

Practical Wireless

PWN

amateur radio & more!

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WIN!
A GARMIN GPS III
A YAESU VX-1R

NEWS

KEYLINES

CLUBS

RADIO BASICS

VINTAGE

VHF

ANTENNAS

PRACTICAL

HF

BROADCAST

BARGAINS

THE

DIGITAL

DEBATE

THE FUTURE OF RADIO BROADCASTING

REVIEWED

**THE IC-T8 TRI-BAND
TRANSCEIVER**



April 1998 £2.20



ELECTRONICS IN ACTION INSIDE!



Waters & Stanton PLC

FREE-PHONE ORDER LINE
0500 73-73-88



Peter Waters G3OJV / GOPEP

Part Exchange Welcome

Download our latest second hand list from our web site



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New Web Site:- <http://www.waters-and-stanton.co.uk>

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NEW C-408



From **HORA**
70cms
Handheld
Full
CTCSS

£89.95!

FREE Postage

SPECIAL OFFER PRICE

Full CTCSS; 20 memories; 1.6MHz repeater shift; Priority channel, Scanning; Dual watch; Dual mode squelch; PTT lock; 12.5/25kHz steps, 230mW output - all from just 2 x AA cells

SGC-2020 QRP HF Transceiver



NEW £599

1.8 - 30MHz

0 - 20 Watts SSB and CW with full break-in. Can run from 12 volts or internal pack. Delivery expected at the end of February

Kachina 505DSP HF Transceiver

Send for Brochure

A complete PC controlled remote HF rig - In stock



Main Features

£1995

100W HF All bands + Receive 100kHz - 30MHz
Filters for SSB 3.5, 2.7, 2.4, 2, 1.7kHz
Filters for CW 1kHz, 500Hz, 200Hz, 100Hz
Band Scope, DSP filter, Memory keyer, log book, VSWR meter, Smith Chart, pre-amp, 20dB attenuator, plus many software controlled functions.

YAESU FT-8100 Dual Bander Mobile

£399

Save £100!



Yaesu's new dual band mobile makes the competition look old and out-dated. You get a detachable head, 300 memories, true dual same band rx, CTCSS encode and the best display in the business. This is proving to be one of the best sellers ever - particularly at Our Price!

SGC-230 Auto Wire ATU

1.8 - 30MHz **£299**



Apply 12V and feed with any power up to 200 Watts for instant matching to any end fed wire - any length!! Build a true all-band long wire system to fit any garden

Alinco DX-70s TO CLEAR!!

£599

1.8 - 30MHz
100W PLUS
10W 50MHz



The last few of these rigs at a very special price. Where else could you get a 100 Watt hf rig at this price?

YAESU FT-50R 2m/70cms Handy

£269



- * Wideband Rx (AM Airband)
- * FM Broadcast receive
- * CTCSS & 1750Hz
- * 112 Alphanumeric Memories
- * Dual Watch - Military rated
- * 5W from 12v DC input
- * Ni-cads and AC Charger

This is a very solid rig that is proving one of the most popular dual band handhels

KENWOOD TM-451E 70cms Mobile

Save £210!



A chance to purchase this top range 70cms mobile at a silly price! 35 Watts output, 41 memories and CTCSS encoder gives you all you need to enjoy mobile or base station operation. 12.5kHz/25kHz steps are featured together with a clear LCD.

ADI AR-146 2m 50W



£249

FULL CTCSS

- * 3 Power levels - Wideband receive
- * 40 Memories plus call channel
- * 7 Programmable steps
- * Channel or frequency display
- * The best sensitivity in the business
- * Keypad mic and mounting kit
- * CTCSS Encode and Decode!

ADI AT-600 Dual Bander

New Low Price **£249**



PW says: "an incredibly well priced radio - amazingly sensitive - audio - worked very well with 12.5kHz channel spacing - An Absolute Cracker"

- * CTCSS encode/decode
- * Full DTMF + 1750Hz tone
- * Alphanumeric memories
- * Full duplex
- * CTCSS tone reader
- * 29 programmable features
- * AM airband receiver
- * Rx up to 990MHz
- * Ni-cads and charger

ADI AT-201 2m FM Handy

£149



- * 40 Channels
- * 5W on 12V
- * Illuminated keypad
- * Full CTCSS
- * 1750Hz tone
- * DTMF
- * Channel Reasout or
- * Frequency Readout
- * Set to Set Cloning
- * Uses AA cells

1998 Catalogue



- * Largest in Europe
- * 176 Colour Pages
- * 1000 Photographs
- * 1400 Products
- * Technical Specifications
- * News Snippets

Now established as the foremost equipment guide this edition is completely new with every page in full colour and almost every item illustrated. For the cost of a magazine you can get the best guide ever.

£2.95 plus £1 postage

WATSON

Hunter Frequency Counter

Features:

- 10MHz - 3GHz
- Ni-cad Pack
- AC Charger
- BNC Antenna
- Full Instructions

£59.95

Add £2.50 Post & Ins.

FREE frequency guide worth £12.95 on orders during Feb. & March

Check your base or handheld transceiver, or hunt out frequencies of nearby transmitters or handhels. The "hold" button lets you lock on and store the frequency.

UK's Top Dealer for YAESU, KENWOOD & ICOM

W&S

YAESU FT-847 1.8 - 440MHz! £1495



Includes 70MHz Transceiver

Approx.

100W 1.8 - 50MHz * 50W 2m/70cm * SSB - CW - FM - AM * CTCSS * Alphanumeric * 0.1Hz steps * Packet ready 1200 & 9600 * DSP filtering * Dual display * squelch * IF shift * Notch filter * Power control * Tx monitor * Electronic keyer * 12.5 / 25kHz switched FM filtering * Switchable pre-amp * Size 260 x 86 x 270mm weight 7kg

Free Base Mic

ICOM IC-706 Mk II 1.8 - 146MHz £995



PRICE MATCH

We are pleased to endorse the performance and design of the IC-706 Mk II transceiver as the best compact hf mobile bar none. It out performs and out specifies any other model. The only choice left is which dealer you buy it from! We offer you an unbeatable price and an unbeatable back-up service plus optional extended 5 year warranty for an extra £98!

