for cash. (0425) 274274

WANTED, Most pre-1965 wireless and audio components and accessories. In large or small quantities. Must be new or unused. **WANTED,** pre-1975 wireless, TV, books and magazines. Also **MOST VALVES WANTED for CASH.** Must be unused and boxed. CBS, 157 Dickson Road, Blackpool FY1 2EU. Tel: (0253) 751858.

Tools

100 FREE COMPONENTS with our price list. Send large SAE. AGILE SALES, Box 1408, London NW10 9ES.

For Sale

OSCILLOSCOPE EX-M.O.D. double beam with lead manual £60.00. Probe kits for above scope £23.00 ex-m.o.d. morse keys £10.00 Ex p.m.r. storno QRP 612 10w 12 channel f.m. Tx/Rx suitable for 2m conversion with speaker mike and ni-cad pack and manual £50.00. Send large S.A.E. for component and surplus lists. Collectors Paradise, 56a Worcester Street, Wolverhampton WV2 4LL. Tel: 20315.

£950 ICOM R7000, Icom R71E, PK232, Commodore 64 disc drive, shapes, Philips double beam, scope 10MHz 3232, Monitors, signal BW monitor, earphones, connecting cables. Can be seen working. Interest to dealers or amateurs. Tel: (088362) 2366.

COMMUNICATIONS RECORDER Phillips XMN4 Model EL 1480/20. Incorporating 2 channel 24 hour. Continuous recording. Tapes & manual included. OFFERS. Box No. 26, PW Publishing, Enefco House, The Quay, POOLE, Dorset BH15 1PP.

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.

£45 Incl. VAT, Post + ins. £4.



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 £5

RADIO COMPONENT SPECIALISTS VISA

337 Whitehorse Road, Croydon SURREY, U.K. Tel: 081-684 1665

List, Large S.A.E. Delivery 7 days. Callers Welcome. Closed Wednesday



**Used amateur radio equipment.
Bought, sold & exchanged.
Mail order no problem.
Send SAE for lists.**

Phone Dave on (0708) 862841 anytime.
Callers by appointment.

G4TNY Amateur Radio,
PO Box 1790, Colchester CO2 8TY

RADIO VALVES, COMPONENTS, & mags. Surplus to requirement. Private sale. S.A.E. brings full lists. T. Martini, 6 Levant House, Mile End Road, London E1 4RB. Telephone: 071-790 7499.

Receivers

G3LL 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.

B.F.O. KITS, resolves single side-band on almost any radio, £14.95. CORRIGAN RADIOWATCH, 7 York Street, Ayr KA8 8AR.

IS YOUR CLUB PLANNING OR HOLDING AN EVENT OR RALLY?

Telephone (0202) 676033 to find out the
special advertising rates available for Radio Clubs .

INDEX TO ADVERTISERS

AC Electronics	59
AH Supplies	59
AOR UK	62
ARE Communications	20
Alan Hooker Communications	55
Antex	53
Birkett, J	45
Bredhurst Electronics	52
Castle Electronics	2
Chevet Books	39
Cirkit	39
Colomor	39
Datong	55
Dewsbury	8, 9
Dressler Communications	26
ERA	39
Elliott Electronics	53

Grosvenor Software	59
Howes C.M Communications	2
ICS Intertext	55
Icom (UK)	11, Cover iii
J & P Electronics	45
KW Communications	51
Lake Electronics	59
Langrex Supplies	41
Lee Electronics	31
Lowe Electronics	3
Network Systems	46
Nevada	55
Maplin Electronics	Cover iv
Martin Lynch	12
Photo Acoustics	22
Quartslab	59

R & D Electronics	53
R A Kent	45
RAS Nottingham	45
RSGB	60
RST Valve	62
Radio Shack	68
SRP Trading	60
Short Wave Centre, The	55
Short Wave Magazine	63
Specialist Antenna Systems	52
South Midlands Communications	Cover ii, 6, 7, 40
Suredata	45
Tandy	10
Technical Software	45
Tennamast	59
Ward Reg & Co	63
Waters & Stanton	4, 5

YOUR LOCAL DEALERS

SOUTH WALES

ELECTRO MART

Receivers, Scanners, Howes, ERA, CB, Marine radio etc. part exchange welcome.

