

PW

Reviewed This Month

The Kenpro KT-44 UHF
Transceiver - A Handy Rig For
Any Operator



Plus

Antenna Construction - A 50MHz Base Station
Monopole

Build The PW Chatterbox 1.8MHz AM Receiver

Getting Started The Practical Way,
Packet Panorama,
Bargain Basement, Competition,
CB High & Low And Lots More!

ISSN 0141-0857



9 770141 085006

SEPTEMBER 1991
£1.60

1992 BUYER'S GUIDE TO ELECTRONIC COMPONENTS

Maplin



Order your copy of the New MAPLIN Catalogue on sale 6th September
Pick up a copy from any WHSMITH for just £2.75 or post this coupon now to receive your copy for just £2.75 + 20p p&p. If you live outside the U.K. send £4.85 or 14 International Reply Coupons. I enclose £2.95.

Name
Address
Post Code
Send to Maplin Electronics,
P.O. Box 3, Rayleigh,
Essex SS6 8LR.
pw92

Over 600 product packed pages with more than 600 brand new products. On sale from September 6th, only £2.75

Available from all branches of WHSMITH and Maplin shops nationwide. Hundreds of new products at super low prices!

Contents September 1991

SEPTEMBER 1991
(ON SALE AUGUST 8)
VOL. 67
NO. 9
ISSUE 1014

NEXT ISSUE (OCT)
ON SALE SEPT 12

EDITORIAL & ADVERTISEMENT OFFICES

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

CREDIT CARD ORDERS

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

Editor

Rob Mannion G3XFD

Art Editor

Steve Hunt

Technical Projects

Sub-Editor

NG ("Tex") Swann G1TEX

Technical Artist/

Photography

Rob Mackie

Production

Sharon George

Editorial Assistant

Donna Vincent

Administration Manager

Kathy Moore

Accounts Manager

Alan Burgess

Accounts Assistant

Darren Howe

Clerical Assistant

Rachel Parkes

Advertisement Manager

Roger Hall G4TNT

PO Box 948

London SW6 2DS

☎ 071-731 6222

Cellphone 0860 511382

FAX 071-384 1031

Advert Copy and

Make-up (Poole Office)

Marcia Brogan

☎ Poole (0202) 676033

FAX Poole (0202) 666244



18



32

Regular Features

- 71 Advert Index
- 59 Back-scatter
- 46 Bargain Basement
- 68 Book Service
- 14 Competition Corner
- 11 Keylines
- 15 Newsdesk '91
- 30 PCB Service
- 38 Radio Diary
- 12 Receiving You
- 13 Services
- 21 Subscribers' Club
- 45 Wireless-Line

18 PW Review

The Kenpro KT-44 UHF Hand-Held Transceiver

N. G. 'Tex' Swann G1TEX

22 The PW Chatterbox

1.8MHz AM Transmitter & Receiver - Part 2

Rev. George Dobbs G3RJV

26 Errors & Updates

27 CB High & Low

Quaynotes

28 Mathematics For The RAE

Ray Fautley G3ASG

32 West Devon's RAYNET

Mobile Fleet's Growing!

Ian Harley G6BJJ

35 The PW-50V Vertical

Antenna For 50MHz

Fred Judd G2BCX

41 Getting Started -

The Practical Way

Rev. George Dobbs G3RJV

48 Taking Another Look

At Fuses

Ken Green G1NAK

50 What A Good Idea!

J. D. Bolton G4XPP

52 Packet Panorama

Roger Cooke G3LDI

54 Reflections

Ron Ham

56 Satellite Scene

Pat Gowen G3IOR

Acknowledgements: Our thanks go to budding Novice Amateur David Owen, son of Mike G4YTA, for his help with this month's front cover.

icom



**See the full range of Icom equipment
at your local Icom dealer**

Datapost: Despatch on same day whenever possible.

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



Count on us!



Icom (UK) Ltd.

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

South Midlands Co

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

HF EXCELLENCE

Have you always wanted to stand out from the crowd? Well now's the time to stand head and shoulders above the crowd with the FT1000 and FT990 HF transceivers, from Yaesu, arguably the crown king and prince of all HF transceivers.

Designed with no expense spared, these transceivers offer exceptional performance combined with the ease of operation, a truly marvellous step forward in HF communications. The FT1000 and FT990 feature the very latest in electronics and microprocessor technology to ensure a highly reliable and exciting-to-use transceiver for all modes of operation on the HF bands.



FT-1000

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

FT-990

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



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, un-obstructed display and control layout, make this set a real joy to use. Convenient features include operator selectable coarse and fine tuning steps optimised 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 easy recall of split-frequency operations.

- ★ 160-10m HF TRANSCEIVER
- ★ GENERAL COVERAGE RECEIVER
- ★ ALL MODE (FM OPTIONAL)
- ★ 0-100W OUTPUT (25W AM CARR.)
- ★ CW NARROW (500Hz) STANDARD
- ★ LARGE CLEAR LCD DISPLAY
- ★ SIMPLE OPERATION (see picture)

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

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 heat-sink 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.

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

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

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

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

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

Communications Ltd.

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

DAIWA PRODUCTS

SMC are pleased to announce that we are now the official UK Distributor for the complete range of DAIWA products.



PS 304

POWER SUPPLIES

PS120 Mk2	3-15v Variable	9A/12A max.	£69.95
PS304	1-15v Variable	24A/30A max.	£129.95
RS40X	1-15v Variable	32A/40A max.	£189.00

COAX SWITCHES

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

SWR METERS

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

LINEAR AMPLIFIER

LA2080H	2m 1.5-5W in	30-80W out	£159.95
---------	--------------	------------	---------



CN 101

SMC FOR ALL YOUR ACCESSORIES

COMET ANTENNAS

SMC are proud to be associated with COMET Co LIMITED

COMET produce arguably the best quality base and mobile antennas available today on the amateur radio market. Discerning radio amateurs will appreciate the stunning combination of amazing performance and aesthetically pleasing styling of some of the latest range of antennas available from COMET via SMC, the authorised UK distributor. New additions to the range, which will be available soon are the:

B10	2m/70cms Mini Dualbander (Black)	0.3m long	CF-520	2m/6m Duplexer c/w flying leads
B22	2m/70cms Dualbander (Black)	0.89m long	CA-14HR	20m Monobander
RS-9	Mini Trunk Mount (Black)		CA-21HR	15m Monobander
CA-702	6m/2m/70cms Tribander	2.1m long	CA-50HR	6m Monobander
CA-7HR	40m Monobander	2.1m long	CA-285	6m/2m Dualbander

TOKYO HY-POWER



BALUNS

CBL-30	1:1	1.7-30MHz 1kW P.E.P.	£18.95	A
CBL-2000	1:1	0.5-60MHz 2kW P.E.P.	£25.50	A

HANDHELD ANTENNAS

CH72S	2m/70cm BNC 0dB/3.2dB 2m/70cm	£12.25	A
-------	-------------------------------	--------	---

MOBILE ANTENNAS

CA2x4MB	2m/70cm 4.5dB/7.5dB 2m/70cm	£38.50	C
CA2x4KG	2m/70cm 6.0dB/8.4dB 2m/70cm	£40.75	C

DUPLEXERS

CF-305	50/144 Duplexer UHF conn.	£25.00	B
CF146MN	144/430 Duplexer UHF/N conn.	£26.00	B
CFX-514	50/144/430 Triplexer UHF conn.	£36.75	B
CFX4310	144/430/1200 Triplexer UHF/N conn.	£36.75	B

MOUNTS

TR	Adjustable trunk mount	£11.50	B
RS17	Mini trunk mount	£12.75	A
RS16	Mini Gutter mount	£12.75	B
CK-3LX	Mini Cable Assy for RS16/RS17	£16.25	B

MINI MOBILE ANTENNAS

CHL21J	2m/70cm 0dB/2.15dB 2m/70cm	£14.75	B
CHL23J	2m/70cm 2.15dB/3.8dB 2m/70cm	£17.35	B

BASE ANTENNAS

CA350DB	6m/10m 2.15dB/6.5dB	£139.00	D
CA2x4WX	2m/70cm 6.5dB/9.0dB	£80.72	C
CA2x4MAX	2m/70cm 8.5dB/11.9dB	£102.12	C

FILTERS

CF-30MR	HF Cut off 32MHz 1kW P.E.P.	£38.75	B
CF-50MR	6m Cut off 54MHz 1kW P.E.P.	£38.75	B
CF-30H	HF Cut off 32MHz 2kW P.E.P.	£80.75	A
CF-30S	HF Cut off 32MHz 150W cw	£19.35	A
CF-50S	6M Cut off 57MHz 150W cw	£20.35	A
CF-8PF2	2m Band Pass 150W cw	£31.65	A

METERS SWR/FWE

CM-420	2m/70cm 15-50W Mini	£36.75	B
CD-120	1.8-200MHz 15/60/200W	£76.60	B
CD-160H	1.6-60MHz 20/200/2000W	£90.85	B
CD-270D	140-525MHz 15/60/200W	£79.65	B

COAX SWITCHES

CSW-20	2 way DC-1000MHz SO239	£26.50	A
CSW-20N	2 way DC-1500MHz N	£45.95	B

ACCESSORIES

CEP-M2	Earphone 3.5mm jack	£1.28	A
CES-M2	Mini Clip on Speaker 3.5mm jack	£5.62	A
CHM-M4	Mini mic + PTT 2.5mm jack	£9.15	A

TUNERS

HC400L	160-10m 350W P.E.P.	£203.00	C
HC2000	160-10m 2kW P.E.P.	£365.00	D

PRICES FOR POSTAGE ON ALL THE ABOVE ITEMS ARE CODED

AS FOLLOWS:

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

TRANSCEIVERS

HT106	6m Transceiver 10W P.E.P. SSB/cw	£305.50	C
HT120	20m Transceiver 10W P.E.P. SSB/cw	£305.50	C
HT180	80m Transceiver 10W P.E.P. SSB/cw	£305.50	C
HP100S	Power Supply for HT series	£99.00	B
HC100	A.T.U. 80-10M 5 band 200W P.E.P.	£109.00	B
HC100	CW Narrow filter HT series	£39.85	A
HNB100	Noise Blanker HT series	£19.95	A
HBK100	Mobile Bracket HT series	£10.20	A

LINEARS

HL2K	160-10m HF Linear 2kW	£1450.00	E
HL1K	160-10m HF Linear 1kW	£899.00	D
SAGRA-600	2m 25w drive 600w output	£815.00	E
HL100B/10	10m 10W in 100W output P.E.P.	£182.00	C
HL100B/20	20m 10W in 100W output P.E.P.	£182.00	C
HL100B/80	80m 10W in 100W output P.E.P.	£182.00	C
HL66V	6m 10W in 50-60W output	£131.75	C
HL166V	6m 3/10W in 80/160W output	£255.00	B
HL37V	2m 3W in 32W output	£90.95	B
HL62V	2m 10W in 60W output	£137.95	C
HL110V	2m 2/10W in 100W output	£220.00	C
HL180V	2m 3/10/25W in 170W output	£299.00	C
HL36U	70cm 6/10W in 25/30W output	£138.00	B
HL63U	70cm 10/25W in 50W output	£220.00	C
HL130U	70cm 3/10/25W in 120W output	£397.00	C

TRANSVERTS

HX240	2m to HF 80, 40, 20, 15 & 10m		
	2.5W/10W in 30-40W P.E.P. output	£254.50	B
HX640	6m to HF as above	£254.50	B



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

Waters & Stanton 0702 206835 or 204965

BEST PRICES! FAST MAIL ORDER

ALINCO

NEW DJ-1FE
2 Metre Handheld
+ Airband RX!

£239

The DJ-1FE is a new generation of handheld from ALINCO. Its ergonomic design wins instant appeal whilst its compact size (110 x 53 x 37mm) and tailored shape allows it to sit comfortably in the palm. "Solid yet diminutive", "comprehensive yet simple to use", are phrases that best describe it. And in specification the DJ-1FE is up at the front leaving its competitors gasping!

Features include; 40 memories, digit message display, triple power outputs, 5 Watts capability, vox facility, remote control facility, 6 way scan modes, Auto power off, battery save, illuminated keypad, 5 - 25kHz steps, Tone encoder option, etc.

If you want the full story of why ALINCO is now leading the field in handheld technology send for the colour brochure.



£349

DJ-560E

INCLUDES
TONE
SQUELCH

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

Best Airband Receiver Ever! VT-125MkII £169

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

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



DIAMOND
ANTENNA

Are A

Ham's Best Friend!

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

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

ALINCO PRICE RISE IMMINENT!

DR-590E
2M & 70CMS
£499



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

TONNA VHF - UHF AERIALS

We are appointed UK distributors
Available direct or from most good dealers

KENWOOD SPECIALIST DEALER



TS 850!
£1325 +
FREE PSU!

IN STOCK
New TS 450 & TS 690
Phone for information and delivery

Full 12 month warranty
Phone for latest
DEALS!

TS-140S	Compact HF rig + FREE PSU!	£880
TS-450S	Classic HF rig + FREE PSU!	£1099
TS-690S	HF with 6 metres + FREE PSU!	£1299
TL-922	Hunky 2kW Linear in stock!	£1495
TS-790E	2m/70cms (Part Ex welcome!)	£1525
TH-77E	Dualband handy + Free High Gain Ant.	£395
TR-751E	2m All Mode + FREE PSU!	£610

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

ALL MAJOR BRANDS STOCKED

LARGEST IN SOUTH EAST

KENWOOD YAESU ICOM AZDEN MIZUHO JUPITER ALINCO

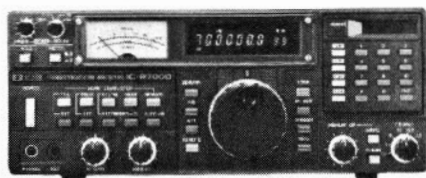
SAGANT ADONIS SONY PANASONIC DATONG TONNA DIAMOND PAKRATT AOR ERA



ICOM FOR
QUALITY

WHEN IT COMES TO DRAWING
ON EXPERIENCE – ARE MUST
BE YOUR FIRST CHOICE

ICR7000



200KC – 2kHz with our HF modification this receiver is a world beater.

£995



PRODUCT KNOWLEDGE



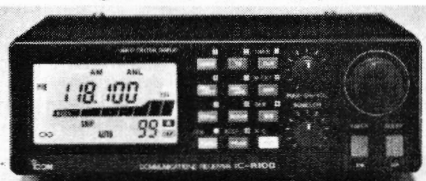
ENORMOUS SELECTION

YAESU

FT23
FT26
FT747
FT290
FT811
FT990
FT1000

PHONE
FOR
THE
BEST
PRICES

ICR100 with SSB



IC-R100 with SSB why settle for anything less – 500kHz – 1800MHz 100 memories.

Only from ARE

£510



VERY BEST PRICES



SELECTED AND TESTED
USED EQUIPMENT



FAMOUS HOSPITALITY

ICR1



ICR1 with SSB 100kHz – 1300MHz we have developed a first class SSB mod for this fine handheld receiver. They said it couldn't be done – so we did it.

£399

Only from ARE

ICOM

IC25E
IC25ET
IC24ET
IC725
IC726
IC765
IC781
ICR9000

PHONE
FOR
THE
BEST
PRICES



SPEEDY DELIVERY



SERVICE WITH A SMILE

STANDARD DUAL BANDER

The C528 still rates as the most comprehensive dual bander hand held, that is available to the amateur. Our price.

£359



NEW KENWOOD MODELS TS850

This superb HF transceiver is now available. This is a masterpiece of radio engineering.



Following the success of the TS440, comes the TS450 and TS650 – which incorporates 50MHz – Come and try them now.

Now open from:
Monday-Friday 8.30-6.30pm Saturday 9.00-6.00pm
NEW Reserved car parking at rear of showroom. ALL EASY TERMS ARE BASED ON AN APR OF 34.4%

MARTIN LYNCH

G4HKS

THE AMATEUR RADIO EXCHANGE CENTRE

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

MARTIN'S MIDSUMMER MADNESS!! stacks of bargains available now

DON'T FORGET I STILL HAVE THE LARGEST STOCKS OF USED EQUIPMENT IN THE COUNTRY AND I HAVE APPARENTLY BECOME THE LARGEST INDEPENDENT RETAILER OF YAESU - AND THAT'S OFFICIAL. WHAT REALLY COUNTS IS CUSTOMER SERVICE - MARTIN LYNCH HAS A TEAM DEDICATED TO SERVING YOU, THE RADIO AMATEUR OR ENTHUSIAST WITH KNOWLEDGE AND BACK-UP YOU WOULD BE HARD PUSHED TO FIND ANYWHERE IN THE U.K. WITH YOUR CONTINUED SUPPORT, WE WILL KEEP ON GROWING. THANKS TO ALL OF YOU WHO HAVE SUPPORTED THE 'TEAM' SO FAR.

73 Martin G4HKS

OFFERS
EXTENDED UNTIL
THE END
OF AUGUST

BUYING
OR SELLING...

DIAL 081-566 1120

LONDON'S TONNA
ANTENNA
STOCKIST
DON'T FORGET
TRICITY INSTANT FINANCE

Martin Lynch is a Licenced Credit Broker.
Full written details available on request. Typical APR 36.8%.

PHONE 081 566 1120



For fast mail order Tel: 081 566 1120.
Please add £10.50 for 48 hour delivery.

Shop opening hours:
Tuesday-Saturday 10-6pm.

24 hour sales HOT LINE 0860 339 339 (after hours only). FAX order line open 24 hours.



Total list price over £2000+, **ONLY £1849.**

You have seen the adverts for this transceiver for over six months. These are direct from the U.K. official YAESU Importer and I have got a limited number - offered with two matching accessories **FREE!**

FT990 HF Transceiver with BUILT IN PSU AND AUTO TUNER

PLUS: DVS-2 Digital Voice Storage and MH1B8 Microphone worth over £170



Total list price almost £2000.

Special offer only £1599!! Saving nearly £400.
FT767GX series II with built in PSU and Auto Tuner **PLUS:** 2 Metre and 6 Metre modules fitted, & MH1B8 Microphone - **FREE!**

Yaesu's innovative all band, all mode transceiver has been around for a couple of years. Since its introduction, Yaesu Engineers have continuously updated the specification to help keep it the "NUMBER ONE ALL ROUNDER." Continuous Coverage Receive, all mode, AM/FM/USB/LSB/CW, built in Auto tuner, Mains PSU and options for 2m, 6m and 70cm - IN ONE NEAT PACKAGE. What are you waiting for?! My special deal, obviously ...



LIST OVER £1600.

Special offer only £1299!! Saving £326!!

So, did LYNCHY get stuck with a few from the last promotion on the FT736R back in MAY? Not likely!! Still the best selling QUAD BANDER to date. 25W MULTI-MODE output on 2m & 70cm, fitted satellite module for duplex operation, built in Mains PSU and expandable to 6m and 23cm, all in one box. FT736R with 2/70cm plus 6 metre card absolutely **FREE.**



After the recent appointment as the only authorised Kenwood Dealer in the EALING area, I can now offer this exciting H.F. Masterpiece from stock. Kenwood have a knack of "Getting it right" - this one is no exception.

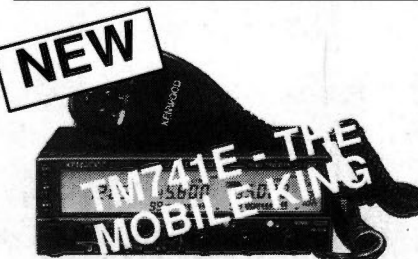
BEAT THE IMMINENT PRICE INCREASE - ONLY £1325



TS450S £1099 TS690S £1299

Complete re-design and bang up to date, two new TWINS to the Kenwood stable. The TS450S is the latest HF general coverage all mode with optional tuner - The TS690S is identical, but with the additional 6 Metre band fitted as standard. The demand will be high for these two, so get your name down quick!!

DEPOSITS NOW BEING TAKEN



TM741E with free PG-4K (Worth over £30) ONLY £729.

Back to basics? The Kenwood engineers looked at the competition (and their own previous models), scrubbed out 70% of the controls and buttons and Hey Presto! A superbly engineered, no-nonsense front panel layout that even a newcomer to mobile operation will find easy. But do not underestimate the power within its tiny dimensions - 50W/35W on 2M/70cm, optional 6m, 10m & 23cm cards available as a plug-in, remote head, TRIPLE SIMULTANEOUS WATCH, full AM receive on AIRBAND. Extended receive including Cellular, (who needs to watch Satellite Movies on Saturday Night?) - This really is a milestone in engineering!

MICRONTA®



CEC

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

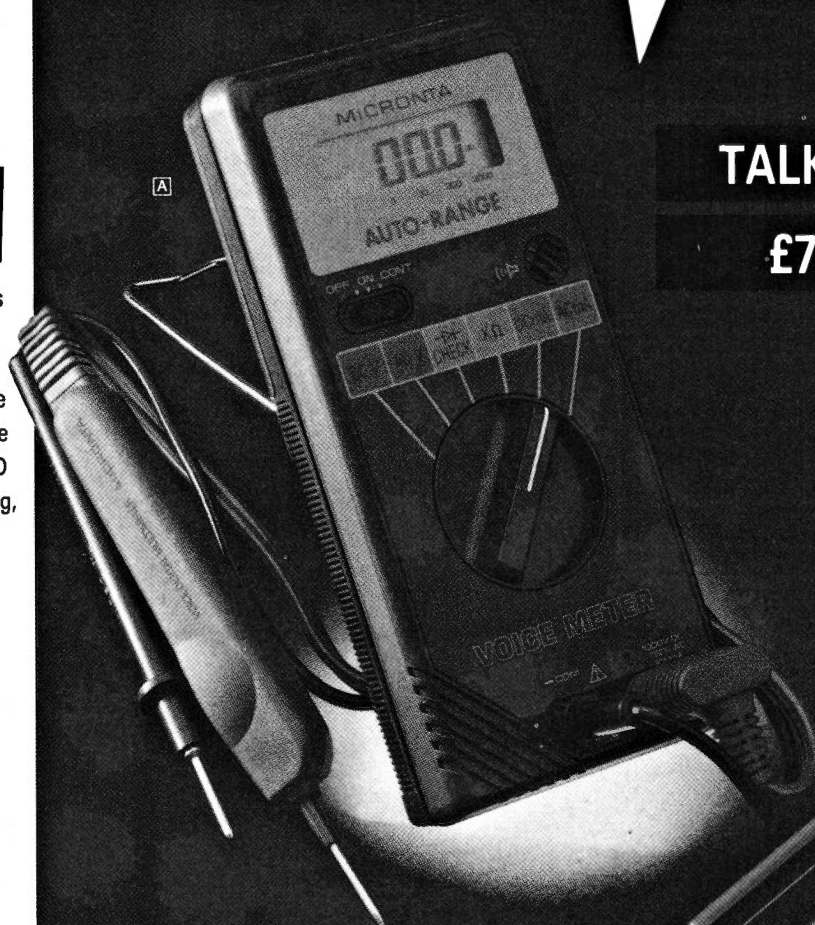
[B] Digital Multimeter. Full autorange or manual range control, selectable by a switch. Easy to read LCD display. Ideal for use in the field, lab, shop, bench or home. Fold-out stand allows you to adjust position for better visibility or to hang unit. Features continuity check, autopolarity, diode-check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

Tandy®

ALL THE ACTION
AS IT HAPPENS!

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

Multi testers



TALKING METER

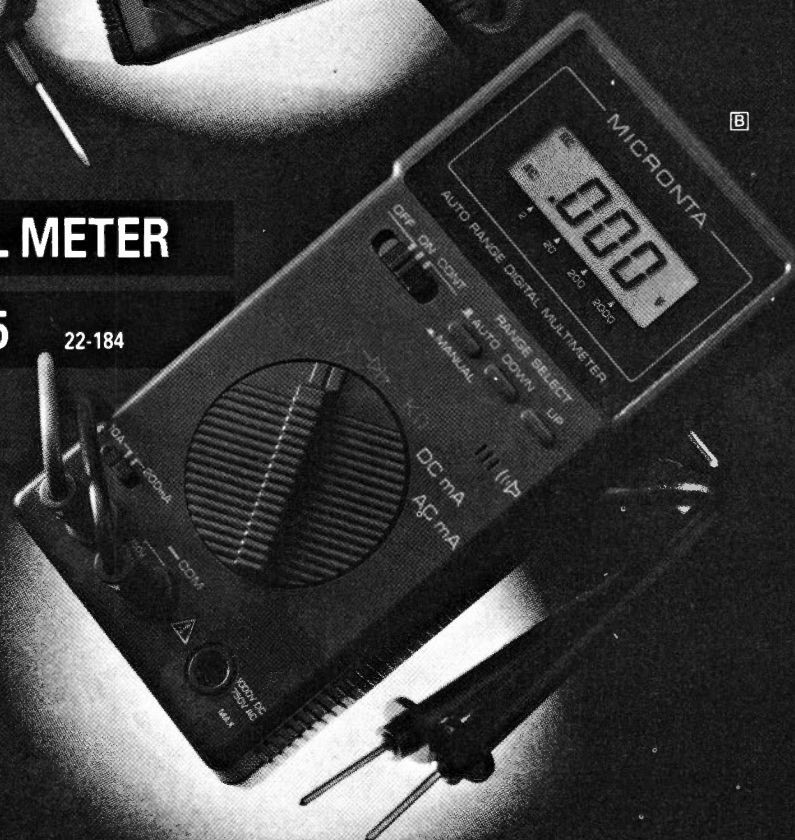
£79.95

22-164

DIGITAL METER

£39.95

22-184



VT125 UK AIRBAND RECEIVER



A new and powerful pocket size air band radio that leaves the competition standing. Covers all the new UK airband frequency allocations.

- Covers 108-142 MHz

- 30 direct entry memories
- Search, scan and keyboard operation
- Search steps 25, 50, 100kHz
- Very sensitive receiver
- Pass and delay functions
- Supplied with UK charger

£179

FAIRMATE HP200



NEW CONTINUOUS COVERAGE VERSION

Freq Range:- 500kHz - 1300MHz

Models:- AM/FM/WFM

An improved version of the HP100E. The new HP200 has superior performance and stability.

- Accessories included as standard are:-
- VHF Antenna
 - UHF Antenna
 - UK Spec.
 - DC charger/adaptor
 - Earphone
 - Carrying Case

£269

AR2000 HANDHELD



Hand-held wide band scanning receiver. Improved specification.

The coverage is 500kHz-1300MHz with no gaps. Modes are AM, FM (narrow) and FM (wide). The AR2000 features 1000 memories for spot frequencies and 10 search banks. The receiver is powered from its supplied internal nicad batteries but these may be removed and dry batteries substituted to allow extended operation in the field. The AR2000 may also be charged and powered from the car cigar lighter socket using the supplied lead. Also supplied as standard are the DA900 wide band aerial, soft case with strap and AC charger.

£259

- ALINCO
- BUTTERNUT
- CUSHCRAFT
- ICOM
- KENWOOD
- HYGAIN
- MFJ
- TEN TEC
- YAESU

MVT7000 HANDHELD

8-1300 MHz continuous coverage - multi-mode. AM/FM/WFM. 200 channel memory - very sensitive S meter.

£289



DIAMOND ANTENNA

£69 ACTIVEAERIALS
1.5MHz-1300MHz
ONEAERIALDOESITALL!
Just think one aerial for all your receivers. Both have built in matching circuits at the base of the antenna to provide high gain performance!

MobileAerialD505

This aerial covers everything from long-wave to VHF. It is no larger than a conventional mobile aerial measuring just 29.5" long, fits any standard mobile mount and comes complete with cigar lighter lead and matching box with RF gain control.

BaseStationAerialD707

Beautifully made from fibre glass, this rugged aerial will fulfil all your needs whether it be HF, VHF, or UHF. It comes complete with all the mounting hardware for mounting externally, plus 15 metres of low loss coax cable and a matching AC supply for the powerfeed via coax.



£99

KENWOOD R5000 HF RECEIVER



Kenwood R5000 HF Receiver 100kHz - 30MHz

£895

ICOM R72 HF RECEIVER



Icom R72 HF Receiver 30kHz - 30Mhz

£659

YAESU FRG8800 HF RECEIVER



Yaesu FRG8800 HF Receiver 150kHz - 30MHz

£649

AR2800 SCANNING RECEIVER WITH SSB



AR2800 Scanning Receiver with SSB 500kHz - 1300MHz

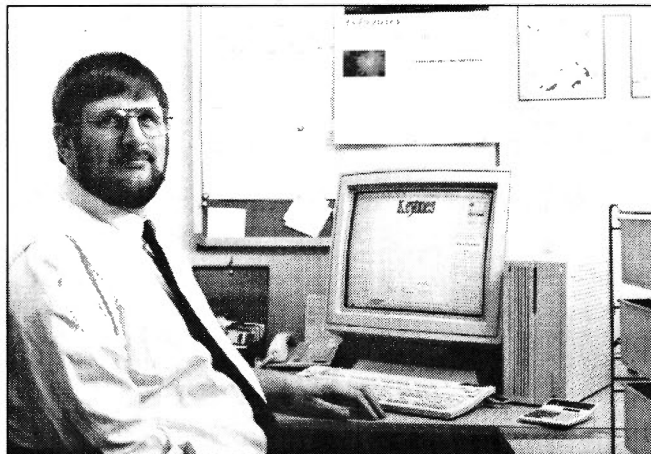
£395

KW Communications Limited

Chatham Road, Sandling, Maidstone, Kent ME14 3AY

Tel: (0622) 692773 Fax: (0622) 764614

Keylines



Rob Mannion G3XFD

I've always enjoyed mobile operating. My first mobile receiving rig was a super-regenerative receiver working on 144MHz - or thereabouts. The little 'swoosh-box' worked well and was very sensitive. The receiver provided me with a great deal of pleasure, especially when I was able to park on relatively high ground.

Unfortunately, 25 years ago, 144MHz was virtually dead during the day. The only activity was usually in the evenings and at weekends. However, during the evenings I soon learned to keep the receiver switched off, until I had driven up into the Hampshire downs. This was because re-radiation from the super-regenerative detector could be detected on any receiver tuned within 10MHz. Policemen equipped with hand-held transceivers on foot patrol always seemed to know when I was coming around the corner, and it became rather embarrassing. I soon put an r.f. stage in to isolate the oscillator from the antenna! But those were the days where you could hear some excellent quality a.m. signals on the band, and my little 955 acorn-valved receiver picked them up really well.

Top Band Mobile

By the time I was active on the bands, I'd graduated to Morris Minors. I fell in love with those amazing little machines and along with Chris G8DXF and Richard G8CEH (now sadly a silent key) we visited virtually every mobile rally in the country, enjoying many QSOs on 1.8 and 144MHz.

Everyone had fun on 1.8MHz a.m. mobile during

the '60s. It was fascinating to walk around the grounds of the various rallies and meet other mobile enthusiasts, and look at the many varieties of gear. It was even more interesting to see some of the often (horrendously!) large home-brew 1.8MHz mobile antennas. I wonder how many of the huge systems we used to see, would survive one juggernaut passing by nowadays?

Rallies then, were much more of a meeting place than the scramble to get bargains that they've turned into now. Other things have changed too, but are they changing again?

High Frequency Mobile

I recently enjoyed a few hours at the Longleat rally in Wiltshire. Despite the very fickle weather, the car park filled rapidly and I noticed a strong contingent of 1.8MHz mobile antennas. Many of the antennas I saw were well made, home-brew jobs. Are we perhaps at the dawning of a new age of h.f. band mobile operation?

During my recent visit to the Dayton HamVention, I saw a great deal of evidence indicating that h.f. mobile working is still very popular in America. Literally every band from 1.8 to 28MHz was in use for mobile working. Speaking as a 7MHz mobile devotee, I was particularly pleased to see that the band is favoured by

many operators in the USA.

So, why don't we see more h.f. mobile work here in the UK? I must admit that I only saw one h.f. mobile rig in operation at the Friedrichshafen Hamfest last year, so it seems from my brief observation, that the same situation exists in mainland Europe.

No Antenna Problems

Nowadays there are very many h.f. mobile antennas available. Even the 1.8MHz versions can be very small, and some can be smaller than 144MHz antennas!

I realise of course that there are many reasons why many amateurs don't try working mobile on the h.f. bands. One reason is of course that h.f. rigs with s.s.b., usually come much larger than the freely available v.h.f. multi-mode transceivers. However, this argument is basically defeated by the many excellent UK-made and imported v.h.f. to h.f. transverters.

I'm not going to waste valuable space discussing the possible reasons behind the decline of interest in working mobile on h.f. Instead, I want to tempt those of you who do operate mobile, to write in and tell us what you find so fascinating working at h.f.

Surely I can't be alone in thinking that we are neglecting this aspect of the hobby. You don't actually need to be

an 'on the move' mobile to enjoy the fun. I found that operating my Yaesu FT-75 s.s.b. rig from my motor-caravan while parked overnight in remote spots in the Scottish Highlands, turned me into an instant celebrity!

I found over the years, that the simplest rigs could provide tremendous fun. Even a one-valved c.w. transmitter working from a rotary converter on 7MHz, provided good results.

Simplest Rig

Here's a challenge for you! Although I did it simply enough with valves over 20 years ago, perhaps you could do it in a simpler fashion using transistors.

My recipe for a (VERY) basic 1.8MHz transmitter-receiver combination went like this: One home-brew base-loaded whip, resonated on 1.915MHz. The receiver consisted of an early *PW* designed, crystal-controlled transistorised 1.8MHz to medium wave converter working into the car radio.

The two-valved crystal controlled transmitter sat in the boot, and was remotely controlled by a typical G3XFD (cheap-skate) method! Not wanting to have huge multi-way control cables snaking through my beloved Morris Minor, I managed to control the entire rig via the 2-cored screened microphone cable.

One Control

Closing the press-to-talk switch on the hand-held carbon microphone provided the polarising current for the mike, and operated the change-over relay at the same time. The antenna changed over to transmitter, and the valve power supply came into action. The transmitter antenna tuning was pre-set, and as I stayed on one of two crystal-controlled channels, there were no problems. After a few adjustments, I was on the air and the rig worked well during my time on the Isle of Wight.

The rig provided several years of inexpensive enjoyment. However, we soon had to modify the receiver converter. This was found to be necessary after Ivor Richardson G3XLP and I passed each other on the Newport to Freshwater road while in QSO, and my front-end transistor melted!

So, I'm going to offer you a challenge. How about coming up with ideas for simple h.f. band mobile rigs? George Dobbs has shown us the way with the 'Chatterbox'. Can you come up with an idea for a similar rig to work mobile?

By the way, if by the remotest chance any of you are interested in my favourite 1.8MHz a.m. mobile design (the basic TX was a *PW* design of course), drop me a line enclosing an s.a.c. I'd be fascinated to work anyone else using such simple 'fun rigs'!

Cheerio for now, and try to enjoy what's left of the summer.

73 DE Rob Mannion
G3XFD.

Receiving You...

Dear Sir

Regarding the 'Spot the Difference' competition, I wondered if there was room for a little extra competition. Knowing the radio amateurs' flair for understatement, etc., how about an amusing caption for the cartoons used in the 'Spot the Difference'? Best or perhaps most apt/funniest could be awarded a small token, everyone likes competitions!

**Geoff Bullyment
Eastleigh
Hants**

Editor's comment: I think Geoff Bullyment is a reader of *Punch* magazine as well as *PW*! For many years, *Punch* has reprinted some of its old cartoons, asking for new, apt, captions. They can be very funny. I look forward to seeing any ideas readers send in. We might even make it a regular feature, running at the same times as the 'Spot The Difference' competition

Dear Sir

John Heys G3BDQ, writing in June's 'Receiving You', cannot understand why *PW* carried the article 'A Valved Transmitter For 3.5MHz'. I don't agree with his opinion as I have built the 'Three Valve Bloopers'.

The rig works well with 7W input. I am always happy to find projects like this in *PW*, now and then. My only problem is that I cannot find the word Bloopers in my English dictionary!
**Johann Hans OE7UT
Kufstein
Austria**

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

It was interesting to read the letters from Bob Hurst and John Heys in June's *PW*. Having been interested in radio myself for the last 40 years, it seems to me to be a hobby with many aspects such as making, mending, modifying, etc. Providing they don't break the law, I would also encourage others to do the same.

My own interest is collecting and renovating valved radio receivers. They take up a huge space, but I

would not swap any for the modern 'wonder boxes'.

I was disappointed however, in your answer to Bob Hurst, when you replied that you intend to "offer the occasional valve project" in future issues. I'd look forward to *PW* a lot more, if you included a valved equipment feature every month!

**D. Andrew
Torrington
Devon**

Editor's reply: The letter from John Heys

provoked a big response, and I'm very grateful to those of you who took the trouble to write to *PW*. Most of the letters received so far reflect a keen interest in valve techniques. The next valved project in *PW* should appeal to many readers, especially as it uses a valve that has no direct semiconductor equivalent. It should prove useful to everyone. Watch this space!

★★★★★STAR LETTER★★★★★

Dear Sir

In the May *PW*, I found some very interesting letters from readers. You asked for reactions from younger readers, and here you have one! I am 18 years old and managed to get my first licence when I was 15. I'm very proud of this, because I had to learn all the technicalities by myself.

The average Belgian amateur is much older than I am. However, I'm very pleased to say that in my area, I know of some youngsters who are very interested in amateur radio. So I keep on hoping to meet more amateurs of my age!

Young amateurs are often criticised because they don't build equipment, but why should we if there are so many commercially-made transceivers available? Another important factor here in Belgium, is that all our equipment has to meet legal standards.

The problem here is that these regulations have become very strict. This makes it impossible for a novice to build a transceiver that satisfies the PTT tests and requirements!

The novice licence **IS** a good idea, and it's certainly an alternative if we don't want our hobby to die out. All young radio amateurs should spread the news about our exciting hobby to their friends.

To finish my letter, I have noticed in *PW*, that some amateurs regard hand-held transceiver users as 'wallies'. But what's the alternative for very young amateurs to start with? Should they work hard for a long time and save £1000 for an expensive rig, just to be respected by other operators?

Olivier Host ON4AGM, Roeselare, Belgium

Editor's reply: Thank you for writing Olivier. We realise of course that *PW* has many readers over in Belgium, and we're always pleased to hear from you. Fortunately, the Department of Trade & Industry's Radiocommunications Agency in the UK has adopted a sensible attitude towards standards and specifications for amateur radio equipment. However, there is still a great deal of concern as to what's going to happen in the future, with the EEC 'Common Market' regulations. If very high, rigidly enforced standards are ever applied, amateur radio construction and the *PW* approach to the hobby could suffer very badly.

Dear Sir

I wish to comment on John Heys G3BDQ's letter, in the June issue. Firstly, I felt that the May article under debate was refreshingly different, and certainly most enjoyable. Contrary to G3BDQ's comments, I think the author took pains to cover the safety aspects in quite reasonable detail.

My only minor criticism, is that regenerative designs are not always an exact science. They often require a degree of 'tailoring' for best results, and further details in these areas would have helped.

I use a variety of valved and solid state regenerative receivers on a regular basis and use them on a number of bands. They've provided many hours of pleasure, and their performance can be very effective with some operational care.

I found John Heys's pre-1950 antique criteria amusing. This is because it can be said that any form of manually generated c.w. is similarly old-fashioned and inefficient compared to other forms of data communication. Are we to assume, therefore, that these pre-1950 methods are also redundant and not worthy of *PW* coverage?

Let's have more valved projects in *PW* please! Finally, I'd like to mention that I work with the very latest technology. So, I'm not prejudiced, but I do have a love of the history of radio and the pleasure of using equipment based on ideas from the earlier years.

**Terry Parker G4NXX
Nr. Sudbury
Derbyshire**

Dear Sir

In reference to Bob Hurst's praise and John Heys's criticism of valved construction projects, I'm writing to support the relevant articles and Bob Hurst's views.

I was 12 when I first became interested in radio. With the help of a retired postman, I was soon introduced to the art of radio construction.

A teacher at my school, who was a radio amateur also encouraged me. Receivers made by the school radio club, out-performed the imported transistor radios of the day, although they weren't so portable!

I agree that extreme care must be taken, due to the lethal voltages present in a valved rig. Many newly-licensed amateurs, find that ignorance of valve technology is a disadvantage when buying on the second-hand market. There are many bargains to be had with valved transceivers.

If the solid state revolution had taken place five years later, I believe that we would still be using valves in many more applications, if valve technology had only been allowed to reach its zenith.

Colin Topping GM6HGW
St. Andrews, Fife

Dear Sir

John Heys G3BDQ's comments on the recently published 3.5MHz transceiver were somewhat pedantic. He only had to read young G7HIU's 'Star Letter' on the previous page to find the answer to his question!

Valves and valved equipment circuitry still hold great fascination for enthusiasts of all ages. Despite the occasional opposition from converts to 'solid state', this interest will be with us for many years.

When they're in use, valves can look beautiful and are a joy to behold. By comparison, the most complicated solid state device has the aesthetic appeal of a building brick! It may surprise John Heys, that valves of all types are still

being produced in large numbers by one well-known American company.

I'd also like to dispel the myth about the lack of valve-related components. It may appear to be true, if your search is limited to the pages of the current 'hobby' catalogues. It's not true if you're a practised rally visitor. I've yet to come back from any rally without a holdall stacked with goodies for valved projects.

Older valved oscilloscopes sell very cheaply at rallies. If you can't find enough bits in an old 'scope, to build either a valved transmitter or receiver, then you're in the wrong hobby!
Nev Kirk G3JDK
Rotherham
Yorkshire

Dear Sir

As a faithful follower of *PW* since the early 30s, I was interested in the correspondence regarding valves in June's 'Receiving You'.

Despite the fact that letters in favour were two to one (that 15 year-old young man will go far!), I feel that John D. Heys comments really hit the spot! Like anyone of my generation, I'm keen on valves, but I feel your projects so far will have limited appeal.

I use a legally converted CB rig for 28MHz. This is not from choice, but simply because I'm on a pension and cannot (brief pause for sympathy) afford the high prices demanded by dealers. This limits me to around 10W output, and I'd like to see a simple, no frills, valved p.a. design dedicated to one band.

It doesn't have to be a sophisticated circuit, it could use an OKD6 or 6LF6 or even the 807! An amplifier like this would compare most favourably with a commercial product, with the added advantage of being virtually indestructible.

So come on *PW*, what about it? Let's see a nice simple circuit for a 100W 28MHz p.a. In view of my advancing years, I ask that you don't make it too far in the future, because I'd like to build it before departing to the great shack in the sky!

With very best wishes to *PW* and all who sail in her!

Trevor C. Harris G00IB
Peacehaven
East Sussex

Editor's reply: Trevor has an interesting suggestion. If there's enough interest, we could come up with something fairly quickly. So, readers, it's up to you and your comments for a project like this would be welcomed (on postcards please) as soon as possible.

Services

Queries

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

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

Back Numbers & Binders

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

Binders, each holding one volume of *PW*, are available price £5.50 each (£1 P&P for one, £2 for two or more).

Send all orders to the Post Sales Department.

Subscriptions

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

Constructional Projects

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

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

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

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

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

Mail Order

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

Wireless Line

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

Dear Sir

Can I suggest that part of the Rev. George Dobbs G3RJV's series 'Getting Started the Practical Way' might include the use and manufacture of various pieces of test equipment, such as wavemeters? It could be very useful.

This subject came to my notice when my wife and her friend were taking their RAE in May. They said that this subject was not covered very well in the RAE syllabus.

R. G. Oldridge
Stourbridge, West Midlands

Editor's comment: Life is full of amazing coincidences Mr Oldridge, for George Dobbs has just sent in the next batch of projects for the series. Among them is a delightful little wavemeter, which will be featured soon. The series is proving very popular, and both George and the *PW* team are pleased to hear from readers with ideas.

Competition Corner

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

Wordsearch

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

Fifteen 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 fifteen words, mark them on the grid and send in your answers.

Send your entry to PW Publishing Ltd., July '91 Wordsearch Competition, Enefco House, The Quay, Poole, Dorset BH15 1PP. Closing Date last post received Friday 27 September 1991. The Editor's decision on the winner is final, no correspondence will be entered into.

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

Algebra
Kenpro
QRP Classics
Ambulance
Maths

Raynet
Chatterbox
Monopole
Reflections
Fuse

Newsdesk
Tabard
Handheld
Packet
Vertical

Name

Address

.....

.....

.....

Postcode

Newsdesk '91

RAE Courses

London: The City of Westminster College (formerly Paddington College), will be running an RAE evening course, commencing early September 1991 (for May 1992 exam). Both class A and class B licences will be catered for (i.e. a Morse course will run concurrently). Professional college lecturers will conduct the course. For enrolment details, etc., prospective candidates should contact: **Ann James, The City of Westminster College, Science and Technology Department, 25 Paddington Green, London W2 1NB. Tel: 071-723 8826.**

Kent: Poverest School, Poverest Road, Orpington, Kent, are running an RAE course on Wednesday evenings, 7.30 to 9.30pm, commencing September 18. Early enrolment is advised, to Bromley Adult Education Centre, Church Lane, Prince's Plain, Bromley BR2 8LD, tel: 081-462 9184. The course leads to the May 1992 examination which will be held at the school. Course tutor is **Alan Betts G0HIQ on (0689) 831123.**

Kirkcaldy: The Glenrothes & District ARC are planning to run a course to prepare candidates for the radio amateurs examination to be held in May 1992. The course will be from 7 to 9pm Monday evenings, beginning late September, leading up to the City and Guilds examination in May 1992.

A second course in Morse code will be run during the same period on Tuesday evenings from 7 to 9pm. It provides training for beginners and those amateurs wishing to improve on the basic 12w.p.m. required for the A licence. Both courses will be held at Balwearie High School in Kirkcaldy.

For further details of enrolment dates, contact **Ken Horne GM3YBQ on (0592) 265789 evenings or Mr McGill at Balwearie High School, Kirkcaldy (0592) 640335.**

Wolverhampton: RAE classes will run on Mondays 7.15 to 9.15pm at Ounsdale High School, Ounsdale Road, Wombourne, Wolverhampton. First class on September 18. Enrol now. Details from **Roger Price on Wolverhampton 895198.**

Surrey: The Electrical Engineering Department of Kingston College of Further Education hope to run the RAE Course from September 1991. Lecturer is Tony G7DVGW. Enrolment takes place September 9/10. KCFE is also a centre for the City & Guilds 765 exam (RAE) as well as the 773 exam (Novice RAE) and welcomes external candidates. Please note that they cannot offer the September 773 exam. For further information, please contact G7DVGW at: **EE Dept, Kingston College of Further Education, Kingston Hall Road, Kingston-Upon-Thames, Surrey KT1 2AQ. Tel: 081-546 2151 Ext. 2066.**

Stockport: The RAE is available as a course of 25 Monday night sessions leading up to the May 1992 exam, with the option of sitting the exam in December 1991 for those needing to re-sit a component or for students with a good knowledge of electrical theory. The lessons run from 7 to 9pm. Students sit the exam within the centre.

A Morse course of 25 lessons for all levels of ability up to about 17w.p.m. Several tutors will be available to assist. The lessons will run on Thursday evenings from 7 to 9pm.

Both of the above courses will begin at the start of the September term at Reddish Vale Evening Centre, Reddish Vale Road, Stockport, Cheshire SK5 7HD. Tel: 061-477 3544. Enrolment will take place on September 16th, 17th and 19th between 7 and 9pm. Further details can be obtained from **Dave Wood (Course tutor) on 061-430 6246 most evenings.**

Merseyside: The Wirral ARS at Ivy Farm, Arrow Park Road, Birkenhead, Merseyside, are running an RAE course, commencing early September for the May 1992 examination. Norman G3CSG and Denis G00TD, are conducting the course. Prospective candidates should contact **Norman Kendrick G3CSG at 77 Grampian Way, Moreton, Wirral L46 0QF. Tel: 051-677 6368** for full details.

Taunton: Somerset College of Arts & Technology, Wellington Road, Taunton, are offering the RAE Course for the May exam. It will be held on

Tuesday evenings from 7 to 9pm and the tutor will be Peter Upton G7CCV. For enrolment details, please telephone **(0823) 283403 Ext. 373 or Ext. 211.**

Stockport: Avondale Adult Education Centre will be running a Morse code course on Monday evenings and an RAE course on Tuesdays. Both courses are from 7 to 9pm. Enrolment takes place week commencing September 16, when the course tutor, Rik Whittaker G4WAU, shall be available to answer any enquiries about the courses. Further information is available from Avondale School and Rik can also be contacted on **061-427 4730** evenings and weekends.