ICOM IC-746 1.8 - 144MHz £Phone! £1269



PRICE MATCH

* 100W 1.8 - 146MHz * SSB - CW - FM AM * Electronic keyer * Gen. cov receiver * Spectrum scope * DSP noise filter * Notch filter * IF pass band tuning. Delivery from stock.

YAESU FT-920 1.8 - 54MHz £1269



PRICE MATCH

+ Free FM board & AM Filters * 1.8 - 54MHz 100W * DSP filter * MOSFET PA * Internal ATU * Auto notch * Twin VFOs * Auto glow display * Shuttle jog * Digital voice memory * Electronic keyer * RS-232C converter * Quick memory bank + lots more phone or e-mail for colour leaflet

ICOM IC-756 HF + 50MHz £1495



PRICE MATCH

* 100W of pure Magic * 160 - 6M * SSB - CW - AM - FM * Spectrum display * Auto ATU * Superb DSP built-in * CW Memory keyer * 100% duty cycle * Keypad entry option * DXers choice in the USA

YAESU FT-1000MPDC £1999



PRICE MATCH

* 1.8 - 30MHz 100W * SSB - CW - FM - AM * Rx 100kHz - 30MHz * Message memory * Dual in-band rx * EDSP filter * RF processor * RF pre-amp * Electronic keyer * IF shift width * Collins filters * Comprehensive menu system * RS-232 Interface and more - send for details

KENWOOD TS-570 1.8 - 30MHz £1249



PRICE MATCH

Kenwoods new transceiver that is earning a reputation for offering one of the best receivers in the business. If you are looking for a hot little number that is not too expensive (Radio we mean!), send for brochure.



Balun matched excellent gain and VSWR. The favourite of the contest groups. Mount horizontal or vertical.

March Offer: 20505 5 EI 50MHz £86.95 £79 carr. £4 Just a small selection!

2 Metres	20804	4 EI. 8dB	£44.95	23 cms	20921	21 EI. 18dB	£69.95
	20809	9 EI. 13dB	£52.95	20623	23 EI. 18dB		£51.95
	20811	11 EI. 14dB	£79.95	20635	35 EI. 20dB		£61.95
	20817	17 EI. 15dB	£97.95	20655	55 EI. 21.5dB		£65.95
70cms	20909	9 EI. 8dB	£45.95	20666	4 x 23 EI. kit		£319.95
	20919	19 EI. 16dB	£53.95		4 x 55 EI. kit		£419.95

Datong D-70 Clearance Offer £49.95



This classic Morse tutor is offered at a really low price. Adjust speed, spacing and volume. Built-in speaker and powered from PP-3. Very limited stocks

Rechargeable Alkaline Cells For Starter Kit

- * Rechargeable Alkaline
- * 1.5V cells
- * No memory effects
- * Charge mid cycle is OK
- * 5 year charge shelf life
- * 3 x capacity of ni-cads
- * Very low cost

In stock now! * Note: you must use the special charger supplied with Starter Kit.

Starter Kit: Comprise 4 x AA cells and dedicated AC wall charger **£13.99 + £2 p&p**
 4 x AA cells (ready charged) £5.99 (£1.00 post)
 8 x AA cells (ready charged) £10.99 (£1.50 post)
 4 x AAA cells (uses standard charger) £6.25 (£1.00 post)

Alinco Prices Down!



DJ-C1E 2m FM
 Credit card size with full CTCSS - 300mW
 20 memories - AM Air
 Review February RadCom
 Normally £169.95 **£139.95**

DJ-C4 70cm FM
 Slip it into your pocket for rally use or the local repeater. Earpiece and AC charger included.
 See page 52 of Feb RadCom
 Normally £99.95 **£169.95**

KENWOOD THG-71E Dual band Phone Special Price £279

- * Dual Band 2m/70cm
- * 200 memories
- * Alphanumeric Display
- * Full CTCSS
- * DTMF
- * Up to 6W out
- * Wideband Receive
- * Illuminated Keypad
- * PC Compatible
- * Windows Programming



ICOM IC-207H 2m/70cm Mobile £329



PRICE MATCH

* 2m & 70cm * 50W / 30W * Detachable head * Packet 9600 bps ready * 180 Memory channels * CTCSS & 1750Hz tone

KENWOOD New TM-G707 £439



New Model

* 144 & 430MHz 50/35W * Packet Ready * 180 Memories * Detachable front head * CTCSS & 1750Hz Tone * Large clear display

WATSON W-MM1 Multimode Modem £69.95



* Packet, AMTOR, CW, SSTV, Fax, RTTY * NAVTEX, SYNOP * Transmit and receive * Powered from RS-232 port

YAESU VX-1R Dual band Save £50!

The world's Smallest HT From the UK's Biggest Dealer! **£219.95**



Our best selling dual bander and one we would be happy to own.

ICOM IC-T8E Dual Band handy 6m 2m 70cms £349.95

All in one small package. * 5W output (13V) * 25 / 12.5kHz ready * Wideband Rx * Nickel Hydride batt * Wide FM broadcast * AM for airband * Rapid scanning * Alphanumeric



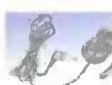
WATSON



Lapel Talker £24.95
Earpiece with lapel mic, and PTT Models for all makes including Motorola. The ideal item for handhelds



QS-110 Speaker Mic £14.95
Available in versions to match all models. Just tell us which transceiver you have.



WEP-400 Earpiece £14.95
Deluxe earpiece has removable pad and soft ear gnp. Extremely comfortable - 8 Ohms and 3.5mm plug.



QS-400 Mount £9.95
Clip onto dash grill and simply push handheld or GPS in between sprung fingers. No sticky pads needed. Another great idea from Watson!



QS-200 Mount £4.95
Dash mount for handles. Fits on dash grill vent



WM-308 Base Mic £59.95
Superb audio quality. Can be powered from most modern rigs 8 pin mic plug or use internal battery. Full connection details inc.

Mast/Base Station Duplexers

£24.95
Split-1: 1.8-225MHz
Split 2: 350-540MHz
Power 300W / Loss 0.2dB
Socket SO-239

Save on coax cable! Accepts masts up to 2.25" diam. Includes water-proof plug shrouds. Use indoors or outdoors.

W-3CK Cable Kit

£18.95
A 5m long mobile cable kit using 5D-FB cable. Very low loss with 30cm thin pigtail.

