

JULY 1990 £1.60

ISSN 0141-0857

FEATURES
RB10 ANTENNA - VALVE TECHNOLOGY - TAMING COMPUTER HASH FURTHER NOTES ON 6m ANTENNAS

REVIEWS
MIZUHO MX QRP SSB RIG
ICOM R1 HAND-HELD COMMUNICATIONS RECEIVER

BACKSCATTER - COMPETITION - PW DISCOUNT VOUCHER

AND A GREAT DEAL MORE INSIDE THE 1000th EDITION OF PWI

### THE NEW

# FT-1000 FOR DYNAMIC DX

The FT-1000 is a new top of the range all mode h.f. transceiver that is the result of more than 25.000 hours of intensive research by Yaesu's top design engineers. They have adopted a completely new approach to the application of digital and RF technology. The extensive use of surface mounted components has allowed six microprocessors and five Direct Digital Synthesisers to be integrated with a simple to use operator interface to give a highly reliable full featured transceiver that has been optimised for serious h.f. applications. Please write or call SMC or your local authorised Yaesu dealer for the full specifications of this dynamic new transceiver and discover how you can open up the bands.



## YAESU

**UK Sole Distributor** 

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



**JULY 1990** (ON SALE JUNE 14) **VOL. 66** NO. 7 **ISSUE 1000** 

Editor **Rob Mannion G3XFD** Assistant Editor Dick Ganderton C.Eng MIEE G8VFH Art Editor Steve Hunt **Technical Features Editor** Elaine Richards G4LFM Technical Projects Sub-Editor NG ("Tex") Swann G1TEX **Technical Artist** Rob Mackie **Editorial Assistant** 

Sharon George 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 Make-up (Poole Office) Marcia Brogan ▼ Poole (0202) 676033 FAX Poole (0202) 666244

#### **Editorial and Advertisement** Offices:

**Practical Wireless Enefco House** The Quay Poole Dorset BH15 1PP ≈ Poole (0202) 678558 (Out-of-hours service by answering machine) FAX Poole (0202) 666244 Prestel 202671191

# Contents July 1990



33



## **Regular Features**

91	Advert	Index

- Backscatter 69
- 87 **Book Service**
- 57 Errors & Updates
- 13 Keylines
- Newsdesk 90 16
- 86 PCB Service
- Radio Diary 24
- 14 Receiving You
- 15 Services
- 67 Wanna Swap
- Wireless-Line 32

- \* Discount Vouchers \*
- **Competition Corner** 17
- The RB10 Antenna Part 1 22 Fred Judd G2BCX
- **Further Notes on the Small** 50MHz Yagi Ken Willis G8VR
- Valve Technology & **Characteristics - Part 1** Peter Buchan G3INR
- **Taming Computer Hash** Peter Rouse GU1DKD
- 33 **PW Review** Icom IC-R1 Hand-held Receiver Rob Mannion G3XFD
  - ★ Special 1000th Issue Celebration Supplement ★
- 57 **Practically Yours** Glen Ross G8MWR
- 58 **PW Review** Mizuho MS-7S 40m SSB/CW Transceiver & Accessories Chris Lorek G4HCL
- 60 **Special Event Stations** Michael Lawton GW4IQP
- 63 The Marland SSB Transmitter -Part 1 Rev. G. C. Dobbs G3RJV

- **CB** Corner 65 Rick Maybury
- PW Peanut Transceiver Part 2 Gus Montgomery GM0ATI & Bill Holt G7DHM

COPYRIGHT® PW PUBLISHING LTD. 1990. Copyright in all drawings, photographs and articles published in Practical Wireless is fully protected and reproduction or imitation in whole or part is expressly forbidden. All reasonable precautions are taken by Practical Wireless to ensure that the advice and data given to our readers are reliable. We cannot however guarantee it and we cannot accept legal responsibility for it. Prices are those current as we go to press.

PUBLISHED on the second Thursday of each month by PW Publishing Ltd., Enerco House, The Quay, Poole, Dorset BH15 1PP. Printed in England by Blackmore Press, Shaftesbury, Dorset. Tel: 0747 53034. Distributed by Seymour, Winsor House, 1270 London Road, Norbury, London SW16 40H, Tel: 01-879 1899, Fax CII-679 8907. Telex 8812945. Sole Agents for Australia and New Zealand - Gordon and Gotch Lásaj Ltd. . South Africa - Central News Agency Ltd. Subscriptions INLAND E19.00, EUROPE E21, OVERSEAS [by ASP) E22, payable to PRACTICAL WIRELESS, Subscription Department, PW Publishing Ltd., Enerco House, The Quay, Poole, Dorset BH15 1PP. PRACTICAL WIRELESS is sold subject to the following conditions, namely that it shall not, without the written consent of the publishers first having been given, be lent, re-sold, hired out or otherwise disposed of 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.

# ICOM

# THE NEW IC-2SE, SIMPLE OR MULTI-FUNCTION **144 MHz FM TRANSCEIVER**

Icom's tradition of building high quality reliable handhelds continues with the IC-2SE an incredibly compact handheld designed with features that exceed larger, bulky handhelds. The IC-2SE proves that superior quality comes in all sizes.

#### Slim and unbelievably compact.

The IC-2SE measures only 49(W) x 103.5(H) x 33(D)\* mm with the BP-82 Battery Pack. Hold the IC-2SE in your hand to truly appreciate its miniature size. Weighing just 270g† with the BP-82, the IC-2SE will easily fit anywhere – on belts in shirt pockets, handbags, etc.  $*1.9(W) \times 4(H) \times 1.3(D)$  in. †9.5 oz.

#### Simple design for operating convenience.

Even with its tremendous versatility and a wide variety of functions, the IC-2SE is easy to use. All functions are performed by a total of just six switches and three controls. The IC2SE includes both simple and multi-function modes. The result is two transceivers in one: both an easy-operation and multi-function transceiver. Simple mode ensures totally error-free operations. Multi-function mode allows you a variety of function settings depending on your operating requirements.

#### Other advanced features:

Reduced size doesn't have to mean reduced quality. The IC-2SE proves this with a wide variety of advanced functions.

- Tuning control on the top panel for quick QSYing.
- Monitor function that allows checking of the input frequency of a repeater.
- Function display that clearly shows all information required for operations.
- Splash resistant design and durable aluminum die-cast rear panel for dependable outdoor operations.

#### **Options**

• BA-11, Bottom Cap. Protective cop for terminals on the bose of the IC-2SE.

#### Battery packs and case.

<b>BP-81</b>	***************************************	7.2V, 110mAh
<b>BP-82</b>		7.2V, 300mAh
<b>BP-83</b>		7.2V, 600mAh
<b>BP-84</b>	***************************************	7.2V, 1000mAh
		12V, 340mAh
		Case for six R6 (AA) size batter

#### • BC-72E, AC Battery Charger

Desk top charger for the BP-81- BP-85.

#### • CP-12, Cigarette lighter cable with noise filter. Allows you to use the IC-2SE through a 12V cigarette lighter socket. Also charges the BP-81 - BP-85

• FA-140BB, 144MHz flexible antenna.

Flexible antenna for 144MHz band operation. Same type supplied with the IC-2SE.

#### •HM-46, Speaker/Microphe

Combination speaker and microphone equipped with an eorphone jack. Clips to your shirt or lopel.

•HS-51, Headset. Headset with VOX function that allows you hands-free operation.

#### • Carrying Cases.

Carrying Case	Battery Case
I C 52	DD 01

LC-53	***************************************	BP-81
LC-55	***************************************	BP-81, BP-83 or BP-86
LC-56		BP-84 or BP-85

#### MB-30, Mounting Bracket.

Mounts the IC-2SE in a vehicle or on a wall.

#### • OPC-235, Mini DC Power Cable.

For use with a 13.8 V DC power supply



**Actual Size** 



Icom (UK) Ltd.

Dept PW, Sea Street, Herne Bay, Kent CT6 8LD. Tel: 0227 363859. 24 Hour.

# Count on us!

# THE COMPACT HANDHELD WITH A SPLIT PERSONALITY

#### 5 Watt Output Power.

Utilizing a specially designed ultra-small highly efficient power module, the IC-2SE delivers o full 5 W\* of output power. Bring those distant repeaters into range.

\* At 13.8V DC

#### **48 Memory Channels.**

The IC-2SE has 48 fully-programmable memory channels and one call channel. Each memory and call channel stores an operating frequency and other information required for repeater operations.

#### **Convenient Repeater Functions.**

The IC-2SE is equipped with programmable offset frequencies for occessing repeaters. All memory channels and a coll channel store repeater information for your convenience. The IC-2SE includes a newly designed 1750 Hz tone call transmit function. A 1750 Hz tone call transmits. when the PTT switch is pushed twice quickly.

## Power Saver for longer operating time.

The power sover ensures lower current flow during standby conditions. Operating times are much longer than with older, more conventional transceivers.

#### **Built-in Clock with timer functions.**

The IC-2SE is equipped with an advanced 24-hour system clock with timer function. The transceiver automatically turns on when real time matches o pre-programmed time. This is perfect for scheduling QSO's. Auto power-off timers and other settings can be made in clock mode.

#### **Convenient Scan Functions.**

The IC-2SE is equipped with VFO and memory scan.

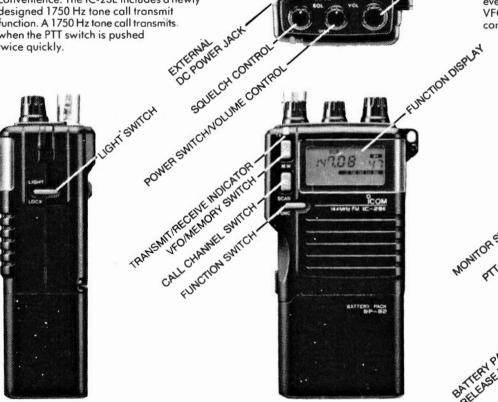
- **VFO Scan.** VFO Scon repeatedly scons all VFO frequencies. In addition, unnecessary frequencies can be skipped.
- Memory Scan. Memory scan repeatedly scans memory channels.

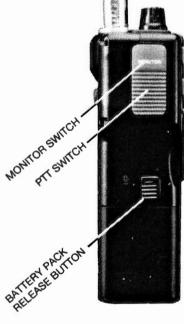
#### **Auto Power Off Timer Function.**

If you ever forget to turn the IC-2SE off, don't worry. It will turn itself off. Power-off time can be selected or deactivated using multifunction mode. Preserve bottery pack power for the times when you need it most.

#### Priority Watch.

Why interrupt calls to check other stations? Priority wotch monitors a specified station every five seconds while you operate on a VFO frequency. Continue with your communications and let priority watch do the checking for you.





**Helpline:** Telephone us free of charge on **0800 521145** Mon-Fri 0900-13.00 and 14.00-17.30. This service is strictly for obtaining information about or ordering Icom equipment. We regret this cannot be used by dealers or for repair enquiries and parts orders, thank you.

Datapost: Despatch on same day whenever possible.

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







# 5MC South Midlands

SCHOOL CLOSE, CHANDLERS FORD IND. EST., EASTLEIGH, H

# STOCKTAKING STOCKTAKING

ALL SMC BRANCHES WILL BE CLOSED ON FRI 29th JUNE FOR ANNUAL STOCKTAKING

# THE NEW FT100



#### ADDITIONAL FEATURES

Other features include adjustable IF width, IF shift, IF notch and APF controls. AGC presentable for fast, medium and slow + defeat, on/off selectable, preamp + adjustable attenuator -6dB, -12dB, -18dB,. Adjustable - mic gain, RF power o/p, processor and drive controls. Built in electronic keyer with adjustable speed control. Twin independent frequency displays with mode

#### **BRIEF SPECIFICATIONS**

- ★ General Coverage Receiver 100kHz-30MHz
- ★ Ham bands TX 160-10m
- ★ Modes CW, USB, LSB, AM, FM, RTTY and PACKET
- ★ VFO steps 10Hz CW, SSB, RTTY, 100Hz AM, FM, PKT
- Auto antenna impedance range 16.7 to 150 ohms
- Selectable receiver band widths 2.4Khz, 2Khz, 500Hz, 250Hz
- ★ Dual band receiver tuning and monitoring with balance
- ★ Power output up to 200 watts P.E.P. 50W AM
- ★ Sensitivity preamp on SSB/CW 0.25 micro volts 10dB S/N
- D.D.S. Direct Digital Synthesiser
- ★ Dual selectable noise blankers with adjustable threshold
- ★ Frequency stability ± 20ppm (0 to +50°C) ± 200Hz F3  $\pm$  0.5ppm (0 to +60°C),  $\pm$  150Hz, F3 with TXCO-1 fitted
- ★ 99 memories

#### FANTASTIC PERFORMANCE, REALISTIC PRICE



The FT-747GX is a compact SSB/CW/Am and (optionally) FM transceiver providing 100 watts of PEP output on all hf amateur bands, and general coverage reception continuously from 100kHz to 30MHz. A front panel mounted loudspeaker and clear, unobstructed display and control layout make this set a real joy to use. Convenient features include operator selectable coarse and fine tuning steps optimized for each mode, dual (A/B) vfos, along with twenty memory channels which store mode and skip-scan status for auto resume scanning of selectable memories. Eighteen of the memories can also store independent transmit and receive frequencies for

- 160-10M HF TRANSCEIVER
- GENERAL COVERAGE RECEIVER  $\star$
- ALL MODE (FM OPTIONAL)
- 0-100W OUTPUT (25W AM CARR.)
- CW NARROW (500Hz) STANDARD
- LARGE CLEAR LCD DISPLAY \*
- ★ SIMPLE OPERATION (see pic below)

All major controls are grouped together for convenience and ease of operation.

easy recall of split-frequency operations. Wideband (6kHz) AM and narrowband (500Hz) CW IF filters are included as standard, along with a clarifier, switchable 20dB receiver attenuator and noise blanker. User programming for more advanced control by an external computer is possible through the CAT (Computer Aided Transceiver) System. The transmitter power amplifier is enclosed in its own diecast aluminium heatsink chamber inside the transceiver, with forced-air cooling by an internal fan allowing full power FM and packet, RTTY, SSTV and AMTOR operation when used with a heavy duty power supply.

WARNING: If you buy FT747GX not designed for the U.K. market, these may not be fitted with AM/CW filters which you may not be able to obtain.

LEEDS SMC (Northern) Nowell Lane Industrial Estate Leeds LS9 6JE Leeds (0532) 350606 9-5.30 Mon-Sat CHESTERFIELD SMC (Midlands) 102 High Street New Whittington hest. (0246) 453340 .30-5.30 Tues-Sat BIRMINGHAM SMC (Birmingham) 504 Alum Rock Road Alum Rock Birmingham B8 3HX (021-327) 1497/6313

AXMINSTER Reg Ward & Co Ltd 1 Western Parade West Street Devon EX13 5NY Axminster (0297) 34918 9-5.20 Tues-Sat



SOUTHAMPTON SHOWROOM open 9.00-5.00 Monday to Friday, 9.00-1.00 Saturday. Service Dept open Mon-Fri 9.00-5.00.

# mmunications Ltd.

ITS. SO5 3BY TEL: 0703 255111 FAX: 0703 263507 TLX: 477351

# SUMMER SPECIALS **70CMS HANDHELD BARGAIN**

SUITABLE FOR USE ON 70CMS

6 CHANNEL CRYSTAL CONTROLLED TRANSCEIVER

SUPPLIED C/W NICAD (LESS CRYSTALS & CHARGER) ONLY £99.00 inc VAT











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

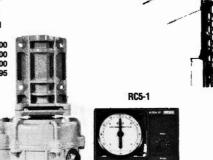
Now available to customers in the UK through South Midlands Communications, the appointed distributor, are the popular CREATE HF beams to cover the 10/15/20 metre bands, HF baluns up to 10KW PEP and the exciting 10/15/20/40V dipole which has elements of only 19ft and is designed in such a way that it 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.

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 £149 + £8 carriage (inc. VAT).

### 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 operation.

RC5-1 ..... £219.00 RC5A-3 ..... £425.00 RC5B-3 ..... £675.00 CK46 Rotary bearing £34.95



## 6M BEAMS

New from Creative Design are a range of 6m beams, the CL6DX 6 element, CL6DXX 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 extremely robust.

CL6DX 6 ele 13dB\* ...... £115.00 CL6DXX 7 ele 14.3dB\* ...... £168.99 ..... £168.99 CL6DXZ 8 ele 14.5dB\* ...... £225.00 \*Manufacturers figures.

### HF BEAMS

Introducing the NEW 318 series of DX Tribanders from Create which offer outstanding efficiency with High Q traps especially designed for 14, 21, & 28MHz. 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

CD318 4 ele 10-15-20M 2KW PEP Gain 7:8:5:95 F/B 18:20:20dB

CD318 5 ele 10-15-20M 2KW PEP Gain 7:5:9:950B F/B 20:18:20dB

CL406-4 3 ele Yagi 40M 4KW PEP Gain 8dB F/B 22-18dB

CV48 40M vertical 2KW PEP 500W PEP Radial wires included suitable for ground or roof

Only £49 P&P £2.85

AD385 Matching network 40/80M for CV48 remote switchable
Unity £45 rer 12
CV730V-1 V dipole for 10-15-20-40 1KW-2KW PEP 19' ele capable of being mounted anywhere nly £149 P&P £3.50

\*FREE FINANCE ON SELECTED ITEMS
On many regular priced items SMC offers Free Finance (on invoice balances over £120) 20% down and the balance over 6 months or 50% down and the balance over a year You pay no more than the cash price!
Details of eligible items available on request
"Subject to status.

PRICES & AV

Free interlink delivery on major equipment Small items, Plugs, Sockets, etc by post £1.75. Anten-nas, cables, Wires & larger items. Lynx up to £5. Interlink delivery available, upon request for items other than radios from £7.30 depending on weight. Same day despatch whenever possible.

YAESU DISTRIBUTOR WARRANTY Importer warranty on Yaesu Musen products. Ably staffed and equipped Service Department. Daily contact with the Yaesu, Musen-factory. Tens of thousands of spares and test equipment.

PRICES & AVAILABILITY SUBJECT TO CHANGE WITHOUT PRIOR NOTICE

5MC

# South Midlands Communications Ltd.



FANTASTIC SAVINGS ON SOME OF YAESU'S BEST SELLING RADIOS

FT736R\*

NOW ONLY £1199

**SAVE £160** 

\*CAN BE EASILY INTERNALLY LINKED FOR 9600 & 1200 BAUD PSK PACKET OPERATION

FT4700RH

NOW ONLY £499

**SAVE £176** 

**FT470** 

NOW ONLY £349 SAVE £40

### TRANSCEIVER ONLY

NO FREE FINANCE ON THESE OFFERS

ALSO AVAILABLE FROM ALL SMC BRANCHES BUT ONLY
WHILST STOCKS LAST

SOUTHAMPTON (0703) 255111 CHESTERFIELD (0246) 453340 AXMINSTER (0297) 34918 LEEDS (0532) 350606
BIRMINGHAM 021 327 1497
For full addresses see display advert

## PHOTO ACOUSTICS LTD

## **Telephone**

58 High Street, Newport Pagnell, Bucks. MK16 8AQ. 0908 610625

#### AR-1000 HANDHELD SCANNER



Basic Spec. Freq. ranges: 8-600MHz and 805-1300MHz Freq. selection: By direct keypad entry or by tuning knob on top panel.

Mem. channels 1000 arranged conveniently in ten banks of 100, with direct keyboard access to any memory. Reception modes: AM, FM (narrow) and FM

RECEIVER COMES COMPLETE AND READY TO GO ONLY £249.00 + P&P £4.00

#### NEW - AR-3000 - NEW YES IT'S FINALLY HERE!!

The AR-3000 Wideband Receiver is now available.



Basic Spec.

Freq. range: 1000KHz to 2036MHz without any gaps. Reception Modes: LSB, USB, CW, FM (wide), FM (narrow) and AM.

Mem. channels: 400 memory cha 4 banks of 100. Freq. selection: By direct keypad entry or by tuning knob on front

ONLY £765.00 + P&P £5.00

#### HF-225

HF general coverage receiver, 30KHz to 30MHz.

(The HF225 has been voted "Receiver of the Year" by World Radio and TV Handbook)



ONLY £425.00 + P&P £7.50

#### **ICOM IC-24ET**

Icoms New Mini Dual Band Handheld for 2M & 70cms.



- Full Duplex
- 5W output on 13.8v Up to 80 memory
- Dual Band display CTCSS option
- available
- Compact and lightweight 52(w) × 136.5(h) × 34.5(d)

ONLY £385.00 + P&P £4.00

#### STANDARD C528



#### Features:

- ★ Full Duplex
- 5W output on 13.8v
- **Dual Watch** facility
- **Dual Band display**
- 144-146, 430-440 and 800-975MHz Rx only
- ★ CTCSS option available

ONLY £379.00 P & P £4.00

#### ALINCO DJ-500E for 2M and 70cms.



#### Features:

- ★ Up to 6W output
- ★ 20 memories
- Battery saver
- ★ 700mAH nicad
- Includes charger
- ★ Full Duplex
- Receive option of: 140-170MHz 430-460MHz 870-900MHz

ONLY £319.00 + P&P £4.00

#### KENWOOD TR-751E



25w 2M multimode transceiver. This radio can be used mobile or makes a superb 2M Base station if used with a 13.8v PSU.

ONLY £599.00 + P&P £7.50

### YAESU FT290RII



2.5w 2M multimode transceiver. This radio can be used either portable, mobile or as a Base if used on a 13.8v PSU.

ONLY £429.00 + P&P £5.00

#### YAESU FT690RII



2.5w 6M multimode transceiver. This is just the ticket to work all those excellent E's openings on 6 metres.

ONLY £429.00 + P&P £5.00

### SECONDHAND ITEMS

YAESU FT290RII excellent cond..... FDK 750X 10W 2M multi mode .... BEARCAT 800XLT Scanner covers 29-54, 118-174, 406-512 &

C58 or Yaesu FT290R. ..

NRO525 Top of the range HF receiver complete with external speaker. This unit is a demo model & therefore has 12 month. REALSTIC PRO-2005 VHF/LIHF scenner. Covers 25-520 and 760-1300MHz, AM, FM(narrow) and FM(wide). 400 mem. As

AM and FM. This is as new

YAESU F1012D AM Bend PM: These is as retw.

YAESU F1012D AM Bend HT Transceiver.

ICOM IC-505 10W 6M multimode trans. Complete and as new.

BNOS LP50-3-50 50W 6M linear with preamp, would suit either

F1690R or IC-505. Superb cond.

£159.95 + p&p £5.00

£615.00 p&p FREE

£230.00 + p&p £5.00

£85.00 + p&p £4.00

£950.00 + p&p £15.00

£265.00 + p&p £5.00

£199.00 + p&p £4.00 £420.00 + p&p £5.00 £345.00 + p&p £5.00 £110.00 + p&p £4.00

REALISTIC PRO-2004 VHF/JHF Scanner, Coverage 25-550MHz & 760-1300MHz. AM and FM. This is in superb condition with 

This unit is in superb condition with box & manuals.

SONY ICF-2001D Portable Short-wave receiver. This unit is only 1 month old and is complete & as new.

YAESU FT-203R 2.5W 2M handheld.

types of transmissions and display them on a TV or video monitor

but not quite as good cond.

YAESU FT-208R 2.5W 2M handheld transceiver....

DEMO MODEL Kenwood TH-75E Dual band 2M/70cms

PK-232 Terminal unit for Packet, Amtor, Rtty, Fax, CW, Navtex, complete with CBM64 software.

£185.00 + p&p £5.00 £310.00 + p&p £5.00 £429.00 + p&p £10.00

£245.00 + p&p £5.00 £130.00 + p&p £4.00 £40.00 + p&p £4.00

£155.00 + p&p £5.00 £349.00 + p&p £5.00

£320.00 + p&p £5.00 £129.00 + p&p £4.00

£230.00 + p&p £5.00

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

SPEND UP TO £1,200 INSTANTLY WITH A PHOTO ACOUSTICS LTD, CREDIT CHARGE CARD — APPLY FOR DETAILS PART EXCHANGE WELCOME, ASK FOR KERRY G6IZF OR ANDY G4YOW RETAIL SHOWROOM OPEN MONDAY-FRIDAY 9.30–5.30, Saturday 9.30–4.30

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

Practical Wireless, July 1990

MVT5000	R RANGE 25-1300Mhz handy
JUP1 JUP2	Case & belt hook
JUP3 JUP4	DC cigar lead 4.95 Set of 4 nicads 6.00 Mains adapter 14.50
DA900 MVT6000	Flexible antenna
ALINCO ALD24E	0 2m /70cm mobile 300 00
DR110E DR410E	2m/70cm mobile
DR510E ALX2E	2-/70
EBP3N EBP2N	2m / 10cm mobile   349.00
EDH10 ESC5	DC to DC ALX2E 16.95 Case/belt clip 14.00
DJ100E DJ100EX	2m handy tevr
DJ500E EBP9NAZ	Dualband hand
EBP6NAZ ELH230D	Nicad 7.2V 500mAh 35.95 Nicad 9.6V 450mAh 29.95 2m amp. 1-5W/10-30W 75.00 2m amp. 1-3W/50W 119.00
ELH260D	2m amp. 1-3W/50W119.00
AZDEN PCS6000	2m mobile329.00
L20	ND/REVEX 15-50w load PL259 15.95
L20N SX100	15-50w load "N"
SX200 SX400	15-50w load PL259 15.95 15-50w load PL259 29.50 15-50w load "N" 22.95 Vswr 1.6-60 MHz 95.00 Vswr 1.8-200 MHz. 65.00 Vswr 18-225 MHz 99.00 Vswr 1.8-1300 MHz 159.00 Vswr 1.8-1300 MHz 159.00
SX600 SX1000	Vswr 1.8-525 MHz119.00 Vswr 1.8-1300 MHz159.00
P300 W510	30 Amp psu
W520 W540	Vswr 1.8-200 MHz 59.95 Vswr 140-525 MHz 63.00
W544 W570 S20	Vswr 1.8–1300
S20N rodD24N	Vswr 1.8-1300 MHz. 159.00 30 Amp psu
G III-MANAGARA	ND ANTENNAS
CP4 CP5	10-40m vert
D130N X50	Disc. 25-1300 MHz 82.00
X500 CP22J	2m/70cm base
EL770H NR72M	2m 6.5dB
M285 EL2E	2m 5/8th PL259 14.95 2m 7/8th PL259 32.95 70cms gain BNC 26.00
RH702B DP-GL	Gutter mount 10.00
EC-H SPM TRA	PL259 cable kit
D505 D707	Boot mount
MB100A MA1100	Base 1.5–1300 MHz. 99.00 Low pro. mt. TNC 39.00 2m/70cm whip TNC 26.00 2m/70cm whip TNC 29.00
MA1000 MA200	2m/70cm whip TNC 29.00 2m whip TNC 26.00
MIZUH	O ORP
MX3.5S MX7S	80m 2W SSB/CW 189.00 40m version
MX14S PM1	20m version       189.00         DC/DC 13.8V to 9.6V       19.95         Speaker microphone       29.00
MSI XTALS	VXO xtals 10.00
BM6 PL3.5S PL7S	Carry case       9.00         80m 10W linear       129.00         40m 10W linear       129.00         20m 10W linear       129.00
PL14S PL1000	20m 10W linear
CWS2 PR3S	
AN-7 AN-14	Mobile mount 27.00 40m 4ft whip 29.00 20m whip (BNC) 29.00
CREAT	E ANTENNAS
5130-1 5130-2	50-1300 MHz 12dB179.00 105-1300 MHz 13dB99.00
730V-1	40-10M Rigid dipole149.00
TS950S	OD HF  HF trevr. + ATU2499.00  HF tevr. + +3199.00
TS950SD TS940S	HF all band tevr 1995.00
AT940 SP940 VS1	Automatic atu
TS440S AT440	HF transceiver
PS50 TS140S	Heavy duty PSU
TS680S PS430	TS140S + 6m module 985.00 Mains power supply
SP430 AT250	Matching speaker
AT130 MB430	Mobile atu 80-10m140.50
AT230 SM220	Mobile mount
TL922 LF30A	Station scope     343.50       9 band 2kW linear     1495.00       HF Low pass filter     32.25

KENWO	OOD VHF/UHF
TS711E	2m Base SSB/CW/FM898.00
TS811E	70cm Base station998.00
SP430	
	Matching speaker
TS790	2m & 70cms 1495.00
PS31	Matching psu186.00
SP31	External speaker 63.00
TR751E	2m multimode mobile 599.00
TR851E	70cm multi-mode599.00
VS1	Voice module 32.25
TM231E	2m FM 50w289.00
TM431E	70cms FM mobile 35w 318.00
TM531E	23cms FM mobile385.00
SP40	Mobile Speaker 21.00
SP50	Mobile Speaker 20.40
TM731E	Mobile Speaker
TM701E	2m/70cms FM 25W469.00
TH75E	2m/70cms FM handy398.00
TH25E	2m FM handheld238.00
TH45E	70cms FM handheld 269.50
BC2	Charger
BT2	Dry case
SC8	Soft case
SC11	DD21U acce 10.46
AD1	PB21H case
	3_ bandbald BNC
TH205E	2m handheld199.00
TH215E	2m handheld228.00
TH405E	70cm handheld245.00
TH415E	70cm handheld268.00
SMC31	Speaker/mic
SMC32	Miniature speaker 23.95
BT5	Dry battery case 11.85
BC7	Rapid nicad charger 97.40
BC8	Compact nicad charger 38.80
SMC25	Spkr/mic 23.00
R5000	Deluxe HF receiver 875.00
VC20	Conv. 108-174MHz167.00
R2000	HF receiver595.00
VC10	Conv. 118-174MHz161.95
RZI	Rx 500 kHz-905 MHz 465.00
KLI	KX 300 KH2-903 MH2403.00
YAESU	HF
F1747GX	HF Transceiver659.00
TIMOA	FM board
F1757GX2	HF Transceiver969.00
FP700	20 Amp power supply219.00
FC757AT	
	Automatic atu349.00
FP757HD	Heavy duty psu259.00
MMB20	Mobile mount
FC700	Manual antenna tuner 149.00
FT767GX	HF transceiver 1599.00

FT767GX CP767	HF transceiver
YAESU FT4700RH FT470R	VHF 2m/70cm mobile 50W675.00 2m/70cm body389.00
FT23R	2m body209.00
FT73R	70cm body229.00
FBA10	Cell case AA 11.50
FNB9	200mAh pack 34.50
FNB10	600mAh pack 34.50
NC27C	Mains charger FNB9 17.70
NC28C	Mains charger FNB10 17.70
NC29	Desktop charger 69.00
MMB32A	Mobile bracket 16.00
FNB3A	425mAh nicad FT727R 41.00
FNB4A	600mAh nicad FT727R 46.00
CSC17	Soft case 10.00
CSC18	Soft case 11.50
MMB21	Mobile mount FT727R 10.00
PA3	12V charger 21.85
NC9C	Mains charger 11.50
NC18C	Mains charger 17.50
YHA27	Dual Band helical8.75
FT290R2	2m all mode portable429.00
FT690R2	6m all mode portable399.00
FT790R2	70cm mode portable 499.00
FBAS	Additional cell case 27.00
MH10F8	Speaker/mic
NC26C	Mains charger FBA-8 11.50
MMB31	Mobile mount 17.50
CSC19	Soft case9.00
FT411	FT23 body225.00
FT811	FT73 body239.00
MMB34	Mobile mount9.00
FT736R	Multimode 2m/70cm 1359.00
FT212RH	2m Tevr. FM 45W349.00
FT712RH	70cms Tevr. FM 35W375.00
MMB11	Mount FT290 MK1 29.95

MINIBIL	Modelt   1270 Mai
	RECEIVERS
FRG8800	HF receiver649.00
FRV8800	Conv. 118-175MHz100.00
FRV/WFM	Module WBFM 20.00
FRA7700	Active antenna 49.00
FRT7700	Antenna tuner 59.00
FRG9600M	60-950 MHz scanner 499.00
PA4C	PSU for FRG9600 25.00
FC965DX	Conv. 0.15-30 MHz 89.00

#### YAESU ACCESSORIES

Most mics and filters from stock. Please phone or write.

ICOM	
<b>ICOM</b>	пг

IC781	HF Tevr. + ATU, CRT . 4500.00
IC765	HF transceiver 2499.00
IC751A	HF transceiver 1500.00
IC726	Compact HF tcvr989.00
IC735	HF transceiver979.00
IC725	HF transceiver759.00
ICOM	DECEIVEDS

<b>ICOM</b>	RECEIVERS
ICR71E	100 KHz-30 MHz Rx855
R7000	Rx 25 MHz-2 GHz 989



#### MAIL ORDER OR RETAIL FAST, FRIENDLY EFFICIENT









COM	VHF	
C575H	50 MHz base 100W	. 1199.00
C2GE	2m FM handheld	265.00
C2SE	2m handportable	275.00
C2SET	2M handy	
C2E	2m FM handy 1.5w/BP3	235.00
CO2E	+ keypad 3w/BP3	249.00
C228E	2m FM mobile 25w	365.00
C228H	2m FM mobile 45w	385.00
C290D	2m multimode mobile	559.00

S-Meter

Internal AA Cells

External DC





Xtal Fitted gives 3.525-3.550 or 7.075-7.100 or 14.20-14.25MHz depending on model. Virtually no drift! Additional xtals in stock.



RETAIL ONLY:- 12 North Street, Hornchurch, Essex RM11 1QX Tel: (04024) 44765

# **ALINCO PRICES DOWN!**

NOW EVEN BETTER VALUE





- 455/5 Watts (70cms 35/5)
- 6 Frequency Steps
- 4 Scanning Modes
- Reverse Repeater
- Priority Channel
- Rotary Knob tune
- Up/Down mic.
- **Mounting Hardware**
- DC Cable
- 12 Month Warranty
- 170MHz Rx Option
- Minute Dimensions
- \* DR410 70cms Price: £299

# 2m & 70cms!

Welcome Extended Rx Option



- **Full Duplex**
- Single Ant. Socket
- 14 Memories
- 4 Scanning Modes 6 Channel Steps
- Reverse Repeater Priority Channel
  - Rotary Tune Knob Up/Down Mic

DJ - 160 2 Metre

3 Watts Rx Option:

130 - 180MHz

Small Size: 132 x 57 x 32mm

#### Rotary Tuning!

- 144 146MHz Tx
- LCD Readout
- **Key-pad Entry**
- 20 Memories
- Scan/Priority
- Call Channel
- Reverse Repeater
- 5 Steps inc. 12.5kHz
- DTMF
- **Battery Saver**
- **Auto Power Off**
- Programme Offset
- Direct 12 volt
- 700mAh Ni-Cad
- **AC Fast Charger**

DJ - 460 70cms

## PCS-6000 FM 2M Mobile Plus! AM Airband Receive



Individual shift and auto-tone burst into each memory channel.

- 25 Watts
- 20 Memories
- 2 Memory Banks
- Hold/Scan/Delay
- Priority Channel
- Reverse Repeater
- 125/25KHz Steps
- Up-Down Mic
- Illuminated Display
- Tone Encoder
- Programmable Shift
- 1750Hz Auto Tone Mic & DC Lead
- Mounting Hardware
- 50 × 140 × 182mm

Robust Construction

Send For Leaflet

RETAIL & MAIL ORDER: 18-20 Main Road, Hockley, Essex SS5 4QS Tel: (0702) 206835, 204965 Visa and Access by telephone. 24hr Answerphone.





The NEW DEWSBURY ELECTRONICS SUPA-TUTA makes learning Morse easier than its ever been

The self contained unit contains all one needs to learn Morse, and learn it thoroughly. From ABSOLUTE BEGINNER to EXPERT, all can make use of the on-board facilities.

- 1. Beginners Course, a gentle introduction to Morse Code over 10 lessons, including letters, numbers and accented characters.
- 2. Training Courses, no less than 90 different training sequences, with answers for checking, plus a further 10 sequences of random letters and figures, but without answers.
- 3. Ten different messages of 500 characters each, with answers.
- 4. Random words, Supa-Tuta has a library of words and abbreviations, no answers for this one!
- 5. Variable Speed, 2-99 wpm, variable sidetone 500-1250Hz, variable inter character spacing, a relay switched output and built in sidetone speaker. Works from 9-14 volts DC at 300mA.

# Price £69.95

inc VAT and postage

Send SAE for details

FULL RANGE OF KENWOOD PRODUCTS STOCKED We are also stockists of DAIWA - POCOM - JRC -TAR - WAVECOM- VIBROPLEX - MICROWAVE MODULES - B.N.O.S.

Dewsbury Electronics, 176 Lower High Street, Stourbridge, West Midlands DY8 1TG Telephone: Stourbridge (0384) 390063/371228 Fax: (0384) 371228



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



Many Radio Amateurs and SWLs are puzzled. Just what are all those strange signals you can hear but not identify on the l.f. and h.f. frequencies? A few of them, such as c.w., RTTY, and Packet you'll

know — but what about the many other signals?

Hoka Electronics have the answer! There are some well known CW/RTTY decoders with limited facilities and high prices, complete with expensive PROMS for upgrading, etc., but then there is Code 3 from Hoka Electronic!

It's up to you to make your choice — but it will be easy once you know more about Code 3!

Code 3 works on any IBM-compatible computer with MS-DOS having at least 640kB of RAM.

Code 3 hardware includes a complete digital FSK Converter with built-in 230V ac power supply and RS232 cable, ready to use. You'll also get the best software ever made to decode all kinds of data transmissions. Code 3 is the most sophisticated decoder available, and the best news of all is that it only costs £249 plus VAT!

The following modes are included in the base-program (with the exact protocols).

Packet Radio AX 25. 50 to 1200 Baud Hell: Suchromostalenderhous all properts

Baudot: ITA 2 plus all types of Bit Inversion, at any speed ARQ: CCIR 476, CCIR 625 mode A ARQ-S: ARQ 1000S
ARQ-Swe: CCIR 518 variant
ARQ-E: ARQ 1000, ITA 2-p Duplex
ARQ-B: ITA 2 Duplex
ARQ-B: ITA 2 Duplex
ARQ-B: CCIR 519 ITA 3
ARQ-6: 56 character 90 and 98
TDM 242: CCIR 242 2/4 channels
TDM 342: CCIR 342 2/4 channels
FEC-A: FEC 100(A) ITA 2-P FEC Broadcast
FEC-Se-FEC CCIR 625 476-4 mode B Stor Amfor FEC-S: FEC 1000S ITA 3

Hell: Synchronous/asynchronous, all speeds Fax: Weather charts, photographs with grey scales at 60, 90, 120, 180, 240 pm Morse: Automatic and Manual with speed indication.

indication Press DPA: F7b spec., 300 Baud ASCII Wirtschaftdienst: F7b spec., 300 Baud ASCII Spot Information: F7b spec., 300 Baud ASCII

ASCII Autospec Bauer: ITA 2 including both modes Spread 21 and Spread 51 Duplex ARO Artrac ITA 2 TWINPLEX F70-1 and F70-2 Duplex ARO ASCII

All modes in preset and variable user-defined speedrates and shifts

Three options are available to use with the Code 3 and consist of:

1: OSCILLOSCOPE, this facility displays the measured frequency versus time, including split-screen, storage and non-storage modes at £25.

PICCOLO MK VI (Everybody wants this facility, but it's only on offer from Hokal), the well-known multitone-mode at £60.
 LONG-TIME AUTO-STORAGE in ASCII (up to several days) £25.

3: LONG-TIME AUTO-STORAGE in ASCII (up to several days) £25. Plus many other special codes. Send for details, price on application. Along with the many facilities listed, the analysis section of the Code 3 offers you a wide choice of unique facilities such as: a built-in low frequency spectrum-analyser for shift measurement and tuning, plus precision speed measurement up to 0.001 Baud resolution. Other tool-facilities include Speed Bit analysis, Speed Measurement, Character Analysis, Auto-correlation of MOD and RAW signal, Bit Analysis. All these state-of-the-art features are included in Code 3 to assist the experienced user.
All options are available from the main menu, saving or loading to or from hard or floppy disk in Bit form (no loss of unknown signals), hard copy with printer, on-screen tuning indicator and very easy to use Help-files.

Warning: The actual use of parts of this program may be illegal in some countries and any liability in this respect is disclaimed.

To order, 'phone us for more details or send cheque, payable to



## RADIO OFFICER A CAREER WITH A DIFFERENCE

Government Communications Headquarters (GCHQ) are specialists in all aspects of communications and as a RADIO OFFICER you would be trained to undertake wide ronging duties covering the complete radiocommunications spectrum from DC to light.

Not only do we offer Comprehensive training but also:-

- Good Career Prospects Competitive Salaries
- Varied Work (opportunities for moves within UK and Overseas)
  - Generous Leave Allowances . Job Security
  - Non-Contributory Pension Scheme and much more!

QUALIFICATIONS

o. You need to hold or hope to abtain a BTEC National Diploma (or HNC/HND) in a Telecommunications, Electronics Engineering or similar discipline. Special consideration will be given to opplicants holding on MRGC Certificate. The C&G 777 (Advanced) or other qualification incorporating morse

skills would be advantageous but nat essential.

b. Have a minimum of 2 years recent relevant radio operating experience. Preference will be given to those capable of reading morse at 20 wpm. Preferred Age Range 18 to 45 years.

SALARIES (Reviewed Annually)

After a residential training course of between 29 and 52 weeks – depending on

background experience – the Radio Officer Pay Scale ranges from £12,678 to £18,431 over 5 years with prospects for further pramotion. (Salaries include an allowance for shift and weekend work).

APPLICANTS MUST BE BRITISH NATIONALS

For further information and application form contact:-Recruitment Office, Room A/1108, GCHQ, Priors Road, CHELTENHAM, Glos GL52 5AJ or Telephone (0242) 232912 or 232913.







KENWOOD TS140S HF TRANSCEIVER
USUAL LIST PRICE £862

OUR PRICE £699

OR £23.49 PER MONTH FOR 48 MONTHS



**KENWOOD TS140S** 

# ICR7000HF Receiver 500kHz — 2GHz





Now available on super credit terms. 48 monthly payments of £33.23 Cash/cheque/credit card price.

£989.

YES, 500kHz to 2GHz CONTINUOUS receive in one unit. Using the ICR7000 multimode facilities, this probably makes the "2 in 1" ICR7000HF Receiver the most versatile scanner available today. Because of the enormous frequency coverage, the ICR7000HF has 200 mode sensitive channels for increased flexibility.

#### REMEMBER

WE SELL ALL WELL
KNOWN BRANDS. LET
US QUOTE FOR YOUR CHOICE
KENWOOD — ICOM — STANDARD

Opening Hours Monday-Friday 9.30 to 5.30 NOW OPEN SATURDAY MORNINGS 10.00-1pm



Brenda G4VXL Both Brenda and Bernie will be pleased to welcome you at their Ealing shop.



Bernie G4AOG

WE HAVE BEEN FORTUNATE
IN PURCHASING A LARGE QUANTITY
OF YAESU FT 747GX TRANSCEIVERS
DIRECT FROM OUR AGENT IN JAPAN
AND WE ARE PLEASED TO BE ABLE TO
OFFER THESE AT THE AMAZING PRICE OF

## £499 INC VAT.

CW & AM FILTERS ARE AVAILABLE AT £35 EACH



# AVAILABLE WITH NO DEPOSIT AND 48 MONTHS TO PAY — £16.76 PER MONTH

THE FT747 HF TRANSCEIVER SSB/CW/AM (AND OPTIONAL FM) 100 WATTS PEP OUTPUT ON ALL HF BANDS AND GENERAL COVERAGE ON RECEIVE 100kHz-30MHz, DUAL VFO 20 MEMORIES. ALTOGETHER A SUPER ECONOMICAL HF TRANSCEIVER.



#### Kenwood TS440S & Auto ATU

One of the finest HF transceivers ever produced by Kenwood. Whether used as a base station or mobile — its superb specification rates it high amongst its competitors.

TS440S with auto ATU AND FREE Revex 30amp power supply — at list price or 48 payments of £43.08.

£1,282

WITHOUT AUTO ATU £1039

	48 PAYMENTS APR 29% Subject to Status	CASH/CHEQUE/ CREDIT CARD
TS950		POA
TS680	£31.09	£925.00
TS140	£23.49	£699.00
ICOM781	£134.25	£3995.00
ICOM765	£75.44	£2245.00
ICOM735	£30.07	£895.00
ICOM726	£30.07	£895.00
ICOM725	£23.49	£699.00

ARE Communications Limited, 6 Royal Parade, Hanger Lane, Ealing, London W5A 1ET, England Tel: 081-997-4476 Fax: 081-991 2565



### BUYING **KENWOOD HF?**

TS950S/TS940S TS440S/TS140S/680S?

As an authorised dealer we offer full UK spec at BEST PRICES!

#### **NEW!! AR1000**

**SuperScanner** 1000 Channel memory & 15-1300Mhz.

IN AT LAST Immediate Delivery @ £249





Ö

#### HP100E

IC-725 STAR BARGAIN

FM/AM Unit included, Microphone included,

30 Amp P.S.U. included, G5RV Antenna included

**NEW HP100E from** FAIRMATE, 15/1300Mhz 1000 channel memory

inc. Nicads £249.00 Inc. Micada and Charger

**ALL-IN** 

**PRICE** 

£869.00!!

#### IN AT LAST!!

#### **NEW ICOM IC-R1**

Micro-size handheld scanner 150Khz/ 1300 Mhz

£399



#### NEW! IC-24E



ICOM mini dual bander 2M & 70cms FM **DISCOUNT PRICE £349** incl. nicad, charger

# RADIO LTD

'The Best Deal in Amateur Radio!'

#### **NAVICO SUPER SPECIAL OFFER!!**

Minimum £50 Trade-in for any working 2 metre or 70cms Japanese Transceiver against the superb AMR1000S at £299.00. Take PX to ARROW branch at CHELMSFORD, GLASGOW, OR WIGAN.



#### SPECIAL PRICES FT736R at £1.199 FT4700RH at £499

(subject unsold)

**ICOM R100 MOBILE SCANNER** 50KHz to 1.8GHz - now in - £499

#### TR751E — FREE CREDIT

**EXCELLENT 2 Metre** performance from this great allmode rig.

Dep: £199 + 9 payments £44.44.



#### TH75E KENWOOD **DUAL BANDER** with receive

140/169 & 430/460 Mhz Nicad & Charger £398.00

#### INTEREST FREE CREDIT

Many major items available with interest free credit at one third deposit balance over 9 months (APR zero)

Arrow welcome your part exchange equipment in UK!! Call for the best deal!

#### COMET ANTENNA

'The effective aerial'

MON RADIAL: Mobile automos independent of vehicle ground plane	
CHL21J 144/432 Mhz, Unity/2.15dB,100W Only 29cms long	215.95
CHL23J 144/432 Mhz 2.15dB/3.8dB 100W Only .44 metres	£17.95
CHL24J 144/432 Mhz 2.15dB/5 dB 100W 0.8 metres long	£25.30
CHL250H 144/432 Mhz 3.0dB/5.5dB 200 Watt 0.95 metres long	£32.80

#### 2x4 Series + Triband mobiles and lines station automos: 2x4M 144/432 Mhz 4.5/7.2dB 150 watt 1.53 metres.

.\$37.65

#### 2x4 SERIES & DUAL RANDERS featuring the unique super linear converter system $2x4MAX\ 144/432\ Mhz\ 8.5dB/11.9dB\ 200\ Watt\ 5.4\ metres\ "N"\ G.$ 2x4WX 144/432 Mhz 6.5/9.0dB 200W 3.18 metres Glassfibre......\$79.95 2x4SUPER II 144/432 Mhz 6.0/8.4dB 200W 2.43 metres Glassfibre. . . £77.35 2x4FX Compact 144/432 Mhz 4.5/7.2dB 200W 1.79 metres.

DUPLEX & TRIPLEXERS Zinc alloy discant
CFX5140 50/144/432 Mhz 800/800/500 Watt PEP 55dB isolation \$28.10 CF416 144/432 Mhz 800/500 W PEP 60dB isolation ..

#### SR Series to order only. MONO BANDER MOBILE ANTENNAS

CA285 5/8 wave 3 5dB 300Watt 1 32 Metres Base loaded ... CA430TM 3 x 5/8 wave 432 Mhz 6.8dB 150W 1.47 metres.......... \$29.95

#### MONOBAND BASE ANTENNAS

ABC23 3 x 5/8 wave 144 Mhz 7.8dB 200 W 4.5 metres ..... ABC71 5/8 wave ground plane 432 Mhz 3.4dB .54 mtrs.....ABC72 2 x 5/8 wave GP.432 Mhz 200W 5.8dB 1.07 metres ..... \$21.56 CA712EF 432 Mhz Twelve x Half wave! 9.5dB 3.10 metres .....

#### HF & 50 MKZ

CHA-5 Vertical with Loaded Radials for 80/40/20/15/10 M 200W SSB 5.29 CBL30 HF 1.7 - 30 Mhz Balun 1:1 1kw ...

#### CRZ/DISCONE & HANDHELD ANTENNAS

CRZ12DB A Unique wide band Active antenna 500Hz to 1500 Mhz 1.24 Metres with controller ...

**COMMENT:** The Comet range is quickly achieving a reputation for excellence and demand has been exceeding supply. We are doubling our import and hope to service your requirement from stock in future!

### JUPITER SCANNERS

25-1300MHz with exceptional perfor-MTV5000 Handheld £269.95 Incl. FREE Nicads, DC. Lead & case (Super slimline design)





#### R-7000

ICOM's superb VHF/UHF/ SHF receiver



£895 DISCOUNT PRICE

#### **NEW IC-R72 RECEIVER**



General coverage 100Khz/30Mhz, compact size

£599

### ICOM 2 metre FM keyboard entry, micro-

handy, with inbuilt nicad, wall charger. Extended receive coverage. Included at: DISCOUNT DEAL £277.00.



**IC2SET** 

ICOM 70cms FM keyboard entry micro-handy, inbuilt nicad, wall charger, included at: DISCOUNT DEAL £289. Extended receive coverage.

RSGB

#### **NEW! C528 STANDARD DUAL BANDER**

with receive 130/172 350/470 & 890/960 Mhz! £369

#### **HEAD OFFICE:**

5 The Street, Hatfield Peverel, Chelmsford, Essex CM3 2EJ Tel: 0245 381626/381673 Fax: 0245 381436

Hours: 9-5 (Closed Thursdays)

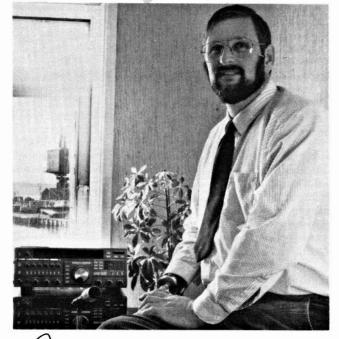




YOUR ORDER CAN BE TELEPHONED WITH CREDIT CARD DETAILS & DESPATCHED IMMEDIATELY! FREE FINANCE ON MANY MAJOR ITEMS AT RRP. (Ask for details of qualifying items — see examples above).

BRANCHES:
GLASGOW: Unit 17, Six Harmony Row, Goven,
Glasgow. Scotland G51 38A. Tel: 041 445 3060.
Hours 8.30-5.30 Mon-Fri (closed Saturday)
WIGAN: Greensway Arcade, Gerrard Street, Ashtonin-Makerfield, Wigan, Lancs. Tel: 0942 713405
LEICESTER: DAVE FOSTER (Agent). Tel: 0533
608189. Latest calls 8.30pm please!

# Keylines



with PW. Let's face it, for many of us the magazine has been part of our lives for many years. The publishing of the 1000th issue arrives as a many-faced milestone. First it graphically illustrates how old we're getting, secondly we're reminded how long we've been in the radio hobby. To round off the reminders - we come face to face with the stark reality of the enormous changes that we've seen in the last 58 years.

Many of us have grown up

Sitting in the editor's chair, I am very aware of the legacy handed down to me by the late and great F. J. Camm. But I don't have a picture of him in my office and his portrait doesn't look down at me while I work! Yet, I am still fully aware of the debt we owe to this most prolific technical writer and editor. Not even he could have forseen the enormity of the change that PW would see, even in the years from 1932 to 1959 when he died.

To many, including myself, PW long since ceased to be 'just a magazine'. It became an institution long ago for me, and I've no doubt that many of you feel the same. I know that to be true from the many hundreds of loyal readers that my colleagues and I have met at rallies, events and club meetings.

#### **Camm's Comics**

The term 'Camm's Comics' was a derisory term for many years - but nowadays I regard it as a term of affection. F.J. was the pioneer of popular technical journalism. I'm convinced that he would have been on 'Tomorrow's World' as programme editor if television

if we know it today, was available in 1932.

Very often, one good idea spawns others and apart from *Practical Television* and *Practical Electronics*, *PW's* influence shows in other magazines that have themselves grown and established distinct identities.

For those of our readers who can remember, or still have, copies of pre- or postwar PW's it may seem that the magazine has changed beyond all recognition. In my mind however, they would be wrong, because when you can see the issues from almost six decades together - the link between them is very strong. In other words, you can see how PW has evolved into the magazine we read today.

The radio hobby is continuing to evolve rapidly. PW has to change too, but who can dare imagine what the future is for amateur radio communications? I can compare my thoughts on the subject by describing a cartoon I enjoyed recently The cartoon depicted a very bored man, sitting beside a computer. It was obvious that his job was to press a button on the computer. The

background showed another man, pushing another computer (complete with a large index finger on an even larger hand) that was obviously just about to make the operator redundant.

It might seem a bit farfetched - but just think, this is already happening in our hobby. We've already got amateur radio without the amateur!

#### **Surprise Packet**

Recently, after watching packet radio in action, a question remained in my head. Is packet radio the future? Will we go off to work in years to come, and return to see what DX has been worked by our automated radio station? Will the radio amateur become redundant?

Now don't get me wrong, I'm all for progress and new ideas. PW has, and will always reflect modern developments applicable to the radio amateur, home constructor and s.w.l. But, despite this I was left to wonder about the impact of this system that allows computer-linking via the amateur radio bands.

I found the idea of

packet radio fascinating. It seems efficient, error-free, and apparently doesn't seem to suffer from interference from other communication modes. The radio amateurs that operate packet networks are technically competent, and are obviously very keen radio communication enthusiasts

G3XFD

But is packet radio, Amateur Radio? This question is heard more frequently as this aspect of radio communication becomes increasingly popular. Packet radio appears to be the main growth area in the widening field of amateur radio I've no doubt that dedicated hand-held packet transceivers will be with us soon. I've already heard from one amateur who was claiming a possible 'first' for a 'static mobile' packet QSO via an amateur satellite!

#### **Presence Required**

The many facets of the radio hobby fascinate me.but I like to feel I'm still needed! Perhaps packet radio will eventually have its own frequencies - away from the amateur bands. It may develop into a separate service.

This facility could allow anyone with a computer, appropriate antenna and dedicated transmitter to join in. While their automatic equipment is receiving data from other enthusiasts, they could be doing something else (maybe operating on the amateur bands?).

One or two computer enthusiasts have asked me "Why can't we link our computers by radio. We know computers, and we can buy and set up the necessary links - although amateur radio doesn't interest us as such".

Personally, I think that a separate packet radio service will come. After all, PW provided the initial 'push' for other magazines

No one at the time of writing, knows which direction the radio hobby will take in the years to come. But then you can be sure that PW will continue to cover amateur radio and the hobby in general, in whatever direction it takes. Perhaps PW number 2000 will be on disk to save paper by then!

#### From Us to You

In rounding off this month, speaking for everyone at PW, I must thank you all for the many letters we've received as the magazine approached its 1000th issue. Everyone here regards the care of the magazine and your interest as readers, of prime importance, enjoyable hard work and a great honour. We never forget that you are also an essential part of the team. Well done all of you!

73s from everyone on Practical Wireless.

73s DE G3XFD

# Receiving You...

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

Letters must be original, and not duplicated to any other magazines. We reserve the right to edit or shorten any letter. Brief letters may be

filed via our Prestel Mailbox number 202671191. The views expressed in letters are not necessarily those of Practical Wireless.

#### \*\*\*\*\*\*

#### Dear Sir

I was delighted with your efforts in May PW to acknowledge the existence of CB radio and to assure it might be used by normal and intelligent people. It may be hard to remember that CB was promoted as a serious communication mode open to everyone, perhaps for emergency purposes and especially among the isolated or elderly.

It seems to me to be a calculated toffee-nosed position for licensed radio amateurs to regard CB radio as an inferior medium. It is true that people using it have not endeared themselves to casual listeners shocked by some language and expressed attitudes to life. Nevertheless, the freedom to communicate freely through space although in a limited way seems to me to be one of the things democracy is about.

It is not after all much to pass a technical examination and a Morse test. To be accorded thereafter the right to transmit as a radio amateur in most modes and on a useful selection of frequencies seems a great privilege especially since the only obligation, to train oneself, is never tested by the licensing authority. Many licensed amateurs never want to do more than chat. That is what happens legitimately on CB frequencies.

I hope you will continue CB Corner and perhaps by admirable diplomacy bring about a conciliation between CB users and amateurs. There are a number of technical and legal matters which clever contributors could discuss to enhance the activities of CB users and even perhaps, by interesting them, accelerate the entrance of some into amateur radio.

Gordon Lines G1TMA Reigate

#### • • • • Dear Sir

Re: 'Keylines' May 1990/Home Construction

As an avid home-brewer and QPRer I am happy to work from the circuit alone, but I am only able to do this as I consider myself an intermediate/advanced constructor.

There was of course a time many years ago when I began as a novice constructor (of early PW valve rigs by G3OGR) and I always appreciated a tourist/laymans guide to the circuit. In later years, the p.c.b. overlay was very helpful.

I respectfully suggest in constructional articles you continue to do this, for two reasons:

- 1. It encourages beginners and remember how you felt on your first project with a soldering iron.
- 2. For us more experienced men, I believe we can read between the lines of constructional text, see what was in the authors mind, and tailor the project to our particular needs. Plagiarism lives.

'Keylines' aside, PW is an excellent journal - keep it up.

#### R. I. Leask G4CEO Sharnbrook Beds

#### Dear Sir

Having recently added two extra speakers to my hi-fi for surround sound, I noticed that by listening to a.m. signals, the two extra loudspeakers converted mono signal into stereo four channel sound.

Having monitored this surprising discovery for a few weeks I have found that the signal needs to be strong and steady and, derived from a stereo source. I have also found **BBC External Services** transmit the most stereo programmes.

You can also apply this to TV sound.

Alexander Kevan **Newton Stewart** Wigtownshire

#### Dear Sir

Surrey

I thought I would just drop you a line to let you know how much I enjoy the new format of your magazine. The paper and print is much clearer, the items more interesting!

I am also glad to see a CB item has been included each month, CB rekindled my interest in radio and gave me the incentive to take the ticket and get involved in amateur radio.

Finally, as per your request in your June Keylines column, I would agree in a 'Bargain Basement' type wanted ads column in your magazine.

All the best for the future

#### T. Ritchie GOGSL Wanstead London

G3XFD replies: The letters above are typical of the replies received in favour of the CB page in PW but they do not seem to reflect the negative 'feedback' we're getting from you at rallies and events regarding this feature. We would very much like to know YOUR feelings on this matter. Please send your vote marked either YES for the CB page or NO for the CB page. Please include your name and address as the first three votes 'out of the hat' will win PW subscriptions (Whichever way they vote!) Don't forget to mark your postcard FREEPOST and it won't cost you anything! All votes in by July 12 please.

#### Dear Sir

When the April issue of PW turned up I was very pleased to see Dick Pascoe's article 'The Windom Revisited' which was just what I was looking for, as many of the dipoles that had been erected on my 'antenna farm' over the years have been marginal to say the least. But there we were, a Windom with all the relevant measurements including details of the balum, a chance not to be missed, so out to the workshop and build all the bits. The antenna has now been up a week and without question it is the best thing since 'sliced bread'. One point I would like to ask Mr Pascoe is that when he erected his unit, he lives in a three storey house and is able to drop the  $300\Omega$ feed in a vertical axis, in my case, living in a single storey house the feed and balum lie on the ceiling above the shack, does this reduce the performance in any way? As a point of interest which may help other constructors I have found that an a.t.u. must be used to get good results.

Thank you Mr Pascoe for letting us into your secret.

Nigel R. Tucker Harare Zimbabwe

#### Dear Sir

Re: Split frequency opera-

I am compelled to write to you regarding the above, and related operating practices most of which I find bad.

The recent practice of DX stations on expeditions Bouvet Island, Spratly, etc, operating the procedure of transmitting on one frequency and listening across 30-50kHz has to be condemned. How can anyone listen across 50kHz at once? Impossible one might say band congestion results, hundreds of stations call at random across the 'split' oblivious by choice to what QSOs might already be in progress in the hope that the DX station will hear them.

Let's get back to 5kHz splits if split frequency operation has to be worked at all and occupy no more than a 5kHz bandwidth when 'listening-up'.

DX expedition managers please note and let's get organisation back into the chaos that has started to become all too apparent.

**Brian Mulleady GMOKWL** Camelon, Falkirk

#### Dear Sir

I heartily endorse G4J0T's plea for a revival of a.m. in 'Receiving You' June PW. I called for the same in my letter in 'Members Mailbag', Radcom February 1988 when I put forward some views re the student (novice) licence. I also endorse your footnote re extending it to bands other than 28MHz

But please, not 3 watts or so. Bearing in mind that the power is shared between the sidebands and the carrier let us have 10 watts as a minimum; easily obtained with v-m.o.s. Although as an old valve man I wouldn't know how to modulate v-m.o.s!

In the same letter I called for a revival of the 'super-gainer' RX, ie a simple superhet comprising frequency converter(s) followed by a t.r.f. (straight) RX as i.f./audio. As I pointed out a t.r.f. is good for all three modes, c.w., s.s.b., a.m. The t.r.f. could be used on its own for top band with converters added for other bands as and when required. Don't forget to include some suitable audio filters; low-pass would be adequate with cut-offs of, say, 500Hz c.w., 2kHz s.s.b. and 4kHz (or 6?) a.m.

Finally, 'ugly' construction please (tagstrips, tagboards, Veroboards, etc).; no twee high-density p.c.b.s. And with the layout resembling the circuit diagram as far as possible.

R. G. Taylor G3AVQ Henley-on-Thames

#### Dear Sir

After reading Alex L. Dicks comments, very properly accorded your Star Letter in this month's issue of the journal, may I say how wholeheartedly I, and many other local amateurs echo his remarks.

After more than fifty years unflagging interest in the hobby, during which time many experiments and d.i.y. projects have been undertaken, culminating in successfully attaining a pass in the RAE with a distinction for each paper, I leave you to imagine my impotent fury upon learning this morning from the GB2RS news, that, should I care to attain the dizzy heights of 5w.p.m. Morse, I can swap my 'B' licence for the so-called 'Novice' licence! Big Deal!

Trevor C. Harris G7FDH Peacehaven, East Sussex

#### Dear Sir

For one taking up Ham radio again after a five-year layoff, hindsight gives me a slightly different viewpoint on the novice licence/ Morse issue. When I look at the vast gaps in my theoretical knowledge and my ineptitude at c.w., I wish that (a) I could study for the RAE again and (b) that I could have somehow been forced to use c.w. after I passed the test.