Staffordshire: The Rugeley Adult Education Centre, Aelfgar Centre, Taylor's Lane, Rugeley will be running an RAE course on Thursday evenings 7 to 9pm, starting in September. Course tutor is Brian Smith G4EQC. The course has been running successfully for a number of years and is aimed at beginners of all ages. Further details from the principal, **Mr B. Golemboski on Rugeley 578738.**

Kent: Len Buck G0DLR has been running very successful RAE courses since 1983, and this years class will commence in the last week of September to run until the May examination. His candidates sit their exam at the North West Kent College at Dartford.

The course is held at his private address, and therefore the accommodation is relatively limited as it is only practical to teach about twelve people at any one time. However, if there is a sufficient number he will be happy to run the course on two evenings of the week.

The cost of the 32-week session is £50.00, plus of course the examination fee that is payable to the College. People who are interested should contact **Len on (0732) 823483.**

Doncaster: Doncaster College will again be running the City & Guilds course leading to the RAE from September. The classes will be on a Tuesday evening from 6 to 8pm. Anyone interested should contact **Mike Parkin G60SD at the School of Electrical & Electronic Engineering. Tel: (0302) 322122 Ext. 287 or 282.** There will also be a basic practical electronics course on a Wednesday evening 6 to 8pm, the tutor being Trevor Jones, who can be contacted on the same extension.

Birmingham: The Summer 1991 RAE course begins on June 6 at a cost of £63.60. The course fee includes tuition, books, folder, paper, calculator and refreshments at break time. The examination fee is extra. The course is run by Chris G8YPE, who has eight years of experience in tutoring people through City & Guilds 765. They offer free tuition until pass, providing that the student takes every available examination. **B&C Electronics, 51 Sir Hiltons Road, West Heath, Birmingham. Tel: 021-475 2426.**

Derby: The City & Guilds course 765 (RAE) will run on Wednesdays, 6.30 to 9pm at the Derby Tertiary College, Wilmorton, London Road, Wilmorton, Derby DE28UG. Enrolment for this course will be in September. For further information, contact 'Student Services' on **(0332) 757570 or course tutor Frank Whitehead on (0332) 519955 Ext. 226.**

Derby: The City & Guilds Novice course 773 (NRAE) will run on Thursdays, 6.30 to 9pm at the Derby Tertiary College, Mackworth, Prince Charles Avenue, Mackworth, Derby DE3 4FL. Enrolment for this course will be in September. For further information, contact 'Student Services' on **(0332) 519955 or course tutor Frank Whitehead on (0332) 519955 Ext. 226.**

London: Hendon College, Corner Mead, Grahame Park Way, Colindale, London NW9 5RA, are offering an evening class for the RAE. On Thursday evenings, 7.30 to 9.30pm, starting Thursday 19 September. They also have evening classes in Practical Electronics (City & Guilds), Electronics (BTEC) and Micro Electronics (BTEC), as well as full-time and day release courses. **Chris Holford on 081-200 8300.**

Extra Special Event Station

During the weekend of September 14 and 15th, the Solihull ARS will be operating a special event station with the callsign GB2BRM (Birmingham Railway Museum). The event is the museum's 'Friends of Thomas the Tank Engine Weekend'.

This is no ordinary event station, as the radio station will be operating from the Royal Coach complete with the original table and furniture as used by royalty and Sir Winston Churchill during World War II. Sir Winston used the coach as a meeting and communication post when in conference with General Eisenhower. The coach was built in the 1930s and is of great historical interest and value.

The radio station will be operating on 144, 7 or 3.5MHz, depending on band conditions. The RSGB's recruitment video will be on show nearby.

Birmingham Railway Museum is located at Tyseley, approximately three miles south of Birmingham city on the A41 (near to Tyseley railway station) and will be open from 10am to 5pm Saturday and Sunday.

If more information is required, please contact **Norman Parker G4VMP on 021-707 3376.**

Silent Key Sale

A large collection of amateur radio equipment gathered over a period of 50 years, is to be sold at a Silent Key sale on Saturday 21 September

1991. The sale, which is being organised by radio amateurs on behalf of Mrs. E. Verrinder, will start at 11am and take place under cover in the

garden of her home in Dorset.

Equipment to be sold ranges from vintage receivers and books, to modern transmitters, receivers, test gear,

antennas, magazines and much radio 'bric à brac'. Full details of how to get to the sale, with short-form listings of equipment can be obtained by sending an

A5 sized s.a.e. to: **Box No. 24 PW publishing Ltd. Enefco House The Quay Poole Dorset BH15 1PP**

Newsdesk '91

The Shetland Bus

In August 1941, the first of a series of daring wartime voyages was made between the Shetland Islands and Nazi occupied Norway, in small fishing boats, 5 to 8m long.

The Norwegian crews were carrying out a variety of missions, including landing agents in Norway to aid the resistance movement and returning with refugees and escaped prisoners of war.

Despite setbacks, the voyages continued throughout the war until the enemy were removed from Norway. So frequent were the dangerous missions run, that they became known as the Shetland Bus.

To commemorate the 50th anniversary of the start of the Shetland Bus, until the end of 1991, the Lerwick Radio Club plans to operate a special event station with the callsign GB5OSB from its club station. A special QSL card will be issued, and an award to all amateurs who contact GB5OSB and two other Shetland stations during 1991. To assist in identifying Shetland radio amateurs, it is hoped to operate two other special event stations GB2KER from Kergord and GB2LUN from Lunna, both bases of Shetland bus operations. In addition the club station GM3ZET will be active throughout 1991.

The Shetland Bus is well known to many Norwegian amateurs and has been a source of bonding between Shetland and Norway. To commemorate the Shetland bus, the Shetland Island Council have struck a commemorative coin at the Tower Mint, London. A book has also been published on the subject.

For more details, please contact **R. G. Miles GM4CA** on (0595) 8411.

South Dartmoor School ARC

As a direct result of the Novice amateur radio course, South Dartmoor School, Ballard Lane, Ashburton, Devon, has now formed a radio club.

It is called South Dartmoor School Amateur Radio Club, and it will be active after the school summer holidays.

The South Dartmoor School has nine students and one teacher taking the Novice amateur radio exam, with another five from Knowles Hill Comprehensive School at Newton Abbot in Devon.

The support from the parents, teachers and head teachers has been 100% and all their courses finished in time for the school summer holidays. This will give time for revision when they return after the holidays, ready for the September Novice amateur radio exam.

The School's Headmaster, Ray Tarleton, is very keen on the project and is making a room available for a radio club in the school with funds for some equipment. To justify the room it will also have a weather satellite station, so that it can be used by the geography and science departments in the school.

Local radio amateurs will also help, and it is proposed that they get a club callsign for the school. Hopefully this can all be carried out in the summer holidays, ready for when the autumn term starts in September.

The students will be the first in Devon to take the exam and hopefully will have their callsigns at the end of October.

Peter Thornhill G6ZKQ, Tutor, 21 Elmbank, Buckfastleigh, Devon TQ11 0DN.

Lothians Radio Society

The Lothians RS will be holding its third Open night at the start of the next session of club meetings in the Orwell Lodge Hotel, Polwarth Terrace, Edinburgh, commencing at 7.30pm on Wednesday 25 September.

The Open night is for all radio amateurs, s.w.l.s and interested enthusiasts, and will this year feature both a Fleamarket and a Bring & Buy sale for both members and non-members of the society. For details of tables and space available in the Fleamarket, please contact Mel Evans on **031-664 5403**. To take part in the Bring & Buy, simply bring along your items clearly marked with your callsign and price.

Also present, will be their registered Novice Licence instructor with details of proposed Novice Licence and c.w. classes for those interested.

So, why not go along and take any interested parties with you!

Big Event

On August 31/ September 1 - GB60NTS - will be on the air for the Third Annual 8 Nations National Trust Event (Diamond Jubilee Event). This is the big event for the National Trust For Scotland for 1991.

This event involves all call areas in the UK and Ireland and they are all operating from National trust properties to combine with Scotland to celebrate 60 years of NTS.

Taking part in this event will be the following stations: GB2NTU, EI7M/P, GB2NTW, GB2NTC, GB0NTJ, GB2NTE, GP3HFN, GT3FLH, GH3DVC and GB60NTS.

A special certificate is available for overseas, contacting any of the above stations in three call areas. UK and Ireland,

contacting any of the above stations in five call areas. Cost to UK and Ireland is £1 and overseas is 4\$ or the equivalent. There's a special QSL card for every contact, with all QSLs via the bureau.

Log extracts only please, to:
Robbie GM4UQG
Awards Manager
PO Box 59
Hamilton
Scotland ML3 6QB.

Northern Sound, Vision & Electric Show

Millions of people will be making their way to Blackpool this autumn for the Illuminations. Not all will be travelling just to see the Lights.

Thousands will be travelling to see a new public exhibition - The Northern Sound, Vision & Electric Show.

The exhibition will be staged at the Norbreck Castle Hotel, on Friday, Saturday and Sunday 13-15th September. The well-known seafront venue is easily found and has good car parking facilities.

The Northern Electric Show, will present to the public all that is best in the world on consumer electrics, from computers to curling tongs, hi-fi to hot plates. If it's powered by electricity and consumer-orientated, it will be on show in Blackpool!

For more information on the show, contact:
Nicola Woodcock
Northern Sound
Vision & Electric Show
335 Red Bank Show
Bispham
Blackpool FY2 0HJ.
Tel: (0235) 52557.

Car Boot Rally

The Madley Satellite Earth Station Amateur Radio Group (G7BTI) are holding their annual car boot rally, within the grounds of the Communications Centre, on Sunday September 8. Madley Comms Centre is located 10km south-west of the City of Hereford. In addition to the amateur radio section there will be a segregated conventional car boot sale. The gates open at 8.30am and talk-in is available on S22. Further details can be obtained from our own 'Backscatter' columnist, **David Butler G4ASR** on **(0873) 87679.**

August Bank Holiday Sale

Garex Electronics have an August Bank Holiday Monday (26th) Sale - One day only from 10am to 4pm.

Regular lines: new & second-hand scanners, antennas, components, plus lots of lovely junk and surplus materials. All the clearance items offered at 'must go' prices.

Garex are easy to find, with ample parking. South Brent is just off the main A38 between Exeter and Plymouth.
Garex Electronics
Station Yard
South Brent
South Devon
TQ10 9AL.
Tel: (0364) 72770.

USA Special Event Station

Amateur radio station WBIU will be operating a special event station from the USA Marconi site on October 5 and 6th. Starting at 1300UTC to celebrate the 90th anniversary of Marconi's Wireless station, South Wellfleet, Massachusetts, USA, (construction started in 1901).

Operating frequencies will be the general section (lower 25kHz) of 21, 14 and 7MHz and the Novice section of 28MHz (28.400MHz) and 3.5MHz (3.700MHz).

To receive a certificate, please send a QSL card, 9x10 envelope and IRCs to: **Ray Hilson WB1U 6 Sherman Place Norwalk CT 06851 USA.**

Scottish Tourist Board RA Expedition Group

On August 17/18 - GB6SM will be on the air for the Summerlee Museum in Coatbridge, Lanarkshire Steam Fair.

It was 150 years ago when Summerlee Iron Works were at the Hub of the Industrial Revolution, when coal and iron brought prosperity to Scotland. Fifty years ago, the works became derelict. Today, the site is the home of a major working Museum illustrating 200 years of Scottish industry and people. The site won the Museum of the Year 1990 and there's a special QSL card for every contact.

John (Paddy) McGill GM3MTH
Tel: (0236) 40495.

Car Boot Sale

Milton Keynes & District ARS have an amateur radio car boot sale on Sunday 8 September at Cranfield Airfield, Beds (south side). It runs from 9.30 until 4pm. Hot & cold snacks and drinks, admission 50p. Talk-in S22. Advance bookings are £7 private (£9 on the day) and trade £12.50 (£15 on the day). Enquiries to **Ray G1LRU on (0908) 660798.**

Newsdesk '91

Club News

Aylesbury Vale RS meet 1st & 3rd Wednesdays, 8pm at the old Village Hall, Hardwick, except during June, July and August when there is only one meeting on the 1st Wednesday of the month. September 4 is a talk by Bill G6WDF on 'Amateur Satellites, All I Know About Them!'. Further details about the club from **Geoff on (0280) 817496** or **Martyn on (0908) 560026.**

Bradford ARS meet 2nd & 4th Thursdays, 8pm at the Polish Ex-Service club, Shearbridge Road, Bradford, West Yorkshire. August 22 is G3NN - Portable operation and September 4-7 is special event station GB50ATC. **Charles Bolt G0ACX on (0247) 494694.**

Braintree & District ARS meet 1st & 3rd Mondays, 8pm at the Community Centre, Victoria Street, Braintree. August 14 is 'Weather Measurements' by Derek G3MMA and September 2 is 'Packet Radio' by Ted G8NPF and Mick G6DFZ. **D. Andrews, 22 Arnhem Grove, Braintree, Essex CM7 5UQ. Tel: (0376) 27431.**

Bromsgrove ARS meet at Lickey End Social Club, Alcester Road, Burcot, Bromsgrove. August 13 is 'Ceramics' by Eric Danks G8BKL and the 27th is a night on the air. **Mr D. Edwards G4ZWR, 2 Mason Close, Headless Cross, Redditch, Worcs B97 5DF. Tel: (0527) 546075.**

Coulsdon ATS meet 2nd Mondays, 7.45pm at St. Swithun's Church Hall, Grovelands Road, Purley, Surrey. August 12 is an RSGB Video evening with Cheese & Wine and September 9 is 'Linear Amplifiers' by John Stockley G8MNY. Further details from **Andy Briers G0KZT on 081-668 7004.**

Dragon ARC meet 1st & 3rd Mondays, 7.30pm at the Four Crosses Hotel, Menai Bridge. August 17 is a special event, the 70th anniversary of No. 4 Flying Training School, the 19th is club station HF night, September 2 is a construction night and the 7-8th is another special event. Seven Nations National Trust event. More details from **Tony Rees GW0FMQ on (0248) 600963.**

Echford ARS meet in the Community Hall, St. Martin's Court, Kinston Crescent, Ashford, Middlesex, 7.30pm. August 12 is The Great Egg Race G0BZF/G1XHP and September 9 is 'Keys and Keyers' G3ESH. Further details from **P. Townshend G6PMT on (0344) 843472.**

Fareham & District ARC meet Wednesdays, 7.30pm in Portchester Community Centre, Westlands Grove, Portchester, Fareham, Hants. September 11 is a talk on 'P Up Mountains' by Peter G0FIM. Details from **Rod Smith G0ERS on (0705) 373572.**

Fylde ARS meet 2nd & 4th Thursdays, 7.45pm at South Shore Lawn Tennis Club, Midgeland Road, Blackpool. August 22 is an Informal meeting with programme review and September 12 is also an Informal. **Eric Fielding G4IHF on (0253) 726685.**

GB3HZ Repeater Group meet at Chiltern Communications, Lincoln Road, Cressex Industrial Estate, High Wycombe, Bucks, 8pm. Their next meeting is on September 26. Details from **Francis Rose G2DRT on (0494) 814240.**

Gloucester ARS meet at St. Johns Ambulance HQ, Heathville Road, Gloucester, 7.30pm. August 14 is Construction Group, the 21st is Morse Sending Practice and the 28th is Homebrew Clinic. More info from **J. Beekingham on (0425) 28533 Ext. 2741.**

Hambleton ARS meet in Room A5 of Northallerton Grammar School at 7.30pm. September 9 is Gulf Gossip by Nigel Robertshaw G0NHM. For more details, contact **Nigel Robertshaw G0NHM on (0609) 776608.**

Ipswich RC have a new secretary, **Mrs S. M. Elden G8HYE, 124 Larchcroft Road, Ipswich IP1 6PD.**

Kettering ARS meet Tuesdays, 7.30pm at the Electricity Sports & Social Club, Eksdale Street, Kettering. August 31/September 1 is an HF Field day at Loddington. All enquiries to **Len G7EHM on (0536) 514544.**

Lothians RS meet on the 2nd & 4th Wednesdays, 7.30pm in the Orwell Lodge Hotel, Polwarth Terrace, Edinburgh. September 11 is The President's Address. Further details from **Mel Evans at 56 Southhouse Road, Edinburgh EH17 8EU or telephone 031-664 5403.**

Loughton & District ARS meet in Room 14 of Loughton Hall, 7.45pm. They haven't any meetings in Loughton Hall during August but on August 9 and 23rd they have Informals at Victoria Tavern. For more details contact **Mike Pilbury G4KCK on 081-504 4581.**

Maidenhead & District ARC meet at The Red Cross Hall, The Cres-

cent, Maidenhead, 7.30pm. August 20 is Quiz against Bracknell ARC (at home) and September 5 is Technical Questions & Answers. Details from **Neil G8XYN on (0628) 25952.**

Mansfield ARS meet at the Polish Catholic Club, off Windmill Lane, Woodhouse Road, Mansfield. On September 5 they have a talk on the 'Short Wave Broadcast Bands' by John G4GYU. Further information from **Mary G0NZA on (0623) 755288.**

Norfolk ARC meet Wednesdays, 7.30pm at 'The Norfolk Dumpling', the Livestock Market, Harford, Norwich. August 14 is a Real Radio evening, the 21st is QRP Activity week - hints & advice, the 28th is 'Science For All' by Arnold Tomalin G3PTB, the 31st is HF SSB NFD at East Tuddenham site, September 4th is Town & Country Show final briefing, the 8th is Club demonstration at Town & Country Show, Royal Norfolk Showground, Costessey and the 11th is 'Flying Kites' by Kevin Appleton. **Jack Simpson G3NJJ on (0603) 747992.**

North Bristol ARC hold their meeting at S.H.E., 7 Braemar Crescent, Northville, Bristol. August 16 is JARL visit to China, a video from the RSGB audio-visual library, September 1 is Motorama, details from **Graham G0MGC** and the 7th is SSB National Field Day at Woodhouse Park. **Chris Budd G0LOJ on (0454) 616267.**

Prudential ARS is open to employees of the Prudential companies and you can get details from **Dennis Egan GW4XKE, 4 Hazel Grove, Longmeadow, Dinas Powis, South Glamorgan CF6 4TE. Tel: (0222) 512959.**

Reading & District ARC meet 2nd & 4th Thursdays, 8pm at The Woodley Pavilion, Woodford Park, Haddon Drive, Woodley, Reading. August 22 is a 'Power Amplifiers' talk by Roy Church G3KJC and the 31st is a special event station for Guide Dogs for the Blind. **Vin Robinson G4JTR, 4 Hilltop Road, Caversham, Reading RG4 7HR.**

South Dorset RS meet 1st Tuesdays, 7.30pm in the Wessex Lounge of Weymouth Football Club. August 11 is Hamfest Rally, Wimborne and September 3 is an Activities evening. **Geoff Gwilliam G4FJO, 13 Overlands Road, Wyke Regis, Weymouth DT4 9HS. Tel: (0305) 781164.**

South Notts ARC meet at Highbank Community Centre, Farnbrough Road, Clifton Estate, Nottingham. August 9 in Preparing for Open day, the 11th is Open day, the 16th is On Air Operating/P from leek, the 18th is a Foxhunt, the 23rd is talk-in on 2m/talk on Packet Radio by Eddy G0INA, the 30th is talk-in on 2m/Open Forum and September 6 is Construction (Fairham college). For further details call **Trevor G4IRH on (0509) 672734.**

Stevenage & District ARS meet in Ground Floor Lecture Room, 'D' Block, Ridgmond Training Enterprise, Ridgmond Park, 7.30pm. September 2 is their RAE course enrolment evening, the 3rd is talk on 'Mobile Operating' by Peter G7HCL and Gary G0ETA and the 10th is Practical Test Equipment. Details from **Pete Daly G0GTE, 48 Lincoln Road, Stevenage, Herts SG1 4PJ. Tel: (0438) 724991.**

Stratford-Upon-Avon & District RS meet 2nd & 4th Mondays, 7.30pm at Baptist Church, Payton Street, Stratford-Upon-Avon, Warwickshire. September 9 is an Open evening (10 minute story by members). Further details from **Alan Beasley G0CXJ, 2 Ilmington Road, Blackwell, Shipston-on-Stour, Warwickshire CV36 4PE. Tel: (0608) 82495.**

Sutton & Cheam RS meet 3rd Thursdays, 7.30pm at Downs Lawn Tennis Club, Holland Avenue, Cheam, Surrey with natter nights on 1st Mondays, in the Downs Bar. August 15 is a Barbecue, the 29th is a committee meeting at G0GZD and September 2 is a natter night. More from **John Puttock G0BWV, 53 Alexandra Avenue, Sutton SM1 2PA.**

The Three Counties ARC meet every other Wednesday, 8pm at the Railway Hotel, Liphook. August 14 is Video of the RSGB and other radio activities, the 28th is a Junk Sale and September 11 is 'Wines of the World'. **Kevin Roche G8GOS on (0420) 83091.**

Wakefield & District RS meet Tuesdays, 8pm in First Floor Rooms, Ossett Community Centre, Prospect Road, Ossett. August 13 is an 'Amateur Radio For Beginners' video - second showing the 20th is 'ATU/Antenna Principles' by G3WWF, September 3 is contest final preparation and on the air and the 7-8th is 144MHz Trophy Contest - Blakey Ridge. **John-Lloyd Bailes G0MVA on (0924) 220048.**

West of Scotland ARS meet Fridays, 7.30pm at the Scout HQ, 21 Elmbank Street, Glasgow. For further details, please contact **John Power G0MKT0, PO Box 599, Glasgow G3 6QH.**

Wimbledon & District ARS meet 2nd & last Fridays in St. Andrews Church Hall, Herbert Road, Wimbledon SW19. August 30 is a general activity evening. **Chris Frost G0KEB, 61 Selbourne Avenue, Tolworth, Surrey KT6 7NR. Tel: 081-397 0427.**

Auction

The Tyne & Wear Repeater Group Auction is to be held on Sunday 3 November at Fencehouses Community Centre, Fencehouses, Nr Chester-le-St., Co. Durham. Doors open at 11am for booking in goods. The Auction starts at 12.30pm. For further details, please contact **Ian G4OCQ on 091-384 0827.**



Tex Swann G1TEX isn't one to turn down the chance of trying out a useful piece of equipment. He tried out the Kenpro KT-44, and was impressed with this budget-priced rig's excellent performance.

Kenpro K Hand-Held

The overall impression received, when I first saw the Kenpro KT-44, was one of a spartan, but smart rig. This u.h.f. hand-held has none of the many multi-functioned front panel keys found on many hand-held transceivers.

The frequency controls are limited to three decade thumbwheels and one small slider switch. The three decade switches control the frequency in 10kHz, 100kHz and 1MHz steps.

At first, I experienced a little difficulty when trying to set the frequency. I even managed to try to call up a local repeater some 200kHz higher in frequency than it really was. I had the repeater shift on '+1.6' and fortunately, was unlikely to have broken into any conversations with repeated use of the toneburst. It was an exercise on how to feel foolish in one easy lesson!

Setting The Frequency

If you look at the photograph of the top panel, you'll see that the frequency is set for 433.350MHz, a local repeater channel. The MegaHertz decimal point is assumed to lie between the first two numbers.

By adding 430 to these and you'll have set 433.35MHz on the rig. The final 0 or 5kHz is selected with the aid of a small slide switch, which is just visible below the Kenpro name.

In the UK we use a +1.6MHz repeater offset. Two of the three small slide switches, hidden on the back panel above the belt clip, may be used to select this requirement.

The switch marked '+1.6' and '-1.6' is almost self-explanatory. In use, this switch selects a transmission frequency either 1.6MHz higher or 1.6MHz lower than the thumbwheel set frequency. You may regard the switch as a 'preset', and it may be left on '+1.6' for use within the UK.

When you're about to use a repeater, all you have to do is move the middle slider switch on the back panel, to the 'DUP' (Duplex) position. To use the normal, or simplex channels, slide this switch back

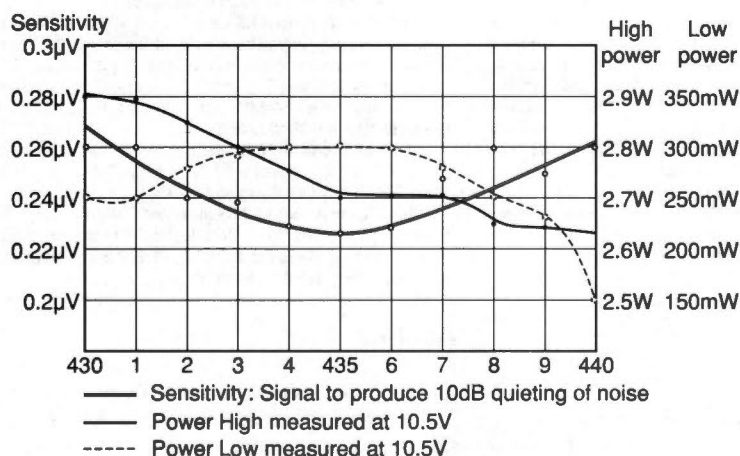
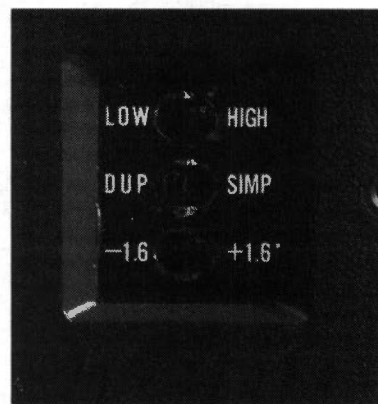


Fig. 1: Combined sensitivity/power diagram.



The cluster of three switches on the back panel.

T-44 UHF Transceiver

over to the 'SIMP' setting. What could be simpler?

The final switch, in this cluster of three controls is the r.f. power output. The actual measured power out was as shown in the composite diagram in Fig. 1.

Using The Transceiver

Two of the transceivers had been supplied for evaluation and Rob Mannion G3XFD and I tried them out in the office, and during lunchtime walks in Poole High street. Rob also took his transceiver out on the Dorset hills, and thoroughly enjoyed himself as a pedestrian portable. Band conditions were so good he managed to work into Bedfordshire and East Anglia using just the 'rubber duck' antenna!

We found that the rigs were very sensitive, and they provided crisp and clear audio on transmit and receive. This is an area where some hand-helds, can show their shortcomings.

The PW editorial office is one floor down from the technical sub-editor's workshop (it's known as the 'Tardis' because of the specially screened measurements cubicle) where much of our development work is done. Despite masses of r.f. noise from the various computers in our, and other nearby offices, the rigs coped very well indeed. Rob and I were able to chat away with no bother, over the short but very badly obstructed pathway.



David, 14 year-old son of Mike Owen G4YTA is looking forward to his Novice Licence and a KT-44 of his own.

Summary

To sum up, I think that the Kenpro KT-44 is a very nice and easy set to use, once the initial fumbling with the frequency selection switches had been overcome. It's a simple, but comprehensive little transceiver with a more than adequate performance for portable use.

The local repeaters were more than happy with the transceiver's signals. Reports received from other operators said that it provided good audio, with a very crisp and clear transmission. This is most likely to be due to the sensitive electret microphone insert, and partly due to good speech processing circuitry.

It's not often we get two rigs of the same type to evaluate and I was able to check the specifications and to put both transceivers through their paces. I'm pleased to report that the final, composite results below reflect the quality of the product, as both rigs were within or better than the manufacturers specification. PW

Our thanks go to Nevada Communications of 189 London Road, North End, Portsmouth PO2 9AE. Tel: (0705) 662145, for the loan of the review sample transceivers which cost £159 and will be available during September.

Measured and tested specifications

General

Frequency range	430-439.995MHz in 5kHz steps
Type of modulation	Frequency Modulation (F3)
Antenna impedance	50Ω
Power requirements	5.5-12V d.c. (battery packs available with 8.4 or 10.8V)
Consumption (at 10.8V)	22mA (standby)

	170mA (Max received audio)
	700mA (High power transmission)
	300mA (Low power transmission)

Operating temperature	-10° to +60°C
-----------------------	---------------

Dimensions	65(w) x 40(d) x 180(h) mm (excluding antenna)
------------	---

Weight	490g (approximately)
--------	----------------------

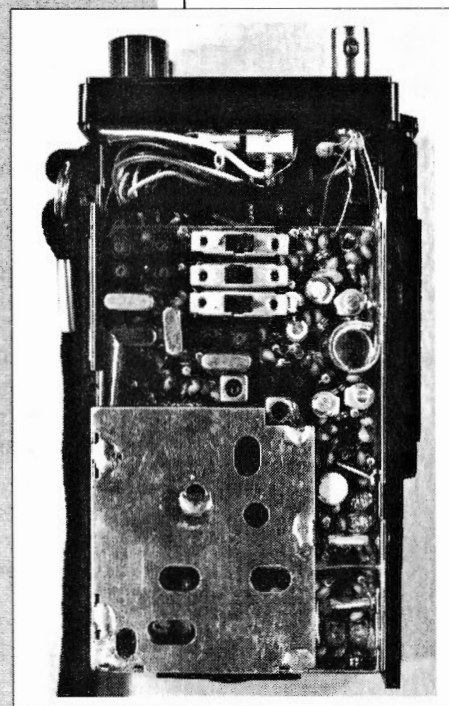
Frequency selection	(includes 8.4V battery pack and antenna)
	Thumbwheel, 10kHz steps +5KHz switch
	(three decade range, add 430 to read frequency
	'335' equates to 433.350MHz (RB14 channel)

Receiver Section

Receiver type	Double Superhet
Intermediate frequencies	21.6MHz (1st i.f.)
	455kHz (2nd i.f.)
Sensitivity	better than 0.5µV (see Fig. 1)
Squelch setting	0.16-3.5µV (measured)
Selectivity	better than 60dBµV (see Fig. 1)
Bandwidth	±7.5kHz
Audio Power	Better than 400mW (10% distortion)

Transmitter Section

Output power	1.5W (high 8.4V) 2.5W (10.8V) (see Fig. 1)
	250mW (see Fig. 1)
Modulation	Reactance
Maximum deviation	±5kHz
Frequency offset	±1.6MHz repeater shift (+1.6MHz in UK)
Spurious emissions	-60dBc or less
Microphone	Electret type
Repeater tone	Separate access tone switch on the front fascia.



The rig is very neatly shoehorned into the casing.



Castle Electronics

Tel: 0384 298616

Fax: 0384 270224

**MAJOR SERVICING/REPAIR
CENTRE FOR ALL AMATEUR,
PMR AND COMMERCIAL
RADIO EQUIPMENT...**

KENWOOD **YAESU**
ICOM **ALINCO**

SR STANDARD.

**plus MOTOROLA and MAXON
and all other major manufacturers**



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

Castle Electronics are a fully equipped DTI approved radio engineering company based in the West Midlands, who specialise not only in PMR equipment, but in land and marine based HF communications equipment of all types.

Our engineers are widely experienced in not only early but also digital/synthesised radio equipment covering a wide range of makes and models.

A 24 hour emergency call out service is available covering the whole of the UK.

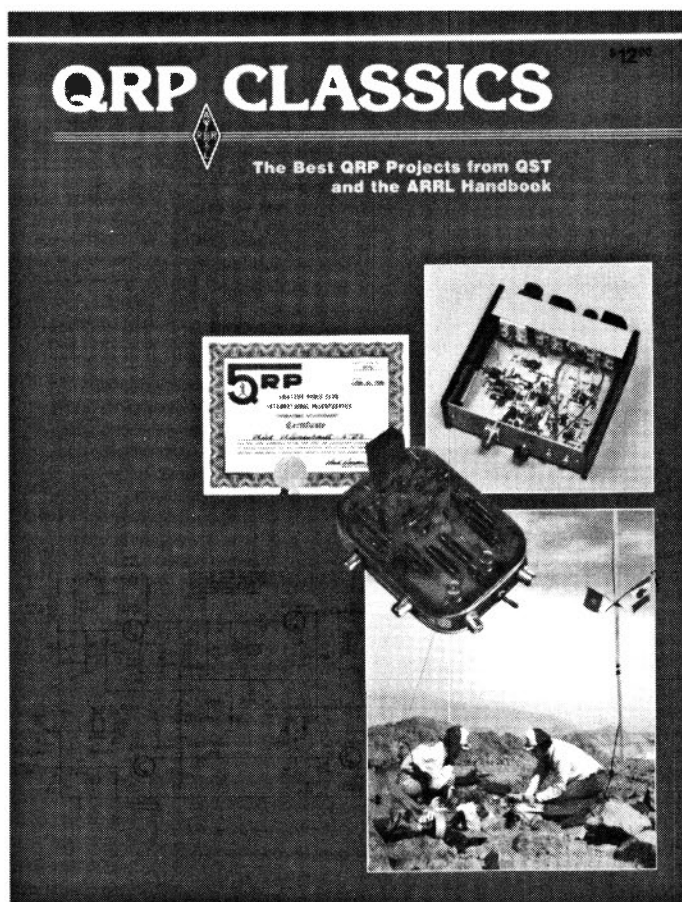


**UNIT 3, "BAIRD HOUSE", DUDLEY INNOVATION CENTRE
PENSNETT TRADING ESTATE, KINGSWINFORM
WEST MIDLANDS D76 8XZ**



PW SUBSCRIBERS' CLUB

If you have a subscription then you will know all about the *Practical Wireless* Subscribers' Club. If you do not have a subscription then doubtless you will be wondering just what this page is all about. Membership of the *PW* Subscriber's Club is free and automatic for all Subscribers, and is our way of saying thank you to all those who have enough faith in their favourite magazine to pay for it 'up front'. Each month there will be Special Offers and occasional competitions with some really useful prizes to be won.



Once again we've another special offer for *Practical Wireless* Subscribers' Club members and it's *QRP Classics*, published by the ARRL. This book contains selections of what are considered to be the best QRP projects published in *QST* and the *ARRL Handbook* in recent years.

If you're a QRP or home-brewing enthusiast, this book will certainly provide many hours of reading. Amongst a host of fascinating constructional projects, there's an s.s.b. and c.w. transceiver for 50MHz and an interesting QRP 14MHz s.s.b. and c.w. design for portable working.

As a member of the *Practical Wireless* Subscribers' Club, you can obtain your own copy of *QRP Classics* for only £8.50 including P&P. This is a saving of £2.45 off the normal *PW* Book Service price.

The closing date for this special offer is 4 September 1991. Please send your order to: *PW* Subscribers' Club (September), *PW* Publishing Ltd., FREEPOST, Enefco House, The Quay, Poole Dorset BH15 1PP.

This offer is limited to one copy per subscriber. Your order must be accompanied by your Subscriber number or a subscription order using the form printed below. We regret that only *PW* Subscribers' Club members can apply.

SUBSCRIPTIONS TO PRACTICAL WIRELESS MAGAZINE

Be sure of your copy every month and qualify for the Subscribers' Club as well. Special offers and discounts normally available to all members, including those abroad.

Please indicate the type of subscription required:

PRACTICAL WIRELESS 1 YEAR

- ☐ £19.00 (UK)
- ☐ £21.00 (Europe)
- ☐ £22.00 (Rest of World)

SHORT WAVE MAGAZINE 1 YEAR

- ☐ £21.00 (UK)
- ☐ £23.00 (Europe)
- ☐ £25.00 (Rest of World)

SPECIAL JOINT SUBSCRIPTION 1 YEAR ONLY

- ☐ £34.00 (UK)
- ☐ £37.00 (Europe)
- ☐ £39.00 (Rest of World)

Prices current at August 1991

Subscription to commence with issue dated.....

☐ Please send me *QRP Classics* at the special *PW* Subscribers' Club price of £8.50 inc. P&P.

To: *PW* Publishing Ltd., FREEPOST, Subscriptions Dept., Enefco House, The Quay, Poole, Dorset BH15 1PP

Name.....

Address.....

.....

.....

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

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

Card No.

Valid from to

**Credit Card Orders
can be taken on
(0202) 665524.**

Signature.....

If you do not want to deface your *PW* a photocopy of this coupon will be accepted.

The PW Chatterbox



The prototype PW Chatterbox receiver.

Errors And Updates

Wrong Toroidal Core.

The PW Chatterbox transmitter parts list, page 23 of the August 1991 issue of PW, has L5 described as being wound on a T50-12 toroid. This is incorrect. The inductor L5 should be wound on a T50-2 toroid. Our apologies to those who've started to build the transmitter.

Before starting on the receiver side of the 'Chatterbox', we ought to take a final look at the transmitter itself. The Chatterbox transmitter is built separately, because many constructors will want to use it in conjunction with an existing receiver on 1.8MHz.

It's been assumed that an existing antenna tuner and low-pass filter unit will be used with the transmitter. However, if you intend to use the complete transmitter and receiver combination as a 'stand alone' unit, it will be necessary to use a suitable low-pass filter to reduce potential harmonics.

A filter of this sort can be built into the transmitter, or it can be an outboard type used in conjunction with a small antenna tuner. What the individual constructor does of course, will depend on the size of casing and whether or not the project is built as separates or as one small unit.

With the change-over switching described in the previous article, the transmitter can be used with any 1.8MHz receiver. If you don't have a suitable set, you can add a simple single board receiver of the sort described here. However, bear in mind that the receiver is not a DX model and it's designed for using the Chatterbox combination in local a.m. nets.

The Receiver

The receiver section is based on the TDA1072A a.m. receiver i.c. This is an inexpensive chip which performs all the functions of an a.m. receiver between the antenna and the audio stages.

The TDA1072A's sensitivity and signal handling capabilities are such that it's suitable for this application. The i.c. also supports several features not used in this design.

Some of the features are made available on the p.c.b., should you wish to incorporate them in the receiver. For example, the chip provides an S-meter output, a muting facility and a buffered oscillator output for driving a frequency counter. The circuit is shown in Fig. 2.1, and it closely follows the manufacturer's specification sheet.

The incoming signal is filtered with a high-pass

In Part 2 of the two-unit 1.8MHz a.m. project, George Dobbs G3RJV describes the construction of the separate receiver section.

filter, L6 (wound on a toroid) and associated capacitors, and a two stage band-pass filter, comprising of T2 and T3. The high-pass filter was included because the receiver operates close to the medium wave broadcasting band.

Winding the toroid for L6 is a simple job and it only requires a little concentration for a neat job. All you need to do is wind 24 turns of 0.4 or 0.5mm enamelled copper wire on a T37-2 core.

I have a local commercial broadcasting station at the top end of the medium waveband that can light bulbs in my location in Rochdale! The high-pass filter was included to kill the pop music breakthrough. The band-pass filter has manual tuning provided by a polyvaricon capacitor, C36, to peak the wanted band signals and reduce the out-of-band signals.

Receiver Tuning

The band is tuned using a variable capacitor, C39, in conjunction with T4. Although the TDA1072A was designed for varicap tuning, this arrangement allows for very stable tuning over the band.

The variable capacitor, C39, is a standard value, 75pF, (a 100pF may be used as an alternative) which more than covers the whole band. This tuning capacitor is mounted directly on the printed circuit board.

The ground connection on C39, is made through the mounting nut to the p.c.b. To avoid any problems with poor connections, I also added a wire between the tag to the moving vanes and the ground plane on the top of the printed circuit board.

Intermediate Frequency

The i.f. at 455kHz, is filtered by using a CFW455HT ceramic filter and an i.f. transformer, T5, placed between the mixer output, pin 1, and the i.f. amplifier, pins 3 and 4.

It's possible to inject a b.f.o. signal at pin 4, to make the receiver available for c.w. and s.s.b. reception. Several radio amateurs have used this i.c. to make a c.w. and s.s.b. receiver. I tried injecting a 455kHz signal at pin 4, but found that it triggered the internal a.g.c. This reduced the overall gain of the receiver, to what I considered to be an unacceptable level.

Spratt Debate

There was a debate between DF2OF and G8SEQ, reported in the G-QRP Club journal *Spratt* (issue 57), on using a b.f.o. with the TDA1072 without a.g.c. problems. The technique is obviously open to experimentation!

One possible idea, would be a b.f.o. which only injects a signal when netting the transmitter to the receiver. This technique would make the netting process somewhat easier.

The circuitry around pins 5 to 8, clearly demonstrates that the TDA1072A requires considerable decoupling

1.8MHz Receiver

around the audio stages. Don't miss out these capacitors, as reducing the decoupling causes instability. To further help stability, the receiver is built on a double-sided p.c.b.

The audio amplifier is the popular LM386 i.c. in its high gain configuration. A muting switch can be applied to pin 2, but in this application the receiver is switched off during transmit cycles, so pin 2 is grounded. Switching off the receiver is quite acceptable in this particular application.

Building The Receiver

The receiver is built on a single p.c.b. which also holds the three controls, peak (C36), tune (C39) and audio volume (R29). The board is a double-sided p.c.b., the top of the board forming a ground plane. Wherever possible, the grounded connections and leads should also be connected to the top side of the board.

It can be helpful to build and test the audio stages first. This job would start from the loudspeaker output as far as pin 6 on the TDA1072A. The capacitors C45 and 46 are tantalum bead types to fit in the small space available. When the audio stages are wired, the rest of the components may be added.

Setting Up

The method used to set up the receiver will depend upon the available test equipment. Although some test equipment is helpful, the receiver can be set-up by using signals on the band.

Even after a setting-up operation on the test-bench, I tend to make final adjustments using signals on the band. The first task is to get C39 to tune over 1.8 to 2MHz. It is, of course, tuning 455kHz lower than the range 1.8 to 2.0 MHz.

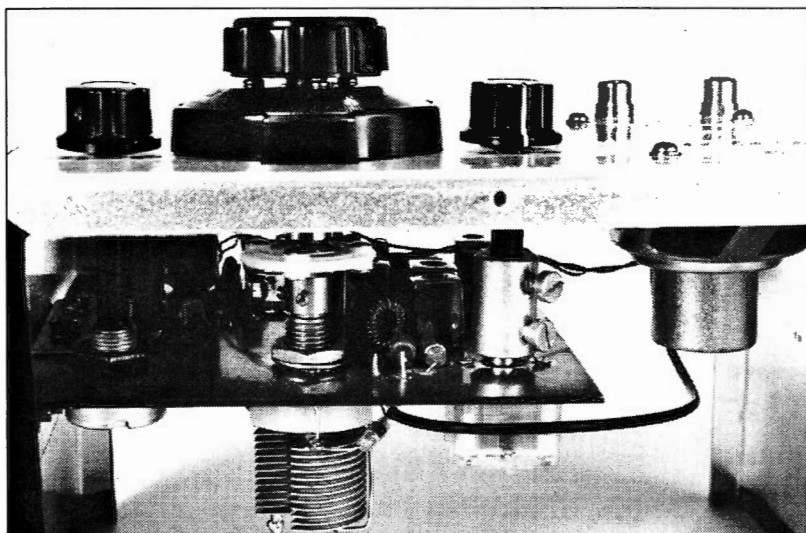
One suitable method is by using a frequency counter to take a signal from TP1. This is a simple technique, but some poorly buffered counters can change the frequency of the signal.

Another method is to listen for the signal on a receiver, set to receive c.w. or s.s.b. This is done by connecting a short wire antenna to the receiver, and then draping it close to C38. The adjustment is by means of the core in T4. You may find it necessary to increase the value of C38, by perhaps 56 or 68pF (the actual value depends on the individual coil) to achieve this easily.

Bandpass Adjustments

The adjustment of the band-pass filter is rather more exacting, and it's done by adjustment of T3 and T4. The ideal method is to set the two cores to peak the band in conjunction with C36.

This may be done by injecting a low level signal of the required frequency into the receiver input or using signals on the band. There are enough 'jingle-jangles'



Looking at the receiver from above. The method of mounting the main p.c.b. on stand-off pillars can be clearly seen along with the slow-motion tuning drive.

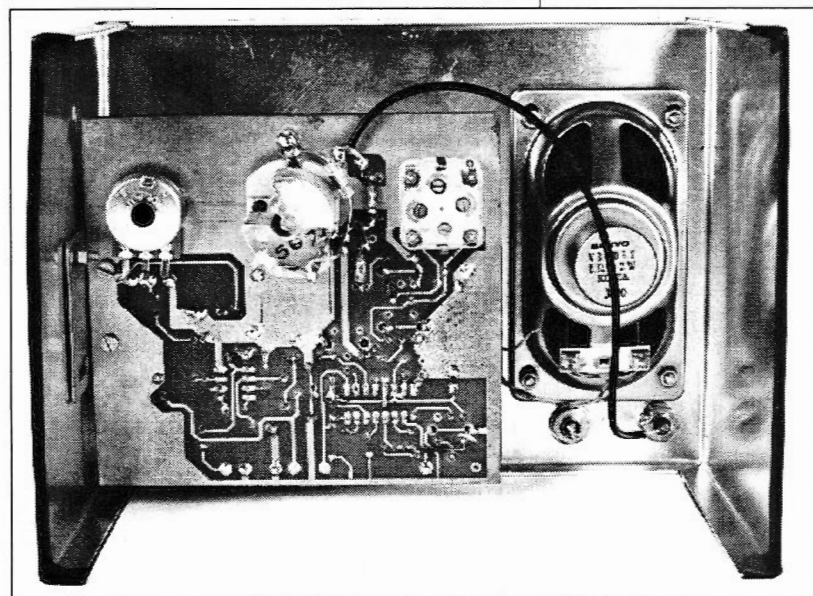
from navigational beacons on 1.8MHz to provide tuning signals. The signals to avoid are any popular songs creeping in from medium wave broadcasting stations!

Begin the process by setting C36 about midway, and injecting or finding a signal at around 1.9MHz. Next, T2/3 are adjusted to peak the required signal.

You should then set a signal at about 1.8MHz, rotate C36 to peak the signal, and then re-adjust T2/3. This operation should then be repeated at around 2MHz. It's worth repeating the whole tuning up process at least twice, and then perhaps re-peaking on a favoured frequency on the band. To finish the job off, you should peak T5, the i.f. transformer, for maximum signal.

The receiver input is designed for 50Ω, and it should be used into a correctly matched 50Ω input from an antenna or tuning unit. An antenna tuning unit will also help to reduce adjacent channel broadcast signals.

Rear view of the receiver showing the p.c.b., gain, receiver tuning and 'peak' controls.



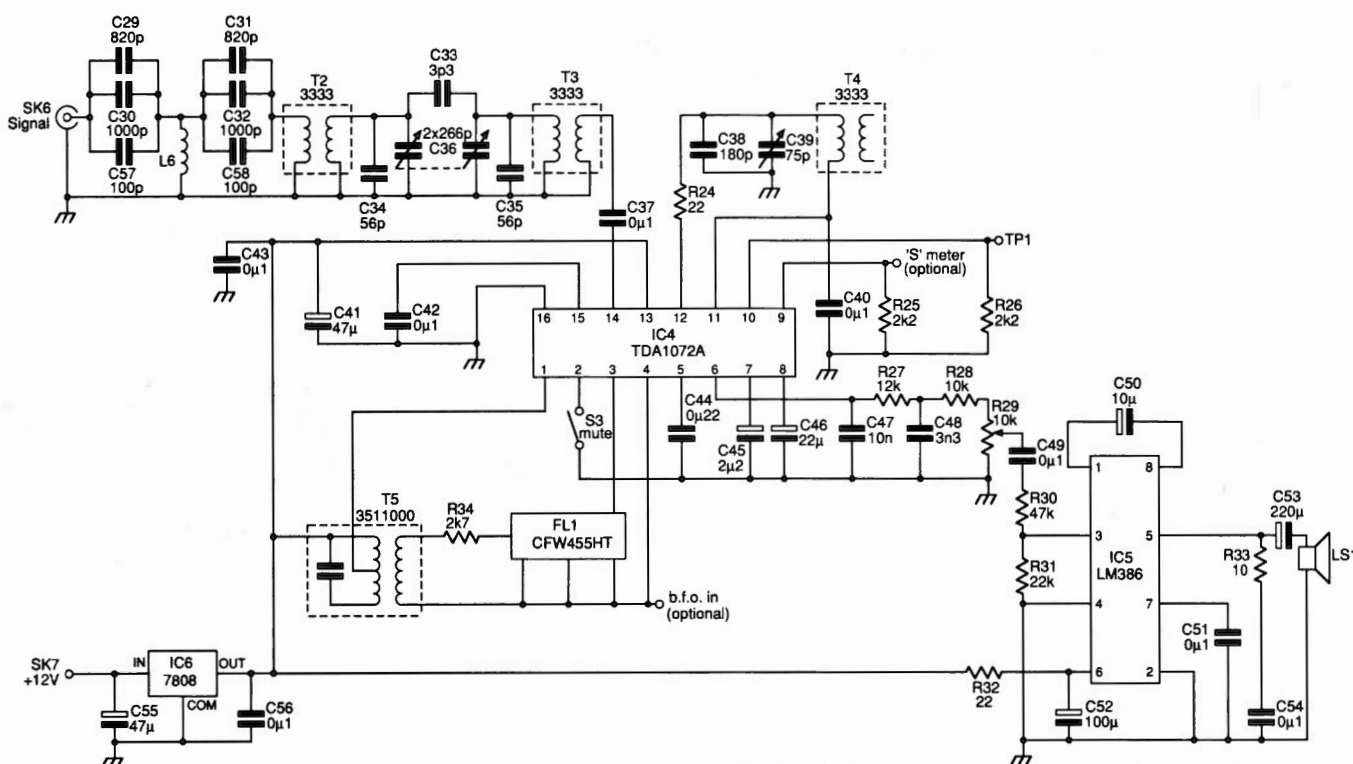


Fig. 2.1: The Chatterbox receiver circuit diagram.