W-3HM Hatch Mount

£14.95
Matching hatch mount with adjustable angle and thumb wheel



WEP-300 Earpiece £9.95
Our standard 8 Ohm earpiece that is ideal for long-term wear. Comes with 3.5mm plug.

Great Value New Mini Case

WATSON For your handheld

Ideal for the modern mini dual bander. It holds the rig firmly in place. The Patented belt clip provides a quick release and has a curved end to prevent it from accidentally riding up, and off the belt. **WSC-3**



£12.95

Alloy Antenna Wire

£12.95
Each reel contains 55ft of 3.5mm alloy wire (ideal for G5RVs etc.) Its ultra light - 55ft reel weighs 400 grams! This alloy wire will not tarnish like copper and its lighter weight means safer aenals.

New Triple Bander

6m - 2m - 70cms £34.95

WATSON W-627

Now you can have all three bands on one compact antenna!

* 2.15dBi / 4.8dBi / 7.2dBi
* 100W maximum
* Length 1.62m
* Foldover PL-259 base
Available

End of March

DC Mobile Leads

£6.95
Standard "T" connector lead used by all modern rigs. 15A dual fused, 1.9m long.

WSM-270 Mag. Ant

£24.95

* Dual Band 2m/70cms
* Mini Magnetic design
* Super strong magnet
* Base just 29mm diameter
* Pre-tuned for 2m & 70cm UK
* Low Profile whip
* 2.75m of mini coax - BNC
* Power rating 50W max.

Base Antennas

W-2000 6m-2m-70cm (216.2dB 4dB 2.5m long) **£89.95**
W-30 2m/70cm (36dB 1.15m long) **£39.95**
W-50 2m/70cm (45.7.2dB 1.8m long) **£54.95**
W-300 2m/70cm (6.5-9dB 3.1m long) **£69.95**

All aenals have SO-239 sockets, mounting hardware for masts up to 62cm diameter and three radials. All tuned for UK bands.

Mobile Whips

Stainless Steel Mobile Whips with hinged bases. Pre-tuned.

W-285 2m whip **£15.95**
W-770HB 2m/70cm **£24.95**

New Super Gainer

W-7900

Best value in high quality antenna design we have ever seen! A super antenna at a very special price!

* 144 & 430MHz
* 5dB 2m / 7.6dB 70cm
* L 1.58m Power: 150W
* PL-259 connector
W-7900 -- **£34.95**

W-PL70 Patch Leads

£6.95

A 66cm long PL-259 patch lead using semi-stiff cable that stays put. A smart ideal!

WATSON VSWR / Power Meters

* Dual band "Gainer" whip 2m / 70cm **£19.95**
* 21cms long fitted BNC connector.

Prices Down

W-220 1.6-200MHz 5/20/200W **£59.95**
W-420 118-530MHz 5/20/200W **£59.95**
W-620 1.6-530MHz 5/20/200W **£129.95**

Cushcraft Antennas

What the mags say!

Practical Wireless:
"An excellent DX antenna - Extremely impressed with standard of workmanship and ease of erection"

RadCom:
"Ideally suited to the small garden - an investment which lasts"

R-7000

7 Band Vertical 81 dB gain

80cm Optic Available

£369

* 7 Bands 40-10m
* Power 1.5kW PEP
* Height 7.3m (24ft)
* 7 x 49 inch radials
* Self-supporting.

Other Cushcraft Models

R-80 80m kit for R-7000 **£129.95**
AV-80 80m vertical 1.5kW 10.5m **£349.95**
A-3S 10-15-20m beam 2kW **£389.95**
A-4S 10-15-20m 4 el beam 2kW **£489.95**
X-7 10-15-20m 7 el beam 2kW **£499.95**
X-9 10-15-20m 9 el beam 2kW **£749.95**
Ten-3 10m 3 el beam 2kW **£139.95**
10-4CD 10m 4 el beam 2kW **£269.95**
15-3CD 15m 3 el beam 2kW **£249.95**
20-3CD 20m 3 el beam 2kW **£379.95**

FC-130 Counter

£79.95

Now being shipped to UK Gov. departments.

* 1MHz - 3GHz
* LCD Display
* BNC Whip Antenna
* Very sensitive "off air"
* Ni-cads and Charger

Super Hunter

£149.95

* 10Hz - 3GHz
* 16 segment field meter
* 4 x gate speeds
* Noise filter
* 50 Ohm / 1M Ohm
* Hold button / Beeper
* Backlight / Battery Saver
* Charger, Ni-cad & whip

24 Hour Digital WallClock

£34.95
+ Temperature
* 265mm diameter
* 24/12 hours LCD
* 55mm digits
* date - day - month
* Celsius / Fahrenheit
* 2 x AAA cells

Available End of March

WDB-30 Dual Band Amp

£139.95



Boost the power of your dual bander with this well-designed amplifier. Covering 144 / 430MHz it requires 0.3 - 5W FM drive for 6 - 30W output. The unit is RF sensed and fitted with SO-239 sockets. Requires 12V DC at approx 7A.

SGC Products Distributed in UK by W & S

Power Clear DSP Filter

£299.00
PW Review Short Wave Mag, Sept. says:- "the Power Clear is simplicity itself - you'll certainly hear the difference."

A complete DSP audio filter and speaker unit in one smart case. Works with any receiver. Requires 12v DC. Superb unit.

£299.00

SG-500 Power Cube

Here's a 500 Watt output solid state linear that will operate between 1.6 - 30MHz. Input of 50-90W is required and the DC supply needs 10 - 18V @ 40A (SSB). PTT or RF sensing

£989.00

160 - 10m Self Tuning Antenna!

SG-230 Auto 200W ATU lets you build this weatherproof all-band end-fed antenna. Use any length of wire, connect 12V to ATU and feed it with RF. It will self-tune in a fraction of a second. Highly efficient for the small garden. Also use it for verticals and inverted "L" systems. We have tested this and it is the perfect all-band antenna system!!

£299.95



SGC-231 Auto Wire ATU

New version of "230" unit above, but covering 1.8 - 54MHz. Works with any length of wire. (12v DC). Just feed with RF. **£499.00**

GPS-38 Clearance

Limited Stock 20% Discount

This model is offered at an amazing price. The fully specified garmin is ideal for walkers and marine use. First come first served!