I now want to get capable at c.w., and I reckon that a period of enforced c.w. - only operation in the past would have done me the world of good. Looking back, it was far too easy to abandon the key and grab hold of the mic. I now feel quite ashamed of having to use six times as much bandwidth than I actually need to for my QSOs. What I'm saying is that any new novice licence should be c.w. only. Elitist? No! Just don't want to see people scared to death of using c.w. on the air like I was!

Seems that it's once again down to practice, practice, practice if I'm going to get up there with the 30w.p.m.-men. A bizarre ambition? Well, what other ambitions can be left for a Ham with limited technical ability, limited antenna space, limited financial resources and an aversion to rag-chewers!

Arthur Wardell G0DKJ Halifax West Yorkshire

#### Dear Sir

Re: Duke of Edinburgh Scheme

I wonder if I may make an appeal through the pages of your excellent magazine.

I have been running a Radio Society here since last September with a view to fulfilling some of the skills awards for the Duke of Edinburgh Scheme. I have girls following syllabuses from all 3 components; short wave listening, radio construction and amateur radio.

Up till now I have been using equipment brought from home and am finding that the continual moving is taking its toll, gear is getting knocked about and, on the whole, the system is very unsatisfactory.

I wonder if any of your readers have equipment, components, wire, poles, etc., surplus to their requirements which they might care to donate, or loan, to the school. I am prepared to collect and will accept equipment in any condition.

Readers can contact me at the following ad-

Watford Grammar School For Girls

Lady's Close

Watford

WD1 8AE

Telephone: 223403

Or at home on Luton (0582) 508259. If I am not at home they may leave a message on my machine.

Keep up the good work on what is undoubtedly the best radio mag going.

Tony Kelsey-Stead G0COQ Lady's Close Watford

#### Queries

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

Services

1: We cannot give advice on modifications to our designs, nor on commercial radio. TV or electronic equipment.

2: We cannot deal with technical queries over the telephone

3: All letters asking for advice must be accompanied by a stamped, self-addressed envelope (or envelope plus IRCs for overseas readers).

4: Make sure you describe the query adequately

5: Only one query per letter please.

#### **Back Numbers & Binders**

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

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

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

#### **Constructional Projects**

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

Beginner: A project that can be tackled by a beginner who is able to identify components and handle a soldering iron fairly competently. Intermediate: A fair degree of experience in building electronic or radio projects is assumed, but only basic test equipment is needed to complete any tests and

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

Components for our projects are usually available from advertisers. For more difficult items a source will be suggested in the article. Kits for many of our recent projects are available from CPL Electronics and FJP kits, both of who advertise in the magazine. The printed circuit boards are available, mail order, from the Post Sales Department.

#### Mail Order

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

#### Wireless Line

This is an information service for the radio enthusiast, updated each Friday. Calls cost 38p per minutes peak time and 25p per minute offpeak. The number to ring is: (0898)

Oxon

#### Dear Sir

I wish to express my support for the views of G4JQT.

I am convinced that amateur radio is in decline, and that we as amateurs will be responsible for its demise. The indiscriminate introduction of s.s.b. on all bands is in my opinion a major cause.

To the newcomer to the hobby s.s.b. is hard to understand and equipment to transmit and receive it almost impossible to build.

I am not convinced that s.s.b. is the godsend that everyone once thought it would be, listen to any band and the misuse of the mode often creates more problems than would the equivalent a.m. signal

Single sideband should be restricted to certain DX segments or bands, and other well defined bands should be reserved for simpler modes more suited to the purpose of the user including the novice.

Amateur radio is supposed to be for self-training in the art. Sitting in front of an all-singing dancing black box does nothing in my view to promote this concept. Far more satisfaction is obtained in building, operating and improving upon something which one has designed and built from scratch at minimal expence.

An excellent start can be made by constructing and operating a.m. equipment.

I will be happy to join a Group to promote the use of a.m.

#### P. Simpkins G3MCL Winchester, Hants

# Newsdesk '90

#### **Junk Sale**

August 27: The Huntingdon Junk Sale & Auction will be held at the Medway Centre, Coneygear Road, Huntingdon, Cambs. The doors open from 10am to 4pm, food and drink will be available all day. The junk sale will be twice the size of last year's event and will include surplus gear, components, a Bring & Buy and the Ouse Valley Repeater Group Stand. G1YVS. Tel: (0836) 611025 or (0487) 830212 (eves).

#### Silver Jubilee Award

The Bromsgrove & District ARC have a Silver Jubilee Award available.

To receive the award, a QSO must be held with either GB2VGG or GB25VGG and four other Bromsgrove Club stations from the callsigns listed here.

G3VGG, G7AQU, G4IVJ, GB2RUB, GB0FS, GB0BC, G4JHY, G4JVB, G3RLF, G0KIN, G2CLN, G4MBW, G4FP, G8IO, G4LRL, G0BLT, G0BIR, G4AAL, G3RBL, G6VTA, G4PZQ, G7FAZ, G0HPG, G0HPH or G7ESV.

John Harvey G4IVJ Tel: (021) 477 7447

#### **Open Day**

This year marks the 70th anniversary of the founding of Stockport Radio Society, formerly the Stockport Wireless Society. The inaugural meeting was held on 4 June 1920.

To celebrate the occasion, the Society will be holding an Open Day from 9.30am to 5.30pm on Saturday June 23 in Room 14 at the Dialstone Centre, Lisburne Lane, Stockport. There will be a display of equipment from each of the seven decades that the Society has been in existence and a special event station will be on the air.

Andrew Paterson G0HAL Tel: (061) 480 3236



#### Loudenboomer

The SRW Kilowatt Loudenboomer is now in production and is available 'off the shelf'. It gives an easy 400W p.e.p. (or c.w.) output on all nine bands - 1.8 to 28MHz-when driven by a standard 50 to 100W output h.f. rig. It is size compatible with modern

rigs,  $356 \times 254 \times 127$ mm. The 240V mains p.s.u. is integral and the whole unit weighs less than 7kg.

Full TVI precautions have been taken. The antenna output is filtered by a 7-section I.p.f. with a 35MHz cut-off. Attention has also been paid to complete screening, including the meter and fan apertures.

SRW Communications Ltd., Astrid House The Green Swinton Malton, North Yorks Tel: (0653) 697513

#### **Moving House**

Greenweld Electronics have moved. Their new address is **Greenweld Electronics Ltd., 27 Park Road, Southampton SO1 3TB. Tel: (0703) 236363.** They have a further 6000sq ft of storage and office space now and will be expanding their operations to include many new lines. Their trade counter will be supplying retailers and bulk users with their entire range.

# Cash in all Rally Season long with Practical Wireless

Cut out this coupon and bring it with you to any of the rallies that *Practical Wireless* is attending and you can save 5% on goods bought from our stand. If you collect the coupon from two separate months of Practical Wireless you can save 10% on goods purchased from *Practical Wireless* at the rally.

If you don't want to cut up your magazine, bring the whole issue along and we will validate the coupon without removing it from your magazine.

Offer limited to a total of two coupons per transaction



#### PW DISCOUNT VOUCHER 1 JULY 1990

# **Competition Corner**

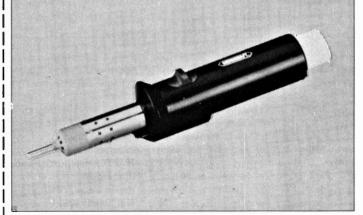
# Mordsearch

**BLACK DECKER** CORDLESS CALIBRATION CAMM **IRON PACKET** SUBSCRIPTION **MICROWAVE** RALLY TECHNOLOGY MILLENIUM SOLAR TRANSMIT MINICRAFT SOLDERING **VEROBOARD NICAD** SPORADIC YAGI

S S S C S D 0 R C F G E Р D S S E Q U В L Z G M G S E U Α 0 Y Y 7 7 Т Н D Р В 0 S S C S S R Q Т D 7 0 M C C S U D G G U Z K C V 0 Y U A G P 0 Т 0 C 11 M Q C R Ε C Ε Е E D L U X N H V S Υ E S E U E U Z S Т Т S Z В ٧ S D E N Х D Ν Υ В D D V Ε 0 G Z Z G 0 N X Ε В 0 Т G S W T W C 0 C Н C Т ML E V C L G Z Т 0 Т Ε Z D K Q G U V Ν 0 D C Z 0 В Е 0 W 0 C 0 P F C 0 0 0 0 0 H C Т Е E S Т R D V H N 0 В Ε Z D C D C G Q M Q В X E X В Т S Z G E E Α 0 Κ Z N 0 Т X Е J Ε M K S R Ε S В D Z C 0 R R A S L R ٧ S X W Т V Z V 1 Ν Q Y M G Т Υ S K N C C Н R F E M J G R D P Н N G Q 1 G Q S Ε F Z Α Q C 0 Z C 0 Υ

#### PRIZES.....

This month we have three very special prizes on offer to readers. There are three **Minicraft Cordless Soldering Irons from Black and Decker** for the first three correct answers out of the 'hat'. The Cordless Soldering iron enables the user to solder anywhere. This is just one of the many items available in the Minicraft range specifically designed for the hobby enthusiast.



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

Send your entry to PW Publishing Ltd., July 1990 Wordsearch Competition, Enefco House, The Quay, Poole, Dorset BH15 1PP. Closing Date last post received Friday 13 July 1990. The Editor's decision on the winner is final, no correspondence will be entered into.

Name	
Address	
Po	stcode

# Newsdesk '90

#### RSGB Sporadic-E Hotline

The RSGB Sporadic-E hotline trial is currently operating for the 1990 season. The recorded message will contain details of potential Es locations within Europe and when available, the recent Boulder Kindex. This is not a forecast, but hopefully will be a guide to more profitable operating based on results from previous years The telephone number is: (0426) 952211 (local rate call).

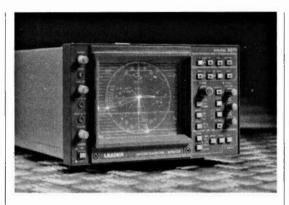
This experimental service is run on an ad-hoc basis and will be updated as new data becomes available (when Anglia Weatherman Jim Bacon is at work!). The precise cause of Es is still not clearly understood. However, by taking part in openings amateur can usefully add to the current level of knowledge - so please try it and then send your logs to G3YLA, QTHR, the IARU Region 1 Sporadic-E Co-ordinator.

#### Annual Stocktaking

Would readers please note that all South Midlands Communications branches will be closed on Friday June 29 for their annual stocktaking.

#### Silent Key Sale

A sale of surplus v.h.f./ u.h.f. goods by auction will take place on July 7 at 2.30pm at The Centre, Shepton Mallet, Somerset. This is the equipment of the late John Glastonbury G8KBQ. The proceeds will go to the local radio club and Musgrove Park Hospital.



#### **TV Test**

The Leader 5871, now available in the UK from Thurlby-Thandar Ltd., is a TV signal test instrument that integrates waveform-monitor and vectorscope functions.

Waveform and vector signals can be displayed independently or simultaneously on the instrument's high-intensity, high-resolution 150mm rectangular c.r.t.

The 5871 has a built-in subcarrier horizontal phase-measuring function for video editing and a 9-point memory to allow the pre-setting and recall of field and line numbers. The subcarrier horizontal phase can be numerically read from the c.r.t., as can phase variations or jitter. Thurlby-Thandar Ltd., 2 Glebe Road, Huntingdon, Cambs PE18 7DX.

#### WAB

The WAB presented over £5000 to the Guide Dog for the Blind Appeal at the Drayton Manor Rally. The dogs sponsored by the WAB will, once trained, will be returned to the hobby for blind s.w.l.s or licensed amateurs.

On a different tack, someone walked off with their Book Numbers for Issue List on Sunday at the NEC. Without it they are unable to complete their membership list in time for the AGM. If you bought a book from the WAB Stand at the NEC on Sunday 21st, please contact any of the Committee as soon as possible.

#### **Waterproof Tape**

Rubbaweld is a selfamalgamating tape that welds to itself on contact. Applied by stretching and wrapping the tape around the object to be sealed, Rubbaweld forms a solid rubber coating which provides excellent electrical insulation properties and protection against water penetration.

It protects electrical fittings from water and chaffing, making it ideal for outside antennas and other external electrics. Other applications include general electrical work and hose and pipe repairs.

Rubbaweld is supplied in a 3m x 25mm roll, complete with instructions and is available by mail for £2.65 including VAT and P&P.

Geedon Performance Coatings Ltd., Commerce Park, Whitehall Road, Colchester CO2 8HX. Tel: (0206) 42234.

#### East to West QRP Weekend

This event, sponsored jointly by the G-QRP Club and the Czech QRP group, will be the largest QRP event yet organised. It will take place from September 28 to 30.

It is open to all QRP operators in Europe and Asiatic Russia, whether members of a QRP Club or not. The objective is maximum QRP communication between stations in eastern Europe/Asiatic Russia and stations in western Europe.

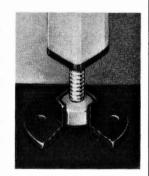
Logs will be adjudicated by the Czech QRP group and merit awards will be produced and issued by the G-QRP Club. The leading UK entrant will also receive and el-bug paddle donated by G4ZPY Paddle Keys.

#### **Bolt Support Foot**

Moss Plastic Parts, the Kidlington based manufacturer of small plastic components, have introduced an inexpensive Bolt Support Foot for applications that use a standard M8 bolt to position furniture, domestic appliances, industrial cabinets, etc., to the correct height.

The support is inserted over the head of the bolt, and with the help of a suitably sizes spanner, can rotate in either direction to ensure that the height of the unit or appliance is correct. The support can be locked in place by using screws or nails in the two holes moulded into the foot

Moss Plastic Parts Ltd., Langford Lane, Kidlington, Oxford OX5 1HX. Tel: (08675) 3073.



# Digital Wind Speed The 'Windy' is



The 'Windy' is a handheld an emometer available from Incastec Associates Ltd. This compact instrument, running on a PP3 battery, gives an accurate digital readout of windspeed in knots or metres/ sec (switchable) with comparison scales for Beaufort or kmh.

The Windy retails at £75 including VAT. For further details, contact:

Incastec. 75/77 Christchurch Road, Ringwood, Hants BH24 1DH. Tel: (0425) 476211.

# Newsdesk '90

#### **Catalogues**

Klippon now produce a full-colour guide to the selection of enclosures for various applications and environments. The brochure provides tabulated information on the environments, finishes and advantages of using mild steel, stainless steel, die cast aluminium, cast iron, polyester (GRP), polycarbonate and ABS enclosures.

Copies are available free of charge. Klippon. Tel: (0795) 580999.

Klippon has also produced a full-colour brochure on its custom assembly service which provides assembly of terminals, enclosures and components to particular specifications.

The publication features details of the terminal and box assembly capability, computerised engraving and the CAD design facility. Copies are available free of charge. **Klippon. Tel: (0795) 580999**.

The latest catalogue from Mauritron Technical Services details the copies of workshop manuals they hold for all kinds of equipment of all ages. There is a section on amateur radio, CB as well as test equipment. Their catalogue is available free of charge. MTS 8 Cherry Tree Road, Chinnor, Oxon. Tel: (0844) 51694.

Another firm to offer catalogues free of charge are RF Engineering Ltd. They have recently been appointed UK distributor for Barker and Williamson Inc, for all kinds of equipment - antennas, transmatch, switches, etc. Other products on offer are air wound inductors, chokes and cables to mention only a few. RF Engineering Ltd. Tel: (0706) 214118

Johnsons Shortwave Radio have quite a large catlogue available to readers. It contains detailed descriptions of many of their products lines. Most radios have reviews where full details of all the functions can be assertained. **Johnsons Shortwave Radio, 43 Friar Street, Worcester WR1 2NA**.

Hamlin has produced a new brochure on its latest range of l.c.d. modules which covers dot matrix and intelligent graphic types, in stantdard TN of Supertwist STN technology. Copies are available free of charge. **Hamlin. Tel: (0379) 644411**.

The Vintage Wireless Company Ltd have produced a short form component catalogue in lieu of news sheet No. 134. Their full illustrated catalogue will be available later. **Vintage Wireless Company Ltd. Tel: (0272) 565472**.

#### Alinco Hand-helds

The DJ-160E and DJ-460E are two recent additions to the Alinco range. Their power output is 2W, although 5W is possible with higher voltage battery packs. Their extended receive range is 137-174MHz for the 144MHz version and 410-470MHz for the 430MHz version.

Features include 20 memories, versatile programmed scanning, priority channel, d.t.m.f. TX (RX optional), comprehensive d.t.m.f. calling frequencies, free split function, battery save, auto power off, reverse repeater, multi-frequency steps, S-meter and many more as standard.

The price is around £229 including VAT for each model and this includes NiCads, charger, carry strap and belt clip.

Waters & Stanton Electronics. 18-29 Main Road, Hockley, Essex SS5 4QS.



#### **DXpedition**

A group of radio amateurs from the Kilmarnock and Loudoun ARC have been visiting some of the smaller Scottish islands over the last few summers to set up portable radio stations. Last year they visited Gigha and the previous year were on Pladda. The destination this time is lona, off the south-west coast of Mull. The station will make contact with other amateur radio stations throughout the world between July 21 and 25. Both Morse code and speech transmissions will be used.

This is believed to be the first major operation of this type from Iona. Other radio amateurs have visited the island for short periods with fairly simple equipment, but due to the restrictions of access and facilities, no large scale, high power operation has taken place. The Kilmarnock and Loudoun group have obtained special permission and arranged facilities for a five day stay. It is estimated that between two and three thousand separate contacts will be made and a QSL card will be sent to each one.

Callsign: GM0ADX/P

**Operators**: Barry GM3YEH, Bill GM3ZRT and Adam GM0KAZ

Logkeepers: Calum Beggs and Billy Strachan Dates: Saturday July 21 to Wednesday July 25 Frequencies: c.w. - 1.84, 3.52, 7.02, 14.02, 21.02 & 28.02MHz

s.s.b. - 1.92, 3.72, 7.08, 14.19, 21.22, 28.52MHz 144 and 50MHz operation will take place if equipment can be borrowed

QSL Information: All contacts will be QSLed via the Bureau. Direct QSLs via GM3ZRT, QTHR. For further information, contact:

Barry Beggs 27 Burnawn Place Galston, Ayrshire KA4 8JY Tel: (0563) 820212 (evenings) or 041-331 3512 (day)

#### Special Event Stations

GB2NTS: This station will be on the air over the week July 15-22 for the Castle Country Four Castles Event. The castles will be Grampian Region Drum Castle, Castle Fraser, Craigievar Castle and Leith Hall. A certificate is available for overseas stations if they work any two of the stations or for the UK if they work any three. Annotation is available for working all four stations (the cost for the certificate is 50p, 1 Dollar or equivalent). Robbie GM4UQG, PO Box 59, Hamilton, Lanarkshire ML3 60B

GB70SIG: To celebrate the 70th Anniversary of the formation of the Royal Corps of Signals, the Scarborough Special Events Group, with members from RSARS, RNARS and RAFARS propose to run a special event station from the Royal Signals Training Centre, Burniston Barracks, Scarborough during the period June 10 to July 7.

Operation will be around 3.725 and 7.055MHz on the h.f. bands, plus 144MHz s.s.b. operation and f.m., in addition to activity on the RSARS nets. Special QSL cards will be available and further details can be obtained from: Roy Clayton G4SSH, QTHR.

**GB0RAF**: From June 16 to 21 this station will be on the airfrom RAF Coningsby.

**GB2RAF**: This station will be on the air from RAF Locking over the weekend of June 22/23.

**GB50BOB**: On July 8, this station will be on the air form the Science Museum Wroughton.

**GB50BOB**: This time this station will be on the air from RAF Swinderby over the weekend August 3/6.

GB50RAF: Again the Science Muesum Wroughton will be on the air, this time using a different callsign on August 12.

GB2BHH: This special event station will be on the air from Burton Hill House School, Malmesbury on June 16 and 17. The school is for disabled children and their school fete is on June 16. G4KJV. Tel: (0249) 720456.

## **GAREX ELECTRONICS**

#### WEATHER SATELLITE EQUIPMENT

#### **ATARI ANIMATED SYSTEM**

Automatic frame capture and animation from Meteosat, also still pictures from NOAA & other VHF satellites. Complete system from antenna to colour monitor, including Atari ST1040 computer & software

Atari interface unit + software only £458 85

COMMODORE AMIGA Interface + software for animation & superb high resolution pictures (600 pixels × 400 lines) £458 85

PCSAT+ for IBM & clones, expandable system from XT+CGA up to 386+VGA. Interface and standard software

Upgrade software for Animation, NOAA, VGA & Paint available.

Complete system: Meteosat antenna, preamp, receiver/interface, software & cables (state which computer) FRRR RS

#### **COMPACT FRAME STORE SYSTEM**

The basic METEOSAT system, no complications, no computer, just a plug in and go package that can be up and running in 10 minutes. Antenna through to 12" mono monitor: £995.95

#### SATELLITE SEPARATES

Meteosat Receiver antenna input, 2 watt audio output	£270.25
Meteosat Preamp 15dB gain 0.6dB NF GaAs FET	£109.25
NOAA 2 channel High Immunity Receiver	£149.95
NOAA BASIC Turnstile Antenna	£39.95
NOAA BASIC Preamp 3 pole filter, boxed, 14dB gain	£28.70

#### **GAREX VHF RECEIVERS**

A simple but versatile design capable of covering spot frequencies in the range 25-200MHz; sensitive double superhet with choice of IF bandwidths from "W-SAT" to "12.5kHz" PMR. Single channel xtal controlled with multi-channel options. (Prices from £49.95) Mains power supply module 12v regulated 250mA £15. 50

#### **GAREX VHF PREAMPLIFIERS**

Miniature General Purpose only 34×9×15mm, any frequency in range 40-200MHz, up to 25dB gain

Stock versions: 6m, 4m, 2m & 137MHz (W-SAT) £11.45 Airband 118-136MHz (reduced gain) Other frequencies in the range 40-200MHz to order £13.75

High Performance 2 metre Preamp 3 band-pass stages, 16dB gain, 1dB NF, RF switched (up to 35 watts) with gas-filled relays, £39.95

Boxed version, with BNC connectors £49.95 Gas-filled relays as used in preamp £4.95

#### TONE BURST GENERATOR

Miniature (38×18×10mm) xtal controlled 1750Hz

£17.95

#### **GAREX DC/DC INVERTERS**

A popular line for many years. Economy package: chassis section cut from commercial R/T gear, re-wired & tidied up to make a free-standing unit, no expensive cabinet, just basic value for money.

12V DC input, 250V 150mA DC output £10.95 12V DC input, 400V 200mA DC output £11.95 24V versions to order.

#### 4 Metre Rx CONVERTER

High quality PMR front and by famous manufacturer, modified by Garex to make 4 metre convertre: 10-11MHz output. Full circuit and connection details

#### 4 METRE 0.5 WATT TX

Tx Low Power driver unit matching above Rx, with modulator, fully aligned with £15.95 data

(or + xtal for 70.45MHz £19.95)

#### **REVCO TABLE MICROPHONES**

Very high quality PTT Base Mikes 600 or 2.4k ohm (state which) £55.00

#### **PYE ANTENNA RELAYS**

12V Operation, handles 50 watts up to 200MHz

£1.95; 5 for £7.50

#### AUDIO BOOSTER

10 watt add-on PA, high quality audio unit by famous R/T maker, useful for noisy areas, Public Address, boosting audio from hand-helds; new, assembled pcb, full circuit data £9.95

#### **SCANNER BARGAIN!!!**

New cabinet, sub-frame and complete MPU pcb & LCD display, front panel and keyboard for AOR2002/Regency MX8000 Scanner; (less PLL & Rx) ideal for refurb., early model upgrade, Amazing value only £29.95

WRITE (See, please) or PHONE for full details.

#### MAIN DISTRIBUTORS FOR REVCO ELECTRONICS LTD

Prices include UK P&P and 15% VAT Ask for details of our interest Free Credit

GAREX ELECTRONICS

HARROW HOUSE, AKEMAN STREET, TRING HP23 6AA
TEL: TRING (044282) 8580
and CHEDDINGTON (0296) 668684

VISA Callers by appointment only



**MOVING SOON — WATCH FOR DETAILS!** 

#### TX-3 RTTY CW ASCII TRANSCEIVE

High performance, low cost. Unbeatable features. BBC,CBM64 tape f20, disc f22. **SPECTRUM** tape f35, +3 disc f37 inc adapter board. **VIC20** RTTY CW program tape f20. All need our TIFI interface or a

#### **GX-2 FAX SSTV TRANSCEIVE**

All modes of FAX and colour/mono SSTV. Review in March 90 Amateur Radio. BBC only. Complete system only £99 or £119 with FAX direct

#### **RX-8 MULTIMODE RECEIVE SYSTEM**

FAX to screen and printer, colour SSTV, HF and VHF PACKET, RTTY, AMTOR, CW, ASCIII, UoSAT. Every feature. Full disc, printer support. Reviews Oct 89 Ham Radio Today & March 90 Amateur Radio. BBC only. Complete system only £259. DISCOUNT for RX-4 users.

#### RX-4 RTTY CW SSTV AMTOR RECEIVE

Still a best-seller. BBC, CBM64 tape £25, disc £27. VIC20 tape £25. SPECTRUM tape £40, +3 disc £42 inc adapter board. All need our TIFI interface, SPECTRUM software-only version £25.

TIF1 INTERFACE for best HF & VHF performance with our software. Kit £20, ready-made & boxed £40. Only with TX-3 or RX-4 software.

#### .PT-1 WEATHER SATELLITE RECEIVE 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

Also MORSE TUTOR £6, LOGBOOK £8, RAE MATHS £9 for BBC, CBM64, VIC20, SPECTRUM. BBC LOCATOR with UK, Europe, World maps £10. All available on disc £2 extra.

Full information 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





#### QRP KITS AT QRP PRIC

Guaranteed complete to the last nut!

#### COMPACT 80m CW ORP Tx/Rx

DTR3 Kit — £81.00 Ready Built — £130.00 \* Stable VFO \* Sidetone \* Audio Filter \* Requires 12/14 VDC \* Very detailed instructions \* Black steel case \* Printed pane

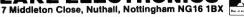
#### COMPANION ANTENNA **TUNING UNITS**

TU1 Kit — £39.25 Ready Built — £54.50 TU2 Kit — £48.50 Ready Built — £68.50

\* Large dia. coil ★ High grade capacitor ★ Built in balun ★ Circuits to match your antenna ★ Up to 30 Watts of CW ★ TU2 has sensitive QRP/SWR meter

Send SAE for brochure or call Alan G4DVW on 0602 382509

AKE ELECTRONICS





(callers by appointment only)

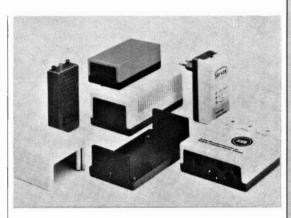
# Newsdesk '90

#### Element

Element is a new range of small instrument and electronic units available, in a new standard colour, from Bopla Ltd. The company are still maintaining the traditional colours of light grey shell and dark grey base while introducing an alternative mid grey lower shell.

The enclosure is made from two interlocking sections. It has the advantage that when the upper section is removed components can be installed quickly and conveniently into the lower section. For mounting a chassis or p.c.b., threaded brass inserts are provided as standard.

The Element range of cases is designed to VDE standards for light-duty



requirements. The cases are moulded in high-impact polystyrene which is easily drilled or machined if required.

Protected to IP44, Element is available in a comprehensive size and colour range. The various accessories range from wall mounting metal brackets,

tilt feet and handles to either carry the case or to support it at an angle. Dual purpose plastics clips are also available to provide an instant snap-on lid.

Bopla Ltd 29 Faraday Road Aylesbury Bucks HP19 3RY Tel: (0296) 399999

#### The Double Whiskey Award

This award is in honour of Jim Adamson G1AWW, who died in late March 1990. Jim was a founder member of Widnes and Runcorn ARC and, at the time of his death, was actively supporting the club in his position as Club President

Proceeds from this award will be donated to Cancer Research.

#### Scoring System:

Club station G0FWR - 10 points

Club members - 5 points

Special event stations run by Widnes & Runcorn ARC 5 points

To claim the h.f. award, all stations require 25 points to claim the award. To claim the v.h.f. award, UK stations require 25 points, non-UK stations require 15 points.

The award starts from July 1990, contacts via repeaters do **not** count towards this award.

The award is open to s.w.l.s and can be claimed by sending details of the station heard, time, date and frequency to G1VJP.

The award costs £2 sterling or 8IRCs. To claim the award please send your log extracts, signed by one other amateur, to:

#### G1VJP

216 Alder Street, Newton-le-Willows Merseyside WA12 8HS

#### **Tokens & Vouchers**

Following the news that the RAIBC in Northern Ireland collect BP petrol coupons, we have heard that they now have a FREEPOST address for people to use.

They can make use of all kinds of stamps and coupons: Shell, BP, Maxol, Esse, Texaco, Green Shield, Blue Chip, Priveligi and Air Miles, even the coupons you get in cigarette packets can be used. They can all be sent to the RAIBC via their FREEPOST address. So far they have been able to obtain more than £7000 worth of equipment in this way.

RAIBC (NI)

FREEPOST BE1769, Belfast, N Ireland BT12 5BR

#### Waterproof Mic

Bruel & Kjaer has introduced a weatherproof microphone unit which complies with both IEC651 Type 1 and BS5969 and features outstanding omnidirectional characteristics.

The Type 4184 weatherproof microphone is designed for use in noise monitoring applications, either pole-mounted for permanent installation or tripod-mounted for semi-permanent or portable use. The unit can withstand most humid and corrosive atmospheres, and features an integral windscreen and rain protection to IEC529. The construction of the microphone minimises variations of sensitivity with temperature change. Each microphone is individually factory-calibrated from 20Hz to 20kHz and is delivered with a calibration chart.

Bruel & Kjaer (UK) Ltd 92 Uxbridge Road, Harrow HA3 6BZ.

Tel: 081-954 9504

#### PW BINDERS Only £4.50 each

0202 665524(24 hour Answer Service)

(plus £1 p&p for one binder, £2 p&p for two or more, UK or overseas)



Are you tired of sifting through cardboard boxes and carrier bags to find that useful item in *PW*?

Our smart binders, covered in blue plastics, are a must for your library, keeping your radio magazines in good condition and easily accessible.

#### Plus!

Tidy up those other mags too. Plain binders to take any A4 size magazines - no names, no pack drill !!!

#### HOW TO ORDER

Send a postal order, cheque or international money order with your order stating number and type required to PW Publishing Limited, FREEPOST, Enefco House, The Quay, Poole, Dorset BH15 1PP.

Payment by Access, Mastercard, Eurocard or Visa also accepted on telephone orders to Poole (0202) 665524. Normally despatched by return of post but please allow 28 days for delivery.

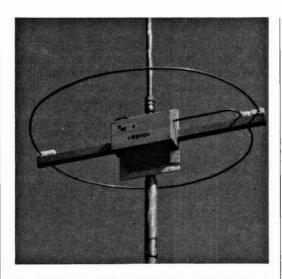
Prices include VAT where appropriate.

#### Construction

This versatile antenna, ideal for portable or base operation, has been designed by Fred Judd G2BCX, with 28MHz enthusiasts in

mind.

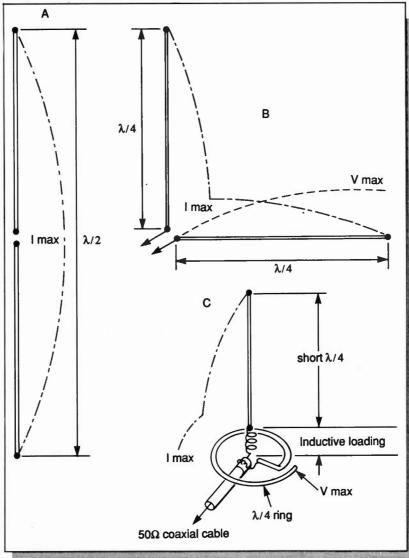
## The RB10 Antenna - for 28MHz



The RB10 stems from the 'Ring Base' antenna that I designed some years ago for 144MHz band operation. (PW, September 1982, subsequently reprinted in Wires and Waves) which employed a half-wave radiating element.

Continued experimental work with this

Fig. 1.1:
Development of the ring-base from a half-wave dipole.



configuration resulted in a relatively efficient but smaller version for 144MHz mobile operation using an inductively loaded 'short quarter-wave' radiator. From this, the RB10 Ring Base antenna for the 28MHz band, has been developed.

Firstly, the RB10 is not difficult to construct, despite seemingly complexity, and it has three applications. The antenna has been designed primarily for portable operation - hence the 'sectional' construction which allows it to be carried in the car.

On the other hand, it can be used as a 'fixed' station antenna mounted at the top of a mast, in which case the radiating element may be in one length (aluminium tube) for either the 28MHz amateur band or the 27MHz CB band.

The dimension provided are for the portable (sectional) version of the antenna intended for the 28MHz amateur band. However, only very little adjustment is needed to make the antenna suitable for the 27MHz CB band.

#### **General Performance**

Operational tests were carried out at my QTH, a fairly open area in the Norfolk countryside. Two prototypes were constructed, one for 'portable' operation as in this article, the other, with a slight difference in construction, being intended for 'fixed' station working.

During 28MHz band 'openings', quite satisfying results were obtained from both prototypes, For example, in a few hours, one afternoon, using s.s.b. and the portable version of the RB10, numerous countries were worked. These included VK, VE, several different USA states, including some in the far West

I also worked Japan, Greece and stations in both the Middle East and nearer home including various parts of the USSR and more distant Europeans. My rig for the tests was an FT102 running at 100W.

Signal reports were generally good while propagation conditions remained at their peak., although it should be remembered that an antenna of this nature does not have the same efficiency as a full dipole but it is omni-directional and relatively compact.

#### **Function and Antenna Configuration.**

The derivation of the ring base antenna from a dipole and its 'electrical' function, is illustrated in Fig. 1.1. The current distribution of a normal dipole is shown by (A) and this would remain the same with the antenna folded as in (B). However, with the 'horizontal' portion formed into a ring, its self-inductance is increased so the length has to be reduced to maintain resonance, i.e, the ring has a circumference of approximately 1/8th wavelength.

The 'vertical' quarter-wave is also reduced in length, by a factor a little over 20 per cent. to obtain more convenient 'section' lengths, although a small amount of inductive loading is used to maintain resonance and an acceptable current as in (C). With reduced radiation resistance the input impedance becomes  $50\Omega$ .

#### **Vertical Radiation**

Operational height above ground is relative to the ring base and the optimum is 0.2 wavelength (reference to the frequency band in use) or approximately two metres. The computer produced pattern for radiation at 'vertical' angles is shown in Fig.1. 2 and is for the height stated although the pattern will not change much as the height above ground is increased.

Height (to the ring) from either ground, or a roof-top, must NOT be less than 1.5 metres. Any height lower than this will result in de-tuning and a totally unacceptable performance. The RB10, as previously mentioned, is otherwise omnidirectional.

#### **VSWR** versus Bandwidth

The very top section of the radiating element is adjustable and its loading inductance turns can be opened out, or squeezed in a little, to obtain precise resonance and minimum VSWR at band centre. (Further notes with regard to tuning for the 28MHz amateur band and the 27MHz CB band are provided later).

For fixed station operation the radiating element can be a single length of aluminium tube of, say 12mm in diameter, with a top adjustable section as shown in the diagrams. Copper tube was chosen for the portable version so that the radiating element could consist of two sections coupled at the centre and then onto the short stub on the ring base unit.

The VSWR versus bandwidth for both arrangements was measured with Bird Thru-Line equipment, the results being shown in the computer print-out in Fig.1.3. It is interesting to note the slightly better VSWR versus Bandwidth response obtained with a copper tube radiating element. However, in view of the 'inductive' nature of the RB10, the VSWR is, in either case, well within acceptable limits considering the wide band-width required.

To be continued.

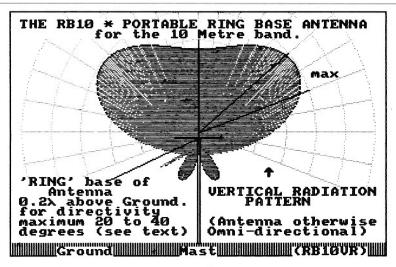


Fig. 1.2: Vertical radiation pattern of the RB10 antenna.

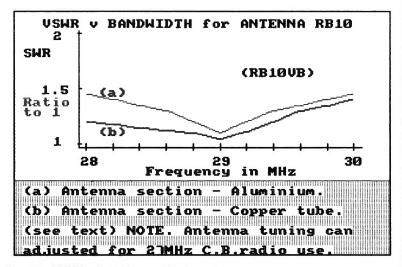


Fig.1.3: VWSR plotted over the board.

#### Shopping List

Hydraulic brake piping:

1.22m. (4mm diameter, copper or nickelplated steel)

15mm diameter copper pipe

(for portable version) 1990mm length

12mm aluminium tube

(for fixed station version)

Copper/Brass/Mild steel tubing for ferrules.

Wood/Delrin/ Perspex or other insulating material for ring support.

Dowel/broomstick for stub 220mm to 250mm long

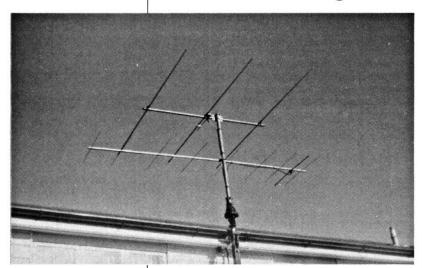
Self-tapping screws, hose-clip, polypropylene ropes for guy lines, metal mounting panel, plastics box, coaxial cable connector, 15mm brass compression type plumbing fittings HOW MUCH ? £ 25 HOW DIFFICULT Intermediate

Next month in part 2, Fred shows us how to build the RB10.

with 'olives' (5)

#### Feature

# Further Notes on the Small 50MHz Yagi



Many readers showed a lot of interest in the original 50MHz Yagi project published in July 1989 and now, one year on, Ken Willis G8VR brings us up to date with modifications and furthers ideas on the same theme.

Judging from correspondence received and comments heard over the air, there has been considerable interest shown in the little three element Yagi which I described in the July '89 issue of PW.

Unfortunately I did not make it clear in the article that the coaxial feeder must be connected either to the boom or the centre of the driven element and this caused some confusion initially.

In my antenna, the plastics box which supports the gamma rod and carries the SO239 socket is fitted with a false bottom made from brass. This is connected to the boom using self-tapping screws, and since the SO239 is also connected to it, this effectively connects the coaxial cable outer conductor to the centre point.

Ian White G3SEK, carried out computer analysis of the antenna and found it to be slightly short, suggesting that it resonates above 51MHz. The fact that I obtained a marked peak in noise at 50.110MHz whenever I tuned across this frequency, Ian attributes to the gamma system which was matched at this frequency and as a result was providing the largest noise contribution.

Recently I visited some of the New England 50MHz 'gang'. During a pleasant weekend with Bob Reif W1XP, we again analysed the antenna using a modified MINEC program, developed by the US Navy Ocean Systems Centre. This program, which is now in the public domain, deals with wire antennas, but Bob has modified it to handle Yagi problems and to provide graphical presentation of polar diagrams.

Using this program again indicated that the antenna dimensions were slightly short, but the difference in gain achieved at the apparent (computed) resonance and the matched frequency of 50.1MHz was barely discernible. The forward gain came out as just over 8dB and the front-to-back ratio at 25dB.

I was particularly interested to receive a letter from Etienne Swart ZS6CE who is a well known South African 50MHz operator. He built a version of the antenna to the dimensions given but instead of using circular tubing, Etienne chose 16mm square section aluminium tubing for both the boom and elements.

This technique enabled him to use a simple bolt and wing-nut method to fix the elements to the boom while the flat sides on the driven element permitted a simple gamma-rod termination to be used. This took the form of an aluminium strip fixed to the driven element by self-tapping screws.

Etienne can break down the antenna into its component parts very quickly, making it very effective for portable operation. He claims that an s.w.r. of between 1.1 and 1.5 from 50.1 to 50.4MHz is available with this arrangement. Etienne likes the antenna because of its low wind resistance, presumably because he is a mountain-topper!

So to sum up, the computer suggests making the elements slightly longer, perhaps 50mm or so on all three. However, if you've already built the antenna and matched it well, then there is little to be gained by making any changes. My original antenna continues to work well, with G3CGQ/5N29 and ZS3JO returning from my first call in 'pile ups' recently.

While I was visiting New England the band went wide open to VK and J, so I cannot say whether it would have been as effective over these longer paths in the face of some horrendous QRM.

It would be very interesting is someone who is active on 70MHz could find the time to try a scaled-down version of this antenna on the band. This could be done by reducing all dimensions in the ratio of 5/7. Since this would result in a very small Yagi with a boom length of just 1.295m with the longest element measuring 2.082m. An attractive proposition for a small urban garden!

Stop press: G8VR reports that he has now worked 56 countries and 211 grid squares on 50MHz to date, with WAC.

PW

# Radio Diary

\*Practical Wireless & Short Wave Magazine in attendance.

June 17: The Newbury Radio Boot Sale is being organised by the Newbury & District ARS at Ackland Hall & Recreation Ground, Cold Ash, Newbury between 10am and 3pm. There will be refreshments available, with free entry and parking for visitors. Talk-in will be provided by GB4NBS. Mike G3YOW. Tel: (0635) 43048.

\*June 24: The Annual Longleat Mobile Rally will be, as usual, held at Longleat near Warminster, Wilts Shaun O'Sullivan G8YPG. Tel: (0225) 873038

July 1: The Worcester & District Droitwich Strawberry Rally will be held at the High School, Droitwich. There will be the usual trade stands, Bring & Buy, family entertainment and strawberry fields (weather permitting). Gates open at 11am with free car parking and entrance. Tony G40PD. Tel: Worcester 620507 or Derek G4RBD. Tel: Worcester 641733.

July 1: The York Radio Rally will be in the Tattersall Building, York Race Course, The Knavesmire, York. Doors open at 11am with an entrance fee of 50p (children admitted free). There is ample free parking. On show will be amateur radio, electronics and computing, arts and crafts, there's a grand Bring & Buy, Morse tests. lectures on various aspects of amateur

radio, a raffle and talk-in on S22. A licensed bar and cafe will be available for refreshments. The Knavesmire is well signposted and there will additional RAC signs round the main approaches to York. Frank Webb G3ZKS. Tel: (0904) 625798.

July 1: Newport ARS are holding their 3rd Grand Surplus Equipment and Junk Sale at the Brynglas Community Education Centre, Brynglas Road, Newport. The Sale is open from 10.30am to 4pm (10am for the disabled). Kevin GW7BSC. Tel: (0633) 262488.

July 6, 7 & 8: The Popular Flying Association Rally is again being held at Cranfield Aerodrome, Bedfordshire. All activities related to flying, including airband radio will have a place there.

July 14: The Cornish Radio Amateur Club Rally will be held in the Richard Lander School, Truro. There will be the usual trade stands, Bring & Buy, a computer display/demo and a weather satellite demo. There will be refreshments, good free parking and the doors open at 10am (9.30am for the disabled). Rolf Little G7FKR. Tel: (0872) 72554.

\*July 15: The Sussex Amateur Radio and Computer Fair will be held at Brighton Racecourse. All the usual traders and other attractions will be there. Doors open from 10.30am to 4.30pm, with entance at £1. Ron Bray G8VEH (QTHR). Tel: (0273) 415654 office hourse or (0903) 763978 other times.

#### THE COMPANY THAT BRINGS YOU THE LATEST TECHNOLOGY - FIRST !

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

#### **ANOTHER RAYCOM PACKAGE**

The TOKYO HX240 HF Transverter when coupled to an all-mode 2m rig will give you 50W on 80 to 10m. RAYCOM have put together this unique unit with the new YAESU FT290RII.

### IT WORKS GREAT!



FT290R II £4	429.00
TOKYO HX240 £:	249.00
1/2 Size G5RV £	
12 Amp PSU £	59.95
12 Amp PSU £ Nicads & Wall Charger£	31.30
Total regular price £	784 20
Total regular price L	704.20

**YOU SAVE £85.20!** 

Includes ALL D.C. and Co-ax leads

EXCELLENT HF AND VHF STARTER PACK
COME IN AND TRY IT FOR YOURSELF - YOU
WILL NOT BE DISAPPOINTED

FULL RANGE OF YAESU AND ICOM ALSO STOCKED

## HP100E/AR1000

#### Exclusive to RAYCOM Short wave converter Module

Made in the UK by AKD
Coverage 200kHz to 30MHz

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

NOTE

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

### THE UK SCANNER EXPERTS

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

#### The FANTASTIC ICOM ICR1 and ICR100

 IC-R1
 500kHz to 1300MHz.
 £399.00

 IC-R100
 500kHz to 1800MHz.
 £499.00

OTHER HIGH QUALITY SCANNERS FROM RAYCOM BEARCAT UBC 50/55XL 66-88/136-174/406-512MHz

10 memories, channel review, including FREE charger worth £4.95
BEARCAT BC 70XLT 66-88/136-174/406-512MHz £149.99 BEARCAT UBC 200XLT 66-88/118-174/406-512/806-956MHz ....... £229.99 ONLY £329.00 25 to 550 MHz and 800 to 1300MHz,100 Memories JUPITER MVT 5000 Hand-held £249.00 25 to 550MHz and 800 to 1300MHz, 100 Memories AOR 3000 base ...... Limited Supplies available £699 00 0.1 to 2036 MHz, 400 mems, LSB/USB/CW/WFM/NFM/AM

MANY OTHER TYPES AND MODELS STOCKED - NEW AND USED.
SEND AN SAE FOR OUR LATEST USED LIST

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

## ICOM IC-R7000



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

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

Save £108! Raycom price £925

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

### CHARGE IT!

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

## YAESU FRG9600



RAYCOM COMMUNICATIONS SYSTEMS LIMITED, INTERNATIONAL HOUSE, 963 WOLVERHAMPTON RD, OLDBURY, WEST MIDLANDS 869 4RJ. TEL 021-544-6767, Fax 021-544-7124, Telex 336483 IDENTI G.

# RAYCOM

COMMUNICATIONS SYSTEMS LIMITED

Telephone

021 - 544 6767



#### RAYCOM gives you more BUYING POWER

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

#### ORDERING INFORMATION

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

#### TEL: 021-552-0073

PHONE BEFORE 4PM FOR NEXT DAY DELIVERY BY COURIER (£15.00) - OR 2PM FOR DELIVERY BY POST (£19.00). PLEASE ALLOW TIME FOR CHEOUES TO CLEAR. MANY OTHER ITEMS IN STOCK. PLEASE CALL FOR MORE INFO AND FOR EXTRA SPECIAL DEALS!

INFOLINE 0836-771500 5-9pm (weekdays)

OPENING HOURS 9-5.30 MON TO SAT, 73 DE RAY G4KZH, PETER G4EWD COLIN and JOHN on the 'phone.

#### Theory

Following a very brief historical note Peter Buchan G3INR takes a look at thermionic emission and then goes on to the diode and triode characteristics and the duties each device perform.

# Valve Technology & Characteristics - Part 1

Sitting down to write this caused me to drift into what probably could be described as a 'brown study' where ones' mind searches below the many layers of thought that fill the present day. I was taken back to the cold winter evenings when you would switch on the gear before tea and leave it warming up the shack for the evenings exploration of say, the c.w. end of the 3.5MHz band. European and Scandinavian contacts giving way to CT3 and CT2 as the evening wore on, and perhaps just before closing one might chat with Jack VE1ZZ exchanging reports of perhaps 55/69 or thereabouts followed by one or two quick QSOs with East Coast W stations.

Mercury Vapour rectifiers pulsing gently with the c.w. and the soft hum of the transformers coupled with the all pervading 'smell' of electricity, gave you the feeling of being given a glimpse of wonderland. The added bonus of course was that the gear expressed your own personality, you had made it, perhaps even designed it, and joy of joys you were operating it. That was the secret behind the Radio Amateur I believe, and the tremendous value they set upon being the owner of a callsign. They were indeed halcyon days. No less should they be now and the following look at the thermionic valve might awaken memories for some and be an introduction to a different world for others.

#### The History

Valves or tubes as the Americans call them have been with us for nearly 100 years. It was in the 1880s that Thomas Edison, who had already developed the incandescent lamp, found that a current passed across the space between a heated filament and a metal plate sealed inside the evacuated envelope of a lamp. The story goes that the metal plate had been introduced deliberately to attract the soot, given off by the filament, which gradually clouded the inside of the lamp above the filament. Curiosity then gave the lead to attaching a galvanometer from the metal pin attached to the plate, and around which the glass seal had been made, to the source of the filament voltage. To his,

no doubt surprise and delight, he found that a small current flowed; about 2mA, this became known as the 'Edison Effect'. The 'Effect' was followed up by another famous name, J.A. Fleming, but it was not until 1899 that J.J. Thomson announced his theory of electrons which gave a clue to the Edison Effect

Fleming realised that this unilateral flow of current could be used for the detection of oscillating currents and in 1904 took out a British Patent for the device to be used for the detection of radio and audio frequencies. This point marks the introduction of the valve into radio engineering. Three years later Lee de Forest took out an American Patent by introducing a third electrode into the original Fleming valve which produced an enormous increase in the potential of the device, but it was still some years before these were fully developed. When vacuum techniques had been substantially improved the triode valve came into general use and revolutionised the science of radio communication.

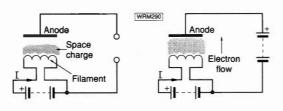
#### **Fundamentals**

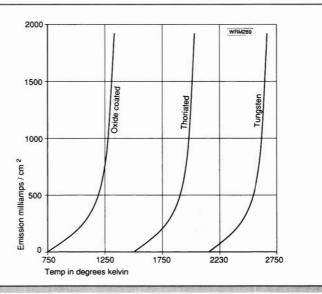
The fundamental feature of a thermionic valve is the control of electron flow. To be able to do this there must be a source of 'free' electrons available. Free electrons are those which may be acted upon by forces, perhaps some little distance away. In an ordinary valve the filament is heated to a temperature where vigorous activity takes place within the structure of the material. Electrons near the surface of the filament are ejected by these internal forces and drawn away from the source by the attraction of a positive potential placed upon the anode of the valve. The electrons are set free by the addition of thermal [heat] energy. The atoms that lose their compliment of electrons become positively charged and are called ions. Thus the words therm, meaning heat, and ion meaning a charged particle are combined to make the word thermionic. Electrons are released by thermionic emission.

To achieve electron emission, the material that is heated must be placed in a vacuum. The pressure in a thermionic valve is reduced to about one millionth

Fig. 1.1: [a] Graph showing the different emissions from three materials at different temperatures.

[b] Fundamental diode action showing space charge around the filament and electron flow with anode voltage applied to the anode.





of atmospheric pressure. Importance of a good vacuum is increased as the power rating of the valve is increased, because an electron attracted by a potential of only 10V can reach a velocity of a 1600km/sec [a thousand miles a second]. Should a gas molecule be encountered at this velocity the force of impact releases electrons from the molecule, leaving behind a positive ion, which in turn is now accelerated toward the filament which it subsequently strikes with considerable force. In a similar way the electrons reaching the anode do so with considerable kinetic energy, and therefore during operation, due to this bombardment, the temperature of the anode increases. Some older transmitting valves had anodes which glowed cherry red when operating normally. In some instances with home-built equipment valves which were not intended to show any colour when operating, also glowed cherry red. Needless to say these valves had a short life.

Choice of material for the valve filament is governed by the work one may get from it and the melting point. Copious electron emission at low temperatures would be desirable, with good efficiency. Thoriated tungsten and oxide coated material is used in valves designed for receivers and associated equipment, where the cost in terms of power and dissipated heat are important factors. However, in large power valves uncoated tungsten is used. Performance of these materials is shown in graphical form in Fig. 1.1(a). Other materials such as Tantalum are used in large power valves but these are really outside the scope of this article.

#### The Two Electrode Thermionic Valve

In the simplest form the diode (two electrode thermionic valve) consists of a heated filament or cathode and a metal plate called the anode. The sketch in Fig. 1.1 (b) shows the representative parts and their functions. The filament is heated by passing current through it and due to the temperature reached electron emission takes place. A number of different filament and cathode assemblies can be seen in Fig. 1.2. Without a positive anode potential the emitted electrons form a cloud surrounding the filament. This is known as the space charge. Electrons ejected eventually fall back to the filament like molecules above a boiling liquid. When a voltage is applied to the anode an electron drift commences across the evacuated space towards the anode, the electrons being accelerated by the attraction of the positive potential. Acceleration and final velocity of the electrons is governed by the value of the anode voltage, but not in a linear manner. If the anode voltage is doubled the electron velocity is increased by only √2 times the previous velocity. Remember that kinetic energy (KE) is 1/2mv<sup>2</sup> where m is the mass of the particle and v is the velocity.

So 
$$KE = \frac{1}{2} mv^{2}$$

$$2KE = mv^{2}$$

$$v = \sqrt{\frac{2KE}{m}} = \sqrt{2} \times \sqrt{\frac{KE}{m}}$$

This relationship shows that the flow of current will not be linear and will not obey Ohm's Law. Evidence of this becomes clear when the anode current versus anode voltage is plotted. A circuit diagram suitable for obtaining the characteristics of a diode valve is shown in Fig. 1.3(a). As the anode

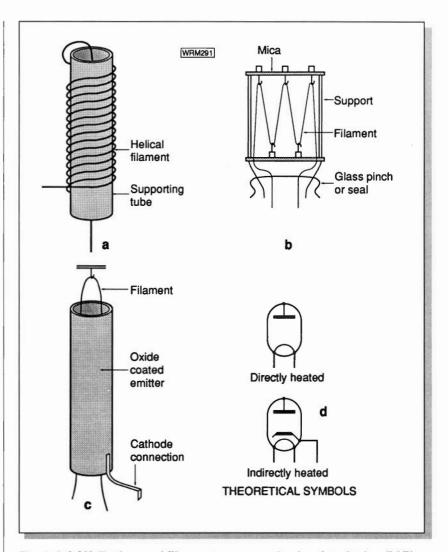


Fig. 1. 2: [a] Helical wound filament on supporting insulated tube. [b] Zigzag filament supported on mica bridges held apart by insulating tubes. [c] Indirectly heated emitter or cathode. The cathode is coated with oxide to increase emission. [d] Diode valve symbols for directly and indirectly heated cathodes

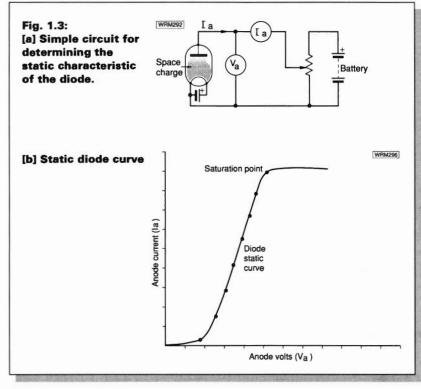
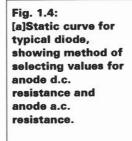
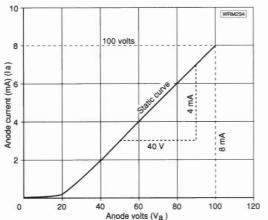
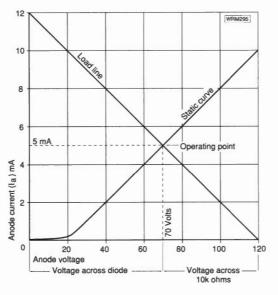


Table 1.1					7.714		
Va (volts)	0	20	40	60	80	100	120
la (ma)	0	.4	2	4	6	8	12

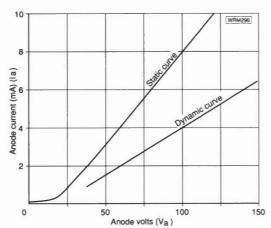




[b] Static with load showing diode operating point.



[c] Static diode curve accompanied by the dynamic curve for an anode load resistor of 10kΩ



voltage is increased the space charge surrounding the heated filament (or cathode) begins to thin out and the electrons move toward the anode. This allows the migrating electrons to be replaced with more from the filament. Anode current increases as anode voltage is raised and eventually a point is reached where the number of electrons reaching the anode is matched by the number leaving the filament, this is the saturation point for the particular filament temperature. To increase anode current further the filament temperature must be raised. (Note: Never exceed the manufacturers recommended filament voltage).

The static Ia/Va curve plotted in Fig. 1.3(b) is simply drawn to illustrate the shape and characteristic of a thermionic diode. As a building block for a diode rectifier or detector the static curve is useful in determining the anode d.c. resistance (diode forward resistance Rf), and the anode a.c. resistance (ra). A static curve plotted from figures shown in Table.1.1 can be sen in Fig. 1.4(a). These figures are representative of a small diode in terms of current and power.

Finding the anode d.c. resistance [Rf] from the curve in Fig 1.4[a] is relatively simple. Take the anode voltage [Va] at say 100V and divide it be the corresponding current [Ia] of 8mA. This gives an anode resistance of  $12500\Omega$ . If you take other values from the curve you will find that the anode d.c. resistance falls as the anode voltage is increased and rises as the anode voltage is decreased, thereby demonstrating the non linear characteristic. For the anode a.c. resistance [ra], the more linear portion of the curve is used, say from Ia equals 2mA upwards. Selecting from Va of 45V to 85V, and the corresponding current from Ia of 3mA to 7mA is a change of 4mA. Dividing the 40V change by the 4mA change gives an anode a.c. resistance of  $10000\Omega$ , or ra equals  $10k\Omega$ . Providing you stay on the linear portion of the curve a small change in anode voltage divided by a corresponding small change in anode current will yield an ra of  $10k\Omega$ .

Up to now the diode has been operated without an anode load resistor. Adding a resistor of say  $10k\Omega$  in series with the anode will enable us to determine the dynamic or working characteristic of the diode. With this resistor in series we can look at two extreme conditions in the operation of the diode. First, suppose the diode is short circuited, then all the voltage would be dropped across the  $10k\Omega$ anode load resistor. Current flowing would be 120V divided by the 10kΩ resistor giving a current of 12mA. Secondly assume the diode is open circuited, the current would be zero and the voltage at the anode end of the resistor would be 120V. Mark these two extreme points in on the graph of Fig 4[b]. Connect the two points with a straight line. Where the line intersects with the static curve is the operating point of the diode. This straight line is known as the load line. For a current Ia of 2mA, 40V [Va] is dropped across the diode, this current has to flow through the anode load resistor causing a drop of 20V. 20+40V is 60V.

From the figures above in Table 1.2 the dynamic curve for the diode may be plotted. See Fig 1.4[c].

When the diode is used as a rectifier the anode load becomes the equipment which the rectified current will supply. That is to say that if you have some piece of equipment that requires say 120V and a current of 50mA the power supply will see a load of  $2.4k\Omega$ . Or another example which certainly would use a semi-conductor diode, but the principle is the same, would be a 12V battery charger. The charger would be expected to charge a 12V battery at say 10A. This means that the charger voltage might be 2V greater than the battery voltage, and if this fact caused 10A to flow into the battery the anode load for the charger diode would be  $0.2\Omega$ .

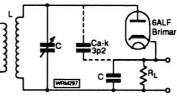
Although it is probably unlikely that many would want to use a thermionic diode for a detector, the principles involved are included. The diode detector works at a different level to the diode rectifier. Anode load resistors are very much higher in an effort to obtain greater efficiency. Choice of anode

load resistor is governed by the ratio of RL[load resistor] to RDC being 20 to 100. RDC you will remember was  $12500\Omega$  so the load resistor will lie between  $250k\Omega$  and  $1.25M\Omega$ . A basic diode detector circuit, with component values for a modulation depth of 75% and a maximum modulation frequency of 10kHz is shown in Fig. 1.5. The L and C would probably be tuned to 465kHz, the i.f. frequency.

One of the common applications of the diode valve was the rectification of alternating current. Nowadays this function is performed by the semiconductor diodes, which have a much lower forward resistance, and consequently are more efficient. However, for the sake of completeness Fig 1.6 shows the way the a.c. is rectified and a brief mention is made of the efficiencies attained. The mention of maximum power output or transfer in Fig 1.6 does not imply that you should attempt to take maximum power from a power supply. Think of what would happen if you attempted to take maximum power from a car battery by matching the load to the battery internal impedance.

Power transfer becomes more important as we move on to the multi-electrode valve as we shall see when we look at triode and pentode output valves. For the moment we move on to the simple triode [three electrode] valve which is a development of the diode as mentioned earlier and was introduced by Lee de Forest in the early part of this century. What de Forest did was to introduce a third electrode which he placed between the cathode and the anode. This extra electrode acts as a controlling electrode which under the control of the circuit designer, regulates the flow of current through the valve. It does this by being connected to a negative voltage supply, the supply may be varied and as a result the anode current varies in sympathy with it. The degree to which the anode current follows faithfully the varying negative voltage is a measure of the linearity of the device. To put it another way it indicates how well the valve can amplify without introducing distortion. One important feature is that the third electrode does not take any current from its voltage supply [unless operated as a power amplifier]. This fact should indicate to you that it offers a very high impedance to any source of voltage or signal.

la(mA)	Va (volts)	Vr (volts)	Va + Vr
2	40	20	60
4	60	40	100



For  $R_L = 250000\Omega$ 

Highest modulation frequency 10kHz (a.m.)

$$\frac{X_C}{R_L} = \frac{m}{\sqrt{1 - m^2}} = \frac{0.75}{0.661} = 1.134$$

where m is modulation depth, say 75%

$$\therefore X_C = 1.134 \times 250 \times 10^3$$

 $= 283.5k\Omega$ 

 $X_C = 283.5k\Omega$  at 10kHz

C = 56pF (greater than 10 times  $C_{a-k}$ )

values between 50 and 100pF are common

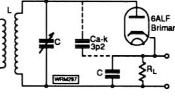


Fig. 1.5: This shows the simple circuit for a diode detector that would demodulate a.m. signals found on the broadcast bands. In addition the means of arriving at the best value for the diode load and the value of capacitor has been described

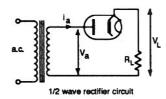
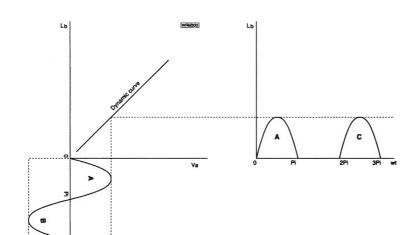


Fig. 1.6. A half wave rectifier circuit

Efficiency = 
$$\frac{P_{out}}{P_{in}} \times 100\%$$
 (by calculus)  
=  $\left(\frac{\frac{Im}{\pi}}{\frac{Im}{2}}\right)^2 \times \frac{100}{1 + \frac{ra}{R_L}}$   
=  $\frac{40.6}{1 + \frac{ra}{R_L}}\%$ 

Maximum power out is achieved when R<sub>L</sub> is the same

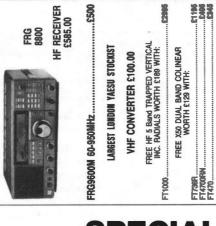


**Peter continues** with part 2 next month

Fig. 1. 6a. Showing a.c. input and half wave rectified d.c. output.