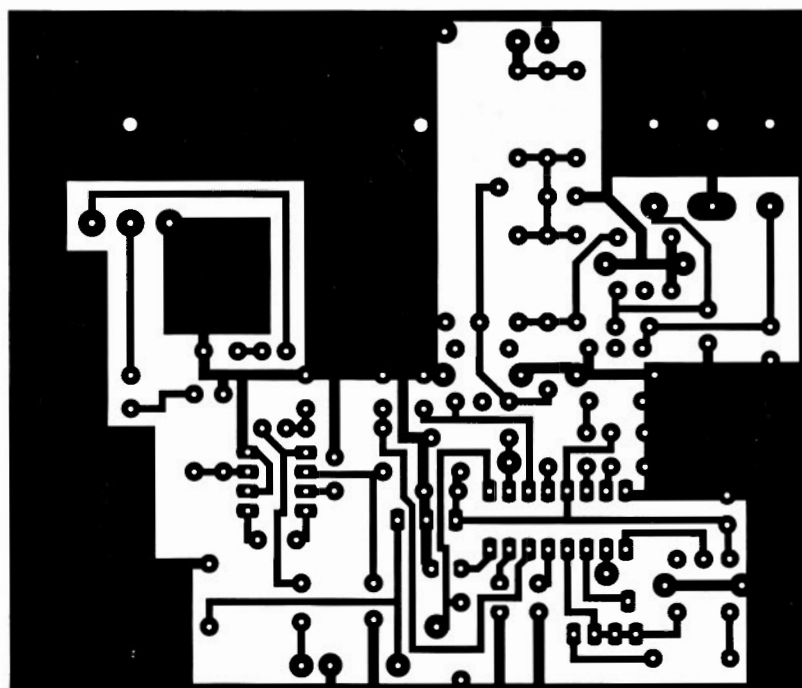


Fig. 2.2: The Chatterbox receiver p.c.b. copper track layout.

Boxing The Chatterbox

The receiver unit can be mounted in a box the same size as the transmitter. The interconnecting leads that form part of the transmit to receive switching, are clearly shown in the photographs.

To provide a suitable receiver tuning rate, a slow-motion drive is required for C39. I used an in-line epicyclic drive. To enable the slow-motion drive to be

used, the receiver p.c.b. is mounted behind the front panel, using stand-off pillars spaced to suit the drive.

Switching Modification

As the unit uses a.m., and frequency stability is less critical, several short-cuts may be taken in the transmit-receive switching arrangements. For example, the v.f.o. is switched off during the receive periods, as the 'warm up' drift is insignificant in terms of an a.m.

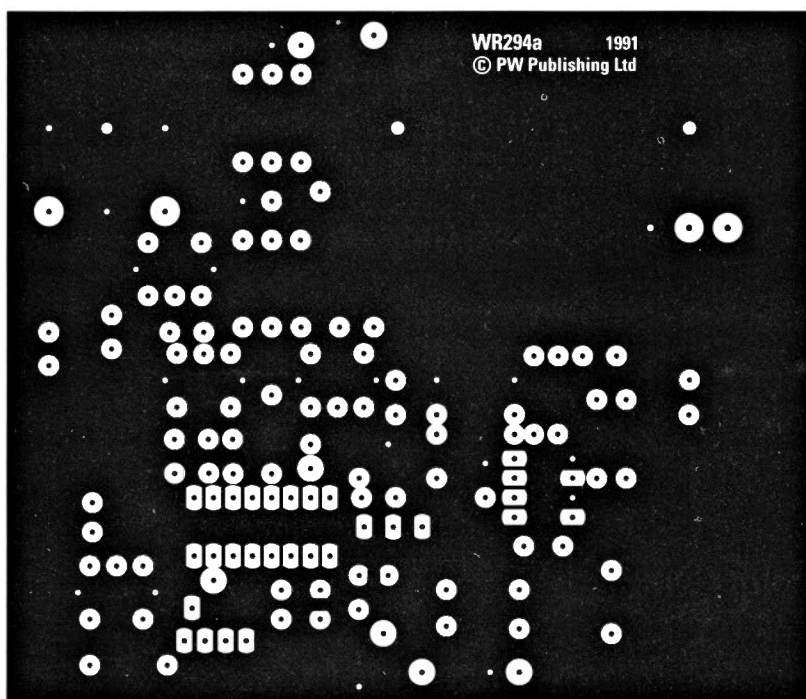


Fig. 2.3: Receiver ground plane details.

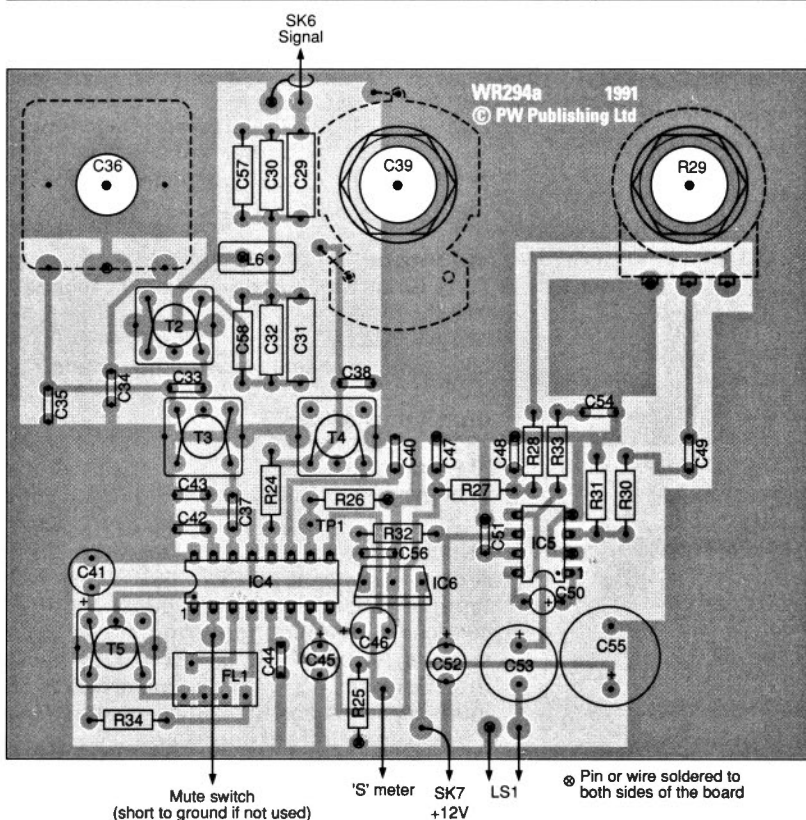


Fig. 2.4: The Chatterbox receiver component placing overlay diagram with off-board connections shown.

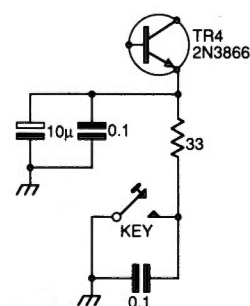


Fig. 2.5: The c.w. modification for the Chatterbox suggested by G3VTT.

signal. For the same reasons, the receiver is completely switched off during transmit periods.

The circuit of the change-over arrangement was shown in **Part 1** as **Fig. 1.1**. The switching circuitry now requires a small modification to incorporate the receiver half of the project.

The change-over action is centred around a 12V relay, RL1, operated by the p.t.t. switch on the microphone. This is a double-pole change-over relay which switches the antenna between the receiver and

Practical Wireless, September 1991

the transmitter output.

An extra supply wire is added to the contacts on the switch. This supplies 12V to the transmitter and the v.f.o. The extra wire, from the normally closed contact, supplies the receiver with 12V which is disconnected when the p.t.t. is operated and the relay switches to transmit.

As the transmitter and receiver are separate units, the transmitter has to be 'netted' to the receiver frequency. This is done by switching on the v.f.o., and

I hope you build, and enjoy using this delightful little rig. There's quite a few of them about already. Perhaps your Chatterbox could be the next one on the air!

then tuning it to the desired frequency on the receiver. The 'Net' Switch, S2, connects a 12V supply directly to the v.f.o. when the unit's in the receive mode.

If the transmitter is to be used for c.w., a more sophisticated method of change-over will be required. In this case, the v.f.o. should be left to run all the time. Additionally, a method of off-setting its frequency is required during receive periods, to prevent it being picked up on the receiver.

Chattering In Morse

Although the Chatterbox was designed as an a.m. transmitter, it works very well on c.w. Colin Turner G3VTT, has built a prototype Chatterbox transmitter and uses it successfully on c.w. with the slight modifications shown in Fig. 2.5.

The 2N3866 driver transistor is keyed, using the arrangement shown in the diagram. This produces pleasant keying characteristics.

With the key added, the microphone p.t.t. point still provides the change-over from transmit to receive. The microphone really needs to be unplugged when you're using c.w., but an extra switch can be added to the transmit section for change-over.

A better arrangement is to disable the modulator. Ideally, this is done by removing the supply to the 2030 audio integrated circuit and shorting out the modulation transformer, T1. The 12V supply then goes directly to the IRF510 p.a. stage. However, after telling you about the proper way to do it, I understand that Colin G3VTT, merely shorts out the modulation transformer!

PW

How Much? £28 + p.c.b. + case

How Difficult? Intermediate

Shopping List

Resistor

Carbon Film 0.25W 5%

10Ω	1	R33
22Ω	2	R24, 32
2.2kΩ	2	R25, R26
2.7kΩ	1	R34
10kΩ	1	R28
12kΩ	1	R27
22kΩ	1	R31
47kΩ	1	R30

Variable Rotary

10kΩ	1	R29
------	---	-----

Capacitors

Miniature Disc Ceramic

3.3pF	1	C33
3.3nF	1	C48
10nF	1	C47
0.22μF	1	C44
0.1μF	8	C37, 40, 42, 43, 49, 51, 54, 56

Polystyrene

56pF	2	C34, 35
100pF	2	C57, 58
180pF	1	C38
820pF	2	C29, 31
1000pF	2	C30, 32

Miniature Radial Electrolytics 16Vw

10μF	1	C50
47μF	1	C41
100μF	1	C52
220μF	1	C53
470μF	1	C55

Tantalum Bead 16Vw

2.2μF	1	C45
22μF	1	C46

Variable

75/100pF	1	C39 Jackson C804 type either value.
266pF	1	C36 (Polyvaricon, double variable capacitor)

Inductors

T5 is Cirkit Stock code 35-11000 (455kHz i.f. transformer)

BKANK 3333	3	T2, 3, 4
L6	See text for winding details	

Semiconductors

7808	1	IC6
LM386	1	IC5
TDA1072A	1	IC4

Miscellaneous

A ceramic filter type CFW455HT, one T37-2 type toroid core (Cirkit), p.c.b. from PW services, slow-motion coupling, spacers, nuts, screws, etc. Miniature coaxial cable, interconnecting wire, a suitable 8-16Ω loudspeaker. A box to enclose the unit (I used a box from Minfford engineering).

Suppliers

Cirkit
Park Lane
Broxbourne
Herts, EN10 7NQ.
Tel: (0992) 464457.

Maplin Electronics
PO Box 777
Rayleigh
Essex SS6 8LU.
Tel: (0702) 554161.

Minfford Engineering
Sun Street
Ffestiniog
Gwynedd LL41 4NE.
Tel: (0766) 762572.

Errors & Updates

Low Cost NiCad Tester, February 1991 Page 26

This E&U corrects a second mistake that crept into an earlier Errors & Updates (PW March 1991). Refer to the diagram Fig. 3 on page 27 of the February '91 issue of PW. The battery under test is connected with its positive terminal to Pin A of the circuit, not pin G as stated in the previous E&U. The negative of the battery under test goes to Pin C. A further mistake, spotted by reader David Dunn-Johnston, was in the same diagram, Fig. 3. The negative supply rails for both IC1 & 2 are shown as returning to the centre rail. In fact they should return to the most negative point of the circuit, Pin F. The overlay pattern shown in Fig. 4 on page 27 is correct. Our thanks to Dave, and apologies to all.

PW Robin Frequency Counter Part 2, August 1991 Page 35

Several readers have contacted us about the testing of the PW Robin, the description on page 35 is not very clear. In the paragraph beginning 'Testing Time' the links to IC3 pins 7 and 10, are made to the socket, as IC3 has not been fitted at this point. The temporary connections in (b) should be to IC3 pin 5, not IC2 pin 5. Further down in the same column beginning, 'Remove power and transfer the link from pin 5 of IC3 to pin 10', this should have read 'pin 10 of IC2'. This is the input to the counter which is 256Hz. There was also some confusion about which parts DJ Electronics were sourcing for the PW Robin. We asked them to supply the electronic parts only. See PW August '91 page 35, for more details. The p.c.b.s WR290 and WR291, are available from the PW PCB Service at £5.42 and £7.25 respectively. These prices include VAT and p&p. Once again our apologies to all involved.

'Quaynotes' comments on some of your critical letters this month, and asks for some help from you, to plan for the future of the CB page in PW.

Okay, so I boobed! I'm sorry that I got so carried away with my interest in SSTV that the rules were broken. I must say thanks to the various CBers who took the trouble to write in and warn me of the problem. One or two of you even took the trouble to explain what had happened after your own experiments with SSTV and packet radio.

Several readers who'd mistakenly tried SSTV and other data modes, reported that they were visited by the DTI's Radio Investigation Service. The RIS men put them 'on the right track' and left it at that. Fortunately, the same happened to me, and apart from some finger-wagging and an outsize Dunce's cap, here I am. The Editor's intervention and the statement produced on last month's page says it all. So, enough said.

Moans And Groans

While I'm on the whipping block, it's perhaps a good idea to look at some other criticisms that have come my way. I get a big postbag every month, and although the feedback is usually very favourable, one or two adverse, although constructive comments have arrived. It's not my job to ignore them - if I'm to do my job properly.

I must start the ball rolling by mentioning a letter from **Mr A. B. Stanley** from Appleby in Cumbria, who says that he's disappointed in the column. He says it's full of trivia and doesn't reflect the needs of the CB enthusiast reading *PW*. In his long letter, which contained much constructive criticism, Mr Stanley suggests technical reviews of CB rigs, news on licensing, and other related items.

What do you think? Would you like to see some reviews on new gear? Drop me a line and let me know. I shall be replying in full to Mr Stanley in a personal letter, but I do appreciate the time he's taken to write to me. I'm also hoping you'll write and let me know what you prefer to see, now that we've got our own little corner in *PW*.

Other letters have come, notably from **M. A. ('Lofty') Phillips** in Slough, who comments, amongst other things, that it must be difficult to produce a page covering 27 and 934MHz. In reply, I've got to say that I enjoy the feedback from you, but now that we're established, it's time to see where we're going!

Finally, on the brickbat front, a letter arrived from **Leon Greenfield** who lives just around the corner from the famous Chalkpits Industrial Museum at Amberley in West Sussex. Leon says that he'd like to see an article on the CB REACT service. He also points out

that he's active on 27 and 934MHz, and considers that many amateurs would not be on the air now, if they hadn't had their first introduction through CB.

So, to sum up, I must thank all of you for writing. To be honest, even the most critical letters ended up with 'thanks for the column'. It's obvious from your letters and final comments that 'CB High & Low' is needed, but we've got to try and reflect the CB radio scene in an effective way. I'll do my best, but to achieve our aim you have to do your bit and let me know what **YOU** want. It may be that you

CB HIGH & LOW

By 'Quaynotes'

might want to see a rig reviewed occasionally, an antenna project, and constructional ideas with 'High & Low' appearing in this form during alternate months.

In the meantime, I'm going to reply personally to as many of you as I can, and look forward to your ideas and suggestions arriving from the office.

Antenna Time

One of the problems associated with magazines, is the limited amount of space available each month. The editor has to juggle his plans and ideas for each issue, and

I've got to fight for this little corner.

As you all know, the 934MHz antenna design from Fred Judd is 'ready to go'. So, I'm going to suggest that so we can get the idea published as soon as possible, that the project appear instead of 'High & Low'. There's method in my madness, because it means I can take my holiday knowing that those of you who've been waiting for the antenna project can go ahead and build it.

In the meantime, I'll get busy collating all your letters and ideas regarding the future of 'High & Low' so that we can forge ahead. So get busy!

Fig.2: Frank Fuller, Chairman of the 934MHz Club UK operating his much travelled u.h.f. hand-held transceiver.



Finding That Rig

There's great demand for second-hand 934MHz transceivers. The newly-introduced and popular 'Bargain Basement' has proved that. I was far too late to buy either of the u.h.f. CB transceivers offered in *PW* recently.

Because of the interest shown in second-hand gear, and as I'm still looking for a rig myself, I was pleased to hear that **Brian Hollins** is offering a solution to the problem of finding 934MHz gear. Brian, based in Weybridge in Surrey, runs the '934MHz Exchange' where he offers a service of buying and selling u.h.f. CB gear.

I haven't met Brian myself, but the Editor Rob Mannion G3XFD, met Brian at the Longleat Mobile rally on June 30th. He had quite a chat with Brian and **Frank Fuller**, (Fig. 1 and 2) the Chairman of the 934MHz Club, about the 934MHz Club UK itself and the difficulties in buying second-hand equipment. Brian took the opportunity of telling the editor about his service, and the news was soon passed on to me.

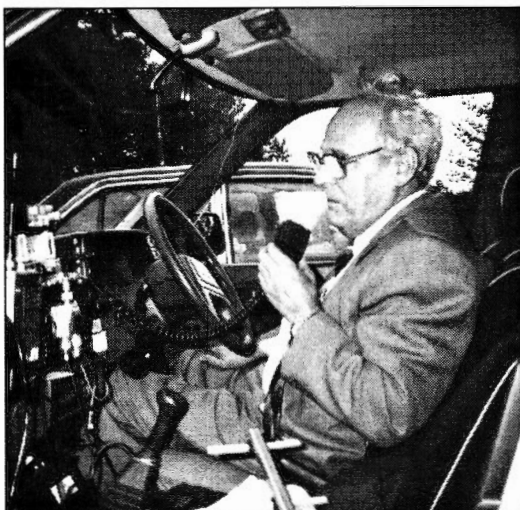
It's a great pity that I work most weekends, as it means that I can't get along to rallies. For my sins, I'm 'on call-out' duty to repair specialised communication equipment, but at least I can see our delightful countryside.

Still, at least I can pass on Brian Hollins address and 'phone number. I've no doubt that either Brian or Frank Fuller (as prominent members of the 934MHz Club) would do their best to help you find a rig. You can call or write to Brian at Beech Rise, Rodona Road, St. George's Hill, Weybridge, Surrey KT13 0NP. Tel. (0932) 852656.

That's the lot for this month, don't forget to write, brickbats and all!

Quaynotes

Fig.1: Inside Frank Fuller's mobile CB shack. Frank's travels throughout Britain have provided many contacts for 934MHz operators.



Mathematics For The RAE

Part 6

*Ray Fautley
G3ASG continues
with his look at
algebra, dealing
this month with the
multiplication and
division of terms.*

How, when the terms contain different symbols, do we multiply simple algebraic terms together? The answer is quite simple and logical. Multiply any **COEFFICIENTS** together and then write down the symbols in order. Examples are the best way to explain, so we will start with a simple one:

(i) Multiplying together $2a$ and $4b$:

$$2a \times 4b = (2 \times 4) \times (a \times b) = 8 \times a \times b = 8ab$$

(ii) Multiplying together $5b \times 6a^2 \times 2b^3$.

Multiply the coefficients together, then the 'b' terms and finally the 'a' term:

$$\begin{aligned} &= (5 \times 6 \times 2) \times (b \times b^3) \times a^2 \\ &= (60) \times (b^{1+3}) \times a^2 \\ &= (60) \times (b^4) \times a^2 \\ &= 60b^4a^2 \end{aligned}$$

or as the terms are usually written in alphabetical order:

$$= 60a^2b^4.$$

More Rules:

You may have noticed that the above terms were all positive (+). What happens if some or all of the terms are negative (-)? Don't worry, there's a series of rules which cover these cases.

(i) Multiplying a 'plus' quantity by a 'plus' quantity gives a 'plus' answer.

$$(+)\times(+)=(+)$$

(ii) Multiplying a 'plus' quantity by a 'minus' quantity gives a 'minus' answer.

$$(+)\times(-)=(-)$$

$$(-)\times(+)=(-)$$

(iii) Multiplying a 'minus' quantity by a 'minus' quantity gives a 'plus' answer.

In short:

$$(-)\times(-)=(+)$$

I'm afraid these rules will have to be committed to memory as they are very important. But there is a small memory jogger that can help. **If the signs are the same, the answer is 'plus'. If they're different the answer is 'minus'.** Not really as difficult as you may have thought, is it?

Now let's make the terms a little more complex. Don't shrink away it's not too difficult. Get all the terms having the same symbol together and add their indices. Then multiply **ALL** coefficients together.

Remember that $a \times b \times c = abc$

or when it has some terms more than once:

$$a \times a \times b = a^{(1+1)}b = a^2b$$

now add a few more terms:

Get the best deal at **ARROW**

- ★ Keenest prices and best deals
- ★ Best support and after sales service
- ★ Experienced staff with specialist knowledge

DEPEND ON ARROW!

- ★ Nationwide showrooms
- ★ Demonstration facilities
- ★ Over quarter century serving British Amateurs

DUAL BAND HANDHELDS

IC-W2 £395



**TH 77E
£397**

**C528
£379**

Special Star Bargain!

*****IC-24ET Only £299*****

HF TRANSCEIVERS

**FT747GX
£549**



**IC-735
£ Phone
Special!**



**TS950SD
£ Phone
Special!**



RECEIVERS — SHORT WAVE

**NRD535
£1,099**



IC-R7100E £ Phone NEW!



**IC-R72E
£ Phone**

**AR3000 £699!!
Special**



SCANNERS

**AR2000
£259 NEW!!**



**ICOM R1
£339**

Special Offer!!

**MVT7000
£289**

Latest model

2 METER HANDHELDS

**TH27E
£254**



**FT26R
£245**

New model



**IC-2SE £259
Bargain**

BARGAIN OFFERS

**FT736R £1,359
with free 6m module**



TR751E £ Phone

**IC-725
£779**

Free 20 amp P.S.U.!!



0% FINANCE Many items available with 0% finance. Please enquire if the equipment you want qualifies — If not we can probably save you the finance charges anyway!

HEAD OFFICE:

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

GLASGOW

Unit 17, Six Harmony Row,
Govan, Glasgow,
Scotland G51 38A
Tel: 041 445 3060
Hours: 8.30-5.30 Mon-Fri (closed Saturday)

$$a \times b \times c \times a^2 \times b^3 \times c^5$$

$$= a^{(1+2)} \times b^{(1+3)} \times c^{(1+5)}$$

$$= a^3 \times b^4 \times c^6 = a^3 b^4 c^6.$$

Here are few more worked examples.

(i) Multiply $3a \times 6c \times 8b \times 2a$
 $= (3a \times 2a) \times 6c \times 8b = 6a^2 \times 6c \times 8b$
 $= 6 \times 6 \times 8 \times a^2 \times b \times c$
 $= 288a^2bc.$

(ii) Multiply $c \times 3a \times 2c^{-4} \times 4b^4 \times 6a^{-5}$
 $= (3a \times 6a^{-5}) \times (4b^4) \times (c \times 2c^{-4})$
 $= (18a^{1-5}) \times (4b^4) \times (2c^{1-4})$
 $= (18a^{-4} \times 4b^4 \times 2c^{-3})$
 $= (18 \times 4 \times 2) \times a^{-4} \times b^4 \times c^{-3}$
 $= 144a^{-4}b^4c^{-3}.$

Division of simple terms is not much different (if you remember the rules for indices).

$$\frac{a^2}{a} = a^{(2-1)} = a^1 = a$$

The coefficients are divided in the usual way. Sometimes you may need to 'break' the individual terms down to make simplifying easier.

$$\frac{6a^3}{2a} = \frac{6}{2} \times \frac{a^3}{a} = 3 \times a^{(3-1)} = 3a^2$$

Terms In Brackets

Now for some more more difficult problems involving the use of brackets.

$(a-b)(a+b)$ means $(a-b) \times (a+b)$.

To multiply the bracketed terms together needs a little care if the answer is to be correct. The rules (there are always rules!) to be followed are:

(i) Multiply the first part of the first term by the first part of the second term.

(ii) Multiply the first part of the first term by the second part of the second term.

(iii) Multiply the second part of the first term by the first part of the second term.

(iv) Multiply the second part of the first term by the second part of the second term.

(v) Add all four answers together.

As usual, an example is far easier to follow than the rules on their own!

Multiply $(a+b)$ by $(a+b)$

From rule (i) $(+a) \times (+a) = +a^2$

From rule (ii) $(+a) \times (+b) = +ab$

From rule (iii) $(+b) \times (+a) = +ab$

From rule (iv) $(+b) \times (+b) = +b^2$

Finally from rule (v) we arrive at:

$$a^2 + ab + ab + b^2$$

$$= a^2 + 2ab + b^2.$$

That was very dry and dusty with just letters wasn't it? So now to check if we've got it right, and to make

RADIO All major brands in stock!

DAIWA

AMATEUR RADIO EQUIPMENT



NS660P PEP METER

SWR METERS

CN410M SWR/PWR Meter Cross Needle 3.5-150 MHz	£64.50
CN460M SWR/PWR Meter Cross Needle 140-450 MHz 15/150W	£64.50
DP830N Digital Meter 1.8-150/150KW 140-525/150W N Sockets	£232.75
NS660P 1.8-150 MHz 15/150/1500W PEP & Hold	£132.15
U66VN 140-525 Sensor for NS660P	£61.25
NS663BN SWR/PWR Meter Cross Needle 140-525 MHz 30/300W	£143.85
CN101 1.8-150 MHz/15-150-1.5KW PEP/SWR/PWR	£69.25

POWER SUPPLIES

PS304 1-15V Variable 30amp max	£129.95
PS120MII 3-15V Variable 9.2amp Protection circuit	£65.90
PS140II 13.8V 12amp Protection circuit	£78.95

ANTENNA TUNERS

CNW319II 3.5-54 MHz 150W CW	£179.95
CNW419 1.8-30 MHz continuous 200W (100W 1.8-3.4)	£199.00
CNW518 8 Bands 3.5-30 MHz 1KW CW	£299.00
CNW727 ATU 2M/70cm + SWR/PWR 200W CW (150W-70cm)	£169.95

LINEAR AMPLIFIERS

LA2035R 2M + Pre-amp 1-5W in/30W out	£87.45
LA2065R 2M + Pre-amp 1-14W in/60W out	£134.95
LA2080H 2M + Pre-amp 1-5W in/80W out	£159.95
LA2155H 2M + Pre-amp 1-5-25W in/150W out	£299.00

ALL DAIWA PRODUCTS AVAILABLE — FULL CATALOGUE ON REQUEST

SAE PLEASE!

COMET 'THE EFFECTIVE ANTENNA'

OUR LIST OF COMET ANTENNAS IS TOO EXTENSIVE TO LIST — COMPLETE COMET CATALOGUE AND LIST ON REQUEST — LARGE SAE PLEASE

NON-RADIAL: Mobile antennas independent of vehicle ground plane.

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

ZK4 SERIES — TRIBAND mobile & base station antennas.

CA-2X4M 144/432 Mhz 4.5/7.2dB 150W 1.53 metres	£38.50
CA-2X4G 144/432 Mhz 6.0/8.4dB 120W SSB 2.06 metres	£40.83
CX-702 Mobile Tribander 50/144/430Mhz 2.15/6.0/8.4dB 120W 2.1m	£45.95
CX-725 Base Tribander 50/144/430 Mhz 2.15/6.2/8.4dB 200W 2.43m	£75.00

CX-801 Mobile Tribander 144/432/1296 Mhz 3/6.8/9.6dB 100W 1.0m £36.40

ZK4 SERIES & DUAL BANDERS featuring the unique super linear converter system.

CA-2X4DXM 144/432 Mhz 8.1/12.2dB 200W 6.05m	£135.50
CA-2X4MAX 144/432 Mhz 8.5/11.9dB 200W 5.4 metres "N" G-fibre	£102.00
CA2X4WX 144/432 Mhz 6.5/9.0dB 200W 3.18 metres G-fibre	£80.70
CA-2X4SUPERII 144/432 Mhz 6.0/8.4dB 200W 2.43 metres G-fibre	£79.00
CA-2X4FX Compact 144/432 Mhz 4.5/7.2dB 200W 1.79 metres	£57.00
CA-2X4BX 144/432 Mhz 3.0/6.0dB 120W 1.15m	£38.80

MONOBAND BASE ANTENNAS

ABC21 5/8 wave Ground Plane 144 Mhz 3.4dB 200W 1.4 metres	£26.25
ABC22A 2 x 5/8 wave 144 Mhz 6.5dB 2.87 metres	£38.40
ABC23 3 x 5/8 wave 144 Mhz 7.8dB 200W 4.5 metres	£65.00

CRZ/DISCONE & HANDHELD ANTENNAS

CDS180 Discone antenna 25-1300 Mhz + TX 6/2/70/23cm 4.105 mtrs	£79.95
CDS150 Discone antenna 25-1300 Mhz + TX 6/2/70/23cm 1.785 mtrs	£69.95
CH720C BNC Dualband 2M/70cms Flexi-Black 2.15/3.8dB 50W 0.45 mtrs	£14.85

ACCESSORIES

CD120 Power/SWR Meter 1.8/200 MHz 15/60/200W PL259. Reads Peak & Average Power. Low Insertion Loss	£76.65
CD270D Power/SWR Meter 140/525 MHz 15/60/200W. Peak & Average Power. Low Insertion Loss	£79.70
CD160H SWR/Power Meter 1.6-60MHz 20/200/2kw	£90.95

KENWOOD TS850S



The best selling HF Transceiver in years. Send sae for data.

If you like send large sae & £5 deposit — we will loan you the handbook!

Best supported Kenwood dealer in UK!

PICK UP A TELEPHONE FOR PRICE!

WIGAN

Greensway Arcade,
Gerrard Street,
Ashton-in-Makerfield,
Wigan, Lancs
Tel: 0942 713405

LEICESTER

DAVE FOSTER (Agent)
Telephone: 0533 608189
Latest calls 8.30pm please!

You order can be
telephoned with credit
card details &
despatched immediately!



it more interesting, let's assume that $a = 6$ and $b = 7$
 $(a + b) \times (a + b) = (6 + 7) \times (6 + 7)$
 $= (13) \times (13) = 169$ (answer i).
 Now our answer was $a^2 + 2ab + b^2$
 Putting $a = 6$ and $b = 7$:
 $a^2 + 2ab + b^2 = 6^2 + (2 \times 6 \times 7) + 7^2$
 $= 36 + 84 + 49 = 169$ (answer ii)
 Good! As (answer i) is the same as (answer ii) we were correct. Now just to check your answers, try other figures in place of a and b above.

Try another similar problem:
 Multiply $(a - b)$ by $(a + b)$.
 From rule (i) $(+a) \times (+a) = +a^2$
 From rule (ii) $(+a) \times (+b) = +ab$
 From rule (iii) $(-b) \times (+a) = -ab$
 From rule (iv) $(-b) \times (+b) = -b^2$
 Finally from rule (v) we get:

$$+a^2 + ab - ab - b^2$$

and as the addition of $+ab$ to $-ab$ is 0 (or zero) we are left with: $a^2 - b^2$.

Once again, let's check the results with some simple numbers. Assume $a = 9$ and $b = 5$.

$$(a - b) \times (a + b) = (9 - 5) \times (9 + 5) = 4 \times 14 = 56$$

Our answer was $a^2 - b^2$. Substituting the numbers:
 $a^2 - b^2 = 9^2 - 5^2 = 81 - 25 = 56$.

Using the same rules multiply $(x^3 - y^2)$ by $(x + y)$. It looks far more difficult, doesn't it? But this is **not** the case, following the rules from above.

- (i) $(+x^3) \times (+x) = +x^{(3+1)} = +x^4$
- (ii) $(+x^3) \times (+y) = +x^3y$
- (iii) $(-y^2) \times (+x) = -xy^2$
- (iv) $(-y^2) \times (+y) = -y^{2+1} = -y^3$
- (v) $x^4 + x^3y - xy^2 - y^3$ is the answer.

Let's check again. Substituting, say 4 for x and 6 for y , from the original we have:

$$(4^3 - 6^2) \times (4 + 6) = (64 - 36) \times 10 = 28 \times 10 = 280 \text{ (answer i).}$$

Now the second worked-out algebra:

$$\begin{aligned} 4^4 + (4^3 \times 6) - (4 \times 6^2) - y^3 \\ = 256 + (64 \times 6) - (4 \times 36) - 216 \\ = 256 + 384 - 144 - 216 \\ = 280 \text{ (answer ii).} \end{aligned}$$

Well once again, it looks as if algebra does work! Now that you can set and check your own questions and answers, I'll leave you without homework again this month. We'll start with transposition of formulae in the next part of this series.

Don't forget, keep practising!



0202 665524

PCB SERVICE

Printed circuit boards for *Practical Wireless* constructional projects are available from the PW PCB SERVICE. The boards are made in 1.5mm glass-fibre, and are fully tinned and drilled. All prices include postage, packing and VAT for UK orders.

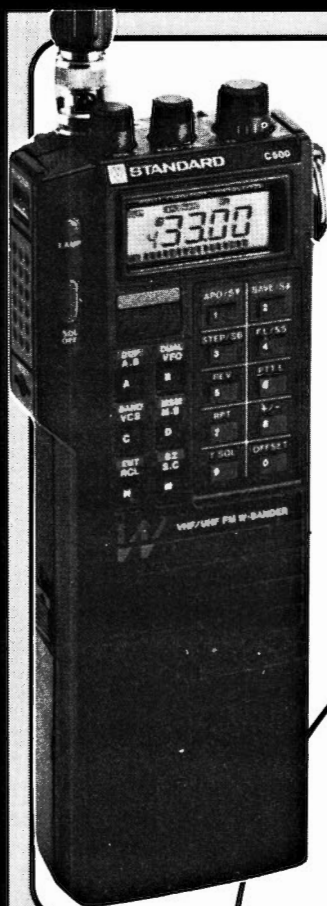
Orders and remittances should be sent to: **PW Publishing Limited, FREEPOST, Enefco House, The Quay, Poole, Dorset BH15 1PP**, marking your envelope **PCB SERVICE**. Cheques should be crossed and made payable to PW Publishing Ltd.

When ordering, please state the Article Title and Issue Date as well as the Board Number. Please print your name and address clearly in block letters, and do not send any other correspondence with your order. You may telephone your order using Access or Visa. A telephone answering machine will accept your order outside office hours.

Please allow 28 days for delivery. Always check the latest issue of PW for the current details of price and availability. Please enquire for p.c.b.s not listed here.

Board	Title of Article	Issue	Price £
1 SET	CHATTERBOX (3)	...	14.00
WR294	CHATTERBOX (RX)	SEPT 91	5.90
WR293	CHATTERBOX (TX)	AUG 91	5.70
WR292	CHATTERBOX (TX) VFO	AUG 91	4.80
WR291	ROBIN FREQ. COUNTER	AUG 91	7.25
WR290	ROBIN FREQ. COUNTER (disp)	AUG 91	5.42
WR289	MEON 4 (control)	JULY 91	4.67
WR288	MORSE MASTER	JUNE 91	4.89
WR286	MEON 4 (lin amp)	JUNE 91	5.54
WR287	MORSE KEY (speedbrush)	MAY 91	4.85
WR285	MEON-4	MAY 91	6.76
WR284	SCOPE PROBE	APRIL 91	4.87
WR283	SUDDEN RECEIVER	APRIL 91	5.75
WR282	REPEATER TONEBURST	MAR 91	4.54
WR281	HIGH VOLT REG PSU	FEB 91	5.10
WR278-80	MARLAND SET (7 BOARDS)	JAN 91	4.70
-263/4	TRANSMITTER	SEPT 90	21.95
WR272	NICAD RECYCLER	JUNE 90	7.06
WR275	LOW VOLTAGE ALARM	JUNE 90	6.49
WR273	VALVE PSU	MAY 90	7.00
WR274	RX ATTENUATOR	MAY 90	5.84
WR271	PRODUCT DETECTOR	APRIL 90	5.05
WR270	BADGER CUB	APRIL 90	5.04
WR269	GLYME	FEB 90	6.83
WR268	IRWELL (r.f. p.a.)	FEB 90	6.12
WR264	IRWELL (relay)	FEB 90	5.10
WR263	IRWELL (vfo)	JAN 90	6.12
WR267	FORTYNINER	JAN 90	6.12
WR265	TUNED ACTIVE ANTENNA	JAN 90	5.71
WR265	TUNED ACTIVE ANTENNA (psu)	JAN 90	5.71
WR262	REPEATER TIME-OUT	DEC 89	4.92
WR261	AM TX FOR 1.8MHz	NOV 89	6.63
WR260	10MHz RECEIVER	OCT 89	5.10
WR259	10MHz RECEIVER	OCT 89	5.10
WR258	10MHz RECEIVER	OCT 89	5.10
WR257	LOW BATTERY WARNING	SEPT 89	6.00
WR256	ACTIVE FILTER	AUG 89	7.10
WR254	TX CONTROL FOR MOBILE USE	JULY 89	5.18
WR253	TS940S MODIFICATION	JUNE 89	5.65
WR252	TWO TONE OSCILLATOR	MAY 89	6.65
WR251	RF OPERATED RELAY	FEB 89	3.87

Board	Title of Article	Issue	Price £
WR250	DC/AC POWER CONVERTER	JAN 89	3.29
WR249	"MARLBOROUGH" MF CONVERTER	DEC 88	4.70
WR248	"BADGER" 144MHz RECEIVER	OCT 88	9.29
WR244	PRACTICE MORSE KEY	JULY 88	3.02
WR245	STOPBAND FILTER FOR PW BLENHIEM	JUNE 88	2.96
WR243	VHF MONITOR RECEIVER (audio)	APRIL 88	2.35
WR242	"ORWELL" VARICAP TUNE OPTION	MAR 88	6.12
WR241	"ORWELL" MED. WAVE RECEIVER SET	MAR 88	9.29
WR240	"	"	"
WR239	"	"	"
WR238	"OTTER" 50MHz RECEIVER	JAN 88	7.25
WR237	HIGH STABILITY VFO (see issue)	OCT 87	"
WR236	"BLENHIEM" VHF CONVERTER	SEPT 87	7.14
WR235	MAINS ON/OFF FOR BATT RADIOS	SEPT 87	3.05
WR234	SIDE-TONE OSCILLATOR	JUNE 87	2.75
WR232	"AXE" SIGNAL TRACER	MAY 87	"
WR231	"	"	9.40
WR230	"	"	"
WR228	"BLANDFORD" RECEIVE CONVERTER	APRIL 87	9.90
WR227	"	"	"
WR226	"	"	"
WR298	"ITCHEN" LCR BRIDGE	APRIL 87	5.97
WR225	"WOODSTOCK" SW CONVERTER	MAR 87	4.18
WR219	MASTHEAD PRE-AMP PSU	FEB 87	2.55
WR218	MASTHEAD PRE-AMP FOR 144MHz	FEB 87	4.28
WR224	"WESTBURY" BASIC WOBBLATOR	JAN 87	3.57
WR214	MOD SRX-30D (AUDIO)	DEC 86	3.05
WR223	HIGH-IMP MOSFET VOLTMETER	DEC 86	2.96
WR222	"TAW" VLF CONVERTER	OCT 86	5.92
WR216	LF BANDS ACTIVE ANTENNA	NOV 86	2.44
WR220	GET STARTED LOW-COST CONVERTER	OCT 86	2.44
WR215	SIMPLE 50MHz CONVERTER	SEP 86	3.67
WR213	MOD FRG-7 (CARRIER Osc)	JUN 86	2.75
WR210	"ARUN" PARAMETRIC FILTER	MAY 86	8.27
WR211	"MEON" FILTER (SMALL)	APR 86	3.18
WR209	SIMPLE AUDIO OSCILLATOR	MAR 86	4.38
WR208	RF SPEECH PROCESSOR	MAR 86	4.18
WR207	CRYSTAL CALIBRATOR	JAN 86	2.13
WR205	RTTY/MORSE MODEM	JAN 86	5.51
WR203	SIMPLE CAPACITANCE METER	OCT 85	2.85
WR199	"MEON" 50MHz TRANSVERTER	OCT 85	6.63
WR202	ECONOMY UHF PRE-SCALER	SEP 85	3.77
WR201	ADD-ON BFO	AUG 85	2.55
WR200	LOW-COST CRYSTAL TESTER	JUL 85	2.55
WAD302	BATTERY CHARGER CONTROLLER	JUN 85	3.05
WR197	"COLNE" (Osc/Converter)	JUN 85	3.98
WR198	"COLNE" (Product Det/Audio)	MAY 85	3.98
A005	"COLNE" (VFO)	APR 85	3.16
A004	"COLNE" 3.5/114MHz RX (RF Amp)	APR 85	3.16
WAD249	MOD FRG-7 (BFO)	FEB 85	3.05
WAD280**	TRIAMBIK KEYS	FEB 85	7.25
WA002	"TEME" (RECEIVER)	JAN 85	6.68
WA001	"TEME" (VFO/DOUBLER)	DEC 84	5.29
WR178	DART (Audio / change)	DEC 83	3.05
WR177	DART (p.a.)	NOV 83	3.05
WR176	DART (v.f.o.)	NOV 83	3.05
WAD246	"DART" FOLLOW-UP	DEC 84	4.07
WR196	"TEME" 7/14MHz WRP (TX)	NOV 84	3.77
WR195	STABLE TONEBURST	NOV 84	2.65
WR189/92 Pair	BUG KEY WITH 528-BIT MEMORY	OCT 84	8.68
WR185	AUTO-NOTCH FILTER	JUN 84	6.63
WR183	TOP-BAND DF RECEIVER	APR 84	6.63
WR179	TRANSCIVER VOX UNIT	MAR 84	7.68
WR181	"MARCHWOOD" 12V 30A PSU	JUL 83	4.28
WR165 oct set	"SEVERN" 7MHz QRP TX/RX	"	15.21
WR169	"SEVERN" (TRANSMITTER)	JUL 83	6.63
WR168	"SEVERN" (CH.OVER/SIDETONE)	JUL 83	6.63
WR166	"SEVERN" (RECEIVER/AUDIO)	JUN 83	6.63
WR165	"SEVERN" (VFO)	JUN 83	5.31
WR187	RTTY TERMINAL UNIT FOR ZX81	JUN 83	7.96
WR160	LMS REGENERATIVE RECEIVER	FEB 83	5.31
WR156	REPEATER TIME-OUT ALARM	NOV 82	5.31
WR143	ATV CONVERTER	APR 82	7.25
WR144	IAMBIK KEYS	MAR 82	6.63
WR126	"EXE" 10GHz TRANSCEIVER	AUG 81	7.86
WR095	TRANSCIVER POWER SUPPLY	SEP 80	3.92
WR068	AF SPEECH PROCESSOR	JAN 80	5.31



C500

New low price of
£300*

*including
CNB III
Ni-Cad Pack
and Charger.



STANDARD®

C150

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

£199 Special Offer



C528 Dual Band Hand Held £379

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

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

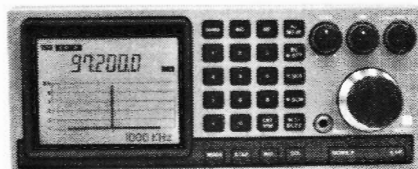
AX700E

You can see from the photograph that the AX700E has maintained Standard's reputation for innovation.

The strange looking liquid crystal display not only shows the frequency, mode and so on. It is also a panadaptor! Covers 50 to 904.995MHz with AM and FM (wide & narrow). It is powered by 13.8V dc and it measures just 180mm W x 180mm D x 75mm D. Come into the shop and see for yourself.

Send an SAE for more details.

£575



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

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

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



Normally 24hr despatch but please allow 7 days for delivery



Lee Electronics



**NORMAN
G4THJ**

West Devon's RAYNET Fleet's Growing!

Ian Harley G6BJJ, former Group Controller of the West Devon Radio Amateurs' Emergency Network, tells us the story behind their mobile control-centre, and how a 'high profile' approach is helping the group's expanding emergency communications service.

The members of the West Devon RAYNET have found that having a 'high profile' is paying dividends. The latest addition to our growing fleet of vehicles is a Mark II Ford Transit ambulance, which formerly belonged to the Plymouth branch of the St. John's Ambulance Brigade.

I had the job of Group Controller and I'd heard that the local St. John's group were about to replace their old ambulance. We've got a strong and close relationship with our St. John's branch, and we offered to buy the vehicle for conversion into a group control vehicle.

Empty Shell

When we eventually took delivery of the ambulance in December 1989, it was an empty shell with several major faults. It took some three

months of hard work to make the vehicle roadworthy again.

Once we'd done this, Ken Parker, a friend of mine who's the signals officer at the local Air Training Corps, helped me to convert the inside of the ambulance. It was quite a job, but the finished result was worth the effort!

The re-furnished control unit now seats six people. Four of the seats are around the main table and there are two others nearby. We also fitted several lockers, a sink and a cooker unit.

There's also a white 'blackboard' inside the vehicle and we managed to find room for a colour TV receiver for those periods of 'stand-by duty' when things can be very quiet!

Much thought went into the radio equipment needed for our control unit. We eventually ended up with a telescopic mast and provision for 144 and 430MHz transceivers, plus communications equipment for St. John's, British Red Cross Society and County Ambulance Service frequencies.

Overnight Exercises

Overnight exercises, or duties away from home, meant that we had to incorporate somewhere for the crews to sleep - in a limited space. Fortunately, we were able to arrange the four seats around the control desk to convert into a double bunk.

The 'Battle Bus', as it's affectionately known

The West Devon RAYNET team pause for the picture, but they're ready for action!



West Devon RAYNET's former ambulance, now converted to a versatile mobile control centre.



There are RAYNET groups all over the UK, why don't you offer to help? This long established service not only provides an excellent communications 'back up', it also promotes Amateur Radio in a very positive way. *Practical Wireless* will support RAYNET in every possible way, why don't you?

RAYNET Mobile



The West Devon RAYNET Fleet.

to the group, had its first outing during September 1990. The occasion was a two-day operation when the vehicle, based at Plymouth Hoe, became the base for RAYNET operations assisting with a 53km cycle 'fun ride' in aid of three local charities.

The control unit was soon in action again, on October 10, during the traditional Tavistock 'Goose Fair'. On this occasion the 'Battle Bus' became the communications liaison point for the Tavistock Town Council, Devon & Cornwall Police, St. John's Ambulance Brigade, Devon County Ambulance Service and several local bus services!

Quick Response

For the shorter exercises or mobile escort duties that our RAYNET group has been asked to do, we've found that the 'quick response' vehicle offers the best solution. The vehicle is manoeuvrable when escorting runners or cyclists and with their distinctive marking and flashing overhead beacons, provide useful front or rear 'markers' for road events.

Over The Top?

Some of you may think that this approach is 'over the top', but we are trying to provide as near a professional a service as possible, and it's often said that 'looks are everything'! If you look the part, not only do you feel the part, but others, (user services) respect you more for what you do and stand for.

To this end we have developed a group



The West Devon RAYNET's 'Battle Bus' in action and manned by Peter Kerton G0EOZ who is now Group Controller.

standard of dress to be adopted at 'call-outs', very much along the lines being discussed by other RAYNET groups. Our own 'rig of the day' consists of dark trousers, with either the group's navy-blue sweat-shirt, a T-shirt, or woollen pullover with the yellow and black RAYNET logo on the front.

British Weather

The standard RAYNET 'tabard', or for the more usual type of British weather, reversible black and yellow fluorescent coat with reflective badges, has proved to be practical and hard wearing.

So, when you've just completed an overnight stint on RAYNET duty, in the cramped confines of the usual family car - just think what an old ambulance could do for your RAYNET team's efficiency, health and moral!

PW

Here's a message for all RAYNET Groups - The PW 'Newsdesk' is waiting for your news!



ICOM - YAESU - KENWOOD - STANDARD

£ INSTRUCTIONS £ WEALTH WARNING

Before purchasing a radio please read **FULL INSTRUCTIONS** to prevent financial damage.