£99.95

Carriage is charged at cost - Phone, fax or e-mail for total cost.

Free-Phone Orders 0500 73 73 88

Waters & Stanton PLC

E-mail: sales@wsplc.demon.co.uk

Web Site: http://www.waters-and-stanton.co.uk

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RadioScene



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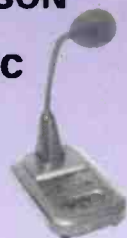
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YAESU FT-920



HF + 6 **£1449**

WATSON WM-308 BASE MIC



Can be powered from most modern rigs. Low noise amp built in. Full connections details.

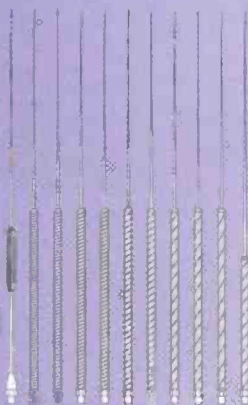
£59.95

KENWOOD TS-570D



HF **£1249**

P
R
O
-
A
M



160M = £49

80M = £22

40M = £20

20M = £18

17M = £18

15M = £18

10M = £18

6M = £18

P&P £5

DAK-AD

£9.95

P&P £2.50

Dual adaptor accepts 2 antennas for vertical or horizontal dipole. (Note: suitable for pro-am HF antennas which are sold separately).



D270 Duplexer On glass antennas



144-148MHz
430-450MHz

£26.95

P&P £3.50

EGM 144-430 dualband on glass **£39.95** + £4 P&P on glass scanner ant
112-1200MHz **£29.95** + £4 P&P.

G5RV HALF SIZE £16.95 + £4 P&P **G5RV FULL SIZE £18.95** + £4 P&P

WATSON, TAIWAN SERENE, TONNA, CUSHCRAFT ANTENNAS ALSO AVAILABLE

YAESU FT-8100R



2 + 70cm mobile **£445**

ICOM IC-207



2 + 70cm mobile **£339**

ALINCO DR-605E



2 + 70cm mobile **£399**

ALINCO DR-610E



2 + 70cm mobile **£499**

CABLE per metre

H103 Westflex (10mm) low loss
50Ω coax.....95p
213U low loss
50Ω coax (10mm).....80p
RG58 CU 50Ω coax (5mm).....30p
7 core rotator cable60p
Twin 300Ω65p
Twin 75Ω25p
DC 10 amp red/black25p
DC 15 amp red/black30p
Doubled screened satellite cable.
60p

Large range of connectors available. Minimum cable/connector order £10 P&P dependant on weight.

ALTAI AR300XL Rotator

Rotator & controller



45Kg vertical load **ONLY £49**

POWER SUPPLIES

P-2512 'M'

25-30 amp. Variable volts (3-15V) twin metres



£89.95

ALTAI

Over voltage/current short circuit protected



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ICOM IC-746



HF + 6 + 2 £1690

ICOM IC-706 MKII



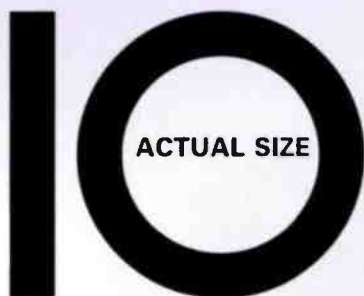
HF + 6 + 2 £995

**ICOM
IC-T8E**

**2 + 70 + 6
£345**



FERRITE RING



Pack of 10

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INC P&P

Specifications:

Mic impedance 600Ω. Mic frequency response 50-20000Hz. Sensitivity 65dB. Nic current 1Ma max. Speaker impedance 32Ω at 1000Hz. Response 120-2000Hz. Output sound pressure level 88dB. Comes with wiring diagram.



**ACE MH1 HEADSET
£12.99** inc P&P

**KENWOOD
TH-G71E**

**2 + 70 with
6W output
£249**



**YAESU
FT-50R**

**2 + 70
£279**



VECTRONICS

DUMMY LOADS

DL300M



DC-150MHz
300W

£32

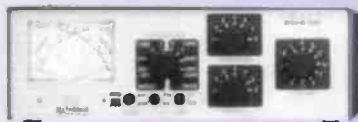
DL650M



DC-650MHz
1500W

£54

VC300DLP A.T.U.



1.8-30MHz built-in dummy load
six position antenna selector

£129

**ALINCO
DJ-G5**

**2 + 70
£269**



EARTH RODS 4FT LONG, ADJUSTABLE BRASS FIXING
SOLID COPPER **£10.99**, COPPER PLATED STEEL **£8.99** P&P £4

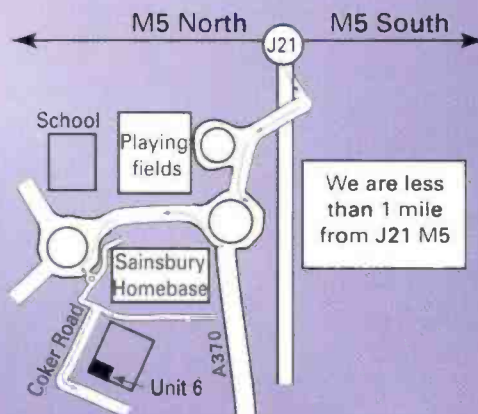
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Pack of three card holders
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We match/better competitors advertised prices on current UK equipment - and give a better customer service. Phone us last, for the best deal.



Do you remember when antennas were built to last?

Not only do some lightweight makes fold up in the first puff of wind, but their bandwidth is poor due to the small diameter of the elements. CQ-DX Beams are made to last, and their bandwidth is excellent - no trimming capacitors necessary. Designed and built to professional standards, these beams are available world-wide only from EastComm. Each beam is DC grounded, completely sealed to prevent moisture ingress, and fitted with a downlead and 'N' socket. All saddle clamps are Diecast Zinc Alloy. Booms allow for end fitting as well.

Don't throw money away on short-term solutions.
Buy a beam that will last! BUY CQ-DX!