KENWOOD



# STANDARD

COM

THE WILL STREET STREET	232
C500 DUAL BAND	E
C150 2 MTR	ä
C528 DUAL BAND	8
C5200 DUAL BAND MOBILE, IOW	2

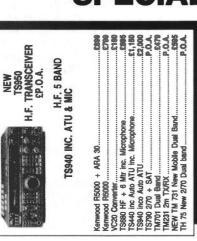
8288

# SONY

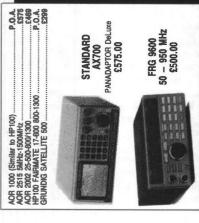


SCANNERS

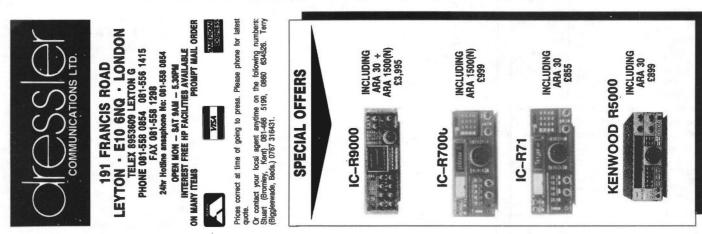
#### ON ΔΙ E YA



### H.F. TRANSCEIVER EP.O.A. All ICOM stocked including accessories £ 349.00 £2249.00 £ 249.00 IC R1 IC R100 IC R72 IC 970 IC 3210 IC 228 IC 765 IC 781 IC 901 Special Price... Special Price... Special Price... Special Price... C 24E IC 2SE 1C32 1C765 1C3210 1C2SET



#### OFF **ICOM** ᆿ Ξ ΔL



#### **YAESU ICOM DEALER** LONDON





N' Type Connection

Gain 11.5dB Noise 3.0dB Intercept point 3rd Ord

2159.00

+21dbm

Now with fully tuneable

interface

42 . . . 40MHz WITH LIMITED PERFORMANCE UP TO 100MHz **ARA 30 ACTIVE ANTENNA** 

fibre rod. Circuit is built into waterproof 2.5mm thick Professional electronic circuitry professional demands both in electronics and mechanical ruggednes. 1.2m long glass with very wide dynamic range Ideal tube. aluminium

antennas come complete with 7 metres of and supply systems. £139. See Review in and swi-receiving Dressler preamps available interface, power August 1985 Issue p.35 commercial

brackets.

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

# **Taming Computer Hash**

The problem of what is now popularly called 'hash' is fairly complex. In order to operate, the computer's circuitry relies on streams of square wave signals which, like most square waves, are rich in harmonics. The hash from most computers is in the form of magnetic radiation but electromagnetic radiation is also involved. It is a sad fact of life, that unlike many developed nations, Britain has yet to impose any controls on how much hash a computer is permitted to radiate. This is dramatically demonstrated in my own shack where I can use my American made Apple computer (complying with FCC regulations) with little if any real affect on receivers in the same room, whereas all the radio gear has to be switched off when a certain British made computer is switched on. Home computers are not alone in causing this type of problem and as someone who lives in a built-up area I have identified even worse problems from 'Space Invader' type arcade games, microcomputer based self-service petrol pumps and even some minicomputers used by business houses.

The sad part is that at the manufacturing stage, the computer can be quietened down quite cheaplytackling the problem later comes more expensive.

#### The Solutions

It must be stressed from the outset that there is no simple or single step to cure the problem and even when all the recommendations have been carried out it is likely that the problem will be noticeably lessened rather than completely eliminated.

Antennas: The first and most obvious step is to ensure that the antenna system is not inviting problems. It should be sited as far as possible from the computer and connections should be checked -

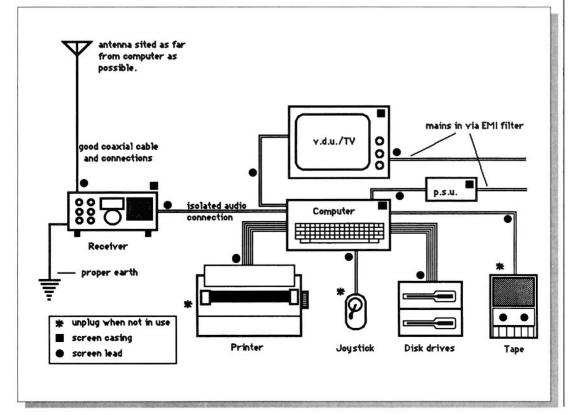
corroded earth points and the like are a recipe for problems.

The computer: The first and most obvious step to cut hash levels is to screen the computer case, assuming it is a plastics type. There are two ways of tackling the problem. The first, and most expensive, is to completely re-house the computer circuit board and keyboard in a metal case or cases. In the latter instance the circuit boards are housed in a simple equipment case and the keyboard in a separate metal case. Keyboard housings are available with ready cut front panels from a number of the larger mail order component suppliers and the keyboard is attached to the circuit box with screened cable.

The second option is to screen the existing case. Many people have simply stuck aluminium kitchen foil on the inside of the case but be warned that there are risks involved and I know of disastrous damage caused to one computer when part of the foil became detached and touched the track side of the p.c.b. A safer method is to spray the inside of the casing with a special aerosol paint that is now available. It is known as Nickel Screening and the one I have used is manufactured by Electrolube. It is quite pricey but one can goes a long way and the same spray can be used to screen small plastics boxes, etc. All the electronics will need to be stripped-out of the case and masking tape and newspaper used to cover the outside of the casing. Once the paint has dried, carefully examine any raised pillars that normally support the p.c.b. and make sure that they do not come in contact with live tracks. If they do then the paint must be scraped off the pillar. Once the computer is re-assembled it is of course essential that the paint (or the aluminium foil) makes contact with the circuit ground (in the case of the BBC-B the power supply module case is

#### Feature

Many home computers can be used as terminals for weather pictures, SSTV and RTTY. They provide access to these services with a convenience and cost that only a few years ago would have been unheard of. The big drawback though is that many home computers generate high levels of 'hash' that can wipe-out radio reception. Following a plea from readers for a cure to this problem. Peter Rouse explains some of the steps that can be taken to reduce 'hash'.



Steps for reducing hash. Do not assume that the audio and VDU cables supplied with your computer are screened - often they are not.

grounded and will supply the necessary contact when in place).

One problem that still remains with computers using one-piece plastics cases, is that the keyboard cut-out still provides a large unscreened area. On some computers it is near impossible to do anything about this but on the BBC-B, the metal plate that supports the keyboard should be grounded by drilling a small hole on one corner and fixing a solder tag for the connection.

Theres one further step that can be tried. Most home micro's will have at least two quartz crystals somewhere on the circuit board. Try grounding their cases whilst monitoring hash levels. Do not be surprised though if grounding one crystal reduces noise but grounding another increases noise.

Interconnections: The leads that connect disk drives, printers, monitor, joy-sticks and even the cassette recorder can all be sources of hash radiation. Wherever possible these should be screened and peripherals that are not being used should be disconnected. Replacing the leads of the cassette recorder, Monitor (RGB types are not always supplied with screened leads) and joy-stick with screened multi-core cable is not a big problem but is difficult with the printer and disc drive because most use plugs designed for attachment to ribbon cable. The easiest solution is to wrap them in aluminium foil held in place with adhesive tape which is then grounded. In some cases, a similar drop in hash levels might be possible by using the 'clip-on' type of ferrite chokes that are now available.

It is worth noting that earthing between cases can sometimes cause quite dramatic drops in hash levels. Using jumper wires try grounding cases in different combinations. This can be particularly effective with the typical BBC-B set-up using metal cased disc drives and monitor.

Mains Leads: On some computers, a fair degree of radiation is via the connection to the mains supply. Computer power supplies basically fall into two categories, integrated (where the supply stages are built into the main case like the BBC-B) or separate (such as the Spectrum with its simple external mains/d.c. adaptor). The best solution is to use an EMI (electromagnetic interference) filter. These consist of a network of chokes and capacitors and are usually supplied in a sealed casing with mains in/mains out and earth connections. Unless you have a computer with plenty of space inside, the EMI filter will need to be housed in a small case outside the micro. It should be inserted into the mains lead as close as possible to the power supply stage. In the case of separate power supplies it is probably worth re-housing the circuitry with the EMI filter in a new earthed metal case. The existing d.c. feed cable to the computer should be replaced with a screened type.

EMI filters provide an added bonus in that they also remove mains spikes and this can eliminate glitches in the computer. However, the type of EMI filter discussed here should not be confused with the type that merely replaces the mains plug, to be really effective in cutting hash coming out of the computer, the filter must be as close to the micro's mains transformer as possible.

Monitor/TV receiver: Probably the biggest problem posed by a monitor or TV receiver are time-base harmonics. These do not pose a big problem at v.h.f. and above but on the h.f. bands can caused severe interference. The problem can be tackled in a similar way to the computer itself. If the monitor or TV has a plastic casing then the inside can be sprayed with Nickel screening. The mains input to the set can also incorporate an EMI filter. In my own experience, when both these steps are taken this provides a big reduction in hash levels.

One final point of note is that some of the leads supplied for systems using RGB video (such as the BBC-B) are not screened. They should be.

The receiver: The majority of amateur transceivers have well screened metal cases but other equipment might not have. If not, it is important that screening is provided. When I first acquired an AOR-2002 scanner with computer control interface I had enormous problems with hash and a dramatic improvement was made when I screened the scanner's casing with Nickel spray.

On some equipment, it seems that a fair degree of hash can be caused by the simple interconnection between the receiver and the computer. For instance I noticed hash levels drop when using an isolated audio feed between a receiver and RTTY interface. This consisted of nothing more than a telephone pick-up coil taped to the mesh of the receiver's loudspeaker and a simple pre-amplifier to boost the signal to a level needed by the interface. However, an even better solution could be to use a circuit based on an opto-coupler.

#### Step-by-step

Taming your micro is a little like taming vehicle ignition noise. Each step in itself may not seem to make a lot of difference but by adopting more and more measures, the problem is finally brought under control. Do not be discouraged if hash levels do not drop by any considerable degree until you have adopted most of the measures shown. With time, patience and sadly some expense, it is possible to bring the average computer under reasonable control.

Finally, I would draw attention to the QRM eliminator made by S.E.M. which was reviewed in the February 1988 edition of *Practical Wireless*.

PW

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

Wireless-Line on 0898 654632

Calls charged at 38p peak, 25p off peak.

If you have news for inclusion on Wireless-Line ring (0202) 678558 in the evenings and leave a message on the answering machine

The trend that's really caught my eye at shows and rallies is the increasing popular fashion for minute rigs. The Icom IC-R1 certainly fits neatly in this category. When the review receiver arrived I was amazed at the small size of the unit. To say it is minute is an exaggeration! I should also point out that the hand holding the receiver is not mine but that of a YL PW staff member!

#### What The R1 Does

Unfortunately I was unable to obtain a circuit for this apparently complex piece of miniaturisation. Still, even by a description of the facilities available you can quickly appreciate how intricate the R1 must be inside.

Features include continuous coverage from 100kHz to 1300MHz, and very small physical size even with the (supplied) NiCad batteries fitted. A NiCad charger is also supplied A dual frequency control system, entry by keyboard or controlled by a rotary knob. Multiple scanning functions which include an auto-write memory scan and a 24-hour clock system with timer functions.

#### **Sound Advice**

When I took delivery of the loan receiver I was also given some very sound advice. I was told to sit myself down, and read through the comprehensive instruction manual before attempting to use the receiver.

It will be obvious to anyone who tries an R1 for themselves, that they'll have to be very careful when using the control panel-pad. The buttons are very small and the rotary tuning knob is, of course, minute. To add to my problems I have a very large hand and this made it much more difficult to use.

#### **The Multi-Function Display**

The liquid crystal display is small (of course!) but is relatively easy to read and is very comprehensive.

The display provides information on frequency, reception mode, auto-memory scan, scan up-down indications, memory selected indication, memory channel readout, priority channel indicator, tuning step indications, scanning indication, dial selection indicator and signal strength indication.

#### Scanning

The scan mode of operation is a most useful aid. The programmed scan mode sequentially scans each frequency, but for amateur radio use I found that the memory scanning mode was very helpful as I could avoid using the very small controls as much as possible. Once the 144MHz memory channels had been entered via the key-pad, I found that the R1 sat on the shelf quite happily until someone came up on 'local' favourite channel.

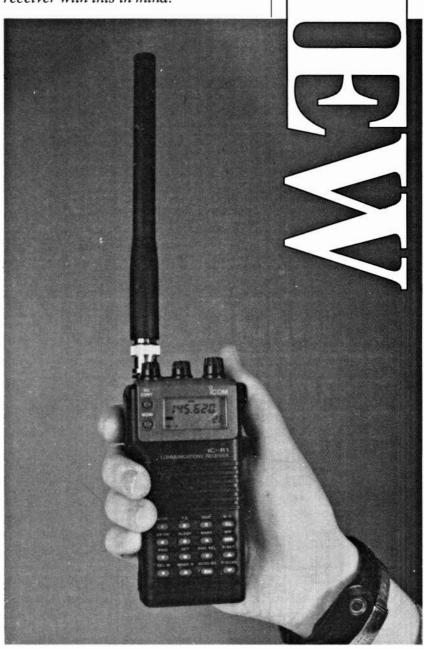
Potential users must be aware that the scan function must be disabled (the instruction manual clearly helps on this point) because otherwise the scan will continue after ten seconds has passed!

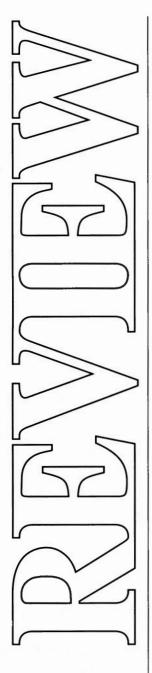
Scanning speed is adjustable and the manual

The Icom IC-R1
Communications Receiver
held by a young lady on the
PW staff team.

## Icom IC-R1 Review

Summer's here and many of us like to get 'out and about' and perhaps try a little portable operation at the same time. Rob Mannion G3XFD has been trying the Icom IC-R1 hand-held receiver with this in mind.





#### Specifications

Selectable tuning steps: Number of memory channels: Reception modes: Antenna impedance:

Power supply requirements: Current drain:

Usable temperature range: Dimensions:

Weight:

**Receive System:** 

#### Intermediate frequencies:

First Second Third

Sensitivity:

a.m. (for 10dB s/n ) f.m. (for 12dB SINAD) w.b.f.m. (for 12dB SINAD)

#### **Squelch Sensitivity:**

a.m. f.m. Selectivity: a.m.

f.m. w.b.f.m.

Audio Output Power: Audio output impedance: 0.5, 5, 8, 9, 10, 12.5, 15, 20, 30, 50kHz

100

f.m., a.m. wide f.m. (w.b.f.m.)

50Ω (unbalanced)

7.2V d.c. (internal battery)or external power source 6-16V d.c. Maximum audio output, less than 300mA. Power saved. Average consumption 15mA. duty cycle receive: Standby = 1: 16

-10°C to +60°C

102.5mm (H) x 49mm (W) x 35mm (D)

280g

a.m. f.m. triple-conversion superhet. w.b.f.m. Double-conversion.

266.7MHz to 266.66.7095MHz

10.7MHz

455kHz (f.m./a.m. only)

 $\begin{array}{ll} 1.6\mu V \; (2\text{-}24\text{.}9995\text{MHz}) \;\; 0.79\mu V (25\text{-}905\text{MHz}) \\ 6.3\mu V \; (2\text{-}24\text{.}9995\text{MHz}) \;\; 0.4\mu V \; (25\text{-}905\text{MHz}) \\ 6.3\mu V \; (2\text{-}24\text{.}995\text{MHz}) \;\;\; 3.16\mu V \; (25\text{-}905\text{MHz}) \end{array}$ 

1.26μV (2-24.9995MHz) 0.63μV (25-905MHz) 0.63μV (2-24.9995MHz) 0.32μV (25-905MHz)

More than 15kHz / -6dB More than 15kHz/ -6dB More than 150kHz/ -6dB

150mW at 10% distortion with an  $8\Omega$  load.

 $8\Omega$ 

The Icom IC-R1 hand-held Communications receiver is available from Icom (UK) Ltd, Sea Street, Herne Bay, Kent CT6 8LD at £399.



This photograph shows the scale of the Icom IC-R1 hand-held receiver.

states that it can be varied from 10 channels per second to as high as 20 per second.

#### **Lower Frequency Listening**

Quite honestly, I found that the facility to listen on the lower frequencies was not much help to me. I quickly found this out when I tried to find Radio 4 on 198kHz where, as expected, it needed another antenna. On Band II broadcast f.m. duty I found the receiver to be very sensitive. I also found that if the unit was connected to an antenna other than the 'rubber duck', it seemed to overload and cross-modulate. However, the manual does warn the user that the R1 is prone to this problem and that the unit will pick up its own local oscillators on certain frequencies, and these are described in the comprehensive manual.

#### **Final Thoughts**

So, to sum up my opinion on this receiver I must be frank and honest. I am wondering who the receiver is aimed at. Apart from the wideband capability, which would be useful when checking for harmonics and other problems, I can't think of a use for it in my shack. Still, it cannot be denied that it is a very clever and beautifully made device. My thanks to Icom (UK) Ltd for the loan of the review model.

# AMATEUR RADIO COMMUNICATIONS

AUTHORISED ICOM, YAESU AND STANDARD DEALER



#### STANDARD C-528

- Direct 13.8V in for 5 Watts out.
  VHF 2.5W, UHF 2W with CNB151 NiCad pack.
  Dual displays. VHF 2.5W, UHF 2W Dual displays. Power save function.
- Multiple memories.

- Multiple memories.
   Priority channel.
   Tone squelch (option).
   Programmeable offsets
   Coded paging function.
   Various scanning mode
- ning mode:
- r Programmeable step sizes.

  144-146 VHF, 430-440 UHF, 800-975 Rx only.

  Separate Vol. & Squ. controls for each band.

PRICE £379

#### POINTS TO CONSIDER WHEN CHOOSING THE EMPORIUM TO BUY YOUR NEW RIG FROM:

- The largest selection of new and secondhand equipment in the North of England.
- All demo transceivers are available for back to back tests enabling you to choose the make or model best suited to your
- Adequate stocks of all equipment kept.
- 98% of all servicing and guarantee work carried out in house
   — often while you wait, therefore eliminating the 2 or 3 weeks
   delay while your equipment is returned to the main importer.
- A friendly and expert advice service both technical and practical.

**OUR AIM IS 100% SATISFACTION** 

#### YAESU FT1000



PHONE FOR BEST PRICE

AMR-1000 £247 AMR-1000S £299 IC-2SE

A

**RX** Coverage 80-180MHz £275

#### **NOW IN STOCK**

The Ultimate in Pocket Scann NEW

- **FAIRMATE HP-100** • 25-550 830-1300Mhz
- coverage 1000 channel memory 10 independent search
- bands
   Complete with nicads, 2 antennas, carrying case,

£299

Phone for more deta

ALWAYS A GOOD SELECTION OF SECOND HAND AND **COMMISSION SALES, PHONE** FOR MORE INFORMATION.

HF Log for the Amiga Computer Card Index/Contest log/dupe sheet. Will hold 4000 entries.

£12 + £2 P&P

BANDEDGE ANTENNAS

High performance antennas for the 14-18-21-24-28MHz bands. Manufactured in the U.K. Top quality products at the price you want to pay. DX Tri-Star vertical for 14-21-28 self supporting trapped radials, exceptional performance with very low angle of radiation. Our top selling antenna, did you see the review? Verticals with radial kits and Rotary Dipoles for all the above bands as shown at the R.S.G.B. NEC

Send for details to: S.E.S. Communication Systems, Barnwell House, Barnwell Drive, Cambridge CB5 8UJ. Tel. 0223 410899.

*"*SRW KILOWAT

Covers all 9 HF Bands. Weighs under 7Kg, Has internal mains PSU! Matches small rigs size wise (747 etc.). Only 14" wide, 10" deep, 5" high! Order now whilst you can still buy direct from the designers: SRW Communications Ltd., ASTRID HOUSE, The Green, Swinton, MALTON, North Yorks. YO17 0SY. Tel 0653 697513. Please write or 'phone Steve Webb, G3TPW, for details and leaflets.



38 Bridge Street, Earlestown, Newton-le-Willows, Merseyside WA12 9BA. Only 1 mile from Junction 23 - M6 Telephone: N-le-W (09252) 29881 Fax No: 09252 29882

OPEN TUES-SAT 10 a.m. - 5 p.m.

VISA

RSGB

INSTANT FINANCE AVAILABLE SUBJECT TO STATUS

Prices correct at time of going to Press.

E & EO.

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

RST MAIL ORDER CO. LANGREX SUPPLIES LTD, 1 MAYO ROAD, CROYDON, SURREY CRO 20P

SPECIAL EXPRESS MAIL ORDER SERVICE

AZ31	4.00	EM87	2.50	PY82	1.50	6AS6	4.00	6SA7	3.00
CL33	6.50	EN91	8.50	PY83	1.25	6AS7G	8.75	69C7	2.75
DY86/7	1.50	EY51	2.75	PY88	2.00	6AT6	1.25	6SG7M	2.50
DY802	1.50	EY86	1.75	PY500A	4.00	6AU5GT	8.00	6SJ7	3,25
- E88CC	6.95	EY88	1.75	PY800	1.50	6AU6	2.50	6SK7	3.50
- E180F	4.50	EY500A	3.00	PY801	1.50	6AW8A	3.75	6SL7GT	3.00
E810F	25.00	EZ80	1.50	QQV02-6	19.50	6B7	3.25	6SN7GT	3.00
EABC80	1.25	E281	1.50	QQV03-10	5.00	688	3.25	6SS7	2.75
EB91	1.50	GY501	3.00	QQV03-10 Mu		6BA6	1.50	6UBA	2.25
EBF80	1.50	GZ32	4.00	QQV03-20A	25.00	6BA7	5.00	6V6GT	4.25
EBF89	1.50	GZ33	4.75	QQV06-40A	27.50	6BE6	1.50	6X4	3.00
EC91	6.50	GZ34 Mul/GE	7.50	QQV06-40A M		68H6	2.50	6X5GT	1.75
ECC33	7.50	GZ37	4.75	QQ03-12	6.80	6BJ6	2.25	12AX7	2.25
ECC35	7.50	KTB1	7.50	R18	3.00	6BN6	2.00	12AX7A GE	7.00
ECC81	1.75	KT66	15.00	R19		6BO7A	3.50	12BA6	2.50
ECC82	1.75	KT86 GEC	30.00	SP41	7.50	68R7	8.00	12BE6	2.50
ECC83 Siemen		KT77 Gold Lio		SP61	6.00	6BR8A	3.50	12BH7A GE	8.50
ECC85	3.50	KT88	15.00	U19	4.00	6BS7	6.00	12BY7A GE	7.00
ECC88	3.50	N78	10.00		9.50	68W6	6.00	12E1	
ECC91	4.50	OA2	3.25	U25	2.50	68W7	1.50	12HG7 12GN7	17.00 7.00
ECF80	1.50	082	4.35	U26	2.50	6826		30FL1/2	
ECH35	3.00	OC3	2.50	U37	9.00	6C4	2.75	30PL1/2 30P4	1.38
ECH42	3.50	003		UABC80	1.25		1.25	30P19	2.50
ECH81	3.00	PC86	2.50 2.50	UBF89	1.50	606 6086A	3.50	30PL13	2.50
ECL80	1.50			UCH42	4.00		2.50		1.80
ECL80		PC88	2.50	UCH81	2.50	6CD6GA	5.00	30PL14	1.80
ECL83	1.50	PC92	1.76	UCL82	1.75	BCLB	3.75	572B	70.00
	3.00	PC97	1.75	UCL83	2.75	6CG7 GE	5.25	805	45.00
ECL86	1.75	PC900	1.75	UFB9	2.00	6CH6	6.95	807	3.75
EF37A	5.00	PCF80 PCF82	2.00	UL41	10.00	6CW4	8.00	811A	16.50
EF39 EF41	2.75		1.50	UL84	1.75	6D6	3.50	812A	52.50
EF42	3.50 4.50	PCF86 PCF801	2.50	UY41	4.00	6DQ5 GE 6DQ6B	12.00	813	27.50
EF50		PCF802	2.50	UY85	2.25	6EA8	4.75	8417 GE 886A	11.50
EF54	2.50	PCF805	1.70	VR105/30	2.50	6EH5	3.00		35.00
EF55	5.00	PCF808	1.70	VR150/30	2.50		1.85	872A	20.00
	3.50	PCF808	1.70	Z759	25.00	6F6	3.00	931A	18.50
EF80 EF86	1.75	PCH200 PCL82	3.00	Z803U	25.00	8GK6	3.50	2050A GE	9.95
	5.00	PCL82	2.00	2D21	3.25	6H6	3.00	5763	10.00
EF91 EF92	2.95 3.95	PCL83 PCL84	3.00	3B28	15.00	6HS6	4.95	5814A 5842	4.00
		PCL84 PCL85	2.00	4CX250B		6.15	4.50		10.00
EF183 EF184	2.00	PCL85	2.50		C 65.00	6,16	2.00	6080	6.00
EH90	2.00		2.50	5R4GY	5.50	6.17	4.75	6146B GE	15.00
EH90 EL32	1.75	PCL805 PD500	2.50	5U4G	4.50	6JB6A GE	9.50	6550A GE	15.00
EL32 EL33	2.50	PFL200	6.00	5V4G	2.50	6JE6C 6JS6C GE	8.50	6883B GE	15.95
	7.50			5Y3GT	3.50		11.25	6973	8.75
EL34 Mullard EL34 Siemens	10.00	PL36 PL81	2.50 1.75	5Z3	4.00	BKBGT	2.75	7025 GE	7.00
EL34 Siemens		PL82		5Z4GT	2.50	BK7	3.00	7027A GE	12.50
ELL80	2.50	PL82 PL83	1.50	6/30L2	1.75	6K8	3.00	7581A GE	11.95
EL81	5.25	PL83 PL84	2.00	6AB7	3.00	6KD6 GE 6L8G	11.95 7.50	7586 7587	15.00
ELB1	2.25	PL84 PL504	2.50	6AH6	5.00	6L6GCSYL	9.00	7567 7868	23.00 8.50
EL86	2.75	PL508	5.50	6AK5	1.50				
EL91	4.00	PL509		6AL5	1.50	6L6GC Siemens		9068 GE	16.50
			6.00	6AM6	2.95	6L6GC GE	9.50	8417 GE	11.50
EL95 EL360	2.00	PL519 PL802	6.00	6AN5	4.75	6L7 6LO8	2.50		
	18.50	PY33		6AN8A	4.50		8.50 3.75		
EM34	8.50	PY33 PY81	2.50 1.50	6AQ5	3.25	6Q7		Prices correct	
EM81	2.50	F101	1.50	6AR5	25.00	6RHH8/6KN8	10.00	going to pr	ess

Open daily to callers: Mon-Fri 9am-4pm — Closed Saturday, Valves, Tubes and Transistors. Over 6000 types available Terms C.W.O. and Visa Cards accepted. Orders despatched by return.

Quotations for any types not listed S.A.E. Post and packing £1.00 per order + VAT

4 element crossed . 9 element fixed

**ANTENNAS TONNA (F9FT)** 

435MHz 21 element ATV ... £47.61(a) 25 element......

144MHz

17 element

Fax: 081-684 3056

Telex 946708

The

1250MHz .£29.39(a) 23 element .281.07(0) frame - power .....£175.00(a) 

144/435MHz

250.71(a) 9 & 19 ek

.£81.87(a)

All prices include VAT. Please add carriage (a) £5.00 (b) £2.20 (c) £1.20. U.K. MAINLAND DNLY. ACCESS or VISA cardholders telephone your order for immediate dispatch. Callers welcome, but by telephone appointment only, please. Send 50p for our catalogue which contains the full specifications.

SOLE U.K. DISTRIBUTOR FREEPOST, ABINGDON, OXON, OX14 1BR. Tel: (0235) 523080 (24hrs)



THE VHF/UNF ANTENNA SPECIALIST

POWER SPLITTERS

**RANDAM ELECTRONICS (P)** 



Tel. 081-684 1166

Prices excluding VAT add 15%

VISA

# C.M.HOWES COMMUNICATIONS

NORTHANTS NN11 6PT Mail order to: EYDON, DAVENTRY

We have too many kits in our range to be able to feature them all in one advert! So this month we are concentrating on just the transmitters. For every transmitting kit there is a companion receiver kit available too, plus a whole range of accessories (VFOs, speech processor, side-tone, digital readout, etc.). Our kits are designed to be compatible, so you can build a more complex item, a transceiver for example, by combining several kits together - a large project is much more managable in modular stages.

#### HTX10 SSB/CW EXCITER FOR 10 & 15M

This dual band exciter was reviewed in last month's PW. Combined with other This dual band exciter was reviewed in last months Fw. Combined with other HOWES kits it will enable you to build an SSB transceiver for 10 and 15 Meters, or a tunable I.F. for driving transverters. You could build a very useful satellite uplink using the HTX10 as your "prime mover". The HTX10 makes the home-built SSB rig a practical project for any constructor with the ability to use a soldering iron. As with all our kits, no fancy test equipment is needed by the constructor.

HTX10 Kit: £49.90

#### AT160 AM/DSB/CW 10W PEP TRANSMITTER FOR 80 & 160M

You can join in the fun on the Top Band AM Preservation Society nets with the AT160. It will also produce an excellent quality DSB signal to work those using SSB transceivers, and of course a nice sounding CW note for longer distance contacts.

Use the MA4 mic amp kit with this kit for "phone" operation. Construction and alignment are both very straightforward.

AT160 Kit: £34.90

#### CTX80 and CTX40 QRP CW TRANSMITTERS FOR 80 or 40M

These little transmitters have been the introduction to the fun of QRP working for many operators. Combined with a direct conversion receivers (DcRx) and VFO kits they can form a transceiver that gives very effective performance, and won't break the bank! Great for holiday and portable use! Just listen around the QRP frequencies — you'll hear them making plenty of contacts!

CTX40 or CTX80 Kit: £13.80

Assembled PCB: £19.90

#### MTX20 10W CW TRANSMITTER FOR 20M

10W is a very effective power level for World-wide contacts on this popular band. A pre-set control is provided to reduce the output level to 5W for G-QRP club events. The 14.060 crystal in the MTX20 kit can be "pulled" up to 8KHz for a useful tuning range, or the matching CVF20 VFO kit can be connected for full band coverage. You can work lots of DX with this super little rig!

MTX20 Kit: £22.90

Assembled PCB: £29.90

Matching VFOs, receivers and accessory kits are available for all our transmitters. SWLs can use the receivers on their own and add the transmitters later. Please send a good size SAE for a free copy of our catalogue showing the full kit range. Data sheets are also available for any specific products you are interested in.

All HOWES kits include a good quality printed circuit board (PCB) with the parts locations printed on it for easy, accurate construction. All board mounted components are included, as are full, clear instructions. Technical help, advice and credit card sales are available by phone during office hours. during office hours.

P&P is £1.00, delivery normally within 7 days.

73 from Dave G4KQH, Technical Manager.



Reg Ward & Co. Ltd. 1 Western Parade, West Street, Axminster, Devon, EX13 5NY.
Telephone: Axminster (0297) 34918

1	Yaesu			ІСОМ		•		KENWOOI	)
FT1000	HF Transceiver	P.O.A.	IC785 NEW	HF Transceiver	2499.00	(-)	TS940S	9 Bend TX General Cov RX	1995.00 (-)
FT767	HF Transceiver	1599.00 (-)	IC751A	HF Transceiver	1500.00		AT940	Auto/ATU	244.88 (4.00)
FEX767(2)	2m Module (767)	179.00 (3.00)	10735	New HF Transceiver	979.00		SP940 TS140	Ext Speaker HF 9 Band Gen. Cov. TX/RX	87.85 (4.00) 862.00 (-)
FEX767(70) FEX767(6)	70cm Module (767) 6m Module (767)	225.00 (3.00) 179.00 (3.00)	IC728 IC725	HF/6m base stn. HF Base Transceiver	769.00		TS8805	HF/6m TX Gen. Cov. RX	985.00 ()
SP767	Speaker	69.95 (3.00)	AT100	100W ATU (751/745)	385.00	(4.00)	TS440	9 Band TX General Cov RX	1138.81 (-)
FT747GX	Budget HF Transceiver	659.00 (-)	AT150	150W ATA (735)	315.00		AT440	Auto/ATU	144.82 (4.00)
FT767GX	MkII HF Transceiver	969.00 (-)	PS55	Ext PSU (735)	185.00		PS50	H/Duty PSU	222.49 (4.00) 208.67 (3.00)
FP700	20A P.S.U.	219.00 (4.00)	IC505 IC290D	50MHz multi-mode portable 2m 25W M/Mode	529.00 569.00		AT230 SP230	All Band ATU/Power Meter External Speaker Unit	208.67 (3.00) 66.49 (4.00)
FC700 FP767HD	Manual ATU Heavy Duty 2m P.S.U.	148.00 (3.00) 268.75 (4.00)	IC228E	2m 25W FM Mobile	365.00		PS430	Matching Power Supply	173.78 (4.00)
FAS14R	Remote Aerial Switch	80.00 (3.00)	IC2SE	2E New Mini Hi-Fi	275.00	(-)	SP430	Matching Speaker	40.81 (4.00)
FT736 NEW	2/70cm 25W Base Stn.	1,359.00 ()	IC275E	New 2m 25W Base Stn IC75E	1069.00		SM220	Station Monitor	343.62 (4.00)
FT4700	New 2m/70cm Dual Band FM Mobile	675.00 (7.00)	IC4SE IC24ET NEW	70cm H/Held 2m/70cm Dual Band H/Held	310.00	(4,00)	BS8 TL922	Band Scope Unit (830/840) 10/160 2kW Linear	77.00 (2.50) 1485.00 (10.00)
FT290MkII FT690MkII	Mkll Super 290 2m Multimode 2.5W Mkll 6m M/Mode 2.5W	429.00 (5.00) 429.00 (5.00)	IC490	70cm 10W M/Mode	817.00		TH25	NEW 2m H/Held	238.00 (4.00)
FT2311R	23cm FM Transceiver	475.00 (-)	IC240	2m/70cm FM Dual Band Mobile	635.00	(4.00)	TH45	NEW 70cm H/Held	269.00 (4.00)
FT211RH	2m 45W FM Mobile	309.00 (-)	ICR71	Gen Cov RX	859.00		TH75	NEW 2m/70cm H/Held	P.O.A. ()
FT212RH	New 2m 45W FM Mobile	349.00 (-)	IC7000 AH7000	VHF/UHF Scanner 25-1300MHz Discone	989.00		TH206 TH216	2m H/H 2m H/H Keyboard	215.26 (4.00) 252.13 (4.00)
YHA16	2m Helical	7.50 (2.00) 12.50 (2.00)	SP3	Ext Speaker	81.00		TR751	2m 25W M/M Mobile	599.00 (-)
YHA44D MMB15	70cm   wave Mobile Bracket	12.50 (2.00) 14.55 (2.00)	CK70	DC Cable (R70/R71)	7.00	(2.00)	TS790	VHF/UHF Transceiver	1495.00 (-)
FT411	New 2m H/H Keyboard	225.00 (3.00)	EX257	FM Board (R70/R71)	41.00		R2000	Gen Coverage HF/RX	589.00 (-)
FT811	New 70cm H/H Keyboard	239.00 (3.00)	GC5	World Clock	43.00 14.38		VC10 R5000	118-174MHz Converter (R2000)	161.94 (3.00) 875.00 (-)
FT470	New 2m/70cm Dual Band H/H	389.00 (3.00)	AC2 BC35	Waterproof Bag all Icom H/H Desk Charger	14.38 70.15		VC20	General Coverage HF/RX 118-174MHz Converter (R5000)	875.00 (-) 167.21 (3.00)
FT23R FT73R	2m Mini H/H 70cm Mini H/H	209.00 (3.00) 229.00 (3.00)	BP3	Battery Pack 8.4V (2/4E/02/04E)	29.90		TM701	NEW 2m/70cm FM Mobile	489.00 (5.00)
FNB9	Nicad Battery Pack (23/73)	34.50 (2.00)	BP4	Empty Battery Case (2/4E/02/04E)	9.20		TM731	2m/70cm FM Mobile	865.00 (5.00)
FNB10	Nicad Battery Pack (23/73)	34.60 (2.00)	BP5	Battery Pack 10.6V		(2.50)	TM231E	NEW 2m FM Mobile 50/10/5W	289.00 (5.00)
FNB11	Nicad Battery Pack (23/73)	67.85 (2.00)	CP1 DC1	12V Charge Lead BP3/7/B	6.90	(2.00)	TM431E SMC30	NEW 70cm FM Mobile 35/10/5W Speaker/Mic TH21/4/2600	318.00 (5.00) 28.31 (3.00)
NC18C SMC28	Charger (23/73) Charger (23/73) 13A Plug	17.71 (2.00) 17.71 (2.00)	HM46	DC/DC converter operate from 12V NEW Mini speaker mic		(2.00)	MC50	4P Desk Mic	46.08 (4.00)
NC28	Charger (23/73) 13A Plug Charger (23/73)	17.71 (2.00)	HM9	Speeker/Mic	21.85	(2.50)	MC60A	8P Desk Mic	88.22 (4.00)
NC29	Base Charger (23/73)	89.00 (3.00)	HS51	Headset inc PTT/Vox unit		(2.00)	MC80	Electric Desk Mic	53.96 (3.00)
PA6	Car Adapt Charger (23/73)	24.15 (2.00)	LC41	IC32 + BP3		(2.00)	MC85 MC43	Desk Mic Audio Level Comp 8P Fist Mic	99.00 (4.00) 22.22 (3.00)
MH12A2B	Speaker Mic	31.05 (2.00)	LC42 SM8	1C32 + BP5 1.3ku/600u 8P Base Mic	82.00	(2.00)	MC43 MC35	4P Fist Mic	21.72 (3.00)
MH18A2B FRG9600M	Speaker Mic Miniature (23/73/727) 60-950MHz Scanning RX	31.05 (2.00) 509.00 (-)	R1	150kHz-1300MHz RX	P.O.A.		MC55	Mobile Mc (6p.p. 8p)	52.67 (3.00)
PA4C	Power Supply for 9600	29.00 (2.00)	R72 NEW	HF RX	P.O.A.		LF30	HF Low Pass Filter	32.26 (2.50)
NC9C	Charger	11.50 (2.00)	R100	5000KHz-1800MHz	P.O.A.		HS6 HS5	Lightweight H/phones	24.36 (2.50)
PA3 YM24A	Car Adaptor/Charger	21.85 (2.00) 31.05 (2.00)		C III Vanore			RZ)	Deluxe H/phones 500Hz-950MHz AM/FM Scanner	37.54 (2.50) 465.00 (6.00)
FRG8800	Speaker Mike HF Receiver	649.00 (-)		— C W Keyers					
FRV8800	Converter 118-175 for above	100.00 (3.00)	HI-MOUND			12 (2)		SWR/PWR Me	ters —
FRT7700	RX ATU	59.00 (3.00)		ht key (adjustable tension) ht key (adjustable tension)		(2.50)	HANSEN	S It. I It 1110	
MH1B8	Hand 600 8pin mic	21.00 (2.50)	HK704 Straig	ht key (adjustable tension)		(2.50)	W720S	130/440MHz 20/200W	<b>52.75</b> (2.50)
MD1B8 MF1A3B	Desk 600 8pin mic Boom mobile mic	79.00 (2.50) 25.00 (2.50)	HK705 Straig	ht key (adjustable tension)	22.49	(2.50)	JD110	1.5-150MHz	16.50 (2.50)
YH77	Lightweight phones	19.99 (2.50)		ht key (edjustable tension)		(2.50)	YMIX Yeesu Y560	3.5-150MHz 1.6-60MHz	31.50 (3.00) 93.15 (3.00)
YH56	Padded phones	19.99 (2.50)		ht key (adjustable tension) ht key (Deluxe-Brass)		(2.50)	Yeesu YS500	1.0-00MHz 140-525MHz	93.16 (3.00) 81.65 (3.00)
YH1	L/weight Mobile H/set-Boom mic	28.75 (2.50)		ht key (Brass)		(3.50)	Hanson	740-020min	01.00 (3.00)
\$82 \$810	PTT Switch Box 290/790 PTT Switch Box 270/2700	22.00 (2.50) 22.00 (2.00)	MK703 Sque	aze key		(2.50)	FS500H	1.6-30MHz	<b>53.40</b> (3.00)
FL2025	25W Linear	115.00 (3.00)	MK704 Squee			(2.50)		14:	
FL8020	6m 10W Linear	109.00 (3.00)	MK705 Sque MK706 Sque			(2.50)	_	— Miscellaneous	5 —
QTR24D	World Clock	39.00 (3.00)			30.46	(2.50)	SMCS 2U	2 Wey SO239 Switch	18.95 (2.50)
II			STARMAST		2000	7.77	SMCS 2N	2 way 'n' Skts Switch	23.50 (2.50)
	— Antennas —		Dewsbury	Electronic Keyer Unit (No Paddle) Electronic Memory Keyer (No Paddle)		(4.00)		2 way Switch 'n' Socket Deluxe	27.00 (2.50)
000170	70-700MHz RX Discone	24.95 (4.00)	Demandiy	The state of the s	90.00	(4.00)	T30 T100	30W Dummy Load 100W Dummy load	10.29 (2.50) 49.00 (3.00)
DSC770 D130	26-1300MHz HX Discone	75.00 (4.00)		Rotators -			T200	200W Dummy load	65.00 (3.00)
Jeybeam	TB3 MkIII 3e HF Tribender	348.45 (8.00)	G250	Light Duty	78.00	(4.00)	WAI	Wavemeter 120-450MHz	24.95 (2.00)
Creative	CD318 JR 4e HF Tribender	299.00 (8.00)	AR200XL	Light Duty	49.50	(4.00)	PK232	Packet/RTTY Terminal	299.95 (3.00)
Creative	CD318 4e HF Tribender	349.00 (8.00) 39.95 (3.00)	G400	Medium Duty		(5.00)	Datong D70 Datong FL2	Morse Tutor Audio Filter	83.40 (3.00) 100.91 (3.00)
CA2X4KC WX1	2/70cm Mobile 2m/70cm Base Fibre Glass	54.99 (5.00)	G400RC G500RC	Medium Duty (Round Face) Medium/Heavy Duty		(5.00)	Datong FL3	Audio Filter/Autonotch	145.51 (3.00)
WX2	2/70cm Base Fibre Glass	75.50 (8.00)	G200RC	Heavy Duty		(5.00)	Datong ASP	Processor 4pin	93.15 (3.00)
CF416Max	/70cm Duplexer	25.50 (3.50)	G500	Elevating Rotator	149.00	(5.00)	Datong ASP	Processor 8pin	93.15 (3.00)
CA2X4Max	2:n/70cm Base Fibre Glass	99.95 (5.00)	GR5400	Azimuth/Elevating		(5.00)		Active Antenna	77.62 (3.00)
TDHP	10/80m trapped dipole	49.00 (6.50)	TS950S	NEW HF Transceiver	P.O.A.	()	Datong PCI	General Coverage Converter	154.90 (3.00)
BARCLAYCARD	Instant credit available.  Mail/Telephone order by cheque of	Access	0	PEN TUESSAT, 9.00-5.30	61	TOCK ITEMS	HEHALLY	DELIVERY/INSURAN	ICE PRICES
VISA	credit card. Cheques cleared befor			(CLOSED MONDAYS)			THIN 48 HRS	IN BRACKE	
	goods despatched.			LUNCH 1-2pm	520			(E&OE)	

Published by

# GEORGE

LTD.

Vol. 1-No. 1

SEPTEMBER 24th, 1932

THE VERY LATEST FOR THE HOME CONSTRUCTOR

THE MAN BEHIND IT ALL -F.J. CAMM

**BUILD THE PW MILLENIUM** REPLICA VALVE RECEIVER AND

THE PW EMPIRE VALVE TRANSMITTER - RECEIVER

PLUS

**NOSTALGIC ARTICLES...** 

**WE'VE BEEN TOGETHER NOW FOR 55 YEARS** 

**PRACTICAL WIRELESS** 1932 - 1990

**READERS' MEMORIES** 

THREE

16 EXTRA PAGES OF GREAT FEATURES



# THE MAN BEHIND IT ALL... F.J. CAMM

Everyone in the radio hobby is familiar with the name behind 'Camm's Comics' - but few know anything of the man himself says Joan Ham.

Ask anyone familiar with technical publications about F.J. Camm and the response is immediate. 'Oh yes! Camm's Comics'. Ask who he was, or what is actually known about him, and it is unlikely that there will be any further information, not even his first names. F.J. Camm is the man everyone knows about, until further details are wanted.

Frederick James Camm was born on 6 October 1895, the second son of Frederick William Camm and his wife Mary (nee Smith) at 10 Alma Road, Windsor. His father was a carpenter and joiner, and over the next 20 years ten more children were born, increasing the family in the house in Alma Road to 14 including parents. One of the youngest sisters lives there still, and in 1986 entertained the mayor, the local Press and others when a blue plaque was unveiled - not to F.J., but to his older brother Sidney. It was Sidney - later Sir Sidney - who designed the famous Hurricane and Harrier aircraft, but Frederick also left us a legacy which lives today in the form of Practical Wireless.



PRACTICAL WIRELESS 1932-1990

#### The Practical Wireless Story

Practical Wireless, now proudly notching up its 1 000th issue, first appeared in 1932. Number 1, Volume 1, was published on September 24th by George Newnes, priced 3d and consisted of 68 pages. Its cover, printed in red and blue, advertised 'the very latest for the home constructor' with a chassis picture of the Long-Range Express Three and a listener tuning the set in its elegant churchwindow shaped cabinet

The chassis of the Long Range Three was itself an innovation, departing from the usual 'breadboard' construction and giving a professional finish with all the untidy wiring and components tucked away out of sight underneath.

#### Free Blue-Print

The cover headline offered a free blue print for this set and the foot of the page advertised Pilot Author Kits. There was another free offer of a presentation volume of Newnes Wireless Constructors' Encyclopaedia valued at 8/6d. To obtain this, the reader turned to page 56, where there were two forms, one an order to the newsagent ordering the magazine weekly until further notice, and the other to be sent to PW for a subscription voucher. This had to carry 13 gift stamps cut from the back cover of 13 consecutive PWs, plus a postal order for 2/4d to cover "registration, postage, packing and insurance" to receive the encyclopaedia. (After which, no doubt, the reader was hooked on the new PW). Another free book, All About Tuning and Tuning Coils, was promised the following week. Over 60 000 readers took up the offer, and its popularity caused it to be reprinted by the News Chronicle ..

In the field of radio alone, there was hardly an aspect which didn't have a useful handbook written for it by F.J. Circuits, short-wave, superhet receivers, coils chokes and transformers, wireless transmission, television and others were all catered for. In particular his wireless encyclopaedias were characterised by simple easily-understood explanations of every relevant theory and stage of construction, the components, design and methods of work were printed in a large legible typeface

right across the page and illustrated by superb, clear line drawings, which were so well executed that it was possible in black and white to see whether an object was made of metal, wood, glass or Bakelite.

In the layout of pages, the books were extremely readable and aesthetically pleasing, making use of 'flow-round' text broken up with framed pages, assembling story-boards on specific topics. In addition to the weekly group of magazines, F.J. was producing a steady stream of hardbacks, all carrying his individual stamp.

#### **Popular Format**

The same popular format used in the encyclopaedias undoubtedly gave rise to the collective title of Camm's Comics. The term is not derogatory, but describes very accurately, the visually-appealing layout techniques which he truly pioneered. These methods produced technical journals that could easily be understood by the non-expert.

Sets reviewed and described in this first issue were the Lissen Skyscraper, (a kit set), The Dolphin Straight Three, reviewed by F.J. Camm himself and described as a splendid economy receiver, cheaply constructed and extremely selective, The Long-range Express Three and The Lotus Bud beginning a weekly feature of sets "tested on our aerial".

#### **Editorial Staff**

The technical staff consisted of H.J. Barton-Chapple, Frank Preston, W.B. Richardson and W.J. Delaney, who was the sub-editor for many years. Their editorial offices were equipped with a laboratory in which components and sets could be tested and appraised.

A page headed My Favourite Circuit was compiled from the editorial staff contributions. Frank Preston as an experimenter and designer opted for a "well-known det. 2 L.F. type of circuit", W.J. Delaney wrote of his home receiver, which as a musician must have adequate volume and above-reproach quality, and was a three-stage S.G., detector and output stage circuit. (William Delaney's son is the drummer and bandleader Eric Delaney).



A similar circuit was chosen by W.B. Richardson using a pentode in the last stage basing his choice on consideration of local conditions and value for money; H.J. Barton-Chapple having designed a great many sets found the choice of a favourite difficult, but described a four-valve circuit which was simple to operate and could be used by "any member of the family".

F.J. Camm pointed out that you could not have everything, an improvement to one part of the circuit led to complications in another, but in the spirit of the question opted for a detector with leaky grid rectification followed by two l.f. amplification stages on the basis that it was an all round simple circuit, easy to construct and operate for non-technical amateurs.

That was how readers of the first PW were introduced to its experts and their attitudes and approach to wireless. By November of that year, published an eight-page photogravure supplement by Barton-Chapple featuring 'The Argus Three'. It could be purchased as a kit from Direct Radio for £8.13.0d complete with three valves and cabinet, or for £5.2.6d without.

The style, the policies and the standards were

Members of the Windsor Model Aeroplane Club with part of a wing under construction. F.J. Camm on the right.

set, and PW and its editor rapidly made it clear that

they existed to give readers a real service. It was

no idle boast. January 1933 began with

Members of the Windsor Model Aero Construction. F.J. Camm on the right.

Frank Preston introducing the

Selectone battery receiver and by the end of the

#### Standards Set

same month,

F.I. Camm's specially designed four-valve Fury Four receiver was available to readers. It was cheap, easy to build and simple to operate. Moreover, F.J. published a signed personal guarantee that if these claims were not met, every reader could have his personal advice free of charge until the set worked satisfactorily.

#### **Pocket Tools**

Practical Wireless celebrated its first birthday by having a pocket tool box, the size of a cigarette case, made and fitted with beautifully made tools. It was offered free to every reader, and we are pleased that we have one of these in the Chalk Pits Museum.

#### Amalgamation

By 1934, one of the competing wireless journals was showing the strain. It was Amateur Wireless published by Cassell and Company, a magazine which had grown out of Everyday Science - edited by F.J. Camm. The answer was amalgamation, and Practical Wireless became Practical and Amateur Wireless still for the same cover price of 3d. By the following year PW incorporated Practical Television.

In 1938, the last of PWs competitors ceased publication, and in that same year the last of F.J's prewar designs was published; with the descriptive title of the Push-Button Four. The October 29th issue carried the designer's photograph on the front cover, with a picture of the set out of its cabinet; the constructional details were completed from the previous week, with three good photographic views of the chassis. It was the end of the happy pre-war PW with its free offers, new wireless designs and kits, eager reports of the latest in the world of wireless, television, amateur activities and everything associated with

#### The Second World War and the 1940s

The war began to bite very quickly. Before it was a few months old, Britain felt the shortages of everything that had to run the gauntlet of the U-boats; PW in common with other publications was chronically short of paper, and was slimmed to half of its pages.

In 1941 things were even worse and F.J. was battling against overwhelming difficulties. The magazine appeared monthly instead of weekly, and cost 6d. There was a Limitation of Supplies Act in force and the call-up of men into the forces left the service industries severely reduced, so there were problems about maintaining domestic receivers.

> The editorials of the war years were concerned largely with war news. A constructional article featured a single valve medium wave set on a bread-board with front panel - the metal chassis was a thing of the past, but the set was adequate to keep people informed and entertained, even though it was stripped to its basics.

Members of the Windsor Model Aeroplane Club outside their workshop in 1912-13 job. Wartime issues carried 'Active Service Lists' of radio engineers and allied skills in the forces, adverts for wireless enthusiasts to join the RAF for interesting jobs, and one intriguing advert for women with physics skills or degrees to join the WAAFS for 'confidential' work. The advertisement said that applicants had to " be prepared to go anywhere, home or abroad".

#### **Staff Shortages**

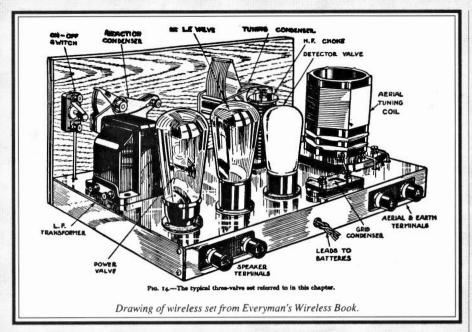
There were other signs of war. PW was not untouched by staff shortages, and the names of H.J. Barton-Chapple, and W.J. Delaney disappeared from the 'staff' names printed on the magazine 'masthead' along with that of the the editor. At that time, F.J. was producing his magazine with the help of Frank Preston and L.O. Sparks. Could this have been a pseudonym for whoever was available? Eventually, even these names were no longer printed as staff.

1944 saw PW in its 12th year of issue, but it had little to celebrate other than its continuity against the odds. The 44 page monthly magazine was reduced in format from 8.5in x 11.5in to 6.5in x 9in, and the price increased to 9d.

#### Post-War Problems

The immediate post-war years saw the restoration of the television service but brought little extra comfort. The shortages were just as severe, sometimes worse as a tired and impoverished Britain faced the task of rebuilding, re-establishing 'demobbed' service personnel, turning war industries back to peacetime manufacturing and repaying crippling war debts.

Some interesting articles published in those years included reports on German wartime equipment such as the JU88 wireless operator's gear, featuring the FUG, LOP, EZ6 (long wave), a short wave set, d.f. and remote controlled u.h.f. receiver. Other articles concerned the grinding of quartz crystals, looking forward to the return of transmitting licences, and mouthwatering adverts of such ex-



government equipment as a brand-new T1154 transmitter for 10 guineas, Air Ministry voltmeters at 19/11d and ammeters at 17/6d.

Another interesting development of the day was a tiny transmitter/receiver almost the size of a cigarette case, 'developed from secret service sets' and produced by Teleradios.

1947 dawned with Britain still in the grip of post-war shortages and problems. New designs, although F.J. assured readers that he had some on the stocks, were still not published and the PW query service had to be suspended because of staff shortages, but radio clubs were reviving and their reports were invited for publication. In reply G5BY was reported to be the first to hear W1HDQ on 50MHz across the Atlantic during an F2 event.

August 1947 brought a most eagerly-awaited announcement of the first post-war Radiolympia. The *Practical Wireless* stand was on the ground floor, where readers could see a full range of the famous blueprints and technical books.

The November issue carried full show reports, but Britain's first radio show, only two years after the war, was all "jam tomorrow" and F.J. reported that it consisted of "1939 designs in new dressings".

The most noticeable feature about the slim postwar PWs is their lack of photographs. There were usually one or two in the World of Wireless round-up which followed the editorial, but the rest of the magazine was illustrated with line drawings.

The late 1940s continued to be years of restrictions, shortages, difficulties and austerity. One 1947 editorial reported rumours that the wireless licence was about to go up from £1 to £1.10s.0d, or to £2.10s.0d if it included TV.

The Purchase Tax on radio and television receivers was raised from 33% to 66% in an effort to divert sets from the home market to much-needed export. This was accompanied by outcries from the manufacturers and PWs editorial.

#### **Government Surplus**

The main source of equipment for home constructors and radio trade alike was the government surplus market. Articles appeared on using war surplus gear, and famous sets like the ex-RAF TR9, the R1155, WS18 and others, were converted to uses for which they had not been designed. Adverts offered an ex-RAF TR9 for £6, or a B2 (suitcase 'Spy' set) new and unused for £9 plus 5/- carriage. An

American SCR625 mine detector was offered complete for £10.10s.0d for "treasure hunting, pipe tracing, detecting metal in trees before sawing into them", etc.

Things began to look up a little. More photographs appeared in PW, and by July 1948 there was an increased allocation of paper, allowing more magazines to be printed. Practical Television reappeared on the cover, with a separate section inside, and as the 16th Radiolympia approached, television was making up a large part of the interest.

Stand 100 at Radiolympia was advertised in the October 1949 issue, where readers could see the full range of technical books on wireless, television, engineering, mathematics and kindred subjects, meet the editorial staff and F.J. Camm himself.

#### **PW** Television Design

Signs of a return to the pre-war traditions of PW took the shape of a new design for a Practical Wireless Television Receiver demonstrated at Olympia. It used ex-government EF50 valves, and was featured over several issues.

By April, there was no mention of Practical Television on the cover of PW. Inside the magazine, a notice announced the launch of the title as a companion journal. Television had become too big for a few pages in a wireless magazine, and there was a need which F.J. was not slow to recognise.

Issue No.1 of the new journal was published on March 24th, the first new title to appear and only 24 days after the end of paper rationing. Television was the absorbing interest of the early 50s - the Sutton Coldfield transmitter had opened and television-in-a-car was demonstrated at the Motor and Radio Shows when HMV installed a set in a Standard Vanguard car.

The 1950 Show at Castle Bromwich, Birmingham proved the enormous success of the PW Televisor. Although the BBC predicted that only 4000 people would be interested, PW proved that 'nearer 50000 were building and experimenting with TV. F.J. suggested in an editorial that the BBC should cater for these enthusiasts with a dedicated programme once a week, putting out experimental transmissions as 2MT (Writtle) had done in the early days of wireless and invite their reception reports. He pointed out that they would have the services of thousands of observers absolutely free.

Early in 1952, PW offered the first free blueprint since 1939. It was for the Mini Four battery portable, a neat little set measuring 6.5in x 5in x 3.5in and its great popularity was assured because Britain was once again plunged into austerity and power cuts.

A noticeable omission from the pages of PW since the war had been F.J. Camm. His name appeared as editor, and the editorials carried his initials, but no designs or articles had his by-line. But even if F.J. was not putting his name to articles during those years, his books came from the presses of George Newnes in a steady stream. The New PW Encyclopaedia (12th Edn.) was published at 1 Guinea and over 300 000 copies were sold; Television Principles and Practice at 25/-; Practical Motorist's Encyclopaedia at 17/6 (8th Edn); Wireless Transmission 6/- and many others

It's virtually impossible to separate this review of PW from F.J's working life and his other activities for he was by now also editing the Practical group of magazines, a mixture of weeklies and monthlies. Practical Engineering was offering a free pocket book every week for eight weeks, and the Mini Four Portable design had produced enormous demand, so much so that the issue with the free blueprint sold out on



publication day in spite of an increased print run. The blueprint and constructional details were reprinted and sold at 1/- to meet demand.

#### Practical Wireless Comes of Age

The arrival of 1953 was a milestone for Britain and PW. The year was a morale-boosting anticipation of the coronation of H.M. Queen Elizabeth II. Television sales boomed and true to tradition, a special new PW receiver was promised. The magazine reported and reviewed transistors, valveless radio and TV. Printed circuits and transformer windings produced like sheets of stamps featured in the magazine. F.J. predicted in an editorial, "In a few years it seems, transistors will oust the valve as we know it today.'

F.J. Camm made a rare reappearance as a journalist with a new series of articles, Beginners' Guide to Radio. It was a return to the early days, with his ultra-simple explanations, wonderfully clear drawings and easy projects.

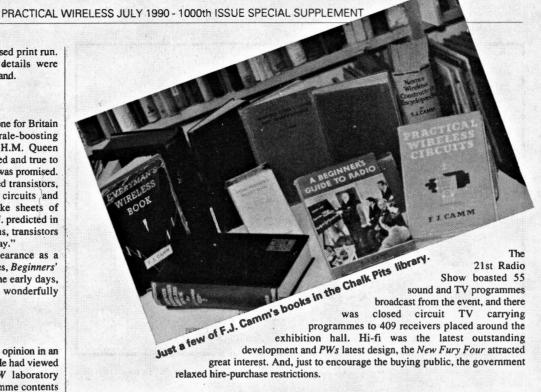
**Camm's Comment** 

The next time that F.J. voiced his opinion in an editorial, was after the Coronation. He had viewed the outside broadcasts in the PW laboratory looking, he said, not for the programme contents but for technical failures. Honest with praise as with brickbats, he declared that there were none. The day was the finest BBC achievement of the time. It was estimated that there were 3 000 000 TV licences but this bore no reflection on the actual number of people who watched the unique event. Television parties for those who had no set probably meant an average of six viewers per

Hardly had the excitement died away, than PW itself was plunged into its own great celebrations. October saw the publication of the 96 page 21st birthday number and it was time to review the past and look forward to the future. There was a fullsize blueprint of F.J.Camm's Coronet A.C. Four, free with every issue.

Manufacturers sent good wishes, some of whom had advertised since the early days. Sir Ian Jacob, Director-General of the BBC, sent his greetings, and F.J. wrote of the 21 years of PW progress; of his own 21 years as editor, praising his loyal staff and the support and encouragement which he had always received from his publishers George Newnes.

All the famous PW guaranteed receivers were listed year by year, and W.J.Delaney introduced a new six-octave electronic organ. There was no time to bask in past glories.



#### The Practical Wireless Film Show

The popular annual film shows began when F.J. saw the Mullard film made for the trade on the manufacture of valves. The film was so interesting that he persuaded Mullard to put on an evening show for readers and radio amateurs at Caxton Hall. F.J. was in the chair, with a director of Mullard introducing the film. The hall was packed to capacity, but even people who turned up without tickets were found standing room!

A spokesman from RCA stated that sunspots improved communications; Project Vanguard, the USA contribution to the International Geophysical Year sought satellite observations from amateurs worldwide. Russia astounded the world with the launch of the first artificial earth satellite. As ever, F. J. realised the potential."The advantages which must follow from the launching of this satellite must benefit radio science", read the editorial.

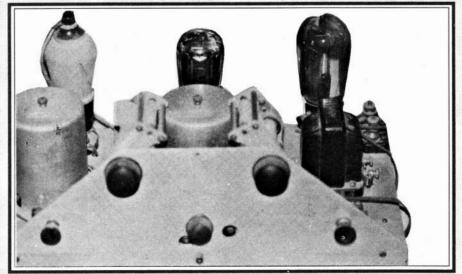
#### Working to the End

F.J. Camm loved his work and followed every new development with lively enthusiasm; he had kept faith with the promise made in the first PW to inform readers of the latest in scientific advances; he held strong opinions and believed in stating them in plain language.

He seemed to live in his office and was often to be found there on a Saturday, when the rest of George Newnes was closed and it was nothing unusual for him to still be working on Sunday. One weekend early in 1959, he was taken ill in his office.

The May issue of PW missed his name from the cover of the magazine for the first time in 27 years, and a small box in the centre of the editorial page carried the announcement of his death and a tribute to his 27 years as editor.

Practical Wireless under his editorship had reached volume 35, No 629, which even WWII could not interrupt. As was said of Sir Christopher Wren and St Paul's - "If you seek his monument, look around you," F.J. Camm's monument rests on many bookshelves and reference libraries,. His life was lived through the printed word and it lives on in PW as we know it today.



Typical three-valve kit of the time in Chalk Pits Museum.