Full Service & Repair Facilities

96 High St, Clydach,
Swansea
Tel: 0792 842135

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 and a large range of scanning receivers. New and part exchange welcome.

189 London Road,
North End, Portsmouth,
Hants, PO2 9AE
Tel: 0705 662145

DERBYSHIRE

RILEY'S T.V. SERVICES LTD.

SUPPLIERS OF:-
SCANNERS - C.B. 27-934 MHz -
AERIALS - TEST METERS - TOOLS -
TELEPHONES KITS AND CABLES

125 LANGWITH ROAD
HILLSTOWN
CHESTERFIELD S44 6LX
PHONE 0246 826578
CLOSED WEDNESDAY

HERNE BAY

ICOM (UK) LIMITED

The Official Icom Importer

Unit 8, Sea Street
Herne Bay, Kent CT6 8LD
Tel: 0227 741741
Fax: 0227 360 155

Open Mon-Fri 9am-5.30pm (Lunch 1-2)

SCOTLAND

JAYCEE ELECTRONICS LTD

20 Woodside Way, Glenrothes, Fife KY7 5DF
Tel: 0592 756962 (Day or Night)

Open: Tues-Fri 9-5; Sat 9-4; Sun by appointment
KENWOOD, YAESU & ICOM APPROVED DEALERS

A good stock of new and secondhand equipment always in stock

PLEASE MENTION
**PRACTICAL
WIRELESS**
WHEN REPLYING TO
ADVERTISEMENTS

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)

YORKSHIRE

YAESU

ICOM
Kenwood

Alan Hooker Radio Communications

42, Netherhall Road, Doncaster
Tel: 0302 325690

Open Mon-Sat 10-5pm
Closed Thursdays

CORNWALL 24hr; 7 days a week

SKYWAVE

RADIO AMATEUR AND MARINE
COMMUNICATIONS SERVICES

ICOM, YAESU, NAVICO,
JAYBEAM, etc.

Slades Road, St. Austell,
Cornwall PL25 4HG
Tel: 0726 70220

Voic Bank: 0426 961909

Contact Marcia
on the
Advertising Hotline
(0202) 676033

for our rate card for display
advertising throughout
Practical Wireless, also for the
special rate to advertise in this
section.

WEST SUSSEX

MAIL ORDER RETAIL



BREDHURST ELECTRONICS LTD.

High St., Handcross, West Sussex
Tel: (0444) 400786
Fax: (0444) 400604

Situated at the Southern end of M23.

Easy access to M25 and
South London.

Open Mon-Fri 9am-5pm
Sat 9.30am-4.30pm.



YAESU

ICOM



RADIO SHACK



ALL OF THE EQUIPMENT WE SELL HAS BEEN IMPORTED BY
THE FACTORY AUTHORISED DISTRIBUTORS WITH FULL
WARRANTY BACK-UP AND PARTS SERVICE.

Lowe HF-225	High performance compact receiver.....	£425.00
Kenwood R-2000	10 Memories	£595.00
Kenwood VC-10	VHF converter for R-2000	£161.00
Kenwood R-5000	Top of their range receiver	£875.00
Kenwood VC-20	VHF converter for R-5000	£167.00
Yaesu FRG8800	Fine performing all mode set.....	£640.00
Yaesu FRV-8800	VHF converter for above.....	£100.00
Icom IC-R71E	The old favourite	£855.00
Icom IC-R72E	Icom's latest, small & excellent.....	£645.00
Icom IC-R9000	The set with everything	£3995.00
JRC-535	The latest from Japan Radio Company.....	£1095.00
Drake RR-3	Second-hand high specification set.....	£1595.00

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.