Model	Band	Elements	Gain	Boom	Price
CQ-DX 50/4Y	6m	4EL	10.6dB	3.8m	£104.95
CQ-DX 144/4Y	2m	4EL	10.6dB	1.5m	£64.95
CQ-DX 144/10Y	2m	10 EL	13.6dB	3.6m	£89.95
CQ-DX 144/10XY	2m	10 EL crossed	13.6dB	4.0m	£109.95
CQ-DX 430/10Y	70cm	10EL	13.6dB	1.5m	£69.95
CQ-DX 430/18Y	70cm	18EL	17.6dB	2.8m	£79.95
CQ-DX 430/18XY	70cm	18 EL crossed	17.6dB	3.2m	£94.95
CQ-DX 430/24Y	70cm	24EL	18.2dB	4.0m	£104.95

Carriage £10

AUTEK RF ANTENNA ANALYSERS

RF1 HF **£169.95**

P&P 7.95

RF5 VHF/UHF **£289.95**

P&P 10.00

Protective Case **£14.95**

P&P 2.75



RF1

The RF1 adjusts antennas, feedlines, and RF networks, from 1.2 to 35MHz in 5 bands. It measures RF values of true impedance (0-2000Ω), SWR (1 to 15.1). C (0-9999pF) and L (<0.04 to 300μH). It instantly reads out impedance and SWR. Feedline loss and phasing, Q, tuned-circuit resonance can be accurately measured and adjusted. L and C are measured at the RF frequency of interest, not at 1kHz or 100kHz as with other L/C meters.

The RF5 is continuously adjustable from 35 to 75MHz, and 138 to 500MHz (typically 530MHz) in 3 bands. It measures RF values of true impedance (0-600Ω), SWR (1 to 6:1), and its INSTANT SWR mode finds the frequency of minimum SWR (or Z) on command automatically.

Both units fit into the pocket, and run on a standard 9V battery (or 7 - 12V).

CALLSIGN CLOCK £39.95

includes world-wide delivery
Hand finished with CALLSIGN on the face. An ideal gift for Radio Amateurs. A useful addition to any radio shack, and a valuable operating aid. A large face gives excellent visibility across a radio room. The hour is indicated in 12/24 hour format. Three colour with blue sky effect background. Global map shows countries with their bearing in degrees. Models are available centred on other world areas.



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FOR OUR FULL CATALOGUE SEND £2 IN STAMPS

△ DELTA ENGINEERING △ LOW PASS & BANDPASS FILTERS, COAXIAL EMP SUPPRESSORS



LOW PASS FILTERS

Lowpass filters are commonly made from thin lightweight materials, assembled with pop rivets, and not even any earth terminals! Their performance is, at the least, poor.

Delta Filters are tough construction, with attenuation slopes avalanching down immediately after transmitting frequency range. Heavily built deep notching Chebyshev designs, prevent interference from harmonic or spurious emissions - a must for good operating. Low power models use silver-mica capacitors and phenolic connectors. High power models use thick teflon TFE insulation sheet, brass or copper capacitor plates, all connections soldered.

420	50Ω	600W	30MHz	S0239	£59.95
421	50Ω	8kW	30MHz	S0239	£89.95
425	50Ω	600W	56MHz	S0239	£59.95
426	50Ω	3kW	54MHz	S0239	£79.95

P&P £5.95 each filter

TRANSCIEVING BANDPASS FILTERS 250W 50Ω

412	50-50.5MHZ	S0239	£69.95
413	144-148MHZ	S0239	£69.95

P&P £5.95 each filter

These Bandpass transceiving filters are designed to lessen or eliminate interference from nearby transmitters

operating in close proximity to transceivers. As they are transceive style, they will also effectively reduce any transmitted spurious and harmonic emissions from your transmitter. The 412 and 413 are two stage, parallel resonant circuit, top-coupled designs. Each unit will pass the listed band of frequencies, and attenuate or block all frequencies above and below that band segment. The filters are connected between the transceiver output and the antenna. Direct grounding of the filter may offer better overall performance, but generally the station's earth ground will be sufficient.

SUPPRESSORS

Delta suppressors protect coaxial line centre conductors from DC and low frequency AC voltage/current transients. Delta suppressors deliver as much current to ground as the centre conductor of the coaxial line can. The circuit, active at all times, neutralizes minute transients which often cause receiver noise. Direct hits can be handled, but not under all conditions.

301/U	1.5 - 200MHz	1kW	S0239	£44.95
302/U	30-500MHz	1kW	S0239	£49.95
302/N	30-500MHz	1kW	N	£46.95

P&P £4.95 each suppressor

Sigma Wire Antennas

The World's Largest Antenna Manufacturer

Sigma Antennas are easy to assemble using the supplied instructions

All antennas marked * have a 3kW Current Balun option for only £18 extra.

Heavy Duty Deluxe G5RV's SO239 TERMINATION

Louis Varney designed the G5RV as a 1.5λ centre-fed doublet on 14.15MHz, hence the top length of 102ft. This gives a low feed point impedance, which can be matched to a 50Ω line using a line transformer, and a multimode radiation pattern.

G5RV	Full Size	80/40/20/15/10m	102' long	£39.95	4.95 p&p
G5RV	Half Size	40/20/15/10m	51' long	£24.95	4.95

Shortened Dipole Antennas* SO239 TERMINATION

SLS-40K	40m	38' long	£66.95	5.95 p&p
SLS-80K	80m	69' long	£77.95	5.95
SLS-160K	160m	100' long	£83.95	5.95

Receiving Dipole SO239 TERMINATION

SAD	46' long	£49.95	4.95 p&p
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Trapped Dipole Antennas* SO239 TERMINATION

SD-32	20/15/10m	2 Trap	27' long	£83.95	p&p 5.95
SD-34	20/15/10m	4 Trap	24' long	£142.95	7.95
SD-42	40/20/15/10m	2 Trap	55' long	£89.95	5.95
SD-44	40/20/15/10m	4 Trap	47' long	£147.95	7.95
SD-52	80/40/20/15/10m	2 Trap	105' long	£103.95	7.95
SD-54	80/40/20/15/10m	4 Trap	97' long	£161.95	7.95
SD-56	80/40/20/15/10m	6 Trap	86' long	£219.95	9.00
SD-68	160/80/40/20/15/10m	8 Trap	154' long	£297.95	10.00
SD-610	160/80/40/20/15/10m	10 Trap	148' long	£349.95	10.00
SD-162	160/80m	2 Trap	208' long	£125.95	7.95
SDW-34W	30/17/12m	4 Trap	32' long	£139.95	7.95
SDW-46W	40/30/17/12m	6 Trap	46' long	£199.95	9.00
SDW-58W	80/40/30/17/12m	8 Trap	85' long	£274.95	9.00
SDW-610W	160/80/40/30/17/12m	10 Trap	152' long	£315.95	10.00