#### Trends and Transistors

The magazine forged ahead into the 'trendy' 1960s. A new series of free blueprints were offered and avidly collected by readers. Constructors were offered many choices of kits and ready-made receivers. Particularly popular in the early 60s were the small portables but advertisements for onevalve receivers and kits still showed there was a lot of interest in proven technology.

The growth of interest in electronics as a hobby led to the need for yet another magazine to fill the gap. Practical Electronics appeared, as yet another off-shoot of PW and a new era was born. The new title, although it had some overlap in coverage, concentrated on electronic rather radio applications and many readers ended up buying both magazines!

In the late 1960s and early 1970s PW, in the forefront of innovation as F. J. would have wished, had several 'firsts' to its credit. Among them was the PW 'Treasure Tracer' metal detector. Many hundreds were built and the project became another favourite.

In 1980, the new decade began with a firm

policy decision to concentrate on amateur radio and communications for the enthusiast. By this time the flood of war and government surplus had dropped to a trickle and specialist, high quality imports from the Far East had really begun to make their mark. Unusual Oriental names, virtually unknown before the late 70s, became amateur household words.

The impact of semiconductors, microprocessors and latterly, large-scale-integration made miniaturisation a reality from British and foreign manufacturers alike. Not to be outdone PW offered state-of-the art projects such as the PW Nimbus modular 144MHz transceiver design and the PW

THE LONG RANCE EXPRESS II

GIVEN FREE WITH

NEL OF "PRACTICAL WIRELESS"

Addition in the Bull Section for Desire

Sherborne synthesised a.m.-f.m. tuner.

Throughout the 1980s PW continued to offer new designs, projects and ideas. Amateur radio satellites, computerised RTTY and Television topics were all featured by the magazine. The astounding growth in popularity in the latest digital communications mode - packet radio - soon earned its own regular page within PWs covers.

A milestone in the history of the magazine was reached in 1987 when it became a separate, independent company operating from the Poole Quay offices on 1 February 1986. The long established Short Wave Magazine joined forces with the new PW Publishing Company Ltd on 1 January 1987. Short Wave Magazine then became a specialised journal catering for the different needs of the dedicated listener. Editorially, both magazines now aim to complement rather than compete.

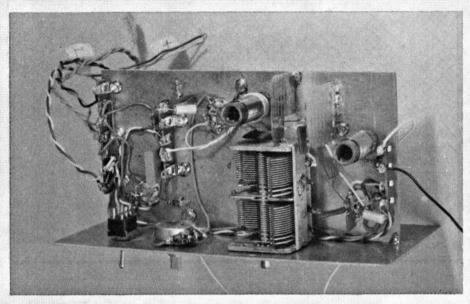
PW entered the 90s - its 6th decade - with a new look, new paper, a strong new editorial team and a positive approach. F.J. may not be in the office at Poole, but his influence and approach lives on!

PW Blueprint given with the first issue and a selection of contemporary components from the Chalk Pits Museum.





# VALVE RECEIVER PROJECT



To Celebrate PWs 1000th issue, Peter Buchan G3INR has recreated a receiver design typical of the 1930s which uses easily obtained valves and easy-to-build techniques

My first thoughts on the Millenium project centred on a mains-powered receiver. But when I considered those of you who don't have a suitable power supply, I decided to use the easily obtained 1T4 B7G base miniature pentode. These useful little valves only cost a £1 or so from various sources.

Another advantage to these valves is that they are very economical in use. If you haven't built (and I recommend that you do!) the 'Power Supply for Battery Radio' unit designed and built by Stefan Niewiadomski (May 1990 PW) you can

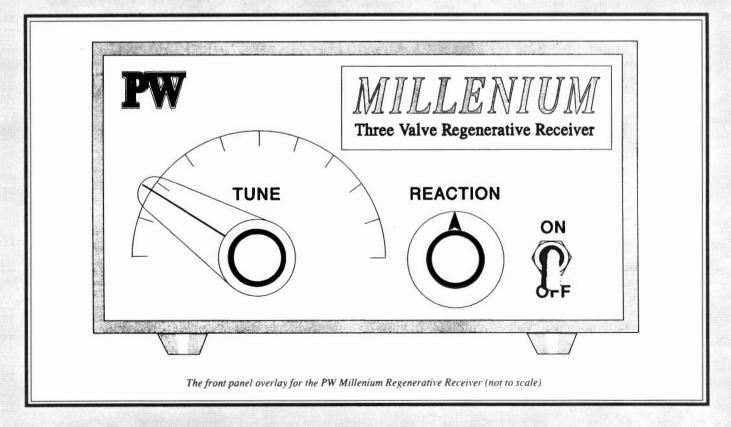
even run this little receiver from a battery power supply.

I haven't seen the old-fashioned h.t. and l.t. batteries for years but you can easily make up your own by series connecting 6 or 7 of the PP3 type. If you can afford to buy as many, the best number is of course 10 as this makes the required 90V supply. However, amateur radio requires innovation and I experimented and found that if I kept the filament voltage at 1.5V (the designed filament voltage) the receiver would still work on an h.t. as low as 27V. This voltage can be provided

by 3 of the 9V type PP3s in series.

In fact, with only 3 h.t. batteries needed, you could buy the heavy-duty alkaline type which would provide a longer life.

The PW Millenium was built using an unusual technique, but I've no doubt that other constructors have also used the idea themselves. As aluminium chassis and the necessary facilities to work the material (plus the valuable experience) may not be available, I built the chassis and front panel from copper laminate p.c.b. material.



This has many advantages, not the least being minimum effort! You can solder the valve-holder lugs to the copper laminate and erect screens by the same method. You can also solder direct to the earth-plane.

The circuit of the Millenium is very straightforward and it is based on the old favourite. the t.r.f, receiver. The tuned-radio-frequency stage amplifier, V1, has the antenna transformercoupled to it. I recommend using a variable capacitor to tune the r.f. stage, but you could pretune it with a trimmer.

The l.f. choke in the anode circuit of V2 can be any small audio-frequency choke or the mains primary (secondary not used) of a very small 240 to 6 volt transformer. The audio output transformer in the anode circuit of V3 - which is connected as a triode - can either be from an old 'all-dry' receiver or another 240 to 6 volt p.s.u. transformer. The output to the headphones is then taken from the secondary winding (what would have been the low voltage output from the

You can also economise by making the r.f. chokes if they're not in your 'junk' box. They can be made by winding 100 turns of 28 s.w.g. enamelled wire onto the body of a 220kΩ 1W

#### Shopping list

How much? £20 How difficult? Intermediate

#### Resistors

5% 0.4W Carbon film  $33k\Omega$ R2 220kΩ  $1.5M\Omega$ R<sub>1</sub>  $4.7M\Omega$ R5 Potentiometer (panel mounting)  $50k\Omega$ R4

#### Capacitors

Ceramic 47pF 100pF C3, C4 10nF 22nF

#### **Variable Capacitor**

Recommended 100pF with built-in

#### Inductors

See table 1 and text.

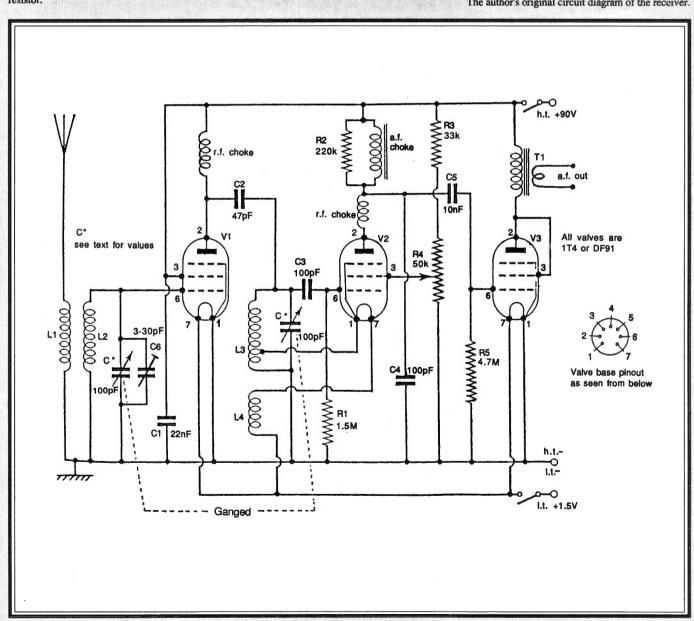
#### Miscellaneous

3 B7G valve holders (J. Birkett Lincoln) 3 type 1T4 valves (Birkett of Lincoln and Colomor Electronics of London), Coil former material (plastics preferred), audio-output transformer (Maplin YN12N suitable, see text) audio choke (Maplin YN12N suitable, see text) p.c.b. material for chassis, switches, headphones, connecting wire.

J. Birkett, 25 The Strait, Lincoln, LN2 1JF Colomor (Electronics) Ltd 170 Goldhawk Road, London, W12 8HJ.

Maplin Electronics, PO Box 3 Rayleigh, Essex, SS6 8LR.

The author's original circuit diagram of the receiver.



#### Table 1

Coils wound with 28 s.w.g. enamelled wire.

turns. L4 = 3.5 turns. trns L4 = 3 turns.
irns $L4 = 3 \text{ turns}.$
ırn

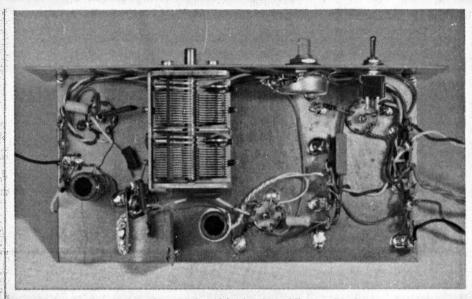
Screening between stages is easily arranged by soldering small (scrap pieces will do) pieces of p.c.b. to the earth plane. You can even use the 'tinplate' from dismantled soft-drink cans for screens as only the tops are usually aluminium -but watch your fingers on sharp edges!

I fixed the r.f. coils to the 'chassis' by use of a 'hot melt' glue gun. This has proved to be very practical in use and I also found that the coil winding could be anchored by the same method.

The r.f. amplifier stage is capacitor-coupled to the regenerative-detector stage as this system make the coil winding easier. Unusually, the feedback for the self-oscillating detector stage is fixed. Control of the 'feedback' (and hence the stage 'gain') is actually achieved by varying the screengrid voltage by the  $50k\Omega$  variable resistor.

This form of 'reaction' control is very smooth. In use I found I could easily resolve c.w. and s.s.b. The receiver has proved to be a delight to use in this respect. In use you carefully increase the gain until the detector is just oscillating ( for c.w. and s.s.b.). Mind you, you'll have to practice to resolve s.s.b.. It's a definite knack, but fun! Resolving a.m. is a very simple procedure. In this mode you adjust the 'reaction' so that the receiver is not quite oscillating. You'll really notice the cicrcuit gain as you adjust the control.

Details of the coils are provided in Table 1.



Internal view of the prototype Millenium.

The suggested coil winding are based on 25mm diameter formers, but you can adjust the windings to suit your own formers. I recommend using a 100pF variable capacitor if available, but you can use a smaller or larger capacity and adjust the

windings to suit. A grid-dip or gate dip oscillator will help in this respect.

Have fun, this little receiver will perhaps revive many memories for us 'Old 'uns' and introduce the 'youngsters' to a new delight.



# READERS' MEMORIES 1932-1990

As PW celebrates its 1000th issue some of our readers have taken the opportunity to send their congratulations and share their own memories.

...On this auspicious occasion of the 1000th edition of *Practical Wireless* it gives me very great pleasure to write and offer congratulations to the *Practical Wireless* team on behalf of the Radio Society of great Britain.

In common with many other radio enthusiasts, I nurtured my budding interest in radio through reading the pages of *Practical Wireless* each month. This initial interest evolved into keen enthusiasm and the eventual obtaining of an Amateur Transmitting Licence together with satisfying participation in the activities of the Radio Society of Great Britain.

I believe that *Practical Wireless* continues to hold an important place in both the development of interest in radio and electronics as a hobby and also towards their practice in a rewarding career.

Congratulations *Practical Wireless* from the Radio Society of Great Britain. May your success continue and the magazine grow from strength to strength!

Frank Hall GM8BZX President RSGB



...1000th Edition of

On behalf of all those involved in producing Radio Communication, may I offer hearty congratulations to you on reaching your 1000th edition. In these changing times, it is common for technical publications to last only a year or two. It is therefore quite remarkable that Practical Wireless has been so durable.

Many of us here at RSGB HQ learnt the basics of radio from reading PW. In my own case, I owe a great debt to the writings of the late F.G. Rayer G3OGR in the 1960s.

May I wish you every success as you embark on the second thousand!

Mike Dennison G3XDV
on behalf of all RadCom staff.



...Reference PW 1000th

I have taken Practical Wireless since 1936 when I left school. The first receiver I built was a crystal set, my first transmitter was a one valve effort employing a 240B which I've kept!

As I was a keen F. J. Camm addict I purchased most of his hardback books, *Practical Mechanics* and *Practical Television*.

I've kept a few copies, including the 21st Birthday issue from October 1953, but when I moved from London I had to dispose of many, with many regrets. Maybe it is nostalgia but I liked the 30s and 40s issues best.

Keep up the good work, yours as

R. L. Hoare G3XQW
Saint Austell
Cornwall



...We've noticed that you are due to publish the 1000th issue of *PW* very soon and on behalf of the committee of BARTG, I would like to congratulate all involved with the magazine for reaching this milestone.

I would especially like to congratulate those who have been responsible for re-designing PW into its current format as it is now a very rewarding magazine to read. I personally, as Publicity Officer of BARTG, also appreciate the many 'mentions' that you have given to BARTG in the pages of PW and Short Wave Magazine.

Very well done to all concerned and here's to the next 1000 issues. Thank you for an excellent magazine.

Ian R. Brothwell G4EAN

Secretary and Publicity Officer BARTG



...Although the first issue of Practical Wireless appeared on the bookstalls in September 1932, numerous other magazines, both weekly and monthly, and devoted to the needs of wireless enthusiasts, were published during the preceding years.

It was through theses that my initiation into wireless both professionally and as an amateur, was well and truly established. There was Popular Wireless, Modern Wireless, Wireless World, Wireless Magazine, Amateur Wireless, etc., all of which vied with each other to include 'the best build your own receiver design', free blueprints, free circuit booklets and a multiplicity of special features.

Copies of those early magazines, all but one no longer published, provide fascinating reading. One for instance, carried an article title 'Aren't The Programmes Appalling' which ended with a suggestion that, "If the listener is dissatisfied with the programmes of the day the BBC should reimburse him or her, with that day's value of the 10 shillings (50 pence) per year licence fee, namely one and a quarter farthings (there were four Farthings to the old penny!). This is an idea that might be applied to current TV programmes!

The constructional features were of course the most sought after content of any of the magazines, like the very ambitious 4 valve (two neutralised hf amplifiers plus detector and l.f. amplifier) receiver. I built at the age of 16. Yes, that's it (and me) in the photograph, but look closely at the copy of of *Popular Wireless* priced at 3d (1.5 pence). The magazine advertises the current 'Radio Exhibition' at Olympia on the front cover. (It was also known as 'Radiolympia').

Many names, still remembered today, were the well known 'bylines' above the regular features in many of those early magazines. Captain ("Please don't do it") P.P. Ekersley, Sir Oliver Lodge, G.V. Dowding, J.H. Reyner and later H.J. Barton-Chapple (*Practical Wireless*) to mention only a few professionals who were willing to impart their knowledge to the amateurs.

Older readers will be amused to see the famous quotes "Please don't do it" alongside Capt. Ekersley's name but I'd better explain it for the 'youngsters! The plaintive request recalls the use of regenerative detectors and the interference they could cause. The problem of badly adjusted regenerative detectors (in effect becoming low power transmitters) radiating from the long aerials of the day, spoilt reception for many people. Hence the cry from the BBC's Chief Engineer (Capt. Ekersley) "Please don't do it"!

Finally, and well remembered to me personally because I had the honour of working with each at different periods during the war on coastal radar, are J. Scott-Taggart, so well known for the 'ST' series of receivers in Popular Wireless, Austin Forsyth G6FO, the founding editor of Short Wave Magazine, M. G. Scroggie G5JX, author of the Foundations of Wireless of which 250 000 copies were sold before his later revised edition was published. Scroggie also wrote regularly for Wireless World, including the monthly comment feature Unbiased by Free-Grid. Very few people ever knew who 'Free Grid' was.

And for a final final.

Congratulations to the present publishers and staff of *Practical Wireless* on its 1000th edition. It seems a long time ago since I set pen to paper to write my first article for it.

Best Wishes from Fred Judd G2BCX Cantley Norfolk.

16 year-old Fred Judd proudly poses with his 4 valve receiver.



...It's a pleasure to send my congratulations to *PW* on reaching its 1000th edition. It also provides me with the opportunity of recalling some cherished moments from my long association with the hobby of amateur radio.

In the early post-war years I took RadCom (then T&R Bulletin), Short Wave Magazine and Wireless World. The last mentioned became too technical for me but I continued with Short Wave Magazine for many years.

I recall that the late Clarricoats (then General Secretary of the Society) did not see 'eye to eye' with Austin Forsyth the editor of Short Wave Magazine. so it was a pleasant surprise when Austin G6FO, bought me, then a Regional Representative of the RSGB, a cup of tea at a Manchester convention!

Clarricoats' book World at their Fingertips tells me that in 1937.

Austin Forsysth was "the RSGB representative for South Wales and

Monmouthshire". It also records that the RSGB and Short Wave Magazine organised the first post-war Old Timers dinner in 1949. Any disagreement there may have been must have come later!

Now that I receive PW on a regular basis, your 1000th issue prompts me to tell you that I once sat at a luncheon table with the famous F. J. Camm. In those days, as I'm sure you'll know, radio amateurs affectionately referred to PW as Camm's Comic! The great man remained completely silent throughout the lunch which he left somewhat early.

I remember marvelling how such a quiet man could be editor of the huge number of magazines that were circulating under his name at the time.

With my best wishes for the next 1000 editions!

Basil O'Brien G2AMV Heswall Merseyside

Honorary Vice President RSGB



Please add my appreciation to your ever-growing list of favourable comments on *PWs* new format. I have 68 turns on the tank coil and I find the presentation very much easier to read.

My first meeting with PW goes back to early 1939 when I was a teenager just feeling my way as an s.w.l. I am almost certain that F. J. Camm printed the enclosed photograph under the caption 'A corner of Mr. W. G. Andrew's shack'. in October 1939.

I support some of your readers who ask for a little thermionic valve nostalgia. It is over 22 years since I taught valve theory. If you can tolerate their physical size and attendant power supplies, they are certainly immune to the effects of ill treatment and e.m.p.

My best wishes to you all.

Wm. G. Andrews
G3DVW
Aigburth
Liverpool



...With reference to your remarks in 'Keylines' in March PW here is a reply from one reader who was not only an enthusiast before the war, but also wrote quite a regular supply of articles for Practical Wireless in those days.

F.J. Camm was not generous with by-lines and one would not know which articles were mine, although I did get my name on one in July 1954, by which time I was better known!

I enclose a copy of one of my published designs. I still have this particular receiver in working order!

I remember discussing with F.J. the popularity of the Scott-Taggart receivers which appeared in *Popular Wireless*. He seemed worried about them but need not have bothered, as of course, *Practical Wireless* soon had the field to itself after absorbing *Amateur Wireless*.

My interest in radio began with the BBC opening in 1922 when I was just a lad. We lived in the heights of North London and received a fine signal on a crystal set from 2LO whose aerial was six miles away on the roof of Selfridge's store.

In 1926 my father bought a new house at Harrow and had a friend make us a three-valve receiver (detector- two 1,f stages, plug-in coils and two Igranic transformers). The receiver had many adventures and was built and re-built and now stands on a shelf before me in working order - complete with large hom loudspeaker.

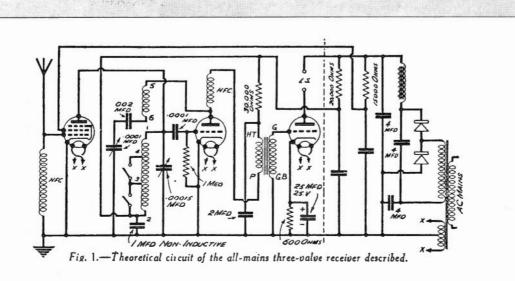
This particular receiver really began my serious interest in radio and I began writing for most of the radio papers at the time, including *Practical Wireless*. After the war I became the first British radio amateur to commence operating from Berlin. My collection of QSL cards must be worthy of museum status now! I have one from Douglas Byrne G3KPO, then living in Peterborough, but now living on the Isle of Wight and who often writes to 'Receiving You'.

I'm now embarking on a 1931 valve design to put some fun back into my short wave listening. I'm going to make it harder on myself with a need to bring the reaction up gently - just like the old days!

Sorry to be so long-winded but it's hard to condense a lifetime in radio into a short letter. All good wishes to PW in its modern form and with kindest regards,

Gilbert Davey Peterborough

Author of: Fun With Radio, Fun With Short Wave Radio, Fun With Electronics, Fun With Transistors, Fun With Hi-Fi, Fun With Silicon Chips, and contributor to Boy's Own Paper 1946-1967.



Gilbert Davey's circuit as published in Practical & Amateur Wireless, March 1935.

... Congratulations to PW on its 1000th issue. I understand that you would like to hear from some of us who knew the magazine in the early days.

I cannot remember which was the first issue of PW that I saw, as I was in a remote part of Central Africa at the time and did nor even hear of its birth! But I did take its predecessor Amateur Wireless during the 1920s while I was still at school. I built my first crystal set in 1924 and my first contribution to PW appeared in December 1943, but it was not accepted by F.J. Camm until I gave him an assurance that the circuit described was original. He said he thought he'd seen it somewhere else!

My article described a receiver designed for use in a country in which mains supplies were rare and batteries very expensive and hard to find. It was therefore necessary to obtain the maximum efficiency from the minimum possible current.

I used this highly sensitive and economical receiver as our normal domestic outfit until the end of 1958. Various modifications took place from time to time including later conversion to mains operation but the main circuit remain unaltered. It would still give a good showing as a broadcast band short wave receiver even today.

Best of luck to you all, Sir Douglas Hall Kingsbridge Devon.



PRACTICAL WIRELESS

December, 1943

#### Battery-operated "Communication 3-valver

An interesting Superhet Reflex Circuit Possessing Novel Features. By D. B. HALL, B.A.

An interesting Superhet Rellex Circuit Possess HE writer lives in Northern Rhodesia, and his hext door neighbours are 25 miles away. The occurrence of the control of the c

Presency Unanger
This is the critical part of the circuit, and the values shown should be adhered to. The valve used is a 1A7G r.4 volt type. A 2-volt heptode has been used successfully in this circuit with some modification to the colls, particularly the tapping point of the oscillator coil; this depends on the particular valve used and is best found by experiment.

this depends on the particular valve used and is best found by experiment.

An essential point is that the inductance capacity ratio of both tuned circuits must be kept high, otherwise it is impossible to get satisfactory oscillation in the oscillator section and satisfactory aerial reaction at the same time, and the exceptionally high gain of this stage depends on smooth reaction being available when

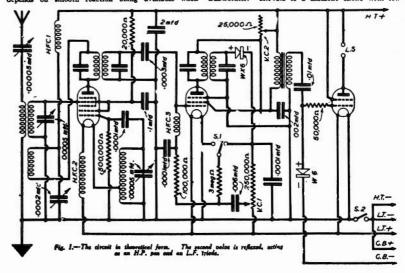
required. With 50 mmfd. tuning condensers it is possible to cover 13 to 52 metres with three separate pairs of coils, with convenient overlapping. If the coils are wound as shown the two condensers can be ganged, provided there is some external means of trimining the aerial circuit. This is necessary when reaction is being used. The best method is to gang the condensers in such a way that the fixed plates of the aerial tuner can be rocked through a few degrees by means of a separate control. This method of trimming avoids throwing any extra capacity across the circuit. If it cannot be arranged it is probably better to have the two controls quite separate.

The tapping point on the oscillator call the controls of the capital cannot be controls of the capital cannot be capacity.

extra capacity across the circuit. If it cannot be arriaged it is probably better to have the two controls quite separate.

The tapping point on the oscillator coil is really critical, especially in the case of the smallest coil. The position of the tap and only determines the oscillator voltage, but at the same time it has a big effect on acrial reaction. If the tapping is too near the grid end of the coil the oscillator voltage will be too high, and as a result of this the screen current will drop to such a low figure that reaction on the acrial circuit will not be possible. But if the tapping is too low there will be insufficient oscillator voltage for satisfactory conversion, aerial reaction will be fierce, and there will be inter-locking of the two tuned circuits. It should be noted that the screen of the valve is the oscillator's anode in this circuit. The real anode is joined to the screen and does little work. The circuit will function quite well with this electrode disconnected.

H.F.C.z. should be a small choke. It should be just large enough to prevent unwanted reaction effects via the B.T. battery, but not so large as to daup the 1.F. transformer. H.F.C.z is a filament choke with low





5- 10 mills

The precision and accuracy of the Avollinor specifity and efficiently track down faults in valves, resistances, barteries and power units, etc. Enables you to keep your set aiways in perfect working condition. Each model covers a wide field of measurement and provides testing facilities unrivalled by any other meters in their price class.

e class.

THE UNIVERSAL AVOMINOR
precision movine cold instrument for A.C. as testing the cold of the



#### BUILD A

#### **MOTOR-DRIVEN** LAWN MOWER

Here is a wonderful spare-time activityconverting your manual lawn-mower into The June PRACTICAL a motor - mower. MECHANICS gives full instructions for making a motor-mower at the surprisingly low cost of only six guineas!

Many other interesting features.

SEE THE JUNE

# PRACTICAL

House. W.C.2.

6

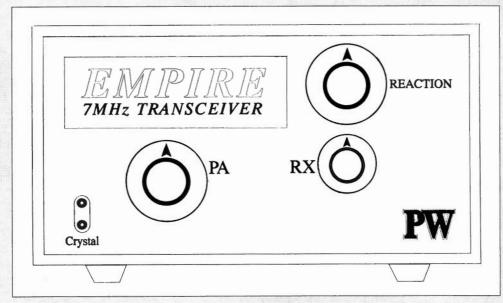


FLUXITE LTD. (Dept. W.P.), DRAGON BERMONDSEY ST., B.E.I.

SIMPLIFIES ALL SOLDERING

George Newnes, List.

# TO WEMPIRE TRANSCEIVER



This new 'old' transceiver has been specially developed for the 1000th issue. It uses 90V h.t. 1.5V heater valves and may be operated from the power supply described in the May 90 issue of PW

#### A 7MHz QRP Transceiver

In the realms of QRP work most modern designs feature semiconductor circuits. The PW Empire design has been designed to use valves. These may be new to many readers, but still can perform as well as, if not better than, the equivalent solid state counterpart.

#### Receiver Design

The type of receiver used is a regenerative one. In this type of set, controlled positive feedback is applied to increase the overall gain of the system. This control, ('Reaction'), has one advantage, in that by careful use it is possible to resolve both a.m. and s.s.b. transmissions. The more modern designation is 'a self-oscillating mixer with audio frequency i.f. output'.

The DF92 valve (V2) performs this task. The anode has a double load in that RFC2 forms the load at r.f. and the primary of T1 the load at audio frequencies. A portion of the r.f. signal developed at the anode is fed back to the grid via L4 and tuned circuit L3/ C9,10. This signal is mixed with the r.f. input signal from RFC1, the anode load of the pre-amplifier valve V1. As the stage gain of V2 is increased by advancing the reaction control R4 the stage will eventually start to oscillate. This causes any incoming signals to be synchronously detected. headphones should be high impedance types and ex-military ones have been found to be very sensitive. The type provided with many personal stereo systems may prove inadequate for this project. The tuning capacitors C2/C9 are a small triple gang air-spaced 15pF type (see shopping list) but a 20pF as available from suppliers should work as well.

#### **Transmitter Design**

There is little to be said about the transmitter side. Valve V1(DL93) acts as an oscillator with the frequency controlled by the crystal XL1 which is at 7.020MHz. This design seems to run slightly on the high side of the crystal. The power amplifier V4 is permanently connected to the output of the oscillator, and has the h.t. keyed in operation. Capacitor C19 tunes the anode of the p.a. valve. This will allow the set to be matched to most antenna systems in use. Best output, about 500mW, will be into a dipole of  $70\Omega$  impedance.

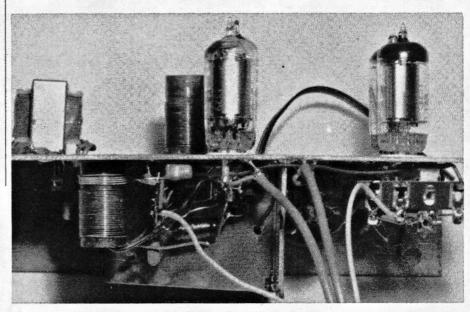
#### Construction

The 'chassis' was made from pieces of p.c.b. material cut and soldered together to form the main board. This is used throughout as an earth plane as all connections can be made at a convenient point.

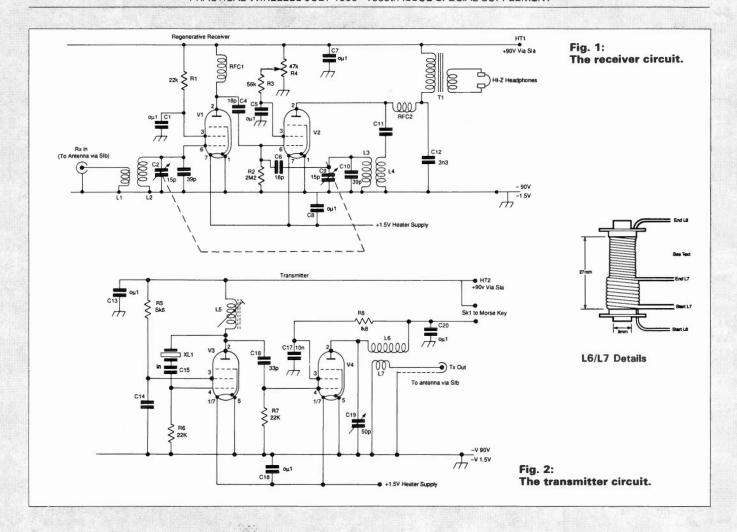
Following the circuit diagram, Figs. 1 and 2, and using the suggested layout as drawn in Fig. 4, construct the unit. The only stipulation is that the screening strips should be full chassis depth and preferably using double sided board. Certain lines pass through the screen between the receiver valve V1 and V2 and care should be taken to ensure that these are insulated as they may be at a high potential (+90V).

#### In Use

Most users of this type of equipment will



A new technique for valve equipment — using P.C.B. material for the 'chassis' construction.



need a few words on the use of this rig as they may not have come across the type before.

#### Receiving

Advance the reaction control until there is an increase in the level of noise from the headphones. Too far advanced and the set becomes 'dead' again. Rotate the receiver tuning control until whistles may be heard. Now slight adjustment of the reaction and tuning controls will allow the signal to be

tuned in at maximum volume. Morse and s.s.b. transmissions need the receiver just to be oscillating (more reaction), and a.m. will need a setting of not quite oscillating (less reaction).

#### **Transmitting**

WARNING POTENTIALLY LETHAL VOLTAGES ARE PRESENT IN THIS EQUIPMENT.

Take care at all times.

Insert the crystal to be used, and set the

switch S1 to 'NET'. Both the oscillator and the receiver are operating but the antenna is disconnected. Tune the receiver to the strong heterodyne of the oscillator. Reduce the setting of the reaction control to ensure accurate setting at this stage.

Turn S1 to transmit. Place a meter set to measure 50mA in parallel with the Morse key and tune the p.a. for minimum current drawn (this should be in the region of 20-30mA). Take the meter out of circuit and use the Morse key as normal. Return S1 to receive at the end of transmission.

The receiver as shown is capable of tuning between 6.8 and 7.5MHz. The tuning capacitor is a triple gang 15pF, covering this range with 1.5 turns on its slow-motion drive spindle.

Shopping list and further drawings on next page.

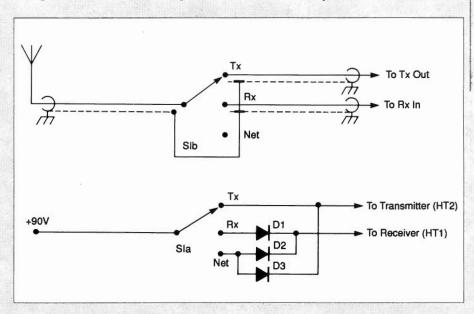


Fig. 3: The Empire transmit-receive switching circuitry.

#### Shopping List

#### How much? £30.00

#### **How difficult? Intermediate**

Rotary Potentiometer 47 kΩ 1 R4

Capacitors

Silver Mica 5% tolerance 18pF 2 C4,6 33pF 1 C16 39pF 2 C3,10 180pF 1 C11

Polyester 100V working (minimum voltage)

1nF 1 C15 3.3nF 1 C12 10nF 1 C17

0.1uF 8 C1,5,7,8,13,14,18,20

Variable (Air spaced tuning) 50pF Jackson 1 C19 15pF Triple-gang 1 C2/9

This is an unusual miniature type and may not be readily available, but the editorial staff have secured a number of them. Please contact G1TEX c/o PW offices for more details (Cost about £3.50 including postage).

V1,2

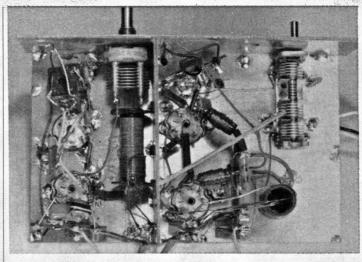
2 V3,4

#### **Semiconductors**

**DF92** 

**DL93** 

Diodes 1N4006 3 D1-3 Valves



Under-chassis view showing L6/7 and main receiver tuning capacitor in position.

#### **Wound Components**

All inductors are wound with enamel covered copper wire. The wire gauge is shown in brackets in the description.

RFC1,2 100T (0.2mm) wire wound on the body of a 220k 1W resistor and varnished.

L1 5T (0.5mm) close-wound on a 15mm aircored former. Spaced 3mm from:

L2 28T (0.5mm) close-wound on the same former as L1 (see diagrams)

L3 wound as L2 above spaced 3mm from the coil:

L4 14T (0.2mm) wound on the same former as coil L3

L5 consists of 45 Tturns (0.2mm) wire pile wound on a 6mm coil former with a ferrite slug.

L6 and L7 are wound on the centre spool

from a 35mm film cassette (see your local fast development shop).

L6 47T (0.5mm) close wound on the spool, ends brought out through the flanges.
L7 10T (1.0mm) close wound over the end of L6 furthest from the anode connection of V4.

#### Miscellaneous

Crystal of between 7.0 and 7.05MHz.

Pieces of p.c.b. material to make the chassis. 1 piece 200x100mm for the top plate and various lengths about 40mm wide for the sides and screens. One 4P-3W switch, valve holders B7G type. The valves are available from various sources, and several PW advertisers can supply them. (J. Birkett of Lincoln can supply valve holders and Colomor Electronics can supply the valves) High impedance/sensitivity headphones, wire to interconnect, miniature coaxial wire Knobs to suit, plugs and sockets to suit. 90/1.5V p.s.u. as described in May PW.

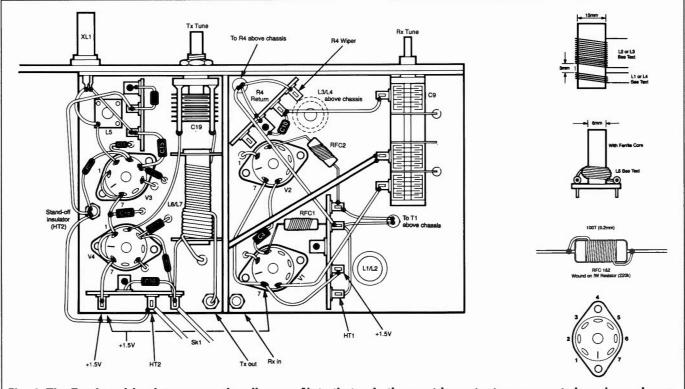


Fig. 4: The Empire wiring interconnection diagram. Note that only the most important components have been shown so as not to complicate the drawing.

# TATE'VE BEEN TOGETHER NOW FOR 55 YEARS

It would be around 1935, when I was 11 or 12 years old that I lived near a small railway station in the rural heart of the North Riding of Yorkshire, that's what is was called in those days. There were six trains a day on the down line and five on the up line, plus a goods train which shunted wagons at every station on the line.

My father had just bought a second-hand wire-

less set, it was a threevalve 1-V-1 with a British General Tuner, a Reaction Control and a separate loudspeaker. The set was housed in a 'Lift Lid Box'. This wireless gave rise to many questions which ran though my young

head, such as, "How did sound get up the twin flex from the lift lid cabinet to the loudspeaker on the mantelpiece?", "Why, when the signalman in the signal-box used his telegraph did my father's wireless reproduce a series of clicks?" "How could electricity be carried in a glass accumulator jar from the village to our house?" "What was in the cells of an h.t. battery, it looked to me like cold mashed potato in a little muslin bag with a carbon rod in the middle?"

#### Railway Telegraph

I was fascinated by the railway telegraph. I asked lots of questions of the signal man but got few satisfactory replies. My wildest dreams were answered when a new station master arrived at the station and he turned out to be a wireless wizard (to me at least). He was willing to listen to me and to give me answers to my questions, not only that, he gave me his copy of Newnes Practical Wireless Encyclopaedia. It was edited by F J Camm. I read and re-read that book and as a result of such devotion to the written word, I decided I would make a crystal receiver. Problems were encountered in obtaining the bits and pieces in the scientific wilderness of rural Yorkshire in the thirties but the station-master found me some Carborundum crystals. and a variable condenser and I found a man in the village who had been a dabbler and sold me a pair of headphones for 6d. Now that sum of money represented no less than a dozen errands to the village for various people in the vicinity and the village was 2.3 miles away - I knew it was 2.3 miles because I measured it endless times on my bike mileometer which a kind aunt had bought me for Christmas.

#### First Wireless

Come the winter a heavy snow storm brought down lots of telephone wires. This was indeed the gods of wireless shining a light upon me, because I was able to acquire the material for an aerial. Shellac I got from the local joiner and with a cardboard tube I made my former. I cannot recall where the instrument wire came from and I won't bore you further except to say that it worked and I heard Radio Newcastle on my headphones using over 100ft of aerial.

The die was cast, though I probably didn't know it. I saved my errand money and bought a

Cossor HL2 (a 2V filament triode) second hand from the dabbler, changed the crystal to a leaky grid detector using my tuning coil/condenser, a  $2M\Omega$  resistance and a  $0.0001\mu F$  fixed condenser. My own, very first, 'wireless'. I had little idea how it all worked but I was learning. Some time later I bought from the dabbler, a Mullard PMA2 and with an audio transformer taken from a scrap radio which was given me, I produced an 0V1. My progress continued as time passed but power supplies were a major problem and now I needed a

some square bashing and felt proud in my ATC uniform. I was still taking PW.

I cannot be sure of the year but there was an announcement in *Practical Wireless* about something called RDF. I absorbed what little this article was able to disclose and made up my mind that 'It was for me'. By this time I would be about 17 and keen on the RAF. At 18 I cycled to Middlesbrough and told the recruiting officer I wanted to join the RAF and that I wanted to know all about this RDF. For those of tender years, RDF stood for Range

and Direction Finding but was what we now call radar.

I was recruited after some aptitude tests but had to wait some time before being

Gordon Lumley has been a reader of PW now for many years. The story of his early days with the magazine should interest all.

grid bias battery as well.

My parents, sensing some kind of penchant, agreed to order Practical Wireless. I was now learning more and more. Some of my questions were being answered, loudspeakers, coupling condensers and even Ohm's Law were less of a mystery. Power supplies bedeviled me, we had no electricity mains, in fact it was to take almost twenty years before those places got electricity. The station master came to my rescue again and told me that although the signal box maintenance men came regularly to renew the Leclanché cells in the signal cabin, there was little wrong with the discarded porous pots that a new charge of salammoniac could not remedy. I knew the whereabouts of the rubbish dump and duly recovered lots of cells which, with old 2lb jam-jars, sal-ammoniac and scraps of perforated zinc from the local joiner (it was used to cover larder windows to keep out flies), I had an l.t. supply, albeit at rather more than 2V. The h.t. was still at father's discretion in that I was allowed to have his 120V batteries when they were 'run down'. I feel sure that he often rejected them before they were discharged in order to help me but would never have admitted to being wasteful. Eventually, I collected enough Leclanché cells to make a 60V h.t. battery but I spent most of the time repairing corroded connecting wires on this

War had started and I joined the Air Training Corps. This meant that three times a week a return journey of twenty miles by bike to Northallerton was undertaken to attend classes but I was more than willing to do so. By this time I had left school and was serving an apprenticeship. I learned some Morse and more about the physical sciences, did

venture.

called for training. I was still young and the training facilities were stretched to the limit. After some months I was to report to the Personnel Disposal Centre at RAF Padgate (it sounds dreadful and it was) after attestation and six weeks square bashing and small arms training at Blackpool I was posted to Stockport to undergo ab-Initio training in wireless, etc., at the Stockport Technical College. I was now classified as an AC2.U/T.RDF/WM. That meant Aircraftman, 2nd class (under training) Range & Direction Finding/Wireless Mechanic.

It was a splendid civilian course of three years duration crammed into just over a year, executed by civilian instructiors and overseen by an RAF Education Officer. Every three weeks there was a test which, if failed spelled rejection, or so we were told. At the end of the course there was a final examination in which one obtained a result, classified 'A', 'B' or 'C'. The A's went on to Radio School to study RDF either ground or air, the B's went to W/T School, ground or air and the C's were eliminated.

I never knew what happened to the unfortunate C's, they were never seen again by the 'erudite elite'. I managed an 'A' and went to No. 7 Radio School, South Kensington in the Royal College of Art



Gordon's QSL card



Some six months later I was a 'fully trained' Group One, A.C.2, RDF Mechanic, posted to Special Signals Section, 100 Squadron, Bomber Command, Royal Air Force, Grimsby. I was very proud of my Sparks insignia but due to the highly classified nature of RDF at the time, we were issued with the standard sparks as were all other wireless trades, from Wireless Operator Ground upwards. The RDF business was highly classified in those days and the simple expedient of permitting only the Standard Sparks insignia, made for 'Confu-sion of the Enemy'. We were all billeted together and because the section had to be manned at night by a duty mechanic, we were excused all guard duties. We were forbidden on pain of courts martial, to talk about out job outside of the section. We could only use equipment circuit diagrams and descriptions by signing out the SD (Secret Document) from the section safe and to make life more difficult, all our course notes were destroyed before leaving RDF School.

It is now necessary, in the brevity, to omit the saga of the remaining war years except to say that experience, promotion

and effort in a kaleidoscope of activity drove me on to study at any technical college that duty permitted. Private study course and many specialist RAF courses got me a Final Diploma in Radio Communication and another Electrical Technology from the City & Guilds of London Institute by 1946; by the end of that year I was discharged, disabled, from the RAF (but that is another story).

#### Cable & Wireless

I obtained a job (Technical Assistant) with Cable & Wireless once I got free from hospital treatment. C&W had their own school in those days in Electra House on Victoria Embankment and if one was able to offer something in evidence of being worthwhile, (a City & Guilds Final was accepted) it was possible, after some experience in the Company, to sit for their own 'engineer's ticket'. This covered the technical side, the operational side and signal reading. The first two presented little difficulty but oh dear - signal reading meant 20w.p.m. Morse, both ways, no uncorrected errors, five minutes duration.

Additionaly, one had to read Morse Undulator Slip, Dual Channel Submarine Cable Code, Five Unit Baudot and Seven Unit RCA punched tape. I wasn't very good at any of this but after three attempts at the signal reading I got my ticket, Acting Assistant Engineer. Substantive (paid) rank had to wait for a vacancy and there were several of us, all ex-service, all hoping. Very soon I was allocated duties of a supervisory nature in Wireless Control, then in the Facsimile Room, acting at that stage but later substantive. In those days, C&W communications were world-wide via h.f. radio and submarine cable.

#### **Amateur Licence**

In 1947 I got my Amateur Licence, 25 watts, c.w. only. I was exempt from the technical examination but the Post Office would not accept the C&W Morse test in spite of the vast difference in requirements. Maybe something to do with the general bad feeling which abounded - due to pending nationalisation, (C&W went under Post Office control). I took the test at Harrow Post Office one Saturday morning. A year later I applied for my full licence, 150W input to the final amplifier, c.w. and R/T. The Post Office Radio Inspectors visited my shack and signed the log.My home-brew rig expanded to ten times its original size, an Eimac



The modern station at G3DJE

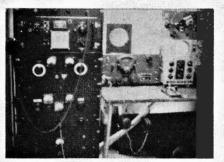
35T glowing cherry red now in the Class C final amplifier, and an e.h.t. supply from an ex-government transformer and a pair of mercury vapour rectifiers. A pair of 807s in push-pull modulated the 35T via a Woden modulation transformer. In spite of its size, 6ft high in a 19in rack it only worked on 20m (the 14MHz band).

I did a bit of development work at C&W and learned an awful lot about professional communication but by 1950 my love of aeroplanes called, C&W had been nationalised and so I went to Sperry Gyroscope as a field engineer. By this time I had improved qualifications and after some four years of flight developments work along with customer liaison and servicing of gyro-compasses, auto-pilots and such like, I became involved in the flight trials and development of a computerised flight system/blind landing system known as the Zero Reader Flight Director.

#### **Boscombe Down**

My final aeronautical assignment was the flight analysis of certain problems in early 'V' bomber aircraft. The programme was controlled from A & AEE Boscombe Down. Many flights were made from there but ultimately, because of aircraft shortages/commitments I found myself on my old squadron for several months, by then RAF Waddington, from where I flew as a civilian, continuing with the analysis, living in the mess during the week and at home at weekends. Perhaps amongst the most memorable times of my life, although the problems were sticky they were eventually solved.

I had been promoted in 1954 to Superintendent Aeronautical Field Engineering then some time later I was engulfed in overall control of Field



The original G3DJE station

Engineering as Dept Manager. My responsibilities covered all Company products in the Marine, Aero and GW fields. The task was world-wide with the exception of the Americas which came under the wing of the US end of the Corporation. Trials, Liaison, Service Documentation, Air Registration Board (now the CAA) Approvals, After-Sales Service and Repairs and Overhauls were all part of the responsibility of the department.

#### Air & Ground Miles

It was clear that amateur radio activities were going to take a back seat. I was overseas almost as often as at home, ships and aeroplanes do not stay in one place fro long. We had agents in all major countries and marine service offices in all major UK ports. This, together with the administrative back-up necessary left no time for the hobby. I reluctantly sold my station, lock, stock and 19in rack to a chap at Vickers Armstrong Aircraft at Weybridge. I have not seen him since. Perhaps it's as well,

After several years in Field Engineering, I was assigned to the marketing and development of new Naval and Military equipments. I was glad of the commercial experience and a change of management but the overseas

travel requirement remained.

My time span with Sperry Rand was a few weeks short of twenty years, after hundreds of thousands, or maybe around the million air and ground miles and a wealth of experience which enabled me to start, along with my XYL, our own business in 1969. I am of the opinion that the origins of all this lay in that copy of Newnes Practical Wireless Encyclopaedia, back in the thirties.

#### Retirement

In 1981 we retired and after a brief period of well earned respite, I felt as if my very life blood had been syphoned off. Depression set in and then, one day, I heard from a friend, a radio amateur, that provided one could prove the existence of previous licensed amateur activity, it was possible to apply for licence reinstatement.

I followed this through, I had my old RSGB Certificate, evidence of past membership of Brit. IRE and Royal Inst. of Navigation, an old QSL card, a photograph of my 150 watt rig and some copies of some patent specifications which I submitted as some kind of identification. I had no idea of what was required after 33 years QRT. They were placed in a large envelope with a covering letter and sent off to Waterloo Bridge House with a silent prayer. This was acceptable to the DTI, the evidence that is, I do not know if they heard the prayer - maybe they did - but I was soon on the air again.

#### **Looking Forward**

I look forward to my Practical Wireless and my RadCom. The depression has long since vanished. I work the h.f. bands, living as I do in the Swaledale Valley. The Morse came back, I still use the key, not all that well perhaps but certainly more than enough to re-pass the test if I had to. A single paddle side-swiper now with electronic keyer, it makes life easier for me, makes better Morse and with luck my correspondents will have a better chance of reading me.

I am an active member of RAFARS, ROATA and supporter of the RSGB and I devour PW metaphorically speaking, as soon as I get it from over in Wensleydale, in the certain knowledge that I am safe from a repetition of the same career pattern, I am now too old at 67.

# OMMUNICATIONS WITHOUT WIRES

This time and for future reference, Ron Ham identifies the scientists and engineers who, through their respective fields, came together in the 19th and early 20th centuries and laid the foundations for communications without wires.

#### **Practical Electricity**

Although the academics knew of a mysterious energy, called electricity, for over a thousand years, the general public had to wait until the 1800s for the production of a storage battery, the voltaic pile, by Professor Alessandro Volta, an explanation of the electric current by Andre Ampere and the development of Michael Faraday's dynamo, before seeing its practical use.

By the end of the century, thanks to the efforts of Alexander Graham Bell. Edouard Branly, Sir W.F. Cooke, William Crookes, Thomas Edision, Oliver Heaviside, Joseph Henry, Heinrich Hertz, D.E. Hughes, Lord Kelvin, Sir Oliver Lodge, Guglielmo Marconi, James Clerk Maxwell, Samuel B. Morse, Dr. Ohm, Alexander Popov, William Preece, Joseph Swan, Sir Charles Wheatstone and others, the beginnings of electric light and power and the ability to communicate along overhead wires (telegraph or telephone) attached to insulators and strung along rows of wooden poles.

The message was sent in Morse code, by a telegraphist with a 'tapper' or 'key', and read from a 'sounder' or later by voice, via a 'mouthpiece' and 'earpiece'. Furthermore and of particular interest to this column, some of the scientists proved, that by using and controlling the electromagnetic waves, it was possible to transmit and receive messages, over short distances, by a wire-less system. Readers interested in the precise contributions made by the aforesaid people should consult a good scientific encyclopedia and/or such books as Early Wireless by Anthony Constable (ISBN 0 85936 125 X), The Story of Radio, Vol. 1 of 3, by W.M. Dalton (ISBN 0 85274 241 X) and Sun, Earth and Radio by J.A. Ratcliffe (SBN 303 17894 9).

#### Wire-less Communications

After a number of limited-range tests between 1896 and 1900, the big leap forward for wireless communications came on 12 December 1901 when Marconi and his colleagues, Kemp and Paget, successfully received signals in

Newfoundland from his 12kW station some 3500km away in Poldhu, Cornwall. Soon after this, wireless installations were in demand for coastal stations, ships at sea, news and weather reports from stations like the Eiffel Tower in France, etc., and of course, for active service by all sides during the 1914/18 conflict.

#### "Around The World", How?

The 1920s saw the start of local, national and international broadcasting and the opening up of the short-wave bands for wireless (now radio) traffic between government, military and press offices throughout the world. In the early days it was thought that the earth's curvature would limit the range of signals, in fact some said it would carry straight on and be lost in space, however, it was A.E. Kennelly and Oliver Heaviside who suggested, in 1902, that a layer of ionisation in the upper atmosphere could reflect electromagnetic waves. This was found to be true because radio signals at certain frequencies do return to the earth's surface, some distance away from their place of origin and continue to 'skip' between the ionisation and the earth before reaching their intended destination, Fig. 2 'A' and 'B'. Frequent experiments proved that to reliably use this means of radio wave propagation there were a number of factors to be considered such as, the radio-frequency of the transmission, the angle of the radiating antenna relative to the height and state of the ionisation, the season of the year by reason of the earth's orbital position relative to the sun, the time of day and the targeted reception area. In addition, because of the solar influence, the structure of the ionosphere varies between day and night

due to the earth's daily rotation on its own axis which leaves approximately half of the globe facing the sun while the rest is in darkness.

Among the first scientists to investigate the suggested ionisation and its effect on the path of terrestrial radio signals were Sir Edward Appleton and M.A.F. Barnett in the UK and G. Briet, A.H. Taylor and M.A. Tuve in the United States.

#### The Ionosphere

The ionisation must have always been present in the earth's atmosphere but its existence and usefulness to mankind was not fully realised until this century and the advent of radio communications. In April 1946, Practical Wireless published extracts from a speech to the Physical Society by Sir Edward Appleton, G.B.E., K.C.B., on the subject of RADAR, or as he preferred to call it, "Radiolocation". He described the frequency-modulation method used for detecting enemy aircraft and shipping during WWII and explained that this system was first used in 1924 to find the position of the Heaviside layer and remarked, "We may therefore say that the first radiolocated reflecting surface was the Heaviside layer." We know this today as the 'E' layer which is one of four areas of the earth's atmosphere ionised by the sun and collectively called the ionosphere. These regions are known in ascending order as 'D', 'E', 'F1' and 'F2' ranging between about 60 and 400km above the earth's surface.

#### Ionospheric Sounding

Before concluding this piece I checked my archives and learnt that the existence of the 'E' layer was proved by transmitting signals, between 1 and 3MHz, vertically and studying their reflections and later, Fig. 1, increasing the radio-frequency until it penetrated the Heaviside layer. But, instead of this higher frequency being lost in space, as was first expected, it came back and the existence of yet another layer of ionised gas was discovered. For a while this new reflector was called the Appleton layer, until Sir Edward classified the Heaviside and Appleton layers as 'E' and 'F' respectively. Evidently he used such classification because the electric field of the wave reflected from the lower layer, in his first tests, was known by the letter 'E' and when he found the upper layer, the field was given the letter 'F'. This simple idea allowed any further discoveries to be identified by the adjacent letter below 'E' or above 'F' and as we know today, another one, which absorbs some signals, was found underneath 'E' so its ident automatically became 'D'. A text book,

published in 1934, describing the method of measuring layer height, first developed in America by Briet and Turve says, "A very short signal is transmitted and received at a station a mile or two away."

The surface wave is therefore received and also a ray which leaves the transmitter almost vertically and is "reflected" from the ionosphere." Scientists in different parts of the world commenced 'sounding' the ionosphere with an instrument called an ionosonde to learn more about the actual penetration and reflection frequencies. It follows that when an ionosonde is installed in a satellite the ionised layers can be 'sounded' from above and the signal received back by the satellite can be compared with similar tests from a ground station, Fig. 1. Your next obvious question is. "how then does the information gathered by the satellite reach earth if the ionosphere will not let radio signals pass through?" In most cases the information is converted by the satellite into telemetry and carried to earth on v.h.f. or micro-wave signals, Fig. 1, which easily penetrate the ionosphere.

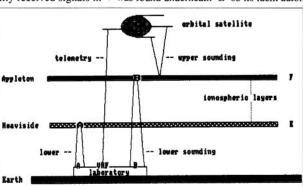


Fig. 1: Using a satellite-borne ionosonde for upper layer sounding. ionosphere Heaviside

Fig. 2: Ionospheric sounding signals penetrating the Heavyside layer, led to the discovery of the Appleton Layer.

#### Using the Lavers

The gap on earth between A and A or B and B is the 'SMIP' distance

After all natural changes have taken place and the structure of the ionosphere is normal, terrestrial radio signals transmitted at different frequencies by stations 'A' and 'B' in Fig. 2 will either be deflected or gradually bent back toward earth by the 'E' layer or penetrate 'E' and be similarly returned to earth by 'F' before continuing to 'skip' towards their intended destinations. Of course, if the ionosphere has been disturbed then the signal may be absorbed and lost or sometimes thrown back, but that must be left till next time.

# **NEVAPA** introduce the world's **FIRST**

1000 CHANNEL **PROGRAMMABLE SCANNER** 

the

# **Fairmate HP100E**

 8 - 600MHz and 830 - 1300MHz frequency coverage

 An incredible 1000 channel memory capacity

• 10 independent search bands

• A fast 40 channel per second search speed

- User-selectable search steps from 5KHz to 995KHz
- Modes AM. FM and new Wideband FM for commercial reception
- Selectable 10dB attenuator
- Keypad and rotary tune controls

Each Fairmate 100E comes complete with:

- Full set of high capacity Ni-Cads
- Two antennas (one VHF, one UHF)
- Carry case
- Shoulder strap
- Belt clip
- DC cable
- Earpiece for private listening

FAIRMATE HP100E MARK 2 NEW VERSION NOW AVAILABLE WITH EXTENDED FREQUENCY RANGE All this for £249



for our latest Catalogue packed full of information on Scanners, Amateur & CB Radio use your credit card for same day despatch

HOTLINE: 0705 662145 FAX: 0705 690626

NEVADA COMMUNICATIONS 189 LONDON ROAD NORTH END PORTSMOUTH PO2 9AE

## **Practically yours**

#### **Main Factors**

There are two main factors which determine a receivers sensitivity to weak signals. One is the amount of noise which is generated in the various stages of the rig and the other is the actual bandwidth which is used. The greatest noise contribution is normally that of the first stage in the chain. This is because the noise contribution of this stage is amplified by all the following stages. The overall gain of a receiver is not a primary factor in determining the sensitivity, and for this reason adding a pre-amplifier will only produce better sensitivity if the pre-amp is quieter than the existing first stage.

#### **White Noise**

The noise generated in a receiver has equal power at all audio frequencies and is described simply as broadband or white noise. Another term you may see mentioned is pink noise which is white noise which has had its spectrum tailored by the use of filtering. Various filters are used in the receiver depending on the mode to be received. These filters limit the amount of noise that appears in the speaker, the wider the filters are, the more noise gets reproduced by the audio system.

#### **Bandwidth**

It must be obvious from this that you will get about twice as much noise through a 3kHz filter as you would through a filter with a bandwidth of only 1.5kHz and this is indeed the case. It must also be obvious that if a signal to be received will pass equally well through either filter, then the signal to noise ratio will be better if the narrower filter is used. Because of this it follows that the sensitivity of a receiver improves as the bandwidth is reduced. Using a 200Hz filter on c.w. not only keeps out interfering signals but actually enables you to hear signals that would otherwise be down in the noise. The sensitivity is actually about 6dB better when using a 500Hz filter than when using a standard 2.5kHz s.s.b. type.

Remember when comparing receiver sensitivity figures to ensure that you compare them at the same bandwidth.

#### **Noise Figure**

The problem of comparing figures where different bandwidths are employed can be overcome by the noise figure concept which is independent of receiver bandwidth. The type of receiver noise which we are concerned with is caused by electron flow due to thermal agitation. This type of noise is known as thermal noise or, sometimes, Johnson noise. This noise is produced by all the components in the receive system including the antenna and feeder.

#### **Noise Power**

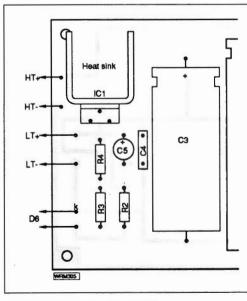
The actual power of thermal noise is dependent on bandwidth in the usual way but is also dependant on temperature, hence its name. The hotter the environment the higher the level of noise produced, rather like the spitting of fat in a frying pan. The noise figure of the receiver is simply the ratio of its internal noise floor to the thermal noise floor. To give some concrete examples the thermal noise floor at normal room temperature is about -140dBm when using a typical s.s.b. filter bandwidth. If your receiver is quoted as having 10dB S/N s.s.b. sensitivity of 0.15 microvolt (which is equal to -123dBm), its actual noise floor would be -133dBm and the receiver therefore has a noise figure of about 8dB.

#### **Good Enough?**

Are the figures quoted for your receiver good enough to really let you dig into the noise for the weak DX stations? Do not forget that noise comes from other things than just the receiver itself, perhaps we can get away with lower figures than we might think. Next time we look at some of the other noise contributions and provide some figures showing what your receiver really has to produce in real terms.

#### Feature

This month Glen Ross G8MWR continues the investigation into receiver specifications with a review of what causes all the noise we hear in the speaker



## Errors and Updates

#### Power Supply For Battery Radio, May 1990.

The gremlins were at work in the Valve Power Supply by Stefan Niewiadomski in May PW. On page 61 the overlay shows IC1 with the mounting tab towards the bottom of the page (Similarly on page 62). The part illustration shown here is the correct orientation of IC1. The mounting tab should be towards the top of the page(s). This means bending the legs of the i.c. (two outer ones forwards, and the middle one backwards) to fit the board layout. NO changes are necessary to the p.c.b. Our apologies for any inconvenience caused. We also recommend a 'bleeder' resistor of approximately  $100k\Omega$  across capacitor C2.

## Mizuho MX-7S 40m SSB/CW Transceiver & Accessories

Packed into a tiny box measuring 65 x 40 x 145mm the Mizuho rig provides a tunable s.s.b./c.w. transceiver, even containing it's own built in microphone, speaker and Morse key! Each of the pocket sized h.f. transceivers are single band rigs, coming in 3.5, 7 or 14MHz band models. Each version costs £189 and gives 2W r.f. output on transmit, combined with a sensitive receiver for weak signal reception work. Tuning is accomplished by the larger of the top panel rotary knobs, this controls a v.x.o. (variable crystal oscillator) circuit to provide a 25kHz tuning range on 3.5 and 7MHz, with 50kHz on 14MHz, and up to two tuning segments may be selected using a 'Band A/B' switch on the top panel, the second position switching in an optionally fitted crystal.

c.w. or s.s.b. operation, l.s.b. is provided on 3.5 and 7MHz whilst u.s.b. is fitted on 14MHz, in accordance with normal operating practices. A front panel speaker is fitted for receiver use. Next to this, behind the same protective grille is a sensitive electret condenser microphone for s.s.b. transmit use, a side mounted push-totalk spring loaded button being fitted for transmit switching. An optional speaker-microphone at £29 may be plugged in also if you wish. Separate top panel 2.5mm and 3.5mm jack sockets being provided for the connection of this. As well as a socket being fitted at the bottom of the case for an external c.w. key, the rig's top panel sports a small push button that may also be used for c.w. keying. For c.w. use, the side-mounted p.t.t. switch acts as the TX/RX control, and although a red l.e.d. lights in sympathy with the c.w. keying no internal side-tone is fitted.

A small switch on the bottom panel selects either

adequate amount of audio output for portable use in noisy surroundings as well as for home station use. To compensate for those off-frequency receive signals, a rotary r.i.t. (receiver incremental tuning) control is also fitted, this has a centre 'detent' position for its zero setting. A small top panel meter is fitted which gives relative indications of the transmit power and receiver signal strength, and a switched receive attenuator is provided to give a measure of protection against receiver overload from strong signals. The antenna connector is a BNC type, as well as allowing you to plug in large external antennas the suppliers of the review transceiver also offer a base loaded telescopic set-top antenna at £29 which may be fitted, this being just over 1m long when fully extended.

The set has room inside its case for either seven AA size NiCads, or six dry cells plus a dummy battery (dry cells having a slightly higher voltage than NiCads).A d.c. connector on the bottom of the case doubles up as an external 9V d.c. input and a charger input for the NiCads.