73a Terry Edwards
G3STS



RADIO SHACK

(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



HEAVY DUTY HF



IC-781
HF all band transceiver

- The HF master model designed for serious DX'ers.
- Advanced spectrum scope.
- Twin PBT, dual watch capability and fully automatic antenna tuner.
- 150W output power.
- 425(W)x149(H)x411(D)mm.

IC-765
HF all band transceiver

- Superior basic performance.
- First-class C/N characteristics and rapid lockup time.
- High-speed, fully automatic antenna tuner.
- Band stacking registers.
- DDS system.
- 424(W)x150(H)x390(D)mm.



IC-735
HF all band transceiver

- Offers both compactness and high performance.
- Full and semi break-in.
- Passband tuning and adjustable notch filter.
- 10dB preamp and 20dB attenuator.
- 241(W)x94(H)x239(D)mm.

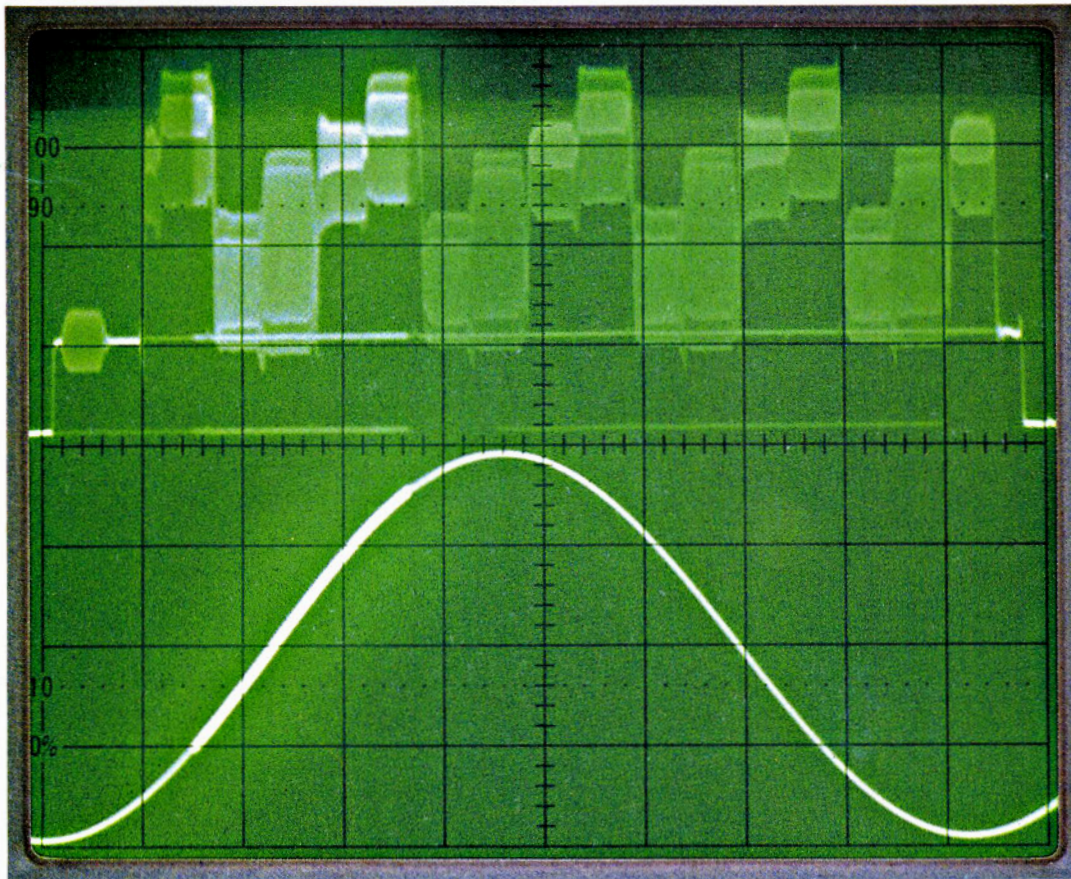
IC-725: HF all band transceiver
IC-726: HF/50MHz all mode transceiver

- Compact, lightweight and easy to operate.
- 105dB dynamic range.
- Band stacking registers.
- Optional HF automatic antenna tuner for mobiling.
- 241(W)x94(H)x239(D)mm.