- (1) Decide which product/transceiver/kit/receiver/scanner or accessory you want.
- (2) Telephone or write to all the other advertisers in this magazine and check stock availability, **PRICE**, delivery and service backup.
- (3) When you have called all the other dealers, telephone **RAYCOM** for a price to suit your budget, or the best Part exchange deal.

Alternatively, call **RAYCOM** first, and save even more money!!

RAYCOM has been around since 1979 and we are one of the few companies who supply **ALL MAJOR MAKES** of equipment. We have more agencies than anyone in the business.

We are a large professional Radio communications company, the largest in the West Midlands. We operate nationally and internationally, so why not place a local call and find out why?

We accept all major credit cards (inc. American Express) and offer hire purchase terms, lease and interest free credit on certain items. **RAYCOM** is a licensed credit broker. We can find the right purchase scheme for you. We also take cash!!

Please call: Ray, Kim, Chris, John 1, 2 or 3, Keith, Belinda, Sue, Ian, Paul, Tony, Trevor, Chrisie, Ken, Ollie, or Jackie. We all want to help. What can we do for you?

Please call 021 552 0073 Amateur Sales. 0930-1730 hrs

After hours advice/sales/service 0836 771500 (until 2100 hrs daily)

WE WORK EIGHT DAYS A WEEK.

G1KZH G6KZH G4KZH G0KXT G8VIQ G8AEO

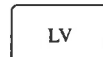
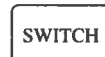
WE ALSO PURCHASE USED EQUIPMENT DEAD OR ALIVE!

A large SAE brings you our largest used list and information pack

PROFESSIONAL SALES ON 021 544 6767

OR 0836 282228 OR 0836 340888

**International House, 963 Wolverhampton Road,
Oldbury, West Midlands B69 4RJ**



OPTO ELECTRONICS - BUTTERNUT - MFJ - RAMSEY KITS - AOR - ALINCO - NAVICO
(UK DISTRIBUTORS)

MOTOROLA - SONY - FAIRMATE - YUPITERU - RACAL VODAFONE - CELNET - TET - UNIDEN

MARCONI - JRC - RADIO-TEC - LOWE - AZDEN - JAYBEAM - BEARCAT
(UK DISTRIBUTORS)

The PW-50V Vertical Antenna For 50MHz

Construction

Now that many of the restrictions on 50MHz have been removed, Fred Judd G2BCX begins a short series on suitable antennas for the band, by describing a 'homebase' vertical.

The Department of Trade and Industry now permit the use of vertically polarised antennas on the 50MHz band for both main station, and mobile operation. This article (Part 1) provides construction details of a relatively simple design for main station use.

I'm also going to provide references for alternatives, and most importantly, explain how the performance of vertical antennas at these frequencies are affected by their physical height above the ground.

The quarter-wave vertical antenna with a ground-plane will be considered separately, for reasons that will become apparent. I shall cover the special requirements for mobile antennas for these frequencies, including a design for home construction, in Part 2.

Critical Height

The physical height of all 'vertical' antennas above ground becomes a critical factor, particularly in view of the various 'modes of propagation' that are possible. Some understanding of what follows is important, and incidentally, the same factors apply equally to vertical antennas for the 21, 24, 27(CB) and 28MHz bands.

With all vertical antennas, radiation in the horizontal plane is omni-directional. That means the radiation pattern is circular, regardless of the frequency of operation or height of the antenna above ground.

With multiple element antennas, e.g. Yagi type beams, a multiple element cubical quad, etc., radiation in the horizontal plane will be either bi-, uni- or multi-directional. This will depend on configuration, but is virtually unaffected by frequency of operation, or height above ground.

Vertical Plane

Vertical radiation occurs at angles considered vertical with respect to ground. The pattern of radiation depends very much on the height of the antenna above ground. This incidentally, applies to ALL types of antenna except the 'ground plane'.

Radiation patterns, even at these high frequencies are difficult, if not impossible to measure physically. However, computers can be used to illustrate on screen or by print-out, both vertical and horizontal radiation patterns for virtually any type of antenna. This can be at any frequency of operation and at any height above ground.

Vertical Half-wave

The computer produced vertical radiation patterns, shown in Fig. 1, apply to a vertical antenna above ground. The distances, to the centre of the antenna are, $\lambda/2$ and $3\lambda/4$ at the frequency of operation.

These patterns are based on perfect ground conductivity. They are derived by multiplying one lobe, of what would be the 'free-space' pattern of the antenna, by the ground reflection factor that applies at each wave angle for the selected height. As the height above ground is increased, so the number of vertical lobes increases.

The variations in magnitude in vertical radiation for other types of 50MHz vertical antennas, at relatively low height with respect to ground, are much the same as those illustrated. In other words, the lobes increase

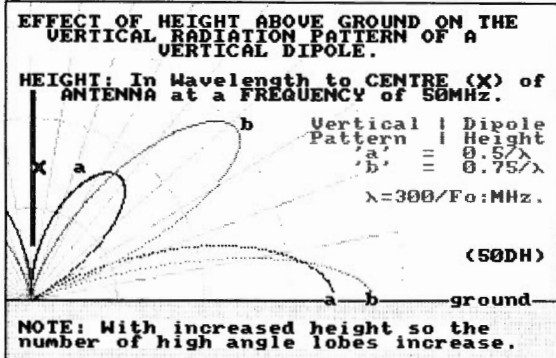


Fig. 1.

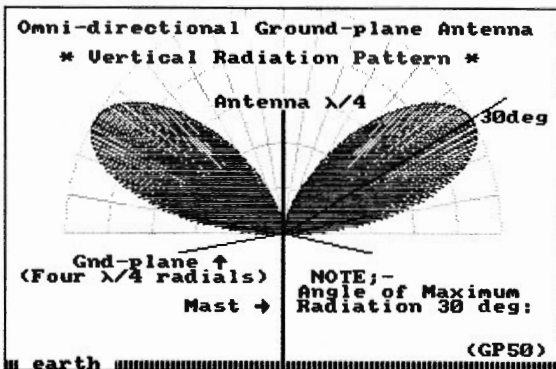


Fig. 2.

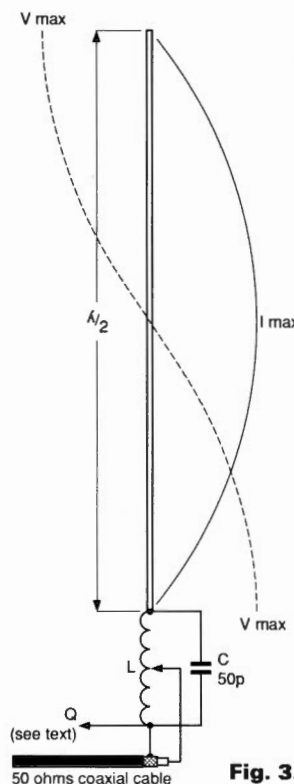


Fig. 3.

Fig. 1: Vertical radiation patterns for a half-wave antenna at 50MHz. Height above ground as given (see notes in text).

Fig. 2: Vertical radiation pattern of a 'ground plane' antenna with the quarter-wave radiator and radials.

Fig. 3: Circuit, voltage and current distribution of the PW-50V end-fed half-wave antenna for 50MHz.

Fig. 4: Photo of PW-50V mounted on a mast. Note: The sleeve joint, visible near the base of the radiating section, is not required and was only used for original development work.



in number as the height of the antenna above ground is increased.

Note: The patterns exist all around the antenna. You need height to obtain a 'free-space' symmetrical vertical radiation from a half-wave dipole operating at 50MHz. The antenna would have to be at least 5λ above ground, which is a height of 30m!

Antenna Choice

One of the simplest antennas for any frequency is the $\lambda/4$ ground plane. The antenna consists of a single vertical radiating element and a minimum of four horizontal radials, each at least a quarter-wave in length ($\lambda/4$ at 50MHz is approximately 1.5m).

The magnitude of radiation from the antenna as a whole, is NOT equal to that of a $\lambda/2$ dipole as many people think. The vertical radiation will have a lobe with an angle of about 30° , as shown in Fig. 2.

This angle is not a good proposition for short, ground path working. It should be more effective for Sporadic-E, intense E and even F region working, if the 'critical frequency' is high enough.

A more efficient single element vertical antenna is the $\lambda/2$ antenna. This could be centre fed from a

coaxial, or better still via a balanced line. However, close proximity of the cable to the antenna could distort the otherwise omni-directional radiation pattern, and make it difficult to obtain a low v.s.w.r.

A better, and much more convenient arrangement is an end-fed half-wave (monopole). It's this type of antenna for which constructional and performance details are described here.

If specific directivity gain is required, there are of course the active and parasitic arrays, such as the Yagi type beam antenna, the quad, and 'end-fed' systems that can be operated vertically.

The Design

The theoretical circuit is illustrated in Fig. 3. The diagram also shows the voltage and current distribution on the half-wave radiating element.

The antenna is voltage-fed from the high impedance matching action of the tuned circuit. **Note:** The line marked 'Q' may be used to prevent r.f. currents flowing back down the feed cable, if this is less than 5m long. I'll explain the theory behind this technique later.

The radiating element is made from aluminium tubing 2.74m long, and 15-20mm in diameter. I recommend a wall thickness of 1 or 1.5mm, but it isn't critical.

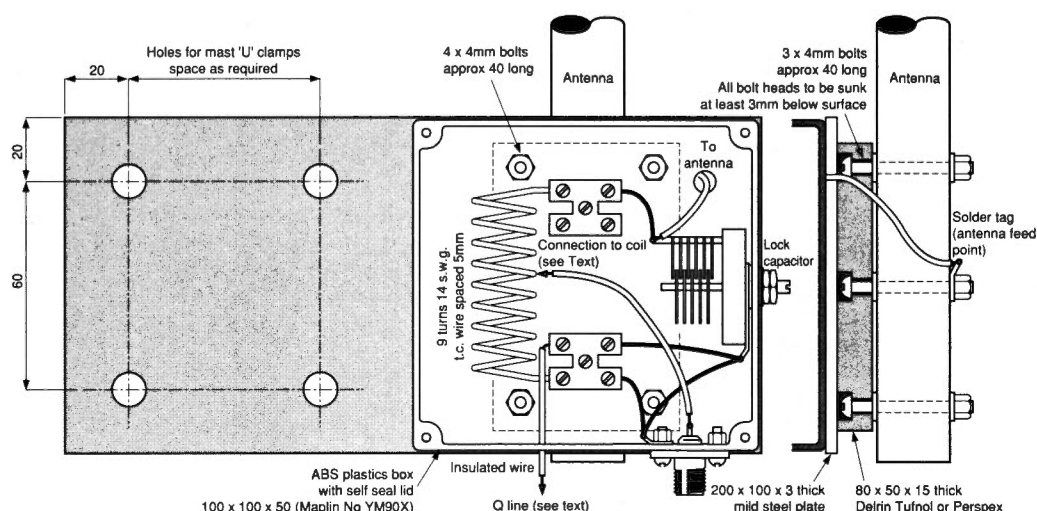
The length is a little less than the electrical half-wavelength of 3m, owing to the inductance (L) at the base. The whole system is assembled on a flat mild steel or aluminium plate. It may be mast-mounted with 'U' clamps or through bolts, as in Fig. 4, which shows part of the radiating element.

The plastics box also shown in Fig. 4, houses the inductance and tuning capacitor and is mounted on one side of the plate. The solid insulating block that supports the radiating element is on the reverse side. Both items are secured to the plate with four through bolts.

Further Details

The inductance, the electrical connectors and the tuning capacitor (C) are assembled as shown in Fig. 5. The wire from the coaxial cable inner conductor, to the inductance may be a short length of insulated wire with a small 'crocodile' clip attached, so that the

Fig. 5: Dimensions and assembly details of the antenna base, showing the tuning components box mounted on metal mounting plate. The coil is wound with an internal diameter of 20mm.



correct tap to the coil can be found experimentally (more later).

The completed assembly is shown in **Fig. 6**. I recommend that you use only the specified wire gauge, number of turns, diameter and turns spacing for (L).

Next job in line is the antenna mounting block, **Fig. 5**, this must be a good quality insulator. The bolts that hold the radiating element to the block are countersunk, so as not come into contact with the mounting plate. They are secured to the block with nuts, as shown, before it is attached to the metal plate (C).

The housing box with its internal components and the antenna mounting block, is attached to the metal plate with four 'through' bolts marked (a). The insulated lead marked (X) from the top of the capacitor, is taken through a hole near the top of the box and also goes through the metal plate as in **Fig. 7**.

This lead is long enough to reach either of the antenna securing bolts, and is terminated with a large solder tag. Details of the assembly is shown in **Fig. 5**. Finally, the radiating element is attached to the three countersunk bolts that go through the holes in the insulating block in **Fig. 5**.

Antenna Adjustments

To start the adjustments, mount the whole antenna so that it is vertical, and with the base at least 1.25m above ground. It may be clamped to a temporary short mast, a pair of steps, or suspended from a rope between two points.

If possible, you should use the length of coaxial cable that will be used when the antenna is finally sited. This cable may be (M)UR43 or (M)UR67.

Should the cable length be 5m or less, then the line marked 'Q' will be required. This is indicated in **Fig. 5**, and is connected to the earthy part of the circuit, i.e. the screen braid. The line may be any thin insulated wire 1.5m long.

The line is taken through a hole at the bottom of the box with its full length taped, at intervals, along the outer cover of the coaxial cable. The 'Q' line will cancel any r.f. currents that may flow along the screen if the cable run is short. If the coaxial cable is longer than 5m, the 'Q' line won't be necessary.

An s.w.r. meter may be used at the transceiver end of the coaxial line. First, clip the lead from the coaxial inner to the centre of the inductance and set the capacitor about half mesh. The lead to the radiating element is connected to one of the bolts, as in **Fig. 5**.

Tuning Up

Adjust tuning capacitor for the lowest s.w.r. at 51MHz. If you cannot achieve a 1:1 ratio, try another tapping point on the coil and adjust it again.

It may be necessary to try several combinations. When you have achieved this ratio, check the s.w.r. at 50 and 52MHz. The readings should not exceed 1.25:1. The prototype measurement results are shown in **Fig. 8**.

Next, you should solder the 'tap' lead on to the inductance, and then fit a lock cap on the tuning capacitor. If the specified (Maplin) plastics box is used, the lid is watertight when screwed on. Fill all the holes in the box with a sealant to prevent water getting in.

The vertical radiation pattern for an optimum height of $3\lambda/4$ (4.5m) to the centre of the antenna. The diagram, **Fig. 9**, gives more details.

This antenna provides a strong very low angle lobe for maximum ground and tropospheric path distance, as well as F region propagation when the 'critical

Practical Wireless, September 1991

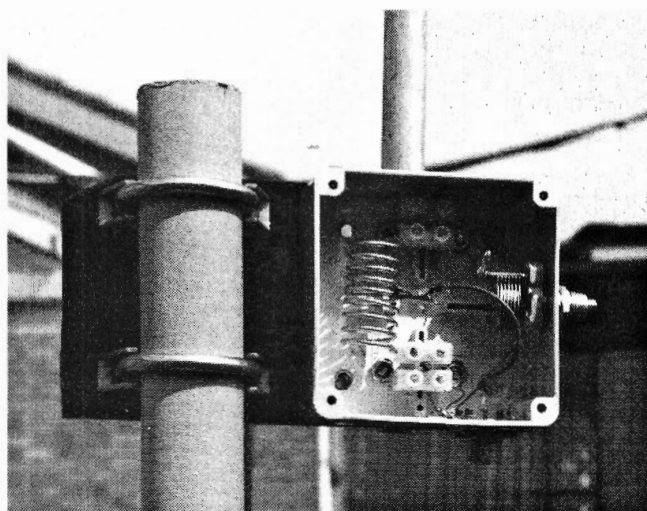


Fig. 6: Photo of the completed assembly as in Fig. 5.

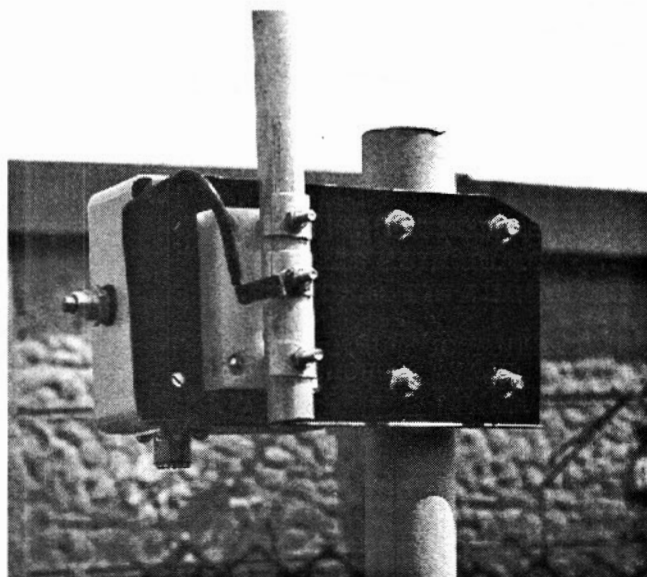


Fig. 7: Showing the antenna mounting, on metal plate. NOTE: The lead through from housing box to centre fixing bolt of antenna element.

frequency' is very high. The stronger, but higher angle lobe may serve for fairly long distance propagation via sporadic-E and/or an intensely ionised E region.

Final Note: If the use of power higher than 10W is to be used, then the tuning capacitor must have wider spaced vanes. If this is the case, a slightly larger housing box may be necessary. A quarter-wave stub match, with the stub horizontal could be used as an alternative.

Acknowledgement

I'm indebted to Waters & Stanton Electronics of Hockley, Essex for the loan of a Yaesu FT-690II 50MHz transceiver, along with a Yaesu FL6020 10W linear amplifier. All tests on the antenna prototype were carried out using the above equipment and a Bird 'Thru-line' power meter.

CONTINUED OVER

Fig. 8: Measured s.w.r./bandwidth of the PW-50V half-wave 50MHz antenna.

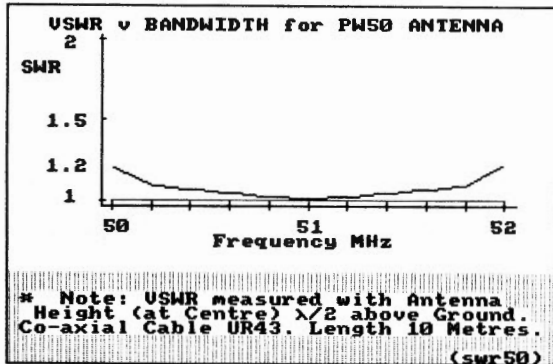
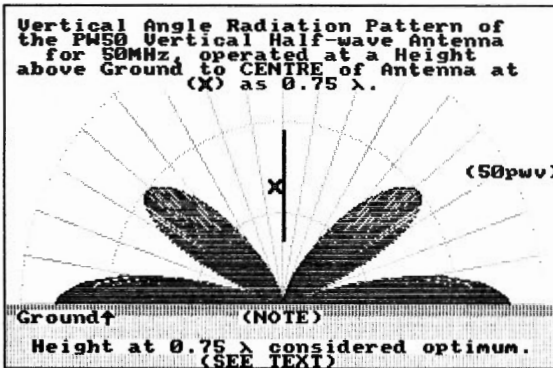


Fig. 9: Full vertical radiation pattern of the PW-50V at optimum height to CENTRE at 0.75λ above ground (4.5m) see text.



Further Reading

The ARRL Antenna Handbook, ARRL.

All About Vertical Antennas, Orr and Cowan.

Beam Antennas Handbook, Orr and Cowan.

Wires & Waves PW Publishing. Some designs in this selection of reprints from *PW*, could be re-dimensioned for 50MHz operation.

The RB10 (28MHz Ring-base Antenna *PW* July 1990) antenna dimensions could be scaled for 50MHz operation, or any other band of interest.

SANDPIPER COMMUNICATIONS ARE SUPPLYING A KIT OF PARTS TO MAKE THE PW-50V, SEE THEIR ADVERTISEMENT IN THIS ISSUE ON PAGE 66.

Next time I'll be looking at ideas for antennas to use on 50MHz mobile operation.

RADIO DIARY. • PRACTICAL WIRELESS & SHORT WAVE MAGAZINE IN ATTENDANCE

August 11: The 32nd Annual Derby Mobile rally will take place this year at a new venue, Littleover Community School, Rykneld Road, Littleover, Derby. The school is situated on the A5250 road, just north of its junction with the A38. Talk-in on 144MHz. All the usual attractions, including the famous monster Junk Sale. **Martin Shardlow G3SJJ, QTHR.** Tel: (0332) 556875.

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

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

August 25: Galashiels & District ARS have their Open Day at the Focus Centre, Livingstone Place, Galashiels. All the usual activities, Bring & Buy, traders, club stalls, refreshments, etc. **John Campbell G6MAMB, 9 Brunton Park, Bowden, Melrose TD6 0SZ.** Tel: (0835) 22686.

August 26: Huntingdonshire ARS will be holding their annual rally and Junk Sale at The Medway Centre, Conyegear Road, Huntingdon, Cambridgeshire. Doors open 10am, rally closes at 4pm. Trade stands, Bring & Buy, components, junk and refreshments. Car boot pitches available or a second hall on standby in case of bad weather. Talk-in on S22 and GB30V (433.125). **O. C. Leech G7DIU, 4 Rydal Close, Huntingdon, Cambs PE18 6UF.** Tel: (0480) 431333.

September 1: Preston ARS will be holding their 24th Annual Rally at the University of Lancaster, as in previous years. **Godfrey Lancefield G30WQ, QTHR.** Tel: (0772) 53810.

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

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

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

***September 8:** The Scottish amateur radio convention will be held at The Northern College of Education, Gardyne Road, Dundee. Parking available for 1000 cars. **Alan Glashan G64JCM, 35a Lochinver Crescent, Dundee DD2 4UA.**

***September 15:** The BARTG Rally will be held at Sandown Exhibition Centre, Esher, Surrey. Located close to London, it is a 10-minute drive from the M25 (junction 10) and is not far from the M3, M4 and M40. Free parking for over 5000 cars. On-site catering, hot and cold meals, snack, beverages and licensed bar. Doors open 10.30am to 5pm, admission £1 for adults and OAPs, with children under 14 free if accompanied by an adult. Talk-in on S22. **Peter Nicol G8VXY, 38 Mitten Avenue, Rubery Rednal, Birmingham B45 0JB.** Tel: 021-453 2676.

September 15: The East of England radio rally will be held in the ICI Building, The East of England Showground, Dundle Road, Peterborough. Admission is £1, doors open 10.30am (10am for the disabled). There's a main traders' hall with bar and catering, a traders' marquee with Bring & Buy, separate outside area with flea market plus radio and electronic car boot sale. Various other attractions - Which-Kit Car Show, Caravan Club Rally, Banger Racing, Golf Driving Range & Go-Karts, Nene Park & Nene Valley Railway, acres of free parking. **Nigel G1ARV.** Tel: (0733) 78685.

***September 15:** The Bristol Radio Rally will be held at Brunel's Great Train Shed, Temple Meads, Bristol. **D. Farr** (0272) 839855.

***September 22:** The Norfolk Amateur Radio, Computer & Electronics Rally is being held in Swardesdon,

about 8km south of Norwich. The rally itself will be held within the grounds of G3LDI. All normal trade stands, along with a Bring & Buy, food and drink, etc. Talk-in will be available on S21 and the gates are open between 1000 and 1600. **G4ONF.** Tel: (0603) 747782.

***September 22:** The Centre of England Amateur Radio Rally will be held at the British Motorcycle Museum, Bickenhill, near the NEC Birmingham (junction 6 M42). Doors open 10.30am, admission £1, OAPs 50p, children free. Over 60 trade stands in three large exhibition halls, Bring & Buy, talk-in on S22, bar and restaurant available, ample free parking, concessionary rates to visit museum. **Frank Martin G4UMF.** Tel: (0952) 598173.

***September 28/29:** The RSGB HF Convention will be held at the Penguin Hotel, Daventry, Northants. Featuring two lecture streams in parallel sessions throughout Sunday, which should offer something interesting for everyone. There will be the usual bookstalls, club stands, c.w. pile up competition, raffle and refreshments. Reduced rate for overnight accommodation. For more details, contact **Bob Whelan G3PJT, 36 Green End, Comberton, Cambridge CB3 7DY.** Tel: (0223) 263137.

September 29: The Harlow & District ARS will be holding their 33rd Amateur Radio and Electronics Rally at the Harlow Sportscentre. The Main Hall will provide a large and varied selection of traders, both old and new to the event. The studio upstairs will also have some traders along with the Bring & Buy, there will also be the usual special interest groups. Adjacent to the centre there's parking for 1000 cars. On-site reserved disabled parking is available, with full facilities inside for the disabled. Catering and licensed lounge bar. Talk-in on S22 and SU22 by G6UT. Entry is £1, with children under 14 and OAPs half price. **Liz G0MDL.** Tel: (0277) 364742 evenings and weekends only.

***October 6:** Great Lumley Amateur Radio & Electronics Society will be holding their rally in the Community Centre, Great Lumley, nr. Chester-le-Street, Co. Durham. Doors open 11am, 10.30am for the disabled. Trade stands, Bring & Buy (£200 value limit), refreshments available. Talk-in on S22 by G6GLR. Admission 50p, children under 14 (accompanied by an adult) free. **Barry Overton G1JDP.** Tel: 091-388 5936.

October 6: Blackwood Amateur radio rally will be held at Oakdale Community College, Blackwood, Gwent NP2 0DT. **Brian Matthews G6JWF, 25 Manor Park, Newbridge, Gwent NP1 4RS.** Tel: (0495) 243858.

October 13: The Armagh & Dungannon District ARC will be held in Gosford House Hotel, Markethill, Co. Armagh. Doors open at 12pm. Usual trade stands plus other events. For further information please contact **Mr T. Hall G10MSJ, 1 Hamiltonsbawn Road, Armagh City BT60 1DL.** Tel: (0861) 523454.

October 13: South Devon RC have their seventh annual Ham radio & computer exhibition and rally at Hill Head Camp, Hill Head, Brixham, Devon. Doors open 10am. Trade stands, AR supplies, kits, computer sales, raffle, refreshments, unlimited free parking and overnight camping. Car boot sale, bigger and better this year. Outside attractions. Talk-in on S22 + SU22 by G7FDC and G4SSB. Special event station GB4CPU. Details from **G6ZRM.** Tel: (0803) 522216 or (0836) 577220.

***October 25 & 26:** The Leicester Amateur Radio Show will again be held at the Granby Halls, Leicester.

***November 2/3:** The 5th North Wales Radio & Electronics Show will be held at the Aberconwy Conference Centre, Llandudno. The rally opens at 10am with the entrance fee at £1, OAPs 50p and children under 14 free of charge. **Siggy Fergusson G60DYH.** Tel: (0492) 532459 (day). **Tony Wilkinson G64PVU.** Tel: (0492) 49121 (evenings).

November 10: Barnsley & District ARC will be holding their first Radio Rally at Willowgarth Senior High School, Brierley Road, Grimethorpe, Barnsley, South Yorkshire. Details and trade enquiries from **Ernie G4LUE, 8 Hild Avenue, Cudworth, Barnsley, South Yorkshire S72 8RN.** Tel: (0226) 716339 (6-9pm).

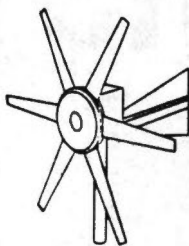
***November 17:** Bridgend rally. Further details from **Charles Sedgebeer, 50 Minfrwd Road, Pencoed, Mid Glamorgan, South Wales CF35 6SD.**

November 24: The West Manchester Radio Club's 'Winter Rally'. All details as August Rally. Admission £1. **Dave G1100** on (0204) 24104 evenings only.

***December 15:** The Centre of England Amateur Radio Rally will be held at the British Motorcycle Museum, Bickenhill, near the NEC Birmingham (junction 6 M42). Doors open 10.30am, admission £1, OAPs 50p, children free. Over 60 trade stands in three large exhibition halls, Bring & Buy, talk-in on S22, bar and restaurant available, ample free parking, concessionary rates to visit museum. **Frank Martin G4UMF.** Tel: (0952) 598173.

RUTLAND WINDCHARGERS

- ★ Free power from the wind
 - ★ Independent battery charging systems
 - ★ Charging commences at 4mph (2m/s)
 - ★ Charges 4Amps at 22mph (10m/s)
 - ★ Ideal for remote telecoms, automatic feeders and lighting barns, sheds, etc.
- For free brochure contact:



**Marlec Eng Co Ltd, Unit K, Cavendish Ctyd
Sallow Road, Corby, Northants NN17 1DZ
Tel: 0536 201588 Fax: 0536 400211**

SIG GENS. Marconi TF995A2. 1.5 to 220 Mc/s AM/FM tested with book, £115. TF995B2 200Kc to 220Mc/s AM/FM £135. **URM-28** 10/420 Mc/s AM compact unit tested with book, for 115v £95 **MORSE KEYS.** Army gneral purpose adjustable £8.50. **BRIDGE SET CT530** Lab type CRL bridge with low imp adaptor Mil version of B221 tested with inst book & leads. £95. **ARC-44 AIRBORNE T/Rx** 24 to 51.9 Mc/s in 100 Kc chan with control box, Dynamotor unit, circa etc reqs 26v DC at 5 amps £38 also with 8ft whip and matching unit. £54. **AIRCRAFT RADIO STR.37** 116 to 135.95 Mc/s in 50Kc chan reqs 26v DC fitted Vol & Sq controls tested on Rx with connec. £65 Tech H/Bk £9.50 **WATTMETER LOW POWER.** 50 ohm absorbtion type W/M meter ind with 3 ranges to 1.5 watts FSD to 1 GHz in neat Mill Patt case size 5x5x4" £45 **VARIACS SMALL** 240v I/P output 0 to 250-v at 2 amp with knob for int mt tested. £25.00 **CABLE.** 6 core screened nom 5mm OSD new 15 Mts. £7.50 **DIPOLE AE.** for radio Alt nom 420 Mc/s with mt brk with S0259 Sk new £4.50 ea 2 for £8 **DISH AE.** plain ali 18" dia with 1.6 GHz dipole £13.50 **BOMB SIGHT.** RAF type T.4 Gyro Stab sighting head in fitted case. £75 **RX R234 HF 2/27** Megs in 4' rack SSB/DSB/FSK Write for spec £195.00.

Above prices include carr & VAT. Goods ex equipment unless stated new.

2 x 22p stamps for List 46/1

A.H. SUPPLIES

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

S.E.M.

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

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

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

S.E.M. TRANZMATCH MKIII. The only Aerial Matcher with UNBALANCED and TRUE BALANCED OUTPUTS. 1kW 1.8-30MHz, £185.00. Built-in EZITUNE (see below), £55.00. Built-in Dummy Load, £10.90.

EZITUNE. Allows you to TUNE UP on receive instead of transmit. FANTASTIC CONVENIENCE. Stops QRM. Boxed unit, £59.50. P.C.B. and fitting instructions to fit in any ATU, £55.00.

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

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

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

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

VERY WIDE BAND PRE-AMPLIFIERS. 3-500MHz. Excellent performance. 1.5dB Noise figure. Bomb proof overload figures. £45.00 or straight through when OFF, £65.00 ex stock.

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

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

TWO-METRE LINEAR/PRE-AMP. Sentinel 40: 14x power gain, e.g. 3W-40W (ideal FT290 and Handhelds), £125.00. Sentinel 60: 6x power, e.g. 10W in, 60W out, £135.00. Sentinel 100: 10 x 100W out, £165.00.

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

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

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

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

12 MONTHS COMPLETE GUARANTEE INCLUDING TRANSISTORS

Prices include VAT and delivery. C.W.O. or phone your CREDITCARD NO. Ring or write for further data or catalogue. Orders or information requests can be put on our Ansaphone at cheap rate times.

G6XBH GIRAS G8UUS

Visit your Local Emporium

Large selection of New/Used Equipment on Show

AGENTS FOR:

YAESU • AZDEN • ICOM • KENWOOD • ALINCO
ACCESSORIES

Welz Range, Adonis, Mics, Mutek Pre-Amps

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

★ ERA Microreader & BPS4 Filter, SEM Products ★

★ Full range of Scanning Receivers ★

AERIALS, Tonna, Full Range of Mobile Ants, Jaybeam

BRING YOUR S/H EQUIPMENT IN FOR SALE

JUST GIVE US A RING

Radio Amateur Supplies

3 Farndon Green, Wollaton Park, Nottingham NG8 1DU

Off Ring Rd., between A52 (Derby Road) & A609 (Ilkeston Road)

Monday: CLOSED Tuesday-Saturday: 10.00 a.m. to 5.00 p.m.

Tel: 0602 280267

J. BIRKETT

RADIO COMPONENT SUPPLIERS

R.F. POWER TRANSISTOR. Similar to MRF 455 with Data @ £9.95.
LARGE 3" DIA. CERAMIC SWITCH 1 Pole 3 Way 2 Bank Plus 1 Pole
7 Way 3 Bank. Will switch at least 1 KW @ £7.95.
WIDE SPACED VARIABLE CAPACITOR 150pf @ £3.50.
MITSUBISHI M57710A RF POWER MODULE Centre Frequency 156 MHz
12 Volt 28 Watt with Data @ £17.95.
VOLTAGE REGULATORS MC78T12CK 12 Volt 3 amp @ £1.65, LM39308 8 Volt 1 Amp @ 50p.
POWER TRANSISTORS 2n3055 @ 5 for £2.00, BDY90 @ 5 for £2.00.
REDIFON FM TRANSCEIVER Mid-band Boot Mounting No Accessories @ £8.95 (P & P £4.00)
MOTOROLA UHF FM DASH MOUNTING TRANSCEIVER @ £25.00 (P & P £4.00).
UHF BURNDENT HAND HELD FM TRANSCEIVER 428 MHz No Batteries. With Conversion Details @ £28.00 (P & P £2.00).
TRANSMITTING FIXED CAPACITORS 680pf 6Kv @ £1.00, 6 for £5.00.
C804 TYPE AIR SPACED VARIABLE CAPACITORS 25pf @ £2.50, 50pf @ £2.50
WIDE SPACED VARIABLE 150pf @ £3.50.
TANTALUM BEAD CAPACITORS 10v.w. 4.7uf or 15uf. Both 15 for £1.00.
PHILLIPS RF MODULES 40 to 440 MHz BGY84 @ £5.95, BGY85 @ £4.95.
FERRITE RODS 1/4" dia x 4" long @ 50p, Special 1/4" rod with Short Wave Winding 8" long @ £1.30.
GaAs FETS 24GHz Red Spot @ £2.50, 18GHz Black Spot @ £1.85, out of spec devices 18GHz @ 3 for £1.99.
UNIJUNCTION TRANSISTORS. Like TIS43 @ 25p each.
RF POWER FETS MRF136 @ £9.95, BLF44 @ £9.95.
LOW POWER FETS 2N3819 @ 25p, J304 @ 20p, BFW11 @ 30p, BFW12 @ 30p.
DISC CERAMICS 0.1uf 63v.w. @ 200 for £1.95.

ACCESS and BARCLAY CARDS ACCEPTED. P&P 60p under £5, over free, unless otherwise stated.
C.M. HOWES KITS Available by post and for callers



25 The Strait
Lincoln, Tel. 520787
LN2 1JF
Partners J.H.Birkett
J.L.Birkett

NEW! 40M QRP TX/RX KIT

COMPLETE TO THE LAST NUT!



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

★ CASE AND ALL HARDWARE INCLUDED ★

DTR7 — KIT £87.50 READY BUILT £140.00

Send SAE for Brochure or call Alan, G4DWW on 0602 382509

Post, packing & insurance £3.00

LAKE ELECTRONICS

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



ALL VALVES & TRANSISTORS

Call or Phone for a
most courteous
quotation

081-743 0899

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

COLOMOR ELECTRONICS LTD

170 Goldhawk Road, London W12 8HJ

Fax 081-749 3934.

Getting Started The Practical Way

"O world invisible, we view thee"
Francis Thompson : *The Kingdom of God.*

Electricity is invisible. We can't tell if a power cable is 'live' by simply looking at it. But if electrical energy is converted into some other form, we can see, and sometimes measure, the result.

If I connected a 12V bulb to a 6V supply, it would light up. If I then increased the supply to 9V, it would glow more brightly. Although this would provide an indication of the difference between the two voltages, it would be a crude way to measure voltage.

In electronics, there are instruments designed to show and measure electrical quantities. The most commonly used instruments are based upon the use of a meter. To start off this time, we're going to look at workings and simple applications of the moving coil meter, which is a very popular instrument in amateur radio equipment.

Voltage And Current

What do we want to see, when we try to 'look at' electricity? Obviously, the basic things are how much we have and how much of it is flowing. These two basic units are **voltage** and **current**.

What are these units? To make life simpler at this stage, we are only going to consider **direct current** (d.c.) electrical flow. This is the term used when the electrical 'flow' is in only one direction through a conductor.

Many of you will already know that electricity involves the movement of electrons. But if you want to know more about electron theory, you'll have to read a physics text book, and not this article!

It will do, for the time being, for us to know that **current** is the quantity of electricity passing through a given point. Its unit of measurement is the **Ampere** (A). In fact, one ampere is measured as 6 250 000 000 000 000 000 electrons passing a point in one second!

Large Unit

Although the **ampere** (A) is often used in domestic power applications, it's a large unit for use in electronics. More frequently we use the **milliampere** (mA) which is a **thousandth** of an ampere and the **microampere** (μ A) which is a **millionth** of an ampere.

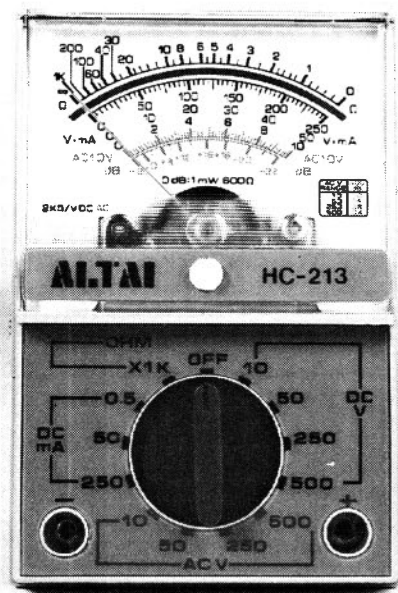
It is usually said that **voltage** is a measurement of the **electro-motive force** (e.m.f.) which is sometimes called the potential. This is a measurement of the 'electrical pressure' present in the circuit. It's called the 'potential' because the electric charge present is capable of doing some work, but in fact, may be doing no work, a little work or a lot of work!

To put it simply, we might say that the voltage represents what the electricity present could do, and the current tells what it is doing. The amount of work the voltage does (hence the amount of current that flows) in a circuit depends upon the **resistance** present in the circuit. Perhaps you've noticed that we've come full circle back to **Ohms Law** once again!

Practical Wireless, September 1991

Theory

A typical budget-priced multimeter based on a moving coil movement.



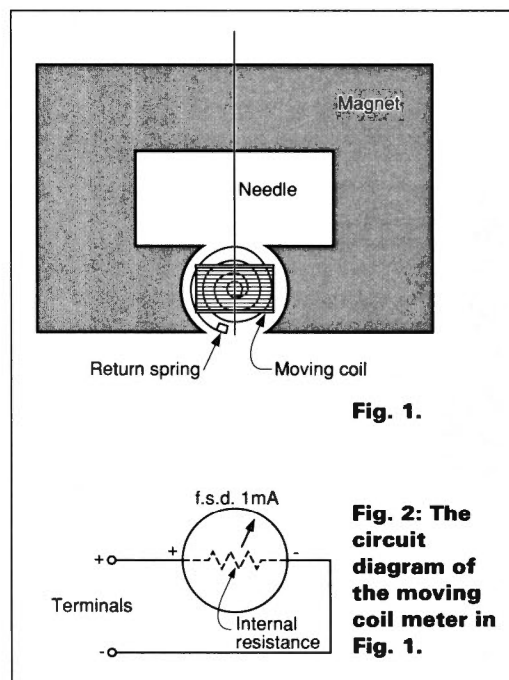
Analogue Meters

If you look at the front panels of most amateur radio equipment, you'll probably have seen a type of analogue meter. These meters are the clear dials with moving needles that everyone seems to associate with radio equipment, because they seem to go together like peaches and cream!

You may also have noticed equipment fitted with digital meters. These indicating devices are the indicators with actual digits or numbers, forming the display.

Analogue meters can be divided into two main types, the **moving coil** and **moving iron** meter. Generally speaking, in amateur radio work we use moving coil meters. The moving iron meters are simpler and cheaper, but less accurate in use.

Although we're only going to look at moving coil



This month the Rev. George Dobbs G3RJV, takes a look at meters and their use in measuring. George likes to use the occasional quotation to start a new theme, and as usual he's managed to find one to fit the job!

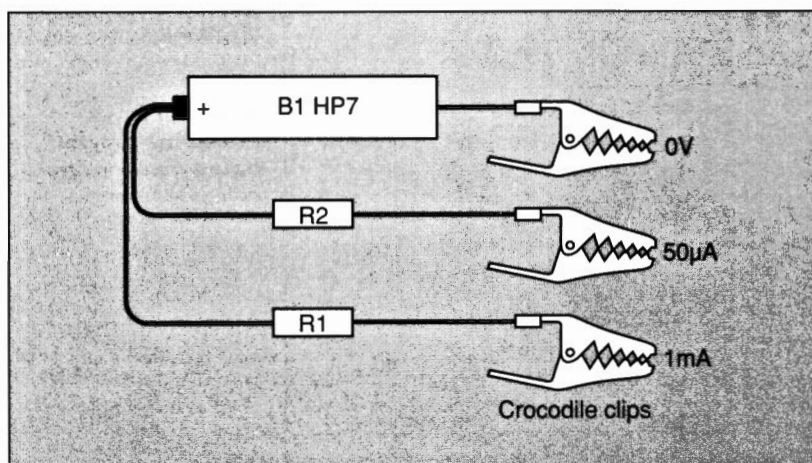


Fig. 3: A simple meter tester, capable of checking most meters available on the surplus market.

instruments, the moving iron type is useful. Most of the indicating devices for fuel gauges and temperature displays on car dashboards are usually moving iron, although nowadays the l.c.d. and l.e.d. is beginning to become popular.

Physics Lessons

Perhaps you will remember from your school or college physics lessons, wrapping some wire around a compass and then passing a current through the wire.

The **current flow** sets up a **magnetic field** in the wire and deflects the compass needle. That action is roughly how a moving iron meter works.

The moving coil meter actually works in the reverse way to the compass action. The magnet (a compass needle is a small magnet) is fixed, **and it's the coil which is allowed to move**. When the current passes through the coil, the magnetic field in the coil reacts to the magnet field in the fixed magnet and the coil deflects.

The illustration, **Fig. 1**, shows how this is done in the moving coil meter. A coil is held on a pivot in the centre of a fixed magnet. When a current passes through the coil, a magnetic field is set up in the coil. The interaction between the magnetic field in the coil and in the fixed magnet, causes the coil to rotate on its pivot. An indicating pointer (or needle) is attached to the coil which shows the amount of rotation (or deflection).

Right Hand Drive

Usually, the construction of the meter is arranged



so that deflection of the coil (and the needle) is to the right. As the current passing through the coil increases, the needle moves more towards the right, indicating the increase in current flow.

The coil has a return spring so that when current no longer passes through the coil, the coil (and needle) returns to its original position. This is 'zero' on the meter, and it indicates when no current is passing through the instrument. Many moving coil meters can be accurately adjusted. It's usual to have a 'set zero adjustment' screw to move the needle at the bottom end of the scale, when no current is passing.

Moving Coil Meters

The diagram, **Fig. 2**, shows the electrical circuit diagram of a moving coil meter. It's represented by a circle with a pointer. This illustration also shows two other important factors about a moving coil meter which you shouldn't ignore!

You can see from **Fig. 2**, that the meter has fixed positive (+) and negative (-) terminals and therefore must be connected the right way round in a circuit. The direction the current flows controls the polarity of the magnetic field. Connect a moving coil meter the wrong way, and it will try to read backwards!

The diagram also shows the internal resistance of the meter. The coil itself has an electrical resistance. This factor, although small, is added to the total resistance of any circuit into which the meter is connected.

Sometimes the internal resistance is small enough to ignore. But we shall see later, that it becomes important when we wish to make accurate measurements with a moving coil meter. The internal resistance of a moving coil meter may appear in small print on the face of the meter, and it should certainly be mentioned in the maker's specification for the meter.

The main specification given for a moving coil meter is the **full scale deflection (f.s.d.)**. This is a statement of the amount of current required to make the needle indicate to the highest mark on the scale.

If a meter is marked as '1mA f.s.d.', it requires 1mA to make the pointer deflect fully across the whole of the marked scale. Information about the f.s.d. of a meter is vital, because the user needs to know how much current the meter will indicate.

The Multimeter

Moving coil meters measure current, but they can be contrived to measure voltage and resistance. This is commonly seen in the analogue **multimeter**.

The multimeter is a meter equipped with several switched ranges marked in current, voltage and resistance. The maximum deflection permitted by each particular switch position, is clearly marked. The user can then immediately 'read' the values from a calibrated scale, which is directly below the 'needle' pointer.

A Meter Checker

Moving coil meters are expensive. It's not unknown for a constructor, wishing to add a meter to the front panel of a project, to find it could cost more than the rest of the project added together! Many constructors use surplus meters, bought cheaply at radio rallies or sales and modify them for their own particular use.

Very often, meters bought cheaply can be excellent instruments. But they can also have odd

LOWE ELECTRONICS LTD

TM-741E Ultra-compact Expandable Mobile Dual Bander (with VHF Airband Receive)



The new TM-741E is designed to meet the demands of the mobile radio amateur. The revolutionary design provides dual band operation on 144MHz and 430MHz with optional modules for a third band on 1200MHz, 50MHz or 28MHz.

Main features: Ultra-compact design with easy-to-install detachable front panel. High power output (144MHz: 50W; 430MHz: 35W) with 3 position power switch. Multi-function scan, Automatic Band Change, Auto Power-Off, etc.

You really need to see this mobile rig to fully appreciate the thought Kenwood have put into the design. So please drop in at your local Lowe Centre and our staff will be delighted to show it to you. Full colour brochure from Matlock.

BARRY (S WALES)

251 Holton Road, Barry, S Glamorgan
Tel: 0446 721304 Fax: 0446 735662
Managed by Ceri GW0JCB

BOURNEMOUTH

27 Gillam Road, Northbourne, Bournemouth
Tel: 0202 577760 Fax: 0202 593882
Managed by Colin G3XAS
(Closed on Mondays at present)

BRISTOL

Unit 6, Ferry Steps Ind Estate, Bristol
Tel: 0272 771770 Fax: 0272 772500
Managed by Tony G4CYE

CAMBRIDGE

162 High Street, Chesterton, Cambridge
Tel: 0223 311230 Fax: 0223 315099
Managed by Tony G4NBS

CUMBERNAULD

Cumbernauld Airport Foyer, Cumbernauld
Tel: 0236 721004 Fax: 0236 738322
Managed by Sim GM3SAN

DARLINGTON

56 North Road, Darlington
Tel: 0325 486121 Fax: 0325 381485
Managed by Hank G3ASM
(Closed on Mondays at present)

LONDON (HEATHROW)

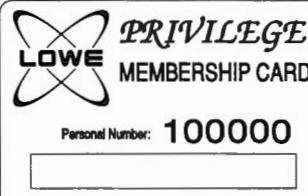
6 Cherwell Close, Langley, Slough, Berks
Tel: 0753 545255 Fax: 0753 545277
Managed by Tom G6PZZ

LONDON (MIDDLESEX)

223/225 Field End Road, Eastcote, Middx
Tel: 081-429 3256 Fax: 081 868 2676
Managed by Fred G4RJS

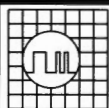
MATLOCK

Chesterfield Road, Matlock DE4 5LE
Tel: 0629 580800 Fax: 0629 580020
Contact Beryl Goulding



FOR DETAILS, TELEPHONE 0629 580800

Buy locally - Trust technically



SUREDATA

AMSTRAD REPAIR AND SECOND USER SALES

We are offering this month PC 1512 Colour Monitors at £145 inclusive of next day delivery and VAT, so get your order in quickly as this item is in great demand.

We also sell bits of systems, keyboards, drives, printers etc, so phone us for a quote and get the benefit of our knowledge of Amstrad PCs and PCWs and stock of parts. We are always on the look out for broken or part systems and will make you an offer over the phone, we can even arrange collection.

If your AMSTRAD PC or PCW has gone wrong, a quick phone call to us should give you an idea of cost and our rapid turn round on items received for repair usually follows (subject to spares being available).