#### Add-Ons

As well as the options of a set-top antenna and external speaker-mic, a variety of other accessories are available for the rig. For those who'd like a side tone on c.w. combined with automatic semi break-in transmit switching, but who don't wish to build their own circuit, a CW-25 cased module is available at £45 which performs this function.

For those who'd like a little more than 2W output, a matching 10W linear amplifier is available at £129, operating from an external supply voltage of 13.8V. This unit comes with an automatically switched transmit linear amplifier circuit and a 13.8V to 9V d.c.d.c. converter to allow the transceiver to be powered from an external source. A front panel switch gives either 'Line Off', 'Through', or 'RFHigh' positions for easy use.

> If 2W output is enough but you'd still like to run the unit from an external 13.8V d.c. supply, a small voltage converter at £19.95 is available, and a mobile mount at £27 together with a soft carrying case at £9 complete the accessory line-up.

#### In Use

The review model tested was the MX-7S which operated on 7MHz, it was supplied with the normally fitted coverage of 7.075-7.100MHz on band

'A' together with an optional crystal giving 7.000-7.025MHz on range 'B', thus providing coverage of both c.w. and s.s.b. segments of the band. The complete line of accessories was also kindly supplied, allowing a good degree of testing flexibility (in other words it let me have a great time trying out all the different possible uses!).

To get used to the set, I first tried it at home using my normal antenna system, here I found the receiver very sensitive indeed and I tended to always keep the rear panel attenuator switched in to give my ears a bit of a rest. The recent h.f. s.s.b. contest gave plenty of opportunities for quick checks to be made on how I



A combined on/off/volume

knob is fitted next to the

look at what is on offer.

was getting out with the 2W output, unfortunately despite repeatedly calling many stations who were S9++ with me I often had to resort to switching in the 10W amplifier before I was even heard.

During more relaxed QSOs in quiet band conditions, the low output was often quite copyable although at weak strengths, with my inverted 'L' antenna with a large ground plane giving good coverage into Europe. Switching in a Sagant Zepp antenna, this literally being thrown out of my first floor shack window and secured at the far end to a fence post at the end of my garden, gave very impressive results. Eventually this antenna was a little more permanently fitted and excellent results across the band were obtained.

I found the tuning knob was fairly easy to use but only once I'd had a bit of practice, at first I found the control was rather touchy. Apart from that, I found the set very easy to use, and the lack of c.w. side tone was not a great loss as when keying I found I subconsciously generated a side-tone all to myself. Others may like to either knock up a small circuit or go all the way and purchase the matching sidetone accessory.

#### **Out and About**

The same good on-air results could not unfortunately be gained when I tried using the set as a portable transceiver in its own right, with just the settop whip plugged in. Here I found I could receive many stations but my transmitted e.r.p. was extremely low, with not one QSO resulting. Eventually I found that by connecting a quarter wavelength of insulated wire to the case of the set, this acting as counterpoise ground plane, I gained a significant increase in both receive and transmit signal strength. As trailing out a 10m length of wire wasn't always practical, I eventually used the trick of carrying with me a length of wire terminated in a large crocodile clip, to attach to any convenient ground plane that could be found.

Using a PL-259 to BNC adaptor, I found I could use the SO-239 gutter mount fitted to my car as an antenna mount for the portable whip. Here the car metalwork plus its capacitance to the earth again gave good results, although I felt the whip was a little too fragile to attempt operation on the move with it attached, lest it fractured. The 10W amplifier and the speaker microphone were useful here, the overall arrangement providing me with a handy mobile rig together with

the option of a quick transformation into a portable set-up.

In all, I was very pleased with the transceiver in use, the set together with the various add-ons allowing a wide degree of operating modes all based around a central 'building block' transceiver.

#### **Laboratory Tests**

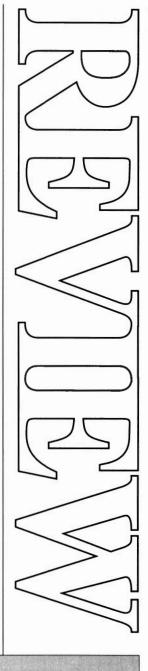
A set of measurements were performed to see how the set fared on the test bench, on-air tests by their very nature being subjective with the results gained being determined by propagation conditions, antennas used and suchlike, together with a lot of operator patience and persistence when using low power levels! As found on-air, the receiver was very sensitive indeed, and with the rear panel attenuator switched in the receiver still compared with other sets of normal sensitivity.

On transmit, the harmonics were very well suppressed as the accompanying table shows, this matter is becoming of increasing importance especially with recent proposals of minimum technical standards for amateur radio equipment being put before a European regulatory audience.

#### Conclusions

The Mizuho MX rig offers a very versatile transceiver system, allowing use at home, out mobile, and indeed portable with a suitable antenna system. As such it is certainly a 'fun' rig to use, and the technical performance certainly should allow the set to hold its own on receive during busy band conditions. The low output level of 2W is ideal for QRP enthusiasts, but in my opinion it is not a perfect 'beginner's rig' to be used with a small inefficient antenna, as disappointment would probably result. However with much patience, operating skill, and an efficient antenna system, great distances can indeed be worked with QRP, and the ease in which the rig lends itself to portable operation allows operation in favourable locations, for example whilst out for a family picnic on the local hill top.

My thanks go to Waters and Stanton Electronics Ltd. 18-20 Main Road, Hockley, Essex SS5 4QS. Tel: (0702) 206835 for the loan of the review transceiver and accessories. PW



#### LABORATORY RESULTS

#### RECEIVER

Sensitivity: Input level required to give 12dB SINAD;

Attenuator Out 0.06uV pd Attenuator In 0.22uV pd

**Blocking:** Measured as increase over 12dB SINAD level of interfering signal with an unmodulated carrier, causing 6dB degradation in 12dB SINAD on-channel signal;

Separation Rejection +/-10kHz 72.5dB +/-100kHz 76.0dB

+/-1MHz 91.0dB +/-10MHz 93.5dB

Selectivity

-6dB 2.39kHz -60dB 4.55kHz

3rd Order Intermodulation Rejection: Increase over 12dB SINAD level of two interfering signals giving identical 12dB SINAD on-channel 3rd order intermodulation product, 10KHz signal spacing;

Attenuator Out 53.0dB Attenuator In 60.5dB IF and Image Rejection: Increase in level of signals at the first i.f. image frequency, and the i.f. itself (11.2735MHz), over level of on-channel signal to give identical 12dB SINAD signals;

image <100dB IF 73dB

#### TRANSMITTER

**TX Power** 

Transceiver 2.36W PL-7S Amplifier 10.9W

#### **Harmonic Levels**

Harmonic	Transceiver	PL-7S Amplifier
2nd	-63dBc	-59dBc
3rd	-59dBc	-66dBc
4th	-76dBc	-77dBc
5th	<-90dBc	-72dBc
6th	-82dBc	-76dBc
7th	-80dBc	-76dBc
8th	<-90dBc	<-90dBc
9th	~- andBc	~-90dBc

#### Feature

We've all seen the callsigns, most of us have worked them. What is a Special Event Station? For that matter, why is it? Michael Lawton GW4IQP explains how to get the best from the occasion.

# **Special Event Stations**

"Here is GB4... Special Event station at Little Blodsworth in Loamshire celebrating the commissioning of the village duck-pond..." and don't laugh, because special event stations have celebrated odder things than that.

In the last few years there has been a vast increase in the number of summer functions down to, and including, vicarage tea parties where these callsigns may be heard any weekend in the summer. Virtually all special event stations have one thing in common apart from operating and that is - publicity.

Should you or your club be thinking of running a special event station it is important to ask one question at the start; Why? In many cases it is an excuse to spend Sunday operating /P, with a sense of duty to relieve the conscience about not doing the washing-up. Roughly speaking, the reasons for mounting the operation fall into two categories, those of internal and external benefit. In the latter case, it is essential to remember that you are presenting a public image both of amateur radio and of yourselves. The majority of the public have never heard of the amateur service although they may be aware, if hazily, of CB.

Once it is settled that the Little Blodsworth church fete will have a special event station (whether offered or requested), sit down and think about the requirements.

First, an operating centre. Obviously, this must be in reach of a power point if the station is mains supplied, and preferably **not** supplied by a long wander lead. If this in unavoidable, the lead **must** be marked with warning notices and either staked down or slung to prevent it being tripped over.

Other considerations are - available antenna supports if operating h.f., whether a generator, if used, is too noisy and public accessibility. There is no point in having the most professional set-up in the country and a mile and half from the centre of things. If you can also supply a public address facility, so much the better.

What are you going to operate from? Many groups have their own tents or caravans, others make do with trestle tables in the open. Whichever option is open to you, it must have room for an audience. Ideally, if using tables, arrange the rigs along the trestle and provide several chairs for visitors.

What bands are you going to use? Obviously this will be dictated largely by the licence and the rigs available, but there are other considerations. One object of the station is to show radio communication, and people will not be impressed with an amateur shouting "CQ" into the void. So, in order to guarantee contacts, the 144MHz band is probably the best band to use, followed by 3.5MHz and, depending upon your location, 430MHz.

However, mere communication by voice is also not sufficiently impressive to rivet an audience. After all, any CB station can do as much. Since the international aspect of amateur radio is likely to capture the imagination better, it is also useful to have one (and preferably only one) DX band in operation. For demonstration purposes in UK daylight, 14MHz is probably the best prospect, likely to yield East European (always good for the 'international brotherhood' angle) and possibly some better DX as well.

Next item on the list is equipment, and the prime requirement here is reliability. It is absolutely essential to have:

- 1: A reliable, adequate power source
- 2: A transceiver or separates of known performance mated to that supply
- 3: Matching microphone (hands up those who forgot it last time)
  - 4: An a.t.u. if required
  - 5: Known antenna(s)
- 6: ALL appropriate patch leads and a complete set of spares

THIS EQUIPMENT MUST BE PREVIOUSLY CHECKED AND TESTED IN THE SAME CONFIGURATION IN WHICH IT WILL BE USED; and at least two days earlier, not ten minutes. If possible, back-up gear, should be available.

These precautions will be familiar to most portable and contest organisers, but I offer no apology for emphasising them. This is what people have come to see.

Not as easy as it first looked, is it?

Now we come to the crunch: Information. Your operating centre established, the rig is operating to perfection, you're working VKs like there's no tomorrow. Now's the time to tell people.

There must be one member of your group at any time who is actually talking to the public, telling them what's going on. Make up a large placard for display, in big letters, something like:

#### AMATEUR RADIO DISPLAY by LOAMSHIRE RADIO CLUB

If there are any advertising experts in your club or group, grab them and pick their brains. The first job is to get people into the tent, and the next job is to keep them there. What the average layman will expect to see is probably a black box with someone talking into a microphone, and possibly someone pounding a key. Therefore the minimum equipment will be a voice (s.s.b. or f.m.) transceiver. It is important to show the variety of options available to amateur radio. If you are not a c.w. operator, try and borrow a key (a straight key: easily recognised) and an automatic Morse tutor. Leave the latter running at low volume, to give a constant background of Morse. This helps set the atmosphere, even if it doesn't actually say anything. Connect the key to an audio oscillator and let people have a go with it (well away from an active microphone). This always goes down well, especially with children.

The other modes guaranteed to hold spectators' interest are TV and data. These are much more specialised, and availability depends on getting someone to lend the gear for the day. Fast scan TV, with its possibilities of a roving camera around the event, is excellent, but only for the fortunate few. Slow scan TV is also good but has less visual impact for the layman, and will depend more on getting a DX contact of some sort. Data is another matter, since many people are now running RTTY, AMTOR and packet stations. Any data mode will do. Preferably a simple one, the technology of packet is likely to command respect, but also to scare off potential recruits.

Assuming that you have managed to assemble a station involving c.w., 'phone and RTTY, think about the layout. If you can arrange a visitor flow in one direction, arrange rigs in order of increasing complexity, i.e. c.w. first, then 'phone, then data. The equipment should face the public, the operator would have his back to them. Get hold of as many

BREDHURST ELECTRONICS LTD. High St, Handcross, W. Sx. RH17 6BW (0444),400786

#### SITUATED AT SOUTHERN END OF M23 — EASY ACCESS TO M25 AND SOUTH LONDON

RECEIVERS	
HF225	£425
ICR71	£855
R2000	£595
VC10 V.H.F. Converter	£161
FRG8800	£649
FRV8800 V.H.F. Converter	£100
R5000	£875

110000	2075
HF TRANS	CEIVERS
TS950s	£3199
TS940s	£1995
TS440s	£1138
TS140s	£862
TS680s	£985
FT767GX	£1599
FT757GX2	£969
FT747GX	£659
IC765	£2499
IC751A	£1500
IC735	£979
IC725	£759
ICTOC	0000

HF TRANSCEIVERS		
TS950s	£3199	
TS940s	£1995	
TS440s	£1138	
TS140s	£862	
TS680s	£985	
FT767GX	£1599	
FT757GX2	£969	
FT747GX	£659	
IC765	£2499	
IC751A	£1500	
IC735	£979	
IC725	£759	
IC726	£989	

TH25E	6000
TH205E	£238
TH215E	F225
TS711E	£898
TR751E	£599
TM231	£289
FT411 + FNR10	£259
FT290R II	£429
FT211RH	£305
FT212RH	£349
IC2GE	£265
IC228H	£385
IC275E Inc PSU	£1069
IC2SE	£275
IC2SET	£295

70CM TRANSC	EIVERS
TS811E	£908
TR851E TH405E	£699 £245
TH415E FT790Rii	£268 £499
FT711RH	£349 £375
FT712RH IC4GE	£299
IC4SE IC448E	£310 £429

IC448E	1423
DUAL BAND TRANSCEIVERS	
TM721E	£699
TS790E	£1495
FT470R + FNB10	£423
FT736R	£1359
FT4700RH	£675
IC32E	£399
IC3210E	£499
IC2400E	£635
IC2500E	£675

SCANNING REC	EIVERS
ICR7000	£989
FRG9600M	£509
RZ1	£465
AR2002	£487
R535 Airband	£249
AOR AR1000	£249
ANTENNA TUNI	ER UNITS
FRT7700	£59
FC757AT	£349
AT230	£208
AT250	£366

DATONG	The state of	P&P
AD370 Active Antenna	£77.62	3.00
FL3 Multimode Filter	£145.54	2.00
D70 Morse Tutor	£63.40	2.00
ASP Speech Processor	£93.15	2.00

COAXIAL SWITCHES		
SA4502wayS0239	£19.49	1.50
SA450N 2way N	£26.99	1.50
Drae 3way SO239	£20.18	1.50
Drae 3way N	£35.94	1.50
C54 4way BNC	£30.39	1.50
MFJ-1701 6way SO239	£38.35	1.50

POWER SUPPLIES	With the	
BNOS 12/5E	£74.75	5.00
BNOS12/20E	£178.25	5.00
DRAE 6amp	£84.99	3.00
DRAE 12amp	£113.10	5.00
DRAE 24amp	£163.42	5.00

R537S Airband	£69.00	2.00
Sony Air 7	£249.00	2.00
Win 108 Airband	£175.00	2.00
AOR AR900	£199.00	2.00
YUPITERU MVT5000	£299.00	2.00
FAIRMATE HP100E	£299.00	2.00

PALOMAR ANTENNA PRODUCT	rs
Antenna Noise Bridge — Up to 100MHz Tuner-Tuner — Tune your ATU transmitting LED S.W.R. Meter — Auto SWR up P.E.P. 9:1 Balun. For the T2FD Antenna.	£59.95 without £99.95 to 2kW £124.95 £23.95 £119.95

ANTENNA RANGE	
J Beam 'Minimax' Tribander	£378.35
J Beam TB3 MK3 Tribander	£365.70
Buttemut HF6V	£182.85
Butternut HF2v	£163.00
Cushcraft A3 Tribander	£329.00
Cushcraft 2M 15WB	£99.00
Tonna 20505 5ele 50MHz	£50.72
Tonna 20809 9ele 144MHz	£33.12
G Whip tribander 10-15-20	£44.39

P&P			
£33.50 2.50 £42.50 2.50			
£33.50 2.50 £20.00 2.00			
£22.00 2.00 £67.42 2.50 £76.97 2.50			

FILTERS				
AKD HPF1	£7.65 1.00			
AKD Braid Breaker	£7.65 1.00			
AKD Notch Filter	£8.75 1.00			
LF30A Low Pass Filter	£32.26 2.00			
AKD High pass filter	£8.25 1.00			

ANTENNA BITS		
Bricomm Balun 1:1 1kW	£15.25	1,50
Bricomm Balun 4:1 1kW	£16.25	1.00
Bricomm 7.1MHz Epoxy Traps (pair)	£13.65	1.50
Self Amalgamating Tape 10m x 25mm	£4.25	0.75
T-piece polyprop Dipole centre	£1.60	0.25
Small ceramic egg insulators	£0.65	0.20
Large ceramic egg insulators	£0.85	0.20

URM67 low loss coax 50 ohm per metre £0.95 0.25 UR76 50 ohm coax dia. 5mm per metre £0.35 0.10 UR70 70 ohm coax per metre £0.35 0.10 UR95 50 ohm coax dia. 2.3mm per metre £0.40 0.10

BREDHURST ELECTRONICS LTD HIGH ST, HANDCROSS, W. SUSSEX. RH17 6BW (0444) 400786

Open Mon-Fri 9am-5pm except Wed 9am-12.30pm. Sat 10am-4pm

#### HAND HELD FREQUENCY COUNTER

INTELLIGENCE INSTRUMENT FOR PROFESSIONAL USE

#### **MODEL 1300 H/A**

Frequency range from Sensitivity:

1MHz to 1.3GHz 1-10MHz : 10-150mV, rms

10-1000MHz : 1-50mV, rms 1-1.3GHz: 10-80mV, rms



£199.00

#### MODEL 2400H

Frequency range from

10MHz to 2.4GHz Sensitivity: 10-60MHz: 10-150mV, rms

60-2GHz: 3-100mV, rms 2-2, 4GHz: 5-100mV, rms



£299.00

Accuracy ± 1 part per million 25 to 35 degrees C.TCX0 time base is standard.

All counters have 8 digit red .28" LED displays. Aluminium cabinet is 3.9" H × 3.5" W × 1". Internal Nicad batteries, a full line of antenna, carrying case and accessories is available.

ONE YEAR PARTS AND LABOUR GUARANTEE

## DAVE TRONICS LTD.

330 Kilburn Lane, London W9 3EF Tel: 081 968 0227 Fax: 081 968 0194



DATONG ELECTRONICS LIMITED Tel: 0532 744822

Clayton Wood Close West Park Leeds LS16 6QE 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.





posters, maps, leaflets, QSL cards and the like as you can and arrange them on boards behind the equipment. The RSGB is a good source of material. In addition to the working equipment, beg or borrow some home-brew gear, rigs or peripherals, and have them on display. Arrange them with the lids off (construction standards doesn't matter) and provide clearly-typed labels giving a minimum of information. Nobody will read more than three lines. Avoid jargon where possible.

Get the operator to wear headphones to avoid distraction, but pipe received audio to a loudspeaker. The operator should, as far as he can, work stations that are loud and clear. A confirmed DX-chaser may be able to copy 2 and 2, but nobody else can! Change bands and possibly modes every few minutes, unless you have a pile-up, since people want to hear contacts, not empty CQs. In case you get desperate, a couple of friends wandering round the show with hand-helds can keep a sticky situation going for a while.

Visitors are likely to resolve themselves into two types, those who glance casually and stroll by and those who stay to watch and listen. The aim of the guide is to encourage the latter. Take the initiative by greeting them as they walk in, and offering a personal tour of the station. Few people can resist the impression of privileged treatment.

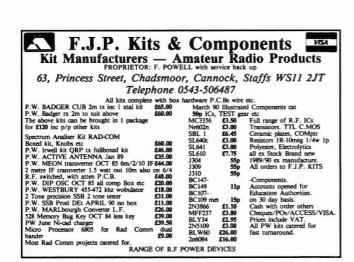
Explain what is happening without resource to technicalities and use a world prefix map to show

the location of h.f. contacts and a European locator map for v.h.f. Have some received QSL cards handy and, if possible, a sample of the special event station's own QSL card. Do your logging manually for show, even if you are computer logging as well, since a written list means something to spectators. Some stations use a blackboard to write up the country currently being worked and this is especially useful if you have a large audience. Every few minutes, or when an interesting contact occurs, pause to allow people to listen to the speaker. Start talking again when the operators changes band or mode, and say what he is doing and why he is doing it. Have simple and encouraging answers to the standard questions of "How far can you get?" "What do you talk about?", "How difficult is it?" and "How much does it cost?". Keep a few radio magazines around (such as PW) and, if you can, have printed some cheap leaflets giving details of your club. You never know....

Finally, if you special event station is at a charity event, how about getting people to sponsor you for so much per contact? It makes a change from raffles and certainly livens up the operating!

To apply for a special event station callsign, you must contact the RSGB well in advance. There is normally no problem, but it must be issued at least a month previous to the intended day of operation. If you do not have a special call, your own or the club's call /P is quite acceptable.

PW



ARC 44 Airborne TriRix compact unit intended for use in Halicopters covers freq range 24 to 51.9 McIs in 100Kc chan, mode F.M. O.P 8 watts into 50 ohm Camprises TRix, Dynamotor unit, Control Chan Sel Box, Mike Pres Amp, supply 26v DC at 5 amps uses min & sub min valves with circs att. £13 or with 6ft whip & metching ass. £53. AERMAL LOVE ASS Book type loop As part of Microxi AD7052 ADF for for use in range 150Kc to 2 McIs complete with drive motor & slipring unit, Desyn & Selayn Ts units with circ & mod details for 26v DC £23. AERMAL TWIRER part of Redford GR.410 KH.T. TRix nown 2 to 16 McIs 100 watts 5075 ohm to long wire tuning matter arc next unit in case size 9 v5 v15" good cond. £115, POWER BURIT general purposes borech HTR.T power unit provides HT 0 to 500+ DC Cet 100 Mto 350 v6 &50 vA CC 13 amps in table case with VARe matter, now 8 fused DR streated with circ. £2. ELEC METER Macroari type TF1041 banch VTM for 240v general purpose unit with ranges DC wafts 300 Milk to 150 v6 mages 100 Meg) AV votts 300 Milk v6 milk circ. \$4.00 milk circ.

SAE with enquiry or 2×20p stamps for List 45/1

#### A.H. SUPPLIES

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

Vintare_	
Radio	)

Vintage Radio will be a quarterly magazine, delivered to your home address. It is designed for those who have an interest in the history of radio and historical projects. If you have not seen the pilot issue of this magazine, send a large s.a.e. along with this form to PW Publishing Ltd, Enefco House, The Quay, Poole, Dorset BH15 1PP marking your envelope "Vintage Radio".

Yes, I would like to take out a subscription to Volume One of Vintage Radio.	Name:
I enclose my cheque for £10.00	Address:
Please debit my Access/Visa account	
Signature	
All subscriptions will be refunded in the event of the magazine not being published.	

#### Construction

## THE MARLAND SSB TRANSMITTER

#### A simple practical s.s.b. transmitter for 3.5 and 14MHz

Over the last several years there has been an increase in the number of signals on the amateur bands generated by homemade equipment. The QRP revival has led to many radio amateurs building simple equipment, and enjoying the satisfaction of being on the amateur bands using the work of their own hands. Usually these have been c.w. transmitters or transceivers because this mode offers the simplest way to put a signal on the bands. Relatively few home constructors have ventured into area of speech modulated transmission.

This was not always so, I well remember my first home-built amateur radio transmitter: a three valve circuit for 1.8MHz. An EF50 variable frequency oscillator followed by an EF50 buffer amplifier and an 807 in the power amplifier. Those were the days. The chief method of speech modulation then was amplitude modulation. I keyed that transmitter in the cathode of the power amplifier which made my first attempts at telephony very simple. I merely inserted a carbon microphone in place of the key and spoke loudly. It worked and I had many successful a.m. contacts until I added more sophisticated modulation to the transmitter.

#### Why SSB

These days single sideband (s.s.b.) is the more conventional and efficient form of speech modulation applied to amateur transmissions. Single sideband is more complex but has assumed a mystique out of all proportion to its true nature. Very few home built s.s.b. transmitters are heard on the amateur bands and many constructors believe that the techniques involved are well beyond their capabilities. This project will attempt to offer the average home constructor a chance to build a viable s.s.b. transmitter for two amateur bands. Most amateur constructors, even with a limited amount of experience, should be able to duplicate these circuits and enjoy the satisfaction of working single sideband with home-made equipment. The only likely risk is an inflated ego from the praise fellow radio amateurs seem to give anyone who puts out a home-made s.s.b. transmission.

#### The Marland

The Marland transmitter is designed as a firsttimers s.s.b. transmitter. As such it offers the following features;

Single sideband signals on two popular bands: 3.5 and 14MHz.

A useful power output: some 10W peak.

Simple, well proven, circuitry using only discrete components: there are no integrated circuits.

Easy to work, well spaced, board layouts which follow the circuit diagrams.

The project is built in modules, each of which can be tested in its own right: a step by step approach.

No specialised test equipment is required: the prototype was set up using no more than a multimeter, a home-made r.f. probe and a receiver.

The completed transmitter is built into a large case for ease of interwiring and testing and leaves enough space for a possible receiver section.



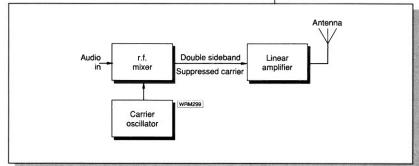
Established r.f. design engineers may smile at the Marland. It is simplistic and it does cut some corners. It may not be elegant or sophisticated but it is very buildable by the amateur. With a little care, the average amateur constructor, with a decent soldering technique, should have little trouble in getting the Marland to work first time. Naturally there are better circuits for doing most of the things that the Marland does. They are more complex, I tried a lot of them in preparing this project but in the end it simmered down to that offered here.

#### Sideband Generation

Most commercial s.s.b. equipment uses the filter method of single sideband generation. It is probably the easiest method to understand and it is the method employed in this project. Shown in Fig. 1.1 is a block diagram of a sideband generator. The signal begins with a **carrier oscillator** which may be crystal controlled at an intermediate frequency which is later converted to the required amateur band frequency. This feeds into a **mixer** (sometimes called the balanced modulator) together with an audio signal from the **microphone amplifier**. If the mixer is correctly balanced then, when either the carrier or the audio signals are applied separately, there will be no output. If both are applied

Starting in this issue, Rev. G. C. Dobbs G3RJV describes the basics of an s.s.b. transmitter that he will be build in coming issues.

Fig.1.1: A double sideband transmitter circuit.



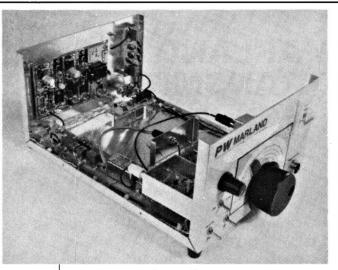
An inside
view of the
PW Marland
clearly
shows room
for the
future
expansion of
the basic

Fig. 1.2: How the

generator, showing

s.s.b. signal is developed within the

the various waveforms.



simultaneously there will be an output from the balanced mixer. The level of the output will depend upon the amplitude of both inputs.

#### Diagramatically

The diagram Fig. 1.2 shows this mixer and the output is double sideband suppressed carrier (d.s.b.s.c.). In this drawing the two input waveforms are shown superimposed. The shaded area of the drawing represents the actual output if the mixer is correctly balanced. In crude terms we might say that the carrier is only 'released' when the audio signal is present. Half the battle is over, the circuit has produced a d.s.b.s.c. signal. Some radio amateurs use double-sideband signals on the bands.

The next stage after the balanced mixer is the **filter**. This section does what the name suggests: it filters out one of the sidebands of the signal. The

Carrier oscillator

Carrier signal fc

Balanced mixer

fc - fmod Mixer output fis.s.b.

Shaded area = single sideband suppressed carrier

Microphone amplifier

mixer output shows the full double-sideband signal with each sideband represented as a 'mirror image' either side of the carrier frequency. The resulting signal is shown on the waveform drawn coming from the filter. The shaded area again represents the ideal output from such a filter. The filter allows the signals on one side of the carrier frequency to pass, but attenuates signals on the other side of carrier. Such a filter is said to have a narrow bandwidth and is designed around a crystal filter centred on a frequency of 9.00MHz with a bandwidth of 2.4kHz.

The design and function of such filters is outside the scope of a practical article but can be found in the amateur radio handbooks.

#### **More Complex**

Refer to now to Fig. 1.3. The carrier oscillator has two values (8.9985MHz or 9.0015MHz) which when mixed and filtered produce either upper or lower sideband centred in the passband of the filter. This signal is mixed once more with a v.f.o. of 5.0-5.5MHz signal and passed to one of two bandpass filters. These filter out either the 3.5MHz (9.00-5.5MHz) or the 14MHz (9.00+5.0MHz) band signals.

#### **Power Output**

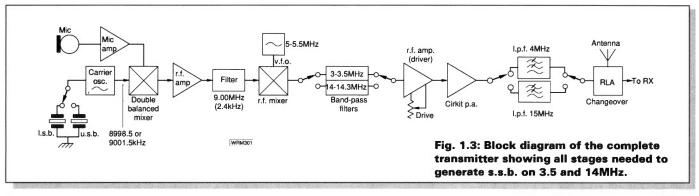
We have now produced the required mode in the required amateur band. The final requirement is to amplify the signal to a level suitable for transmission. This requires a linear amplifier. The amplification must be linear as the audio content is explicit on the s.s.b. signal. An amplifier with poor linearity would distort the audio information on the signal.

The selected signal is pre-amplified by a Driver Stage and thence to the power amplifier. The power amplifier is a slight cheat as I recommend the use of a commercial kit amplifier. The Cirkit HF linear amplifier is well suited for this application. It offers high overall gain and is suitable for 1.8 to 30MHz. Simple to build, it usually works first time and all the examples I have built have been very stable.

Switched Low Pass Filters are added to reduce the harmonic output of the power amplifier and the transmitter is completed with a transmit/receive change-over board controlled by the press to talk button on the microphone.

The above is a very simplistic explanation of the process, missing out the detail of the theory and the refinements of the circuitry required to generate an s.s.b. signal.

...Enough of the description. In the next part we will look at the actual circuits.



# CBRZER



Rick Maybury continues his short history of the Citizens' Band contemplating the specifications and attitudes.(MPT1321 -934MHz the Cinderella band?)

When the original specifications for the UK Citizens' Band service were published in 1981 comparatively little media attention was given to MPT1321 which outlined the provision for a second set of CB frequencies on and around 934MHz. Quite simply the equipment didn't exist, or at least not in a form that was in any way applicable to the concept of a low cost publicly accessible two way communications system. It's been more or less downhill ever since and this technically interesting and innovative system never really achieved the kind of success it deserved. The choice of frequency caught manufacturers at home and abroad on the hop and it took another three years for realistically priced equipment to appear in the specialist CB shops. In retrospect the technical difficulties of producing equipment in quantity, at a price that ordinary CB users could afford, were probably the least of its problems. Ill-informed comment from some surprisingly authoritative quarters didn't help. I can recall reading an article, written by an eminent doctor, in one serious newspaper, respected for its

coverage of science, outlining the medical hazards of exposure to sub-microwave rf radiation on or around 934MHz CB frequencies.

#### **Horror Stories**

It included a horrific list of maladies. These included cancers and cataracts. Whilst these effects undoubtedly existed, probably quite a few laboratory rats suffered as a result, little account was taken of the actual power levels of 934MHz CB, the intermittent operation and the proximity of antennas to vital organs in normal use. You would have almost had to poke the antenna in your eye, and keep the transmit switch pressed for a week to run any serious risk. At that time very little well researched information had been published so there was plenty of scope for speculation. Even quite serious sections of the technical and scientific press ran occasional scare stories, usually hastily cobbled together fillers that ran along the lines: 'CB will interfere with heart pace-makers, aircraft landing systems, computer terminals, petrol pumps etc etc.' In fact

experience has shown it to be the other way around; for the last five years 934MHz users have been under almost constant pressure from cellular telephones; though simple measures, like changing to horizontal polarisation has minimised the problems and under ideal conditions transmission and reception quality is very high.

#### **Notice of Doom**

Nevertheless, several thousand CB enthusiasts spent their hard earned money on equipment and many of them persevered with the system, building up a good reputation for their conduct and behaviour that would shame many licenced amateurs. Gradually a reasonable assortment of equipment and accessories became available. Most agreed that it would never be as popular as 27MHz, but a dedicated band of stalwarts kept the system alive, until mid 1988, when the bombshell dropped... Two years ago the Department of Trade and Industry, Radio Regulatory division announced that the 934MHz CB service was to be phased out; no new equipment could be

manufactured or imported and suggested that within ten years the band would eventually be given over to industrial interests for a new high quality digital PMR service. It was huge blow to 934MHz users, and whilst the band would be available for CBers, theoretically for the life of their equipment, it was clear that commercial operation would make the frequencies unusable over much of the country. Manufacturers, dealers and retailers were informed and quite substantial stocks of equipment and manufacturing capacity were disposed of, or written off, much of it at a loss.

#### **Notice Rescinded**

Now we learn that the idea has been quietly shelved, and according to a DTI spokesperson there are no immediate plans to run down the 934 service, at least for the foreseeable future. The damage has been done though, no new rigs have been available for over 18 months so the system simply cannot expand. The best estimates of the 934 population is between three and four thousand users, and they are mostly concentrated in pockets around the country. Nothing much can be done now to save the system, it is in a terminal state of decline, but one interesting side effect has been to increase the value of those rigs still in circulation. In areas with an active 934 user base they fetch quite respectable prices. An interesting, and a for a while, a potentially useful collectors item.

#### Construction

### PW Peanut Transceiver Part 2

Gus Montgomery GM0ATI and Bill Holt G7DHM conclude the PW Peanut, in this issue they describe its construction and testing

The construcion of the PW Peanut is fairly straightforward as the circuits are assembled on Veroboard, see Fig. 2.1a-c. Begin by winding the coils onto the 4.8mm formers. Oscillator coil L1 consists of one winding of 50 turns, with the antenna tapping made at 30 turns. Continue with the further 20 turns to complete the winding. This may be held in place with a dab of varnish or a suitable glue. Mixer coil L3 consists of single layer of 80 turns on a similar former (4.8mm).

The 5 turns of coil L2 are wound over the 'earthy' end of L3 after it has been constructed and dried. Taking care with the windingof the coils will not only improve the look, but enhance the performance of the system. The original units were built with coil base pins soldered to the Veroboard with the trimmed off 'legs' of other components. A neater arrangement would be to drill holes in the board to accept the formers directly.

#### Recommended

After allowing the varnished coils to dry start the construction by assembling them onto the board. It is strongly recommended that the layout of the oscillator and mixer boards is adhered to, and that transistor TR1 is a BFY52 and not an equivalent. These stages operate at r.f. and Murphy's Law being what it is, if either is changed then neither may work. The boards for the Peanut built to the layout shown worked:

- a) on their own on the benchtop,
- b) 'Blutacked'to a chipboard base and,
- c) on assembly into the aluminium case, even after closing the lid.

Some layouts we tried were prone to sensitivity of the position of the mug of tea with respect to L1 or L2/L3. Not to mention other strange paranormal happenings. So stick to the Veroboard layout and you cannot go wrong.

The items used in the design of the Peanut have been chosen to minimise costs. Having built projects like the PW 'Severn' previously, I can agree with George Dobbs that the humble standard phono plug/ socket is adequate for QRP h.f. and is much cheaper than other options. The original Peanut had a b.n.c. plug for the antenna, rescued from a pile of rubbish destined for the bin. After a shine with metal polish it made a suitable finishing touch for the unit. The other plugs sockets may be whatever is to hand or cheap.

#### Interwiring

Using the block diagram Fig.1.1 as a guide and the further layout plan Fig.2, interconnect the various boards. With S1, identify the three position associated with wiper A then Fig.2.2 shows the cabling layout.

#### **Finally**

The unit is tuned for a reasonable output power by adjusting the slug within coil L1. Coils L2/3 have the tuning slug wound fully home to give maximum coupling between the coils, and capacitor C18 is used to align the receiver. This is best achieved in the evening when within a few minutes something should be heard. When L3/C18 is badly out of tune then only broadcast stations will be heard. The variable resistor R7 is used to set a suitable control range of audio level depending on the antenna in use. The range of control is such that the receiver may be used on a short piece of wire or a full 3.5MHz dipole antenna. The Peanut has been used with all the antennas of our radio club (White Rose Club in Leeds) and this includes an inverted 'V'.

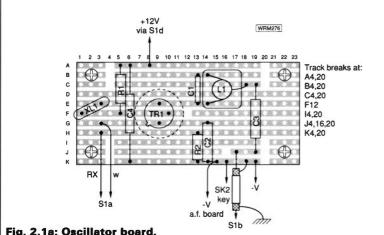


Fig. 2.1a: Oscillator board.

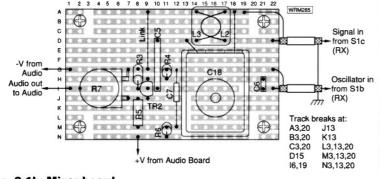


Fig. 2.1b: Mixer board.

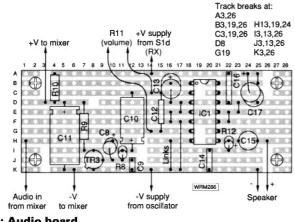
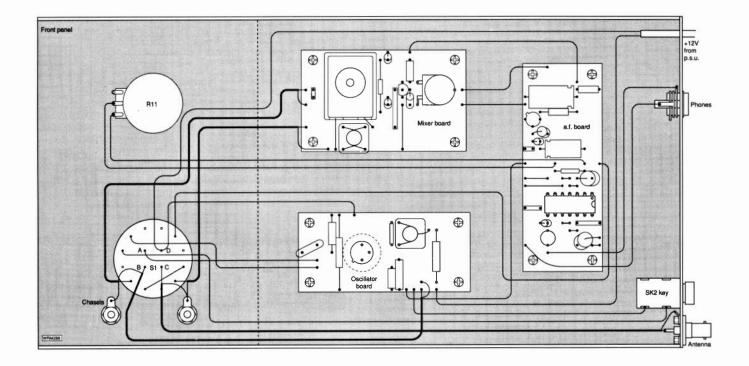


Fig. 2.1c: Audio board.



No change of tuning was noted inspite of all these various types of antenna. The note transmitted is very pure, but should 'chirps' be evident this is an indication that Coil L1 is incorrectly adjusted. More output can be obtained by optimising R1 and C1. The components have been chosen to be 'bombproof', transistor TR1 became only slightly warm with a near infinite v.s.w.r.

#### Other Bands

The more experienced of you may wish to experiment with other bands, and would be comparitively simple to rework to the 7MHz band. You could fit sidetone with a ceramic resonator

connected to the 12V supply and the Morse key input. Making the frequency tunable over a few kHz with a small (10t) coil in series with the crystal is possible. The plastics tuning rod could then be brought out via the front panel as the 'tuning' control. If skilfully built the transceiver can be put into a very small pocket-sized enclosure.

The only time we found that the costs rose sharply was when Morse key had to be bought to work the station, as they tend to be more expensive than the radio!

That in a nutshell...was the Peanut.

PW

Fig. 2.2: Overall interwiring. Note front panel 'bent' for clarity.

# Wanna Swap!

Have large stock of components, new and used including ROMS, RAM i.c.s, many transmitter bits and pieces. Would exchange for a simple communications receiver e.g. EC10, Codar CR70, Heathkit etc. w.h.y? Mr B. Sirignano G4FZG (QTHR) Tel: Cheltenham 580329.

Have Marconi QRO a.t.u. Would exchange for KW2000 or w.h.y? Mann. Tel: Cambridge 860150.

Have Minolta Dynax 7000i camera with 35-80mm AF zoom lens, boxed and in mint condition, Also a Spectrum + with p.s.u. and manual. Would exchange for a Yaesu FT-290R or 144MHz base station. Would also consider a good f.m. only mobile rig. Bob. Tel: 0536 711021.

Have Practical Wireless from May 1966 to April 1975 and Practical Electronics from November 1964 to April 1975. These are free to a good home if new owner collects. C.P. Clark. 157 Coates Way, Garston, Watford, Herts.

Have Pentax Program A s.l.r. camera outfit. Would exchange for a Trio R-600, R-1000 or Yaesu FT-7700 or similar h.f. receiver. Dunfermline 735967.

Have Pye Westminster (f.m.) recrystalled onto 70MHz also 2 very clean Pye Bantam 3-channel; a.m. sets also suitable for 70MHz. Would exchange for Tandy PRO-22 hand held scanner or w.h.y? with cash adjustment to suit. J. Parry GJ8RRP, No. 2 Thornley, Bagatelle Road, Jersey CI JE2 7TB.

Have r.f. unit type 26 and receiver R1147B both rough condition. Would exchange for the main tuning knob and/or other parts for the AR88.1.C. Denham Tel: (0734) 722480.

Have Tandy 1000SX computer with 640K RAM, colour monitor, twin 5.25in. drives, serial plus printer board, mouse, joystick and much software. All in good condition and hardly used. Would exchange for an h.f. rig with digital readout, or w.h.y? Mr V. Lowe. Tel: Doncaster 531927.

Have Trio TR-2200G 144MHz portable 12-channel transceiver, complete with NiCads, charger, mains p.s.u. and handbook. Would exchange for Eddystone EC10 Mk2 receiver with mains power unit., or Yaesu FRG-7 with a cash adjustment. Mr C. A. Collins. 60 Alexandra Road, Skegness, Lincolnshire PE25-3RE.

Have Uniden Bearcat 200XLT hand held scanner in mint condition. Would exchange for a Uniden 300 CB base station in similar condition. Ray Williams Tel: Grantham 66047.

Have Yaesu FT-501 transceiver, Watford Disk interface and SP-DOS, Wafer drive, test ROM and µspeech for Spectrum. Would exchange for a dual disk drive suitable for a BBC computer, an 80 track d/sided drive or a 144MHz hand held suitable for packet radio use. Mr P. O'Brien Tel: (0286) 5468.

Have JVC HR-D750 Nicam stereo video in original packaging, can be demonstrated. Would exchange for a dual band 144/430MHz hand held, or would consider good 144MHz multi-mode mobile. Dave Newman G4CGZ (QTHR). Tel: 01-450 3282 ext. 360 (daytime).

Have 1920's crystal set Gecophone style, working with original cat's whisker and basket wound coil. Would exchange for s.l.r. camera. Mann. Tel: Cambridge 860150.

#### J. BIRKETT

#### RADIO COMPONENT SUPPLIERS

100 GERMANIUM DIODES LIKE OA 91 for £1. 50 AC 128 TRANSISTORS Branded But Untested @ 75p. 50 BC107-8-9 TRANSISTORS. Assorted Unmarked Untested @75p

J.L.Birkett. 50 ASSORTED S.A.W. FILTERS, Condition Unknow vn @ £2.95

25 The Strait Lincoln, Tel. 520767

J.H.Birkett.

(LN2 1JF)

**Partners** 

SO ASSORTED S.A.W. FILTERS. Condition Unknown @ £2.95.

AIR SPACED VARIABLE CAPACITORS. 10-10-20pl @ £1.50, 200+350pl @ £2.50, 350+180pl Double Geared S.M. Drive @£2.50, 75-75pl @ £2.95, 15-15pf @ £2.50.

CAM TYPE ELECTROLYTICS. 1000ul 385v.w. @ £1 each, 10,000ul 40v.w. @ 60p each, 450ul 385v.w. @ 60p.

PHILLIPS RESISTORS MR25 110K 2% @ £1 per 1000, 5000 for £4.

10 CHARNEL BOOT MOUNTING STORNO FM TRANSCEIVER. 79 to 110MHz. No Accessories @ £8. (P.P. £3.)

TRANSISTORS. 8C557 Pre-Formed Leads @ 20 for 80p, BST 72A @ 20p each, BS107 @ 20p each, BCY 71 @ 10 for 75p, BUX 82 @ 65p each, BUX 20 @ 55p, LM 250K @ 65p, 2M 3716 @ 60p, BSZ 64 @ 6 for 75p.

CRYSTAL FILTERS SE1 0C 1246 10.7MHz BW 7.5kHz @ £3.95.

MURATA CERAMIC FILTER 455kHz @ 6 for £1.

ASSORTED MULT-TURN TRIMPOTS @ 9 for £1, 18 for £1.50.

200 ASSORTED POLYESTER MINIATURE CAPACITORS for £1.

UMMARKED TRIACS 400 PV 6 Amp @ 5 for £1.50.

AIRCRAFT TRANSCEIVER Transistorised STC Model STR 37E. 360 Channel @ £38.95 (P.P. £2.)

R 210 COMMUNICATION RECEIVERS With Broken Film Scale @ £25. (carr. £6.)

FETS. 2018 319 255, BF 256 @ 20, 3304 @ 20p, BRY12 @ 30p, 2014 @ 30p, Dual Gate 3N201 @ 80p, 3SK88

FETS. 2N3819 @ 25p, BF 256 @ 20p, J304 @ 20p, BFW12 @ 30p, 2N3824 @ 30p, Dual Gate 3N201 @ 80p, 3SK88

GAAS FETS 18GHz In Stripline Form. Out of Spec. Devices @ 3 for £1.99.

ACCESS AND BARCLAY CARDS ACCEPTEO. P.&P. 60p under £5. Over Free, Unless Otherwise Stated. C.M. HOWES AND WOOD & DDUGLAS KITS Available By Post and For Callers.

#### **ENNAMAST FOR TILTOVERS**

Our wind up, tiltover Tennamasts are ideal for HF and VHF beams. Designed and professionally built by amateurs for amateurs, they are safe and easy to use, slim, elegant and economically priced from £215. Immediate delivery.

BEAM KITS Homebrew your own GM4UTP 5 Band Quad or VK2ABQ Beam with our low cost kits. We can supply Head Units separately to suit, 2-3".

Call 05055 3824 (24 hours) for Brochure and Info plus

In friendly technical advice

TENNAMAST SCOTLAND

81 Mains Road, Beith, Ayrshire KA15 2HT

O TENNAMAST SCOTLAND

#### **G6XBH G1RAS**

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

nam)

YAESU • AZDEN • ICOM • NAVICO • ALINCO ACCESSORIES:

Welz Range, Microwave Modules, Adonis Mics, Mutek Pre-Amps, Barenco Mast Supports, DRAE Products, BNOS Linears & P.S.U.'s 

\* ERA Microreader & BPS4 Filter, SEM Products \*

AERIALS, Tonna, New Diamond Range of Mobile Whips, Jaybeam BRING YOUR S/H EQUIPMENT IN FOR SALE JUST GIVE US A RING

Radio Amateur Supplies

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

Tel: 0602 280267

## SUSSEX AMATEUR RADIO COMPUTER FA

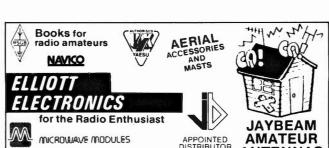
SUNDAY 15th JULY 1990 - 10.30 to 4.30

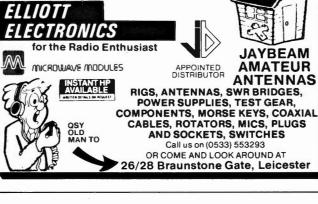
**Brighton Racecourse** 

Trade Stands • Bring and Buy Stall Picnic Area ● Refreshments ● Car Park

> FREE SHUTTLE to Brighton Sea Front

Details: 0273 501100





A1065	2.40	EBF89	0.80	EF85	0.90	EY51	0.90			UCC85	0.7
A2293	7.00	EC52	0.65	EF86	1.45	EY81	1.10	PL82		UCH42	4.8
A2900	12.75	EC91	5.20	EF89	1.60	EY86/87	0.75	PL83		UCH81	0.7
AR8	1.40	EC92	5.55	EF91		EY88	0.65	PL84		UCL82	1.8
ARP3	1.45	ECC81	1.25	EF92	2.15	EZ80		PL504		UF41	1.8
ARP35	1.50	ECC82	0.95	EF95	1.40	EZ81		PL508		UFB0	1.6
ATP4	0.90	ECC83	1.10	EF96	0.65	GM4		PL509		UF85	1.4
312H		ECC84	0.60	EF183		GN4		PL519	5.85	UL84	1.5
CY31		ECC85	0.75	EF184		GY501		PLB02	6.60	UM80	1.6
DAF70		ECC88		EF812		GZ32		PY80		UM80*	2.3
DAF96		ECC189		EFL200		GZ33		PY81		UM84	1.3
DET22		ECC804	0.65	EH90		GZ34		PYB1/800		UY82	1.1
0F92		ECF80	1.25	EL32		GZ34*		PY82		UY85	0.8
)F96		ECF82		EL34	3.25	GZ37		PY88		VR105/30	2.7
DH76		ECF802		EL34*		KT77**		PY500A		VR150/30	2.7
DL92		ECH42		ELB2	0.70			QQV03/10	5.95	X66	4.8
0Y86/87		ECH81		EL84		ML6	3.20	QQV03/10*		Z749	0.7
OYB02		ECH84		EL86			29.50	QQV03/20A	27.50	Z759	19.9
92CC		ECL80		EL90	1.75			QQV06/40A			3.4
180CC		ECL82		EL91		OB2	1.70	QQV06/40A	45.00	Z801U	3.7
1148		ECL85		EL95		PCL82		QV03/12		ZB03U	21.1
A76		ECL86		EL504		PCL84		SP61		Z900T	9.5
B34	1.15			EL519		PCL86		TT21	47.50		1.9
B91		EF22		EL821		PCL805/85		TT22	45.00		0.9
BC33		EF37A		EL822		PD500/510		UABC80	0.75		1.2
BC90		EF39		ELL80SE		PFL200		UBF80	0.95		1.2
BC91		EF80		EM80		PFL200*		UBF89	0.95		0.8
EBF80		EF83		EM87		PL36		UCC84	0.85		0.7
ALVES A	ND TRAN	ISISTORS Te	leohone	enquiries f	or valves	transistors.	etc. Ret	ail 749 3934,	trade an	d export 743	3 089

COLOMOR (ELECTRONICS) LTD 170 Goldhawk Rd, London W12 8HJ Tel: 081-743 0899 Fax 081-749 3934. Open Monday to Friday 9 a.m.-5.30 p.m.

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

S.E.M. Q.R.M. ELIMINATOR MKII. This device can phase out completely local interference of ANY KIND. Connects in your aerial feeder and covers 100kHz to 60MHz. You can transmit through it. £85 incl ex stock. Hi Q RECEIVER AERIAL MATCHING UNIT. Provides a high selectivity impedance match for wire or co-ax fed aerials to your receiver £65 incl ex

stock.

S.E.M. TRANZMATCH MKIII. The only Aerial Matcher with UNBALANCED and TRUE BALANCED OUTPUTS. 1kW 1.8-30MHz, £149.50. Built-in EZITUNE (see below), £44.50. Built-in Dummy Load, £9.90 ex stock. EZITUNE. Allows you to TUNE UP on receive instead of transmit. FANTASTIC CONVENIENCE. Stops QRM. Boxed unit, £49.50. P.C.B. and fitting instructions to fit in any ATU, £44.50. FREQUENCY CONVERTERS. V.H.F. to H.F. gives you 118 to 146MHz on your H.F. receiver, Tune Rx, 2-30MHz, £69.50 ex stock. H.F. to V.H.F. gives you 100kHz to 60MHz on your V.H.F. scanner, £55.00 ex stock. Plug in aerial lead of any receiver. Tuning from 100MHz up.

or 6-METRE TRANSMATCH. 1kW, will match anything, G2DYM or

2 or 6-METRE TRANSMATCH. 1kW, will match anything, G2DYM or G5RV? on VHF. £45.00 ex stock. DUMMY LOAD. 100W THROUGH/LOAD switch, £29.00 ex stock. VERY WIDE BAND PRE-AMPLIFIERS. 3-500MHz. Excellent performance. 1.5dB Noise figure. Bomb proof overload figures. £37.00 or straight through when OFF, £42.00 ex stock. R.F. NOISE BRIDGE. 1-170MHz. Very useful for aerial work measures resonant freq. and impedance. £49.50 ex stock. IAMBIC MORSE KEYER. 8-50 w.p.m. auto squeeze keyer. Ex stock. Ours is the easiest to use. £49.50. First class twin paddle key, £27.00 ex stock.

TWO-METRE LINEAR/PRE-AMP. Sentinel 40: 14 x power gain, e.g. 3W-40W (ideal FT290 and Handhelds), £105.00. Sentinel 60: 6 × power, e.g. 10W in, 60W out, £115.00. Sentinel 100: 10W in, 100W out, £145.00. All ex stock

H.F. ABSORPTION WAVEMETER. 1.5-30MHz, £39.50 ex stock.
MULTIFILTER. The most versatile audio filter. BANDPASS Hi Pass, Lo Pass and two notches. Frequency and Bandwidth adjustable 2.5kHz-20Hz,

HIGH PASS FILTER/BRAID BREAKER. Cures T.V.I., £7.95 ex stock.

CO-AX SWITCH. Three-way + earth position. D.C.-150MHz, 1kW, £32.00 ex stock

£32.00 ex stock.

12 MONTHS COMPLETE GUARANTEE INCLUDING TRANSISTORS

Prices include VAT and delivery. C.W.O. or phone your CREDITCARD NO.
Ring or write for further data or catalogue. Orders or information requests
can be put on our Ansaphone at cheap rate times. Remember we are as
near as your 'phone or post box.

# Back-Scatter

**HF Bands** 

Reports to Paul Essery GW3KFE

287 Heol-y-Coleg, Vaynor, Newtown, Powys SY16 1RA

he passed away in his eighties.

Just a couple of contacts are noted by **G2HKU** (Sheppey) who offers c.w. with ZV7AA and CX5BW.

Now to GOHGA (Stevenage) who is back on the QRP rig again; Angle managed TA3D on that band.

Onto G3BDQ who used s.s.b. to UH8ABD, VK6PY, ZS200WOL, 4Z8C, 5B4YC, BY8AC, A41KM, 6W2EX, VP8CDR, G4WYG/ST2, HZ1AB, C53GB, TZ6RC, FT5XH, 9J2FR, VQ9IF and K1VV/IMD for International Marconi Day.

Now on to **ON7PQ** (Kortrijk) who says his c.w. crossed swords with A15AA, V31BB, WL7E, A51JS, UA0/GB4MSS, ZL2VS, 8J90XPO, HL00RC, XU8CW,9Y4/JA2EZD, FG5BP, PA3CXC/ST0, VP8BFM and 1S0DX.

#### The 3.5MHz Band

Doubtless those who hear or work me on this band are all breathing a sigh of relief! Seriously, I must admit to being deprived at sked times, even on a Sunday morning.

No DX this time says GW0HWK who says he raised GW3MED, GW0LAL, G4DXK, G4UPD, G4NST, G3IKS, G4PUY all on SSTV, plus LA9TQ, GJ4YCR and G30QD.

GOHGA (Stevenage) has about 20W to 20m of wire on this band and on c.w. she raised G4YNU, DL4KF/YL and G40PF.

The c.w. of ON7PQ made it across to 6Y5FS, UJ8JI, 5H1HK, V31SW, TR8XX and 4Z7G.

#### **SWL Club**

Lee Greaves is a newcomer to the short wave listening game and he is keen to form an s.w.l. club to cover the Northampton area. Any readers who may be interested please get in touch with Lee at 15 Heathville, Dallington, Northampton NN5 7HT. One suspects that perhaps the existing local amateur club will beat a path to Lee's door to enrol him!

#### **Snakes Alive**

I have a letter from **Richard** Williams (Deddington) who asks whether anyone in this country knows of the 'snake' antenna? Richard says he was shown it by a VK who used it on 14 and 3.5MHz; it was some 50m long, lying on the ground the 'head' in a plastics box, and the 'tail' into the station a.t.u. What is it and how does it work?

#### **WARC Bands**

The prize for this month is the delayed letter, datelined February 7 which turned up here a few days ago.

G4ZZG used to be a 'regular' many years ago. Charles now uses an Icom 735 and has a telescopic mast bracketed to the wall which normally sits at 5.5m, but can be wound up to 10m. Interest in the goings-on on the WARC bands caused him to put up a ground plane for 18MHz, comprising just a length of 4m aluminium pipe, mounted on the gable end about 5m a.g.l. and a couple of wire radials. Once it was up, the rig was switched on, came up on 18.078 and lo there was 3B8CF waiting for a QSO. On the other hand, as Charles says, the vertical picks up all the noises there are going! Since then on 18MHz there have been c.w. to various Ws, JR5WKQ, VK2AW, JA1IFP, PY1ASN VF1FTG IS0FFN PJ2/0H4XY. VE2PA, ZS8MI on Marion, RV9CFA, LU1QCK, HZ1HZ, VS6BI, EA8BEE and, of course, the Europeans.

Now we turn to 9H1IP in Malta; Vincent offers on 18MHz, AA2U/QRP at 4.8W, C31LBB, 4N3KW, UA9CBO, EA6VE, VE2RP, ZP5JCY, 7X2AK/3, C02BB, 9Y4KS, JA3EMU, TA2AK, ZL1BMV and PY5BI. Gotaways hereabouts included 1A0KM, HC2NI and 0Y9JD. As for the 24MHz collection, JG2TUQ, UA9CBO, LA4XFA, GJ3RAX, GJ3YHU, 7X2AK/3, CN8ST, VK6AKG, RA9UZ, C05DD and VU2NUD were completed contacts but IS0XV, V51BG, T77T and 9X5NP escaped. Antennas, wire dipoles or a magnetic

Now we turn to a new reporter in GOIMA (Clevedon) who ises 18MHz regularly, with an FT-101ZD and a dipole, or a G5RV; the site is 3m below sea level so the antenna is at 3m a.s.l. Operation is s.s.b. and c.w. and Phil notes how the band 'changes its spots' quite suddenly. In the month prior to writing GOIMA had worked the band on 11 days, at times varying between 0800 and 2330 local. The haul included G,I, EA, CU, SP, OE, JA, VK, KP, D66, ES, YL, F, OZ, VA. VB, OK, CT, W 6W7, C31, HA, HB and ZD - which ZDwas not specified but a long haul anyway!

Perhaps the best day was April 27, when CU2GE, W2FJ, G3CSK, W1HHY, SV1AWH, SV1ANW, JA7JH, JA6GIJ, VK3AHJ, LU9EHR, KP2BH, W4PEL and YV1CI M.

For a change, ON7PQ made a foray on 24MHz and pulled out 9M2AX.

Still with the WARC allocations, it was a very pleasant surprise to hear from G3VWC (Bath), who was many years ago in his s.w.l. days a founder of the Bishops Stortford club. Andrew had been QRT for many moons but is now back on the bands with a TS-680S used mainly on c.w. and mainly on 18MHz, making quite a few transatlantic contacts. The antenna is a 7MHz dipole at 6m which can be loaded up on 14 or 18MHz.

It was c.w. all the way with G2HKU. On 10MHz he raised ZM4HB, on 18MHz EA6ZY, LU9HGW, W6VX, OH2BVQ, N5VV, K2QIL, KF0Z and K4FV; turning to 24MHz there were K7VR, PJ9JT, KB6T0X and UB5LAK.

On 10MHz, says GW0HWK, the score was simply zilch; but on 24MHz, HZ1AB, RB5CP, N9BUU, CT1LN and RB5FF were booked in.

#### **Events**

As always, thanks to K1ARs Contest Calendar DX News Sheet The DX Bulletin, The DX Magazine and the CARFs Canadian Amateur, plus of course all you good reporters out there.

First the contests. Just about time to mention the All-Asian Phone on June 16/17. Notably the rules lay down strict disqualification clause for taking credit for duplicate contacts in excess of 2% on any band.

The Canada Day Contest is on July 1 for the full 24 hours of GMT time. Exchange name RS(T), QSO number, country. Score 10 points for each Canadian contact, 4 points per contact outside Canada and 20 points for a QSO with the official stations using the VCA or TCA suffix. Classes of entry are single-op all band, s.s.b., c.w. or both modes, single-op, single band, multiop single transmitter and multi-multi all-band only. The multiplier is one for each Canadian province/territory worked on each band and mode. Frequencies are around: 1.825, 1.875, 3.525, 3.775, 7.075, 14.025, 14.150, 21.025, 21.250, 28.025 and 28.500MHz. Entries to be mailed by the end of July addressed to John Clarke VE1CCM, 16 Keefe Avenue, Sydney, Nova Scotia B1R 2C7, Canada.

Expeditions and things now. As always, many of them are notified and completed before we can get a note to you in this column, alas. Although he starts before publication day, we understand that VK2GJH will be at Tuvalu (T20JH) between June 15-20, and on Nauru at C2INI after June 27; June 20-27 sees him at W Kiribati as T30JH.

At the time you start to read this the Trindade DX pedition will be up and running; the intention is to be there for all of June and July; operators PS7KM (s.s.b.) and PT7AA (c.w.).

The 1990 Malpelo expedition is planned to start in mid-October, with some 15 operators, QSLs being in the charge of HK3DDD; this one is currently well up the 'wanted' listfor most people, the last activity having been as far back as 1983.

Nowto a spot of history; The Spratly effort by 3W3RR as 1S0XV is aiming for 50 000 contacts though there have been breaks while fuel and supplies were fetched.

At the time of writing it is understood the close date will have been May 15. Conway Reef also will be history by the time you read this.

#### **Top Band**

G3BDQ (Hastings) mentions just a single contact, s.s.b. with GU2FRO for Sark. Doesn't anyone work this band these days?

This month finds me minus a rig, thanks

to a fire in the p.a. compartment. The

sight of flames reflected, like a coal-

effect electric fire, off the wall behind

the rig was somewhat startling!

Unhitching everything - linear,

outboard v.f.o., earth link, coaxial cable,

v.h.f. rig, power supply, keyers, what

have you - seemed to take a long time.

It is the first time since I have held my

A licence that an h.f. rig hasn't been

available to use when desired. That

sudden change of habit has produced

marked withdrawal symptoms!

Yakking on a v.h.f. repeater from down

here in the valley just doesn't seem to

have the same flavour somehow...One

lesson I have learned is that I will be

spending a lot of time thinking and

planning how best I can re-arrange

things so that any single item can be

extracted from the operating position

with minimum trauma and maximum

speed. So, this time I am totally in the

hands of the kind souls and publications

who report what goes on - to all of you

as individuals, to TDDXB, DXNS, The

DX Magazine and the Canadian

Amateur - my thanks. At the time the

rig went up, things seemed to have

been going pretty well by and large on

the bands. Since then I have only had

your reports to go by so I will not

comment here but let it appear from,

as it were, the input terminal.

#### The 28MHz Band

The strange conditions have reduced the possibilities of this band. Certainly we have had the sunspots, but alas it has been quite rare for the A index to be down at a civilised level, so propagation hasn't been all that superb. Mind, the band had its moments.

**GW0HWK** (Wrexham) uses the v.h.f. repeaters as monitors of propagation, as he can hear some 22 of them under normal conditions and even reckons to have noted me on GB3PW and survived! On 28MHz, s.s.b. accounted for A22AP, A22AK and T77FT, while f.m. raised UA3AFO, G0MUL, LZ1AY, LZ1AI and 4Z4SY.