SVS-31	20/15/10m	1 Trap	14' long	£49.95	p&p 4.95
SVS-32	20/15/10m	2 Trap	13' long	£79.95	5.95
SVS-41	40/20/15/10m	1 Trap	28' long	£52.95	5.95
SVS-42	40/20/15/10m	2 Trap	24' long	£81.95	5.95
SVS-51	80/40/20/15/10m	1 Trap	53' long		
£59.95					
SVS-52	80/40/20/15/10m	2 Trap	49' long		
£88.95					
SVS-53	80/40/20/15/10m	3 Trap	44' long		
£118.95					
SVS-64	160/80/40/20/15/10m	4 Trap	77' long		
£156.95					
SVS-65	160/80/40/20/15/10m	5 Trap	73' long		
£189.95					
SVS-161	160/80m	1 Trap	105' long		
£70.95					

Trapped Slopers* SO239 TERMINATION

Anti-corrosion compound for copper wire antennas:
ACJ-1 Sachet £7.95 p&p £1.95



These vertical slopers are fed at ground level with the 'cold' side of the bottom connector connected to a ground stake.

All Band SA-10 450Ω TERMINATION

SA10 operates on all bands 160m - 10m. It can be installed as a flat top, sloper, or inverted 'V'. The top is 135ft/41.15m of heavy duty stranded copper wire, with low loss end insulators. A centre insulator is fed with 100ft/30.48m of 450Ω heavy duty twin ribbon feeder. It will work well from the balanced line output of your antenna tuner. £89.95 p&p £10

All Band Limited Space SAS-2 450Ω TERMINATION

SAS-2 will operate on all bands 160m - 10m. It can be installed as a flat top, sloper, or inverted 'V'. The top is of heavy duty stranded copper wire, and provides 135ft/41.15m electrical length, with a physical length of only 70ft/21.34m through the use of antenna shorteners. The centre insulator is fed with 100ft/30.48m of 450Ω heavy duty twin ribbon feeder. This antenna will work well from the balanced line output of your antenna tuner. £89.95 p&p £10

Off Centre Fed Dipoles SO239 TERMINATION

OCF Full Size	80/40/20/17/12/10m	135' long	£65.95	5.95 p&p
OCF Half Size	40/20/10m	68' long	£50.95	5.95

Baluns & Centre Connectors



Lightweight, sealed, weatherproof, with Solid Brass rustproof terminals. Jumper wires not needed. Soldering of antenna wire not necessary. DC grounded for lightning protection. SO239 Connector. Stainless Support Hook (except SCE-1/S).

SPB-1 Pro-Balun 1:1 impedance ratio "voltage" Balun that matches 50-75 ohm coax to 50-75 ohm load. 3 - 35MHz, 1.5kW. £29.95 p&p £4.95

SPB-1-C Pro-Balun 1:1 impedance ratio "current type" balun that matches 50-75 ohm coax to 50-75 ohm load. 1.5 - 60MHz, 3kW. £32.95 p&p £4.95

SPB-4 Pro-Balun 4:1 impedance ratio "voltage" balun that matches 50-75 ohm coax to 200-300 ohm load. 3 - 35MHz, 1.5kW. £32.95 p&p £4.95

SCE-1 1kW centre connector for a dipole antenna. £14.95 p&p £2.75

SCE-1/S 1kW connector for a vertical sloper antenna. £14.95 p&p £2.75

Traps & Shorteners



These heavy duty deluxe 600W traps are housed in weatherproof enclosures. No soldering or jumper wires are required.

Use 2 traps for a dipole, or 1 trap for a Vertical sloper.

ST-10 28MHz trap	£29.95 each	p&p £4.95
ST-12 24MHz trap	£29.95 each	£4.95
ST-15 21MHz trap	£29.95 each	£4.95
ST-17 18MHz trap	£29.95 each	£4.95
ST-20 14MHz trap	£29.95 each	£4.95
ST-30 10MHz trap	£31.95 each	£4.95
ST-40 7MHz trap	£31.95 each	£4.95
ST-80 3.5MHz trap	£31.95 each	£4.95

Antenna 'Shorteners' are excellent where installation space is limited. Housed inside weatherproof, sealed enclosures, so no periodic cleaning is required.

Two are needed for a dipole, one for a vertical sloper.

SCL-40 Shorten a 40m Dipole to 38' overall. £19.95 each p&p £2.75

SCL-80 Shorten a 80m Dipole to 69' overall. £21.95 each p&p £4.95

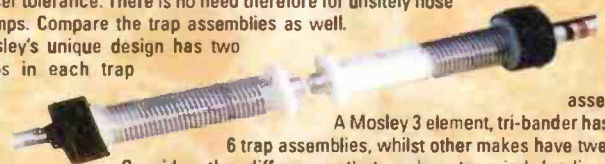
SCL-160 Shorten a 160m Dipole to 100' overall. £21.95 each p&p £4.95



Mosley H.F. Antennas



All Mosley Antennas have pre-drilled and colour coded element pieces which makes assembly quick and easy. All hardware is of stainless steel and tubing is aircraft grade, drawn, aluminium. This means that the telescopic tubing can be of closer tolerance. There is no need therefore for unsightly hose clamps. Compare the trap assemblies as well. Mosley's unique design has two traps in each trap assembly.



A Mosley 3 element, tri-bander has only 6 trap assemblies, whilst other makes have twelve! Consider the difference that makes to wind loading and structural stability.