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

73 John G3TLU.

SUREDATA
TELEPHONE: 081-902 5218

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

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

SCANNER AND CB SALE



ACE ELECTRONICS



73 Highgate, Kendal, Cumbria

SCANNERS	MIDLAND	CB
PRO-2022.....£189.95	77099.....£49.95	
PRO-2006.....£249.95	77104.....£69.95	
PRO-35.....£159.95	771165.....£69.95	
PRO-38.....£179.95	77805.....£99.95	

Tel: (0539) 725728

Phone for latest prices,
more information & special offers.
Add £5 carriage on orders under £100.
Large range of antennas and accessories.

PACKET for Spectrum NO TNC.

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

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

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

J. & P. ELECTRONICS LTD.



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



SRW KILOWATT LOUDENBOOMER

400 Watts output on all 9 H.F. bands. Internal mains P.S.U. Total Weight 6Kg. Only 14" wide, 10" deep and 5" high. Fits on MFI desk! Matches FT747 etc. Drive with any 50 to 100 watt output rig. RF or hardwire switching. The power gain of a beam, on all the bands. At least 2 's' points! NOW ONLY £499 + VAT. For more details contact Steve Webb, G3TPW at:

S.R.W. COMMUNICATIONS Ltd.,
Astrid House, The Green, Swinton, MALTON,
North Yorkshire YO17 0SY Tel: (0653) 697513.



Practical Wireless, September 1991

Having difficulties with RAE MATHS?

PWT Electronics have produced a 3 hour video on "RAE Maths ONLY" to help with the RAE Exam. ALSO: **RAE COURSE** on video. Contains nearly all you need to know for the Radio Amateurs Examination.

Both videos £25.00 each incl. p&p. VHS only.

PWT Electronics, 21 Elmbank, Backfastleigh, Devon TQ11 0DN

DEWSBURY ELECTRONICS

SUPA-TUTA

To teach you morse quickly
£69.95



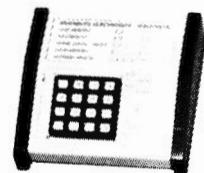
SUPA-TUTA PLUS

To teach you morse with keyer
£84.95



SUPA-KEYA

The most friendly keyer around
£99.95



VIBROPLEX



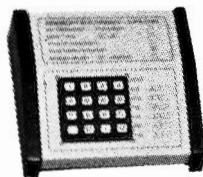
Original Deluxe
£96.88



Iambic Deluxe
£90.89

SUPA-TUNA

Makes selecting frequencies easier
£67.50



VAT included on all items at 17.5%
Post & Packing £2.50

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

DEWSBURY ELECTRONICS,
176 LOWER HIGH STREET,
STOURBRIDGE,
WEST MIDLANDS DY8 1TG
Tel: (0384) 390063/371228
Fax: (0384) 371228

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



Talent Computers

- Computer Engineers
- Custom Computer Builders
- Computer Repairs
- Computer Upgrades

PARTS SPECIAL OFFERS

XT-4380E 380Mb ESDI Disk Drive	£375.00
32Mb RLL Disk Drive 3.5"	£100.00
20Mb MFM Disk Drive 3.5"	£85.00
3.5" 720/1.44 Floppy Disk Drives	£50.00
286 16MHz Mother Board 0/Ram	£80.00
386sx 16MHz Mother Board 0 Ram	£220.00
VGA Video Cards from	£65.00
Case with power supplies from	£80.00

COMPUTER SYSTEMS

TC286C	80286	CPU running at 16MHz.....	£780.00
TC386SC	80386sx	CPU running at 16MHz.....	£920.00
TRC386C	80386	CPU running at 25MHz.....	£1040.00

All the above come with:-

- 52Mb Hard disk drives
- 14" VGA Colour Monitor .28 Pitch
- 102 Key Keyboard
- Desktop case
- 5.25" 1.2Mb or 3.5: 1.44Mb floppy disk drive
- 1 Year Warranty.

PRICES EXCLUDE VAT.

For all your computer requirements
call Paul on (0533) 376909

Talent Computers

32 Mountsorrel Lane, Rothley,
Leicestershire LE7 7PR
Tel: (0533) 376909



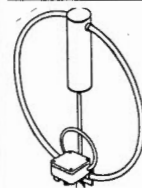
SOLID BRITISH ENGINEERING
British Workmanship at its Best.

We have recently acquired the licence for the production and marketing of all aluminium products previously manufactured by Western Electronics Ltd.

The principal products are the ALUMAST high strength lightweight aluminium tower, the DX-PENETRATOR series of Tribander beams and vertical antennas e.g.

DX-6V 6 Band Vertical Antenna£175.00 inc VAT
Built to the traditional high quality of the existing CAP.CO products, the addition of these items will expand considerably the range of antennas available from a British manufacturer.

AVAILABLE SHORTLY:
DX-PENETRATOR DX-2602-Element 6-Band Quad
DX-PENETRATOR DX-4604-Element 6-Band Quad



BUILD YOUR OWN LOOP - Complete Kits
AMA3 Kit covers 10-20m£308.15 + £10.00 p&p
AMA5 Kit covers 30-80m£398.85 + £15.00 p&p
(Individual parts available.)
AMA-3 10-20m£339.59 + £15.00 p&p
AMA-5 30-80m£463.30 + £20.00 p&p
(Only two aerials needed for continuous coverage from 3.5 to 30MHz.)
COST OF TWO AERIALS£716.85 + £30.00 p&p
COST OF TWO KITS ONLY£621.05 + £25.00 p&p
This offer includes control box, clamps and cables.

NOW AVAILABLE
AMA-6 covers 12-40m£377.90 + £15.00 p&p
AMA-4 covers 80-160m£541.70 + £30.00 p&p
Build your own ATU for£75.55
CAP-25S£20.60
CAP-25T£25.10
Roller Coast£29.85 + £4.50 p&p

AS-305 AERIAL SWITCHING UNIT 1-160MHz, 3000 Watts PEP£72.50 + £5.00 p&p.
AS-305R AERIAL SWITCHING UNIT Remote version of above (See PW April 81 for review)£82.50 + £5.00 p&p.
SPC-100 ATU This small budget priced ATU designed with low power operator and short wave listener in mind L&C Match covering an impedance range of 8:1 Max power: 300 watts PEP£85.80 + £5.00 p&p.

For more information on any of our products including high power ATUs, Loop Antennas for commercial use, send an SAE to:

CAP.CO ELECTRONICS LTD, Unit 28, Penley Ind. Est., Penley, Wrexham, Clwyd LL13 0LQ.
Tel: (0948) 74717 Fax: (0948) 74728



things marked on their scales and what is worse, they may have no indication of the f.s.d. of the movement.

One of my amateur radio friends has an excellent, and large meter indicating the output power of his transmitter which is marked in 'revolutions per minute'! It's usually a simple task to remark a meter scale, but for it to be useful, the f.s.d. must be known.

Meter Tester

The circuit in **Fig. 3**, shows a simple piece of test equipment which I've used for many years with unknown surplus meters. The gadget does two very useful jobs. It checks that the meter movement is good, and also gives an indication of the f.s.d. of the meter. Sometimes surplus meters can be defective, the commonest fault being sticky movements, and this little tester will show up such a defect.

It's a simple project, and only requires a battery with two fixed resistors arranged to pass two set currents though the meter being tested. Usually, surplus meters have a f.s.d. of no less than 50µA, and more often the maximum will be in the region of 100µA, 200µA or even as high as 1 to 5mA. The meter checker project will show the f.s.d. value accurately enough to be useful.

Internal Resistance

The simple meter tester ignores the internal resistance of the movement, but still provides reasonably accurate results. If a meter is connected (the right way round) between the negative lead (-ve) and the 1mA lead, the 1.5V battery and the 1.5kΩ resistor will cause about 1mA to flow through the meter.

You can work it out using Ohm's Law, remembering that 1mA is one thousandth of an ampere. A meter connected between the negative lead and the 50µA lead, will cause (approximately) 50µA to flow. This is less accurate (try it with Ohm's Law) but I have used the preferred values of resistor.

Building The Project

This month's little project is very simple to build.

It only needs three parts, three wires and a container. For the wires, I used small clip leads which come complete with crocodile clips.

Power is supplied by the HP7 battery and the two resistors just fit inside a plastics 35mm film canister. Some reliable way must be found to identify the three leads. You could do this by having colour coded wires, or marking them at the point where they leave the canister.

The wires are soldered directly onto the battery. The most difficult connection, will be the negative lead which is soldered to the zinc casing of the cell. To make the connection, scrape the end of the case with a knife edge until it shines (or use a small file) and then tin a small portion of it with solder, before adding the lead.

Do not use a NiCad rechargeable battery for this tester. It is unsafe to solder leads directly to NiCad cells (they also provide less than 1.5V).

Using The Tester

Using the tester is as simple as the circuit. The negative lead of the tester is connected to the negative (-) terminal of the unknown meter. Then the 50µA lead is connected.

You should always connect the 50µA lead **first** to the positive (+) terminal. This will show how far 50µA moves the needle. If the indication is low, try the 1mA lead. Then by observing whether there's either full scale deflection, or part deflection, a useful approximation of the meter's f.s.d. can be found.

That's the lot for this month, I hope you're finding the series useful. Don't forget to write and let me know if you've got any problems or suggestions to make.

Shopping List:

HP7 battery

R1 1.5kΩ

R2 27kΩ

2 clip leads and a 35mm plastics film canister.

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

Wireless-Line on 0898 654632

Up-dated every Friday

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

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

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

Calls charged at 34p off-peak. 45p at all other times. News & Information prepared by the staff of PW Publishing Ltd, Enefco House, The Quay, Poole, Dorset BH15 1PP.

Write out your advertisement in **BLOCK CAPITALS** - up to a maximum of 30 words plus 12 words for your address - and send it together with your payment of £2.35, and corner flash or subscriber dispatch label to: **Donna Vincent, PW Bargain Basement, Enefco House, The Quay, Poole, Dorset BH15 1PP.**

Subscribers must include the dispatch label bearing their address and subscription number to qualify for their free advert.

Advertisements from traders, apparent traders or for equipment which it is illegal to possess, use or which cannot be licensed in the UK, will not be accepted.

No responsibility will be taken for errors.

BARGAIN BASEMENT

WANTED 85kHz i.f. transformers for valve circuit (Electronique or Denco), Denco dual purpose coils range 3 red and yellow, PW Gillingham receiver frequency display. Tony. Tel: (0905) 641759.

WANTED Eddystone 830 or 888A. For sale Eddystone 640, £80. Tel: (0226) 288718.

FOR SALE FT-101B with c.w. filter, outboard v.f.o. FV101B and matching speaker. Suitable for mains or 12V d.c. operation. In good working order, £250. Les Hickingbotham G3HZG. Tel: (0527) 27914.

FOR SALE Amstrad PC1640 DD, mono display complete with instruction manuals, DMP3000 printer, Wordstar, Supercalc, Accountmaster. All in original boxes and all in very good working order. Bargain at only £400. Mick Watkins G0NBB, Canterbury, Kent. Tel: (0227) 738248 anytime.

FOR SALE Yaesu FT-901 DM h.f. TX/RX v.g.c., mic and manual, original box, £525 to include postage, or will swap for Icom IC-551 or w.h.y. 6m. Andy GD7JQI, Isle of Man. Tel: (0624) 626080.

FOR SALE Marine band receiver type 46T 150kHz-4MHz in 4 switched bands + a.t.u., switched filter battery 12V. Steel case 325x220x155mm approx. Good condition, £45 carriage extra. Seon Smyth, 'De Porres', 67 East Princes Street, Helensburgh, Scotland G84 7DG.

FOR SALE Phillips PM3215 50MHz c.r.o., £185. Crotech 20MHz c.r.o., £125. Tel: (0543) 579818.

FOR SALE Yaesu FR-50B. Hallicrafters 5 x 110 receivers. Both working order, £100 the pair or will split. **Wanted** Yaesu FRG-7700 or Trio 1000 reasonably priced. Terry, 28 Spring Close, Leicester LE2 8UQ. Tel: (0533) 839188.

WANTED TNC KPC2 or equivalent with WEFAX receive. IBM/PC or Macintosh software. Tel: (0227) 464157 (Canterbury).

FOR SALE Commodore C64 + p.s.u.

+ micropatch RTTY-c.w.-ASCII reader. Commodore data recorder. Alphacom printer and p.s.u. Homebrew 9in audio visual monitor. All necessary handbooks etc., £150. Would **Exchange** for static RTTY-c.w. etc. Decoder. Tel: (0843) 593546 (Thanet).

EXCHANGE Tornado 1000 28MHz linear 5 x EL519 valves, variable power out, g.w.o., for 934MHz delta one or PRO-2004 or w.h.y. Ian G7HXI. Tel: (0692) 580201 day-time or (0692) 581663 evenings.

WANTED Telefunken Opus Studio 5650 tuner-amplifier and mains eliminator for Ever Ready Sky Prince h.t. 90V l.t. 1.5V. Mr H. McCallion, 8 Strathard Close, Coleraine, Co. Londonderry, Northern Ireland BT51 3ES.

FOR SALE Offers are invited for: **Telequipment** D34 scope 15MHz dual-beam portable. Racal Dana frequency counter 120MHz portable. Two Weir s/mode compact 13.8V power supplies each 10A, v.h.f./u.h.f. rotator and controller. Bob G4KSG. Tel: 021-705 1089.

FOR SALE Offers invited for: 28uH roller coaster and 1500pF capacitor plus bits for a.t.u. 48k spectrum, tapes, filters for c.w. RTTY, 5in TV. Datong speech processor. Howes CSL5 audio filter. Bob G4KSG. Tel: 021-705 1089.

FOR SALE Ex-army telescopic aerial complete with kit, £40. Spectrum 200 26-28MHz vertical antenna (never used), £45. Datong D70 Morse tutor, £45. HRT Morse tapes with instructions, £5. Mr J. A. Newman G0FVC, 161 Junction Road, Archway, London N19 5PZ. Tel: 071-281 1464.

FOR SALE Dragon 32 fitted RS232. G4BMK software for packet, RTTY, AMTOR and c.w., plus assorted other software and books. Technical unit for RTTY, AMTOR, and c.w., £75 o.n.o. Tim Stanley G4TXK. Tel: (0532) 873628 (Leeds) after 6pm.

FOR SALE Major M360 28-29.7MHz u.s.b., l.s.b., f.m., a.m. Spectrum Communication conversion

DTI permit, good condition, £70. Barry Marsh G1JOA, QTHR. Tel: (0442) 65324 (Herts).

WANTED 1 set of YU3UMV frame store printed circuit boards with LOK board and building instructions to complete half finished project or consider a completed unit with LOK board and paperwork. Barry G1CIE. Tel: (0202) 678684 evenings after 7pm.

FOR SALE Amstrad CB901. CB 27/81, offers please. G2DRT. Tel: (0494) 814240 or QTHR.

FOR SALE Microwave modules MMT1296/144 23cm transverter. 144MHz i.f. works well with FT-290 etc., or with any 10W rig with supplied attenuator, £140 o.n.o. Colin G6MXL, 45a Lulworth Avenue, Hamworthy, Poole, Dorset BH15 4DH. Tel: (0202) 665284.

FOR SALE Alinco DR-112 144MHz mobile transceiver, complete with magnetic mount antenna, unused, £220 o.n.o. Kevin. Tel: (0535) 655343 evenings.

FOR SALE 20m Versatower, £250 o.n.o., not set in concrete. Reasonable condition, buyer removes from QTH in Dorset. Ring for further details. Tel: (0258) 817336.

FOR SALE Icom R7000, £550, C64+1541 (NEW), £180. CP-1 unit send/receive Morse RTTY etc., £100. Icom R70, £300. Log periodic, £35. Satellite Yagi antenna, £35. 200 kilo rotator, £30. Maplin decode, £40. Gordon Dutton, 40 Grafton Road, Harwich, Essex CO12 3BD.

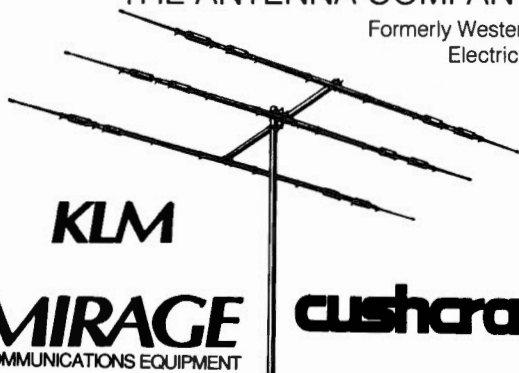
FOR SALE Reftec 934MHz CB transceiver, £120 o.n.o., buyer must collect. Dave G0MZT. Tel: (0934) 510877 (Weston-Super-Mare).

WANTED Trio 9R-59DS or JR500S in **Exchange** for Realistic PRO-38 hand-held 10 channel scanner also exchange Durst colour photographic enlarger for portable short wave receiver (ICF 7600D or similar). Tel: Dewsbury (0924) 464167.

**Readers' Ads
September 1991 Coupon**

THE ANTENNA COMPANY

Formerly Western
Electrical



KLM

MIRAGE
COMMUNICATIONS EQUIPMENT

cushcraft

Jaybeam, MET and Tonna

DOWN EAST MICROWAVE

23 and 13cm Loop Yagis,
Pre-amp, Rx/Tx and
Linear Amp Kits

Rotators, coaxial, connectors and much more.

Please send a large SAE for full price list and catalogues.



**Specialist
Antenna
Systems Ltd.**

Radfords Fields
Maesbury Road,
Oswestry
Shropshire
SY10 8EZ

Tel: (0691) 653221
Fax: (0691) 670282

ENTERPRISE RADIO APPLICATIONS LTD.

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

MK.II MICROREADER



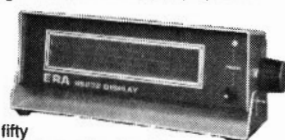
The easiest way to receive CW & RTTY without all the fuss of computers. Just plug into your speaker socket and switch on. The Microreader automatically decodes both amateur and commercial stations displaying the received text on its own LCD screen. The Microreader also incorporates a MORSE TUTOR facility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

BP34 AUDIO FILTER

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

RS232 DISPLAY

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



BP12 DATA FILTER



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

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



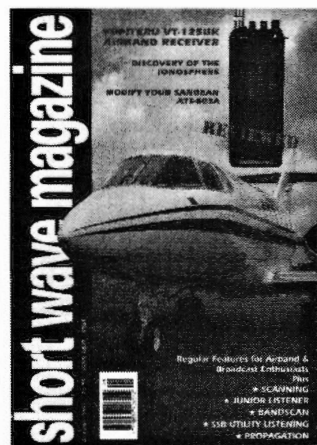
ALL LISTENERS SHOULD READ SHORT WAVE MAGAZINE

THE AUGUST ISSUE ON SALE NOW

★ **REVIEWED** - Yupiteru VT-125UK
Airband Receiver.

Yupiteru MVT-7000 Hand-held Scanner

★ **MODIFY** - Sangean ATS-803A Receiver



★ **The Discovery
of the
Ionosphere**
★ **DXing
in Ecuador**
★ **PLUS -**

ALL THE REGULAR
FEATURES: JUNIOR
LISTENER, AIRBAND,
INFO IN ORBIT,
DECODE, SSB
UTILITY LISTENING,
PROPAGATION,
SATELLITE TV, ETC.

1991-1992 HENRY'S ALL NEW COLOUR CATALOGUE

PLUS Test Instruments,
Security, and Component
Supplement

WITH
£90.00
WORTH OF PURCHASE VOUCHERS
FREE and £2.00 OFF first purchase

To obtain
Henry's new catalogue
send envelope, minimum size C4 (12 3/4" x 9"),
self addressed with £2.65 stamps affixed OR
send £4 ch/po with request for catalogue,
(Export £6) to the address below.

Also available for callers.
Trade/Industry/Education.
Attach notepaper request for FREE
catalogue with trade price lists.

AROUND
350 PAGES
COVERING
■ Components
■ Fans ■ Relays
■ Public address
■ Security ■ CCTV
■ Test instruments
■ Speakers ■ Disco
■ Power supplies
■ In car ■ Cables
■ Inter comms
■ CB ■ Tools etc.
■ Accessories
for TV-Video
■ Telephones,
Computer, Audio etc.

HENRY'S OPEN 6 DAYS
A WEEK
404 EDGWARE ROAD, LONDON, W2 1ED
Sales: 071-258 1831 Fax: 071-724 0322
Audio and Electronics Specialists

Taking Another Look At Fuses

Although it's annoying when a fuse blows, the device is only doing its job. Ken Green G1NAK thinks we take fuses for granted, and that it's about time we had another look, to see what they can and cannot do.

Fuses are certainly the best known and the simplest defensive tools in the engineering armoury. They're accepted generally as being extremely unreliable, but few either know why or look into the reasons.

It's best to tread warily when things seem simple. This rule certainly applies to fuses. Designed as the 'weak link in the chain', they're used to break an electrical circuit when the current increase to a certain value.

Fuses provide a visual check when you're seeking a break in a circuit. Their failure to work effectively, has more to do with what happens after a fuse has ruptured, than with the fusing process itself.

Voltage Limitations

As I've already said, fuses are used to protect circuits from the heating effect of excessive currents. As such, they are connected in series with the circuit they protect. So why does voltage enter the argument?

The answer is that a fuse is simply a form of thermal switch. When the switch opens, (when the fuse 'blows') the e.m.f. of the source appears across its terminals. It then becomes very important whether that e.m.f. is 5, 50 or 5000 volts.

A fuse must have a small thermal capacity so it heats rapidly, and ruptures before damage is caused. In other words, a fuse needs to be made from a fine

gauge wire. However, fine wires tend to have high resistance, which causes a voltage drop. This generates heat and encourages the fuse to blow!

The real difficulty is because the fuse wire has to melt. As the wire vapourises it can generate an ionised and conducting media. This can keep the current flowing by means of an arc. When the arc is quenched, the vapour cools, depositing copper over the surrounding area and can re-establish a conducting pathway.

A fuse in a 5V circuit is not very likely to sustain an arc. However, the same fuse employed in a high-voltage circuit is far more likely to form an arc.

Another important factor, is whether the circuit involved is resistive or reactive. An inductive circuit, even at 5V, can generate enough voltage to set up an arc. On the other hand, a capacitive circuit can supply a very large current for a short time, helping an arc to become established.

Choosing A Fuse

It is important to understand the markings on a fuse. When you replace a fuse, you must use an exact equivalent or substitute.

Speed of operation is an important factor. Digital circuits, for example, are extremely intolerant of overloads and any protective fuse must rupture very quickly to be effective.

In some circuits there's a need for a fuse to 'wait and see'. Before it interrupts a circuit, the fuse has to 'decide' whether there's a fault condition or an acceptable transient.

A typical example, is the in-rush of current occurring when equipment is switched on. This happens because large value reservoir capacitors are virtual short circuits until they're charged up.

In-rush current is a reality, and was a menace before modern fuses became available. I can remember throwing the main switch in a television studio, only to be greeted by a heavy 'crump'. I then had to replace 15 sets of mains fuses!

In-rush current probably accounts for many of the so called 'tired fuse failures'. Nowadays, equipment likely to suffer this problem, is fitted with time delay or anti-surge fuses.

Making And Testing

Fuses are made and tested under standards laid down by the Underwriters Laboratories Inc. (UL) in the USA, the Canadian Standards Association (CSA) and the International Electromechanical Commission (IEC) in Europe and Asia (there are others). All fuses are batch tested and must be marked as follows:

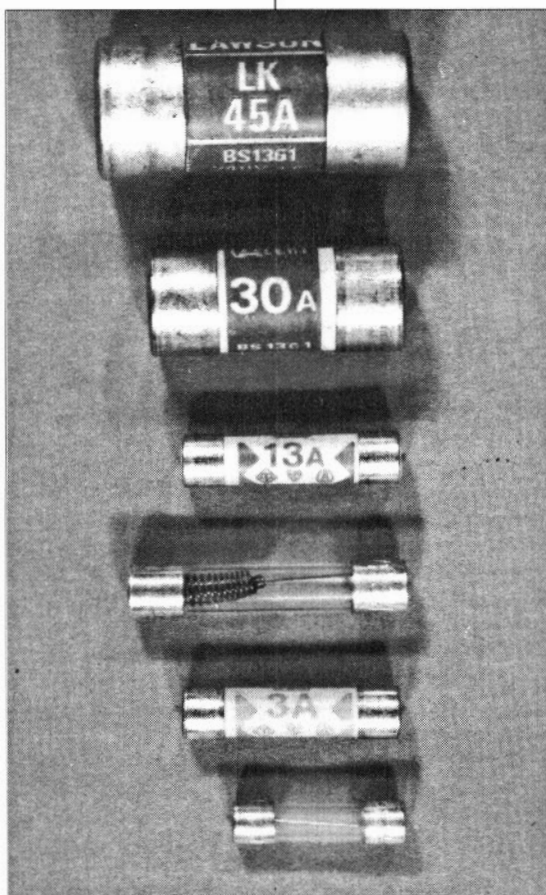
Super Quick Acting (FF)

These are specified for protecting semiconductors and other equipment where the 'quick-acting' F-fuses are too slow.

Quick-acting (F)

These are for use in circuits not subject to surges or transients and don't produce high short-circuit currents. Some are provided with a filler to help

Fuses are available in a wide range of sizes and ratings. Ken Green reminds us it's important to get the right fuse for the job.





Communications Centre (Photo Acoustics Ltd.)

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

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

P
H
O
T
O

A
C
O
U
S
T
I
C
S



TS-850S Greatness Re-asserted

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

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

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

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

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

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

TS-850S...

£1,325.00 inc VAT

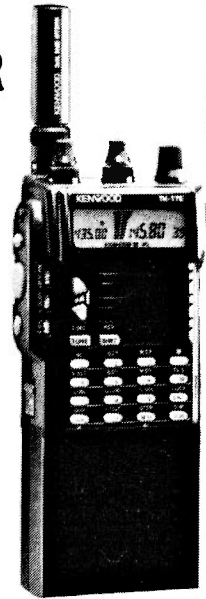
KENWOOD TH-77E DUAL BANDER

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

TH-77E £395

Full range of accessories for all models

P&P £5.00



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

IC-W2E features include:

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

£395.00



DR-590E 2M & 70CMS £499



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

STOP PRESS

NEW TS-450S with built-in ATU in stock at time of writing.

Brief Specs:

- All mode general coverage transceiver
- 100 memory channels
- Output power 100W
- IF shift and notch filter

TS450SAT

£1299.00 Inc. VAT

TS450S

£1150.00 Inc. VAT

Carriage

£12.00

AR2000

Hand-held wide band scanning receiver. Improved specification. The coverage is 500kHz - 1300MHz with no gaps. Modes are AM, FM (narrow) and FM (wide). The AR2000 features 1000 memories for spot frequencies and 10 search banks. The receiver is powered from its supplied internal nicad batteries but these may be removed and dry batteries substituted to allow extended operation in the field. The AR2000 may also be charged and powered from the car cigar lighter socket using the supplied lead. Also supplied as standard are the DA900 wide band aerial, soft case with strap and AC charger.

R.R.P. including VAT £259 (P&P £5).



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



quench arcs. In American terminology this type is known as a 'Normal Blo' fuse.

Medium Time-lag Fuses (M)

M-type fuses will withstand the small transients or surges encountered in normal operation.

Time-lag (T)

These are intended for use in circuits subject to high in-rush currents. They're called anti-surge or delay fuses, and in American terminology, as 'Slo-Blo' fuses. They have a built-in thermal delay.

Super Time-lag (TT)

These are similar to the T-fuses, but provide an even greater time delay before rupturing.

Fuse Ratings

The current-value marked on a fuse is the maximum current loading. The exact meaning of this, depends somewhat on the standards to which the fuse was tested. Fuses tested to IEC standards, should be selected so that the normal current equals the fuse-rating. Fuses tested to UL standards should be rated at 25% more than the normal circuit current.

Voltage Rating

The rated voltage marked on a fuse, refers to the maximum it can safely clear a short-circuit. A fuse can be used at any voltage **not exceeding** its rated voltage.

Breaking Capacity

The breaking capacity is also known as the short-circuit or interrupting rating. The term refers to the maximum short-circuit current the fuse can safely interrupt, without risk of explosion.

Derating Fuses

Fuses are thermal devices, but few technicians realise that fuse performance is affected by the temperature of their surroundings. It's often forgotten that fuses are usually close to heat generating components and their surrounding temperature is likely to exceed the ambient levels.

The temperature assumed by any body stabilises when the heat which it generates is exactly balanced by the heat which it loses. The higher its surrounding temperature becomes, the higher that stabilised temperature becomes.

A fuse which is running hotter than the test-value, must rupture more readily. That's why in determining the rating of a fuse, its operating temperature must be taken into account.

A fuse also runs hotter when the normal operating current approaches the rated-current of the fuse. This perhaps might explain why rogue fuses persistently fail for no apparent reason!

Current Carrying Ability

Fuses are tested for their current carrying ability at a temperature between 20°C and 25°C. However, a fuse rated at say 1.6A, would have to be replaced by a 2A fuse if it is to perform at 70°C.

Some fuses are manufactured with wire connections. In general it's best to crimp and clamp the connections into place. If you solder the connections, it's most important to use a heat-sink. The application of heat to any fuse, is likely to re-flow the internal solder and so change the characteristics of the fuse.

PW

Innovation Into Investment

We've always been proud of our authors and their work. Now you can join in - and win £25 - by sending circuits and projects to 'What A Good Idea'. It's the ideal solution to the advice often offered by friends who suggest that 'You should publish that!'

Circuits - accompanied by the minimum of text - must be **neatly** and **clearly** drawn in ink. Wherever possible the idea must be original, although your suggestion might be a significant improvement based on another idea. In which case you should always quote the original source. All entries will be acknowledged. Send your entry, with your name and address, to: 'What A Good Idea', Practical Wireless, Enefco House, The Quay, Poole, Dorset BH15 1PP.

PLEASE NOTE: that we at PW may not have built and tested the circuit, but present it on an 'as-is' basis. We do take the greatest care in preparation of the article, but cannot be held responsible for the suitability of the original suggestion, or for any damage that may occur to property or equipment in implementing this idea.

What A Good Idea

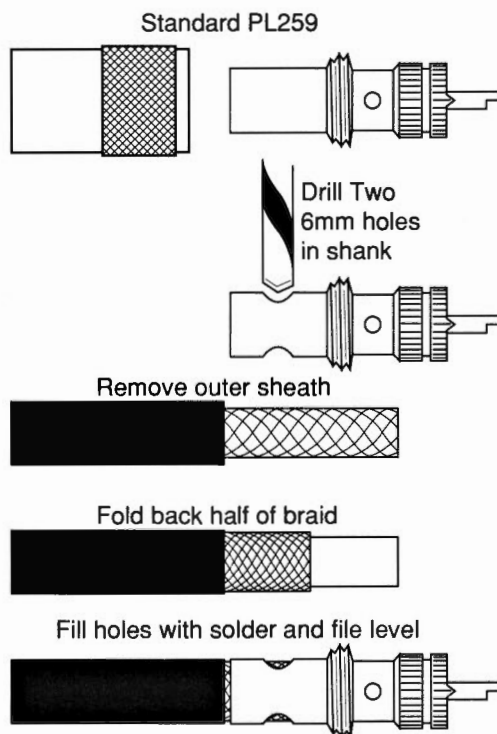


Fig. 1.

Like most amateurs I use the best quality coaxial cable, usually low loss type, for all cable runs. Imagine my feelings after paying quite a large sum for this cable, to find that within a few months the v.s.w.r. has risen once more to an almost unacceptable value.

After several occurrences, of this nuisance, I decided to investigate. I discovered that the major problem is actually the contact resistance of the outer braid to the body of the coaxial plug. I have tried many ways to maintain contact, and met with apparent success. But when one plug fails, the whole cable run becomes suspect.

Then I had a brain-wave. Solder, had to be the answer! Refer to the drawing of Fig. 1, here the operation is shown in sequence. Starting at the top of the series, by drilling two 6mm holes in the shank of the PL259 plug. Trim the outer covering back about 40mm from the end of the cable. Fold the braid back upon itself as shown. Cut the inner insulator back, about 12mm, to clear the centre conductor. Screw the coaxial cable into the PL259 as far and as tight as possible.

Using a large HOT soldering iron, solder the braid to the body of the PL259 plug, filling up the hole completely with solder. File the excess solder away to clean up the joint. Finish off the job by soldering the inner conductor in the plug tip. After screwing the shroud back into place the plug is ready for use.

In almost two years of use, I haven't had another case of poor contact to the plug body.

You did put the shroud the right way round on the cable first, didn't you?

J. D. Bolton G4XPP
Crook, County Durham

OUT NOW!

SUMMER 1991 CATALOGUE

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

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



£1.70
plus 30p
postage

Cirkit

CIRKIT DISTRIBUTION LTD

Park Lane · Broxbourne · Hertfordshire · EN10 7NQ

Telephone (0992) 444111 · Fax (0992) 464457



D A T I N G
E L E C T R O N I C S L I M I T E D

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

For products you can rely upon to give amazing results

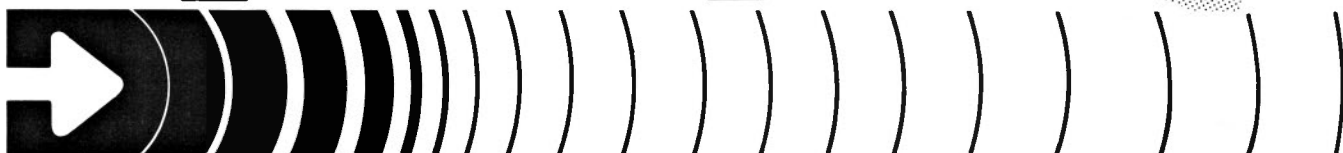
For information on **Active Antennas, RF Amplifiers, Converters, Audio Filters, the Morse Tutor and Speech Processors** send or telephone for a free catalogue and selective data sheets as required.

All our products are designed and made in Britain.

Orders can be despatched within 48 hours subject to availability.



— VISA AND ACCESS WELCOME —



PACKET PANORAMA

This time Roger Cooke G3LDI looks at the problems of catching up with the news, packet guidelines, and suggests some good reading.

Catching up with news and bits and pieces is not always easy. Especially when it has to be planned some months ahead. Some of the news, when seen in print, seems to be out-dated, much like delayed bulletins!

However, I've got to start with apologies to Simon GM4LPM who, some months ago, sent me some news for inclusion in the column. I hope that most of it is still current. Simon is sysop at GB7HFF in Glasgow, and is hoping to run an AMTOR h.f. port on a number of frequencies in the 7, 10, 14, 21 and 28MHz bands. It is also hoped to link up with GB7PLX and GB7SCA to provide a 'wormhole' from North to South. This pathway has always been somewhat of a problem. The Satgen bulletins from John GM4IHJ, rarely make it to Norfolk, much to the consternation of Pat G3IOR, several of the local users and myself.

However, by using the Aplink software developed by Peter G3PLX, Simon hopes to close a few gaps. Knowing the lengthy business of licensing, he may or may not be active yet, but I wish him luck with the project.

Peter has also joined the Data Communications Committee (DCC), with specific responsibility for h.f. planning. I'm corresponding with him regarding h.f. bandplans, so hopefully something will be sorted out at the next IARU meeting, preferably internationally, not just in our own back-yard. If you have any views on this in relation to AMTOR/Packet, drop Peter a line.

One of the problems associated with the h.f. side of packet operations, is knowing just how many BBS stations to licence for any one country. As an example, a letter just received from Dave G3VOM, says he's having quite a difficult time justifying the need for another h.f. BBS besides the ones already licenced in the UK. This could of course, lead to a lot of congestion if we all operated in similar vein.

I feel that there are several jobs to be done on h.f., not all of which can be undertaken by just one or two lone BBSs. Dave mentions that

much of the private mail from his area, destined for abroad, doesn't reach my h.f. port. This would seem to be quite an indictment on the UK packet network. This only serves to support my theory regarding the North/South divide as mentioned above!

Packet Guidelines

The DCC, in agreement with the RA, has just issued the latest packet guidelines for both users and BBS sysops. There is a responsibility placed on both parties as to the content of messages, private as well as bulletins. This should help to both guide/dissuade the user from sending questionable packet messages. It will also support the sysop in his unenviable editorship.

The guidelines, recently propagated on the network by Ian GM4AUP, are reproduced below for those that have not seen them. It may be useful to duplicate them and keep them for reference.

Finally, I have had quite a mailbag over my article in the July '91 issue of *PW*, both in support and some against some of my suggestions. If you would like to add to the arguments, please let me have your views and I will present them in a subsequent article.

Guidelines For Sysops

1. In addition to these guidelines please read carefully, and comply with, the 'Guidelines for the use of the Packet Radio Network' (*Guidelines*).

2. Always ensure that the TNC parameters are adjusted correctly and suit the conditions on your Local Area Network (LAN). Especially PACLEN, MAXFRAME and CSMA parameters.

3. Ensure that you have a second sysop (who must be a licenced amateur, or more than one) who is familiar with the mailbox so that the service can be continued whilst you are away on holiday, etc. The second sysop need not have regular access to the equipment, but must know how to close down your station in an emergency. He, or she, should be able to do basic remote housekeeping on the mailbox on a

daily basis. You should also ensure that the RSGB Mailbox Co-ordinator knows who your additional sysop is in the case of an emergency.

4. Review all messages at least once per day, to ensure that nothing contravenes the conditions of your licence. If in doubt about a message consult the *Guidelines* and act appropriately. Sysops are advised to err on the side of caution: it is **your licence which could be at risk**. During the daily review, check why any messages have remained unforwarded, and look for any duplicate messages.

5. Ensure that the mailbox will auto-start after any power failure.

6. Where possible, limit the downloading of large files to off-peak times, or less congested frequencies. You should advise your users accordingly.

7. IARU for Region 1 have advised that there should be no formal network links on the 144MHz band. You are strongly recommended to link on other bands covered by your Notice Of Variation.

8. Forwarding should only take place on fast efficient routes, preferably on a dedicated forwarding frequency. If it is essential to use the 144MHz band, or frequencies which are shared with users, then forwarding should only take place during the less busy, off-peak periods in your area.

9. Do not forward to unlicensed mailboxes, or use unlicensed stations for forwarding. It is however, permissible to forward personal mail automatically to the licensed amateur who is the intended recipient of that mail.

10. If you have any problems, ask the DCC mailbox co-ordinator to help. He will probably have encountered your problem before, or will be able to put you in touch with someone who has.

11. Remember that at all times, you are providing a service which should be as reliable and efficient as possible for your users, whilst at the same time causing minimum channel congestion for other packet radio stations.

12. The RA have advised that using the band 1298-1300MHz for

mailbox linking, is likely to be subject to occasional severe interference from the primary band-users. Different parts of the country will experience problems on different frequencies and time of day. The radio frequency environment is also likely to be less hostile outside normal working hours.

13. For those providing an end user service, it is permissible to restrict the message categories available to the users, provided this is pre-advertised and even-handed. **ALL** trunk traffic must be carried until forwarded unless it contravenes the *Guidelines*.

14. If a user persists in sending messages that contravene the *Guidelines* after having been warned, he may be excluded. Users should not be excluded for any other reason.

Users Guide

Section A

1. All messages should reflect the purposes of the amateur licence, in particular 'Self-training in the use of communications by wireless telegraphy'.

2. Any messages which clearly infringe licence conditions could result in prosecution, revocation of, or variation of a licence. The Secretary of State has the power to vary or revoke licences if an amateur's actions call into question whether he is a fit and proper person to hold an amateur licence. An example of this could be unreasonable behaviour, such as, using the packet network to carry on a dispute or to deliberately antagonise other amateurs.

3. The RA has advised that the Amateur Radio Licence prohibits any form of advertising, whether money is involved or not.

4. Messages broadcast to 'ALL' are considered acceptable but, should only be used when of real value in order to avoid overloading the network.

5. Do not send anything which could be interpreted as being for the purpose of business or propaganda. This includes messages for, or on behalf of, any social, political, religious or commercial

PACKET PANORAMA

organisation. However, our licence specifically allows news of activities of non-profit making organisations formed for the furtherance of amateur radio.

Section B

1. Do not send any message which is libellous, defamatory, racist or abusive.
2. Do not infringe any copyright or contravene the Data Protection Act.
3. Do not publish any information which infringes personal or corporate privacy, e.g. ex-directory telephone numbers or addresses withheld from the call book.

Section C

1. Any cases of abuse noted should be referred, in the first instance, to AROS. This is coordinated by Geoff Griffiths G3STG, who will take the appropriate action.
2. It is worth noting that any transmissions which are considered grossly offensive, indecent, obscene or menacing, should be dealt with by the police. This action, initially, should be coordinated by AROS.
3. Mailbox sysops have been reminded by the RA, that they have an obligation to review messages daily. They (sysops) should not hesitate to delete those they feel are unacceptable. It is worth remembering that their licence is also at risk as well as your own.

Section D

1. Do not send 'Open Letters' to individuals.
2. Do not write in the heat of the moment. Prepare your bulletin first, then re-read it. You may feel differently after a few minutes.
3. Obey the golden rule - If you wouldn't broadcast it in speech, don't send it on packet.

Reading Material

I am often asked what books I'd recommend regarding information on packet radio for the beginner. Well, recently a copy of just such a book has been sent to me for comments. It is written by Mike Mansfield G6AWD and is called -

Practical Guide to Packet Operation in the UK, available from the PW Book Service priced £6.95 plus P&P.

The book, spiral bound like many TNC manuals, runs to some 90 pages. It's ideal for somebody with little knowledge of packet, who wishes to obtain the basic principles. The introduction is followed by a step-by-step course through to the actual operation of a packet station on v.h.f. In-depth technical aspects are avoided, so as not to confuse the reader. The 'innards' of a TNC need not be a major topic. These days many of us can purchase a ready-made unit. However, understanding the parameters is important, and Mike covers the parameters of a typical TNC and explains its use.

Parameters Explained

Explaining packet parameters takes some 17 pages, and covers the full command set, the PMS (personal messaging system) set plus the error messages. Instructions on using a BBS are followed by similar instruction on using nodes, PMS, digipeaters, net-nodes and KA-nodes. Also included in its own section, is how to use the DX Cluster. This is the latest innovation from Pavilion Software in the USA.

Following on from this information, are four separate helpfiles from four different BBS systems G1NNA, WORLI, AA4RE and G4WSD. I must admit I hadn't heard of the last one! The other popular ones, MSYS, F6FBB and SVIAIZ are not covered, or even mentioned. Lists of v.h.f. BBSs and h.f. BBSs complete the book. When all is considered, I think it is a very worthwhile book for the beginner, and it will answer a lot of the questions that some operators seem afraid to ask.

Only Criticism

If I were to criticise the book, I would say that not enough space was devoted to the actual interconnections required for setting up a station. Only one page is devoted to this topic. I feel the beginner needs more diagrams,

Starting Frame

Data Circuit-terminating Equipment or Data Communications Equipment. (DCE):

The device that provides communications between a DTE and radio equipment or telephone lines. A master station in unbalanced mode at the link layer. Compare DTE and DXE.

Data communications software: A computer program that causes a computer to function as a DTE for the purpose of transferring data over a communications medium.

Data Rate: The speed at which information is transferred, usually expressed in bauds or bits per second. Also called baud-rate and bit-rate.

Data Terminal Equipment (DTE): A device that is used to interface between a human and a computer to allow the human to exchange information with the computer. A slave station in unbalanced mode at the link layer. Compare DCE and DXE.

Datagram Protocol: A Network layer protocol that transfers each packet independently along the best available route. Also called connectionless Protocol.

DCE Ready: EIA-232-D serial interface signal, formerly called Data Set Ready, that informs the DTE that the DCE is prepared for data communications.

Default: The state of a TNC parameter after the TNC is initially switched on or reset.

Destination: The station that is the intended recipient of a packet frame sent over a radio link, either directly or via a repeater.

Dibit: A group of two bits. Dibit modulation is a technique for transferring two bits of information during one time period. (Two bits per baud).

Digipeater: A DIGital rePEATER, a device that receives, temporarily stores and then retransmits (repeats) packet-radio transmissions that are specifically addressed for routing through the digipeater.

Disconnect Frame: (Disc) An AX-25 unnumbered frame that indicates the rejection of a Set Asynchronous Balanced Mode frame.

Download: To receive files from a BBS or other packet-radio station.

DTE Ready: An EIA-232-D serial interface signal that informs the DCE that the DTE is prepared for data communications. The signal was called Data Terminal Ready under RS-232C.

Domain: In packet-radio, the combination of a frequency and a geographical service area.

Dumb Terminal: A simple DTE that provides only basic input and output functions.

Duplex Operation: Operating method where transmission is possible simultaneously in both directions of a telecommunications channel.

more specific help, especially with the RS232 connections. There also ought to have been more emphasis on the importance of the audio levels.

If I were to be hyper-hyper critical, GB7LDI was left out of the World-wide BBS list! In fact there were only two from the UK mentioned, GB7BNI and GB7TED, both in Northern Ireland. Ah well, can't win 'em all I guess!

Hungarian Activity

I have a file, received from HA5DI showing the amount of activity now taking place in

Hungary. Actually the file is a few months old, so it may be more widespread. This information may still be useful to some of you. If you'd like the information, send a large s.a.e. to the editorial offices, marked 'Hungarian Packet Lists'.

That's it for this month, please send any information, hints etc., to G3LDI QTHR, @ GB7LDI. The time of response may drag out a little however, as I am off to the USA for a holiday. I intend capturing some of their packet scene on film!

73 and happy packeting de Roger G3LDI.

Reflections

This month Ron Ham takes a look at the close relationship between photography and radio interests and tells us about modern TV broadcasting techniques.

Light

It is generally accepted that electrons, light and radio waves all travel at the same speed, 300 000km per second, and because they can each be reflected from its intended path, they become, individually and collectively, a subject for discussion in this column. After all, closely allied to our prime subject radio, is computing, which sends electrons darting in a multitude of directions at the same time and photography, which basically works on reflected light. Many of our present-day readers have a camera or computer, or both, either entirely dedicated to their radio activities or for a completely separate domestic or scientific interest. Whichever, there is space in 'Reflections' to cater for you.

Active People

On June 9th, I had the pleasure of meeting two of our readers **Hugh Griffiths** and **Pete Dickerson** (Malvern) who appear, complete with cameras, on the left and right respectively of **Fig. 1**. In addition to their general interests in broadcast band listening and photography, they are both narrow gauge railway and model engineering enthusiasts. Pete uses RA17 and NRD515 receivers fed by a long wire antenna and an ERA Morse reader to decipher the c.w. signals. Hugh has a Sony ICF7600D for general listening and a vintage collection of Hammarlund (600), Marconi (T1154/R1155), National (HRO) and RCA (AR88) communications equipment. Hugh and Pete are near neighbours and, without their radio, they have plenty in common what

with Hugh's model railway and Pete's Atari and Einstein computers and collection of scientific and technical books.

Watching The BBC

On the subject of cameras and broadcasting, Joan and I spent a pleasant afternoon on the 27th at nearby **Parham House** recording, on film, for archives and posterity, the live production of the BBC Radio 2 programme, *A House In A Garden*. That title aptly describes Parham, an Elizabethan House set in a most beautiful garden near the village of Storrington. Throughout the two hour programme, co-presenters, **Gloria Hunniford** and **Alan Titchmarsh** were each

accompanied on their 'walk-about interviews' by an engineer with a v.h.f. back-pack transmitter, a pair of microphones and a talk-back set. The signals from these portable stations were sent to a BBC control vehicle elsewhere in the grounds, and then on to London via a microwave link. I had an enjoyable chat to the BBC's engineering team, **Fig. 2**, under the charge of **Doug Taylerson G3PPC**, (left **Fig. 2**). At the end of the day **Richard Earle**, (centre **Fig. 2**), showed me the pack sets and the 'base' antennas. Richard is holding the set carried by the engineer, (front **Fig. 2**), who operated for Gloria Hunniford, **Fig. 3**, mainly inside the house during the programme. The sound engineer (right **Fig. 2**) who worked in the



Fig. 2: Ron Ham (4th from left) with BBC engineers at Parham House.



Fig. 1: Hugh Griffiths and Pete Dickerson (Malvern).

garden with Alan Titchmarsh, **Fig. 4**, is still wearing his full gear.