Next we have **GM4UQD/M** around the Livingstone area; Alistair raised HC1NT, ZS6TJ, W3KDD, W0CG in Ohio on s.s.b. while c.w. managed W9ZVY, NX8X, K9RN/M, NU3Q, W9CDB, UL7ACE and WD8RTW. Incidentally, Alistair makes the very valid point that 99% of his operation occurs when he's stationary - as he says, sending c.w. from the car while coping with trafficis difficult! Difficult, yes, but W6AM/M was often heard on the move with almost as big a signal as the one from Rhombic Farm, operating on c.w. until

## Back-Scatter

However it is understood the Yasme boat will be visiting other hard-to-get spots in the Pacific after this one, so keep an ear open!

PA3CXC/STO pleased many a DXer, but alas the Ethiopia stop didn't materialise.

Malawi, 707; it is understood that 707LA is on the bands; he is said to be G3JCJ but at the time of writing it is not known how long he will be there. The QSL route also seems to be a mite vague, more details when I get them!

#### The 7MHz Band

An early letter from G2HKU (Sheppey)thistime as he was sneaking off for a crafty holiday; Ted used his key to raise UA9UPA, YV4AU, N4MQS and K8NW.

GOHGA says her crop this time included VP5VPX, 9H3JR, CT9/OH7XM, N4SF, W1MK, WA1KHR, NX1T, N4ND, WA1KWA, UA9QBA, RA9LD, UA9CAQ and U29FWW. Atthelower power level, she managed UOAL, UA9TA, W3BY, W2XF, W2RD, W1QK and VO1BZ. On a different tack, Angie worked GO/N6YBS who is in fact a JA and uses JA4KQG as his QSL Manager; this puzzles her, but after all, if one has a valid US call and comes to this country there is no reason why one shouldn't quote that call to obtain the reciprocal permit.

Just one for this band for G3BDQ, c.w. to ZB2B.

Now to ON7PQ; Pat found A15AA,

VK9LE, C6AFV, 6W1QB, 8J90XPO, TA1AZ, W6KP, V73AS, SV5/DK6AS and KH8/VK2EKY.

Late nights over the holiday were tried by GW0HWK; Mike obviously found this ploy profitable since he offers 4S7NMR, LU2BLK, 9K2DB, RA9STK, 4X6UU, 4Z8C, VE1TL, PY6KY and some 47 Europeans.

#### The 14MHz Band

Noisiness personified!

Alistair at GM4UQD offers s.s.b. with 3B8CF (a new one for the score), CN8EC, KF7NP, F/JA2RM, A41JR, 4S7VK and 4S7SW (who was using a three-element beam slung between two coconut trees), CN8EJ, VK2EQ, VK3QZ, IG9/IT9KJY (Lampedusa Is), ED1MDA (QSL via ON4AVL), ER4L for a query, UA0/GB4MSS and UA0FQ (Sakhalin). On the key he managed to find 4X6VH, VK3GY, N3ELN, JH1ADR, JQ7QYL and TK4MC.

Because of the noisiness, GWOHWK steered clear of the band in general, but did manage WA2VUY, NT11, CN8FZ, plus SSTV to DJ1TV, SP3/ DK1ZP/P, HB9AXG, DJ1IJ, HA1ZH, IV3EA and LZ2KAF.

Turning to ON7PQ we find Pat at the key and tangling with EK0DAP/HK4, JG2CLS/JD1, 4K4BDH, CE0ZIG, AH6JF, K9EL/VS6, XV8CW, A51JS, 4K2BDU, UA0/G0KPH, YK1AO, 9N1FOC, F05BI/P, KH8/VK2EKY, PZ1DY, ZK1XQ, ZK2KK, AH3C/KH5J and PA3CXC/STO.

It was c.w. all the way for G3BDQ

who usually mixes his modes more. VU2SGR, UI8O/UI8IAY, 3B9FR, TK5GT, TK/PA3DQW, UA0/GB4ICE (delightful call that!), EX1A, PA3CXC/ST0 and VK3EGN.

Over to G0HGA (Stevenage) and the QRP;thisyielded UA3DKX, UA3ZEK, UA9JH, UB5QSA, LA2OHA, OZ7JR, DL1ZQ, K1DG, K1AR, W2AA, the last three being contest contacts.

#### The 21MHz Band

Not so much as usual here for some reason. GW0HWK sets off very simply by commenting that he worked nothing on the band.

The 21MHz band is obviously a favorite band with ON7PQ; Pat's c.w. managed807ZL,3C1EA,VK9LE,3D2GB, JG2CLS/JD1, KE9A/DU3, ZLOAIC (Greenpeace at Amsterdam), UA0/G0P, FH5EJ, XU8CW, 9M2VF, JY9LC, UD60DKW, FR4FD, 7X4AN, 4K3PBD, AH3C/KH5J, ZK2KK, ZK2RW and PA3CXC/ST0.

Overto G3BDQ; John's s.s.b. raised KB6DDV/OU3, while his c.w. made it over to VP5P, YC2NFD, JAs, 4Z4UW, ER4L and ISOXV - Spratly at last, sighs G3BDQ!

Finally GOHGA who persuaded her QRP up the 28MHz vertical and by that means hooked TK5EP, UP2BQH, UC2WO, UB4UFL and UB5HX.

#### **QSL** Addresses

G2HKU sent us some to be going on with, namely; FM5FP who is Box 619 Fort de France; 4K2OT, via UB5KW; ZD7KM, via G3JKB; 8J9DXPO, to JA3RL; PJ9JT via W1AX; and VP5P who goes to WN5A.

#### **Bouquets!**

The final letter comes from George Senior (Loftus, Cleveland) who notes that he frequently hears ZC4GA on 28.45 or 21.17MHz. This chap, George comments, is a good operator and if the rabble gets to be too much just disappears and leaves the mob alone. The ZC4GA QSLs are handled by GMOALS who also gets a bouquet for fast service. As a matter of interest George uses an FRG-7 receiver with 7m of wire. What a pleasant change to receive a letter singling someone out as a decent operator! Thanks George.

#### Final-Final

That's the lot for now. One hopes to be operational again by the time next month's piece comes to be written; meantime the deadlines for the next three months are for your letters to reach me by June 25, July 40 and August 24. The address is at the head of the piece.

#### **FOR UP-TO-DATE NEWS RING 0898 654632**

Calls charged at 38p peak and 25p off peak.

During the latter part of March the more active side of the sun was looking our way, causing numerous minor auroras to occur. There were a number of solar flares up to 365 flux units and sudden ionospheric disturbances almost every day. The sunspot count climbed to well over the 300 level, with the solar flux rising to 247 units on March 22. The geomagnetic levels were very disturbed being up to storm level on the previous day. There were proton events on March 28 & 29, together with a flare of 310 flux units. Massive noise bursts were heard up to 10GHz. With all this geomagnetic activity it was hardly surprising that radio auroras continued to be prevalent, especially with stations situated in Scotland or northern England. By the end of March the sunspot count had declined to around 145, the solar flux dropping from 227 on March 26 down to 159 on April 1.

Solar flares continued to be reported, with an X1 flare occurring on April 3 and a class M7 flare occurring on April 4 but nothing appeared to have developed from them. Starting from April 7, solar activity slowly increased every day up to April 11. On April 7 there was a flare of 230 flux

# Back-Scatter

#### VHF Up

Reports to
David Butler G4ASR
Yew Tree Cottage
Lower Maescoed, Herefordshire HR2 0HP

units and another flare which caused strong radio noise bursts, ionospheric disturbances and a small proton event. A magnetic storm commenced at 0843UTC on April 9 continuing through to April 11. A series of flares was reported on April 10 followed the next day by another proton event.

During this active period there were a number of auroras, the event on April 10 being particularly good. There was a steady rise in solar activity through to April 19. Sunspot counts rose to over 300 with major flare and magnetic alerts being issued throughout the period. There were ionospheric disturbances on April 16 & 17. As the quiet side of the sun came into view from April 23, so the solar activity saw a general decline.

Sun spot counts dropped to the 140s compared to 304 on April 18. Little happened during this period apart from a proton event of 150 particle flux units on April 28. During April the following highs and lows were recorded. Sun Spot Numbers, 327 on the 20th, 116 on the 10th, Solar Flux, 249 on the 20th, 133 on the 30th, Boulder A Index, 67 on the 10 & 11th, 4 on the 1st.

Propagation on the 50MHz band has seen a few months of relative quiet, but recently the band has started to pick up. During April, operators had the choice of working stations via Aurora, Auroral-Es, Sporadic-E, Trans-Equatorial Propagation and even extended groundwave. The month of April also saw the end of the main

auroral period. We have now entered into the Sporadic-E propagation season which generally lasts from May through to August.

#### Aurora

The majority of correspondents writing in mentioned only the excellent aurora that occurred on April 10. However, in a 5 week period from March 18 to April 23, PW readers recorded 13 events, most of these admittedly reaching only to the 50MHz band but auroras nevertheless. But first, excellent news of 50MHz QSOs with the North Pole 90 Expedition.

Laurence Howell GM4DMA has reported a number of Auroral-E contacts made whilst operating from UAO/GB4MSS on Sredny Island. Following days of receiving Band I Norwegian television, via aurora, the first 50MHz amateur radio contact was accomplished on April 11. In a brief opening, between 1632 to 1633UTC, OH9NLO (JP26UM) was worked at 559, over a path length of 2364km. The next contact came 4 days later, April 15, between 1648 to 1650UTC when a c.w. contact was made with OH3MF/9 (JP36UN) at an increased distance of

2718km. Events on April 16 were even better. At 1728UTC, OH2TI (KP20KE) was worked peaking 559, at a distance of 3024km. A few minutes later a repeat QSO was made, this time signals being exchanged at 599 bothways. Another

QTH Locator Squares Table

Station	50	70	144	430	1296	Total
G3IMV	228	_	430	125	51	834
GJ4ICD	360	_	263	119	59	801
G3JXN	204	22	187	134	88	635
G6HKM G4KUX	202	_	218 372	109 120	46	575 492
G3UVR			257	140	83	480
G1KDF	140	_	180	102	37	459
G4RGK	_		284	124	50	458
G3XDY	_	_	206	148	91	445
GODAZ	7	_	277	128	27	432
G4DEZ	55	_	249	49	49	402
G6DER	40	22	183	110	78	393
ON1CAK GOLBK	48	_	280 257	53 89	11 46	392 392
G8LHT	79	19	185	93	14	390
G1SWH	153	25	153	58		389
G1EZF	_	_	263	93	_	388
G4XEN	- 1	_	274	111	_	385
G4MUT	82 43	22	153	93	31	381 361
ON1CDQ G1LSB	44	_	255 172	56 143	7	359
GOEVT	88	_	209	57		354
G4RRA	_	_	255	80	-	335
G3COJ	_	_	186	103	44	333
G4SS0	=	=	229	93	-	322
G4FRE		_	102	146	72	320
G1DWQ G4TIF	171	-	142 200	110	_	313 310
G4DHF	=		307	110	_	307
G1EGC	_	=	198	80	23	302
G8HHI	_	_	148	110	38	296
G8PNN	_	-	129	99	64	292
G4ZTR	78	28	104	50	30	290
G6MGL G4NBS	-	-	141	89	59	289 287
DL8FBD	_	_	119 280	105	63	280
G8ATK	_	=	143	91	45	279
GW6VZW	118	_	143	6	_	267
G8PYP	122	2	106	32	-	262
G4PCS	-	=	258	3		261
G1GEY G3NAQ	_	_	168	77	11	256
G6STI	_		175 152	80 69	24	255 245
G6DZH	_		154	87		241
G3FPK	_	_	241	_	=	241
G4IG0	_	=	238	-		238
GOEHV	_	_	160	75	_	235
GM4CXP EI5FK	_		198 172	31 56	_	229 228
GISMD	115		106	30	_	220
G4DOL			216	_	_	216
G4MEJ	_		213	_	_	213
G8LFB	_	-	209	<b>—</b>	_	209
GW4FRX	_	_	204	40	_	204
G8MKD GJ6TMM	_	_	150 151	49 48		199 199
G4YCD			197			197
GITCH	94	_	95	6	_	195
GIIJUS	_	-	192	_	-	192
G1D0X	54	26	73	16	8	177
G6DZH G7ANV	-	_	156	-	_	156
G6MXL		_	153 91	45	16	153 152
G4FVK	_	_	78	49	21	148
G4AGQ	_	=	104	42	1	147
G8XTJ	29		116	-	_	145
GOFYD	1	-	142	1	_	144
G6MEN G1WPF	41	2	97	26 29	4	136 126
GOFEH	_	_	101	24	_	125
GOISW	45		59	17	_	121
<b>GW1MVL</b>	_		109	7	_	116
GIIMM	=	_	98	17	-	115
G7ENF			86	23	_	109
G7CFK	109		77	18	_	109
G1CEI GM0HBK	11		107	10		106 107
GI40WA		_	103	_	_	103
GMOGDL		_	81	22	_	103
G7CLY		-	100	2	_	102
G1SWH		-	148	53	-	101
G4WHZ	76	_	76		/	83 76
GOGTF	70		73		_	73
GU4HUY	_		73		_	73
G1NVB	76 — —	_	73	-	-	73
GOHDZ			64	-	7	64
GM1ZVJ	6	-	48	_		54
GM0J0L G2DHV		_	47 33	7	2	47
G7AHQ	_	_	34	-	-	34
0,,,,,,,						

No satellite or repeater QSOs Starting date January 1 1975 contact was made with OH3MF/9 at 1734UTC, followed at 1741UTC, by a new country in the form of SM3JGG (JP71). Signals by this time were getting weaker, an exchange of 539/519 being given. No other signals were heard by UA0/GB4MSS until close down on April 21. Following these results Laurence suggests that the best time for contacts into these latitudes via Auroral-E's would be between 1400 to 1800UTC.

Prior to obtaining this report from GM4DMA I received news from G3MY (YSS) that he had positively identified signals from UAO/GB4MSS, in beacon mode, between 2000 to 2043 UTC during the big aurora on April 10. The signals, on 50.109MHz, were very weak and fluttery, typically 41A. Unfortunately, any hope of a contact was negated by all the UK lids operating on and around the DX calling window of 50.110MHz. When will you all realise that 50.110MHz is specifically for CALLING between Continents and that the area 50.100 to 50.130MHz is designated for traffic between Continents. Inter-UK or UK to Scandinavia is European traffic and should not be carried out within this 30KHz wide DX window. Your comments please!

Ted Collins G4UPS (DVN) detected a weak 50MHz aurora on March 18, from 1945UTC, in which several Scottish stations were heard on c.w. An even weaker event was noticed on March 21, at 1840UTC, with only GM0GEI being heard peaking 55A. Another event occurred on March 25, stretching to 144MHz. On 50MHz, from 1550UTC, G4UPS worked into Northern Ireland and Sweden, the aurora finishing with him around 1835UTC. Jim. Smith G1DWQ (DOR) heard some Scottish stations on 144MHz c.w. around 1610UTC but was unable to work any. Also on 144MHz, GM0EXN (HLD) worked GW0KZG/MM on the Royal Research Ship Challenger in locator IP71. Other stations situated in Scotland worked into Norway, northern Sweden, Finland and Denmark. G4UPS heard GM0GEI, 55A, on March 26 at 1825UTC but very little else. Weak auroral television carriers on 48/49MHz were heard by G1DWQ on March 27 around 1800UTC but no amateur signals were heard this time. Jim did however hear GM3WOJ on March 29 peaking 55A on s.s.b. at 1530UTC and some weak c.w. on 144MHz around 1715UTC. G4UPS heard two stations on 50MHz, GM0GEI at 55A and GM3WOJ at 44A, both from 1700UTC

Auroral activity disappeared for the majority of UK operators over the next 11 days only to re-appear with a very large scale opening on April 10.50MHz operators had a field day with at least 14 countries being available to those prepared to tune around and find them.

Paul Feldhahn G7CFK (MCH) worked many stations, contacts including E12GB (1063), G1DWQ (1090),

GI6FHD (I086), GM1XOG (I085), OH3AWW (KP21), ON1IM (J011), PE1LCL (J021) and SM3JGG (JP71).

Ela Martyr G6HKM (ESX) concentrated on 50MHz rather than going up to 144MHz and was rewarded byworking7 new locator squares when s.s.b. contacts were made with PE1DTU (J023), PE1JWV (J033), SM3JGG (JP71), SM3LBN (JP80), SM6ESG (J067), SM7CMV (J075) and SM7JUQ (J065). Many other stations were worked including G, GM, GW, LA, OH, ON, OZ and PA. Ela mentions that she still hasn't worked GD but a letter from John Heys G3BDQ (SXE) includes GD3AHV (1074) as one of a number of stations worked during the aurora. Unfortunately this station prefers to operate on c.w. a mode which Ela does not enjoy. G3BDQ concentrated on c.w. towork 0Z1GRS (J045), 0Z3ZW (J054), 0Z60L (J065), PA2AWU (J032), PA0VAJ (J033), SM7CMV and SM7FJE (J065), all being new squares.

Steve Damon G8PYP (DOR) shared his operating time with 144MHz working only G1YOA (AVN) and G8GXP (YSW) via the aurora and at 2139UTC, LA9BM (JP40) via Auroral-Es.

G4UPS made the most of the event by working 40 stations in 12 countries. Highlights of the event, between 1254 to 1806UTC, included EI2GB (I063), EI5FK (I051), GD3AHV, LX1SI (JN39), OZ1ABE (J065), SM7AED (J065) and SM7FJE. Contacts were made via Auroral-Es with LA9BM at 2135UTC and with OH5NQ (KP30) at 2136UTC, the event finally fading out with Ted at 2200UTC.

M. Van de Velde ON1CAK worked 60 stations on 50MHz including GD3AHV, GI8YDZ, GM1SZF, GW3LDH, OH1AJ (KP20), OH2TI (KP30) and OH5NQ (KP10).

The event was also very good up on the 144MHz band. Dave Brown GD4XTT (IDM) managed to get on the air at 1646UTC to work DF90X (J042), EI8BEB (SG0), F6CCH (IN96), F6EZT (IN97), G4ZML (CVE), G8PYP (DOR), G14MAC (ATM), GJ6TMM (IN89), OE50LL (JN68), ON4AYR (J010) and PA0AKN (J021). Dave however was upstaged by his wife Joice GD0ELY who worked DF5BN (JN59), YU3ES (JN65) and YU3ZV (JN76) among many other stations.

Overin Ormskirk, Bob Nixon G1KDF (LNH) was also doing great things. Many German, French and Dutch stations were contacted on s.s.b., including DJ0JI (JN38), DG6HB (J053), FC10ET (JN38) and F6FET (JN37) who were located in wanted squares. Between 1645 to 1745UTC the longer distance stations were worked, contacts being made with OK3LQ (JN88) at 1498km, SP2MSC (J092) and SP3MFI.

lan Wright GW1MVL (CWD) managed a number of useful s.s.b. contacts working DG3BCU (J043), DG4BE (J033), DK6LI (J041), DL1BCT (J032), EI8BEB, GD6ICR, GI4MAC, GI7EEV (I074), GW4HDF, GW8JLY and PE1NFN (J022).

Across in Belper, Vince Shirley G7ENF (DYS) first detected the event on 144MHz at 1230UTC when the German beacon DLOPR went auroral. Stations were then worked contest style until 1945UTC, new squares being worked with DG6HB (J053), DG8NCO (J050), DL8PCD (J040), DL8SCQ (JN48), DG9NOK (JN59), FC10ET (JN38), F6CCH (IN96), HB9DFP & HB9EAH (JN37), OZ1ANA (J055) and Y25WA (J064). Best DX of the event was OE5OLL (JN68) but he has been worked on several occasions before. Vince runs an IC251E and mentions that the doppler shift on southerly stations was almost out of the range of the 800Hz r.i.t. control, the two HB9s and F6CCH being right on the limit.

John Lemay G4ZTR (ESX) was only able to come on for little over one hour but seems to have caught the best time as new contacts were made with HG8CE (KN06),11KTC (JN45) and YU3ZV (JN76).

Down on the Dorset coast, G8PYP worked GD4XTT, GD6ICR and ON2AFT whilst G1DWQ worked FB1LJP (IN77) and a few DL, El and G stations.

I first heard the aurora, at 1500UTC,

Distance in kilometre

	Distance in kilometres											
	Station	Tropo	Aurora	Meteors	Es							
Ì	GOCUZ	2943	1758	1996	2943							
ı	GODAZ	1251	876	2026	2249							
ı	GODKM	2811	1488	_	2203							
	G0EVT	3080	1640	1808	3080							
	GOFYD	1315	1624		2019							
	GOISW	1059	566		2057							
ı	GOLBK	3060	1755	1876	2350							
1	G1DWQ	1454	1812		1836							
	G1EZF	1730	1757	1920	2375							
	G1KDF	3023	1421		2386							
١	G1LSB	1319	733	1732	2723							
١	G1SWH	3035	1429	_	2372							
	G3FPK	1835	1686		2337							
	G3LTF	1824	1846	2021	2174							
	G3SEK	1560	1681	1872	2154							
	G4ASR	2848	2029	2107	2853							
1	G4DHF	1498	1530	2000	2448							
١	G4JCC	1334	1158	1018	2173							
	G4MUT	1163	684	1533	2068							
	G4RGK	1466	1757	1920	2375							
	G4VXE	2862	1446	1501	2880							
	G4YTL	1404	1774	2025	2172							
	G4ZTR	935	1535		2130							
ı	G6DER	1834	997	1957	2068							
ı	G6DZH	2924	711	_	2233							
١	G6HCV	2880	1450	1912	2880							
ı	G6HKM	1304	1555		2265							
ı	G6LEU	2620	910	_	2430							
1	G8HHI	1742	—	1	2058							
ı	G8JDX	2667	1368	_	2663							
١	G8LHT	3070	1780	1868	2510							
1	G8MFJ	1209	1210	1329	2168							
	G8PYP	1083	1451		2318							
	GD4XTT	3053			1700							
	GIIJUS	3067	1614	1507	2216							
	G18YDZ	1216	1809	1901	2562							
	GJ4ICD	1620	1100	2050	2090							
	GM4CXM	1428	1750	2100	2023							
	GM4YXI	3160	1881	2048	2513							
	GW6VZW	2830	1473		2236							
	ON1CAK	1420	1166	1948	2725							
	ON1COQ	1420	1166	1948	2124							

Annual c.w. ladder

		Band	(MHz)		
Station	50	70	144	430	Points
G4ASR	11	-	63	_	74
G40UT	-	2	49		51
GDOELY	2	-	41		43

Number of different stations worked since 1 January 1990

when I was gain matching the elements of my newly installed 50MHz widespaced Yagi with the antenna pointing up at 60 degrees. Once the tower was wound into the vertical position it was obvious that this was a good event and therefore I hastily connected a length of cable to the 144MHz antenna to hear what was happening. Results were very poor. Between 1555 to 1620UTC only 3 contacts were made, GOJNZ (1070), PA2GER (J021) and DL1BCT (J032). Something was obviously wrong with the system and investigations made during the following day showed that the temporary feeder to the 144MHz Yagi was completely open circuit and that all contacts had been made via the earthy side of the cable!

The only reported contact on the 430MHz band was made between G1KDFand GM1SZF(1088) with signals peaking 52A.

Following the big event of April 10, further auroras continued to be heard during the next four evenings. On April 11, between 1745 to 1815UTC, G1DWQ heard a number of GMs on 144MHz and made contact with GW4VEQ on the same band. GM4CXP (1085) was worked at 1757UTC on April 12, again on the 144MHz band. Meanwhile, down on the 50MHz band, G4UPS worked GM3WYL (1075) and GM4DGT (1086) between 1759 to 1802UTC. During the evening of April 13, Jim G1DWQ heard the 48/49MHz television carriers go auroral between 1830 to 1930UTC but no amateur signals were heard to do the same. Still with the 50MHz band. G4UPS made contact with GM4DGT at 1611UTC via aurora on April 14 and heard GM3WYL at 1615UTC. Ted lost the aurora at his location in Devon at 1645UTC whilst at my QTH in Herefordshire the 144MHz band was still open but only just. Between 1630 to 1650UTC a number of c.w. contacts were made mainly with GM stations in 1085, 86, 87 and 88 but at 1640UTC, YL2MD (K017) came back to my CQ call giving me a report of 51A.

During the next week there was no sign of auroral activity in central England but on April 23 the v.h.f. bands sprung into life again. Dave GD4XTT had a quick session on the 144MHz band from 1622 to 1643UTC working 10 stations in G and GW. Joice GD0ELY managed to get Dave off the rig to work a number of operators in G, GM and PA.

At my QTH, I made a number of c.w. contacts, between 1630 to 1701UTC, with LASSJ (J059), SM0CCM (J089), Annual v.h.f/u.h.f. table January to December 1990

SM1BSA (J097) and a small number of GM stations. G1DWQ heard SM1BSA (J097) and GM0J0L (I078) being unable to work either but did work GM8MBP on 50MHz.

The auroral event on April 23 was most likely the last of the season, Sporadic-E now taking precedence.

### The 70MHz Band

The only propagation events to liven up this band were the numerous auroral openings in March and April.

Dave Lewis GW4HBK (GWT) caught the aurora on April 10, managing to work 5 countries and 9 counties in the process. Contacts on s.s.b. were made with EI9FK (Co. Wicklow), GI4ONC (LDR), GM3WYL (SCD), GU2FRO (SRK), G3HRH (LEC), G3ZRK (DHM), G0ING (ESX), G6DER (YSS) and G8GXP (YSW).

Subject to there being no objectionsfromhislocal RIS Manager, Dave Austen G1EHF (BRK) intends operating an unattended beacon on 70.070MHz during the month of June to coincide with the Sporadic-E season. The beacon will consist of a transmit strip from a Storno CQM-632 transceiver, with f.s.k. of his callsign and locator being applied to the crystal oscillator. The transmitter will supply 15W to a gamma matched dipole orientated north-west/south-east. Reception reports, both via Es or tropo would be welcomed.

Mid-Glamorgan is a county that you don't hear much 70MHz fixed station activity from. It is therefore pleasing to note that **GW4NBY**, located in Bridgend, is now active on the band.

Devon is another county with a scarcity of 70MHz operators. However, it is now worth putting the beam in that direction as G6ZRM, located in Paignton, can often be heard in the evenings on s.s.b.

### The 144MHz Band

A number of auroras, some usable meteor showers, periods of extended tropo and an e.m.e. contest all served to liven the band up during April. And it can only get better!

A number of stations have reported working GW0KZG/MM in various wet squares. G1SWH, G3IMV, G4ZTR and G6HKM contacted Andy whilst he was in J006, G1KDF worked him in 1056 & 1055 and GW1MVL found him in 1065 & 1075. G1SWH also worked him in 1056 and 1096.

On the tropo front, G8PYP has been making regular s.s.b. contacts into DL,

F, ON and PA during March and April. Some of the better QSOs include DL1EFJ (JO31), DJ6LV (JO31) and DF0AA/P (JO32).

G6HKM mentions contacts with LX/
ON1KPW on April 1 and GU3EJL (ALD)
on April 13.

Having correctly terminated the LDF4-50 Heliax and Westflex-103 patch cable around the rotator to the 18element Cushcraft Boomer I was determined to try out the system to confirm that it was working to my satisfaction. Contacts via meteor scatter were made during April with SM0KAK (J089), he getting a 77 second burst from me at S7, SM5MIX (J078) and IKOBZY (JN61). A schedule with OH5LK (KP30) at a distance of over 2100km was not completed although reports were exchanged bothways. Towards the end of the month the R.E.F. EME contest provided an opportunity to try some moonrise/moonset contacts whilst the moon passed through the vertical beamwidth of the single Yagi. Contacts were made with SM5FRH at moonrise on April 28 and with KB8RQ and VE7BQH at moonset on April 29. Signals were very copyable and readers may care to note that it does not require a super optimised antenna system to hear the larger EME stations off the moon. I was using a 10m boom length Yagi, no preamplification, 33m of heliax and an 15 year old FT-221 transciever in s.s.b. bandwidth with no filtering other than the ears! Other stations heard off the moon included UA1ZCL, F8SQ and DL5MAE.

### The 430MHz Band

Activity on this band is apparently very low, having received only four reports and of those, GD4XTT mentions just 2 contacts in January, G8PYP reports a QSO with F1ANH (IN98) on March 17 and G6HKM writes to say that no DX has been worked at all.

The only time when there is some life on the band is during scheduled contest weekends. In the event on March 3, GW1MVL made s.s.b. contacts with GW8SJP/P (PWS), G4NPH (CBE), G6UMP (WKS), G0CLP/P (CBA), G0FEK/P (YSN) and G0FRR/P (DOR).

### The Microwave Bands

I have received no station activity reports for some time but at least I am getting information regarding stations who are becoming QRV on the microwave hands.

G1SWH writes that he will be on 1.3GHz very soon and looks forward to working G6HKM shortly!

John Eaton GM4LBV (SCD) is now active on 1.3 and 2.3GHz running 200W of s.s.b. on 1.3GHz and 50W on 2.3GHz. He is expected to become QRV soon on 3.4 and 5.7GHz, running about 5W on both bands. Earlier this year John

had a good contact, on 1.3GHz, with a station in Paris.

David Mann G8ADM (BKS) is back on 1.3GHz following a house move. He is running 10W into two 15/15 J-Beam Yagis with a GaASFET low noise amplifier. Contacts are now being regularly made into the home counties but he reports that activity is much lower than in previous years.

### **VHF News**

Following a trip to visit his brother 6Y5IC, in Jamaica, Neville Bethune G3RFS has left behind an R & N 50MHz transverter and 5-element F9FT Yagi. Neville reports that the last 50MHz activity from Jamaica was during 1980.

Andy Adams GWOKZG/MM sent in a report whilst he was docked in Dundee at the beginning of April. The severe weather in March was the worst encountered in the North Atlantic for 40 years, causing the first part of the trip to be abandoned. Andy did manage to make a number of contacts however. On March 15, from 1056, he worked G1SWH, G1KDF and G8XVJ, all on s.s.b. and G3UVR on c.w.

G4APA was heard the next day when Andy was in 1058 but contact could not be established. Meteor Scatter was tried for the first time with G3IMV and G0CUZ and although reflections were received no QSOs were made. On March 21, Andy was located in IP71 and trying again for an MS contact with GOCUZ. Unfortunately reflections were still poor resulting again in an uncompleted QSD. Whilst in the Faroe Islands Andy used the callsign OY/GW0KZG/MM and on March 24 when he was in locator IP62, he was able to make a few c.w. contacts during a late night aurora. Stations worked between 2319 to 0050UTC included GM4YXI (1087), LA5SAA (J029), LA9T (J059), SM5DCX (J089) and SM7GWU (J078), Results were better on March 25 as an aurora occurred, at 1425UTC, during an afternoon off. Located in IP71, stations were worked within G, GM, LA, OZ and SM. The longest distance during this session was SM5DCX, with G4KUX (1094) being the best from the UK. Another phase of the aurora was heard between 2320 to 2340UTC, SM4HFI (JP70) and SM5DCX being worked. Another aurora, on March 29, when in locator 1089, gave contacts with several Scottish stations and also G3UTS (ID94), G4APA, G8XVJ (IO83) and GI4KSO (1064).

If you didn't manage to work GW0KZG/MM whilst he was sailing through J018, don't worry. It is also possible to work the resident operators in this wet square! Both LA5JEA and LA8AEL are active from a gas platform in this locator, running 25W into a dipole. A beam is expected to be shipped out to them soon. They are mostly active around midday and from 1700UTC onwards.

	50MHz		70MHz		144MH	Z	430MHz 13		1296MHz		
Station	Country	Counties	Country	Counties	Country	Counties	Country	Countries	Country	Counties	
G1SWH	31	14	24	4	54	9	17	5	-	_	158
GD4XTT	23	3	_	_	57	12	5	2	_	_	102
G6HKM	5	7	_	_	47	10	8	3	_	_	80
G8PYP	12	7	1	1	28	8	9	2	_	_	68
G4ASR	3	12	3	1	27	14	_		_	_	60
G4ZTR	_		_	_	36	12	-		_	_	48
GW4HBK	_	_	24	6	_	_	14	3		_	47
G4SEU	_	_	42	3	_	_	_	_	_	_	45
G7CLY	_	_	_	_	41	4	_	_	_	_	45
G7CFK	18	12		_	_		_	_	-	_	30

# NTERPRISE PPLICATIONS **ERA LTD** NOW WITH VERSION 3

**26 CLARENDON COURT** WINWICK QUAY Tel: (0925) 573118. **WARRINGTON WA2 8QP** 



All prices include VAT & P&P

£154.95

### MKII MICROREADER

The Microreader is a small compact unit that allows anyone equipped with a suitable SW receiver, to read Morse & RTTY signals simply and without fuss. No computers, interfaces or program tapes are needed, just connect the Microreader to the ear or speaker socket & switch on. The decoded words appear on the built-in 16 character LCD display screen.

The Microreader contains all the filtering & noise blanking needed to allow

reception even under bad conditions. A three colour bargraph tuning indicator makes precise tuning simple, while shift indicators take some of the guess work out of RTTY. Despite the fact the Microreader contains two fast processors (12MHz), it is extremely quiet generating virtually no RFI. The Micro-reader can also if you wish, transfer the decoded messages to any printer, computer or terminal unit equipped with an RS232 port.

In the tutor mode, the Microreader will send random groups of characters

with variable speed & spacing, or plug in your own Morse key to check your

sending. In both cases the characters are shown on the display.

The MKII Microreader comes complete with audio lead & demonstration tape. Full technical support & advice & a free upgrade service.



Price £99.50

REVIEW PW SEPT 89

### **BP34**

The BP34 audio filter helps you hear weaker stations by eliminating adjacent channel & wide band noise interference. A must for SWLs/Contest groups/CW operators/

Weather Fax users.
Easy to connect & use but despite it's apparent simplicity, the BP34 has the highest performance specification of any filter you can buy. Exceptionally sharp cutoff, 80dB of stopband rejection & less than 0.3dB passband ripple makes the BP34 more versatile than a whole set of expensive crystal filters!

To order or for more information ring or write. We are open Saturdays for personal callers.

Also available from:

Third Eye Ward Elct

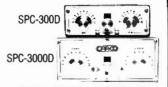
All Products unconditionally guaranteed for 2 years.



### **BUY THE BEST — BUY**



### SOLID BRITISH ENGINEERING



'STAY TUNED FOREVER' With a

CAPP.CO) A.T.U

AND BALUNS OOP

ONARY

BUILD YOUR OWN A.T.U. FOR £66.10 CAP-25S £17.90

CAP-25T R/COAST

£21.80

£26.40 + £4.50 p&p

CAPACITORS, ROLLER COASTERS

BUILD YOUR OWN LOOP - COMPLETE KITS

AMA3 COVERS 10-20m

£276.20 + £10.00 p&p AMA5 COVERS 30, 40, 80m

£360.65 + £15.00 p&p

OR INDIVIDUAL PARTS e.g.

CAP-L1 + MOTOR 10-20m

£55.15+£3.00 p&p

CAP-L2 + MOTOR 30-80m

£99.50 + £5.00 p&p

NEW RECEIVING LOOP AERIAL

RMA-1 COVERS 1.5-7.0MHz INC. AMPLIFIER £79.50 + £5.00 p&p

RMA-2 COVERS 7.00-30MHz

£44.50 + £5.00 p&p

See Short Wave Magazine, June, for review.

AMA3 COVERS 10-20m £314.60+£15.00 p&p AMA5 COVERS 30-80m £429.00 + £20.00 p&p

YOU ONLY NEED TWO AERIALS FOR

CONTINUOUS COVERAGE FROM 3.5 to 30MHz

COST OF THE TWO AERIALS-ONLY £665.50+£30.00 p&p THIS OFFER INCLUDES CONTROL BOX, CLAMPS AND CABLES. BRITISH WORKMANSHIP AT ITS BEST \*NEW PRODUCT FROM CAP.CO AS-305 AERIAL SWITCHING UNIT

1-160 MHz, 3000 Watts PEP. £64.95+£3.00 AS-305R AERIAL SWITCHING UNIT

REMOTE VERSION OF ABOVE £74.95 + £3.00 p&p

\*NEW PRODUCT SPC-100 A.T.U.

1-30 MHz, 300 Watts PEP. £79.50 + £5.00

For more information on any of our products including high power A.T.U's, Loop Antennas for commercial use.

send to: CARCO ELECTRONICS LTD

UNIT 6, PEEL ROAD INDUSTRIAL CENTRE PEEL ROAD, WEST PIMBO SKELMERSDALE, LANCS WN8 9PT TEL: 0695 27948

ROMICS From 1st June 1990 our new address will be: UNIT 28, PENLEY IND. EST.

PENLEY, WREXHAM, CLWYD LL13 OLQ TEL: 0948 74717

CONCRETIVATIONS TO ARRECTED WHELE

# TOTAL COMMUNICATIONS Pye Europa UHF 420/470MHz Pye Westminster AM high band, boot mount with control gear but no speakers and Pye Westminster AM high band, boot mount with control gear but no speakers and Pye QUYASE base stations, all model unit (no cables), choice of 3. Pye Camprigue UHF 420/470MHz. Pye QUympic UHF 420/470MHz. Pye Clympic UHF 420/470MHz. Pye Cambridge AM high band, 150/175MHz, choice of 5. Pye Cambridge AM low band, 56986MHz, choice of 2. Pye Olympic M233 ind-band AM, 1054 and Mich boot mount, with no control gear, choice of 5. Pye Pye Olympic M233 ind-band AM, 1054 and Mich boot mount, with no control gear, choice of 5. Pye Pye Olympic M233 ind-band AM, 1054 and Mich boot mount, with no control gear, choice of 5. Pye Pye Olympic M233 ind-band AM, choice of 5. Pye Pye Olympic high band AM, no microphone or speakers, choice of 30. Pye Pye Gembridge power supply, 240V input 12V output, and 24V output at 10 amp. Pye Gembridge power supply, 240V input 12V output, and 24V output at 10 amp. Pye Westminster high band AM, choice of 36. Pye Westminster (motorcycle) low band AM, (ex-Automobile Association), with control gear, choice of 10. Pye Westminister (motorcycle) low band AM, (ex-Automobile Association), with control gear, choice of 25. Pye Pye Griect from the AR, choice of 5. Pye Busses station 402 receiver unit only, high band FM, choice of 10. Pye Busses station 402 receiver unit only, high band FM, choice of 5. Pye Busses station 402 receiver unit only, high band FM, choice of 9. Pye Busses station 402 receiver unit only, high band FM, choice of 9. Pye Busses station 402 receiver unit only, high band FM, choice of 9. Pye Busses station 402 receiver unit only, high band FM, choice of 9. Pye Busses station 402 receiver unit only, high band FM, choice of 9. Pye Busses station 402 receiver unit only, high band SM, choice of 9. Pye Busses station 404 with control gear. UNITS 3 AND 4 THORNHAM HALL, THORNHAM MAGNA EYE, SUFFOLK, IP23 8HA. TEL: 0379 838 333

### PLEASE MENTION PRACTICAL WIRELESS WHEN REPLYING TO

### ANTENNA TUNER

ADVERTISEMENTS

LOSING DX?, Reduce interference and BOOST RECEPTION 100kHz-30MHz, for outside or INDOOR ANTENNAS, end-fed LONG WIRES or dipoles, only £31.30, get MORE DX.

V.L.F.? EXPLORE 10-150kHz, Receiver £28.20.

Each fun-to-build kit includes all parts, case, postage etc.

CAMBRIDGE KITS 45 (PG) Old School Lane, Milton, Cambridge.

### PACKET RADIO FROM THE SPECIALISTS!

Siskin Electronics have and my of supplying the best range of packet radio equipmer expansion at the radio enthusiast. We have examined the proof memory eliable nanufacturers and are pleased to be able to offer widest range of equipment available from just one UK gate machine. All prices include VAT and were valid when going to press.

PACCOMM	PACKET ACCESSORIES
HANDIPACKET (LeTNC)£199.00	ATARI Portfolio pocket PC£249.99
MICROPOWER-2£149.00	ATARI 520STFM +"HamPack"£289.95
MICROSAT PSK MODEM New!.£ 189.00	32K (62256) static ram£ 12.50
PC-120 dual port PC specific card £ 139.00	Custom made audio leads from£ 11.95
PC-320 dual port PC card£ 189.00	Custom made RS232 leads from£ 9.95
TINY-2 with PMS version 3.0 £129.00	In house custom RS232-TNC lead service!
TNC-320 dual port.HF/VHF £179.00	AMSTRAD 464/664/6128 or
9600 baud modem £ 95.00	PCW 8256/8512/9512 RS232 I/F£ 69.95
Real Time Clock£ Phone	SPECTRUM 48K TNC I/FACE£ 14.95

### AMT 3 AMTOR/RTTY New!.....£169.95 PK232+MAILBOX ..... PK232 MAILBOX upgrade.....

### KANTRONICS KPC2 HF/VHF with Wefax.....£165.00 KPC4 VHF/VHF dual port ......£242.00 KAM all mode with Wefax.....£285.00 "Smart Watch" Real Time Clock. f. Phone

### UPDATE NEWS PK-232 & PK-88 enhanced mailbox available. PacComm version 3 PMS now ex-stock, phone for details.

PACKET ACCESSORIES
ATARI Portfolio pocket PC£249.99
ATARI 520STFM +"HamPack"£289.95
32K (62256) static ram£ 12.50
Custom made audio leads from£ 11.95
Custom made RS232 leads from£ 9.95
In house custom RS232-TNC lead service!
AMSTRAD 464/664/6128 or
PCW 8256/8512/9512 RS232 I/F. £ 69.95

### TRANSCEIVERS/RECEIVERS HF-225 Gen. Coverage Receiver... £425.00 Navico AMR 1000 Transceiver.... £247.00 Navico AMR 1000S Transceiver.... £299.00

### CTE 2M handy incl. TNC lead.....£169.00 SOFTWARE

We supply driver software for most computers FREE of charge with all TNC purchases. (Largest selection in Europe!)

STOP PRESS!	
MNP-5 Quad telephone modern	.£POA
EURAD SMD commercial TNC	£POA
TOR-1 commercial TOR telex unit.	£574.95

If it's in stock (and it usually is !) we will despatch it same day.

NOTE: Prices do not include carriage

### Siskin Electronics Ltd

2 South Street. Hythe, Southampton, SO4 6EB.

FAX: 0703-847754

Tel: 0703-207155

....£POA







VISA

## **USED AMATEUR EQUIPMENT?**

I Buy, Sell & Exchange

WANTED! — Your TOP QUALITY USED EQUIPMENT! We pay best prices for all types of used amateur radio equipment. Is YOUR gear for sale? Is it in top condition? Why not give us a call? If our offer isn't up to your expectation, why not sell your gear through our 'RIGSEARCH' service? Our new showroom is open where we can display your rig until sold, or alternatively you hang on to it until we find a suitable buyer. This service costs you nothing, your gear is offered to every prospective purchaser that calls, and we achieve the price YOU require. All with least hassle for you. Why not give us a try?

DON'T FORGET - IF YOU'RE SELLING, IT'S GATNY and RIGSEARCHI

BUYING? — If you're looking for quality used amateur equipment, it has to be G4TNY. We have a large stock of used equipment ourselves, but, if we don't have what you're looking for, our new amateur radio brokerage RIGSEARCH possibly will.

R0-R7, S8-S23,

WHY NOT VISIT OUR NEW SHOWROOM? MUCH EQUIPMENT NOW ON DISPLAY ONLY 5 MINS FROM DARTFORD TUNNEL & M25.

Phone Dave, G4TNY on (0708) 862841 or (0836) 201530. From 9.30 am to 7 pm, Tuesday to Saturday. SAE PLEASE FOR LISTS. CALLERS BY APPOINTMENT, PLEASE.

MAIL ORDER? OVERNIGHT DELIVERY **NOW AVAILABLE!** 

G4TNY AMATEUR RADIO
UNIT 14, THURROCK COMMERCIAL CENTRE, JULIET WAY, SOUTH OCKENDON, ESSEX RM15 4YG.





# **QUARTZ CRYSTALS**

### **QuartSLab** MARKETING LTD

P.O. Box 19 Erith Kent DA8 1LH

Telephone: 0322 330830 Fax: 0322 334904 Telex: 8813271 GECOMS-G

(Attention QUARTSLAB) An SAE with all enquiries please PRICES INCLUDE VAT

### STOCK CRYSTALS

HC25 52.70 FOR ONE CRYSTAL 52.50 EACH FOR 2 OR MORE

RX CRYSTALS 44MHz Series Res 14/15MHz 30pF Scanner Crystals SR9 crystals £3.45 TX CRYSTALS 12MHz 30 & 40pF

HC6 52.80 FOR ONE CRYSTAL \$2.60 EACH FOR 2 OR MORE TX CRYSTAL\$
4MHz 30pF
44MHz Series res R0-R7, S1 R0-R7, S11, S20-23

4MMtz Scries res R0-R7, S11, S20-23
4MMtz Scries res R0-R7, S11, S20-23
4 Mietre CRYSTALS FOR 70.28 M HCB/U at £2.00 each
TX 6.78250 RX 29.7800
76CM CRYSTALS £1.80(pr or £3.30 each.
TX 6.78250 RX 29.7800
TX 6.78250 RX 6.78250 RX 6.78250
TX 6.78250 RX 6.78250 RX 6.78250
TX 6.78250 RX 6.78250 RX 6.78250
TX 6.

TONEBURST, I.F. & MPU CRYSTALS III HC18 £2.80 each. 7.188MHz (For 1750 HZ Tone), 10.245 (for 10.7 I.F.) 3.2768 4.000 5.0688 10.245MHz 15.00000

YAESU CRYSTALS FOR FT101's FT801 & etc £4.80 each.
Many available ex stock (A list is available on request please send S.A.E.) Full list available on request, please send SAE

PRICES INCLUDE VAT

### MADE TO ORDER CRYSTALS

FUNDAMENTAL	2	OVERTONES	
FREQUENCY RANGE		FREQUENCY RANGE	PRICE
1.5 TO 2.0MHz	25.90	3rd OVT 21.00 TO 65.00MHz	£5.25
2.0 TO 6.0MHz	€5.50	5th OVT 60.00 TO 110.0MHz	£5.90
6 TO 21MHz	€5.25	5th OVT 110.00 TO 125.0MHz	28.60
21 TO 25MHz	₹7.50	7th OVT 125.00 TO 175.0MHz	211.60

### **DELIVERY** 2.0 to 175.0MHz 2 weeks approx.

Unless otherwise requested fundamentals will be supplied for 30 pf load capacities and overtones for series resonate operation.

HOLDERS – PLEASE SPECIFY WHEN ORDERING – else HC25/U supplied for XTLS above 3MHz.

HC6/U & HC23/U 175MHz

HC18/U & HC25/U 2-175MHz

HC17 Add £1.00 HC45 Add £3.75

DISCOUNTS: Price on application for 10 + units to same frequency/spec. or bulk

bisCounts. Fine or appraisant in V = while water in electropy. Decreases of mixed frequencies. COMMERCIAL CRYSTALS: available on fast delivery and at competitive prices. COMMERCIAL CRYSTALS: available to 1575MHz. Add the surcharge for each XTAL. Days refer to working days. 4 days + £12, 6 days + £7, 8 days + £5, 13 days. days + £3. CRYSTALS SOCKETS HC25 £0.25 ea.

£1.50 unless ordered with crystals.

TERMS: Cash with order post inc. to UK & Ireland. Cheques & PO's to QSL LTD.

### Beacon and Repeater News

The Northern Ireland 50MHz beacon **GB3NGI** is now restored to service but is running on a temporary antenna. Reception reports should go to Alan Doherty GI8YDZ.

The Icelandic 50MHz beacon TF3SIX is now operational on 50.057MHz running 15W into a 5-element Yagi beaming 110 degrees. It has already been heard by many UK stations.

Two new beacons on the 144MHz band have also recently become operational. **TF1VVV** (IP04) is running 10W into a vertical dipole on 144.9705MHz and **TF8VHF** (HP84) is running 40W into a 2-element Yagi beaming at 120 degrees. Reports would be welcomed by TF8FP.

Two 1.3GHz television repeaters have recently become operational. The units are GB3TN in Norwich and GB3RT, formerly at Rugby, and now in Coventry. Reports would be welcomed by G4WVU and G6IQM respectively. The Hastings ATV repeater has been taken off the air for an extensive rebuild.

The UK's first DX Packet Cluster to become licensed, **GB7DXC** in Cheltenham, istemporarily operational on 144.650MHz until permission is granted by the DTI for a permanent frequency of 70.325MHz.

The Scarborough packet radio node GB7EY is now operational on 50.650 and 144.650MHz. The 430MHz port has changed frequency and is now on 432.625MHz. More information on this node and others run by the Yorkshire AX25 Packet Group, YAXPAK, can be obtained from Geoff Smith G4AJJ.

### **Expeditions**

Look towards the Pacific Ocean region if you want to work **PE1MVJ/ MM.** Operational now on 50MHz with 10W into an HB9CV, he visits VS6, BV, JA, KH6, KL7, W and XE. The trip ends in September.

From June 21 to July 12, Trevor Day G3ZYY will be active from Gibraltar in locator IM76. Trevor will be operating on 28.885MHz and 50MHz, with a modified IC211 and 50W amplifier, mainly at weekends, evenings and occasionally during the day. Callsign in use will be ZB2HN but QSLs should go via G3ZYY.

The next voyage by Andy Adams GW0KZG/MM on the Royal Research Ship Challenger is scheduled to start on June 21 and end on July 5. I will release information regarding this trip via packet radio under the subject "GW0KZG/MM".

Between June 27 to July 10, the Square Bashers Expedition Group will be active from the Island of Gozo, Malta in locator JM76. Activity will be on h.f., 50 and 144MHz. Operating frequencies on v.h.f., will be 50.165 and 144.265MHz, with all the appropriate calling

frequencies being used. Callsigns in use will probably include 9H3LF although confirmation of this has not yet been received. Operators signed up for the trip include GW3NYY, G4FRE & XYL G7FRE, G4HGT, GW4LXO, G4VXE, GW8TVX and G0DAZ & XYL Carol.

Thanks are due to Joe 9H1CG and Mans 9H1GB for their help with the organisation of this trip.

Walter Steinwender will be using the callsign **SV/0E6WIG** when he and his family visit Greece (KM19) between July 7 to August 18. Although most activity will be on the 144MHz band, Walter hopes to operate on 50.100MHz, with 10W and a 5-element Yagi, if permission can be obtained. He will also be looking for tropo and Sporadic-E contacts, around 144.300MHz, for most of the time but will operate via meteor scatter during the period August 8-14.

Walter will be active between 0300 to 0700UTC on 144.027 MHz, transmitting during the first 2.5 minute period, at a speed of 1200 letters per minute. The equipment will run 100W into a 9-element Yagi, which may be a bit marginal for the 2300km path into England via meteors but should be more than adequate if Sporadic-E is prevalent.

If you need the **Island of Sark** on 50, 70 or 144MHz, keep an ear out for G8BFL, G8UUR and G4ZUR, operating from there between July 21-28. They also plan to operate on the h.f. bands as well.

Between July 21-23, G8BJG and G0FDZ plan to be operating from the Island of Guernsey on 10GHz. They will be using both narrow-band and wideband equipment. Schedules can be arranged by telephoning G2DSP on (0243) 823684.

Another microwaver, G4EFT, expects to operating from the Isle of Wight during the contest on July 22. On the same date you can expect to find G3FYX, G3KEU and G3VKV operating from Hardy's Monument.

### **Meteor Showers**

The following data, concerning meteor showers occurring in the next few weeks, will help you determine in which direction to beam at specific times and when the shower is below the horizon.

The June Perseids, alternatively called the 54 Perseids, are encountered between June 22-30, peaking on Monday June 25. Between 0700 to 0900UTC beam north-east or south-west, 0900 to 1200UTC beam east or west, 1200 to 1500UTC beam southeast or north-west, 1500 to 1600UTC beam south or north. The radiant is below the horizon from 1700 to 0300UTC.

The Beta Taurids shower lasts for over one month, from June 5 to July 17, reaching a maximum on Tuesday June 26. This shower has virtually the same beam-heading characteristics as the June Perseids, the only minor difference being that the shower is below the horizon from 1700 to 0500UTC.

The Alpha Orionids occur between July 9-15, with best activity being on Thursday July 12. Between 0600 to 0800UTC beam north- east or southwest, 0800 to 1200UTC beam east or west, 1200 to 1400UTC beam southeast or north-west. This shower does not favour the north-south path and is below the horizon from 1600 to 0500UTC.

The Nu Geminids stream is encountered between July 9-18, peaking on Thursday July 12. Between 0600 to 0900UTC beam north- east or south-west, 0900 to 1200UTC beam east or west, 1200 to 1400UTC beam southeast or north-west, 1400 to 1500UTC beam south or north. The radiant is below the horizon between 1700 to 0300UTC.

The L. Geminids shower lasts for most of the month of July, between the 4-29th, the best day being Thursday July 12. Between 0700 to 0900 UTC beam north-east or south-west, 0900 to 1400 UTC beam east or west, 1400 to 1600 UTC beam south-east or northwest. The north-south path is not usable with this shower.

It is below the horizon from 1800 to 0400UTC.

### **QRZ Contest!**

The Scandinavian activity contests will be run on the following dates. Microwave activity, July 2, 144MHz, July 3 and 430MHz activity, July 5.

The RSGB are holding their v.h.f. National Field Day contest between 1400 to 1400UTC on July 7-8. Up to four separate stations may operate simultaneously on the 70, 144, 430, 1296 and 2320MHz bands. The 70MHz c.w. section will take place in the period 1400 to 2200UTC, and the 70MHz s.s.b. section will take place in the period 0600 to 1400UTC, with close down between 2200 to 0600UTC.

The 1296 and 2320MHz stations will also close down for the period 2200 to 0600UTC.

The 6th Annual CQ-WW-VHF-WPX Contest possibly takes place on July 21-22 although at the time of writing these dates had not been confirmed. Operation takes place on the 50, 70, 144, 220, 430, 902 and 1296MHz bands over a 48 hour period. The rules are not complicated but with eight classes of entrant it is best to obtain a copy of the rules, either from myself or from someone who subscribes to CQ magazine.

Oh, by the way - it stands for CQ, World Wide, Very High Frequency, Worked all Prefixes Contest!

Microwave Cumulative Contests, arranged by the RSGB, are scheduled for the following Sundays; July 22, August 19, September 9 and October 6. All or any microwave bandfrom 3.4GHz may be used on these days.

### Help

The column works! Following a request, in the May issue of *PW*, for details of 144MHz Yagis designed by OZ5HF, I received a letter and promotional information from Tony Read GOGMS, the UK agent for these antennas. I have passed the information to GOLBK who had originally asked for it. If you want further details of the full range of OZ5HF 144 & 432MHz Yagis, you can telephone Tony on (0403) 55011.

### Deadlines

Please send your letters in to me by June 25 at the very latest. The dates for the following two issues are July 30 and August 24.

I am now also able to receive messages via packet radio at my local mailbox GB7TCM. If you have access to the DX Cluster GB7DXC you can also leave messages there but note that GB7DXC is not a mailbox in the normal sense and therefore NTS traffic is not forwarded to it.

IF YOU HAVE HAD DIFFICULTY IN OBTAINING
YOUR COPY OF PRACTICAL WIRELESS THEN
WRITE TO, TELEPHONE OR FAX, ELAINE G4LFM,
AT PRACTICAL WIRELESS, ENEFCO HOUSE,
THE QUAY, POOLE, DORSET BH15 1PP.

TEL: (0202) 678558. FAX: (0202) 666244.

### RTTY

Reports to Mike Richards G4WNC 200 Christchurch Road, Ringwood, Hants BH24 3AS

I recently managed to find time to have a go in the Alesandro Volta contest on the weekend of May 12/13. This is a very popular contest which usually attracts a world-wide entry making it a good time to catch some rare DX. Because I was working on the magazine stand at the VHF Convention on the Saturday, my only opportunity for any logging was late on Sunday morning. After a quick tune around, it became clear that the best conditions were to be found on 21MHz. There was plenty of activity although the majority was of European origin, the few I logged were: SP9BCH Poland, SM7BGE Sweden, UA4HBW USSR, LZ5W and LZ2KZA Bulgaria. The best DX for me was JA2EJA, again on 21 MHz and he was putting out a very good signal indeed. I next had a go at 14MHz but, although there was plenty of activity, there were no signs of any of that tasty DX. After scanning around the other bands, I decided I must have missed the best of the conditions, so I

I shall await the results with interest as its often very enlightening to see the amount of DX that some operators can pull out of what seem like very poor conditions.

### **SARTG Contest**

gave up at that point.

Another important contest in the calender is the SARTG (Scandinavian Amateur Radio Teleprinter Group) World Wide RTTY contest. This contest has undergone a major change this year as all the digital modes have now been included. This must be the way forward if the contests are to survive, as many RTTY only contest are tending to suffer a marked lack of interest. Providing I'm not away at a rally, I will be monitoring this contest very closely.

For those of you who might like to try your hand at this contest, here are the details:

Period: Saturday August 18, 0000UTC to 0800UTC and 1600UTC to 2400UTC.

Sunday August 19, 0800UTC to 1600UTC.

Bands: 3.5MHz, 7.0MHz, 14MHz, 21MHz, 28MHz.

Modes: Baudot, AMTOR, ASCII and Packet (digipeaters not allowed). The same contact may be contact once on each band in one of these modes for QSO and multiplier credits.

Classes: Single operator, all band. Single operator, single band. Multioperator, single TX, all bands. Shortwave listeners.

Message: RST and QSO number starting at 001.

QSO points: QSO with own country five points, with own continent ten points and with other continents fifteen points. In Australia, Canada and USA each call district will be considered as a separate country.

Multipliers: Each country as per the DXCC list will count as one multiplier on each band. Each call district in Australia, Canada and USA will count as an additional multiplier on each band.

**Scoring**: Sum of QSO points x sum of multipliers = total score.

Shortwave listeners: Use the same rules but based on stations and messages copied.

Awards: To the top stations in each class, country and district providing the number of QSOs is reasonable.

Logs: These must be received by October 10 and must contain: band, Date, Time UTC, Call, Message (sent and received), Points and multiplier. A separate sheet is required for each band along with an overall summary sheet. With multi-operator entries the calls of all operators involved must be included.

All completed logs and comments for future improvements should be sent to: Bo Ohlsson SM4CMG, Skulsta 1258, S-710 41 FELLINGSBRO, Sweden.

### **ProComm Plus**

This month I thought I would feature a particularly versatile communications package for the IBM PC range of computers and compatibles. ProComm Plus is distributed through the Shareware scheme and as such is available intrial version very cheaply. Despite the ease of availability, this package should not be underrated as it is one of the most powerful communications packages on the market.

So what does the package do for me as a radio amateur? First and foremost it's a serial communication package, i.e. it allows information to be exchanged via the serial port. Although this sounds a simple enough task there are in fact a vast number of differing standards in use ranging from the speed of transmission through to the file transmission protocol. In order for a program such as ProComm Plus to be effective it must be able to easily handle as many as possible of the options or standards.

Another area that is very useful in a communications package is the ability to emulate a number of standard terminals. This facility is provided in ProComm Plus and in fact is expanded to include some sixteen different types of terminal. The main difference between the various terminals is the code generated when some of the nonalphabetic keys are pressed. A classic example of this is of course the function keys where some terminals have specific commands or character strings tied to these keys. The other area of difference concerns control functions, i.e. the codes used to clear the terminal screen etc.

Very closely linked to the terminal emulation is the character translation option. This allows the user to change the way in which characters are presented. A common use of this is the ú and # characters which are often required to be reversed so that a key marked ú is actually displayed as #.

With ProComm Plus any received character can be changed to any other character. From a radio point of view this feature can be very useful because you could in fact build up a complete ITA No2 character conversion table which could then be used as the basis of a receive RTTY program.

The only snag from a RTTY point of view is that, in its present form, the lowest speed supported is 300 baud this means that the standard 45 baud is not available. However this is not insurmountable as this type of speed conversion can be achieved with a UART (Universal Asynchronous Receiver Transmitter) which is a basic communications integrated circuit used to convert serial data into parallel data. By connecting two of these back to back and providing appropriate clock signals, all manner of speed conversions can be provided.

An extension of the character conversion option is the key mapping which allows the function keys to be programmed with a variety of short cut commands. These are particularly useful for issuing commands to Packet

TNCs or other data controllers.

For the programming of longer messages the keyboard macro facility can be used which allows strings of up to fifty characters long to be stored against the keys ALT 1 to ALT 0. All the emulation translation and macro information can be saved to disk so several differing sets can be built up for specific functions.

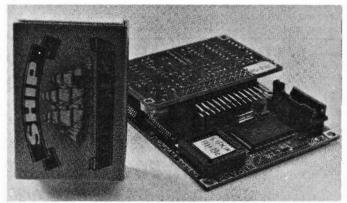
Another very powerful and timesaving facility is provided by the command or script file. These are simple ASCII text files which contain specific commands that control the operation of ProComm Plus. These can be set up to handle all your standard log on commands as the process is interactive with the device to which your computer is connected. Its original designed used was to enable the program to automatically log on to such services as Prestel and Telecom Gold. However the command language is so powerful it can be used to not only to set up the basic communications parameters but also to set the screen. prompt for user input to name but a

In order to simplify the use of these files ProComm Plus can even generate its own Script files. This is achieved by putting the program in 'record' mode and typing the commands you want included in the file. ProComm Plus then generates a Script file which not only contains the commands you typed but details of the response from the remote terminal. I can see that this could be very useful for the Packet operator who regularly checks the local mailbox. You can even set the program up to automatically log on to a mailbox at a particular time download your mail and save it to disk!

No comms package would be complete without file transfer options and ProComm Plus is very capable in this area. In addition to basic ASCII file transfers it can handle just about every other common system - you can even set up your own external protocols.

Forthose of you who regularly have an input to mailboxes, ProComm Plus has a built in text editor and file viewing facility which means that messages can be prepared from within the comms package without have to exit to a separate text editor.

So there we are, an extremely powerful communications package which represents remarkable value for money even at its full registered user price. In this feature I have really only scratched the surface as far as the potential for this program is concerned and I would thoroughly recommend it as the first choice for anyone with a need to use serial communications on an IBM compatible machine. For more information on this program or the whole range of shareware products, contact The Public Domain Software Library, Winscombe House, Beacon Road, Crowborough, East Sussex TN6



The new data controller from Siskin Electronics

### **Commercial Packet Radio**

Those of you who have experienced Packet radio may well have realised that the format developed for amateur radio has a lot of potential for commercial use. The ability to transfer data over an error free link using conventional voice radio equipment opens up a whole new area of data communications which could revolutionise the way some companies operate.

One example of this would be a service organisation that uses mobile radio as its method of controlling its field force. The addition of a packet TNC at each end of the link combined the provision of miniature printers in the vehicles and a terminal at the base station would allow the transmission

of hard copy direct to the vehicle. This operation could take place even if the service engineer was away from his vehicle clearing a fault. Another advantage is that the control point would also have confirmation that the message had been received.

From this I'm sure that you can see that the potential is enormous.

The problem, up until recently, was that being strictly an amateur communications mode, there was no licensing provision to allow the system to operate over commercial p.m.r. systems.