VERTICALS	RV-4-C	10/15/20/40m	£269	Carr	£10
	RV-6-C-WARC	10/12/15/17/20/40m	£359		£10
	RV-7-C-WARC	10/12/15/17/20/30/40m	£379		£10
STANDARD	TA-31-JR-N	10/15/20m	1 EL	£199	£10
	TA-32-JR-N	10/15/20m	2 EL	£299	£15
	TA-33-JR-N	10/15/20m	3 EL	£349	£15
	TA-33-JR-N-WARC	10/12/15/17/20m	4 EL	£499	£15
HEAVY DUTY	TA-31-M	10/15/20m	1 EL	£229	£10
	TA-32-M	10/15/20m	2 EL	£399	£15
	TA-33-M	10/15/20m	3 EL	£509	£15
	TA-33-M-WARC	10/12/15/17/20m	4 EL	£659	£15
HEAVY DUTY COMPACT	TA-53-M-WARC	10/12/15/17/20m	4 EL	£769	£15
HEAVY DUTY CLASSIC	CL-33-M	10/15/20m	3 EL	£679	£15
	CL-36-M	10/15/20m	6 EL	£989	£20
WARC BANDS	TW-33	12/17/30m	3 EL	£829	£15

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Cushcraft CORPORATION ANTENNAS

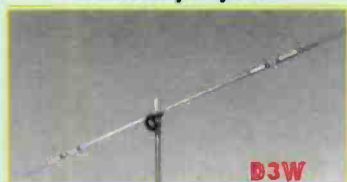
HF Multi-Band Beams



Cushcraft HF beams enjoy proven performance on DX-peditions, they are made from high quality aluminium, heavy duty element clamps and stainless steel hardware.

- A3S...10, 15, 20 mtr 3 element Yagi...£389.95
- A4S...10, 15, 20 mtr 4 element Yagi...£469.95
- A3W5...12, 17, mtr 3 element Yagi...£299.95
- A743...30, 40, mtr kit for A3S...£129.95
- A744...30, 40, mtr kit for A4S...£129.95
- A103...30 mtr kit for A3W5...£119.95

HF Rotary Dipoles



- D3W...12, 17, 30 mtr Dipole...£199.95
- D4...10, 15, 20, 40 mtr Dipole...£259.95
- D40...40 mtr rotary Dipole...£229.95

HF Mono Band Beams



- TEN-3...10 mtr 3 element beam...£139.95*
- 104CD...10 mtr 4 element beam...£269.95*
- 154CD...15 mtr 4 element beam...£289.95
- 203CD...20 mtr 3 element beam...£359.95

* NEW Euro Design YAGIS

A new range designed especially for the European market

VHF/UHF Beams

- * 13B2N...2mtr 13 element Yagi 15.8 dbd...£129.95
- * 17B2...2mtr 17 element Yagi 18 dbd...£199.95
- * A14410SN...2mtr 10 element Yagi 13.2 dbd...£85.95
- * A148-20T...2mtr 20 ele. crossed 11.1 dbd...£105.95
- * 719B...70cm 19 element Yagi 15.5 dbd...£109.95
- * 729B...70cm 29 element Yagi 17.8 dbd...£169.95

postage and packing £8 on each item

Dual Band Yagis

- A2706S...2m/70cm 3+3 element 7.8 dbd...£59.95
- A2710S...2m/70cm 5+5 element 10 dbd...£79.95

postage and packing £8 on each item

Satellite Antennas

- 22XB...2mtr 22 el. OSCAR Yagi 14 dbdc...£229.95
- 738XB...70cm 38 el. OSCAR Yagi 15.5 dbdc...£209.95

22XB and 738XB feature circular polarisation switching feature

6 Meter Antennas

- A503S...6mtr 3 element Yagi 8 dbd...£89.95
- A505S...6mtr 5 element Yagi 10.5 dbd...£149.95
- A506S...6mtr 6 element Yagi 11.6 dbd...£249.95

postage and packing £8 on each item



13B2N

Contest winning designs for 144-146MHz and 430-440MHz. Computer aided design ensures maximum gain and clean polar diagrams. Rugged aluminium construction and stainless steel hardware performs in all weather conditions. Ultramach balanced feed systems have 'N' type connectors.



A505S

Vertical Antennas

HF Verticals

The ultimate in multiband verticals! The R7000 features 30-50m including WARC bands expandable to 80m. Slim profile, ruggedly constructed traps, no ground radials required make it the ideal choice for small gardens.

- R7000...10, 12, 15, 17, 20, 30, 40 meter half wave vertical...£369.95
- R80...80mtr add on kit for R7000...£129.95
- AP8A...10, 12, 15, 17, 20, 30, 40, 80 meter quarter wave vertical...£229.95
- APR18A...Radial kit for vertical antennas...£54.95

postage and packing £8 - £10 for R7000

VHF Verticals

- AR2...2mtr RINGO 1.2m long 3.75 db...£39.95
- ARX2...2mtr RINGO RANGER 2.8m 5.5 db...£49.95
- ARX2B...2mtr RINGO RANGER 114.3m 7 db...£59.95
- AR6...6mtr RINGO 3.1m 3.75 db...£59.95
- ARX6...6mtr RINGO RANGER 7.3m 5.5 db...£199.95

postage and packing £8 on each item

NEW!

BIG THUNDER SERIES!

- X7-7 element 10-15-20m Yagi...£499.95
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the NEW name in AMATEUR RADIO!



NEW KH-6

6 metre Handy Transceiver

- 50 - 54MHz
- 4W RF out (12V) 2W RF out (9V)
- UK Repeater offsets
- Intelligent Power Save circuit
- CTCSS Encode/Decode
- Scan functions • Memory recall
- Supplied with 8 cell AA battery case (batteries not inc)

only **£149**

Optional Extras P&P £2.75 on each item

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- KH6-HP-50L...Flexi Higher Gain Whip...£12.95

Palstar Compact Tuners



AT300

150W STANDARD MODEL

- Matches dipoles, centre fed doublets, G5RV's, Balanced feeders, Verticals, Single wires, Delta loops, Beams, Windows and inverted V's.
- Built in 4:1 Balun

£129.95 £6 P&P



AT300 CN

150W CROSS NEEDLE MODEL

- 8 position antenna selector switching
- Built in dummy load
- Average power reading to 200Watts
- Standing Wave Ratio measurements with easy set function.