The 'Instantaneous' Circle

At one time the broadcast from Parham could be heard on a Roberts portable, only a few metres away from one of the many interview points where I was working. My thoughts temporarily turned away from the photography in hand and toward the theme of this month's column. The Roberts was tuned to BBC Radio 2 on the domestic v.h.f. band, and receiving the programme

from one of the local Band II transmitters in the normal way. Now readers, let's marvel at this for a moment because it took less time than that for the following multitude of processes to occur. First, Gloria Hunniford's voice was changed from audio frequency (kHz) at the microphone to tiny electrical impulses which, when amplified, modulated the engineer's v.h.f. (MHz) back-pack transmitter. On arrival at the control vehicle, this v.h.f. signal was then converted to s.h.f. (GHz) to be carried via a microwave relay link on the South-Downs, to London. In London, the signal was processed again and then sent, for final transmission, to the BBC's network of Band II transmitters around the UK. The signal arriving at the Roberts, around 89MHz, was immediately changed inside the set from the incoming radio frequency back to audio frequency, so that Gloria's words were clearly understood by her listeners through the loud speaker. For the benefit of the camera buffs among you, Joan used a Canon EOS 1000 with a 80 to 200mm zoom lens for Alan Titchmarsh in the garden, and I used a Minolta 5000i with a 70 to 210mm zoom lens inside the house with Gloria Hunniford's team. Both cameras are computer controlled with auto-focus lenses.

Observations

The earth's natural light is a product of our nearest star, the sun, which like most other stars in the known universe is a complex nuclear furnace. Periodically, explosions on the sun eject vast streams of particles into interplanetary space which create a great deal of scientific interest if they collide with the earth's atmosphere. Solar observers have some prior warning of these events because dark patches, known as sunspots, appear on the sun's apparent yellow disc (photosphere) and are a source of much abnormal activity. Sunspots vary in size and often appear in groups and among the largest observed for some time can be seen in **Fig. 5**, which was observed and drawn by Patrick Moore at his observatory in Sussex, around 0700, on June 10. Although **Fig. 4** shows this group's central meridian passage, Patrick first saw

it appear around the eastern-solar limb on the 3rd and progress with the sun's rotation until the 13th. In Plymouth, **Ern Warwick** heard solar noise on the 28MHz band at 1230, 1545 and 1820 on June 10 and at 0850 and 1345 on the 11th. "A very patchy period with a lot of disturbance from the sun," was the way **Fred Pallant** (Storrington) described the 28MHz band conditions to me on the 28th.

Solar Analogy

This group of sunspots like any other, can be compared with a large gun on a slowly revolving turret firing off random 'rounds' of nuclear waste, with the 'shot' taking between 20 and 40 hours to reach its target. At the point of 'fire' there is a flash of light and an emission of radio waves. Both of which can be seen and heard respectively from the earth, 8.3 minutes after the 'round' was fired. Sometimes giant groups like this, have a long life and reappear on the eastern-limb approximately 14 days after leaving the western limb.

Associated Disturbances

Richard Noble (Abergavenny) has designed and built a magnetometer with its sensor mounted in the attic. His recording chart, **Fig. 6**, for the period June 12 to 14, shows that a large magnetic disturbance took place from approximately 2000 on the 12th to 2100 on the 13th. The instrument's sensor coils for north-south and east-west are represented by the horizontal component and azimuth respectively. Fred Pallant heard a "pronounced" auroral 'rasp' on the signal from the **Rutherford Appleton Laboratory** beacon (GB3RAL-28.215MHz) at 1530 and "some rasping" on the German beacon's c.w. (DF0AAB-28.277MHz) at 1623 on the 5th. For

the benefit of newcomers, the 'rasping', known as tone-A, indicated that Fred, located in southern-England, did not receive these signals direct from the transmitter but indirectly by reflection from an aurora. **Gordon Foote** (Abingdon) consistently monitors the international radio beacons and he reports that another German beacon (DK0WCY-10.144MHz) was giving a weak auroral warning at 1637 on the 12th, strong at 1834 and weak at 1850 on the 13th. Prior to this Ern Warwick heard DK0WCY give a strong

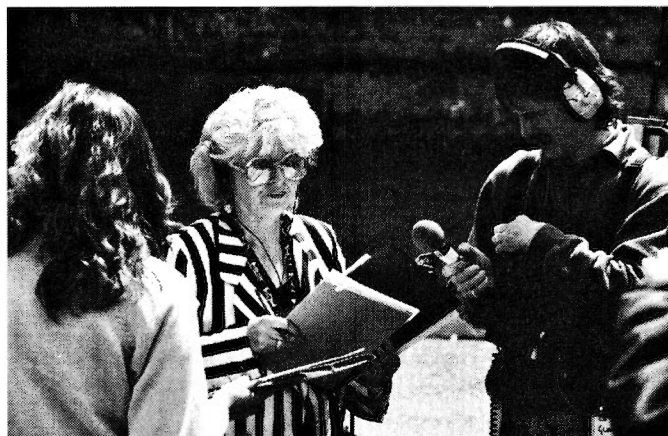


Fig. 3: Gloria Hunniford's crew ready for start.

auroral warning at 1500 on the 5th, and weak at 1700 on May 28, and 1500 and 1700 on June 8 and 11 respectively. He also found that the 28MHz band was generally 'dead' when he checked at 1701 on the 3rd, 0920 on the 4th, 1230 on the 7th, 1000, 1530, 1700 and 1815 on the 9th and 1930 on the 11th.

Sporadic-E

Although unlikely to have been caused by the prevailing solar activity, television pictures in Band I (48-68MHz) from Spain and Italy were received, during periods of Sporadic-E, by **Bob Brooks** (Great Sutton) on June 11, 13 and Italy and



Fig. 4: Alan Titchmarsh and sound engineer.

the USSR on the 15th. Around 2200 on the 23rd Bob received strong pictures from three Norwegian regional stations, while a similar event was in progress. I received pictures from Spain at 1915 on the 15th, Norway and the USSR several times during the day on the 16th and from Sweden and the USSR at 0845 on the 20th. Also on the 16th, strong signals from a variety of eastern European f.m. broadcast stations were frequently heard in parts of the UK between 66 and 73MHz.

Computing

You may have already seen the

TEQNICHE PCW 102, industry standard keyboard for the Amstrad 8256/8512 and 9512 computers being advertised. This new style board, with a recommended retail price of £90.85, but offered by dealers around the £75-£85 mark, has 102 keys and is a direct, plug-in, replacement for the existing 85 key unit supplied with the 8000 machines. I have made the change readers, and found it a joy to use.

Astronomy

W. K. Willan G7IKM (Netherton) tells me that a number of his amateur radio friends in Yugoslavia "are very active in the world of astronomy" and that statistics of one of their stella discoveries is currently at Jodrell Bank for examination. WK feels sure that "any person wishing to exchange information would be welcome in Ljubljana" and gives the address of **Primož Kolman YU3JI**, Velebtiska - 11, 61000, Ljubljana, Slovenia, Yugoslavia, to contact.

Reflections

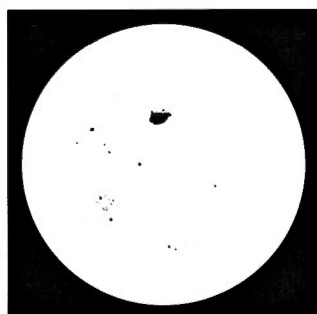
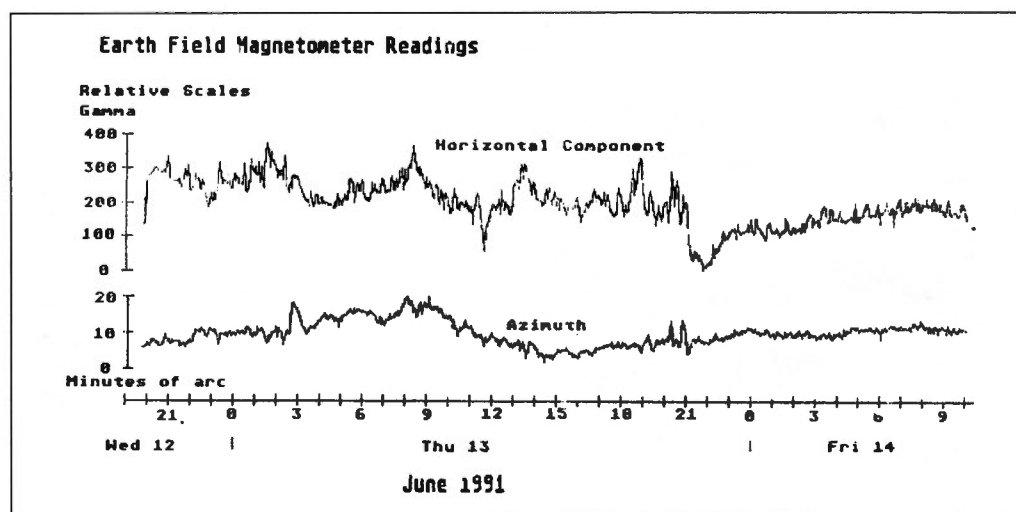
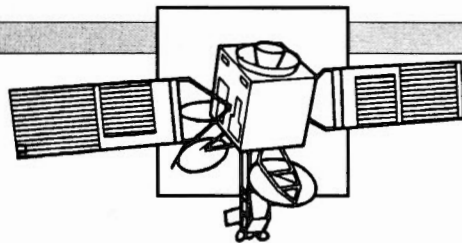


Fig. 5: Giant sunspot group June 10.

Fig. 6: Magnetic disturbance on June 12/14.





Satellites And SIDs

A very powerful series of solar flares were produced in June when a huge sunspot could be seen passing the equator of the sun. Turning my satellite antenna to the sun produced strong noise on 145MHz. Energetic protons of greater than 100 MeV were observed shortly after the peak X-ray flux, which gave over 1.8 Joules per square. Whilst the h.f. bands were wiped out by Dellinger fades and absorption, spectacular auroral conditions extending down to Spain and Italy, resulted in some good 144MHz DX.

John Branegan GM4IHJ writes "The sun has been more active in the past 40 years than it appears to have been in the previous 4000, and the last two sunspot Maxima have been exceptional. Indeed the present 1989/90 maximum has developed a second peak which has been extraordinarily rich in Solar Flares and Aurora".

Flares and the following geomagnetic storms are not good news for satellites. Another problem is the increase in radiation received by the occupants of manned space stations. Memory erasure of computer controlled spacecraft is also likely, and a lowering of orbit due to the atmospheric expansion resulting in more drag. The magnetic orientation sensing and steering of satellites is also upset, causing more problems.

On the plus side, some fascinating propagation abnormalities have resulted. At sub-horizon, RS-10's Mode A beacon on 29.357MHz has been coming in loud and clear even with the spacecraft at an elevation of -35°. This effect occurs most often when Mode A downlink signals are lined up with the receiving ground station through the earth's geomagnetic field, which runs between the poles of the earth. High ionosphere ionisation can also produce antipodal reception of Mode A downlink signals, when the transmitting spacecraft is on the opposite side of the earth to the receiving station. This was first observed in October 1957 from the 20MHz signals from Sputnik 1, and again later

with 29.5MHz signals from OSCARS 5 and 6.

Angus GM4JYZ, reported a Dellinger fade-out (sudden ionospheric disturbance, or s.i.d. for short) which wrecked his reception of the 137MHz NOAA-12 weather satellite. An important point was that when NOAA-10 passed on the same track 20 minutes earlier, before the s.i.d. started, it was a perfect signal.

John explains, "We do not have to look far for a reason. Massive solar flares produce radiation which penetrates deep into the earth's ionosphere down to the E and D-layers, ionising these so much that they absorb all terrestrial h.f. signals for the duration of the event. What is never mentioned however, is 'What happens to the F-layer during these events?' Previously no one has cared, but now that we have satellites trying to put their signals down to us through the F-layer, this point becomes important. Clearly the F-layer must be very heavily ionised, producing a maximum usable frequency (m.u.f.) of a very high level, which of course we cannot (or have never tried to) use for terrestrial purposes. The result I've found is that this extraordinary ionisation of the F, lower D and E-layers, produces a savage deterioration of the downlink of the 137MHz NOAA weather satellites, a marked increase in Faraday rotation and multi-path fading and scintillation".

John GM4IHJ recommends an interesting experiment, and says "I ap-

preciate that we cannot predict Solar Flares (as yet), so we cannot predict the s.i.d.s which follow 9 minutes later, but anyone lucky enough to catch a s.i.d. h.f. fade-out would be well advised to try to copy v.h.f., u.h.f. and microwave satellites through it. Even the microwave geostationary TV band might show some effects!" Readers might wish to read page 156 in the new RSGB *Space Radio Handbook*, where Experiment 8.4.01 could be a good line to follow at any frequency from v.h.f. to microwave.

The 'JUNO' Schools Experiment

Despite the anticipated problems that always arise from high popularity operations, the JUNO mission involving Helen Sharman GB1MIR, using amateur radio to talk to UK Schools stations during her stay on the Soviet MIR Space Station, was a great success. The idea came from the many educational missions of Musa Manarov U2MIR, (UV3AM) who has been using the MIR amateur radio station on S22 (145.550MHz) to talk with fellow amateurs and schools around the USSR. The SHUTTLE mission of Ron Parise WA4SIR, did the same with the schools and colleges in the USA.

The S22 channel has long been the established frequency for simplex f.m. QSOs between both American and Russian spacecraft and earth bound amateurs. Because this fre-

quency is available to all amateurs, U2MIR, UW3AX, G3IOR and head JUNO co-ordinator G3XWH, decided that 145.550MHz should be maintained for the MIR downlink. The offset split frequencies operation employed by the JUNO school stations was used to minimise QRM to enable the successful educational contacts.

Following Richard G3XWH's trip to Moscow, to discuss the details of the times and frequencies of operations with Helen GB1MIR, Tim GB2MIR and Boris UW3AX, the recommended frequencies were tested. Contacts between U2MIR and G3IOR were made at times of peak European simplex-usage on the previous Sunday evening. Although at MIR operational height, all the f.m. channels were in multiple use throughout the UK, and much of western Europe, those finally selected were found to be marginally superior.

The frequencies were further confirmed by an initial check QSO between GB1MIR and G3IOR at 1630UTC on Tuesday June 21, the first operational pass of MIR over the UK. Helen then went on to try to work the set schedules with the nine JUNO stations over the next three days of the mission. I'm pleased to report that six of the nine JUNO stations successfully contacted Helen. The successful six were: GB0JUNO at Harrogate Ladies College, GB2JUNO at Alford Academy, GB3JUNO at Norwich's Hewett School, GB4JUNO at Canterbury High School, GB7JUNO at Guildford's Royal Grammar School, and GB8JUNO at Orwell Park School, Ipswich. GB1JUNO at Bigyn County Primary School, GB5JUNO at Belfast Royal Academy and GB6JUNO at Looe School. Sunrising would undoubtedly have also completed their contacts if QRM and on board operational problems had not intervened, causing the loss of six of the earlier planned schedules.

Three of the GB0JUNO YL team are shown in QSO with GB1MIR in Fig. 1, which was snapped by Richard G3XWH. The team are all very enthusiastic, having taken their RAEs in May.

The Hewett School in Norwich GB3JUNO team are shown in Fig. 2. They are, standing from left to right: David Albury, Adrian Hendrick, Adrian Brooks, Graham Symonds and Charles Gregory. Those shown sitting are Sarah Fuller and Suzie Payne, Jonathon Rowles and Alan Wright G0KRU, their science teacher.

The Saturday in the museum was open day for all amateurs, and despite what must have been the UK's biggest ever 145MHz f.m. pile-up, Helen amazingly managed mixed simplex and duplex QSOs with five stations. She picked out from the massive



Fig. 1: Harrogate Young Ladies College team GB0JUNO.

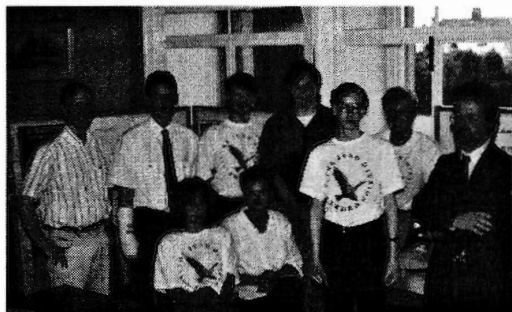


Fig. 2: The Norwich Hewett School GB3JUNO team.

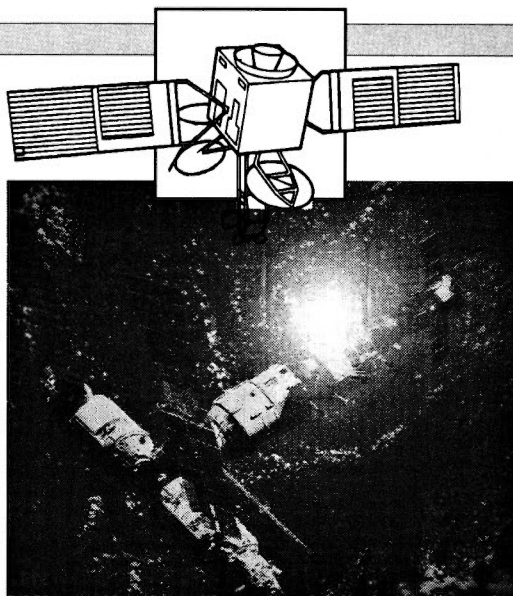


Fig. 3.

number of callers GW4VEQ, G4SMC, G4PIQ, G3MRJ and G5TU. Audio recording tapes from dispersed sources such as G1YIL in Devon, G3IOR in Norfolk and others all helped resolve Helen's signal from the many stations simultaneously calling her. Sadly on-board MIR, shown in Fig. 3, experiments and preparation for return prevented her from operating on all the in-range passes or contacting amateurs in other parts of the world.

Tony Jones GW4VEQ of Anglesey got the Saturday calculated pass times from GB5JUNO at Belfast Royal Academy, and confirmed tracking precision by monitoring the 143.625MHz MIR communications link. Using his pair of 8-element horizontal quad antennas, Tony began calling as Helen came over the Atlantic toward the UK, to hear her return with "Hi - nice to hear you! How are things down in Wales today?"

John Tucker G5TU of Falmouth, Cornwall, writes how much he enjoyed his three minute QSO. He was running 100W to an 8-element crossed Yagi under directional control from his home made az-el interface from his BBC computer.

Helen, advised by Musa, had the good sense not to try to exchange numbers with as many operators as possible. Instead she seized upon any call heard to share some of the fascinating work, findings and experiences she had encountered. This provided great enjoyment to everyone who was listening.

The amateur activity side of JUNO was not without its critics. Whilst over 90% of amateurs expressed their delight and thanks, there were some complaints. In the main these balanced out. Those who complained of insufficient distribution of the pass times and frequencies, were equalled by those who said that by publishing the information we had encouraged the QRM problems.

Of some concern, was the bad publicity resulting to the amateur radio movement by the media quoting the disappointed student at Alford Academy who complained of the interference "by other radio amateurs". The comments were partially correct. It did not take long for some of those with scanners to locate the uplinks and overcall, or to intervene on the U2MIR frequency. The result was that some of the carefully pre-arranged schedules could not be completed in the all too short five minute allocated slots.

I'm pleased to say that JUNO was an outstanding success, mainly thanks to the vast majority of amateurs who listened, but did not intervene during the set schedule periods. Other amateurs provided passes with pre-deter-

mined Doppler corrections, while amateurs in both the UK and the USSR tutored our first cosmonaut, enabling her to get an amateur radio licence, which was arranged by the RSGB and the RSF at such short notice. Everyone, including AMSAT, the RSGB, the RSF and all involved in the mission, have stated that they are very happy with the organisation and the outcome. It would have proved impossible without full and mutual co-operation between all concerned.

Cards for QSLs will be arranged when Helen returns. This will be possibly through the services of UW3AX, the MIR co-ordinator and QSL Manager. Special commemorative certificates may also be available. Don't forget U5MIR will continue to be active on S22 from the space station on both voice f.m. and packet for the next five months, after which further amateur crews should follow.

OSCAR-10 Returns

Peter Guezlow DB2OS reports that OSCAR-10, which celebrated its 8th birthday on 16 June 1991, has returned in good transponding condition, and is providing excellent Mode B operation. Signals are reported to be very good during parts of the orbit, despite the apogee limitations imposed by the monopole antenna system.

OSCAR-13 Schedule

James Miller, one of the dedicated OSCAR-13 command team, which consists of G3RUH, VK5AGR and DB2OS, explains the coming modes of the A-O-13 satellite from now until the end of the current year.

From August 12 until 18 September 1991, a temporary re-orientation to ALON/ALAT 180/20 will result in squint (earth pointing) angles never better than 15 degrees for most users, so the Mode B transponder will therefore be on continuously, as the narrower beamwidth higher frequency antennas would not facilitate good communications on S and L modes. Towards the end of this period the

ALAT will be reduced to zero as sun angles permit. From September 18 until 12 December 1991 we have the new schedule:

Mode B from MA 000 to MA 095
Mode JL from MA 095 to MA 125
Mode LS from MA 125 to MA 130
Mode S from MA 130 to MA 140
Mode B from MA 140 to MA 256

Over the period from November 17 to 9 December 1991, Mode B will be commanded off from MA 10 to MA 40 to cover the long duration eclipses then. The omni-directional antennas will be in use from MA 240 to MA 060, and the spacecraft attitude should then be an ideal ALON/ALAT 180/0.

Some OSCAR-13 users may not be aware of the amount of work and calculation that goes into orientating the spacecraft's angle to the sun. This is to allow for maximum illumination of the solar panels, and yet attempt to simultaneously maintain reasonable antenna earth pointing. This is accomplished by sending pre-calculated current pulses through specially designed electromagnets situated at the end of the arms of AO-13, known as 'magnetorquing'. As the satellite approaches perigee, the closest point to earth during the orbit where the earth's magnetic field is at its strongest, the electromagnets interact with this field. This results in G3RUH being able to slowly manoeuvre the spacecraft and change its angle, in such a way as to allow the solar panels to receive a greatest possible amount of sunlight, and thus maintain a maximum battery power charge.

For the first time, this previously 'routine' manoeuvre is complicated by the need to magnetorquing through solareclipses occurring between Mean Anomaly 246 and 256. During eclipses the satellite loses its celestial marker (the sun) from its special sensor. In addition, when BLON reaches 203 degrees, when the sun angle will be less than 8 degrees, the separate earth sensor will trigger on the sun, which is

likely to cause the temporary loss of the attitude determination capability. Thus the last leg of the attitude change will be performed on 'open-loop', aided by a new magnetorquing simulator to help predict how the spacecraft will react during the magnetorquing sessions.

OSCAR-21/RS-14

AMSAT-U-Orbita, whilst trying to remedy a self-oscillation problem on the TR-2 transponder, temporarily took the RM-1 TR-1 and RUDAK transponder off the air. The No.2 RM-1 transponder has been activated, with its 30 channels of digital information at 1100bps. Its 2W beacon is on 145.800MHz, its 0.4W digital telemetry on 145.838MHz, and its 0.2W c.w. beacon at 145.948MHz. The transponder uplink runs from 435.123 to 435.043MHz, and the downlink from 145.866 to 145.946MHz. The receiver is very sensitive, and the 10W inverting downlink transmitter very strong indeed, with even 1W uplinked signals being transponded fully readable. **Bob McGwier N4HY**, reports first working the second transponder on May 21. Other than a little breakthrough of digital mode into the analogue passband reported by **Dave Rowan G4CUO**, all seems to be functioning very well indeed.

John Branegan GM4IHJ has worked out that US States Maine, Vermont, New York, New Jersey, Maryland, Delaware, Virginia, North and South Carolina, Georgia and Florida are within general range of the UK, with the more westerly states out to the Dakotas, Minnesota, Iowa, Illinois, Kentucky and Tennessee at extreme edge of the footprint. The capture is from North Alaska and Hudson's Bay to the Soviet Arctic, to East and West Africa and the Persian Gulf. A-O-21 has 10 or 11 orbits in UK range daily, each some 109 minutes apart and occupying an orbit window about 18 hours wide. Because of perturbation of the RAAN the window drifts about 7.3 minutes earlier each day.

An eight hour sequencing schedule of planned operation which alternates the modes between transponders 1 and 2, with the -12dB attenuators alternating with the linear passband control going in and out has been sent by Leo Labutin UA3CR. The switching is currently changing at 0000, 0800 and 1600 m.s.k., but is likely to change as progress is made with the command system. Leo points out that when the timer is on, the 145MHz downlink will be off for ten seconds every tenth minute.

I now go off too, satellite fans! Next month we shall try to catch up with FO-20 and the rest of the news!

NEW BOOKS

Amateur Radio for Beginners

by Victor Brand, G3JNB

At last, a simple introduction to the hobby, written specifically for the absolute beginner of any age. This copiously illustrated book shows how to tune into the fascinating world of short-wave radio, how to make a crystal set, and just how to go about becoming a radio amateur.

65 pages; 210 by 145mm; £4.56 incl p&p



RSGB Amateur Radio Call Book

The latest 1991/92 edition of this indispensable reference contains an up-to-date listing of the names and addresses of UK and Republic of Ireland radio amateurs plus a directory containing all sorts of useful information, from country checklists and operating data to RAE centres. Don't be without it!

414 pages; 297 by 210mm; £9.27 incl p&p

Space Radio Handbook

by John Branegan, GM4IHJ

Space exploration by radio is exciting and it's open to anyone! This book shows how it's done and the equipment you'll need. It covers the whole field, including auroras, meteor scatter, moonbounce, satellites and other space craft, even simple radio astronomy. If you're ready to use radio to explore beyond the atmosphere, let this book be your guide.

242 pages; 244 by 183mm; £13.34 incl p&p

• **HOW TO ORDER:** Phone your credit card (Access/Visa) order in on 0707 49855 or send a cheque/PO. Allow up to 28 days for delivery.

The Radio Society of Great Britain welcomes all radio amateurs and short-wave listeners as members. The benefits of membership include a monthly magazine, *Radio Communication*, use of the RSGB QSL Bureau, discounts on books and much, much more.

• For a FREE sample copy of *Radio Communication* and a membership information pack, just call us or write to the address below.

Radio Society of Great Britain (PW)
Lambda House, Cranborne Road,
Potters Bar, Herts, EN6 3JE
Tel: 0707 59015



TX-3 RTTY CW ASCII TRANSCEIVE

High performance, low cost. Unbeatable features. BBC, CBM64 tape £25, disc £27. SPECTRUM tape £40, +3 disc £42 inc adapter board. VIC20 RTTY CW program tape £20. All need our TIF1 interface or a terminal unit.

GX-2 FAX SSTV TRANSCEIVE

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

RX-8 MULTIMODE RECEIVE SYSTEM

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

RX-4 RTTY CW SSTV AMTOR RECEIVE

Still a best-seller. BBC, CBM64 tape £25, disc £27. VIC20 tape £25. SPECTRUM tape £40, +3 disc £42 inc adapter board. All need our TIF1 interface. SPECTRUM software-only version £25.

TIF1 INTERFACE for best HF & VHF performance with our software. Kit £30, ready-made & boxed £40. Only with TX-3 or RX-4 software.

APT-1 WEATHER SATELLITE MODULE

Converts satellite signal for display on any FAX system. £59. For use with RX-8, all connections included and price only £39 if ordered at same time as RX-8.

FAX AND WEATHER SATELLITES

Full resolution charts and greyscale pictures from any SPECTRUM computer to a dot matrix printer. FAX £80 or WX SATS £99, both £139.

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

Full info available on everything. Please ask. PRICES INCLUDE VAT AND P&P BY RETURN



technical software (P.W.)



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

COMMUNICATION CENTRE OF THE NORTH

The largest range of communications equipment available in the North. Full range of receivers, transceivers, antennas, power supplies, meters. Ali tubing - wall brackets - rotators - insulators.

FULL KENWOOD RANGE IN STOCK.

BUTTERNUT	
HF2V 40-80M vertical	£143.77
20MRK 20M add on kit	£34.25
HF6VX 6 band vertical	£182.97
TBR160S 160M add on kit	£55.16
HF5B Triband Mini Beam	£240.11
NEW R5 5 Band Vertical	£268.72
CUSHCRAFT	
A3 3 element Triband	£331.86
A4 4 element Triband	£408.75
10-3CD 3 element 10m	£123.51
15-3CD 3 element 15m	£143.06
20-3CD 3 element 20m	£244.07
AP8 8 band 25ft vertical	£185.50
AV5 5 band 25ft vertical	£123.00
R5 5 Band vertical Antenna	£268.84
15 element 2 Boomer	£38.95
ANTENNA TUNERS	
Kenwood AT230	£213.20
MFJ0 Random Wire Tuner	£46.06
MFJ945C 300 watt Versatuner	£99.45
MFJ948 MkII 300 watt Tuner	£123.37
MFJ986 Roller Inductor Tuner	£324.00
MFJ989B 3kW ATU	£377.00
MFJ 949C 30V watt tuner	£172.08
SCANNING RECEIVER RANGE	
AR300 Base Station	£781.63
AR2002 Base Station	£497.58
AR950 Base Station	£254.38
AR900 Hand-Held	£203.33
RS37S Airband Hand Held	£64.77
ICOM R7000 Base Station	£1010.48
RS35 Airband Base Station	£240.11
WIN 108 Hand-Held Airband	£178.81
SWR/POWER METERS	
SX200 1.8-200MHz	£66.42
SX400 140-525MHz	£80.72
W510 1.5-30MHz	£80.72
DIAWA CN410M 35-150MHz	£53.06
DIAWA CN460M 140-450MHz	£66.82
NS860P 1.8-150MHz + PEP	£117.50
KOYO-100 1.8-80MHz	£76.62
KOYO-200 1.8-200MHz	£51.31
KOYO-400 140-525MHz	£53.34
DUMMY LOADS	
MFT300 Watt D. load	£34.23
TenTec 300 Watt Dummy Load	£33.72
L20 20 Watt Dummy Load	£22.48
MFJ1701 6 Way Antenna Switch	£40.00
MFT202B Antenna Noise Bridge	£69.37

A FULL RANGE OF RECEIVERS FOR AIR-BAND - MARINE - SHORT WAVE - AVAILABLE

G5RV full size £18.91 half size £16.35. Full range of Antenna - NEW HIGH POWER G5RV ANTENNA £28.61 G5RV 160-10M Antenna £28.50 Accessories plus full range of VHF - UHF - HF mobile antennas.

AKD PRODUCTS NOW IN STOCK

Full range of RSGB and ARRL publications in stock. Part Exchanges welcome. Second hand lists daily. Send S.A.E. for details of any equipment. HP terms. Access/Barclaycard facilities. Open 6 days a week. 24 Hour Mail Order Service. Goods normally despatched by return of post. POSTAGE-CARRIAGE EXTRA AT COST.

Phone 0942-676790.

STEPHENS JAMES LTD.

47 WARRINGTON ROAD,
LEIGH, LANCs. WN7 3EA

Back-Scatter

HF Bands

Reports to
Paul Essery GW3KFE

287 Heol-y-Coleg, Vaynor, Newtown, Powys SY16 1RA

What a month this has been! After completing my last chore, I went off on a brief visit to GM land. When I was half-way there I discovered I'd forgotten the /M antenna. That was remedied with a scrounged piece of welding-rod cut in half, held in place by a matchstick! At GM3JDR my car had to have a jump start, as I'd left all lights on. When I arrived home, the beam was noted to be pointing in a different direction, and the coaxial cable loop for the rotator had disappeared. When that had been rectified, I discovered the real problem was that the rotator had stripped its gear teeth. Even if I had had a rotatable antenna, it wouldn't have made a fat lot of difference, as I've got the impression this had been by and large the worst month ever since I started writing the piece back in 1966! Thus, Finagle's Axiom....Murphy's Law is always too optimistic!

Oddments

The news is that S2/WZ6C is said to be in Bangladesh for four years, but because of the breakers and tailenders, he will 'not run pile-ups but answer CQ calls'. If you do hook him, cards via W4FRU.

If you come across a 4S6, these are Novice licensees from Sri Lanka. I've heard that ZD8XX who was also V29A, died suddenly on June 11. On the DXCC front, Penguin Island has been accepted, effective 15 November 1945. QSLs may be submitted for credit from September 1 next.

Whilst on a recent study-tour of museums in New Zealand, Douglas G3KPO, who is Curator of the wireless museum on the Isle of Wight, visited Ron ZL2APW in Blenheim, and both are shown in Fig. 1. Now retired and spending much of his time in the 'Shack', Ron has an ideal QTH, his house is in the middle of a large grassy field, far from any neighbours. Naturally, antennas run in all directions and whenever the bands are open, Ron puts a strong signal into the UK. On the evening Douglas visited him, Ron switched on the rig on 21MHz, and who did they have a QSO with, but Eric G3IMX, a fellow islander living at Cowes, and also just retired!

The Bands

I've already said my piece regarding band conditions, so let's go straight to 3.5MHz, home of the QRP operators. First G0KRT (Welling) who has 2W output from a Lake DTR3, and reception by Howes; 25 metres of wire up aloft and a counterpoise beneath. Two-way QRP c.w. scored on G3JRL, G3YHO, GW3COI, while Eric's signals were responded to by QRO (relatively!) merchants G4VFX, G3UES, and five other Gs, plus GJ3EML and PA3FTJ. Activity has been reduced by a severe bout of constructionitis(!).

Onto Pat ON7PQ (Kortrijk) now, who sticks 100% to his key, and managed VP2MDH, 4J1FS, UA9CR and UL8GB.

Angie G0HGA (Stevenage) now has a 22m wire for this band, but so far there have been minor problems which have kept the c.w. contacts down to OK5IPA, Y21CW/P, SM7SNF, G4EXQ who was QRP, G3JVC and SP3KBJ.

Top Band

The 1.8MHz band has been very noisy whenever I've listened. Ted G2HKU (Minster, Sheppey) says his s.s.b. sked with ON7BW has been a terrible struggle, while c.w. was the mode for LY2ZO.

One of our s.w.l. D. Sheppard (Earl Shilton) mentions hearing LY1BYK, RB3MM, UB5KEI and RB5VQ.

Thought!

Ted G2HKU added a tailpiece to his letter, remarking that he had just won £20 in a PW competition. The last time this happened was in 1938, when F. J. Camm sent him a book *Wireless Coils, Chokes & Transformers, and How to Make Them*. Ted adds that he will try to have another win before the next 53 years are up!

The 7MHz Band

Let's start on 7MHz with Angie G0HGA (Stevenage) who has keyed with VP2MDH, VP9PCQ/MM, 0Y/N6NR, OH2AP/OJO, UA9SAN, UL8/UC2WX, HB0/DA1WA, ZB2X, plus the usual crop of Europeans stuff.

Turning to Eric G3LPS (Blackburn), who notes that when he worked 6W1QB there was no pile-up so he asked for comparative reports. The inverted-L gave a 589 report, while the vertical yielded 559. On the other hand 9M2AX was 579 on the vertical the following evening, but all but inaudible

on the wire antenna - which goes to show there's no such thing as a 'best' antenna! Other c.w. stations worked were UJ8JJK, YP0A (QSL to YO Bureau), 9M2AX, 4Z4DX, PJ8MM, PY1CIP/4, CX4SB, 4X4VF, LU5DTN, LU4HLN, HB0/DA1WA, LU6DBH/H, VK6VZ, OH0/SM0AJV, YV4BV, 4X1EL, 4S7RO, LU4FC, LU1UGA, SV9BAI, OH2AP/OJO, UH3Y/UA4HVV, YC0UNC, UL8GB, 4K1ADQ, A22GH, VE1DF, ZD8VJ (these two were the only stations audible during magnetic storm QRM), ZD8LII, YC0UNC again, VK6NV, 8P6JR, PP1RL, UT7U/LY1DS, VK6VZ, RA9FF and W0LYI when the band was just opening to the East Coast Ws - this one turned out to be in W1!

On to ON7PQ. Pat's c.w. list includes LU4KV, VP2MDH, J49CW, 4J1FS, 9V10K, KC6KW, A22GH, LU5EW, CX4SB, Z88CW, LX/SM0NJO, ZD8SE, VU2RJ and DL4MEH/5B4.

WARC Bands

Pat ON7PQ sticks to the key. On 10MHz this resulted in 4J1FS, LX/PA3BUD/P, TK/DL7HZ, OJO/SM0RBO, RZ0Y/UA0WWW, UF6FEI, JG6MQI, T77C, 4U1ITU, CO2VG, 9L1US, KP2A and C31LL. Turning to 18MHz we find FO5DV, AG9A/WHO, 4J1FS, Y88POL, 3A/DJ0MBG, 3C1EA, SV0HS, 9J2B0, LX/PA3BUD/P, ZD8WD, LU9CV, TL8MB, OH2AP/OJO, JY9SR, ZD8LL, OA4AMM, HF0POL, 9M2AX, FH5EJ, 9Q5PL and 9L1US.

As for 24MHz, in between the dead periods AG9A/WHO, IS0/DL6RAI, TL8MB, 4J1FS, ZD8LII, 9M2AX and 3B8CF were booked in. Incidentally Pat finished off his trap dipole for these bands and got it aloft, where it sits two metres above the tribander which is itself at 22 metres. Thanks go to ON4AGX, ON4ADZ and ON4AVA for help in getting the beast up.

Now to Ted G2HKU, who also sticks to keying. On 10MHz I notice UH9YWA, NT2R, NA4UB, VV1AO and HE9BYO. For

18MHz he notes K3SEW, EA8AB, PJ2/PA0VDV, and on 24MHz 9M2AX.

Mary G0NZA (Kirkby-in-Ashfield) says she managed a GU when all else failed(!) but on 18MHz A92BE, SV8QJ (Lesbos, where the temperature was 33°C!) and UM8MCV.

Onto Don G3NOF (Yeovil) who used 24MHz for QSOs with CE3GEI, J88BS, UG6LQ and 4U1ITU. Andrew G3VWC (Bath) tried a session on the band, and found (c.w.) K8XF/MM in Mid-Atlantic, T77C, 9H3UJ and W6UK (Utah). Andrew notices that conditions to USA have worsened of late, and wonders....'Perhaps this is summer conditions, magnetic storms or have I really got my antenna plugged in?'

Now we turn to 9H1IP (M'Scala, Malta) and his s.s.b. Vince looked on 18MHz to find 8P9BW, HV3SJ, PY0SK and PY0SR (St. Peter and St. Paul Rocks), 9V1RH, ZF1EJ, 4U6ITU, ZC4DG, YS1AG, S15SM, GU/SP5ZK, S79MB, 4J1FS, UG6LQ, YS1RRD, UL8PA, 3A2LZ and TI2CCC. As for 24MHz Vince knocked off ZD8DX, C56/DL8OH, PY0SR (St. Peter and St. Paul Rocks again), SV5AZR, FK8FR, J37AJ, 4U6ITU, YS1AG, J88BS, FR5DX, N1GNF/TA, HF0POL, ET2A, T26VV, YV5DTA, 3A2LZ and V51P.

The 28MHz Band

Despite all the problems on the sun, 28MHz correspondents have in fact managed to make the odd QSO here and there. Angie G0HGA, though was out of luck, as all her dipole managed was the odd EU station and the sounds of the odd beacon.

As for Pat at ON7PQ, he managed to scare up D2ACA, 8P6BX, TL8MB, ZS1ADS and XX9ATM. The plums in G2HKU's c.w. crop were IS0/DL6RAI, ZS6BCR, IS0TDY and LU5UL.

The arch s.s.b. operator just has to be G3NOF, but Don offers D2ACA, ID8/IK8AUC, LU9FHF, OH0/LA0EW, OH0/LA0FW, PP2JF, VP5JM, ZS6DNO, ZS6JUN, 3DA0BK, 5T5ZZ, 5Z4FM, 9L1US and 9U5BZP.

The 21MHz Band

Angie G0HGA has a sloper dipole (14/21MHz) for this band, and she was thus able to raise AA2CQ, WX8Q, KB5OG, all after midnight, plus Ws, LT0A (LU disguised), and LU1UG in the WPX shindig.

The band seems to have appealed to ON7PQ; Pat mentions AG9A/WHO, Z08SE, J49CW, 4J1FS, VP2MDH, 9V1YC, FR5AI/T, OK3CLA/5N0, SU1HV, SV5/DJ2GM/P, KC6KW, D2ACA, TR8/F6AXX, TR8GL, VK2DXI/9M2, Z21HS, FH5EJ, P29PL and VP5P.

Turning now to G2HKU, Ted keyed with PY40D, YV4ABR, LU1PHC, LU8EKC, HZ1HZ, LU1ICX, PY2GUL, LU6UA, TK/DF4RD, 3A2LF, VU2NBT, UZ9JVV, RZ9UA and NV1U/MM (cargo ship Jean Sykes, WLAH off the coast of Morocco).

In Nottinghamshire G0NZA stuck

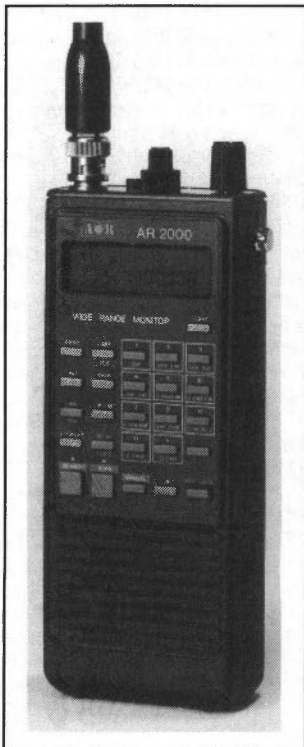


Fig. 1: Ron ZL2APW (left) with Douglas G3KPO.

Photo by G3KPO.

Listen to AOR

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



AR2000

AR2000 The *NEW* AR2000 must be the ultimate portable monitor receiver. AOR have followed on from the successful AR1000 and have made the specification of the AR2000 even better. Frequency coverage of the AR2000 is now continuous 500 kHz to 1300 MHz (with no gaps) and not in two ranges as with the earlier AR1000. The receiver has also been designed to cover short-wave and has an improved performance in this area. One major change is the replacement of the 154.825 MHz crystal with a highly-stable 12.8 MHz reference and multiplier chain. The result is an improved frequency stability with a further reduction in unwanted products especially in the VHF marine band. Modes are AM, FM (narrow) and FM (wide). There are 1000 memories and 10 search banks. The receiver is powered from 4 x AA NiCads (supplied) or external DC. The AR2000 is supplied with a wide band whip aerial, AC charger, NiCads, 12V DC lead, soft case and belt hook. Everything you need is included to just switch on and start listening.

AR3000 The AR3000 now extends your listening horizons further than anyone believed was possible. Covering the entire frequency spectrum from 100 kHz to 2036 MHz without any gaps in the range, the AR3000 brings the general coverage receiver to a new level of performance and versatility. Not only will the AR3000 cover this extremely wide range, it will allow listening on any mode: USB, LSB, CW, AM, FM (narrow) FM (wide). Tuning rates are selectable from an ultra-fine 50Hz step for SSB and CW, right up to 100 kHz steps for the TV bands and Band-2. A slight pull on the spring-loaded rotary tuning control will increase the tuning speed by a factor of ten for really fast tuning. 400 memory channels are provided arranged in 4 banks x 100 channels. Each memory channel will retain mode, frequency and RF attenuator setting. 15 band pass filters are used before the GaAsFet RF amplifiers, this ensures high sensitivity throughout the entire range with outstanding dynamic range and freedom from intermodulation effects. An RS232 port is provided to enable remote operation by plugging directly into most personal computers. The AR3000 is supplied with a telescopic whip aerial, 13.8V DC lead, AC power supply and operating manual.

Also available: AR2800, AR2500, ACEPAC-3, DA3000 etc. For a complete set of leaflets and price list please send a S.S.A.E. (32p).

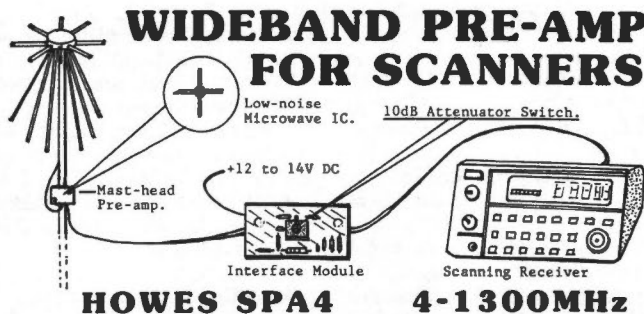
AORTM AOR (UK) Ltd.
Room 2, Adam Bede High Tech Centre,
Derby Road, Wirksworth, Derbys. DE4 4BG.
Tel: 0629 - 825926 Fax: 0629 - 825927

E&OE

C.M.HOWES COMMUNICATIONS

Mail order to:

EYDON, DAVENTRY
NORTHANTS NN11 6PT
Tel: (0327) 60178



HOWES SPA4 4-1300MHz

The **HOWES SPA4** wide-band pre-amplifier is designed to add extra gain to passive antennas (discone, nested dipoles etc.). The low noise combined with at least 15dB of gain over the whole frequency range overcomes the losses in the antenna's down lead, and adds extra sensitivity to the scanning receiver.

The SPA4 uses advanced technology adapted from our very popular AA4 active antenna. Now you can add this extra performance to your discone!

- ★ Fully broad-band covering 4 to 1300MHz
- ★ Low noise microwave IC (NF <3dB). Over 15dB gain. IP3 +15dBm.
- ★ Coax powered pre-am. 12 to 14V DC at less than 20mA.
- ★ 10dB switched attenuator on the receiver interface board.
- ★ Pre-amp only 40 by 28mm. Easy-to-build kit or ready-built modules.

If you would like to improve your scanner reception, and you already own a passive broadband antenna, then the **HOWES SPA4** could be just what you need to boost those weak signals.

SPA4 kit: £14.90 **Assembled PCB modules:** £20.90
Weatherproof (IP65) case for outdoor pre-amp mounting: £6.90

AA4 ACTIVE ANTENNA for scanners. The **HOWES AA4** Active antenna gives full coverage from 25 to 1300MHz in a neat compact unit. The answer to antenna space/visibility problems for home, holiday and portable operation. Reviewed in the November '90 *Short Wave Magazine*. Excellent performance in a small space!

AA4 Kit: £19.80 **Assembled PCB modules:** £26.60

RECEIVER KITS	KITS	Assembled PCB
DXR10 3 Band (10,12 & 15m) for DX amateur work	£26.60	£39.90
DcRx54 5.4MHz HF Aircraft band (rescue etc)	£15.90	£22.70
DcRx20, 40 or 80m Single band amateur receivers	£15.90	£22.70
TRF3 Simple Shortwave Broadcast receiver (TRF)	£15.50	£21.70

RECEIVER ACCESSORIES	KITS	Assembled PCB
AA2 150kHz to 30MHz active antenna	£8.50	£12.90
ASL5 Externally fitted SSB and CW audio filter	£15.90	£24.60
CSL4 Extra SSB/CW filtering for our receivers	£10.50	£17.40
CTU30 All HF bands and 6M ATU (up to 30W TX)	£31.50	£38.40
CV100 HF to VHF converter for scanners	£26.50	£37.90
CBA2 Buffer for adding counter to our SSB/CW RXs	£5.90	£9.50
DFD5 Digital frequency counter/display	£41.50	£64.50
DCS2 "S meter" for our receiver kits	£9.20	£13.80
XM1 Crystal frequency calibrator (8 markers)	£16.90	£22.80

TRANSMITTERS	KITS	Assembled PCB
AT160 AM/DSB/CW 80 & 160M 0.5-10W PEP TX	£39.90	£61.80
CTX40 or 80 Single band QRP CW transmitter	£14.80	£21.80
HTX10 10 & 15M SSB and CW Exciter (filter type)	£49.90	£78.70
HPA10 3 or 10W PEP Power Amp to suit HTX10	£33.90	£51.20
MTX20 20M 10W or QRP CW Transmitter	£24.50	£32.50

TRANSMITTER ACCESSORIES	KITS	Assembled PCB
AP3 Automatic Speech Processor	£15.90	£23.80
CM2 Quality Mic with VOGAD	£12.50	£17.10
CVF20, 40 or 80m VFO for above TXs or TX+RX	£10.90	£18.40
MA4 Filtered Microphone Amplifier (suits AT160)	£5.20	£11.50
ST2 Side-tone/practiCe oscillator (sine-wave)	£8.90	£14.30
SWB30 SWR/Power Indicator/Load 30W 1-200MHz	£12.90	£18.50
VF10 Matching VFO for HTX10/Transceiver	£17.50	£31.60
VF160 80 & 160 Hetrodyne VFO for AT160/Transceiver	£22.80	£39.20

PLEASE ADD £1.20 P&P to your total order value.

HOWES KITS are produced by a professional RF design and manufacturing company. They contain a good quality printed circuit board with screen printed parts locations, full clear instructions and all board mounted components. Sales and technical advice are available by phone during office hours. Please send an SAE for our free catalogue or specific product data.

73 from Dave G4KQH, Technical Manager

Back-Scatter

to s.s.b. for UI8ZI, UF6FIM, 4Z4EC, 4X6VT, VE3GUA, YC0FEO, YC0XIH, YC0SWR, and YB0ZZ, plus YL Sue on SK0YL, at the International YL Convention in Stockholm.