Fortunately that has now changed and within the UK 500mW can be used on u.h.f. for the transmission of telemetery. Although 500mW is not a lot, it can provide a very useful coverage within an industrial estate.

The key to my mentioning this whole topic is in fact the release of a new data controller from Siskin Electronics who are famous for their excellent service in amateur packet.

The new controller is called EURAO and operates to the EX-25 specification and meets all the regulatory requirements for connection to existing PMR equipment.

Additional protective features include over deviation protection and shutdown in the event of a malfunction.

Interfacing the EURAD has been made as simple as possible and it links with the microphone socket and external speaker for connection to the radio and has an RS-232 configuration for connection to the data device, which could be a computer or perhaps a printer.

The heart of the EURAD is a Toshiba TMP Z84C015 processor and HDLC which is clocked at 6MHz. It also features 32K of battery backed RAM and 32K EPROM.

At present the only speed available is 1200 baud but Siskin, together with its partner Europedata of Antwerp, are developing high speed systems which will handle up to 14400 baud.

The EURAD is constructed using advanced surface mount technology which results in a very compact and cost effective unit which further eases the interfacing of the unit in a mobile radio environment.

Anyone requiring more information on this range of products should contact Siskin Electronics Ltd., 2 South Street, Hythe, Southampton SO4 6EB. Tel: (0703) 207155.

The main ongoing interest at this time is still focussed on the progress of of the new microsatellites, so we commence this month with this news, coupled with an effort to explain some of the complex technology and terminology involved. This is followed up with the latest information on the other current operational amateur radio satellites, plus news of some of those in the pipeline.

### **UOSAT-OSCAR-14 Status**

The command team are planning to load increasingly sophisticated housekeeping software to the PCE. The new housekeeping software includes a 'file system' for storing WOD and data frames from the Cosmic Particle Experiment (CPE). This data will be downlinked using the standard PACSAT Broadcast Protocol, inside AX.25 UI frames. Once the housekeeping software is installed, Jeff Ward of the University of Surrey will begin working on the BBS software, a host-mode BBS designed by JeffWard G0/K8KA and Harold Price NK6K, specifically for the PACSATs.

Jeff Ward G0/K8KA, of the University of Surrey AMSAT/UoSAT laboratory, gives details of the latest information on the operational UoSAT, and of the new software now being uploaded into UO-14. He states:

"The past several weeks have seen 9600 baud packet activity beginthrough UO-14s Packet Communication Experiment (PCE). This week (early May) a much more sophisticated multitasking operating system was installed in several stages. The first stage involved the multi-tasking kernel and the Prototype Housekeeping Task (PHT). The PHT greatly facilitates the loading of software into the RAM memory of UO-14. This new software also allows ground stations to digipeat

# Back-Scatter

### **Amateur Satellites**

Reports to
Pat Gowen G3IOR
17 Heath Crescent
Hellesdon, Norwich, Norfolk NR6 6DX

through the PCE. Many stations have been using this digipeating capacity of UO-14 to test their 9600 baud modems. Also added to the PHT software is the telemetry support for the Cosmic Particle Experiment (CPE). The CPE continuously monitors cosmic particle activity and the observations are reported in 53 bytes of data in the telemetry every five minutes".

Jeff points out that to complete the final software load to U0-14 so that its mailbox BBS comes into operation, a great deal more work needs to be done. The software which performs the BBS functions includes a file server system, the AX.25 packet handling algorithms, and more telemetry development to handle the Whole Orbit Data (WOD) tasks. Hereports a major programming milestone was reached on April 27 when a partial load of the final flight software was loaded into U0-14.

In addition to Jeff at the University of Surrey, software engineers NK6K and WB6YMH are working very diligently on the other side of the Atlantic to get the message store-and-forward software completed soon.

After just one week of operation, numerous stations have been successful in modifying their equipment to run 9600 baud packets through UO-14. ON6UG, DF3ZL, DF5DU, I2KBD and IW2ECL all connected to stations (other than themselves) in the first few days of the high speed mode.

The level of activity at 9600 baud on UO-14 demonstrates that it is relatively easy to become operational at that speed. A complete list of stations so far logged on the UoSAT-OSCAR-14 MHEARD list includes DF3LZ, DF5DP, DG3LAE, G0BDD, G3RUH, G4WFQ, G8TZJ, GM4IHJ, I2KBD, JA6FTL, JH1LVN, JH3FDA, JH7CKF, JR1EDE, JR1FRF, KA2MOV, KF4WQ, LU1BEE, LU8DYF, N4HY, ON6UG, VK3DTO, and W7KRC. It was reported that KA2MOV was able to connect to N4HY via U-O-3 using 25 watts on transmit and omnidirectional antennas for both transmit and receive.

Alberto Zagni I2KBD, reports that the modifications to his FT-736R were very easy and the whole set up was 'plug and play'.

John Branegan GM4IHJ, reports that Uosat 3's signal is the strongest/ steadiest of all the packet satellites. He takes the signal from the Icom 451 (pin IC7 RX discriminator), and feeds it direct to the G3RUH 9600 f.s.k. modem. (Note: not the Fuji modem). At TP4 on the modem he sees the signal waveform, but, when these transmissions are 'BERT' (BitError Rate Tests), the TP6 output of the modem RX Oata out, shows a d.c. level consequent on the test transmission being a succession of 1s.

John's RUH modem RX data goes to a modified TNC 320 (with its own modem disconnected). He relates: "All you see on the TNC is a steady DCD LED light when signal is present. You get screen print with packet, but not with 'BERT'. One warning - you must reset the Baud command on your TNC BEFORE you start. Some TNCs use manual shift, others use software. Which ever yours is, your receive baud rate MUST be 9600. You can, should you wish, set the Terminal rate to 9600, and set your computer software to 9600 if permissible... BUT... you must remember that your Terminal and your computer must be the same baud rate. or they will not communicate one to the other. Remember to reset to 1200 baud when you go back to using the Fuji modem on 1200 BPSK". John feels that before long you will soon get fed up with all this plugging and unplugging, baud setting and resetting!

GM4IHJ writes: "The Uosat 3 9600 f.s.k. system looks like the one for me. Giventhe NK6K and G0/K8KA software, it should have few of the problems of F0-20. As is the case with the Microsats, you can digipeat through UoSAT-OSCAR-14 any time you see d:1 at the end of the LSTAT message. For example:

UOSAT3-1>LSTAT I P:0x3000 o:0

The uplink is 145.975 MHz, and UO-14 has a.f.c. on the uplink, so doppler tracking is not too critical.

The transmission is not always on 9600b.p.s. UoSAT-3 mainly sends 1200b.p.s. signal (not packet format). When the 9600 baud rate is on, it has usually sent for 1.5 minutes in every 6 minutes. With the receiver set to f.m., the 9600 signal sounds like noise. There is no tuning note, and newcomers can be forgiven for assuming that no signal is present, but, tune your receiver across the signal and you will hear a change as you go from off tune noise, onto the noisy signal. To get properly on tune a centre tuning f.m. meter is

essential. Modern transceivers and receivers let you to switch between centre tuning and signal strength, and you will need to do this because signal strength is the only guide you have to tell you when your antenna tracking is optimised. Tuning is much less critical than with BPSK packet.

You can tune in 1kHz or 5kHz steps. a.f.c. would be nice, but few receivers presently feature this aid. I use scope eye diagram as tracking aid.

### UoSAT-OSCAR-15

The team at Stanford, California, using the big dish, have now succeeded on a number of occasions in detecting local oscillator leakage from the UO-15 command receiver whilst the spacecraft was in eclipse, so indicating that the on-board NiCad battery pack is indeed functioning. Further tests to check the command system are now following, by attempting to change the listening frequency, evidenced by the change of receiver local oscillator frequency that will result when the commands are successful.

Contrary to hearsay, all is not lost with this ailing spacecraft, and the International AMSAT team are quite optimistic in re-setting the system and having the other University of Surrey satellite up and active just as soon as time and energy permit the many serialised functional checks and tasks to be carried out.

### DOVE

On the AMSAT-NA Operations Net of 22 April 90, Microsat command engineer Bob McGwier N4HY gave a brief rundown on the current status of the BRAMSAT Project DOVE satellite. After the DOVE c.p.u. crash in March, the primary transmitter on 145.825MHz was locked on in a condition where no data was being transmitted. Routine commanding of the spacecraft was rendered impossible, as commands are sent up on the same band during the 'off' periods. As the DOVE 145.825MHz TX was on continuously, it was 'deaf' to any uplink command needed to assert control.

Eventually, with the help of the big moonbounce array at W5UN and fortuitous circumstances, the c.p.u. was reset and control was regained. On the following day, the two meter

transmitter was turned off and the experimental 2401.220MHz 'S' band transmitter was activated, so providing the only downlink available during the interim recovery period.

A decision was made not to resume any DOVE operation on 145MHz until a completely new software load could be accomplished. This meant that return packets from the Microsat Boot Loader (running in on-board ROM) would have to be recovered from the 'S' band transmissions. DOVE's provider, BRAMSAT President Dr. Junior De Castro, PY2BJO, supplied N4HY with an 'S' band receive converter and an antenna system to be used in the recovery effort. When this equipment was installed at N4HY, Bob was able to verify what other 'S' band receiving stations around the world (including ON6UG, KORZ, and KF4AU) had already discovered, i.e. that the phase shift keying modulation index on the transmitter was much lower than expected. In simple terms, the binary data was not shifting the S band carrier a full plus and minus 180 degrees as it had been designed to.

Listening on a sideband receiver, the signal sounded like mainly carrier, with the data content only at a low volume. Additionally, data being sent via this transmitter was from the MBL which transmits incomplete telemetry packets, and even these only infrequently! Command stations have experience with this data format, but it cannot be decoded directly by regular TNCs, so it was difficult for other operators to participate in data collection even though they may have 'S' band gear.

Since the reset, it has been determined that DOVE is in a safe and stable condition running the MBL firmware. N4HY has developed a DSP (Data Signal Processing) based technique to decode with some degree of certainty the undermodulated packets returned on DOVE's 'S' band during software uploads. He expects to be able to load and verify a new operating system on OOVE (with some degree of difficulty) and then resume 145.825MHz transmissions. A full recovery is expected, and when it returns, if all goes according to plan, the speech f.m. will be active too.

During the time required to get the 'S' band receive gear and demodulation techniques developed, work has been proceeding on the first, rudimentary PBBS systems for LUSAT and PACSAT. After these systems are installed and in use, probably by the time you are reading this information, full attention will be concentrated on the DOVE recovery.

AMSAT-NA and BRAMSAT recognise the popularity of DOVE and regret the inconvenience that these start up delays have caused to educators and other amateurs worldwide who are anxious to see DOVE begin its operational mission. It is, of course, imperative that all facets of spacecraft checkout and operation, including this first crash recovery, be done thoroughly and with the utmost care.

### **WEBERSAT** Update

From **Steve WD8QCN/7** at Weber State University, Ogden, Utah, birthplace of the Weber microsat, comes the latest information on the progress of their microsat.

In late April, after a brief pause for gathering and transmission of WEBERSAT picture data, Whole Orbit Data (WOD) collection and retransmission recommenced.

The telemetry format has temporarily changed to binary, and can handle up to ten channels consisting of the array levels, impact detectors, horizon sensors, etc. according to those selected from ground station command. The data can be collected over a 6.3 hour period, with a sample taken every ten seconds.

### **WEBERSAT**

Preliminary tests have been carried out by G0/K8KA & G3RUH using the PACSAT microsat. The communications experiment used 9600 bps digipeating, and early data has been received from the Cosmic Particle Experiment. They have been working on new data formats for Whole Orbit Data (WOD) dumps, the new formats presenting data in on-board memory by which Bob and Harold can command the microsats to downlink the information stored.

By using this technique, they have determined that AO-16 has achieved magnetic lock with earth's field, which results in the satellites +Z surface pointing toward earth when over the south pole and away from the earth when over the north pole. They feel

that there is still some residual wobble, but for the most part, the satellite has stabilized.

As Bob and Harold continue to test this software, the digipeating function of AO-16 will be disabled. To determine if the digipeater is active, check the LSTAT telemetry line. If you see "d:0" this means the digipeater is off, "d:1" means the digipeater is on. The telemetry normally comes down once every 10 seconds, but when a packet is digipeated, the time interval switches to 30 seconds. If telemetry is coming down each 10 seconds, look at the LSTAT line, and if d=0, DON'T TRANSMIT. If you see other digipeat activity, then you will know that the digipeater is on and it is OK to transmit. You must specify the spacecraft callsign e.g., PACSAT-1 to get digipeated. This is because there are multiple spacecraft on various uplink frequencies.

### OSCAR 13

The AO-13 transponder operational schedule as from 9 May 1990 (until further notice) is as follows:

Mode 'B': MA 000 to MA 100. Mode 'JL': MA 100 to MA 125 Mode 'LS': MA 125 to MA 130 ('S' beacon turned ON, but 'S' mode

transponder OFF).

Mode 'S': MA 130 to MA 135 (Mode 'S' beacon placed OFF, but 'S' mode transponder ON)

Mode 'BS': MA 135 to MA 140 ('S' beacon still OFF, 'S' and 'B' mode transponders both ON).

Mode 'B': MA 140 to MA 256 ('B' mode ONLY now).

The omni antenna will be used around perigee, from MA 220 to MA 040

In early May there was a transponder and attitude change. During the changing of position by magnetorquing to B.LON/B.LAT 180/0, as all power possible was needed, so the the transponders had to be commanded OFF from MA 200 to MA 060

AMSAT-NA Operations Nets are now a regular feature, and offer a valuable source of topical satellite and general space information to both participants and casual listeners. Mode B nets are conducted on an AO-13 downlink frequency of 145.950. Mode J/L nets are held a downlink frequency of 435.970. When the h.f.

DO YOU READ AND ENJOY 'BACKSCATTER'? IF YOU DO, PLEASE WRITE AND LET US KNOW. WHAT DO YOU FIND MOST INTERESTING? DO YOU FEEL THAT THE INFORMATION THAT YOU NEED IS THERE? OUR CONTRIBUTORS AND PW STAFF NEED TO KNOW YOUR NEEDS.

WRITE OR PHONE (0202) 678558 (OUR ANSWERING MACHINE) TONIGHT!

If you thought the first one was good . . .

# LONDON AMATEUR RADIO SHOW

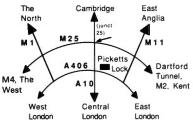
Saturday
March 9th
and
Sunday
March 10th

1991

### Make a note in your diary for the next!

Following the success of the first London Amateur Radio Show, the organisers are pleased to announce that the Show will take place once again in 1991 at Picketts Lock Centre, Picketts Lock Lane, Edmonton, London N9.

Traders wishing to book space should contact
The Secretary, London Amateur
Radio Show, 126 Mount Pleasant
Lane, Bricket Wood, Herts, AL2 3XD.
Tel 0923 678770.









# The New Cirkit Summer Catalogue

- 100s new products
- £10 worth discount vouchers
- Latest books
- Low cost multimeters
- 184 pages
- Only £1.60 available from larger newsagents or directly from Cirkit

### Cirkit Distribution Ltd.

Park Lane, Broxboume, Herts EN10 7NQ Telephone (0992) 444111

OUT NOW! OUT NOW! OUT NOW!

VISA

bands are out, or contests rage and readability is rendered impossible on the 14.282MHz International AMSAT net, the satellite downlink is always dependable. The days and times of these nets are short time fused, and will be given out on the HF AMSAT Nets in advance.

### OSCAR-10

Now that the sun angle has improved, a good long period of full time Mode 'B' operation will recommence on A-O-10. Remember that the beacon is a plain carrier, as all IHU operation has long ceased. If you hear f.m. wobble on this carrier, reduce power or stay off until it is heard to be stable again.

G3RUH has calculated that the satellite attitude, found to be at A.LON/A.LAT 28/11 in April will change to A.LON 17 and A.LAT-5 in July this year.

### FO-20

Bob G8ATE of Leicester can normally be heard on the satellites most passes, as he is a very active station. Apart from a period of silence following the February high winds, which brought down his antennas, he has made the most of this year, and has worked the following stations on FO-20 mode 'JA' SSB.

HB9CQK, HB9SAE, HB9OAB, IK1FJI, I7LIT, I1YK, I5IT, IW2DMN, IW4ASO, IW1BMJ, IW1PPZ, I6KZR, SM6RS, SM3RF, SM7JIB, DD1US, DL1YDD, DB9DV, DJ2QV, DF2BX, OG6EAS, DK2VLT, DH6YAR, PA0AND, PA0DIL, N2IQU, G3WFM, G4CUO, G4ZHG, G6HMS, G2BFO, EA6IC, OH1AYQ,FC1GTU,YU3BA,OK2VLT and KG6GU/F.

All this was accomplished using 30W into a 145MHz turnstile for the uplink and a 'sundial' hairpin loop (as employed by G4CUO, described earlier in this column) feeding a 435MHz preamp to a 435MHz to 29MHz down converter.

### **RS-10**

Bob finds RS-10 to be working very well, although some very strong c.w. and s.s.b. QRO stations cause problems, as does 29MHz f.m. and packet radio uplinks to OSCAR-20 also. Using his turnstile he made QSOs with Y05QAQ, OK1UFC, OK1VVM, SP8RHL, SP9BIF, SP6ASD and SP6LB, plus lots of West European stations. He found and worked two Icelandic stations in the form of K4HPB/TF and KE0YG/TF. One very pleasing QSO was with Lawrence UA0/GB4MSS, operating from the North Pole expedition base camp on Sredny Island.

### **Forthcoming Satellites**

Now for the latest news on the satellites to be. First, the up and coming

USSR satellite RM-1

From Leonid Labutin UA3CR, at his club station UA3KP/RK3KP, we have been sent the following information compiled by DB2OS, RC2CA and UA3CR on the forthcoming USSR/West Germany AMSAT amateur radio satellite RADIO-M-1, hitherto known as 'RS-14'. RADIO-M1 is an AMSAT-DL/AMSAT-U Joint Project

### Linear Transponders and Rudak-

RUDAK II (2nd Generation of the earlier problematic OSCAR-13 RUDAK) is now a part of the Russian amateur radio transponder. 'RADIO-M1'. 'M' refers to Molodechno, White Russia, USSR, base of the satellite construction and testing team, whilst 'RUDAK' is the AMSAT-DL acronymfor 'Regenerative Transponder for Digital Amateur Radio'.

COMMUNICATIONS: The transponder is a joint project of AMSAT-U-ORBITA in Molodechno, the AMSAT-U-SPUTNIK group, a section of the Adventure Club in Moscow, and the AMSAT-DL/RUDAK group based in Marburg, Munich and Hanover.

LAUNČH: In June, 1990, from Plesetsk, USSR, by a PROTON rocket. The specific date is not yet known, but it is possible that a launch net may be organised for the event. Update details on these will be given out on the AMSAT nets.

SATELLITE: A 'Subtenant' to GEOS, a Russian geological research satellite. ORBIT: A circular orbit of 1000 Km altitude at 83 degrees inclination. ORBITAL PERIOD: ca 105 minutes.

AMATEUR RADIO PAYLOAD:

Linear Transponder 1:

Uplink: 435.102 - 435.022MHz (80kHz bandwidth)

Downlink: 145.852 - 145.932MHz (inverted)

Output power: 10W maximum. (Very strong!).

Beacon c.w. telemetry (8 parameters): 145.822MHz. 0.2W

Beacon digital telemetry (30 parameters) 1200b.p.s. p.s.k.

R+Scrambler 2kHz deviation 145.952MHz, 0.4W

Regenerative Transponder - RUDAK-2:

Two onboard computers with IPS operating system for packet radio (AX.25) (Mailbox, telecommunications experiment with digital signal processing up to nearly 20 kHz, etc.) 1 Mbyte RAM disk. Four separate uplink channels.

Gain of satellite RX and TX antennas: 2.3dBi each (e.g.dipoles)

Input sensitivity: < -125dBm (435MHz) for a S/N of 45dBHz

SAT-RX-1: 435.016MHz +-10kHz 1200b.p.s., FSK, NRZIC/Biphase-M (JAS, PACSAT)

SAT-RX-2: 435.155MHz +-10kHz (a.f.c.) 2400b.p.s., BPSK, Biphase-S

SAT-RX-3a 435.193MHz +-10kHz (a.f.c.) 4800b.p.s., RSM, NRZIC/ Biphase-M SAT-RX-3b: 435.193MHz +-10kHz (a.f.c.) 9600b.p.s., RSM, NRZI (NRZ-S) + Scrambler

SAT-RX-4: 435.041MHz +-10kHz (digital a.f.c.) RX for RTX-DSP experiments

Output signals of RX-4 are the Inphase and Quadrature components, I(t) and Q(t), which are sent to the DSP RTX immediately after analog/digital conversion with 8 bit resolution. This supports various modulation modes depending on the software. All other receivers provide data (D) and clock (C) at their outputs.

The downlink can be switched to the following operating modes:

Satellite Transmitting frequency: 145.983MHz

Mode 1: 1200b.p.s., b.p.s.k., NRZI (NRZ-S) (like FO-20)

Mode 2: 400b.p.s., b.p.s.k., Biphase-S (e.g. the AMSAT mode for the OSCAR-13 beacon)

Mode 3: 2400b.p.s., b.p.s.k., Biphase-S (as planned for OSCAR-13) Mode 4: 4800b.p.s., RSM, NRZIC (Biphase-M) (like 4800b.p.s. uplink)

Mode 5: 9600b.p.s., RSM, NRZI (NRZ-S) + Scrambler (like 9600b.p.s. uplink)

Mode 6: c.w. keying (only for special events)

Mode 7: f.s.k. (F1 or F2B), e.g. RTTY, SSTV, FAX, etc., (only for special events)

Mode 8: f.m. modulated by D/A signals from DSP-RISC processor (e.g. speech)

Power consumption: 14V@350mA (max) = 4.9 W;

Standby: 80mA (RUDAK without power amplifier)

Mass: 6.2kg Dimensions: 230 x 320 x 120mm<sup>3</sup>

Linear Transponder 2:

Uplink: 435.123 - 435.043MHz (80kHz)

Downlink: 145.866 - 145.946MHz Output power: 10W maximum

Beacon c.w. telemetry ( parameters): 145.948MHz 0.2W

Beacon digital telemetry (30 parameters) 1100b.p.s. p.s.k.

R+Scrambler 2kHz deviation 145.838MHz 0.4W.

Beacon digital telemetry (30 parameters) 1100b.p.s. p.s.k.

R+Scrambler 2kHz deviation

Total power consumption: 40W (maximum)

Total mass: 22kg. Total dimensions: 480 x 400 x 300mm³

AMSAT-I satellite

Alberto Zagni 12KBD, reports that AMSAT-IT achieved a major milestone last week in the construction and assembly of their MICROSAT when they successfully tested their new onboard computer (OBC) design. This OBC is based on the design found in the currentflock of MICROSATs today. The biggest difference is that the AMSAT-IT OBC now consists of three printed circuit boards instead of two.

With the help of Lyle Johnson (WA7GXD), Harold Price (NK6K), and Bob McGuiwer (N4HY), the OBC worked the first time running the software they had developed. During the same testing, I2KBD also reported that the computer was sending telemetry.

### Phase III-D

Amateurs from around the world who are involved in the Radio Amateur Satellite Service are meeting in Marburg, West Germany from May 7 through May 9 to begin work on another major amateur satellite project. The purpose of the meeting is to set specific design goals for Phase III-D. The three days of meetings will cover a wide range of topics. Areas to be discussed will include: launch opportunities, orbit choices and constraints, transponder choices, antenna design, on-board computer systems, and propulsion systems. In addition to setting hardware and software design goals, equally important discussions will focus on labour division between groups, monetary commitment required, and development of a communication structure between groups involved in the program.

AMSAT-NA will be represented at the meeting by Jan King W3GEY, VP-Engineering, Bob McGwier N4HY, Dick Jannson WD4FAB, and Dick Daniels W4PUJ.

Once formal design goals have been determined, they will made available through the AMSAT News Service.

### **Project OSCAR**

Ross Forbes WB6GFJ, reports on plans for the future made during the latest Project OSCAR Meeting.

The Executive Committee met on April 22, and set forth on a number of new projects. Among the items covered was renewed interest to again commence production of the Project OSCAR Orbital Prediction Calendar Book. The purpose of this booklet. available until some three years ago, is to provide simple and inexpensive tracking information to anyone interested in the low orbiting satellites. Now that we have the various Microsats, UoSAT, Fuji and the Radio Sputnik series of amateur satellites, a renewed interest is evidenced.lt was determined that Project OSCAR members would like to participate in future satellite projects, so, the **Executive Committee are submitting** their thoughts to the group meeting in Marburg, West Germany in May, discussing ideas on a Phase III-D

Project OSCAR will look to develop a Mode 'S' receive system from available (and cost effective) modules now available on the market. Project OSCAR members will complete this

project and write up a description of the system for publication in the Amateur Radio media so that anyone interested in Mode S will be able to make the move into this new area of OSCAR communication.

Finally, in response to many who have asked for information, Project OSCAR will sponsor a seminar about operating on all of the available

Amateur Radio satellites. This seminar will take place on September 29 and 30 on the San Francisco Peninsula. In addition to a full schedule of talks aimed at the beginning and advanced satellite

user, there will be demonstrations available, plus published papers provided to all in attendance. Complete details of this OSCAR seminar, along with names of the speakers scheduled

# FOR UP-TO-DATE NEWS RING WIRELESS-LINE ON 0898 654632

Calls charged at 38p peak and 25p off peak.

to speak will appear in the AMSAT bulletins, on Packet and phone BBS, and the usual Amateur Radio Media. To receive complete registration information as soon as it's available, send a self-addressed stamped envelope or a self-addressed envelope plus 2 IRCs to: OSCAR Seminar, Project OSCAR, Inc., PO Box 1136, Los Altos, CA 94023-1136. USA.

By the time you reach this page and see my propagation column you will be well aware of the fact that this is the 1000th issue of PW and, come September 24, our magazine will be 58 years old. I was about 18 months old when this journal was born and my initial steps into radio came 9 years later when I built a one-valve shortwave receiver.

My introduction to Practical Wireless came around 1943 and then it was beyond my wildest dreams that one day my name would feature among its regular authors and that radioastronomy and the natural disturbances to terrestrial radio signals would become my prime interest. The former grew from references to the effect of sunspot activity on the ionosphere in the various technical books that were available in the mid-1940s and the latter was sparked off in 1947/8 after seeing the effect of a Sporadic-E disturbance on the BBCs television service on 45MHz. This interest was further stimulated in the late 1950s when erratic patterning, caused by changes in the troposphere, sometimes obliterated the pictures transmitted by the new Independant Television Authority between 175 and 213MHz. I soon realised that the saying 'one man's meat is another's poison' really did apply to the television bands because, such conditions meant DX for the radio enthusiast, due to the v.h.f. bands being open and misery for the viewing public who could not see their programmes.

Much of the credit for our present understanding of these events must go to the multitude of amateur radio enthusiasts who have worked or heard amateur or broadcast stations over impossible paths or distances, proved that long-range communication can be achieved via auroral and meteor trail reflection, identified bursts of solar noise which often precede an ionospheric disturbance and shown the scientific world the value of the international beacon service. With these facts in mind, I have always been pleased to publish a variety of reader's reports because I believe that by doing so we are providing a catalogue of contemporary observations for the astronomers, engineers and scientists of the future. During the past 14 years, penning this column, I have learnt that

# Back-Scatter

### **Propagation**

Reports to Ron Ham Faraday

Greyfriars, Storrington, West Sussex RH20 4HE

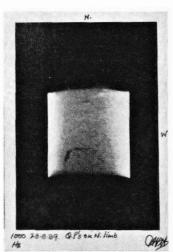


Fig. 1

250 SOLAR FLUX HARCH 1998 230 98CAS 215 200 150 170 155 1 1 2 2 3 0 DAYS 0 5 0 5 0

Fig. 2

1990 was 188 s.f.u. with a low of 144 s.f.u. on the 11th and then climbed to a monthly high on the 22nd of 274 s.f.u.," wrote Neil Clarke GOCAS

(Ferrybridge), who shows the daily variations in his computer print-out, Fig. 2. Ern Warwick (Plymouth) heard long bursts of noise around 1045 on March 26 and 1700 on April 1. Henry Hatfield located 3 sunspot groups, 17 filaments, 10 very small quiescent prominences and a few spicules on the sun's disc at 1145 on March 30, 2grps, 17f and 13qps at 1132 on April 1, 5grps, 17f and 10gps at 0912 on the 14th, 3 double spots, 19f and 7qps at 1057 on the 29th and 30th and despite poor seeing due to cloud and haze he saw a triple and 3 double spots, 18f and 8gps at 1127 on the 27th. "In general there has been very little activity," said Henry in his report for the month prior to April 30. However, his radio telescope recorded bursts of solar noise at 136MHz on days 17, 22, 23 and

At his observatory in Bristol, **Ted Waring** counted 17, 22 and 24 sunspots
on April 1, 8 and 23 respectively and
the detailed drawings made by **Patrick Moore**, with his solar projection
apparatus at his home in Selsey, are
fine examples of the sun's rotation and
the apparent progress of the sunspot

although radio to most of my readers is a spare-time hobby their indepth knowledge of what really happens on specific bands under all conditions is amazing and that their assessments of the abnormal can be relied upon. So now let's see what we have this month.

### Sola

Cmdr Henry Hatfield (Sevenoaks) kindly sent a photograph, Fig. 1, showing a large filament and a few quiescent prominences on the sun which he observed through his spectrohelioscope last August 28.

In March Ron Livesey (Edinburgh), using a 2.5in refractor with a projection box, located 5 active areas on the sun's disc on the 4th, 6 on the 22nd, 27th 29th and 31st, 7 on the 16th, 21st and 28th, 8 on the 1st, 2nd and 24th and 10 on the 25th

"The mean solar flux for March



Fig. 3



g. 3

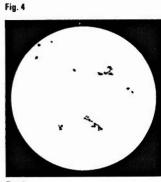


Fig. 6

Fig. 5

groups across the disc between 0750 on April 3 and 1330 on the 6th, Figs. 3 and 4 and 0830 on the 15th and 0800 on the 17th, Figs. 5 and 6.

### Auroral

Ron Livesey, the auroral British coordinator for the Astronomical Association, received reports of 'auroral glow, unspecified form' from observers in various places and not all at the same time. Places such as Alness, Colchester, Cornwall, County Clare, Edinburgh, Fraser, Peel Kirkwall, Machrihanish, Richmond and the weather ship 'LIMA' overnight on March 8, 12, 13, 14, 15, 18, 19, 20, 24, 25, 26 and 27. 'Homogenious arc or band' from Kirkwall and St. Andrews on the 20th and 25th; 'rayed arc or band or veil' from Central Canada and Kirkwall on the 10th and 25th; 'rays' from Beith, Detroit, Dundee, Edinburgh, Glasgow, Glengarnock, Kirkwall, Machrihanish, Pathhead, Nova Scotia and St. Andrews on days 1, 12, 13, 19, 20, 21, 25, 26, 27 and 29.

There were 'active, moving, pulsating, flaming' from North Dakota, Edinburgh, North Finland, Kirkwall, 'LIMA' and Pathhead on days 1,3,4,5, 13, 18, 20, 21, 25 and 26 and 'Corona' from Denmark, Quebec and Nova Scotia on the 12th and 21st.

Among Ron's observers are the Met offices at Kirkwall, Machrihanish and Wick and the weather ship Cumulus.

He also had reports of radio signals suffering from auroral influence from Tony Hopwood (Upton on Severn) on days 12, 18, 20, 21, 24 and 27, Garry Hawkins (Bristol) on the 21st and 30th and Doug Smillie (Wishaw)on the 25th, 27th and 30th.

During an auroral opening on April 10, **Simon Hamer** (New Radnor) received pictures from Ireland's RTE on 5 of their channels in Band III. "Also smeary pictures on Chs. E2/R1 and a short-wave wipeout," said Simon. Ern Warwick heard weak auroral tones on the signals from the German beacon DKOWCY on 10.144MHz between 1720 and 1810 on March 26, 27, 29 and 30 and again during the mid-afternoons of April 10, 11 and 14.

Mark Appleby G4XII (Scarborough) heard signals on 28MHz from the German beacon DF0AAB via aurora and Fred Pallant G4RNM (Storrington)

reported several 'G' (English) stations with auroral flutter on April 10.

### Magnetic

"March was mostly active and more so in the second half of the month when it became sub-storm with an Ap index of 60 on the 21st and 59 on the 30th. The daily changes of the Ap index for the month can be seen on Neil's chart in Fig. 7. The various types of magnetometers used by Garry Hawkins, Tony Hopwood, Ron Livesey, David Petitt (Carlisle) and Doug Smille betweem them recorded storm conditions at some time on March 12, 18, 19, 20, 21, 27 26, 29 and 30.

### **Propagation Beacons**

First, my thanks to Mark Appleby, Chris van den Berg (The Hague), Henry Hatfield, Greg Lovelock G3III (Shipston on Stour), Ted Owen (Maldon), Fred Pallant, Ted Waring and Ern Warwick, for their detailed 28MHz beacon logs from which I compiled this months chart, Fig. 8, of signal heard between 28.2 and 28.3MHz.

Greg Lovelock reports hearing PT8AA sending 'PWR 5W ANT GP LAT 0958S LONG 6748W LOC FI60CA RIO BRANCO AC', on 28.219MHz on April 14 and WJ7X/5 using 10W from Houston on 28.252MHz on the 20th.

However, Ern Warwick also looked

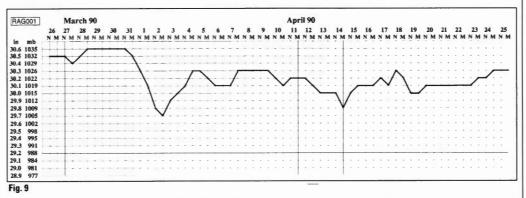
for the beacons on other bands and received signals, almost daily, from PY2AMI on 24.931MHz, OH2B, ZS6DN/B and 4X6TU/B on 14.100MHz and DK0WCY on 10.144MHz between March 26 and April 25 and among the infrequent signals he logged for the same period were IK6BAK on 24.915MHz, PY2AMI on 18.100MHz and JA2IGY, KH60/B and W6WX on 14.100MHz.

### **Tropospheric**

My thanks to Pete Thompson G8DDY (Shanklin, IOW) for sending me copies of his barograph charts for the periods covering the hurricane on

	Ma	rch											Apri	ı		1				- 17											
Beacon			28	29	30	31	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
FOAAB				X	-	X	X	X	X			X				X					X	X		X	X	X		X		X	
LOIGI	X	X		X		X	X	X	X	X	X	X			X	X	X			X	X	X	X	X	X	X		X	X	X	
A2HB	^	^		^		,,	,,	^	^	,,	,,	,,			,,	,,						,,		,,					X		
A3JA				Х	X	X	X	X	X	Х	Х	X	X	Х	X	Х	X		X	X	X	X	X	X	X	X		X	X	X	
A6AU1				^	^	^	^	^	^	^	^	^	^	*	**	^	^		,,	^	,,	,,	,,	,,	^	,,		**	x	^	
Y4M				X	X	X	X	X													X			X					^		
KA1NSV				^	^	x	x	â	X				X								^			^						X	
						^	^	^	â				^													V				^	
(B4UPI	v	v		v		v	v	Х	â		Х		Х									Х				X					
(C4DPC		X		X		X	X	^			٨		Ŷ									x			v	X					
CD4EC	X	X				X	X		X													X			X	Š.					
KE2DI				X		X	X	X	X				X													X					
KE5GY						X																									
KF4MS	X	X		X		X	X	X	X		X		X									X			X	X					
KJ4X																				X											
KM4MY							X																								
KW7Y							X																								
LU1UG	X	X		X		X	X	X	Х				X	X	X		X			X		X			X	X		X	X	X	
NX20		X		X		X	X	X	X				X												X					X	
OH2TEN				X	X	X	X	X	X			X			X	X	X				X		X	X			X	X			
PT8AA				•	•	•														X											
PY2AMI	X	X		X		X	X	X	X											X	X			X				X	X	X	
SK5TEN	^	^		x		^	^	^	^											**	,,			X				•	•	•	
VE1MUF				^		Y																		^							
VE2HOT						X							Х																		
VE3TEN						x			Х				x													X				X	
VK2RSY					v	^	X	v	x		Х	Х	^		V	X							X	Х	X	^		X	v	^	
					X		^	X	x		^	^			0	0							x	^	â			x	0		
VK5WI				v	^		v	0	٨	v	v	v			0	X							x	v	0	v		^	X X		
VK6RWA				X		v	Č	X	v	X	X	Х	V		XXX	٨				X		Х	^	X	X	X		X	^		
WA4DJ\$	X	X		X		XXX	XXXX	X	X		A		X		^					٨		^			^	^		^			
WB4JHS						X	X						.,																		
WC8E		X				X	X	X	X				X																		
W7JPI		X				X	X																								
WJ7X/5																										X					
W3SV					X	X	X	X	X				X																	X	
W3VD		X		X		X	X	X	Х		X		X												X	X		X		X	
W7JPI/B																										X					
W8FKL	X																														
W8UR						X							X													X					
W9UX0				X		X	X	X	X		X		X																		
Y02KHP				•			X	X	X																						
ZL2MHF							X	X	X		X				X		X						X		X						
ZS1LA		Х	X	X	X	Х	x	x	x	X	X	Х	Х	Х	x	Х	X	Х	X	X	X	X	X	X	X	X	X	X	X	X	
ZS5VHF		^	^	^	^	^	^	^	^	â	â	^	^	^	^	^	^	^	^	^	^	^	^	^	^	^	^	^	^	^	
ZS6PW	v	v	v	v	v	v	v	v	v	â	x	V	X	V	X	v	V	V	Y	V	X	X	Y	Y	X	X	X	X	X	X	
	X	X	0	x	X	â	X	X	X	â	â	X	â	X	â	X	X	X	X	0	x		0	Ç		0	^	x	x	x	
Z21ANB	X	X	X			x	â	â	X		â	â	â	X	â	X	X	X	X	X	â	X	X	X	X,	X		â	â	â	
5B4CY	X	X	X	X	X	X		٨	٨	X	A	٨	٨	٨	٨	٨	^	^	٨	٨	٨	٨	٨	٨	^	٨		٨	^	٨	
5Z4ERR							X																								

Fig. 8



October 23, 1987 and the extreme low and high pressures of February 26, 1989 and March 4, 1990 respectively. Pete compared his charts with mine which he saw in the magazines and made an interesting observation, "looks like you get the pressure 2 hours after me!"

The slightly rounded atmospheric pressure readings for the period March 26 to April 25 were, as usual, taken at noon and midnight from my barograph, Fig. 9. The continuing high pressure and fine warm weather was no doubt responsible for the mild tropospheric opening between April 28 and May 2. During the evening of May 1, I found a variety of continental stations in Band II and in Holland, Ed Wieringa (Zandvoort) received BBC Radio 1 on 99.3MHz and 'The Jazz Station' on 102.2MHz, at good strength.

It was necessary for Ed to use the narrow selectivity on his receiver to keep out signals from Belgium's BRT Stad Brussell and Lelystad both on 102.1MHz. Brian Renforth (Newcastle Upon Tyne) heard BBC radio from Northern Ireland, plus f.m. stereo from Belgian and Dutch stations on Arpil 30 and, 'Fox FM' (Oxford) on 102.6MHz, 'The Hot FM' (Milton Keynes) on 103.3MHz and 'Jazz FM' and the usual Yorkshire ILRs on May 1.

Brian also received u.h.f. television pictures from Belgium, France and Holland during the 30th and the 1st and



Fig. 10

BBC Midlands from Sutton Coldfield and North from Emley Moor on the 2nd.

George Garden (Edinburgh) went DXing on Cairn O' Mounth on the 30th and logged BBC Radio Cleveland, not often heard there and York and fluctuating signals from possibly Manx Radio on the Isle of Man.

Around 1830 on the 5th, Band II was open again and I heard idents from BBC and ILR stations ranging from Kent to my east Wales, in the west and inland to Birmingham in the north.

### 934MHz

"Early March brought improved conditions with high pressure peaking 1044mb (30.85in) on fourth," wrote **Terry Wyatt UK-845** (Walton on Thames) which enabled him to make contact with stations in Dorset, Guernsey,

Hampshire, Suffolk. On the 24th he exchanged words with the 3KR Boy Scout Group on Dunstable Downs, "who were enjoying their first venture into radio communication."

During the period April 28 to May 2, Les Jenkins GB-37 took advantage of the high atmospheric and from his holiday home in Deal, he contacted stations in Appleborough, Ashington, Brightlingsea, Chesterfield, Darlington, the maritime mobile, MV 'Canvey', in Dover, Eastwood, Felixstowe, Hastings, Hockley, Ipswich, Leeds, Lincolnshire, Northampton, Scunthorpe, Southend, Tilbury and West Yorkshire. His longest contact was with the station, DL-60, in Darlington, a distance of around 412km.

This list of stations became even more impressive when I learnt that the 11-element Yagi, Fig. 10, which Les built and used to feed his DELTA-ONE transceiver, is only 3m a.s.l.

He further proved that u.h.f. conditions were good when he logged television pictures from Belgium (BRT1), France (Antenna 2, FR3 & TF 1) and Holland (NED 1,2 & 3) on his Salora receiver with a Triax BB Grid antenna, also 3m a.s.l.

### **Goodbye Old Friend**

It is with deep regret that I have to report the death of a friend and colleague, Gerry Brownlow G3WMU,

from Storrington.

Apart from his war service in the RAF when he entered the world of radio communications, Gerry was a pharmacist for 50 years and the dedication and precision that he needed for his daily work was continued in his approach to amateur radio.

For the past decade, Gerry and his wife Margaret G4LCU were responsible for the installation and running of the amateur radio station, inside the vintage wireless exhibition at The Chalk Pits Museum, Amberley, Sussex.

Gerry and Margaret established a unique style of operating which did them and the museum great credit around the world.

They gave priority to explaining the workings of an amateur station to the museum's visitors and, typical of Gerry was the way he arranged the station, gear and graphics, to enable the general public to get the best from the Brownlow's creation, GB2CPM.

A few weeks before his death he organised and operated a station in the Girl Guides' hall at Storrington for their Thinking Day.

He will be sadly missed by his many friends in the Worthing and District Radio Club and by all of us at the Chalk Pits. We extend our deepest sympathy to Margaret, his daughter Ann and his sons Peter and Richard.

Czechoslovakia has been the focus of attention in the past few weeks, with Radio Prague disappearing from the airwaves, to return on 7 May with a new name, Radio Prague International, and with a number of regular voices missing, presumed dismissed. Services from the various language sections have been curtailed, it would seem, although programmes in English seem not to have suffered too much. Details of currently audible programmes from Radio Prague International in English are listed in the European news section, It is rumoured that discussions are taking place between Radio Free Europe and the Czech authorities over use of spare transmitter time by the Munich-based station. This has been neither confirmed nor denied by either party, but one cannot but be amazed by the irony should RFE or Radio Liberty start transmissions over Czech facilities.

There appears to be deliberate harmful interference - jamming to you and me - of the frequency 6.10MHz during the evening time. This is the channel used by Radio Vilnius in Lithuania, and it is suspected that the Soviet Union is carrying out this interference. The m.f. channel of 666kHz appears to be unaffected. The

Back-Scatter

### **Broadcast Round-up**

Reports to Peter Shaw

jamming does not sound completely the same as that carried out against Western broadcasters in years gone by, but presumably that may be as a result of a lack of dedicated jamming transmitters, many of which were pressed in to service as relays of the Soviet Republican radio services for the Moscow area.

The South African Broadcasting Corporation has made startling reductions to its external service, Radio RSA. Transmissions directed outside the African continent were severely curtailed on 1 May, with services to the UK, Irish Republic, Europe (East and West), the Middle East, Far East, and North America dropped. All that remains now are the Swahili, Lozi, Chichewa services, together with French, Portuguese and English to Africa. A complete schedule appears

in the Middle East and African news section.

Thailand has become firm favourite for relay stations for several of the world's international broadcasters. The Voice of America is already well on the way to establishing a new transmitting facility. BBC World Service is examining the prospect and now the news that Australia could soon be setting up a facility there has come our way. Radio Australia has made it clear that the Pacific Basin and the Far East, together with the Australasian area, are its prime targets, and is concentrating resources on achieving much improved coverage in this extensive region. Services to other parts of the world are not in the main scheme of things, although the station will not actively discourage listeners in other parts of the world. More details as they become known, but in the meantime, some new frequencies for Radio Australia in Europe are given in the Far Eastern news section.

### **European Stations**

All times GMT/UTC. All frequencies in MHz unless otherwise specified

The new schedule for Radio Prague International broadcasts in English is,

to North America: 0000-0015 on 11.99, 11.68, 7.345 0100-0130, 0300-0330 and 0400-0415 on 11.68, 7.345, 5.93

to Europe: 1710-1727 on 11.99, 7.345, 6.055,

1830-1845 on 7.345, 6.055 2000-2030 and 2100-2115 on 11.99, 7.345, 6.055, 5.93

Listeners to Radio Denmark's transmissions via Radio Norway's facilities are being urged to send in reception reports to the Copenhagen station, with a request that English programmes be restarted. The Danish Shortwave Clubs International, OSWCI, is encouraging all its members to do this, in the hope that once-aweek broadcasts, perhaps following Radio Norway's English half-hour on

### MAKE YOUR INTERESTS PAY!

Over the past 100 years more than 9 million students throughout the world have found t worth their while! An ICS home-study course can help you get a better job, make more money and have more fun out of life! ICS has over 90 years experience in home-study courses and is the largest correspondence school in the world. You learn at your own pace, when and where you want under the guidance of expert 'personal' tutors. Find out now we can help YOU. Post or phone today for your **FREE INFORMATION PACK** on the course of your choice. (Tick one box only!) -----------

Hi-Fi Servicing	
Refrigeration & Air Conditioning	
Car Mechanics	
Computer	
tion subjects to choose from	
Address	
ondence Schools, Dept. EES70, 312/314 High Str	eet. Sutton. Surrey SM1 1PR
	Refrigeration & Air Conditioning  Car Mechanics  Computer Programming  ction subjects to choose from  Address

### SYON TRADING 16 THE RIDGEWAY FETCHAM, LEATHERHEAD, SURREY. KT22 9AZ Tel. 0372 372587 Callers by appointment only

£1 BARGAIN PACKS 2 x 75 ohm BNC angled plugs. 4 x Octal valveholders. 5 x 8 pin DIL switches. 8 x 2-40 pf Compression trimmers. 12 x 1N5407 800V 3A diodes. 5 x 80 pf Air trimmers. 20 x Push in rubber feet. 4 x Small micro switches. 12 x 2-10 pf Tetfer trimmers. 7 x Ceramic coil formers. 12 x Soldered 2\*5mm jack plugs. 50 x 1000 pf Plate capacitors. 50 x 4700 pf Plate capacitors. 14 x 5mm LEDS Red, Green or Orange. 12 x rectangular LEDS Red or Green. DIL sockets: 15 x 8 pin, 15 x 16 pin, 15 x 18 pin, 13 x 20 pin, 12 x 24 pin, 12 x 28 pin or 8 x 40 pin. 12 x 2N2483 (similar BC109). 20 x BC171A (gen purpose). 3 x BDY27C (TO3 6A 200V). 15 x BF274 (NPN 750Mhz). 15 x BF509 (PNP 700Mhz). 12 x MPS918 (NPN 600Mhz). 12 x MPS2369 (NPN switch). COAX RELAYS - BNC 100W cw to 500Mhz. 2 way 24V £18. - 4 way 12V £22. - 6 way 12V £25. 6 x Used Greenpar PL259 £3. 100 assorted LEDS £5

ALSO STOCKED: - Kanga Kits - Black Star Products - Malsor Kits Nevada Products - Spectrum Kits - Resistors - Capacitors - Diodes Switches - Regulators - Semiconductors - Connectors - Cable. Full list 40p refundable with order : ACCESS : VISA : CHEQUE p&p 50p



### AMATEUR, PMR, AND INDUSTRIAL RADIO COMMUNICATION SERVICING

- ★ Experienced Technical Staff.
- ★ All Major Manufacturers, e.g. Yaesu, Kenwood, Icom, etc.
- ★ Suppliers of PMR and Amateur Radio Equipment (to your requirements).
- ★ Guaranteed 7 day turnround. (Subject to availability of Spares).
- ★ Trade Service Enquiries Welcome.
- ★ Very Competitive rates for both Private and Trade.
- ★ Carriage arranged.

### Castle Electronics

Unit 2. Building 21. Pensnett Trading Est. Kingswinford.

West Midlands. DY6 7PP.

Telephone: (0384) 298616. 270224.



### COMMUNICATION CENTRE OF THE NORTH

The largest range of communications equipment available in the North. Full range of receivers, transceivers, antennas, power supplies, meters. Ali tubing - wall brackets - rotators - insulators.

### **FULL KENWOOD RANGE IN STOCK.**

BUTTERNUT	
HF2V 40-80m vertical	£142.00
20 MRK 20m add on kit	£33.49
HF6VX 6 band vertical	£167.00
TBR160S 160m Add on kit	£53.99
HF4B Triband Mini Beam	£235.00
NEW R5 5 Band Vertical	£259.00
CUSHCRAFT	
A3 3 element Tribander	£329.00
A4 4 element Tribander	£353.00
10-3CD 3 element 10m	£115.00
15-3CD 3 element 15m	£139.75
20-3C2 3 element 20m	£238.00
AP88 band 25ft vertical	£164.00
AV5 5 band 25ft vertical	£123.00
18 element 2m Boomer	£106.00
15 element 2m Boomer	£98.95
ANTENNA TUNERS	
Kenwood AT230	£208.00
MFJ 962B 1.5k Tuner	£241.00
MFJ 949C 300W Versatuner	£157.00
MFJ 941D watt Basic	
MFJ 1601 Random Wire Tuner	£42.02
Kenwood AT250 Automatic	£366.00
TEN TEC "254" 200 Watt Antenna Tuner	£150.00

SCANNING RECEIVER RANGE	
AR300 Base Station	2765.00
AR2002 Base Station	£487.00
AR950 Base Station	£249.00
AR900 Hand Held	£199.00
AR800 Hand Held	
JUPITER II Hand Held	€299.00
JUPITER MV600 Base Station	
ICOM R700 Base Station	2980.00
R535 Airband Base Station	
WIN 108 Hand Held Airband	
AR1000 Hand Held	\$249.00
SWR/POWER METERS	
MFJ 815 HF 2kw SWR/PWR	
Ym1E Twin Meter 3.5-150MHz	£32.00
DIAWA CN410M 35-150MHz	£61.72
DIAWA CN460M 140-450MHz	£65.40
NS660P 1.8-150MHz + PEP	£115.00
KOYO-100 1.8-60MHz	£75.00
KOYO-200 1.8-200MHz	£60.00
KOYO-400 140-525MHz	£62.00
DUMMY LOADS	
MFT 300 Watt D. load	£33.50
DL60 60 watt	
TEN TEC 100 Watt D.load	
HF225 GENERAL COVERAGE RECEIVER	£395.00

A FULL RANGE OF RECEIVERS FOR AIR-BAND - MARINE - SHORT WAVE - AVAILABLE

GSRV full size £18.50 half size £16.00. Full range of Antenna — Accessories plus full range of VHF — UHF — HF mobile Antennas. Alpha HF Linears now available.

all range of RSGB and ARRL publications in stock. Part Exchanges welcome. Second hand lists daily. Send S.A.E. for details of any equipment. Send S.A.E. for cetails of any equipment.
HP terms. Access/Barclaycard facilities.
Open 6 days a week 24 Hour Mail Order Service.
Goods normally despatched by return of post.
POSTAGE-CARRIAGE EXTRA AT COST

FULL TEN-TEC RANGE NOW AVAILABLE

"Paragon", "Corsair", "Omni V"

plus all accessories

### Phone 0942-676790. STEPHENS JAMES LTD.

47 WARRINGTON ROAD, LEIGH, LANCS. WN7 3EA.

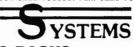


MERLIN WAY, BOWERHILL MELKSHAM, WILTSHIRE SN12 6TJ. Tel: 0225 706886. Fax: 0225 708594

you have a project you would like to be manufactured, we are always on the lookout for new Wizardry.

Sorry for the delay over the list, but we

have put all our stock on computers and this has taken time, this is the Wizard's



### **WIZARDS PACKS** We would like to thank all our new customers for their support. By the way if

### THIS MONTH'S WIZARDRY The WIZARD PRECISION FILTER

240 volts AC, 13 amps input, 4 off IEC 6 amp sockets output, On/Off switch, Precision Pot-ter block RFI filter, VDR, Mains lead and Plug, Merlin made case and built and tested.

This filter helps to remove your RF from the

Price £27.48 VAT Paid P&P £3.00 The WIZARD'S best 13.8 volt PSU kit so

In the kit: Pre built PCB, Super Mains Transformer, 3 inch Cube Heatsink, 60000uf Electrolytic, 25amp Bridge Rectifier, 12V DC Fan, Mains Filter, Overvolt Relay, LED Indicators, Amp Meter, Fuse Holders, Terminals and On/Off Switch.

This PSU has an output of 8amps and 8 to 18amps intermittent. With a full set of data

Price £33.80 + £4.50 P&P

### LINEAR AMPLIFIER BUILDERS

8 off 220uF 400V Electrolytics with mounting clips

Price £15.00 post paid

worst enemy!

12.5 kHz Cennel Spacing + 2.5 kHz Deviation Max Bendwidth 1000 kHz RF Output Power 10 watts

Type 634 68-88 MHz

Mod FM

e £25.00 + £5.00 P&P

Specification
1 20 Amp Hour Drylit Battery
2 Inbuilt Mains Charger
3 RF Filtered
4 Solar Cell Input (Cells optional)
5 Compact Size/Portable
6 Mertin Made

Price £76.00 + P&P £8.00

Mod FM Sensitivity 0.7vV 12 Yoft or 24V Input DC with Control Gear and Data DK for 4 mt.

THE WIZARD POWER CUBE

Printed Circuit Permanent Magnet Motor/Generator with toothed belt reduction drive. Input/Output 2VDC to 30VDC at upto 10Amps. Price £14.00 + £3.50 P&P.

New in Controller Card for the above and others Input power + and — opto 50VDC. This will give a single 5k ohm pot variable speed forward and reverse. Price £7.50 + £2.50 P&P.

COMPRESSORS—Gast rotary air/vacuum pump 20psi/29invac,1/12th HP 240Vac motor. Good for Desoldering/Airbrush work. Just £17.00+£3.00 P&P.

IN THE WIZARDS DEMI—We have from time to time the following new and S/H stock. Printers, Monitors mono-colour. Valve amps and PSUs. Lots of odds and ends.

MORE DATA—Ring the wizard on 0225 706886 (Day time) 0225 763027 (Home). For more information or for a visit to the works.

PAYMENT—Access, Cheque, PO and Cash Post and Packing on components £1.50, over £20.00 £1.00. Please

Thank you John and Adrian the Sorcerers Apprentice!

Sundays, could be started. A good channel at the present for Radio Norway and Danmarks Radio is 11.755 at 0900.

Radio Finland's English service at 2100 is clearly audible in the UK on both the MF channel of 963kHz, and on short wave on 6.12MHz. At 1030, 15.40MHz provides good reception.

Deutsche Welle in Cologne does nottransmitte Europe in English, but is usually audible during some parts of the day. Some frequencies for the Australasian services are:

0900-0950 on 21.68, 21.65, 17.82, 17.78, 11.74

2100-2150 on 15.435, 13.78, 11.381, 9.765, 9.67

At 2025, RAI from Rome is heard on 7.235 in English to Europe. Meanwhile, the Italian Radio Relay Service, IRRS, has a new schedule, operating on Sundays at 0700 in Ukrainian on 9.815, with English from 0815. At 0900, the frequency changes to 9.86 with English at 0915, and again from 1200 onwards.

At 0730, Radio Netherlands English programme is audible on 9.63 from the Bonaire relay station.

Radio Polonia at 2000 is heard with good reception in English on 11.84, with 9.525 in parallel.

Radio Romania International, the new name given to Radio Bucharest, is heard at 2100 on 11.94, 11.81 and 9.69 with the highest frequency offering best reception when checked shortly before preparation of this column.

Radio Moscow has moved up to the very highest parts of the short wave spectrum, noted at 0900 on 25.78 with variable reception of World Service in English. This particular frequency is most probably beamed towards Asia. The channel of 9.45 is used throughout the night by Moscow in English noted at 1700, and again at 0500.

At 2100, the English World Service is audible on medium wave at 1.143MHz, whilst at the same time, Radio Station Peace and Progress is in English to Europe also on medium wave at 1.386MHz.

It is reported from the United States

that the medium wave relay of Radio Moscow's English services to North America via Cuba on 1.04MHz have ceased, and have not been heard since early March.

Radio Tashkent has a new schedule for English broadcasts of:

1200-1230 on 17.745, 15.47, 11.785, 9.64, 7.325

1330-1400 on the same channels.

A reminder for those who are interested of the frequencies for transmissions from the Baltic Republics of Lithuania, Estonia and Latvia:

### ESTONIAN RADIO, Tallin

English carried on Mondays at 2130 on 5.925 and 1.035. At other times, 5.925 carries Estonian, Finnish and Swedish language programmes, and relays of the Estonian Radio First Programme.

### LATVIAN RADIO, Riga

No English language broadcasts are scheduled, but 5.935 carries Swedish at 2030 and 2230 on Tuesday, Thursday and Saturday.

### **RADIO VILNIUS**

English is heard at 2230 on 6.10MHz and 666kHz daily to Europe, with the North American English service on the air at 2300 on 17.69, 17.655, 15.18, 9.765, 7.40, 6.10MHz and 666kHz.

### Middle East & African Stations

Radio Baghdad has started using the new channel on 13.66 for its English language broadcast at 2000 until well past 2100. The channel is received well in the UK, and programmes consist of the usual rhetoric and threats from the Iraqui President.

Meanwhile the Voice of the Islamic Republic of Iran is heard from 1930 to 2030 on 6.035 and 9.022MHz, both affording reasonable reception.

English from the Voice of Israel in Jerusalem is at:

0000-0025 on 15.64, 11.605, 9.435 0100-0125 on 15.64, 11.605, 9.435 0400-0415 on 17.63, 15.64, 15.485,

12.077, 11.655, 11.605 & 9.435 [Domestic service programme]

1000-1030 on 21.78, 21.745, 17.59,

17.575, 15.65, 15.485, & 11.585 [Domestic service programme]

1700-1715 on 11.655, 11.585 [Domestic service programme]

1900-1930 on 17.63, 17.59, 15.64, 15.485, 12.077, 11.605

2130-2200 on 17.63, 17.575, 15.64, 12.077, 11.605

For Tropical Band listeners, Radio Rwanda seems to be audible on 3.33 at 1700 with vernaculars, and French programmes at 1900. Radio Bertoua in the Cameroon has been noted on 4.75 at 2130 in parallel with Yaounde on 4.85MHz.

The revised English language schedule for Radio RSA in Johannesburg looks like this:

1100-1155 on 17.835, 11.90, 11.805, 9.555

1200-1255 on 17.835, 11.90, 11.805, 9.555

1400-1455 on 17.835, 11.925, 9.555 1800-1855 on 17.765, 15.27, 7.23

This column would be interested in reception reports of the new services from Radio RSA.

Radio Tanzania is reported to be testing a new transmitter on shortwave using 5.985 at around 0830, and from 0900 on either 5.985 or 6.015MHz. It is reported that the station is seeking reception reports from listeners which should be sent to the Chief Engineer, Radio Tanzania Dar es Salaam, PO Box 9191, Dar es Salaam, Tanzania.

### **Asian & Pacific Stations**

Radio Australia has been inaugurating new frequencies, but seems reluctant to tell the world about them. No new schedule has arrived from Melbourne, so it has been a case of scanning around the bands until the station is heard. Some frequencies to try at the present are 21.775 during the morning period, with reasonable reception noted at around 0900; 13.70 from at least 0800, again with passable reception; 13.745 from 1930 sign-on (also try this during the mid-afternoon period). It would be interesting to hear from readers about their suggestions

for where to find Australia these days.

Radio Beijing has a new evening frequency for English to Europe at 2000 and again at 2200. 11.50 is now in parallel with 9.92 (which is fractionally behind the 25 metre band channel), and both offer reasonably pleasant reception.

Trans World Radio in Guam has English at 0830-1000 to Asia on 11.805 (including the Pacific DX Magazine on Sunday at 0900); 1500-1635 on 11.65 to Asia (including the Pacific DX Magazine on Sunday at 1515); 1600-1700 to Africa on 11.91 and at 1635-1700 on Sunday to Asia on 11.65.

At 2045, All India Radio signs on with frequencies of 11.62, 7.412 and 9.91MHz, with the 25 metre band giving best results.

English programmes from the Voice of Indonesia are directed to Europe at 2000 on 9.675. This frequency opens at 1730 with Spanish, followed by German and French. The English broadcast lasts sixty minutes.

The North Korean Radio Pyongyang is another station to have moved into the new 13MHz band, using 13.65 for English transmissions at 1300.

### North, Central & South American Stations

HCJB in Quito, Ecuador was in the wars recently when armed bandits attacked the transmitters putting a number out of action. After some breaks in transmissions, all are now back on the air. The morning transmission at 0700 in English now uses 15.27, replacing 6.13MHz.

WCSN has been heard at 0800 on 9.84MHz, whilst in the evening, 13.77 is on the air from 2000 with reception improving from 2100.

WHRI has been noted on the 13MHz band, too, using 13.76 from 1700, heard here in the UK at 2000. Other frequencies announced are:

0600 on 9.62 0800 on 7.355

1100 on 9.465

1500 on 21.84

"As you have recently been extolling the virtues of the Amiga for video work, we thought you might be interested in our long established range of products for the various Acorn computers to turn them into 'video tools'." So ran a letter I received from VEL or Video Electronics Ltd of Atherton, near Manchester.

Well, I am delighted to give them a mention, even more so that someone is reading this column! Yes, it is true I have been giving the Amiga a bit of a plug, mainly because I have had the information about it. But I'll print anything which would interest ATVers

# Back-Scatter

### ATV

Reports to Andy Emmerson G8PTH 71 Falcutt Way Northampton NN28PH

(other firms please note - free advertising!) and the VEL products fit this category as well. As a company, VEL goes back some way and their professional products (such as the Mini-Mixer) are well known and liked in the business. These add- ons for the BBC computers deserve more publicity as they, too, are good, especially the products for the Archimedes, since this computer is so powerful. VEL sent me a demo disk of some of the effects which the Archie can produce and very capable these are too. Indeed, a small video facilities or production house or a cable TV system could make very good use of the facilities offered by the Archie and the VEL add-ons.

Arvis is the name VEL have given to their product range for the Archimedes machine and these hardware boards and expansion cards are designed to interface the Archie with colour video signals from cameras, video tape and

disk and off-air TV. In combination these products make a powerful tool for acquiring, manipulating and creating video images, all at a low cost compared with some video-graphics workstation systems. The ARVC2 board genlocks the computer's RGB video signal to an external signal source and can combine graphics created on the computer with the external signal. A PAL coder is an optional extra. ARDG2 is the card which grabs images from live video in real time and then digitises them in up to 32 000 colours for each pixel. A framestore memory is built into the card and supplied software allows you to edit the digitised images and save them to disk as files which can be manipulated with art or desktop publishing programs. Hard copy printout can also be arranged.