For further information about ICOM products and your nearest authorised dealer please contact:
Icom (UK) Ltd. Dept PW Sea Street Herne Bay Kent CT6 8LD
Telephone: 0227 741741 (24hr). Facsimile: 0227 741742

 **ICOM**



Let's talk waveforms...

...AND THE BEST IN OSCILLOSCOPES.

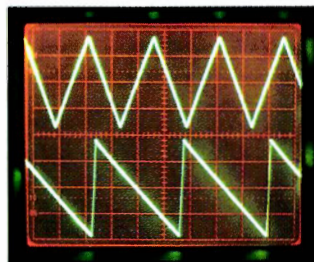
Our new range of precision laboratory oscilloscopes offer not only the best features, but also prices. From the sophisticated 20MHz 7025 to the delayed sweep 40MHz 7046, advanced design and high quality combine to bring you features such as; 1mV/div sensitivity, advanced 6-inch CRT with percentage markers and internal graticule, eliminating parallax error and ensuring a highly accurate display. X-Y mode allows Lissajous patterns to be produced and phase shifts measured.

The 7025 has all the capabilities required of a general purpose oscilloscope and will accept signals from DC to at least 20MHz with a high degree of accuracy. The 20MHz 7026 incorporates a delayed sweep time base, which can be used to magnify a portion of the waveform, and makes accurate time interval measurements and the study of short duration events

possible. The sophisticated 40MHz 7045 includes a 40ns delay line to help show very short duration events in their entirety. A delayed sweep oscilloscope of advanced design and high quality is found in the shape of the 40MHz delayed sweep 7046, having an increased magnification along with a 40MHz bandwidth and capable of displaying complex signals with precision and accuracy.

Full details of our oscilloscopes and all other test equipment can be found in the 1992 Maplin catalogue, available from **WHSMITH** or Maplin shops nationwide £2.75 or by post £2.95. Mail Order to: P.O. Box 3,

Rayleigh, Essex,
SS6 8LR. Credit
Card Hotline, 0702
554161 or visit
your local store.



Maplin
ELECTRONICS

GL29G [H] 20MHz scope 7025...£299.95. GL30H [H] 20MHz
scope 7026 ...£349.95. GL31J [H] 40MHz scope 7045...£449.95.
GL33L [H] 40MHz scope 7046...£499.95 (illustrated).

All items subject to availability. Handling charge £1. [H] Indicates carriage charge of £5.30. All prices inclusive of VAT.

Visit our stores at: **BIRMINGHAM**; Sutton New Road, Erdington. **BRIGHTON**; 65 London Road. **BRISTOL**; 302 Gloucester Road. **CARDIFF**; 29 City Road. **CHATHAM**; 2 Luton Road. **GLASGOW**; 264-266 Great Western Road. **LEEDS**; Carpet World Building, 3 Regent Street. **LEICESTER**; Office World Building, Burton Street. **LONDON**; 146-148 Burnt Oak Broadway, Edgware. 120-122 King Street, Hammersmith. **MANCHESTER**; 8 Oxford Road. **NEWCASTLE-UPON-TYNE**; Unit 4, Allison Court, The Metro Centre, Gateshead. **NOTTINGHAM**; 86-88 Lower Parliament Street. **READING**; 129-131 Oxford Road. **SHEFFIELD**; 413 Langsett Road, Hillsborough. **SOUTHAMPTON**; 46-48 Bevois Valley Road. **SOUTHEND-ON-SEA**; 282-284 London Road, Westcliff. Plus new stores in **COVENTRY** and **SOUTH LONDON** opening soon. Ring 0702 552911 for further details.