Of course it was s.s.b. for G3NOF. Don noted D2ACA, ET2A, FM4FM, FR5DF, FR5DX, HF0POL, HH2BN, ID8/IK8AUC, JW8LHA, OH0LA0FW, PS5C, SN0JP, VE8CB, VP8CEM, VU2PS, YB0ZZ, YC0BNZ, XQ6ET, XQ6CFX, Z21HJ, ZD7DP, ZD8ACJ, ZD8GT, ZD8XX, 3X1SG, 7Q7LA, 9K1IC, 9U5BZ and 9Y4SF.

Most of his activity has been on 21MHz c.w. says Andrew at G3VWC, EX3FKW, 4K2PGO, 4J1FS, 9Y4SD, FY5FO, TI4SU, PJ2/PA0VDV, UH8AAQ, UI8DGN, UA0FDX (Sakhalin), JA7BXS, JH8GYV and ZZ2WV.

Contest Corner

European DX Contest first. The c.w. weekend is August 10-11, and the s.s.b. weekend September 14-15. There are some rule changes for this year. Single-

operator stations are only allowed 30 of the 36 hours of the contest, the six-hours off being taken in one, two or three spells, to be noted in the log. Minimum operating time on a particular band is 15 minutes. Exchange RS(T) plus serial number from 001. Score one point for each QSO and one point for each QTC. Multiplier for non-EU stations to be the ARRL DXCC list of non-EU stations. For the non-EU types the multiplier is the EU countries worked as defined in the WAE country list. Bonus multiplier is found by multiplying your 3.5MHz multiplier by four, on 7MHz by three, and on 14/21/28 by two. QTC traffic points are achieved by non-EU stations reporting a completed QSO from earlier in the contest back to a European station; such QTC to contain time, call and QSO number of the station being reported. Maximum 10 QTC lists to be reported. If more than 100 QTC stations are reported, keep a check list. 3/7 would indicate this is QTC list 3 with seven stations being reported. Claim an

additional point for each station reported back. Score is one point per QSO, plus one point per QTC, times the total multiplier from all bands. There is a club section, s.w.l. section and the usual single-single, single-multiband, and multi-multi sections too. Mailing deadlines September 15 and October 15, addressed to WAEDC Contest Committee, PO Box 1328, D-8950 Kaufbeuren, Federal Republic of Germany.

The same weekend as the EDXC SSB sees also the All Asian SSB Contest, with rules the same as the c.w. even back in June. Logs to arrive at JARL, PO Box 377, Tokyo Central, Japan by October 15.

The 14MHz Band

On 14MHz Angie G0HGA has her sloping dipole and all contacts were between midnight and 0500Z. KD2FSN, W3NZ, W4DZH, N4XY, WA2SON, K1RM, WB2YQM, W4YSK, W1HMD/4,

W4YSK, W4WJ, K8MFO, K8NW, K4FU, W8JGU, WE3X, W4NWX, W8EGU/8, W4ELO, K4II, K1VLB, AA2CV, N4AR, W5REA/4, W6DU, W7YLO, plus VU2AC, PJ8MM, OH0/SM0AJV, UZ9JWV, VE3HX, HK1R and R6L.

At ON7PQ the tally was 4J1FS, KC6KW, D2ACA, FY5YE, 9V1YC, PJ2AM, DX1HB and 9J2SZ.

Mary G0NZA mentions EJ0A, ES1WQ, CN8GM, UQ1GXO, 9H1DE, HC1EEV, UG7GW0, 5U7NU, N1BLF, N2GE and N1IWX.

Bringing up the rear as it were we mention G3NOF, ID8/IK8AUC (Dino Is), OH2AP/OJO, ZS10JUN, 4U1ITU and 9M8FH.

Finish

That's the lot from me for this time. Deadline for the next lot is to arrive with me by September 1 and October 1, and the address is at the head of the column. Now to get the antennas back up - just so I can mow the lawn!!

Solar Data for May-June 1991

Details of solar activity were omitted from last month's column because of the need to give you immediate details of the major auroral openings during the early part of June.

The period from May 3-12 saw the more active side of the sun coming into view with solar flux levels rising every day. Between May 13-19 the active side of the sun was looking our way, and a number of auroral openings were observed during this period in central England. From May 19-23 the solar active side of the sun rotated away, and the more geomagnetic active side came into view. The last few days of May saw a large increase in geomagnetic activity, with a number of good auroral openings being recorded. During the first two weeks of June some of the most remarkable geomagnetic events since March 1989 were recorded. This was caused by solar region 6659, an enormous magnetically complex area which spawned an almost continuous series of major flares, including at least two rated X12+. Flares are classified C, M, or X, in increasing intensity, followed by a number indicating rank within each class. An M1 flare is ten times more intense than a C1 flare. However, the satellite sensors saturate at X12 and flares more intense than this are ranked X12+. The numerous flares gave rise, in central England, to 10 days of auroral openings between June 4-14. The geomagnetic A index reached 151 units on June 5, 94 units on June 6, 66 units on June 10 and 95 units on June 13. The period June 17-23 saw the solar quiet side of the sun looking our way but

Back-Scatter

VHF Up

Reports to
David Butler G4ASR
Yew Tree Cottage

Lower Maescod, Herefordshire HR2 0HP

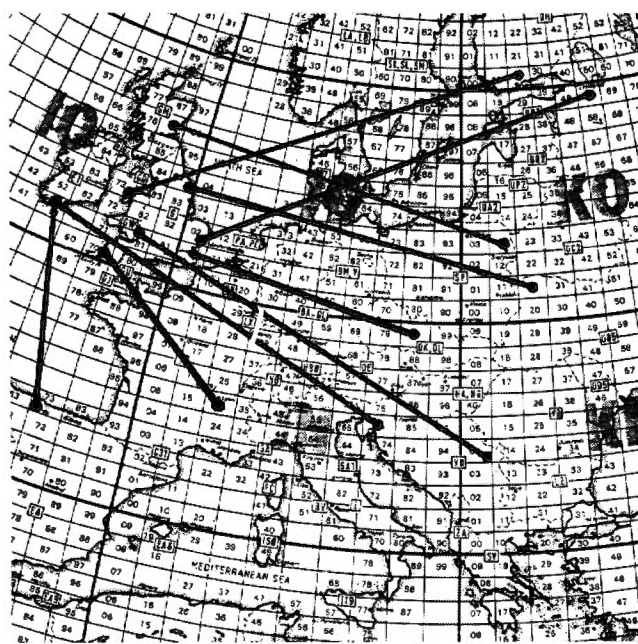


Fig. 1: How the longer distance QSOs from June 5 look on the map.

because of the passage of a number of coronal holes the geomagnetic levels were kept up to substorm level. The last week of June saw very little solar activity apart from a small proton event on June 30 which started a small magnetic storm.

Aurora!

For many v.h.f. operators, the period from June 4-14 won't be forgotten very quickly. I've lost count of all the operators who were heard to say "Oh no! Not another aurora!" Most of you probably got away with it, although I had to do the washing up for a week afterwards! I gave details of the June 5 opening in last month's column, but as a reminder, the day started off with an opening to GM, LA and SM between 0630-0730UTC, followed by a widespread opening, between 1330-2100UTC, in which virtually every country in Europe could be worked from the UK. The opening spread down to northern Spain, across to Italy, over to Yugoslavia and Romania, up through the nearer Russian republics to Finland, Sweden and Norway. The illustration, Fig. 1, shows some of the longer distance contacts made during this opening.

John Lemay G4ZTR (J001) sent in a report, as he wanted to let readers know what can be worked with a modest system, rather than that of the mega-stations. Running 80W into an 11-element Yagi on June 5, he worked a total of 24 stations including HA4XT (JN96), HG1WD and HG1YV (JN87), OK2PZW (JN89), YU2CCY (JN85), YU2VR (JN95) and YU3ZW (JN86).

Ralph Sachs G2CZS (J001) first

heard the event on June 5 whilst listening to the 28MHz band. Signals had a distinctive auroral 'rasp' so he immediately moved up to the 144MHz band and worked a number of stations including F6EAM (JN05) for a new square, DB8KJ (JO30), DF5DP (JO31), G14GVS (IO74) and PA3EXS (JO32).

Tom Cocking EI4DQ and **Charlie Coughlan EI5FK** both report contacting EA1NV (IN73). Charlie worked him at 1840UTC on June 5 and Tom found him at 1755UTC on June 10.

Auroras continued daily, being heard in central England through to June 14, with smaller events occurring on June 17 and 23. I've received a tremendous response from readers regarding these events but unfortunately I cannot report on everything sent in to me. If it's any consolation, I do try to tabulate all the results in the RSGB 'Six Metre and Up DXer' and every relevant letter is passed to the Propagation Studies Committee for evaluation.

Mervyn Rodgers GM0GDL (IO86), worked LA5IH (JP20) during the event on June 8 and on June 10 worked 34 stations in 2 hours, notable contacts including DH4SAN (JN49), DF6IY (JN48) and EI4EY (IO52).

At my QTH, the event on June 10 was quite good, allowing me to work 16 countries, between 1350-1840UTC. The best c.w. contacts including HA4XT (JN96), HG3GR (JN86), HB9BZA (JN37), OE3JPC (JN88), OE3XHF (JN76), SP20FW (JO93), SP7DCS (JO91) and SM1ALH (JO97). I found the aurora on June 13, from 1700-1830UTC, to be quite interesting, as all my DX contacts were made in an eight minute period between 1753-1801UTC. During this time I worked SM7SCJ (JO65), SP20FW (JO93), HG0HO (KN07) and OK1SC (JO70). Did anyone else work anything unusual at these times?

Meteor Scatter

Although the Perseids shower occurs between July 20 to August 23, most operators are particularly active during the period August 8-13. The theoretical peak this year will be on

Annual c.w. ladder

Station	Band (MHz)				Points
	50	70	144	430	
G4ASR	22	2	173	—	197
G4OUT		4	91	—	95
G0FYD	10		37	—	47
GW4VXX			11	—	11
GM4CXP	1		6	—	7

Number of different stations worked since 1 January 1991

Annual v.h.f./u.h.f. table January to December 1991

Station	50MHz		70MHz		144MHz		430MHz		1296MHz		Points
	Counties	Countries	Counties	Countries	Counties	Countries	Counties	Countries	Counties	Countries	
G6HKM	47	36			47	12	12	3	10	2	169
G8ESB	4	2	14	2	66	7	32	6	8	2	143
G4LDR	23	9	8	2	44	11	32	3	—	—	132
G4ASR		32	41	5	10	26					114
G8PYP	13	16	1	1	19	9	8	4			71
GM4CXP	2	1	2	2	22	3					32
GW7EVG					15	5					20

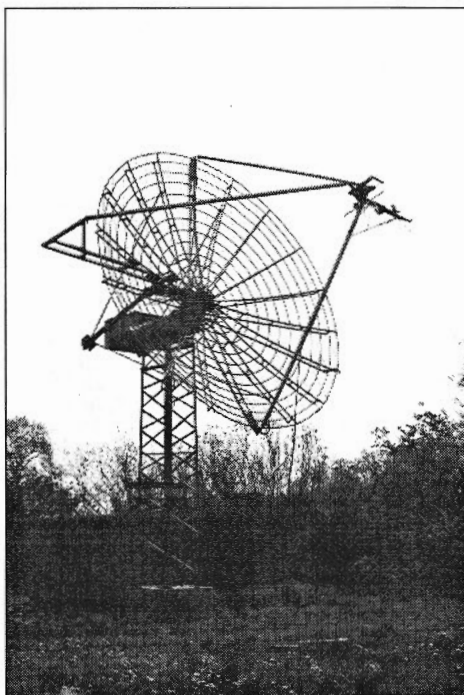


Fig. 2: The OZ7UHF e.m.e. dish.

Monday 12th, and no doubt many operators will be taking a days holiday or alternatively, may be struck down by that rare 24 hour disease called perisiditis! If my boss reads this, I'll have to take it as annual leave! The Perseids shower is circumpolar, which means that it does not set and is therefore usable, in particular directions, throughout the 24 hours. Between 1000 to 1400UTC beam north-east or south-west, 1400 to 2200UTC beam east or west, 2200 to 0200UTC beam south-east or north-west. There is no well defined peak for the north-south path, it generally being good at all times except between 0500-0900UTC and 1700-2100UTC.

Moonbounce

The Copenhagen Engineering College e.m.e. station, OZ7UHF, uses an unusual method of antenna rotation. The 7.5M dish, shown in Fig. 2, is hydraulically powered, enabling it to be moved very rapidly in both azimuth and elevation. The dish is used mainly on 430MHz, but it still exhibits a good performance up to 3GHz. Later this year it will be extended to 9.5m diameter, and a finer mesh will be placed in the centre section to enable it to work on the 10GHz band. The picture, Fig. 3 shows Peter Hall SM0FSK, the Swedish v.h.f. manager (left) and an OZ club member outside the e.m.e. shack.

The 50MHz Band

On June 14, Yugoslavia became yet another European DXCC country to be allowed 50MHz operating privileges. Class A amateurs, the highest class, can operate between 50.0-51.9MHz, on a secondary basis, provided no interference is caused to any other services within the band. Operators are permitted to use A1A, J3E, F1B and F2B with powers up to 10dBW in urban locations and 20dBW outside of these locations. Stations heard during June included YT2AQ, YU2SB, YU2EY, YU3AN, YU3EA, YU3ES, YU3EU, YU3GO, YU3OV, YU3UF and YU3ZM, the SRJ v.h.f. manager.

During June, it was also learnt that additional 50MHz permits have been granted to Romanian amateurs. For the past year, YO2IS has been the only operator with a permit, but now he is joined by YO7VS, YO7VY and YO9HP.

Band conditions were very lively during June, allowing up to four continents to be worked from the UK. Sporadic-E was quite prevalent during the month, apart from the period between June 4-14 when aurora was the predominant propagation mode. Many operators made their first DX contacts via Sp-E and I recorded over 30 European countries that were available via this mode. If you listened very carefully between the S-9+ local European stations you could have found some choice DX stations. A number of stations worked into Asia, contacting 4X1IF (KM72) on June 1 and 2, ZC4MK (KM64) on June 2 and 5B4JE (KM64) on June 29. There are still a number of rare European countries left to work and a number of operators were fortunate to work HV3SJ (JN61) around 0830UTC on June 16. Although not as rare, CU3/K6EDX (HM68), provided

many with a new country. He had propagation into the UK on June 6, 12, 16, 19, 21, 22, and 24. Even nearer to home, OY9JD (IP61), was heard working into the UK on a number of occasions. During one opening, between 1930-2000UTC on June 16, the skip distance shortened considerably and many GM stations were worked from central England. Openings into Africa occurred on June 2, 8, 16, 20, 21, 23, 26 and 28, some of the notable call signs being A22BW, CN8ST, V51W, ZS6AXT, ZS6WB, ZS9A, Z23JO, 7Q7JA, 7Q7RM, 9J2HN and 9L1US. What is claimed to be the first signals heard this season, from North America, came in a report from **Ted Collins G4UPS**. At 1745UTC on June 6, he heard VO1NE calling CQ and a few minutes later the beacon VO1ZA was heard peaking 579. It faded out with Ted at 1810UTC although later in the evening, from 2200UTC in an opening lasting one hour, stations in northern England worked VE1MR, VE1XDX, VE1ZZ and VO1QF. Other weaker openings occurred, with W3EP being heard at 1809UTC on June 19 and K2QIE and VE3UD being heard around 2030UTC on June 23. Did any of you hear these North American openings?

The 70MHz Band

The appearance of ZB0W on a number of occasions, and the string of auroras all served to bring an increase in activity to this much under used band.

Paul Newcombe ZB0W (IM76) has kindly forwarded copies of his 70MHz logs, giving details of recent UK contacts, made via Sp-E.

His first contact of the season was with G3UKV (IO82) on June 2 at 1224UTC. This opening continued until 1540UTC, enabling 72 QSOs to be made on s.s.b. and f.m. Some of the notable contacts included EI4AEB (IO63), GJ0FTZ, GJ1TJP and GM3TAL (IO86) for the best DX at 2208km. Mention must also be made of **Steve Carey G4MJW** (JO01) who made his first s.s.b. QSO ever on 70MHz, with ZB0W, at 1340UTC. I hope Steve doesn't think this happens all the time! **Mark Dickinson G0GTI** also gets a mention, as he made the most of the opening by working Gibraltar from three different locations. Apparently, G0GTI is trying to obtain the RSGB Four Metre and Down Award whilst at home, mobile and portable! Paul ZB0W is also trying to gain this award and contacts made during this opening provided five countries and 30 counties. The next opening to the UK occurred on June 15, between 1607-1935UTC, with 37 contacts going down in the log. One of the QSOs was with G4WND/M, who needed ZB from his home location. Turning the car around, he managed to get within 1km of his QTH, but the band conditions changed and ZB0W disappeared into the noise. There was a happy ending to this story, as G4WND

SPECIALISTS IN DRESSLER ACTIVE RECEIVE ANTENNAS

NEW ARA 1500

50-1500MHz
Now UPGRADED Sept 90

'N' Type Connection

Gain 11.5dB
Noise 3.0dB
Intercept point
3rd Ord
+ 21dbm



£163.00

Now with fully
tuneable
interface.

EXCITING NEW SHORTWAVE ACTIVE ANTENNA

ARA 60

30kHz to 60MHz up to 100MHz.

Size: 940mm high
64mm diameter

Gain: 11dB

Intercept point 3rd order + 44dbm

£163.00

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

dressler
COMMUNICATIONS LTD.

191 FRANCIS ROAD
LEYTON • E10 6NQ • LONDON

TELEX 8953609 LEXTON G

PHONE 081-558 0854 081-556 1415

FAX 081-558 1298

24hr Hotline ansaphone No: 081-558 0854

OPEN MON - FRI 9AM - 5.30PM

OPEN SAT - 9.30AM - 4.30PM

INTEREST FREE HP FACILITIES AVAILABLE

ON MANY ITEMS

PROMPT MAIL ORDER



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

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

IC24ET £299

Few Only IC-2400 £499

ICOM

IC781

IC970 E/H

IC725

IC726

IC2SE

IC2SET

IC765

4 ONLY £2175

ICR100

ICW2 NOW IN STOCK

IC-R9000 inc

IC7100 New super scanner

IC2410 Mobile

IC4SRE

IC2SRE

ARA60 + AR1500

£4000

ALL SPECIAL PRICES

PHONE FOR PRICES
INCLUDING PACKAGE DEALS

ICR1
£325



ICR72
+ ARA 60
+ FM
£699



**SPECIAL STOCK
CLEARANCE
OFFER**

ICR71
ARA60
£875

ICR7000
ARA1500
£1015



FRG 8800 OR
ICOM R72 OR
KENWOOD R2000

£585

LARGEST U.K. ICOM DEALER Authorised Kenwood Dealer

KENWOOD

R5000 with ARA60	£925
R5000 on its own	£895
R2000 on its own	£599
TS790E	£1525
TS850 inc PSU	£1325
TH77	£385
TH27	£234
TM741 (New Model)	£POA
Lowe HP225	£429
TS450 inc auto ATU	

All Kenwood Stocked

AOR 3000	£675
AOR 2000	£259

SHINWA SR001
PRICE BREAKTHROUGH
£325

LARGEST LONDON YAESU DEALER

YAESU

FT5200	FT736
FT26	FT1000
FT76	FT757GX
FT900	FT747GX
	FT767

STANDARD

C5608	£599
C528	AX700
C112	C5608
	FEW ONLY
C500	£299

NRD

NRD535 only

£1015

NRD535 with ARA60 £1115

COME AND VISIT OUR TOTALLY REFITTED LONDON SHOWROOM
WE NOW HAVE AN EXTENSIVE RANGE OF PRE-OWNED UNITS

was the first station to respond to CQ calls from ZBOW, during another opening on June 18. This event, between 1648-1930UTC, produced 30 QSOs, the best DX being with G8PNN (I095). The band was also open the next day, June 19, from 1700-1900UTC, but unusually, although the GB3ANG and GB3REB beacons were both copied at good strength, (up to 599), no contacts were made. A similar opening was observed on June 21, between 1551-1630UTC, with only the GB3CTC and GB3REB beacons being heard. The final opening in June occurred on the 22nd, when nine stations were worked on f.m. between 1411-1512UTC. **Steve Potter G1JHZ** (I082) was one of the lucky stations to make a first contact with Gibraltar. Steve uses a modified Pye Westminster running 28W of f.m. on 70.260MHz and 70.450MHz. He mentions he was getting bursts of French language on 70.450MHz, a point that ZBOW also makes. Paul was getting severe QRM from this network and wonders if anyone knows what allocations other countries have on this frequency band? By the time the last contact had gone down in the log, ZBOW had worked five countries and 45 counties. He is hoping that by the time he leaves Gibraltar in August, he would have worked the required 6+60 for the RSGB award. The only problem is that he still requires ZB on 70MHz!

Gordon Smith GW6TEO (I071) reports that he worked ZBOW on June 2 via Sp-E but missed most of the auroras because of work commitments. However, he did manage to catch the event on June 10, working G18AYZ (I064), GW4HBK (I081), G4SEU (I092) and G8GXP (I093).

At my QTH, the recent auroras allowed s.s.b. contacts to be made with G6VXB (I097) on May 14, G18AYZ and G4WND (I092) on June 9, G4M4CXP and G4MDIJ, both in I085, on June 10, and G4S4LZ (I083) on June 11.

Alan Dimmick RS37241, located in Glasgow, regularly listens to the band. He uses an FR101 receiver with internal converter, a BF981 pre-amplifier and an HB9CV antenna. During the WAB contest on June 9 he heard signals from G3UKV, G4ASR, G6HRC/P and G8BBN, the expedition station located on the summit of Ben Nevis.

The 144MHz Band

Conditions during May and June were quite interesting with a variety of propagation modes, such as aurora, ionoscat, meteor scatter and tropo, which enabled many operators to work the DX.

But where was the Sp-E? It was most probable that the upsurge in geomagnetic activity, although producing exciting auroras, was the mechanism that disrupted the required E-layer ionisation.

Having said that, it should be noted that stations in Holland and Germany did enjoy a few openings. On June 15

at 1930UTC, PE1NMP (J032) worked EA5GTC (IM98) and in the same opening DL1GNM (JN38) heard CT1WW. A few minutes later, between 1947-1949UTC, DB4VQ (JN39) heard EA1EIL, EA4CTP and EB4DNA. There was a good Russian opening on June 16 which allowed DL8LAQ (J043) to work, between 1824-1925UTC, twelve UA3 stations and hear five more. The next day also produced an opening, with DB4VQ working LZ1KWF (KN12) and LZ2CM (KN13) between 2148-2203UTC. The band was open between 1553-1634UTC on June 22, with DL1GNM hearing EA4, EA7 and ZBOW. I wonder if anyone in the UK heard anything on the 144MHz band at these times? My propagation log shows a remarkable correlation between these events and what was happening in the UK on the 50MHz band.

Beacon And Repeaters

The GB3LER beacon on 144.965MHz presently uses a 10W transmitter into a 6-element Yagi, on a beam heading of 22°. This beacon was originally intended to indicate the presence of auroral type propagation, however it is located too far north for many auroral events. Recently, forms of Sp-E and ionospheric scatter propagation associated with auroras have started to be used by radio amateurs. The GB3LER site, on the Shetland Islands, is an ideal location for research into both these propagation modes but requires a high power transmitter and a commercial grade antenna system. The RA have recently approved an application to allow the 144MHz beacon to use two 6-element Yagis, beaming at 45 and 135°, each fed with 100W. In addition, permission has also been granted to add two more beacons at GB3LER, one on 50.064MHz and the other on 432.965MHz. The 50MHz beacon, which will run 20W into each of two 3-element Yagis, will provide an interesting comparison to the results obtained from the 144MHz beacon. The 430MHz beacon will run 20W into a 12-element Yagi and will provide information on tropospheric propagation and may also show interesting effects during intense auroral events. Beacons such as these are only co-ordinated by the RSGB. They are **NOT** centrally funded and are usually set up and run on an entirely voluntary basis. Unfortunately, projects like these cannot rely on an organisation with local members, such as a repeater group, for funds. **Andy Steven GM4IPK** has procured all of the equipment for the beacons, and although some of it has been provided free of charge, a large proportion has had to be paid for at cost. Andy is quite disheartened by the response from radio amateurs to help with the funding but is determined that the beacon project will succeed. If you wish to contribute towards the GB3LER fund, you can contact Andy at 27 Dalsetter Wynd, Dunrossness, Shetland ZE29JJ

or telephone him on (0950) 60312.

What may be the worlds most northerly 50MHz beacon, LA7SIX in JP99LO, is now active on 50.050MHz. Yes, I know it clashes with GB3NHQ! Examples such as this show the need for other societies in IARU to adhere to the standing principal of frequency co-ordination and band planning.

Mike Corbin GU8IRF is now running a personal beacon on 2320.071MHz. Running 0.5W, this beamed transmission can be turned towards the receiving stations direction on request.

DXpedition Update

Further information regarding the scientific expedition to Greenland has been obtained from REF, the French amateur radio society. It's been cancelled! However all is not lost, as OZ1DJJ will be active on 50MHz from various squares in Greenland during August and September. Using the call sign OX3LX, he will operate from HP15 between August 21-September 3 and from GP52 between September 17-26. He will be running 50W into a 5-element Yagi whilst in HP15, but only a dipole from the other location.

By the time you read this, the joint Estonian/Swedish expedition, ES0SM, to Saaremaa Island (K008XL) will be under way. They intend to start the 24 hour per day operation on August 8 and expect to leave the island on the 18th. The main emphasis will be via meteor scatter on 144.177MHz, transmitting during the first two and a half minute period. A non m.s. operation is planned every day between 1900-2000UTC on 144.177MHz calling CQ in c.w. or s.s.b. In the case of good tropo, aurora or other types of propagation, the meteor scatter operation will be stopped. The equipment will consist of a 3X150 amplifier, 15-element Cue-Dee Yagi and 1dB noise figure mast-head l.n.a. A second station, using a solid state amplifier and 9-element Yagi, and the same call sign, ES0SM, may possibly be used simultaneously during the peak of the shower. A 430MHz station, consisting of a solid state amplifier and 21-element F9FT Yagi will be available during good tropo or auroral conditions. Schedules can be made by contacting them on 14.345MHz at 1400UTC or 3.640MHz at 1700UTC. If you make a contact, send your QSL card via Lasse Melin SM0KAK, Platavagen 18, S-19150 Sollentuna, Sweden. A previous information release however, said that cards should be sent to ES2WX, Box 13, Viimsi, 203 006 USSR.

Another expedition that is already active is the trip by the Five Bells group, G4DHF, G4ODA, G4PIQ and G8IJC, to the Faroe Islands. The group are well known for their previous expeditions, particularly the excellent trip to Iceland in 1990. This years expedition, from IP61, commenced on August 4 and is scheduled to finish on August 15. They

plan to operate via all propagation modes, including e.m.e. as appropriate, on 50.125MHz, 144.028MHz, 144.215MHz, 432.028MHz and 432.215MHz. The equipment for 50MHz will run 20W into a 4-element Yagi. On 144MHz, they will use a 3CX800 p.a. and a group of four 16-element Yagis. On 430MHz, a similar set-up consisting of a 3CX800 p.a. into an array of four 21-element Yagis will be used.

Between August 10-25, Clive O'Hennessey GW4VXX will be active on 144MHz from Lairg (I078) using the call sign GB2XS.

During August, Philip Lancaster GOISW will be on holiday in the Paphos area of Cyprus and is hopeful that he can obtain permission to operate on the 50MHz band. He will be using an Icom IC505 and Yaesu FT767, feeding a variety of antennas. If Philip does get a permit, it is unlikely that anyone will hear him in the UK, as August is not normally one of those months that you can expect to work into Cyprus via multi-hop sporadic-E.

QRZ Contest!

The Swedish Six Metre Group are holding a meteor scatter contest on August 11-12 between 2200-0400UTC. Only m.s. contacts over distances greater than 500km will count and all QSOs must be made within the band 50.150-50.300MHz. Strangely, these band limits do not include the recognised IARU s.s.b. meteor scatter calling frequency on 50.350MHz! Further details of this contest were given in last months column.

The RSGB 430MHz fixed station contest will be held on August 25 between 1600-2000UTC. It has sections for both single and multi-operators.

The first in a series of 144MHz c.w. cumulatives will commence on September 4 between 2030-2300 local time. The other dates are September 20, October 7, October 23 and November 8. Only fixed QTH, single operator stations are allowed to compete.

An IARU co-ordinated 144MHz contest takes place during the weekend of September 7-8. Starting at 1400UTC, it lasts for 24 hours, giving plenty of time to winkle out those rare squares.

The ARRL are holding their v.h.f. QSO Party on September 14-16. You never know - 50MHz might be open! If it isn't, you can always listen on 144MHz for the WAB 144MHz QRO contest being held between 0900-1700UTC on September 15. Stations exchange RST, serial number, WAB area and county.

Cumulative microwave contests, for all bands between 3.4GHz and 24GHz, will be held between 0900-2100UTC on August 18, September 15 and October 20.

Scandinavian activity contests will be held on the following dates, 50MHz activity on August 27, 144MHz on September 3, 430MHz on August 13 and

Back-Scatter

September 10 and Microwaves on August 20. All sections run between 1700-2100UTC. You can obtain a full set of rules by sending me a stamped addressed envelope.

Deadlines

Please send your letters to reach me by the end of the month. I always write up the column in the first few

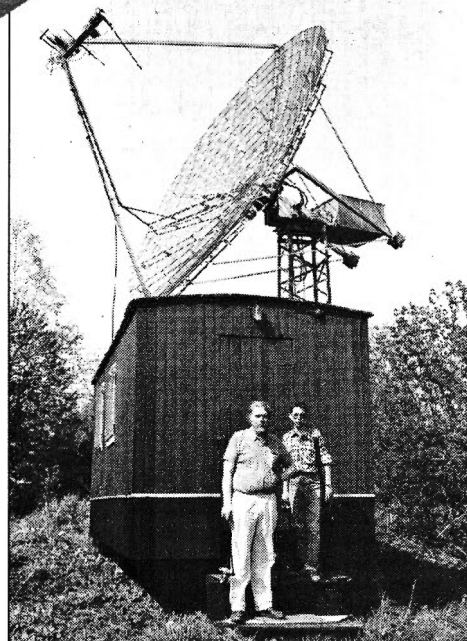
days of the following month. Don't forget that I can also receive messages via packet radio at my mailbox GB7TCM.

Photographs of your shack, antennas or any v.h.f. activity are especially welcome. Other pictorial items such as QSL cards, awards, certificates etc are also required. These can all be returned if necessary.

144MHz QRB Table

Top distances (kms)		
Tropo	3160	GM4YXI
Aurora	2029	G4ASR
Sp-E	3080	G0EVT
Meteor	2107	G4ASR

Fig. 3: The OZ7UHF club shack.



Back-Scatter

Broadcast Round-up

Reports to Peter Shore via the PW Editorial Office

Israel Radio has won a temporary reprieve from major reductions in its operation. The station was due to have its output curbed by well over half on July 1, but the authorities decided to postpone a decision on Israel's external service for two months, whilst an investigation into its role and reach is carried out. There were sighs of relief all around the station from staff who feared for their jobs.

Radio Sofia in Bulgaria has introduced a new schedule which reduces its output by around 50 hours, and English is one of the languages with less hours. Details of the new schedule are in the Europe news section.

Meanwhile, Radio Exterior de Espana launched a 24-hour-a-day Spanish language World Service on July 1. This new service is carried not only on short wave but also on satellite for listeners in Latin America.

Radio France International plans to start using spare capacity on Hungarian short wave transmitters, to improve reception for listeners in Africa. This has been possible as a result of Radio Budapest's cuts at the end of June. The agreement was due to be concluded with the Hungarian authorities in early July.

A report on Radio Japan's *DX Corner* programme suggests that the short wave service of Radio Kuwait will be back on the air within the next eight months, with full operation two years later. There are no specific details on whether the English service will come back on the air when short wave broadcasts first resume.

Italian Radio, RAI, seems to be in rather a poor state of health at present. A report in the station's magazine says that RAI's external service cannot be heard at all well in many parts of the world and that a plan to re-equip the short wave transmitting station at Prato Smeraldo, where much of the equip-

nels and it is possible to overwrite any of the memories which have been pre-programmed. Stereo sound is available through headphones for f.m. broadcasts. Switchable u.s.b./l.s.b. is provided and the synchronous detector remains in the set. I'm told that the new SW 77 will be on sale in the UK during September, with a smaller version, the SW 55 with many of the same facilities, available in the late autumn.

Panasonic also has a new receiver, to be launched at around the same time as Sony's. The RF-B45 replaces the earlier RF-B40 and includes s.s.b. The design of the whole set is more attractive with a convex keypad area.

More comprehensive details of both the Sony and Panasonic will appear in the coming months in *Short Wave Magazine*.

Europe All times GMT (=UTC)

Radio Sofia's current English schedule:

0300-0315 on 17.825, 15.16 and 11.72MHz

1730-1900 on 17.825, 17.78, 15.33, 11.765, 11.72 and 11.66MHz

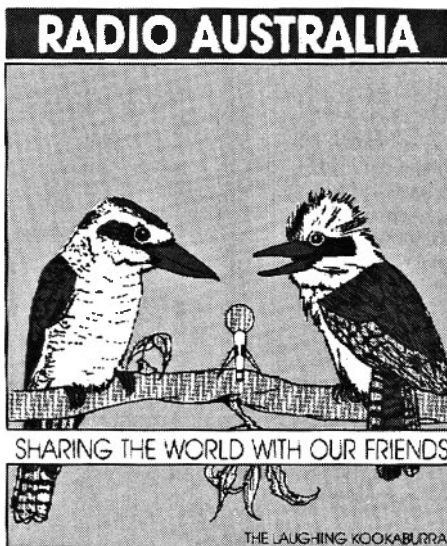
1945-2030 on 17.825, 17.78 and 11.765MHz

2145-2400 on 17.825, 15.37, 15.33, 15.11, 11.71 and 11.66MHz

Roy Merrill reports that the 1700 broadcast offers reasonable reception on 11.66 only, although 11.72 improves after 1730.

Iceland now transmits news in English, heard only Monday to Friday at 0730 for fifteen minutes. The frequencies are 9.265, 6.10 and 3.295MHz.

The Italian Radio Relay Service which carries programmes in various languages, including some from United Nations Radio, operates on 9.815MHz Monday to Friday 0700-0900, Monday



Examples of wildlife from Radio Australia.

ment is now obsolete, was suspended because of lack of funds. The new head of the overseas service plans a reorganisation, which will result in a rationalisation of the 26 languages which RAI transmits now, together with the formulation of a new strategy. This will concentrate on new geographic areas of political and commercial interest such as China and Japan.

If you are in the market for a new short wave receiver, don't rush out to your favourite dealer just yet! There is

news from Sony that the replacement for the ICF-2001D is en route. Known as the ICF-SW 77, the new receiver will offer all the same facilities as the 2001D together with a whole lot of new ones. These include the ability to tap in a station name and page through all the frequencies for that broadcaster (many of which will have been pre-programmed in the factory), saving the need to memorise either tens of frequencies or carry a copy of *PW* round. There are 160 different memory chan-

PRESTON AMATEUR RADIO SOCIETY invite you to our 24th ANNUAL MOBILE RALLY

to be held at
UNIVERSITY OF LANCASTER
on September 1st, 1991

Bring & Buy, Trade stands, Clubs and Repeater Groups.
Snack bar, licensed bar and restaurant. Talk-in £22

Opens 11am (10.30 for disabled). Admission by programme £1
with free draw for colour TV set and other prizes.

Ample FREE PARKING on campus.

Enquiries to George G3ZXC. Tel: (0772) 718175
or Godfrey G3DWQ Tel: (0772) 53810

TENNAMAST for TILTOVERS

GM6OAL - GM4VHZ - GMONHH

Our wind up, tiltover Tennamasts are now better than ever. We continue to expand the range, and now galvanise all our masts to BS729. They are safe and easy to use; slim, elegant and economically priced.

BEAM KITS Homebrew your own GM4UTP 5 Band Quad or VK2ABQ Beam with our low cost kits. We can supply Head Units separately to suit, 2-3".

THE HUSTLER. The ultimate mobile now available.

Call 05055 3824 (24 hours) for
Brochure and Info plus
friendly technical advice

TENNAMAST SCOTLAND
81 Mains Road, Belth, Ayrshire KA15 2HT



SANDPIPER COMMUNICATIONS

6 Metre Aerials

Complete set of parts
for F. C. Judd's PW-50V
(see this issue) £25.00 inc p&p

Other 6 Metre Aerials:

Price includes p&p

- 2 Element HB9CV£19.00
- 3 Element Yagi£39.00
- 4 Element Yagi£47.00
- 6 Element Yagi£64.00

Cheques/Postal
Orders/Visa/Access to:

Sandpiper

Communications

Unit No 5, Enterprise House
Cwmbach Ind Est, Aberdare,
Mid Glamorgan CF44 0AE

Tel: (0685) 870425

Fax: (0685) 876104



Books for
radio amateurs

NAVICO



**AERIAL
ACCESSORIES
AND
MASTS**



**ELLIOTT
ELECTRONICS**

for the Radio Enthusiast



MICROWAVE MODULES

**INSTANT HP
AVAILABLE**
WHILE STOCKS LAST



**QSY
OLD
MAN TO**

**JAYBEAM
AMATEUR
ANTENNAS**
RIGS, ANTENNAS, SWR BRIDGES,
POWER SUPPLIES, TEST GEAR,
COMPONENTS, MORSE KEYS, COAXIAL
CABLES, ROTATORS, MICS, PLUGS
AND SOCKETS, SWITCHES

Call us on (0533) 553293
OR COME AND LOOK AROUND AT
60 Hinckley Road, Leicester LE3 0RB

APPOINTED
DISTRIBUTOR

MAKE YOUR INTERESTS PAY!

Over the past 100 years more than 9 million students throughout the world have found it worth their while! An ICS home-study course can help you get a better job, make more money and have more fun out of life! ICS has over 90 years experience in home-study courses and is the largest correspondence school in the world. You learn at your own pace, when and where you want under the guidance of expert 'personal' tutors. Find out how we can help YOU. Post or phone today for your **FREE INFORMATION PACK** on the course of your choice. (Tick one box only!)

Electronics	<input type="checkbox"/>	TV, Video & Hi-Fi Servicing	<input type="checkbox"/>
Basic Electronic Engineering (City & Guilds)	<input type="checkbox"/>	Refrigeration & Air Conditioning	<input type="checkbox"/>
Electrical Engineering	<input type="checkbox"/>	Car Mechanics	<input type="checkbox"/>
Electrical Contracting/Installation	<input type="checkbox"/>	Computer Programming	<input type="checkbox"/>
GCSE/CSE/SCE over 40 examination subjects to choose from			

Name _____

Address _____



International Correspondence Schools, Dept. EES91 312/314 High Street, Sutton, Surrey SM1 1PR. Tel: 081-643 9568 or 041-221 2926 (24 hrs.)

QUARTZ CRYSTALS

QuartzLab MARKETING LTD

P.O. Box 19 Erith Kent DA8 1L

Telephone: 0322 330830

Fax: 0322 334904

Telex: 8813271 GECOM-S

(Attention QUARTSLAB)

An SAE with all enquiries please
PRICES INCLUDE P&P and VAT

STOCK CRYSTALS

CRYSTALS FOR 2 METRES

HC25 £2.76 FOR ONE CRYSTAL £2.55 EACH FOR 2 OR MORE

TX CRYSTALS
12MHz 30 & 40pF

RX CRYSTALS
44MHz Series Res R0-R7, S8-S23,
14/15MHz 30pF Scanner Crystals

SR9 crystals £2.50

HC6 £2.88 FOR ONE CRYSTAL £2.80 EACH FOR 2 OR MORE

TX CRYSTALS

4MHz 30pF

RX CRYSTALS
44MHz Series res R0-R7, S20-23

4 METRE CRYSTALS FOR 70.20 IN NCB/U at £2.85 each

TX 8.78250 RX 29.7800

70CM CRYSTALS £6.50/pc or £3.35 each

For Pye PF1 PF2 & PF70 series and FDK MULTI U11 SU20 RB0 RB1 RB2 RB3 RB4 RB5 RB6 RB7 RB8 RB9 RB10 RB11 RB13 RB14 RB15.

Also for MULTI U11 ONLY SU16 SU18

CONVERTER CRYSTALS IN NC18U AT £3.35 each.
22.000, 38.666, 42.000, 96.000, 116.000

FREQUENCY STANDARDS £3.20 each.

HC6U 1000kHz 10.00MHz

HC18U 7.00MHz 10.00MHz 10.70MHz 48.00MHz 100.00MHz

TONEBURST, LF & MPU CRYSTALS IN NC18 £2.80 each.

7.168MHz (For 1750 Hz Tone), 10.245 (for 10.7 I.F.)

3.2768 4.000 5.0688 10.245MHz 15.00000

YAESU CRYSTALS FOR FT101's FT801 & etc £4.70 each.

Many available ex stock (A list is available on request please send S.A.E.)

Full list available on request, please send SAE

MADE TO ORDER CRYSTALS

FUNDAMENTALS	PRICE	FUNDAMENTALS	PRICE
1.5 TO 2.0MHz	£8.00	3rd OVT 21.00 TO 65.00MHz	£3.35
2.0 TO 6.0MHz	£5.80	5th OVT 60.00 TO 110.00MHz	£3.80
6 TO 21MHz	£5.35	5th OVT 110.00 TO 125.00MHz	£8.75
21 TO 25MHz	£7.05	7th OVT 125.00 TO 175.00MHz	£11.80

DELIVERY: Approx. 2 weeks.

Unless otherwise requested fundamentals will be supplied for 30 pF load capacities and overtones for series resonate operation.

HOLDERS — supplied for crystals above 2MHz.

HC6/U & HC33/U 1.5-175MHz
HC18/U & HC25/U 2-175MHz
HC17 Add £1.00 HC45 Add £3.75

DISCOUNTS: Price on application for 10 + units to same frequency spec. or bulk purchases of mixed frequencies.

COMMERCIAL CRYSTALS: available on fast delivery and at competitive prices.

EMERGENCY SERVICE: Add the surcharge for each XTAL. Days refer to working days 4 days + £12, 6 days + £7, 8 days + £5, 13 days + £3.

CRYSTAL SOCKETS HC25 £0.25 ea. MINIMUM ORDER CHARGE FOR SOCKETS

£1.50 unless ordered with crystals.

TERMS: Cash with order post inc. to UK & Northern Ireland. Cheques & PO's to QSL LTD.

PRICES INCLUDE P&P and VAT

Back-Scatter

1100-1200, Wednesday 1200-1300, Friday 1300-1400, 2130-2300, Saturday 0900-1100, 2130-2300 and Sunday 0600-1700 and 2130-2300 (all these times are Central European - GMT plus two).

Radio Portugal can be heard with English Mondays to Fridays only:

0230-0300 on 11.765, 9.765, 9.705 and 9.60MHz (Tue to Sat GMT)
1600-1630 on 15.425MHz
1900-1930 on 11.74MHz

From the Soviet Union comes news of a new station operating in Vilnius, Lithuania. Radio Centras is a commercial station which can be heard each Saturday on short wave on 9.71MHz at 0600-0700. Broadcasts are in English and Esperanto and reports can be addressed to Box 1792, Vilnius, Lithuania. Enclose two international reply coupons when writing.

Radio Vilnius with English at 2300 on 11.79 offers clear reception at present.

Roy Merrill says that Radio Kiev is regularly heard in English at 2100 on 9.865 for an hour, in parallel with cluttered 5.96MHz. The station can also be heard in Ukrainian at 1900 on 9.60, following on from a German transmission of Radio Minsk which starts at 1800.

Another new commercial station that can be heard on short wave from the Soviet Union, is Radio Vedo from Volgograd. It is heard in Russian at 1600 on 13.71MHz.

Radio Yugoslavia is probably a station worth keeping an eye on as the country slides towards civil war. English from Belgrade is at:

0000-0045 on 11.735 and 9.62MHz
1200-1230 on 21.60, 17.74 and 17.725MHz
1830-1900 on 15.165 and 6.165MHz
2100-2145 on 11.735 and 5.96MHz

Middle East and Africa

Abu Dhabi in English is on the air at 2200 until 2400 on 13.605MHz with Roy Merrill reporting SIO of 544 or better, although Australia is in the background in Chinese.

ORT Benin Cotonou on 4.87MHz has been quite strongly heard lately, with English news at variable times between 2000 and 2020. CRTV Yaounde on 4.85MHz has been similarly rated recently, up to SIO 533 - with an English programme 2100-2130. There is often good musical entertainment from CRTV Douala on 4.795MHz, in French, from around 2130 up to SIO 343.

Radio Comoros has been rediscovered on short wave, with programmes in French, Arabic and local languages at 0900 on 7.26 changing to 3.33MHz at 1500.

The Voice of Ethiopia can be heard in English 1500-1600 on 9.56 and 7.165MHz.

From Equatorial Guinea comes Africa 2000, in Spanish, on 6.907MHz fading



in around 2000 closing at 2130. This station is funded by the Spanish Ministry of Co-operation to promote Spanish culture in Central Africa.

Roy Merrill notes Iraq on 15.605 and 17.95, weakly received from around 1300 until after 2315. The 15.605 channel is marred by a jammer.

The Maltese station, Voice of the Mediterranean, can be heard clearly in English at 0600 until 0700 usually with only light QSB. One of the more interesting programmes has been a series dealing with the history of Malta. The transmitter used is at the DW relay station on the island.

Radio Mogadishu is back on the air on short wave after an absence of almost a year, and was noted on 7.198MHz during the evening.

Roy Merrill says that he regularly hears Voice of Nigeria on 7.255 from around 1800 until 2100 or later. Initially in French, English from 1900-2030 and later a return to French. The channel is partly blocked for considerable periods by Deutsche Welle, with BBC English at 2030.

The FEBA Radio on the Seychelles has a transmission to South Asia on 11.865MHz at 1500 audible from sign-on and often improves but is blocked by VoA in Estonian via Woofferton. Extra frequencies are on the air Wednesday-Saturday on 15.33 and 9.59MHz.

National Unity Radio from Khar-toum operates 1500-1700 on 9.535, in a variety of languages including English and Arabic.

An English service has been launched by the Republic of Yemen Radio in Aden. It is heard daily at 1600 on 7.19 and 5.97MHz.

Asia and the Pacific

Radio Afghanistan has English via the USSR at 1800-1900 on 15.51MHz with SIO to 544. There are two poor parallels on 11.845 and 9.635MHz.

Radio Australia has Thai at 2300-2400 on 13.705 which offers very good reception in parallel with weak signals on 15.38MHz. English is carried on the 13MHz channel from 2100 until 2300.

The frequency of 13.745 in parallel with 9.86MHz can be very variable (just like New Zealand), but sometimes gives good reception to 2030 and later. Indonesian can be heard signing on at 2100 on 9.505MHz co-channel with Alma Ata.

Radio Bangladesh is on the air with just one channel at present, although two are still announced. Try for English at 1230 on 15.20. A further English broadcast is scheduled 1815-1900 with frequencies of 12.03 and 15.255MHz.

Radio Japan is heard with English at 1700 on 15.345 via Sri Lanka with variable signals up to SIO 333. At 1900 it is scheduled via Gabon on 7.14 and on 11.865, 11.85 and 9.64MHz. A further relay via Gabon is noted, with far better reception, at 2300 on 11.735MHz.

Radio New Zealand International on 13.785 has been very variable at 1800, ranging from inaudible to good until fading takes over at 1840. Sometimes it appears only briefly past 1900.

Radio Pakistan's World Service in English signs on at 1700 with an initial announcement in Urdu on 11.57MHz. The broadcast, which starts with a very doleful tune, lasts one hour.

SLBC Sri Lanka can be heard in Hindi and other local languages on 11.80 from around 1515, although RDP tends to block the channel. It has offered reasonably clear reception between 1645 with the close at 1733.

The All-Asia Service in English has been noted on 9.72 after 1700 until close at 1730.

Radio Alma Ata initially noted on 5.96MHz at 2130 under Radio Yugoslavia and Radio Kiev with all three in English! The station is also on 17.73, 9.505, 5.97, 5.96 and 5.035MHz. Reception is difficult and variable, with 5.035 and 5.97 providing best reception. The announcement, noted by Roy Merrill, is "The International Radio Service of Kazakhstan, Soviet Union" and "External Short Wave service of Radio Alma Ata". The announcement goes on to list wavelengths of 59.58, 48.9, 41.49 and 333.3 metres. The station invites listeners' comments and reports to: Radio Alma Ata, 175 Mira Street, Alma Ata, Kazakhstan 480013, USSR.