Here is a brief rundown of some of the products on offer from VEL.

### **Archimedes Products**

ARPE1. PAL ENCODER BOARD, £139. Encodes RGB signals to composite PAL standard. Colour subcarrier can be locked and phased to external colour burst. Enables Archimedes or ArVis video controller output to be recorded onto tape or fed to other video equipment.

ARVC1. ARVIS VIDEO CONTROLLER BOARD,£279. Full colour genlock and video decoder. Video Mixing system with both 'supremacy bit' key and unique 'shadow' key. Provides additional RGB output which displays both video picture and Arc. graphics on a standard Archimedes monitor.

ARDG2. ARVIS VIDEOGRAPHICS EXPANSION MODULE, £877. Expands the Archimedes for complete videographics applications. Includes a full colour real-time digitiser, 384Kbytes x 16 bit framestore and a dedicated 32000 colour display output. Used with the videocontroller board to combine live video with digitised images and the Archimedes graphics. Complete with ROM software module and OSCAR image editing disk.

DEMDISC, £8 (including VAT). This ArVis demonstration disk contains a number of digitised and edited pictures created using the ArVis Videographics system. Cost is refunded against subsequent hardware purchase.

ARVC2, £279 + ARPE8, £139. A new

expansion module version of the video controller board with optional plug-on PAL decoder and other additional features. Occupies a single podule slot and directly interconnects with the Videographics expansion module. Designed for 4-slot backplanes and recommended for the new Acorn 410, 420 and 440 machines.

VEL also offer A3000 products and can send you details of these and other expansion modules for the Archimedes 400 series.

### Genlock & Mixing Systems for Model B 7 Master Series Computers

The VEL BEEB-LOCK range provides a variety of genlock and other facilities for the earlier series of Model B and Master computers.

BL1,£290.BEEB-LOCK genlock and PAL encoder (vision mixing requires external equipment). Powered direct from micro.

BL2, £370. BEEB-LOCK with genlock, PAL encoder and power supply. No mixer but can be converted to model BL2K with addition of MX/K1 board (£137).

BL2K, £489. BEEB-LOCK with genlock, PAL encoder, and internal vision mixer - complete with power supply. This unit is a complete system for the mixing and keying of computer graphics over live video pictures. Can also be used as a 'down-stream' mixer in studio systems.

BL3, £369. BEEB-LOCK with decoding function. For interactive video and direct display applications. This unit decodes the incoming colour video prior to mixing with the computer graphics. Output is RGB LINEAR to drive a monitor or video projector. (For videotape use model BL2K).

SOFTWARE: The Fontmaster caption generator software package is available for BBC micros, details on request. VEL also manufactures video mixers, switchers and distribution systems etc. Prices shown above are exclusive of VAT& carriage. For further information contact Video Electronics Ltd., Wigan Road, Atherton, Manchester, M29 ORH. Tel: 0942-882332

### **Vorsprung Durch Digital Sound**

If the previous piece on desk-top

video interested you, then you'll agree with my theory that many ATVers find producing their own video tapes an absorbing hobby in its own right. Of course, by the time you have set up an editing station and perhaps added desk-top video facilities for adding those post-production effects you'll have spent quite a bit of money. That, however, is not the end of the story, because by the time you've edited up the original recordings and added the special effects you'll be at least one generation - and probably several down. Each time you re-record you tend to lose some of the fine detail of the picture, while the audio gets mushier too - at least with the kind of video recorders most of us have access to. How can we make this more professional and get the kind of results we expected when we laid out our cash (or plastic)?

By the way, when I say we, don't look at me. I'm afraid I haven't graduated to my own studio yet, so I don't speak from my own experience. That shouldn't worry you, though - it's never worried me yet! I learn from other people's experience and so can you. But let's get on with the story . what's wrong with, say, a twin VHS deck editing system and how can we upgrade? Well, there's nothing wrong with it as such, and it is probably the best that most of us can aspire to. But it does impose some limitations: it can be difficult to make precise video edits (accurate to one or two frames, that is), while dubbing on new sound may be impossible. As we said before, when you've made your final edited version and then wish to duplicate it to hand out copies, you may find that the picture and sound quality are just not good

As far as audio dubbing is concerned, well you'll have to look out for machines which have this facility. Many of the older, better quality recorders did possess this, and a used model with audio dubbing may be within your budget. External edit controllers capable of making sharp edits with two VHS machines are now being offered by Panasonic. These work (so far) only with certain Panasonic recorders but if precise editing is high on your list of priorities, this may influence the choice of your next machine.

To produce recordings which will

withstand several generations of editing you had up to now to go to a more robust, professional recording system. The 3/4in U-Matic machines were - and are - very practical and on the second-hand market, cheap. The snag is their size; they tend to overpower the small rooms we usually end up inhabiting. The new alternative is S-VHS (it was new in 1986 actually but still has not come down to Dixons or Comet prices!). If you have the equipment though, you can master on S-VHS and then duplicate on normal VHS. I'm told the picture quality is pretty good like this, although you still lose quality on the audio. A new development, announced but unlikely to reach the shops for a year or two, is the addition of digital sound to the S-VHS recording process. This will preserve the same excellent sound quality as the pictures. At the same time it will probably put the final nail in the coffin of U-Matic, which in turn will release onto the surplus market all the U-Matics previously used for corporate video production in big firms!

### **More Commercial News**

Doing on a budget what the commercial boys do for thousands is what we amateurs are rather good at, as we have just seen. You may also remember that a radio-controlled model helicopter with on-board TV camera and radio link to base station was demonstrated several years ago atthe British Amateur Television Club's annual convention, when this was still held at Crick. Now the same kind of devices are in commercial production and are being used for news gathering, also for more covert surveillance purposes.

Once again we are being imitated (1) and the Northamptonshire-based firm TV2 has just launched its miniature. portable, microwave link system for television. Working on an approved 3.5GHz frequency, it is said to link sites up to 108km apart, either line of sight or using mid-point relays. The system works from 12V d.c. and has already been used on a Royal Mail commercial, where it provided a helicopter-toground vision link. No doubt similar systems are used by the police for their eye-in-the-sky, heli-telly operations, although these probably use their normal, lower frequency.

### PCB SERVICE

We apologise for the lack of the full PCB Service page which is due to the lack of space in this 'bumper' issue. To help readers who are wishing to check prices on the latest boards, a shortened list is provided below. Readers may obtain a free photocopy of the full service page with latest prices by sending a stamped self addressed envelope to the address on the contents page. We plan to publish the full, up-dated PCB Service page in the August issue of PW.

### Latest Boards and Prices.

Latest Don'ts and I freest			
WR272	NiCad Recycler June 90 issue	£6.92	
WR275	Low Voltage Alarm June 90 issue	£6.36	
WR273	Valve Power Supply May 90 issue	£6.86	
WR274	Receiver Attenuator May 90 issue	£5.72	
WR271	Product Detector April 90 issue	£4.95	
	•		



# BOOKSERVICE

The books listed have been selected as being of special interest to our readers.

They are supplied from our editorial address direct to your door. Some titles are overseas in origin.



### **HOW TO ORDER**

VISA 0202

665524

POST AND PACKING; add 75p for one book, £1 for two or more books, orders over £25 post and packing free, (overseas readers add £1.50 for one book, £2.50 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, Enefco House, The Quay, Poole, Dorset BH15 1PP. Please make your cheques payable to Practical Wireless, payment by Access, Mastercard, Eurocard or Visa also accepted on telephone orders to Poole (0202) 665524. Books are normally despatched by return of post but please allow 28 days for delivery. Prices correct at time of going to press. Please note: all payments must be made in Sterling.

\* A recent addition to our Book Service.

O/P = Out of print, O/S = Out of stock.

### **RADIO**

### AIR & METEO CODE MANUAL 10th Edition

Joerg Klingenfuss

Detailed descriptions of the World Meteorological Organisation Global Telecommunication System operating FAX and RTTY meteo stations, and its message format with decoding examples. Also detailed description of the Aeronautical Fixed Telecommunication Network amongst others. 289 pages £14.00

BETTER RADIO/TV RECEPTION
A. Nailawalla, A. T. Cushen and B. D. Clark

An Australian book giving guidance and advice to listeners seeking reliable reception of distant radio stations, and to DX listening hobbyists. 134 pages. £9.95

### BETTER SHORTWAVE RECEPTION (USA)

W. S. Orr W6SAI and S. D. Cowan W2LX Receivers, antennas, propagation, DX listening techniques for the short waves and v.h.f. 158 pages. £5.50

### PASSPORT TO WORLD BAND RADIO 1990

This book gives you the information to explore and enjoy the world of broadcast band listening. It includes features on different international radio stations, receiver reviews and advice as well as the hours and languages of broadcast stations by frequency. 398 pages. £12.95

### **SCANNERS** (Third Edition) Peter Rouse GU1DKD

Aguide for users of scanning receivers, covering hardware, antennas, accessories, frequency allocations and operating prodedures. 245 pages. £7.95

### **SCANNERS 2**

### Peter Rouse GU1DKD

The companion to Scanners, this provides even more information on the use of the v.h.f. and u.h.f. communications band and gives constructional details for accessories to improve the performance of scanning equipment. 216 pages. £9.95

### SHORT WAVE RADIO LISTENERS' HANDBOOK

In easy-to-read and non-technical language, the author guides the reader through the mysteries of amateur, broadcast and CB transmissions. 207 pages. £7.99

### RADIOTELETYPE CODE MANUAL

10th Edition

Joerg Klingenfuss
This book gives detailed descriptions of the characteristics of telegraph transmission on short waves, with all commercial modulation types including voice frequency telegraphy and comprehensive information on all RTTY systems and c.w. alphabets. 96 pages. £8.00

### THE SATELLITE EXPERIMENTER'S HANDBOOK (USA)

Aguide to understanding and using amateur radio, weather and TV broadcast satellites. 207 pages. £7.50

### 1934 OFFICIAL SHORT WAVE RADIO MANUAL **Edited by Hugo Gernsback**

A fascinating reprint from a bygone age with a directory of all 1934 s.w. receivers, servicing information, constructional projects, circuits and ideas on building vintage sets with modern parts. 260 pages. £9.95

### HIGH POWER WIRELESS EQUIPMENT Articles from Practical Electricity 1910-11 Edited by Henry Walter Young

A reprint of interesting practical articles from the early days of radio. 99 pages. £6.85

### **BEGINNERS**

### AN INTRODUCTION TO RADIO DXING (BP91)

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. £7.95

### **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

### QUESTIONS & ANSWERS RADIO

Eugene Trundle
Basics of electrical theory, radio and semiconductors, receivers, amateur and CB radio, and test equipment. 110 pages. O/P

### THE SIMPLE ELECTRONICS CIRCUIT AND COMPONENTS Book One (BP62) The aim of this book is to provide an in-expensive but

comprehensive introduction to modern electronics. 209 pages. £3.50

### **TELEVISION**

### AN INTRODUCTION TO SATELLITE TELEVISION (BP195)

Answers all kinds of questions about satellite television. For the beginner thinking about hiring or purchasing a satellite TV system there are details to help you along. For the engineer there are technical details including calculations, formulae and tables, 104 pages. £5.95

### A TV-DXERS HANDBOOK (BP176)

R. Bunney

Information on transmission standards, propagation, receivers including multi-standard, colour, satellites, antennas, photography, station identification, interference etc. Revised and updated 1986. 87 pages. £5.95

### **GUIDE TO WORLD-WIDE TELEVISION TEST CARDS**

Keith Hamer & Garry Smith

Completely revised and expanded, this is a handy reference book for the DXTV enthusiast. Over 200 photographs of Test Cards, logos, etc., world wide. 60pages. £4.95

### SATELLITE TELEVISION INSTALLATION GUIDE 2nd Edition

John Breeds

A practical guide to satellite television. Detailed guidlines on installing and aligning dishes based on practical experience. 56pages. £11.95

### THEORY

### **COMMUNICATION (BP89)**

Elements of Electronics Book 5 F. A. Wilson

Fundamentals of line, microwave, submarine, satellite, digital multiplex, radio and telegraphy systems are covered, without the more complicated theory or mathematics. 256 pages. £2.95

### FILTER HANDBOOK A practical design guide by Stefan Niewiadomski

A practical book, describing the design process as applied to filters of all types. Includes practical examples and BASIC programs. 195 pages. £25.00

### FROM ATOMS TO AMPERES

Explains in simple terms the absolute fundamentals behind electricity and electronics. 244 pages. £3.50

### **LEVEL II RADIO & ELECTRONICS THEORY** Ian Ridpath ZL1BCG

A sequel to Amateur Radio & Electronics Study Course, covers advanced theory to a level for most technician courses. The handwritten format aims to make the student feel these are his own notes. 169 pages. O/P

### PRACTICAL ELECTRONICS CALCULATIONS AND FORMULAE (BP53) F. A. Wilson

This has been written as a workshop manual for the electronics enthusiast. There is a strong practical bias and higher mathematics have been avoided where possible. 249 pages. £3.95

### SOLID STATE DESIGN FOR THE RADIO AMATEUR Wes Hayward W7ZOI and Doug DeMaw W1FB

Back in print by popular demand! A revised and corrected edition of this useful reference book covering all aspects of solid-state design. 256 pages £10.95

### The ARRL ELECTRONICS DATA BOOK Doug DeMaw W1FB

Back by popular demand, completely revised and expanded, this is a handy reference book for the r.f. designer, technician, amateur and experimenter. 260pages. £8.95

### LISTENING GUIDES

### AIR BAND RADIO HANDBOOK. (Third Edition) David J. Smith

Listen to conversations between aircraft and ground control. The author, an air traffic controller, explains more about this listening hobby. 174 pages. £6.99

### AIR TRAFFIC CONTROL

David Adair

A guide to air traffic control with maps, drawings and photographs explaining how aircraft are guided through crowded airspace. 176 pages. O/P

### DIAL SEARCH

George Wilcox

The listener's check list and guide to European broadcasting. Covers m.w., l.w., v.h.f. and s.w., including two special maps. 46 pages. £3.95

### **FLIGHT ROUTINGS 1990**

T.T.Williams

Identifies the flights of airlines, schedule, charter, cargo and mail, to and from the UK and Eire and overflights between Europe and America. 104 pages. £4.95

### **GUIDE TO BROADCASTING STATIONS** 20th Edition 1989/90

Philip Darrington

Frequency and station data, receivers, antennas, Latin American DXing, reporting, computers in radio, etc. 240 pages. £9.95

### **GUIDE TO FACSIMILE STATIONS 9th Edition** Joerg Klingenfuss This manual is the basic reference book for everyone

interested in FAX. Frequency, callsign, name of the station, ITU country/geographical symbol, technical parameters of the emission are all listed. All frequencies have been measured to the nearest 100Hz. 318 pages £12.00

### **GUIDE TO FORMER UTILITY TRANSMISSIONS** 3rd Edition

Joerg Klingenfuss

Built on continuous monitoring of the radio spectrum from the sixties until the recent past. A useful summary of former activities of utility stations providing information in the classification and identification of radio signals. 126 pages. £8.00

### **GUIDE TO UTILITY STATIONS** 8th Edition

Joerg Klingenfuss

This book covers the complete short wave range from 3 to 30MHz plus the adjacent frequency bands from 0 to 150kHz and from 1.6 to 3MHz. It includes details on all types of utility stations including FAX and RTTY. There are 15802 entries in the frequency list and 3123 in the alphabetical callsign list plus press services and meteorological stations 502 pages. £19.00

### HF OCEANIC AIRBAND COMMUNICATIONS **3rd Edition**

**Bill Lave** 

Aircraft channels by frequency and band, main ground radio stations, European R/T networks, North Atlantic control frequencies. 29 pages. £3.50

### INTERNATIONAL RADIO STATIONS GUIDE (BP255)

Revised and updated in 1988, this book show country, frequency/wavelength and power of stations in Europe, the Near East and N. Africa, North and Latin America and the Caribbean, plus short wave stations worldwide. 128 pages. £4.95

### MARINE UK RADIO FREQUENCY GUIDE **Bill Laver**

A complete guide to the UK s.w. and v.h.f. marine radio networks. Useful information, frequency listings and the World Marine Coastal Phone Stations. 62pages. £4.95

### **NEWNES SHORT WAVE LISTENING HAND BOOK** Joe Pritchard G1UOW

A technical guide for all short wave listeners. Covers construction and use of sets for the s.w.l. who wants to explore the bands up to 30MHz. 288pages. £12.95

### THE COMPLETE VHF/UHF FREQUENCY GUIDE Updated 1988

This book gives details of frequencies from 26-2250MHz with no gaps and who uses what. Recently updated, there are chapters on equipment requirements as well as antennas, etc. 88 pages. £5.95

### THE INTERNATIONAL VHF FM GUIDE 7th Edition

Julian Baldwin G3UHK and Kris Partridge G8AUU The latest edition of this useful book gives concise details of repeaters and beacons worldwide plus coverage maps and further information on UK repeaters. 70 pages. £2.85

### THE POCKET GUIDE TO RTTY AND FAX STATIONS

A handy reference book listing RTTY and FAX stations, together with modes and other essential information The listing is in ascending frequency order, from 1.6 to 27.1MHz. 46 pages £2.95

### SHORT WAVE LISTENERS CONFIDENTIAL FREQUENCY LIST

Covering the services and transmission modes that can be heard on the bands between 1.635 and 29.7 MHz. £8.95

### VHF/UHF AIRBAND FREQUENCY GUIDE (Updated)

A complete guide to the airband frequencies including how to receive the signals, the frequencies and services, VOLMET and much more about the interesting subject of airband radio. 74 pages. £5.95

### **WORLD RADIO TV HANDBOOK 1990**

Country-by-country listings of long, medium and short wave broadcast and TV stations. Receiver test reports. English language broadcasts. The s.w.l.'s "bible". 576 pages. £18.99

### INTERFERENCE

### INTERFERENCE HANDBOOK (USA) William R. Nelson WA6FQG

How to locate and cure r.f.i. for radio amateurs, CBers and TV and stereo owners. 253 pages. £6.75

### RADIO FREQUENCY INTERFERENCE (USA)

What causes r.f.i? Are all r.f.i. problems difficult, expensive and time-consuming to cure? These questions and many more are answered in this book. 84 pages. £4.30

### AMATEUR RADIO

### AMATEUR RADIO CALL BOOK (RSGB) 1990 Edition

Now incorporates a 48-page section of useful information for amateur radio enthusiasts. 310 pages. £7.70

### AMATEUR RADIO OPERATING MANUAL (RSGB)

A mine of information on just about every aspect of amateur operating. International callsign series holders, prefix lists, DXCC countries list, etc. 204 pages. £6.16

### AMATEUR RADIO SATELLITES the first 25 years Arthur C. Gee G2UK

This souvenir publication mainly a pictorial account of the pattern of developments which have occurred over the last 25 years. 34 pages. £2.25

### AN INTRODUCTION TO AMATEUR RADIO (BP257) I.D.POOLE

This book gives the newcomer a comprehensive and easy to understand guide through amateur radio. Topics include operating procedures, jargon, propagation and setting up a station. 150 pages. £3.50

### HINTS AND KINKS FOR THE RADIO AMATEUR Edited by Charles L. Hutchinson and David Newkirk A collection of practical ideas gleaned from the pages of

QST magazine. 152pages. £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, £5.65

### PASSPORT TO AMATEUR RADIO Peprinted 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 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

### QUESTIONS & ANSWERS AMATEUR RADIO F. C. Judd G2BCX

What is amateur radio? The Radio Amateurs' Exam and Licence. Technology, equipment, antennas, operating procedures and codes. 122 pages. O/P

### **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. £8.95

### THE 1990 ARRL HANDBOOK FOR THE RADIO

This is the 66th edition of this very useful hardback reference book. Updated throughout it has several new sections covering oscilloscopes, spectrum analysers, digital frequency synthesis, phase-noise measurement and ne constructional projects.

1200 pages £15.95

### THE ARRL OPERATING MANUAL

Another very useful book from the ARRL. Although writen for the American radio amateur, this book will also be of use and interest to the UK amateur.

### THE ARRL SATELLITE ANTHOLOGY

The best from the Amateur Satellite News column and articles out of 31 issues of QST have been gathered together in this book. The latest information on OSCARs 9 through 13 as well asd the RS satellites is included. Operation on Phase 3 satellites (OSCAR 10 and 13) is covered in detail. 97 pages £4.95

### 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 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 £5.65

### THE RADIO AMATEUR'S DX GUIDE (USA) 15th Edition

The guide contains information not easily obtained elsewhere and is intended as an aid and quick reference for all radio amateurs interested in DX. 38 pages. £2.95

### THE RADIO AMATEUR'S QUESTIONS & ANSWER REFERENCE MANUAL 4th Edition

R. E. G. Petri G8CCJ

This book has been compiled especially for students of the City and Guilds of London Institute RAE. It is structured with carefully selected multiple choice questions, to progress with any recognised course of instruction, although is is not intended as a text book. 258 pages. £7.95

### VHF HANDBOOK FOR RADIO AMATEURS (USA) H. S. Brier W9EGQ & W. I. Orr W6SAI

VHF/UHF propagation, including moonbounce and satellites, equipment and antennas, 335 pages. £7.95.

### VHF/UHF MANUAL (RSGB)

G. R. Jessop G6JP

Theory and practice of amateur radio reception and transmission, between 30MHz and 24GHz. 520 pages. £8.94

### MAPS IARU LOCATOR MAP OF EUROPE DARC

This multi-coloured, plastics laminated, map of Europe shows the AIRU ("Maidenhead") Locator System. Indispensible for the v.h.f. and u.h.f. DXer. 692 x 872mm. €5.25

### RADIO AMATEUR'S MAP OF NORTH AMERICA (USA)

Shows radio amateur prefix boundaries, continent boundaries and zone boundaries. 760 x 636mm. £2.50

### RADIO AMATEUR'S PREFIX MAP OF THE WORLD

Showing prefixes and countries, plus listings by order of country and of prefix. 1014 x 711mm. €2.9

### RADIO AMATEUR'S WORLD ATLAS (USA)

Seventeen pages of maps, including the world-polar projection. Also includes the table of allocation of international callsign series. £3.50

### DATA REFERENCE

### DIGITALIC EQUIVALENTS AND PIN CONNECTIONS (BP140)

A. Michaels

Equivalents and pin connections of a popular selection of European, American and Japanese digital i.c.s. 256 pages. £5.95.

### INTERNATIONAL DIODE EQUIVALENTS GUIDE (BP108)

A. Michaels

Possible substitutes for a large selection of many different types of semiconductor diodes. 144 pages. £2.25.

### INTERNATIONAL TRANSISTOR EQUIVALENTS **GUIDE (BP85)**

A. Michaels

Possible substitutes for a popular selection of European, American and Japanese transistors. 320 pages. £3.50

### LINEAR IC EQUIVALENTS AND PIN **CONNECTIONS (BP141)**

A. Michaels

Equivalents and pin connections of a popular selection of European, American and Japanese linear i.c.s.

### **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, gramaphones, CDs to name a few. 190 pages. Hardback £9.95

### NEWNES COMPUTER ENGINEER'S POCKET BOOK

This is an invaluable compendium of facts, figures, circuits and data and is indispensable to the designer, student, service engineer and all those interested in computer and microprocessor systems. 203 pages. Hardback €9.95

### NEWNES ELECTRONICS POCKET BOOK

5th Edition

Presenting all aspects of electronics in a readable and largely non-mathematical form for both the enthusiast and the professional engine 315 pages, Hardback £9.95

### **NEWNES RADIO AMATEUR AND LISTENER'S** POCKET BOOK

Steve Money G3FZX

This book is a collection of useful and intriguing data for the traditional and modern radio amateur as well as the short wave listener. Topics such as AMTOR, packet radio, SSTV, computer communications, airband and maritime communications are all covered. 160 pages, Hardback £9.95

### **NEWNES RADIO AND ELECTRONICS ENGINEER'S** OCKET BOOK

18th Edition

Keith Brindley

Useful data covering math, abbreviations, codes, symbols, frequency bands/allocations, UK broadcasting stations, semi-conductors, components, etc. 325 pages. Hardback £9.95

### NEWNES TELEVISION AND VIDEO ENGINEER'S POCKET BOOK

Eugene Trundle

This is a valuable reference source for practitioners in 'entertainment" electronic equipment. It covers TV reception from v.h.f. to s.h.f. display tubes, colour camera technology, video recorder and video disc equipment, video text and hi-fi sound. 323 pages. Hardback O/I

### POWER SELECTOR GUIDE (BP235)

J. C. J. Van de Ven
This guide has the information on all kinds of power devices in useful categories (other than the usual alpha numeric sort) such as voltage and power properties making selection of replacements easier 160 pages. £4.95

### RSGB RADIO DATA REFERENCE BOOK

G. R. Jessop G6JP
The 5th Edition of an essential book for the radio amateur's or experimenter's workbench.

244 pages. Hardback O/P

### SEMICONDUCTOR DATA BOOK A.M.Ball

Characteristics of some 10000 transistors, f.e.t.s, u.j.t.s, diodes, rectifiers, triacs and s.c.r.s.175 pages. **O/P** 

### TRANSISTOR SELECTOR GUIDE (BP234) J. C. J. Van de Ven

This guide has the information on all kinds of transistors in useful categories (other than the usual alpha numeric sort) such as voltage and power properties making seletion of replacements easier. 192 pages. £4.95

# FAULT FINDING ARE THE VOLTAGES CORRECT?

Reprinted from PW 1982-1983

How to use a multimeter to fault-find on electronic and radio equipment, from simple resistive dividers through circuits using diodes, transistors, i.c.s and valves.
44 pages. £1.50

### **GETTING THE MOST FROM YOUR MULTIMETER**

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 primarly 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

lan Hickman

This book describes oscilloscopes ranging from basic to advanced models and the accessories to go with them. 133 pages. O/P

### PRACTICAL HANDBOOK OF VALVE RADIO REPAIR

Chas E. Miller

The definite work on repairing and restoring valved broadcast receivers dating from the 1930s to the 60s. Appendices giving intermediate frequencies, valve characteristic data and base connections.

230 pages, Hardback £20.00

### SERVICING RADIO, HI-FI AND TV EQUIPMENT Gordon J. King

A very practical book looking at semiconductor characteristics, d.c. and signal tests, fault-finding techniques for audio, video, r.f. and oscillator stages and their application to transistor radios and hi-fi. 205 pages. O/P

### TRANSISTOR RADIO FAULT FINDING CHART (BP70)

Used properly, should enable most common faults to be traced reasonably quickly. Selecting the appropriate fault description at the head of the chart, the reader is led through a sequence of suggested checks until the fault is cleared. 635 x 455mm (approx) £0.95

### CONSTRUCTION

### HOW TO DESIGN AND MAKE YOUR OWN P.C.B.s (BP121)

R. A. Penfold

Designing or copying printed circuit board designs from magazines, including photographic methods. 80 pages. £2.50

### INTRODUCING QRP

Collected articles from PW 1983-1985
An introduction to low-power transmission, including

constructional details of designs by Rev. George Dobbs G3RJV for transmitters and transceivers from Top Band to 14MHz, and test equipment by Tony Smith 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 unstabilised types, fixed voltage regulated types and variable voltage stabilised designs. 91 pages. £2.50

### PRACTICAL POWER SUPPLIES

Collected articles from PW 1978-1985

Characteristics of batteries, transformers, rectifiers, fuses and heatsinks, plus designs for a variety of mainsdriven power supplies, including the PW "Marchwood" giving a fully stabilised and protected 12V 30A d.c. 48 pages. £1.25

### ORP 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 spentyeers as an ardent QRPer. All the text is easy-to-read and the drawings large and clear. 77 pages. £4.95

### TEST EQUIPMENT CONSTRUCTION

R.A.Penfold
Describes, in detail, how to construct some simple and inexpensive, but extremely useful, pieces of test equipment. 104pages. £2.95

### 50 (FET) FIELD EFFECT TRANSISTOR PROJECTS

50 circuits for the s.w.l., radio amateur, experimenter or audio enthusiast using f.e.t.s. 104pages. £2.95

# ANTENNAS (AERIALS) AERIAL PROJECTS (BP105)

Practical designs including active, loop and ferrite antennas plus accessory units. 96 pages. £2.50

### L ABOUT CUBICAL QUAD ANTENNAS (USA) W. I. Orr W6SAI & S. D. Cowan W2LX Theory, design, construction, adjustment and operation of

quads. Quads vs. Yagis. Gain figures. 109 pages. £5.50

### ALL ABOUT VERTICAL ANTENNAS (USA)

W. I. Orr W6SAI & S. D. Cowan W2LX
Theory, design, construction, operation, the secrets of making vertical work. 191 pages. **£7.50** 

### AN INTRODUCTION TO ANTENNA THEORY (BP198)

This book deals with the basic concepts relevant to receiving and transmitting antennas. Lots of diagrams reduce the amount of mathematics involved. 86 pages. £2.95

### ANTENNA IMPEDANCE MATCHING

Wilfred N. Caron

Proper impedance matching of an antenna to a transmission line is of concern to antenna engineers and to every radio amateur. a properly matched antenna as the termination for a line minimises feed-line losses. Power can be fed to such a line without the need for a matching network at the line input. There is no mystique involved in designing even the most complex multi-element metworks for broadband coverage. Logical step-by-step procedure is followed in this book to help the radio amateur with this task. 192 pages £11.95

### **BEAM ANTENNA HANDBOOK (USA)**

W. I . Orr W6SAI & S. D. Cowan W2LX

Design, construction, adjustment and installation of h.f. beam antennas. 198 pages. **O/P** 

### HF ANTENNAS FOR ALL LOCATIONS (RSGB)

L. A. Moxon G6XN
Taking a new look at how h.f. antennas work, and putting theory into practice. 260 pages. £5.19

### \*NOVICE ANTENNA NOTEBOOK Doug DeMaw W1FB

Another book from the pen of W1FB, this time offering "new ideas for beginning hams". All the drawings are large and clear and each chapter ends with a glossary of terms. 130 pages £5.95

### **OUT OF THIN AIR**

Collected Antenna Articles from PW 1977-1980
Including such favourites as the ZL Special and 'ZBCX 16element beams for 2m, and the famous "Slim Jim",
designed by Fred Judd G2BCX. Also features systems for Top Band, medium wave/long wave loop designs and a v.h.f. direction finding loop. Plus items on propagation, accessories and antenna design. 80 pages. £1.80

### PRACTICAL WIRE ANTENNAS - Effective HF Designs for the Radio Amateur John D Heys G3BCQ

Wire antennas offer one of the most cost-effective ways to put out a good signal on the h.f. bands and this practical guide to their construction has something to interest every mateur on a budget. 100 pages. £7.53.

### SIMPLE, LOW-COST WIRE ANTENNAS FOR RADIO AMATEURS (USA)

W. I. Orr W6SAI & S. D. Cowan W2LX

Efficient antennas for Top Band to 2m, including "invisible" antennas for difficult station locations. 191 pages. £6.75

### THE ARRL ANTENNA BOOK (USA) 15th Edition

A station is only as effective as its antenna system. This book covers propagation, practical constructional details of almost every type of antenna, test equipment and formulas and programs for beam heading calculations.

### THE ARRL ANTENNA COMPENDIUM (USA) **Volume One**

Fascinating and hitherto unpublished material. Among the topics discussed are quads and loops, log periodic arrays, beam and multi-band antennas, verticals and reduced size antennas. 175 pages. £7.50

### WIRES & WAVES

Collected Antenna Articles from PW 1980-1984

Antenna and propagation theory, including NBS Yagi design data. Practical designs for antennas from medium waves to microwaves, plus accessories such as a.t.u.s, s.w.r. and power meters and a noise bridge. Dealing with TVI. 160 pages. €3.00

### W1FB'S ANTENNA NOTEBOOK Doug DeMaw W1FB

This book provides lots of designs, in simple and easy to read terms, for simple wire and tubing antennas. All drawings are large and clear making construction much easier. 124 pages. £5.95

### 25 SIMPLE AMATEUR BAND AERIALS (BP125) E. M. Noll

How to build 25 simple and inexpensive aerials, from a simple dipole through beam and triangle designs to a mini-rhombic. Dimensions for specific spot frequencies including the WARC bands. 80 pages. £1.95

### 25 SIMPLE INDOOR AND WINDOW AERIALS (BP136) E. M. Noll

Designs for people who live in flats or have no gardens, etc., giving surprisingly good results considering their limited dimensions. 64 pages. £1.75

### 25 SIMPLE SHORT WAVE BROADCAST BAND AERIALS (BP132)

E. M. Noll

Designs for 25 different aerials, from a simple dipole through helical designs to a multi-band umbrella. 80 pages. £1.95

### 25 SIMPLE TROPICAL AND MW BAND AERIALS (BP145)

E. M. Noll

Simple and inexpensive aerials for the broadcast bands from medium wave to 49m. 64 pages. £1.75

# THE RADIO AMATEUR ANTENNA HANDBOOK William I. Orr W6SAI & Stuart. D. Cowan W2LX Yagi, quad, quagi, I-p, vertical, horizontal and "sloper

antennas are all covered. Also towers, grounds and rotators. 190 pages. £6.75

### COMPUTING AN INTRODUCTION TO COMPUTER **COMMUNICATIONS (BP177)**

R. A. Penfold

Details of various types of modem and their applications, plus how to interconnect computers, modems and the telephone system. Also networking systems and RTTY. 96 pages. £2.95

### AN INTRODUCTION TO COMPUTER PERIPHERALS

J. W. Penfold

Covers a wide range of computer peripherals such as monitors, printers, disk drives, cassette recorders, modems, etc., explaining what they are, how to use them and the various types of standards. 80 pages. £2.50

### MICROPROCESSING SYSTEMS AND CIRCUITS (BP77)

**Elements of Electronics Book 4** F. A. Wilson

comprehensive guide to the elements of microprocessing systems, which are becoming ever more involved in radio systems and equipment. 256 pages. O/P

### **MORSE**

### INTRODUCING MORSE

Collected Articles from PW 1982-1985
Ways of learning the Morse Code, followed by

constructional details of a variety of keys including lambic, Triambic, and an Electronic Bug with a 528-bit memory. 48 pages. £1.25

### THE MORSE CODE FOR RADIO AMATEURS (RSGB) Margaret Mills G3ACC

A guide to learning to send and receive Morse code signals up to the 12 w.p.m. required for the radio mateur aspiring to a Class A licence having passed the RAE. 19 pages. £2.88

### THE SECRET OF LEARNING MORSE CODE Mark Francis

Designed to make you proficient in Morse code in the shortest possible time, this book points out many of the pitfalls that beset the student.

87 pages. £4.95

The prepaid rate for classified advertisements is 42 pence per word (minimum 12 words), box number 60p extra. Semi-display setting £13.90 per single column centimetre (minimum 2.5cm). Please add 15% 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.

# assit

Whilst prices of goods shown in advertisements are correct at the time of going to press, readers are advised to check with the advertiser both prices and availability of goods before ordering from non-current issues of the magazine

### Receivers

B.F.O. KITS, resolves single-side band on almost any radio, £14.95. Also Steepletone FM/AIR/MW £9.95. CORRIGAN RADIOWATCH, 7 York Street, Ayr KA8 8AR.

# SCANNERS AMEX REALISTIC PRO-2005 BASE MOBILE, 25-520 & 760-1300MHz 400 memory £325 SAVE £14.95 FAIRMATE HHP100E HAND HELD, 25-550 & 830-1300MHz 1000 memory £299. Both incl. Free Freq. Guide & 12V DC lead & P&P. LECTRONIC SERVICES 12b High Street, MILDENHALL, Suffolk IP28 7HQ LICKLOSCO 273-731-7329. AVE £14.95.

G3LLL 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.

Tandy Authorised Deale

Tel: (0638) 713329

AOR-2002 25-1300MHz scanner, £320. AOR-2001 25-550MHz scanner, £120. Bearcat 10KHz-30MHz S/W-receiver, £170. 40 Channel Hand-helds 4W-CB Transceiver, £60. Tel: (0889) 563495 (Staffs).

RECEIVERS EX-M.O.D. 1-20MHz with lead and manual £60.00, oscilloscopes EX-M.O.D. double beam with lead and manual £60.00, A 41 VHF PXRH back-pack set: £60.00, Bradley Electronic Multimeters £45.00, new Larkspur Morse Keys £12.00. All prices include P&P. Tel: Wolverhampton 20315.

### Valves

VALVES FOR AUDIO, INDUSTRY, Receiving & Transmitting. Rare and obsolete types a specialityl Special prices for wholesale quantities. Orders from Gvt. Depts., PLCs, overseas etc. welcome. Also CRT, IC, Klystrons, Magnetrons, Transistors, USA valves etc. RETAIL: Minimum order £20: Phone or Fax for immediate ate quote. Discounts for quantity. Phone (0403)210729 Fax (0403) 40214. Min order £20. Visa and Access accepted. BILLINGTON VALVES,39 Highlands Rd, Horsham, Sussex RH13 5LS. (callers by appt only). Office hours Mon-Fri 9am-5.30pm

### Service Sheets

### ACCESS TECHNICAL INFORMATION SERVICES (PW) MASTERCARD

**EUROCARD** 

TERCARD 76 Church St., Larkhall, Lanarkshire ML9 1HE EURO Immediate quotes - Phone 0698 884585 Mon-Fri 9-5, 0698 883334 any other time IMMEDIATE DESPATCH OF ALL Phone Orders by ACCESS, VISA etc. or to Listed Customers

WORLD'S LARGEST COLLECTION OF SERVICE MANUALS ... from £3.50 to £50 ... Most unobtainable elsewhere Every issued FULL SIZE ERVICE SHEET in stock; CTVs or Combinations £3.50/Singles £2.50 Plus :SAE LSAE for any Quotation, plus huge FREE Catalogue, STREE Review, Pricelists, etc.
For £3 ... Comprehensive Sercie Manuals & Sheets Catalogues PUS 1989 Chassis Guide & £4 Vouchers pectrum Repair & Service Guide £5.00.
Video Recorders Service Guide £5.00.
Giant Collection of 10 Huge Binders covering all main CTVs to end 1989, (FREE Updating) £265

Available for most Video Recorders, Colour & Mono Televisions, Cameras, Test Equipment, Amateur Radio, Vintage Valve Wireless, Any Audio, Music Systems, Computers, Kitchen Appliances etc.

Equipment from the 1930s to the present and beyond.
Over 100 000 models stocked, orignals and photostats. FREE catalogue Repair and Data Guides with all orders.

MAURITRON TECHNICAL SERVICES (PW), 8 CHERRY TREE ROAD, CHINNOR, OXON, OX9 4QY
TATE (1944) 15164 Env. (1944) 15756.

8 CHERRY TREE ROAD, CHINNOR, OXON, OX9 4QY
Tel: (0844) 51694 Fax: (0844) 52554

TECHNICAL MANUALS, AR88, CR100, R210, HR0, £4 each. Circuits only 150 pence, plus SAE, lists thousands. BENTLEY, 27 De Vere Gardens, Ilford, Essex IG1 3EB. Phone 071-554 6631.

### Components

### QUARTZ CRYSTALS and FILTERS

Large numbers of standard frequencies in stock for amateur, CB, professional and industrial applications.
Stock crystals £5.50 each (inc. VAT and UK post).
Any frequency or type made-to-order from £6.50.
Phone or SAE for lists.

**GOLLEDGE ELECTRONICS** Merriott, Somerset, TA16 5NS Tel: (0460) 73718

JAPANESE TRANSMITTING TUBES and transistors for broadcasting, communication and industrial use Please make enquiry by fax 816-338-3381. TSUTOM YOSHIHARA, 1-105, Deguchi-cho 34 Suita-shi, Osaka 564. JAPAN.

### Components (cont)



### SURFACE MOUNT **DEVICES**

Full range SMD Rs, Cs, Transistors and ICs SMD 'starter kit' a 0.5W AF Amp for Rx, OP, £6.80.

SMD Assembly Jig £16.50.

Send SAE For Kit List

A15 page catalogue £1.00 from:

BRE, 538 Liverpool Rd, Great Sankey,
Warrington WA5 3LU,

Mail Order. Callers by appointment.

Tel: 0925 72 7848

J. A. B. The new name in Mail Order. Electronic and R. F. Components, with an evening telephone service. Catalogue 50p (Refunded on first order) from:- JAB 76 Wensleydale Road Greatbarr, Birmingham B42 1PL.

TOROIDAL CORES, FERRITE BEADS, send 50p for catalogue to: FERROMAGNETICS PO Box 577 Mold, Clwyd, N. Wales CH7 1AH.

Kits

PRO-2004/5 Owners Search with autostore. 256 memo-

# ries, details G31ES QTHR Bristol 500742 **ORDER FORM** PLEASE WRITE IN BLOCK CAPITALS Please insert this advertisement in the next available issue of Practical Wireless for.....insertion/s. I enclose Cheque/P.O. for £......(42p per word, please add 15% VAT to total). Rates and Postal Address at top of page. (Cheques and Postal Orders should be made payable to Practical Wireless). CATEGORY HEADING..... Name. Address

### For Sale

USED SCOPES, SIG. GENS, METERS, P.S.Us. Many bargains in our walk-round store. COOKE INTERNATIONAL. Tel: (0243) 545111.

TEKTRONIX 60MHz OSCILLOSCOPE Model 2215 dual trace delayed timebase. As new condition COST £873, ACCEPT £400. Phone (Richard) 081-961 3762 (Evenings).

ICOM IC-735 HF TRANSCEIVER. V.G.C. Boxed. Three years old. £650. Tel: (0227) 361377.

### RCS VARIABLE VOLTAGE D.C. BENCH POWER SUPPLY

1 to 24 volts up to half amp. 1 to 20 volts up to 1 emp. 1 to 16 volts up to 1 1/2 amp D.C. Fully stabilised. Twin panel meters or instant voltage and current reading

Operates from 240V A C



Post £2.

### RADIO COMPONENT SPECIALISTS

337 Whitehorse Road, Croydon SURREY, U.K.
Tel: 081-684 1665
List, Large S.A.E. Delivery 7 days Callers Welcome Closed Wednesday

### 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, 39 Highlands Road, Horsham RH13 5LS. Callers please phone for Horsham RH13 5LS. Callers please phone for appointment. Tel. (0403) 210729. Fax: (0403) 40214. Telex: 87271.

SURPLUS ELECTRONICS COMPONENTS, test gear, computers amateur, bought for cash, (0425) 274274.

**RADIO TYPES** 12, 1154, 1155, W.H.Y. Ex Army, NWII. M.O.D. (0705) 250463.

### Computer Soft/w & Hard/w

### AMATEUR RADIO SOFTWARE

Transceive or receive only for 1) Spectrum. 2) VIC20, 3) CBM64, 4) MSX (1), 51 Rv only AMSTRA 0846/128, SDIS Green, Type Ahead Etc. Various Baud rates. Rx only uses full screen 1) Requre filter, 2) & 3) Needs starlet terminal, 4) & 51 Use tone demodulaor. VarNx ... £9,00 Rx only ... £7,00 MX only ... £7,00 Transceive for the Spectrum ... no interface ... £9,00 BB C B, Dragon, Atari (400-600 & XL) & Amstrad (464 & 5128) Sinclair needs no interface.

Programme . . £7.00 interface . . £3.00
Tutor for Spectrum, MSX(1), CBM 64, C16, plus 4, Electron, BBC B, Atari
and Amstrad 464/6128 £5.00

Transceive or receive only for the Spectrum. Aso design programme. Picture stores for Tx or Rx 8 text stores etc., etc. No interface required.

Tx/Rx . £14.00 Rx only . . £7.00 Design . . £11.00

SEND LARGE SAE FOR FULL DETAILS & PRODUCT LIST

### J. &.P. ELECTRONICS LTD.

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

COMMODORE COMPUTERS (+4, C16, 64, 128).
"MICROCOM" cw/rtty tx/rx with superb Morse tutor.
"TURBO LOG" ultimate high speed station log.
"MICROCOM INTERFACE" ready built. S.A.E. to:-Moray Micro Computing, Enzie Slackhead, Buckie, Moray, AB5 2BR. (Tel. 0542 7384).

IBM/COMPATIBLE SHAREWARE CATALOGUE,

7000+ files, wordprocessors, spreadsheets, communica-tions, Ham & games. Send £1.50 or 2 disks & return postage. AK SHAREWARE, 54 Sheldrake Road, Christchurch, Dorset BH23 4BP.

### Antennas

TRAPS FOR D.I.Y. Tribander beams and Anti-T.V.I. Trap-Dipoles. Aerial D.I.Y. Bits, Baluns, Data: 28p SAE. Aerial Guide £1. G2DYM, Uplowman, Devon, EX16 7PH (03986) 215.

### Recruitment

## If $[1MHz \le a \le light]$ then $b \to 1$

(where a = your skill and b = efficiency of our service)

We are the specialist agency for Engineers working from 1MHz to light! If you are seeking design or test, permanent or contract, home or overseas, then consult the experts in the field. We have hundreds of top positions with companies working on RF mobile comms, opto, space, mm-wave & microwave projects.

Please contact our consultant Simon Luttrell MSc today.



160 Bellingdon Road, Chesham, Buckinghamshire HP5 2HF

Tel: 0494 773918

Icom (UK) 2.3 Cover iii

# **INDEX TO ADVERTISERS** AH Supplies 62 ARE Communications 11 Aerial Techniques 20 Amateur Radio Communications Ltd 35 Bredhurst Electronics CapCo Castle Electronics Cirkit Colomor ..... Datong 61 Davetronics 61 Dewsbury 10 Dressler Communications 30 GCHQ ......G4TNY Amateur Radio ...... ICS Intertext ......84

CONT (OK)
Lake Electronics
Maplin Electronics
Nevada Communications38, 56
Photo Acoustics7
Quartslab74
RST Valve     35       Radio Shack     92       Randam Electronics     35       RAS Nottingham     68       Raycom     25
SEM         68           SES Communication Systems         35           SRW Communications         35           Siskin Electronics         74           South Midlands Communications         Cover ii, 4, 5, 6,           Stephens James         84           Sussex Amateur Radio & Computer Fair         68           Syon Trading         84
Technical Software         20           Tennamast         68           Total Communication         74
Ward Reg & Co

### 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 professional examinations, etc.) write or phone: THE RAPID RESULTS COLLEGE, Dept. JX100, Tuition House, London SW19 4DS, Tel. 081-947 7272 (9am-5pm) or use our 24hr Recordacall Service: 081-946 1102 quoting

**ELECTRONICS WORKSHOP** Repairs, rebuilds, modifications, advice. Specialists in valve equipment. See also PAYL School. Green, G1NAK Chylean, Tintagel, Cornwall. Tel: (0840) 212262.

R.A.E. PAY AS YOU LEARN Correspondence, £2 per Green, C. Eng., M.I.E.E. Chylean, Tintagel, Cornwall. Tel: (0840) 212262

### Veteran & Vintage

SCOOP PURCHASE 2MT WRITTLE . THE RIRTH OF BRITISH BROADCASTING. The last 75 copies of this new book now out of print. An informative book by Tim Wander charting the struggle to achieve a broadcasting service in this country from the famous Melba broadcasts, through Writtles sparkling success to the birth of the BBC. Includes seperate technical/historical appendices on the Chelmsford, 2LO and The Hague transmitters and work of early telephony pioneers. Much previously unpublished technical material and photos. Limited Hardback edition signed by author. Published £13.95 pp £1.55. Two copies sent for £28 post free. CHEVET BOOKS, 157 Dickson Road, Blackpool FY1 2EU. Tel: (0253) 751858.

FOR VALVES, SERVICE DATA, AMPLIFIERS AND RADIOS, Try The Vintage Wireless Co., first. Send for free information package. 1990 Catalogue available April £4.00.Cossham Street, Mangotsfield, Bristol BS17 3EN. Tel: 0272 565472.

### Miscellaneous

G2VF LOOP ANTENNAS COMPLETE WITH ATU FOR H.F. HAM RADIO BAND TRANSMISSION (SWR Dne to One 40, 15 and 10 and One Point Five to One 80 and 20) AND SWLs, AND LONG AND MEDIUM WAVE BANDS FOR BCLs. Loops 21 inches square or triangle. No special skills required. Circuits, Parts Lists with sources of supply assembly/data. HIGH FROUENCY LOOP 80 to 10 Metres Fo. LONG AND MEDIUM WAVE LOOP for BCLs £3. LONG WAVE MEDIUM WAVE AND SHORT WAVE LOOP 100 to 100 Metres FOR THE BCB AND SWLSS. SHORT WAVE ATU FOR LOOP OR LONG WIRE ANTENNA £4. SHORT WAVE ATU BUILT IN PRE AMP FOR LOOP OR LONG WIRE E.P. Pre-amp LV, MW and SWave £2. MW LOOP with pre amp ATU E.P. FRE AMP FOR BCVF HE Loop or ATU £4. SA£ details. All projects DIY. Metal Detector £2. Phot oCopy HRO manual£4. Fa. Rylands, 39 Parkside Avenue, Millbrook, Southampton SO1 9AF Tel. (0703) 775064.

HEATHKIT U.K. Spares and Service Centre. Cedar Electronics Unit 12, Station Drive, Bredon, Tewkesbury, Glos. Tel: (0684) 73127.

### **SPECIAL NOTICE TO READERS**

Although the proprietors and staff of PRACTICAL WIRELESS take reasonable precautions to protect the interests of readers by ensuring as far as practicable that advertisements in PRACTICAL WIRELESS are bona fide, the magazine and its Publishers cannot give any undertakings in respect of claims made by advertisers, whether these advertisements are printed as part of the magazine, or are in the form of

While the Publishers will give whatever assistance they can to readers having complaints, under no circumstances will the magazine accept liability for nonreceipt of goods ordered, or for the late delivery, or for faults in manufacture. Legal remedies are available in respect of some of these circumstances, and readers who have complaints should address them to the advertiser or should consult a local Trading Standards Office, or a Citizens Advice Bureau, or their own solicitor.

# YOUR LOCAL DEALERS



### FLECTRO MART

Receivers, Scanners, Howes, ERA, CB, Marine radio etc. part exchange welcome.

> 96 High St, Clydach, Swansea Tel: 0792 842135



### **ELECTRONIC DISTRIBUTORS**

Specializing in Electronic Components

and Surplus
13 Clarence Arcade,
Stamford Street,
Ashton-U-Lyne
Lancashire

Mon to Sat Tel: 061 343 7782

Open

### LONDON

Henry's 27MHz/934MHz Rigs & accessories in stock. Lists - S.A.E. (A4) - 26p Full catalogue (TG/P) large S.A.F. £2.00 404 Edgware Road, London W2 1ED

Tel: 01-724 0323 (Open 6 days a week)

### 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 9SP PHONE 0246 826578

CLOSED WEDNESDAY

### HERNE BAY COM ICOM (UK) LIMITED

The Official Icom Importer Unit 8, Sea Street Herne Bay, Kent CT6 8LD

Tel: 0227 369464

Fax: 0227 360 155

Open Mon-Sat 9-5:30,
(Lunch 1-2:00 pm)

### SOUTHAMPTON

### **South Midlands** Communications

Official Yaesu Importer

S.M. House, School Close, Chandlers Ford Industrial Estate, Eastleigh Hants SO5 3BY. Tel: 0703 255111

### PORTSMOUTH

### Nevada **Communications**

Importers of the Nevada range of 934MHz equipment

189, London Road, North End, Portsmouth, Hants, PO2 9AE Tel: 0705 662145

### DEVON

### Reg. Ward & Co. Ltd.

The South-West's largest amateur radio stockist. Approved dealer for Kenwood, Yaesu and Icom

1 Western Parade. West Street, Axminster, Devon, EX13 5NY Tel: 0297 34918

(Closed 1:00-2:00 and all day Monday)

### BUCKINGHAMSHIRE

### Photo-Acoustics Ltd.

Approved Kenwood, Yaesu and Icom dealer (part exchange always welcome)

58 High Street, Newport Pagnell, Buckinghamshire MK16 8AQ Tel: 0908 610625

(Tues-Fri 9:30-5:30, Sat 9:30-4:30) Closed Mondays

### SOUTH WALES

MAIL ORDER MSA

### A.C.S. SYSTEMS

PACKET RADIO: ST-PC-AMIGA COMPUTERS AMATEUR SOFTWARE FOR MOST COMPLITERS SATELLITE TELEVISION SYSTEMS

### ICS DEALER FOR DATA COMMUNICATIONS

19, CILHAUL TERRACE, MOUNTAIN ASH, MID GLAI SOUTH WALES, CF45 3ND. TEL 043 478040 CALLERS BY APPOINTMENT SAME THE MOST CALL

### WEST SUSSEX

MAIL ORDER RETAIL

### 

### **BREDHURST** electronics Ltd.

High St., Handcross, West Sussex Tel: (0444) 400786

Situated at the Southern end of M23. Easy access to M25 and South Landon. Open Mon-Fri Sem-5pm except Wed Sam-12.00pm. Set 10am-4pm.

YORKSHIRE

YAESU COM

### Alan Hooker Electronics

42, Netherhall Road, Doncaster. Tel: 0302 325690

Open Mon-Sat 10-5pm Closed Thursdays

### EAST YORKSHIRE

"Characteristics"

FOR YOUR AMATEUR RADIO AND CB
REQUIREMENTS
GOOD PRICES GIVEN FOR YOUR SURPLUS
EQUIPMENT
OPEN SUNDAY

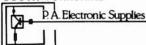
44, Hilderthorpe Road Bridlington



YO15 3BG Telephone 0262 673635



### SOUTH YORKSHIRE



NEW COMPONENTS KITS TRANSISTORS I/C AND SURPLUS EQUIPMENT MAIL ORDER CATALOGUE SEND CQ/PO FOR £1.50 96 Rawmarch Hill

Parkgate Rotherha South Yorks SB2 GEX

Open Six Deys Mon to Sat Phone (0709) 527109

TO FILL THIS SPACE CALL:

0202 676033 PLEASE MENTION PRACTICAL

WIRELESS WHEN REPLYING TO ADVERTISEMENTS

### STOCKPORT

### NCS FACILITIES LTD

GENUINE NEW, USED SPARES & CRYSTALS SECONDHAND RIGS HAND HELDS FOR SALE/HIRE PMR BAND III & MARINE

PART-EX WELCOME

dgatey. Incknort SK3 9E6

Telephone: 061 429 6332 Fax: 061 480 0509

Open on to Fr

Mail Order

# PRACTICAL SCANNERS FROM RADIO SHACK

You can only wonder in amazement at how scanners are getting smaller with more features than you ever dreamed of, such as hand helds with 1000 memories, 25 to 1300MHz etc. I must admit to being very sceptical with the specs of some of the latest, and as to whether the term 'author's licence' had been in force. There is only one way to test the pudding and to try the 'newest kid on the block' the FAIRMATE HP-100E. Starting in reverse order from 99% of our customers and radio amateurs I waded through the owner's manual (9 A5 pages of information in English) and decided to compose a Charlie Chaplin (less words and more pictures) instant simplified operation sheet to make life easier for our customers, one will be with each set. The scanner is FANTASTIC! Unbelievable performance from a hand held, even a frequency lockout in Search mode, a truly practical scanner for Practical Wireless scanner listeners, £299 including carriage from RADIO SHACK. FAIRMATE HP-100E £299.

### OTHER SCANNERS IN STOCK

PRO-2005 25-1300MHz 400 Channels, PRO-34 200 Channel hand heid, PRO-2024, PRO-2022, PRO-38, PRO-57, AR-800, AR-900, AR-950, AR-1000, AR-2002, Jupiter MVT-5000 & MVT-6000, Bearcat 200XLT to name but a few .

Call us for the latest prices.

### MAIL ORDER & EXPORT A PLEASURE

73s — Terry G3STS COME AND GET A BARGAIN!



### RADIO SHACK LTD

188 BROADHURST GARDENS, **LONDON NW6 3AY** 

(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 VISA

# ICOM

# Count on us!

# IC-735 Compact HF.



As predicted the Icom IC-735 has rapidly gained the reputation it deserves. This compact transceiver is ideal for mobile, portable or base station operation. It has a general coverage receiver from 0.1Mhz to 30Mhz with superb sensitivity in all modes, SSB, CW, AM and FM. Spectacular specifications are also achieved on RF Intercept, Dynamic Range, Reciprocal Mixing and I.F. Blocking. As HF conditions improve over the next few years it is equipment like the IC-735 that will provide clear reception even under the worst pile-ups.

The IC-735 has a built-in receiver attenuator, preamp, noise blanker and RIT passband tuning and a sharp IF notch filter ensures clear reception. The twin VFO's and 12 memories can store mode and frequency. Scanning functions include program scan, memory scan and frequency scan. The HM12 scanning microphone is supplied.

RF output is approximately 100 watts and can be continuously adjusted down to 10 watts. The IC-735 is one of the first HF transceivers to use a liquid crystal display, which is easily visible under difficult conditions. Controls that require rare adjustment are situated behind the front cover but are immediately accessible.

Options include the PS-55 AC Power Supply, AT150 Automatic Antenna Tuner, AH2a Automatic Antenna Tuner, SM6 and SM8 Desk Mics, SP7 External Loudspeaker. Why not find out more about the IC-735 contact your local ICOM dealer or contact ICOM (UK) LIMITED.

### Icom (UK) Ltd.

Dept PW, Sea Street, Herne Bay, Kent CT6 8LD. Tel: 0227 363859. 24 Hour.

**Helpline:** Telephone us free-of-charge on <u>0800 521145</u>, Mon-Fri <u>09.00-13.00</u> and <u>14.00-17.30</u>. This service is strictly for obtaining information about or ordering Icom equipment. We regret this cannot be used by dealers or for repair enquiries and parts orders, thank you. **Datapost:** Despatch on same day whenever possible.

Access & Barclaycard: Telephone orders taken by our mail order dept, instant credit & interest-free H.P





DIRECT CONVERSION **SHORT WAVE RECEIVER** 

- ★ Receives speech (SSB, DSB, AM) and morse (CW)
- Choice of amateur band, 160 - 10 metre
- ★ On-board voltage regulator and audio power amplifier

Sophisticated ready-made short wave receivers, often cost hundreds of pounds. Now, you can build a receiver of the direct conversion design that has the advantage of simplicity of construction and ease of alignment, with the minimum of test gear, for a fraction of the cost of a ready-made model. The amateur bands are: 160m, 80m, 40m, 20m, 15m & 10m. To include all these bands on one receiver would present switching & tracking difficulties, for this reason the receiver covers only one band (which needs to be decided upan before construction). The choice is up to you, but do not forget to order your tuning pack when ardering your receiver kit.

AMATEUR BAND	receiver Tuning range	TUNING PACK
160m 1.810-2.000MH	z 1.800–2,010MHz	1
80m 3.500–3.800MH. 40m	z 3.490–3.810MHz	1
7.000-7.100MH	z 6.690–7.150MHz	2
10.100-10.150MI 20m	Hz 10.000–10.500MHz	2
14.000-14.350MI	Hz 13.990–14.400MHz	3
18.068-18.168MI 15m	Hz 18.000–18.500MHz	3
21.000-21.450M	Hz 20.990–21.500MHz	3
24.890-24.990MI 10m	Hz 24.540–25.000MHz A. 27.975–28.525MHz	4
28.000-29.700MI		4
	D, 27.47 J-30.02 JMI 12	4

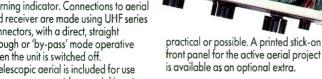
A kit excluding the optional items, Bax and Chassis, Pot Mounting Bracket, Front and Rear Panels and Tuning Kits is available. For full list af optional extras see Maplin Catalogue

LM60Q (Dir Conv Rx Kit) £64.95 LM61R (Tuning kit 1) £3.45 LM625 (Tuning kit 2) £3.45

LM63T (Tuning kit 3) £3.45 LM64U (Tuning kit 4) £3.45

### **ACTIVE AERIAL**

An active aerial pre-amplifier having five selectable tuned RF ranges which cover a total frequency range of 150kHz to 30MHz. The unit includes a gain control operating on the MOSFET amplifier, and a low battery LED warning indicator. Connections to aerial and receiver are made using UHF series connectors, with a direct, straight through or 'by-pass' mode operative when the unit is switched off. A telescopic aerial is included for use where a proper outdoor aerial is not



LM05F (Active Aerial Kit) £52.95

FA99H (Active Aerial f/panel) £3.95 XY45Y (Case 222) £6.45

Photo shows Kit with some optional extras, see Maplin Catalogue for further details.



Further details and specifications on all the items shown on this page are to be found in the Moplin Catalogue. Over 580 pages of electronics ideas from Projects and Modules, Tools, Components, Books, Connectors, Batteries and Pawer Supplies to Test Gear, Audio, Video and Computers and much, much more.

Available from branches of WHSMITH, Only £2.25, or by past £2.75 inc p&p (CA07H).





\* No modifications to receiver

★ High filter attenuation rate ★ Easy construction

The processor features a low-pass filter giving a 36dB per octave attenuation under 150Hz and an expander which severely attenuates noise during pauses in the received speech. The unit is especially suited for SSB & FM CB reception and simply fits between the receiver's audio output and the headphones, thus no modification is necessary to the receiver. The single PCB makes construction very simple.

LK05F (DXer's Processor Kit) £11.95

Optional items: HB26D (Knob (3 off required)) 68p each XY45Y (Case 222) £6.45 FM03D (9V PP6 Battery) £1.98



Given that the aerial impedance of most communications receivers is 50, unless the impedance of the aerial matches this exactly all of the RF energy will not be efficiently transferred from the aerial to the receiver. The greater the mismatch, then the weaker the signal will appear, and under adverse conditions it could vanish completely into background noise. This aerial tuning unit comprises two variable tuning capacitors and a tapped inductor in a passive 'T' configuration. This arrangement covers approximately 600kHz to 30MHz, and matches the aerial load impedance to the input impedance of the receiver. The ATU can also be used for transmitter aerial matching in the same frequency range, including the 27MHz citizen band, up to a power rating of 10 Watts. A printed stick-on front panel is avoilable as an optional extra for the aerial tuner unit.

LM06G (Aerial Tuner Kit) £36.95

Optional items: FD11M (Aerial Tuner f/panel) £3.95 XY45Y (Case 222) £6.45 FW38R (Pkt Stick-on Feet) 24p

# ELECTRONICS

### REDIT CARD HOTLINE







PHONE BEFORE 5nm FOR SAME DAY DESPATCH

A UNIQUE NEW SHOPPING EXPERIENCE

All prices include VAT. Prices valid till 31st August 1990. All items subject to availability, all items will be on sale in our shops in Birmingham, Bristol, Leeds, Hammersmith, Edgware, Manchester, Nottingham, Newcastle-upon-Tyne, Reading, Southampton and Southend-on-Sea

Orders by post to: P.O. Box 3, Rayleigh, Essex SS6 8LR.



75p carriage must be added to all orders (except if ordering catalogue only). In addition, if your order is below £9.25 add 75p, if between £9.25 and £10, make up to £10 (small order handling charge)

RULE THE WAYES

Weights for the Art of Communication.