The Americas

Radio Havana Cuba has English at 2200 for an hour on 11.705 but suffers co-channel QRM from Sweden in Spanish and French throughout.

Radio Rumbos, Venezuela, has appeared very strongly on 9.66MHz after 2145 whilst Radio Nacional da Amazonas on 11.78 becomes very prominent after 2230 on some days.

PLEASE SEND YOUR REPORTS FOR PETER VIA THE PW OFFICE.

HOW TO ORDER

POST AND PACKING: add £1.00 for one book, £2.00 for two or more books, orders over £40 post and packing free, (overseas readers add £1.75 for one book, £3.50 for two or more for surface mail postage) and send a postal order, cheque or international money with your order (quoting book titles and quantities) to **PW Publishing Limited, FREEPOST, Enefc House, The Quay, Poole, Dorset BH15 1PP**. Please make your cheques payable to Short Wave Magazine, payment by Access, Mastercard, Eurocard or Visa also accepted on telephone orders to Poole (0202) 665524. Books are normally despatched by return of post but please allow 28 days for delivery. Prices correct at time of going to press. Please note: all payments must be made in Sterling.

* A recent addition to our Book Service.

O/P = Out of print, O/S = Out of stock.

RADIO

AIR & METEO CODE MANUAL

10th Edition, **Joerg Klingensuss**
Detailed descriptions of the World Meteorological Organisation Global Telecommunication System operating FAX and RTTY meteor stations, and its message format with decoding examples. Also detailed description of the Aeronautical Fixed Telecommunication Network amongst others. 289 pages £15.00

HIGH POWER WIRELESS EQUIPMENT

Articles from *Practical Electricity* 1916-11
Edited by **Henry Walter Young**
A reprint of interesting practical articles from the very early days of radio. 99 pages. £8.95

RADIOTELETYPE CODE MANUAL

10th Edition, **Joerg Klingensuss**
This book gives detailed descriptions of the characteristics of telegraph transmission on short waves, with all commercial modulation types including voice frequency telegraphy and comprehensive information on all RTTY systems and c.w. alphabets. 96 pages. £8.00

RESCUE

Paul Beaver & Paul Berriff
This book follows the life and conditions of rescue helicopter crews. This is not drama, this is real life and it makes a true impression of the rescuers for the reader. There are transcripts of air/ground and between crew dialogues, a summary of the main distress and rescue radio frequencies and helicopter base locations. 192 pages. £9.99

SCANNERS (Third Edition)

Peter Roscoe G1DXD
A guide for users of scanning receivers, covering hardware, antennas, accessories, frequency allocations and operating procedures. 245 pages. £9.95

SCANNERS 2

Peter Roscoe G1DXD
The companion to *Scanners*, this provides even more information on the use of the v.h.f. and u.h.f. communications band and gives constructional details for accessories to improve the performance of scanning equipment. 216 pages. £9.95

SHORT WAVE RADIO LISTENERS' HANDBOOK

Arthur Miller
In easy-to-read and non-technical language, the author guides the reader through the mysteries of amateur, broadcast and CB transmissions. 207 pages. £7.99

WORLDWIDE HF RADIO HANDBOOK

Martyn R. Cooke
This book lists high frequencies used by aircraft and aeronautical ground stations. Divided into sections, Military, Civil etc. The book should be easy to use. £6.95

1934 OFFICIAL SHORT WAVE RADIO MANUAL

Edited by **Hugo Gernsback**
A fascinating reprint from a bygone age with a directory of all the 1934 s.w. receivers, servicing information, constructional projects, circuits and ideas on building vintage radio sets with modern parts. 260 pages. £10.15

TELEVISION

A TV-DXERS HANDBOOK (BP176)

R. Dunney
Information on transmission standards, propagation, receivers including multi-standard, colour, satellites, antennas, photography, station identification, interference etc. Revised and updated 1996. 87 pages. £5.95

GUIDE TO WORLD-WIDE TELEVISION TEST CARDS

Edition 3, **Keith Hamer & Gerry Smith**
Completely revised and expanded, this is a very handy and useful reference book for the DXTV enthusiast. Over 200 photographs of Test Cards, logos, etc., world wide. 60 pages. £4.95

THE ATV COMPENDIUM

Mike Wooding G8IQM
This book is for those interested in amateur television, particularly the home construction aspect. There is not a 70cm section as the author felt this is covered in other books. Other fields, such as 3cm TV, are covered in depth. A must for the practical ATV enthusiast. 104 pages. £3.00

SATELLITES

AN INTRODUCTION TO SATELLITE TELEVISION (BP195)

F. A. Wilson
Answers all kinds of questions about satellite television. For the beginner thinking about hiring or purchasing a satellite TV system there are details to help you along. For the engineer there are technical details including calculations, formulae and tables. 104 pages. £5.95

SATELLITE TELEVISION A layman's guide

Peter Pearson
Pictures from space, that's what satellite television is all about. Orbiting satellites 35 000km high receive TV signals from stations on the earth and retransmit them back again. This book explains all you need to know to set up your own satellite TV terminal at home, dish and accessories, cable end tuner. 73 pages. £1.00

SATELLITE TELEVISION INSTALLATION GUIDE

2nd Edition, **John Breeds**
A practical guide to satellite television. Detailed guidelines on installing and aligning dishes based on practical experience. 56 pages. £11.95

THE SATELLITE BOOK (A complete guide to satellite TV theory and practice)

John Breeds
This book deals almost exclusively with television broadcast satellites and is a comprehensive collection of chapters on topics, each written by an expert in that field. It appears to be aimed at the professional satellite system installer, for whom it is invaluable, but it will be appreciated by a much wider audience - anyone interested in satellite technology. 280 pages. £27.00

THE SATELLITE EXPERIMENTER'S HANDBOOK (USA)

A guide to understanding and using amateur radio, weather and TV broadcast satellites. 207 pages. £7.50

WEATHER SATELLITE HANDBOOK 4th edition

Dr Ralph E. Taggart WB8DQT
This book explains all about weather satellites, how they work and how you can receive and decode their signals to provide the fascinating pictures of the world's weather. There are plenty of circuit diagrams and satellite predicting programs. 192 pages. £14.50

THEORY

A BEGINNERS GUIDE TO MODERN ELECTRONIC COMPONENTS (BP285)

R.A. Penfold
This book covers a wide range of modern components. The basic functions of the components are described, but this is not a book on electronic theory and does not assume the reader has an in-depth knowledge of electronics. It is concerned with practical aspects such as colour codes, deciphering code numbers and the suitability. 164 pages. £3.95

AUDIO (Elements of electronics - book 6)

F. A. Wilson
This book studies sound and hearing, and examines the operation of microphones, loudspeakers, amplifiers, oscillators, and both disk and magnetic recording. Intended to give the reader a good understanding of the subject without getting involved in the more complicated theory and mathematics. 320 pages. £3.95

COMMUNICATION (BP88)

Elements of Electronics Book 5
F. A. Wilson
Fundamentals of line, microwave, submarine, satellite, digital multiplex, radio and telegraphy systems are covered, without the more complicated theory or mathematics. 256 pages. £2.95

EVERYDAY ELECTRONICS DATA BOOK

Mike Tooley BA
This book is an invaluable source of information of everyday relevance in the world of electronics. It contains not only sections which deal with the essential theory of electronic circuits, but it also deals with a wide range of practical electronic applications. 250 pages. £3.95

FILTER HANDBOOK A practical design guide

Stefan Niewiadomski
A practical book, describing the design process as applied to filters of all types. Includes practical examples and BASIC programs. 195 pages. £25.00

FROM ATOMS TO AMPERES

F.A. Wilson
Explains in simple terms the absolute fundamentals behind electricity and electronics. 244 pages. £3.50

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

Les Hayward W7ZDI and Doug DeMaw W1FB
Back in print by popular demand! A revised and corrected edition of this useful reference book covering all aspects of solid-state design. 256 pages. £10.95

THE ARRL ELECTRONICS DATA BOOK

Doug DeMaw W1FB
Back by popular demand, completely revised and expanded, this is a handy reference book for the r.f. designer, technician, amateur and experimenter. 260 pages. £8.95

TRANSMISSION LINE TRANSFORMERS

Jerry Sevick W2FMI
This is the second edition of this book, which covers a most intriguing and confusing area of the hobby. It should enable anyone with a modicum of skill to make a belun, etc. 270 pages. £13.50

BEGINNERS

AN INTRODUCTION TO RADIO DXING (BP91)

R. A. Penfold
How to find a particular station, country or type of broadcast and to receive it as clearly as possible. 112 pages. £1.95

BEGINNER'S GUIDE TO RADIO

9th Edition, **Gordon J. King**
Radio signals, transmitters, receivers, antennas, components, valves and semiconductors, CB and amateur radio are all dealt with here. 266 pages. £5.95

ELECTRONICS SIMPLIFIED - CRYSTAL SET CONSTRUCTION (BP92). F.

A. Wilson
Especially written for those who wish to take part in basic radio building. All the sets in the book are old designs updated with modern components. 72 pages. £1.75

THE SIMPLE ELECTRONICS CIRCUIT AND COMPONENTS Book One (BP62)

The aim of this book is to provide an in-expensive but comprehensive introduction to modern electronics. 209 pages. £3.50

LISTENING GUIDES

AIR BAND RADIO HANDBOOK (3rd Edition)

David J. Smith
Listen to conversations between aircraft and ground control. The author, an air traffic controller, explains more about this listening hobby. 174 pages. £8.99

DIAL SEARCH

6th Edition With Updates, **George Wilcox**
The listener's check list and guide to European broadcasting. Covers m.w., l.w., v.h.f. and s.w., including two special maps. 54 pages. £3.95

FLIGHT ROUTINGS 1991

T.T. Williams
Identifies the flights of airlines, schedule, charter, cargo and mail, to and from the UK and Eire and overflights between Europe and America. 104 pages. £5.25

GUIDE TO BROADCASTING STATIONS

29th Edition 1989/90, **Philip Darrington**
Frequency and station data, receivers, antennas, Latin American DXing, reporting, computers in radio, etc. 240 pages. £10.95

GUIDE TO FACSIMILE STATIONS 11th Edition

Joerg Klingensuss
This manual is the basic reference book for everyone interested in FAX. Frequency, call sign, name of the station, ITU country/geographical symbol, technical parameters of the emission are all listed. All frequencies have been measured to the nearest 100kHz. 408 pages. £10.00

GUIDE TO FORMER UTILITY TRANSMISSIONS

3rd Edition, **Joerg Klingensuss**
Built on continuous monitoring of the radio spectrum from the sixties until the recent past. A useful summary of the former activities of utility stations providing information for the classification and identification of radio signals. 126 pages. £8.00

GUIDE TO UTILITY STATIONS

9th Edition, **Joerg Klingensuss**
This book covers the complete short wave range from 3 to 30MHz together with the adjacent frequency bands from 0 to 150kHz and from 1.6 to 3MHz. It includes details on all types of utility stations including FAX and RTTY. There are 15802 entries in the frequency list and 3123 in the alphabetical call sign list plus press services and meteorological stations. 502 pages. £19.00

HF OCEANIC AIRBAND COMMUNICATIONS

3rd Edition, **Bill Lever**
HF aircraft channels by frequency and band, main ground radio stations, European R/T networks and North Atlantic control frequencies. 31 pages. £3.95

MARINE UK RADIO FREQUENCY GUIDE

Bill Lever
A complete guide to the UK s.w. and v.h.f. marine radio networks. Useful information, frequency listings and the World Marine Coastal Phone Stations. 62 pages. £4.95

NEWNES SHORT WAVE LISTENING HAND BOOK

Joe Pritchard G1UOW
A technical guide for all short wave listeners. Covers construction and use of sets for the s.w.l. who wants to explore the bands up to 30MHz. 288 pages. £12.95

RADIO LISTENER'S GUIDE 1991

Chris Woodward
This is the third edition of the essential guide of all radio listeners. Simple-to-use maps and charts show the frequencies for all the radio stations in the UK. When travelling or at home, the guide gives you all the frequencies you'll ever need. 55 pages. £2.95

THE COMPLETE VHF/UHF FREQUENCY GUIDE

1991 Edition.
This book gives details of frequencies from 26-2250MHz with no gaps and who uses what. Recently updated, there are chapters on equipment requirements as well as antennas, etc. 88 pages. £5.95

THE POCKET GUIDE TO RTTY AND FAX STATIONS

Bill Lever
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. 60 pages. £3.95

SHORT WAVE LISTENERS CONFIDENTIAL FREQUENCY LIST

Bill Lever
Covering the services and transmission modes that can be heard on the bands between 1.635 and 29.7MHz. £3.95

WORLD RADIO TV HANDBOOK 1991

Country-by-country listings of l.w., m.w. & s.w. broadcast and TV stations. Receiver test reports. English language broadcasts. The s.w.l.'s 'bible'. 576 pages. £17.95

INTERFERENCE

INTERFERENCE HANDBOOK (USA)

William R. Nelson WA6FQG
How to locate and cure r.f.i. for radio amateurs, CBers and TV and stereo owners. 253 pages. £8.75

RADIO FREQUENCY INTERFERENCE (USA)

What causes r.f.i.? Are all r.f.i. problems difficult, expensive and time-consuming to cure? These questions and many more are answered in this book. 84 pages. £4.30

AMATEUR RADIO

ALL ABOUT VHF AMATEUR RADIO (USA)

W. L. Orr W6SA
VHF/UHF propagation, including moonbounce and satellites, equipment and antennas. 172 pages. £9.50

AMATEUR RADIO CALL BOOK (RSGB)

1991 Edition

Now incorporates a 122-page section of useful information for amateur radio enthusiasts. 429 pages. £7.20

AMATEUR RADIO SATELLITES the first 25 years

Arthur C. Gee G2UK

This souvenir publication is mainly a pictorial account of the pattern of developments which have occurred over the last 25 years in amateur radio satellite operations. 34 pages. £2.25

AN INTRODUCTION TO AMATEUR COMMUNICATIONS SATELLITES BP290

A. Pickard

This book describes several currently available systems, their connection to an appropriate computer and how they can be operated with suitable software. 102 pages. £3.95

AN INTRODUCTION TO AMATEUR RADIO (BP257)

I. D. Poole

This book gives the newcomer a comprehensive and easy to understand guide through amateur radio. Topics include operating procedures, jargon, propagation and setting up a station. 150 pages. £3.50

HINTS AND KINKS FOR THE RADIO AMATEUR

Edited by Charles L. Hutchinson and David Newkirk

A collection of practical ideas gleaned from the pages of *QST* magazine. 152 pages. £4.95

HOW TO PASS THE RADIO AMATEURS' EXAMINATION (RSGB)

Clive Smith G4FZH and George Benbow G3HB

The background to multiple choice exams and how to study for them with sample RAE papers for practice plus maths revision. 88 pages. £6.70

PASSPORT TO AMATEUR RADIO

Reprinted from *PW* 1981-1982

The famous series by G4FJCA, used by thousands of successful RAE candidates in their studies. Plus other useful articles for RAE students. 96 pages. £1.50

PRACTICAL GUIDE TO PACKET OPERATION IN THE UK

Mike Mansfield G6AWD

Introduces the concept of packet radio to the beginner. Problem areas are discussed and suggestions made for solutions to minimise the problems. Deals with the technical aspects of packet taking the reader through setting up and provides a comprehensive guide to essential reference material. 91 pages. £6.95

PRACTICAL IDEAS FOR RADIO AMATEURS

Ian Poole G3YWX

Offers a wealth of hints, tips and general practical advice for all transmitting amateurs and short wave listeners. 128 pages. £5.95

RADIO AMATEUR CALLBOOK INTERNATIONAL LISTINGS 1991

69th Edition

The only publication listing licenced radio amateurs throughout the world. Also includes DXCC Countries list, standard time chart, beacon lists and much more. Over 1500 pages. £19.50

RADIO AMATEUR CALLBOOK NORTH AMERICAN LISTINGS 1991

69th Edition

Listings of US amateurs (including Hawaii). Also contains standard time chart, census of amateur licences of the world, world-wide QSL bureau and much more. Over 1400 pages. £19.50

RADIO AMATEUR'S GUIDE TO RADIO WAVE PROPAGATION

(HF Bands). F. C. Judd G2BCX

The how and why of the mechanism and variations of propagation in the h.f. bands. 144 pages. £10.95

*THE 1991 ARRL HANDBOOK FOR THE RADIO AMATEUR

This is the 66th edition of this very useful hardback reference book. Updated throughout it has several new sections covering oscilloscopes, spectrum analysers, digital frequency synthesis, phase-noise measurement and new constructional projects. 1200 pages. £16.95

*THE ARRL OPERATING MANUAL

Another very useful book from the ARRL. Although written for the American radio amateur, this book will also be of use and interest to the UK amateur. 684 pages. £12.95

THE ARRL SATELLITE ANTHOLOGY

The best from the Amateur Satellite News column and articles out of 31 issues of *QST* have been gathered together in this book. The latest information on OSCARs 9 through 13 as well as the RS satellites is included. Operation on Phase 3 satellites (OSCAR 10 and 13) is covered in detail. 97 pages. £5.95

THE ARRL UNF/MICROWAVE EXPERIMENTER'S MANUAL

Various Authors

A truly excellent manual for the keen microwave enthusiast and for the budding 'microwaver'. With contributions from over 20 specialist authors. Chapters covering techniques, theory, projects, methods and mathematics. 446 pages. £14.50

THE COMPLETE DX'ER

Bob Locher W9KNI

Now back in print, this book covers equipment and operating techniques for the DX chaser, from beginner to advanced. 167 pages. £7.95

THE RADIO AMATEUR'S DX GUIDE (USA)

15th Edition

The guide contains information not easily obtained elsewhere and is intended as an aid and quick reference for all radio amateurs interested in DX. 38 pages. £2.95

THE RADIO AMATEUR'S QUESTIONS & ANSWER REFERENCE MANUAL

4th Edition. R. E. G. Petri G8CJ

This book has been compiled especially for students of the City and Guilds of London Institute RAE. It is structured with carefully selected multiple choice questions, to progress with any recognised course of instruction, although it is not intended as a text book. 280 pages. £7.95

THE RAE MANUAL (RSGB)

G.L.Benbow G3HB

The latest edition of the standard aid to studying for the Radio Amateurs' Examination. Updated to cover the latest revisions to the syllabus. 132 pages. £6.70

YOUR GATEWAY TO PACKET RADIO

Stan Horapek WA1LOU

What is packet radio good for and what uses does it have for the 'average' amateur? What are protocols? Where, why, when? Lots of the most asked questions are answered in this useful book. It included details of networking and space communications using packet. 278 pages. £8.95

MAPS

IARU LOCATOR MAP OF EUROPE

OARC

This multi-coloured, plastics laminated, map of Europe shows the AIRU ("Maidenhead") Locator System. Indispensable for the v.h.f. and u.h.f. DXer. 692 x 872mm. £5.25

NORTH ATLANTIC ROUTE CHART

This is a five-colour chart designed for the use of ATC in monitoring transatlantic flights. Supplied folded. 740 x 520mm. £4.50

RADIO AMATEUR'S MAP OF NORTH AMERICA (USA)

Shows radio amateur prefix boundaries, continental boundaries and zone boundaries. 760 x 636mm. £3.50

RADIO AMATEUR'S PREFIX MAP OF THE WORLD (USA)

Showing prefixes and countries, plus listings by order of country and of prefix. 1014 x 711mm. £3.50

RADIO AMATEUR'S WORLD ATLAS (USA)

Seventeen pages of maps, including the world-polar projection. Also includes the table of allocation of international callsign series. £4.50

DATA REFERENCE

DIGITAL IC EQUIVALENTS AND PIN CONNECTIONS (BP140)

A. Micheals

Equivalents and pin connections of a popular selection of European, American and Japanese digital i.c.s. 256 pages. £5.95.

INTERNATIONAL TRANSISTOR EQUIVALENTS GUIDE (BP85)

A. Micheals

Possible substitutes for a popular selection of European, American and Japanese transistors. 320 pages. £3.95

NEWNES AUDIO & HI-FI ENGINEER'S POCKET BOOK

Vivien Cape

This is a concise collection of practical and relevant data for anyone working on sound systems. The topics covered include microphones, gramophones, CDs to name a few. 190 pages. Hardback £10.95

NEWNES COMPUTER ENGINEER'S POCKET BOOK

This is an invaluable compendium of facts, figures, circuits and data and is indispensable to the designer, student, service engineer and all those interested in computer and microprocessor systems. 203 pages. Hardback £10.95

NEWNES ELECTRONICS POCKET BOOK

5th Edition

Presenting all aspects of electronics in a readable and largely non-mathematical form for both the enthusiast and the professional engineer. 315 pages. Hardback £10.95

NEWNES RADIO AMATEUR AND LISTENER'S POCKET BOOK

Steve Money G3FZX

This book is a collection of useful and intriguing data for the traditional and modern amateur s.w.l. Topics such as AMTOR, packet radio, SSTV, computer communications and maritime communications are all covered. 160 pages. £9.95

NEWNES RADIO AND ELECTRONICS ENGINEER'S POCKET BOOK

18th Edition. Keith Brindley

Useful data covering math, abbreviations, codes, symbols, frequency bands/allocations, UK broadcasting stations, semi-conductors, components, etc. 325 pages. Hardback £9.95

POWER SELECTOR GUIDE (BP235)

J. C. J. Ven de Ven

This guide has the information on all kinds of power devices in useful categories (other than the usual alpha numeric sort) such as voltage and power properties making selection of replacements easier. 160 pages. £4.95

CONSTRUCTION

HOW TO DESIGN AND MAKE YOUR OWN PCBs (BP121)

R. A. Penfold

Designing or copying printed circuit board designs from magazines, including photographic methods. 80 pages. £2.50

INTRODUCING QRP

Collected articles from *PW* 1983-1985

An introduction to low-power transmission (QRP). This book includes full constructional details of a variety of designs by Rev. George Dobbs G3RJV for transmitters and transceivers covering Top Band to 14MHz, together with test equipment by Tony Smith G4FAL. 64 pages. £1.50

MORE ADVANCED POWER SUPPLY PROJECTS (BP192)

R. A. Penfold

The practical and theoretical aspects of the circuits are covered in some detail. Topics include switched mode power supplies, precision regulators, dual tracking regulators and computer controlled power supplies, etc. 92 pages. £2.95

POWER SUPPLY PROJECTS (BP76)

R. A. Penfold

This book gives a number of power supply designs including simple unregulated types, fixed voltage regulated types and variable voltage stabilised designs. 91 pages. £2.50

PRACTICAL POWER SUPPLIES

Collected articles from *PW* 1978-1985

Characteristics of batteries, transformers, rectifiers, fuses and heatsinks, plus designs for a variety of mains driven power supplies, including the *P.W.* "Marchwood" giving a fully stabilised and protected 12V 30A d.c. 48 pages. £1.25

QRP NOTEBOOK

Oeug DeMaw W1FB

This book deals with the building and operating of a successful QRP station. Lots of advice is given by the author who has spent years as an ardent QRP'er. All the text is easy-to-read and the drawings large and clear. 77 pages. £4.95

TEST EQUIPMENT CONSTRUCTION (BP246)

R.A. Penfold

Describes, in detail, how to construct some simple and inexpensive, but extremely useful, pieces of test equipment. 104 pages. £2.95

50 (FET) FIELD EFFECT TRANSISTOR PROJECTS (BP39)

F.G. Rayer

50 circuits for the s.w.l., radio amateur, experimenter or audio enthusiast using f.e.t.s. 104 pages. £2.95

ANTENNAS (AERIALS)

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. £9.50

AN INTRODUCTION TO ANTENNA THEORY (BP198)

H. C. Wright

This book deals with the basic concepts relevant to receiving and transmitting antennas. Lots of diagrams reduce the amount of mathematics involved. 86 pages. £2.95

ANTENNA IMPEDANCE MATCHING

Wilfred N. Caron

Proper impedance matching of an antenna to a transmission line is of concern to antenna engineers and to every radio amateur. A properly matched antenna as the termination for a line minimises feed-line losses. Power can be fed to such a line without the need for a matching network at the line input. There is no mystique involved in designing even the most complex multi-element networks for broadband coverage. Logical step-by-step procedure is followed in this book to help the radio amateur with this task. 192 pages. £11.95

BEAM ANTENNA HANDBOOK (USA)

W. I. Orr W6SAI & S. D. Cowan W2LX

Design, construction, adjustment and installation of h.f. beam antennas. 198 pages. £7.50

*NOVICE ANTENNA NOTEBOOK

Oeug 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. £6.95

OUT OF THIN AIR

Collected Antenna Articles from *PW* 1977-1980

Including such favourites as the 2L Special and 28CX 16-element beams for 2m, and the famous "Slim Jim", designed by Fred Judd G2BCX. Also features systems for Top Band, medium wave/long wave loop designs and a v.h.f. direction finding loop. Plus items on propagation, accessories and antenna design. 80 pages. £1.80

SIMPLE, LOW-COST WIRE ANTENNAS FOR RADIO AMATEURS (USA)

W. I. Orr W6SAI & S. D. Cowan W2LX

Efficient antennas for Top Band to 2m, including "invisible" antennas for difficult station locations. 191 pages. £7.50

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. £9.50

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. £9.50

THE ARRL ANTENNA COMPENDIUM (USA)

Volume Two

Because antennas are a topic of great interest among radio amateurs, ARRL HQ continues to receive many more papers on the subject than can possibly be published in *QST*. Those papers are collected in this volume. 208 pages. £7.50

THE RADIO AMATEUR ANTENNA HANDBOOK

William I. Orr W6SAI & Stuart D. Cowan W2LX

Yagi, quad, quagi, l-p, vertical, horizontal and "sloper" antennas are all covered. Also towers, grounds and rotators. 190 pages. £6.75

W1FB'S ANTENNA NOTEBOOK

Oeug 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. £6.95

WIRES & WAVES

Collected Antenna Articles from *PW* 1980-1984

Antenna and propagation theory, including NBS Yagi design data. Practical designs for antennas from medium waves to microwaves, plus accessories such as a t.u.s., s.w.r. and power meters and a noise bridge. Dealing with TVI. 160 pages. £3.00

25 SIMPLE AMATEUR BAND AERIALS (BP125)

E. M. Noll

How to build 25 simple and inexpensive aerials, from a simple dipole through beam and triangle designs to a mini-rhombic. Dimensions for specific spot frequencies including the WARC bands. 80 pages. £1.95

25 SIMPLE INDOOR AND WINDOW AERIALS (BP136)

E. M. Noll

Designs for people who live in flats or have no gardens, etc., giving surprisingly good results considering their limited dimensions. 64 pages. £1.75

25 SIMPLE SHORT WAVE BROADCAST BAND AERIALS (BP132)

E. M. Noll

Designs for 25 different aerials, from a simple dipole through helical designs to a multi-band umbrella. 80 pages. £1.95

25 SIMPLE TROPICAL AND MW BAND AERIALS (BP145)

E. M. Noll

Simple and inexpensive aerials for the broadcast bands from medium wave to 49m. 64 pages. £1.75

FAULT FINDING

ARE THE VOLTAGES CORRECT?

Reprinted from *PW* 1982-1983

How to use a multimeter to fault-find on electronic and radio equipment, from simple resistive dividers through circuits using diodes, transistors, i.c.s and valves. 44 pages. £1.50

GETTING THE MOST FROM YOUR MULTIMETER (BP239)

R. A. Penfold

This book is primarily aimed at beginners. It covers both analogue and digital multimeters and their respective limitations. All kinds of testing is explained too. No previous knowledge is required or assumed. 102 pages. £2.95

MORE ADVANCED USES OF THE MULTIMETER (BP265)

R.A. Penfold

This book is primarily intended as a follow-up to BP239, *Getting the most from your Multimeter*. By using the techniques described in this book you can test and analyse the performance of a range of components with just a multimeter (plus a very few inexpensive components in some cases). The simple add-on described extend the capabilities of a multimeter to make it even more useful. 85 pages. £2.95.

OSCILLOSCOPES, HOW TO USE THEM, HOW THEY WORK 3rd Edition

Ian Hickman

This book describes oscilloscopes ranging from basic to advanced models and the accessories to go with them. £14.95

TRANSISTOR RADIO FAULT FINDING CHART (BP76)

C. E. Miller

Used properly, should enable most common faults to be traced reasonably quickly. Selecting the appropriate fault description at the head of the chart, the reader is led through a sequence of suggested checks until the fault is cleared. 635 x 455mm (approx). £9.95

COMPUTING

AN INTRODUCTION TO COMPUTER COMMUNICATIONS (BP177)

R. A. Penfold

Details of various types of modem and their applications, plus how to interconnect computers, modems and the telephone system. Also networking systems and RTTY. 96 pages. £2.95

NEWNES AMATEUR RADIO COMPUTING HANDBOOK

Joe Pritchard G1UOW

Shows how radio amateurs and short wave listeners can "listen" to signals by reading text on a computer screen. This book also covers the application of computers to radio 'housekeeping' jobs such as log-keeping, QSL cards, satellite predictions and antenna design as well as showing how to control a radio with the computer. 368 pages. £14.95

MORSE

INTRODUCING MORSE

Collected Articles from *PW* 1982-1985

Ways of learning the Morse Code, followed by constructional details of a variety of keys including Iambic, Triamtic, and an Electronic Bug with a 528-bit memory. 48 pages. £1.25

THE SECRET OF LEARNING MORSE CODE

Mark Francis

Designed to make you proficient in Morse code in the shortest possible time, this book points out many of the pitfalls that beset the student. 87 pages. £4.95

Classified Ads

Whilst prices of goods shown in advertisements are correct at the time of going to press, readers are advised to check both prices and availability of goods with the advertiser before ordering from non-current issues of the magazine

Service Sheets and Servicing

Valves

SERVICE MANUALS 

Available for most Video Recorders, Colour & Mono
Televisions, Cameras, Test Equipment, Amateur Radio,
Vintage Valve Wires, Music Systems,
Computers, Kitchen Appliances, etc.

Equipment from the 1930s to the present and beyond.
Over 100 000 models stocked, originals and photostats.
FREE catalogue Repair and Data Guides with all orders.

MAURITRON TECHNICAL SERVICES (PW),
8 CHERRY TREE ROAD, CHINNOR, OXON, DX9 4QY

Tel: (0844) 51694 FAX: (0844) 52554

SERVICE INFORMATION, SHEETS ETC. available. For full list send large (6" x 5") SAE to: PWP Limited, Box No 21, Enefco House, The Quay, POOLE, Dorset BH15 1PP.

RACK CHASSIS

FOR THE

CONSTRUCTOR
UNITS ARE CONSTRUCTED OF

ALL ALUMINUM PARTS
FRONT & REAR PANELS ARE
CLEAR BRUSHED ANODIZED
THE BALANCE OF PARTS ARE
BLACK BRUSHED ANODIZED

UNITS SHIPPED FLAT
UNASSEMBLED


SEND FOR FREE CATALOG OF
SHEET METAL BOXES, RACK CHASSIS,
RACK PANELS, SHEET METAL
PUNCHES, PRESS-ON LETTERING,
HAND PUNCH TOOL AND PUNCH KITS,
AND OUR LINE OF OVER 300
PROFESSIONAL
AND SEMI-PROFESSIONAL
AUDIO PRODUCTS.

CHECKS, VISA ACCEPTED.
SHIPPED AIR PARCEL POST.
AT NO CHARGE.

RU = 1.75"

MODEL SIZE (H.W.D.) & PRICE

1RU5 1.75 x 19 x 5	38.00
1RU7 1.75 x 19 x 7	40.50
1RU10 1.75 x 19 x 10	43.00
2RU5 3.50 x 19 x 5	40.50
2RU7 3.50 x 19 x 7	43.00
2RU10 3.50 x 19 x 10	46.00
3RU5 5.25 x 19 x 5	51.00
3RU7 5.25 x 19 x 7	54.00
3RU10 5.25 x 19 x 10	57.00

 **SESCOM, INC.**
2100 WARD DR.
HENDERSON, NV. 89015 U.S.A.
(702)-565-3400 FAX (702)-565-4828

FREE WORDS

FREE WORDS

SPECIAL OFFER - FREE WORDS

For every 12 words you pay for, we will give you 4 free. Just fill out this coupon, include your payment and post to us at the above address. Please note, this coupon must reach us by 12th September 1991.

ORDER FORM PLEASE WRITE IN BLOCK CAPITALS

Please insert this advertisement in the issue of Practical Wireless (if you do not specify an issue we will insert it in the next available issue of PW) for.....insertion/s. I enclose Cheque/P.O. for £.....(42p per word, 12 minimum, please add 17.5% VAT to total).

Rates and Postal Address at top of page.

(Cheques and Postal Orders should be made payable to Practical Wireless).

Name _____

Address

.....

Telephone No.:

FREE LINE ➔

FREE LINE ➔

FREE LINE ➔

CATEGORY HEADING

[illegible]

Veteran & Vintage

THE VINTAGE WIRELESS BOOK LISTING. Published regularly containing 100s of out of print, old and collectable wireless and TV books, magazines etc. Send four first class stamps for next copy or £2.25 for next four issues. **SCOOP PURCHASES EARLY WIRELESS.** By Anthony Constable. This excellent book retraces the paths of history which culminated in the final appearance of the wireless set as a tangible article. Many early sets are illustrated. Much information is provided for the wireless historian. 167 illustrations including many half tones. Laminated boards. **Brand new** £8.50 p&p £1.50. **CLANDESTINE WARFARE** James Ladd and Keith Melton. This interesting and informative book studies the weapons and equipment employed by the S.O.E. and O.S.S. during WW2. Includes a chapter on collecting military and industrial intelligence, selection, training and sabotage. Large format. Limited number of copies. **Brand new.** Published £14.95 our price £9.95 p&p £1.25. **VINTAGE VALVE LISTING** A listing of new/unused valves, of all types 1925-1975. SAE for list with your requirements. **WANTED** Pre 1975 wireless books, magazines, catalogues, any printed material ofphemra relating to wireless. **DEPT PW, CHEVET BOOKS, 157 DICKSON ROAD, BLACKPOOL, FY1 2EU. Tel: (0253) 751858.**

Educational

RAE TUITION in N.W. Kent. Evening course. September to May. Phone: G0DLR (0732) 823483.

COURSE FOR CITY & GUILDS, Radio Amateurs Examination. Pass this important examination and obtain your licence, with an RRC Home Study Course. For details of this and other courses (GCSE, career and professional examinations, etc) write or phone - **THE RAPID RESULTS COLLEGE, DEPT JX106, Tuition House, London SW19 4DS. Tel: 081-947 7272 (9am-5am) or use our 24hr Recordacall service 081-946 1102 Quoting JX106.**

TAUNTON: SOMERSET COLLEGE OF ARTS AND TECHNOLOGY, Wellington Road, Taunton are offering the RAE course for the May exam. It will be held on Tuesday evenings from 7.00 to 9.00pm and the tutor will be Peter Upton G7CCV (Golf, seven, Charlie, Charlie, Victor.) For enrolment details, please telephone: (0823) 283403 ext. 373 or ext. 211.

For Sale

RCS VARIABLE VOLTAGE D.C. BENCH POWER SUPPLY

1 to 24 volts up to 0.5 amp. 1 to 20 volts up to 1 amp. 1 to 16 volts up to 1.5 amps. D.C. Fully stabilised. Twin panel meters for instant voltage and current readings. Overload protection. Fully variable. Operates from 240V A.C. Compact Unit: size 9 x 5.5 x 3ins.

£45 Incl. VAT, Post + ins £4



NEW MODEL Up to 38 volts DC at 6amp. 10 amp peak. Fully variable. Twin Panel Meters. Size 14.5 x 11 x 4.5in. £96 inc VAT. Carr £5

RADIO COMPONENT SPECIALISTS VISA

337 Whitehorse Road, Croydon SURREY, U.K. Tel: 081-684 1665

List, Large S.A.E. Delivery 7 days. Callers Welcome. Closed Wednesday

Miscellaneous

HEATHKIT U.K. Spares and Service Centre. Cedar Electronics. 12 Isbourne Way, Broadway Road, Winchcombe, Cheltenham. Glos. GL54 5NS. Tel: 0242 602402.

DIY INEXPENSIVE RADIO PROJECTS. Easy to make. SAE. **RYLANDS**, 39 Parkside Avenue, Southampton SO1 9AF

Wanted

WANTED, NEED EXTERNAL VFO FV-101Z or FV-901DM. Phone (0202) 886187.

MOST VALVES WANTED: for cash. Large or small quantities must be unused and boxed. CBS, 157 Dickson Road, Blackpool FY1 2EU (0253) 751858.

WANTED VALVES ESP. KT66, KT88, PX4, PX25, Klystrons, Magnetrons, Transistors, I.C.s, Plugs, Sockets. If possible send written list - we reply same day. Cash waiting. **BILLINGTON VALVES**, Oakendene Industrial Estate, Near Horsham RH13 8AZ. Callers please phone for appointment. Tel: (0403) 865105. FAX: (0403) 865106. Telex: 87271.

TEST GEAR, Computers, Computer Surplus, Amateur. Bought for cash. (0425) 274274

Computer Soft/w & Hard/w

COMMODORE COMPUTERS (+4, C16, 64, 128). "MICROCOM" CW/RTTY TX/RX with superb Morse tutor. "TURBO LOG" ultimate high speed station log. "MICROCOM INTERFACE" ready built. S.A.E. to:- Moray Micro Computing, Enzie Slackhead, Buckie, Moray AB5 2BR. (Telephone: 0542 7384).

IBM/COMPATIBLE SHAREWARE 10,000+ FILES. Send £1.50 for comprehensive catalogue on disk. Cheapest prices! **AK SHAREWARE**, 54 Sheldrake Road, Mudeford, Dorset BH23 4BP.

ATARI 520/1040/STE MORSE MASTER. All resolutions. Highly commended, this feature packed **TRAINER/SIMULATOR** is ideal for use by novices and professionals. Send/receive under **REALISTIC** on-air conditions (**QRM, QRN, QRG, QSB**). Cable included. £29.99 from **BOSCAD LTD**, 16 Aytoun Grove, Balldridgeburn, Dunfermline, Fife KY12 9TA. Write for information pack, or Telephone: (0383) 729584, evenings.

Please mention
Practical Wireless when
replying to
advertisements.

Components

J. A. B. Electronic and RF Components. (Toko now available). Callers:- 1180 Aldridge Road, Rear of Queslett Motors, Great Barr, Birmingham. Tel: 021-366-6928 For opening times. MAIL ORDER Catalogue & Discount Vouchers send 75p.

CUSTOM TRANSFORMERS Wound to your specification. From:- £30 inc. VAT & delivery. Tel: (0277) 811802.

Are you a radio club that would like to tell everybody about your Rally?

If the answer is YES then contact Marcia on (0202) 676033 for our special rates for clubs.

INDEX TO ADVERTISERS

ACE Electronics	43
AH Supplies	40
AOR UK	50
ARE Communications	7
Arrow Radio	28, 29
Birkett, J	40
Cap.Co	44
Castle Electronics	20
Cirkit	51
Colomor	40
Datong	51
Dewsbury	44
Dressler Communications	63
ERA	47
Elliott Electronics	66
Henry's Audio	47
Howes C.M Communications ..	60

ICS Intertext	66
Icom (UK)	2, 3, Cover iii
J & P Electronics	43
KW Communications	10
Lake Electronics	40
Langrex Supplies	39
Lee Electronics	31
Lowe Electronics	43
Maplin Electronics	Cover iv
Marlec Engineering	60
Martin Lynch	8
PWP Limited	39
PWT Electronics	43
Photo Acoustics	49
Preston Amateur Radio Show ..	66
Quartslab	66

RAS Nottingham	40
RSGB	58
RST Valve	39
Radio Shack	72
Raycom	34
SEM	40
SRW Communications	43
Sandpiper Communications	66
Satellite Antenna Systems	47
Short Wave Magazine	47
South Midlands Communications	Cover ii, 4, 5
Stephens James	58
Suredata	43
Talent Computers	44
Tandy	9
Technical Software	58
Tennamast	66
Ward Reg & Co	39
Waters & Stanton	6

YOUR LOCAL DEALERS

SOUTH WALES

ELECTRO MART

Receivers, Scanners, Howes, ERA, CB, Marine radio etc. part exchange welcome.
Full Service & Repair Facilities
96 High St, Clydach,
Swansea
Tel: 0792 842135

WEST MIDLANDS

BADGER BOARDS

QUALITY PCB's
MULTIPLE or SINGLES & KITS
Please send S.A.E. for information or write for quotation to:
BADGER BOARDS
1180 Aldridge Road
Great Barr, Birmingham B44 8PE
021 366 6047

OXFORDSHIRE

PROCOMM (UK)

Cash paid for used Amateur Equipment.
Part exchange welcome SAE for stocklist.
9 a.m. - 9 p.m. Mon-Sat
Callers by appointment please.
102 Larkhill Road, Abingdon OX14 1BJ
0235 532653 &
0860 593052

DERBYSHIRE

RILEY'S T.V. SERVICES LTD.

SUPPLIERS OF:-
SCANNERS - C.B. 27-934 MHZ -
AERIALS - TEST METERS - TOOLS -
TELEPHONES KITS AND CABLES
125 LANGWITH ROAD
HILLSTOWN
CHESTERFIELD S44 6LX
PHONE 0246 826578
CLOSED WEDNESDAY

HERNE BAY

ICOM
ICOM (UK) LIMITED
The Official Icom Importer
Unit 8, Sea Street
Herne Bay, Kent CT6 8LD
Tel: 0227 741741
Fax: 0227 380 155
Open Mon-Fri 9 am-5.30 pm
(Lunch 1-2.00 pm)

SOUTHAMPTON

South Midlands Communications

Official Yaesu Importer

S.M. House, School Close,
Chandlers Ford Industrial Estate,
Eastleigh Hants SO5 3BY.
Tel: 0703 255111

PORTSMOUTH

Nevada Communications

Visit our showrooms for Icom, Kenwood, amateur radio products & a large range of scanning receivers.
New & part-ex welcome.
189, London Road,
North End, Portsmouth,
Hants, PO2 9AE
Tel: 0705 662145

DEVON

Reg. Ward & Co. Ltd.

The South-West's largest amateur radio stockist. Approved dealer for Kenwood, Yaesu and Icom
1 Western Parade,
West Street, Axminster,
Devon, EX13 5NY
Tel: 0297 34918
(Closed 1:00-2:00 and all day Monday)

BUCKINGHAMSHIRE

Photo-Acoustics Ltd.

Approved Kenwood, Yaesu and Icom dealer (part exchange always welcome)
58 High Street, Newport Pagnell,
Buckinghamshire MK16 8AQ
Tel: 0908 610625
(Mon-Fri 9:30-5:30, Sat 9:30-4:30)

SCOTLAND

JAYCEE ELECTRONICS LTD

20 Woodside Way, Glenrothes
Fife KY7 5DF
Tel: 0592 756962 (Day or Night)
Open: Tues.-Friday 9-5; Sat. 9-4;
Sunday by appointment
KENWOOD, YAESU & ICOM APPROVED DEALERS
A good stock of new and secondhand equipment always in stock

PLEASE MENTION

PRACTICAL WIRELESS

WHEN REPLYING TO ADVERTISEMENTS

YORKSHIRE

YAESU
ICOM
Kenwood

Alan Hooker
Radio Communications
42, Netherhall Road, Doncaster.
Tel: 0302 325690
Open Mon-Sat 10-5pm
Closed Thursdays

CORNWALL 24hrs, 7 Days a Week

SKYWAVE

RADIO AMATEUR & MARINE
COMMUNICATIONS SERVICES
ICOM, YAESU, NAVICO
JAYBEAM, Etc.

Slades Road, St. Austell,
Cornwall PL25 4HG
Tel: 0726 70220

Voice Bank: 0426 961909

Contact Marcia
on the
Advertising Hotline
(0202) 676033
for our special
rates for advertising
in this section.

WEST SUSSEX

MAIL ORDER
RETAIL

BREDHURST ELECTRONICS LTD.

High St., Handcross, West Sussex
Tel: (0444) 400786



Situated at the Southern end of
M23. Easy access to M25 and
South London.
Open Mon-Fri 9am-5pm
except Wed 9am-12.30pm.
Sat 10am-4pm.

YAESU
ICOM

VISA

RADIO SHACK



KENWOOD TS-850S

The latest transceiver from this famous stable TS-850S SUPERB SPECIFICATIONS

Creating a new era in Amateur Radio!
Call us for the latest details and stock position, also for any other model from
KENWOOD ICOM YAESU
Scanners by AOR, Fairmate, Jupiter, Icom, Realistic,
Bearcat to name but a few.
Competitive service and prices.

We will be pleased to quote you for anything you require in the communications or computer field. In order to avoid a great deal of time wasting on both our parts, we now deal with callers by appointment. We are pleased to hear from you and see you, and we aim to give you the attention you deserve, so please call us first.

73s Terry Edwards G3STS

VISA

RADIO SHACK LTD

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



COMPACT COMMS

IC-735 FULL FEATURED TRANSCEIVER



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.

Clear Reception

Spectacular specifications are also achieved on RF Intercept, Dynamic Range, Reciprocal mixing and I.F. Blocking. The IC-735 that will provide clear reception no matter what the HF conditions, even under the worst pile-ups.

PBT and Notch control

The IC-735 has a built-in receiver attenuator, pre-amp, noise blanker and a built-in passband tuning system that allows continuous width adjustment of the IF passband. In addition, a sharp IF notch filter provides clear reception even in the presence of a strong interfering signal.

Scanning Functions

Scanning functions include programme 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 twin VFO's and 12 memories can store both mode and frequency.

LCD Readout

The IC-735 is one of the first HF transceivers to use a liquid crystal display with green illuminating back-light, which is highly visible even in sunlight. Controls that require rare adjustment are situated behind the front cover but are immediately accessible.

Convenient Miscellaneous Functions

- Compact size: 241(W) x 94(H) x 239(D)mm
- 105dB Dynamic range
- Programmed Scan, memory scan and frequency scan.
- PBT and Notch control
- 10dB preamp and 20Db attenuator
- Full QSK
- Noise blanker

Options include

- AH2A Automatic antenna tuner.
- AT150 Automatic antenna tuner.
- CT17 Computer interface.
- EX243 Electronic keyer unit.
- FL32A 9MHz CW/RTTY Filter 500Hz.
- FL63A 9MHz CW/RTTY Filter 250Hz.
- PS55 A.C. Power supply 13.8V, 20A.
- SM6 Base microphone.
- SP7 Base Speaker.
- UT30 Subaudible Tone Encoder.

Mail orders taken by phone. Instant credit & interest free H.P. Interlink despatch on same day whenever possible

Post to: Icom (UK) Ltd. Dept PW Sea Street Herne Bay Kent CT6 8BR
Telephone: 0227 741741 (24hr). Facsimile: 0227 360155



Yaesu's FT-736R. Because you never know who's listening.

Why just dream of talking beyond earth?

With Yaesu's new FT-736R VHF/UHF base station, you can discover some of the best DX happening in ham radio. Via moonbounce. Tropo. Aurora. Meteor scatter. Or satellites.

You see, the FT-736R is the most complete, feature-packed rig ever designed for the serious VHF/UHF operator. But you'd expect this of the successor to our legendary FT-726R.

For starters, the FT-736R comes factory-equipped for SSB, CW and FM operation on 2 meters and 70 cm, with two additional slots for optional 50-MHz or 1.2-GHz modules (220-MHz North America only).

Crossband full duplex capability is built into every FT-736R for satellite work. And the satel-



lite tracking function (normal and reverse modes) keeps you on target through a transponder.

The FT-736R delivers 25 watts RF output on 2 meters, 220-MHz, and 70 cm. And 10 watts on 6 meters and 1.2-GHz. Store frequency, mode and repeater shift in each of the 100 memories.

For serious VHF/UHF work, use the RF speech processor. IF shift. IF notch filter. *CW Narrow Optional and FM wide/ narrow IF filters. VOX. Noise blanker. Three-position AGC selection. Preamp switch for activating

your tower-mount preamplifier. Even an offset display for measuring observed Doppler shift on DX links.

And to custom design your FT-736R station, choose from these popular optional accessories: Iambic keyer module. FTS-8 CTCSS encode/decode unit. FVS-1 voice synthesizer. FMP-1 AQS digital message display unit. 1.2-GHz ATV module. MD-1B8 desk microphone. E-736 DC cable. And CAT (Computer Aided Transceiver) system software.

Discover the FT-736R at your Yaesu dealer today. But first make plenty of room for exotic QSL cards. Because you *never* know who's listening.

YAESU

*CW narrow optional



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

Prices and specifications subject to change without notice. • FT-736R shown with 220-MHz option installed.