£139.95 £6 P&P

AT1500

1500W HIGH POWER TUNER

- Matches dipoles, centre fed doublets, G5RV's, Balanced feeders, Verticals, Single wires, Delta loops, Beams, Windows and inverted V's.
- Built in 4:1 Balun
- 5 position antenna selector switching
- Average power reading to 3000W

£365.95 £8 P&P



PS30M

30A POWER SUPPLY

- Ideal for HF transceivers
- 3 - 13V adjustable
- 25-20A Max • Voltage Current meter
- 10mV RMS noise and ripple

£99.00 £8 P&P



WM 150

NEW POWER/SWR METER

- 300W/3000W
- Cross needle SWR • 1.8 - 150MHz
- Average/Peak reading

£89.95 £8 P&P

COMET Antennas & Accessories



Comet Base Antennas

- GP 15N Triple Band Base 50, 144, 430MHz, length 2.4mtrs 300W PEP...£89.95
- CA 62B 50MHz Base Antenna 5/8λ 2 step 6.5dB 500W PEP...£84.95
- GP1144/430MHz 3/6dB 1.25mtrs 200W...£49.00
- GP3144/430MHz 4.5/7.2 1.78mtrs 200W...£57.95
- GP6 144/430MHz 6.5/9.0 3.07mtrs 200W...£89.95
- GP98144/430/1.2GHz 6.5/9.0/13.5dbi 2.94mtrs 200W PEP...£119.95

postage and packing £8 on each item

Comet Mobile Antennas

- CHL 350 28/50MHz Mobile 200W, length 2.16mtrs...£34.50
- CA HV Multiband HF/VHF Mobile, 7, 14, 21, 28, 50, 144MHz 1.9mtrs...£89.00
- CHL 285 50/144MHz Mobile 300W, length 1.32mtrs...£24.95
- CX 702 50/144/430MHz High gain 120W, length 2.1mtrs...£57.50
- HR 50 50MHz Centre loaded 2.15dbi 200W PEP, length 2.13mtrs...£39.95

postage and packing £8 on each item

Comet Filters

Japanese manufactured to the highest standards to help prevent and suppress TVI and other interference.



- CF-30S Low pass filter, cut-off 32MHz, 150W CW...£19.95
- CF-30MR Low pass high-power, cut-off 32MHz, 1kw PEP...£37.50
- CF-50S 50MHz low pass filter, cut-off 57MHz, 150W CW...£21.50
- CF-50MR 50MHz Hi power low pass, cut-off 1kw PEP 57MHz...£37.50

Comet Band Pass Filters

- Comet CF-BPF6 50MHz band pass filter, 150W CW...£42.50
- Comet CF-BPF2 144MHz band pass filter, 150W CW...£42.50

Comet Antenna Mounts

- RS20 Gutter mount with dial lock & adj...£17.95
- RS730 Adj in 4 directions for total flexibility...£18.50
- TBR Stainless steel multi purpose mount...£14.95

postage and packing £4.75 on each item

COMET Antennas & Accessories

Comet Duplexers and Triplexers have low input loss, high isolation and high power handling capabilities (up to 1kw!)

Comet Duplexers

Comet CF-416 144/430MHz

- CF-416A SO239/PL/PL...£27.50
- CF-416B SO239/PL/'N'P...£28.50
- CF-706 For IC706 and CAHV 1.3-56MHz/75-320MHz...£39.00

Comet Triplexers

Comet CFX-431A

- 144/430/1200MHz 'N' - 'N' - PL - 'N' socket...£46.00
- Comet CFX-514 Triplexer 50/144/430MHz PL - PL - PL - SO239 socket...£46.00

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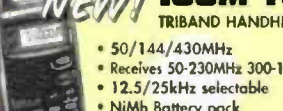
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As the previous issue, a special 2000 Club Calendar can still be available to anyone who either wants to see the calendar or to have it sent to them as a gift. The calendar is available from the Editor of Practical Wireless, 100, The Strand, London WC2R 0AL. The price is £10.00 plus postage. The calendar is available from the Editor of Practical Wireless, 100, The Strand, London WC2R 0AL. The price is £10.00 plus postage.

The club of the C&D is just 8000 ft and is available from all branches of the Club. The club of the C&D is just 8000 ft and is available from all branches of the Club. The club of the C&D is just 8000 ft and is available from all branches of the Club.

It is a pleasure to have you on the project. It is a pleasure to have you on the project. It is a pleasure to have you on the project. It is a pleasure to have you on the project.

The magazine has been a pleasure to read. The magazine has been a pleasure to read. The magazine has been a pleasure to read. The magazine has been a pleasure to read.

Keylines

I'm always very conscious that many readers make a point of reading 'Keylines' each month. That's why I enjoy writing it so much! There's always something to chat about and my biggest problem is keeping it to a page!

Occasionally however, I'm rather taken aback by the response to a particular 'Keylines'. And I honestly say - as I rapidly approach the start of my tenth year as Editor of PW - that my editorial regarding Keith Winward and Don Sobey in the March issue generated the most remarkable 'feedback' I've experienced since I've been in the 'Editor's Chair'.

Ever generous and responsive, PW readers have sent in cheques and even cash in the post to help Keith and Don. Thank you everyone, and I can tell you that both men are very grateful indeed for our help and support.

Although the news came too late for the March issue, I'm pleased to say that The Rapid Results College in London very kindly donated an RAE correspondence course for Keith Winward. However, as I write Keith still has not received the course which was sent by RRC on February 2nd. Let's just hope that the Governor and Staff at HMP Maghaberry, in Upper Balinderry Road, Lisburn, Northern Ireland are not withholding Keith's opportunity to study for the qualification he so much desires.

All the money coming in from readers is being safely looked after and I hope we can jointly provide an RAE course for Don Sobey in HMP Full Sutton in York. The courses cost £185 and I'm very confident together we'll raise that amount! I'm planning to visit Don in April when I'm in the area - perhaps by then he'll

be studying too! But before closing on the subject for this month (I'll provide an up-date as soon as possible) I must ask anyone wishing to send in a donation not to send cash in the post. I was taken by surprise at the response and never dreamed that £5 and £10 notes would arrive! So, please if you wish to help - write to me but make the cheques payable to PW Publishing Ltd. and not to me personally please!

Apologies To Richard G2BZQ

Some readers have queried the choice of title for Richard Marris G2BZQ's article 'The VLF-FLL Antenna For 73kHz' (published in the February issue). Richard had to point out that the title was not his choice (It was mine!) and that he does know the difference between low frequency and very low frequency operation. Sorry for any embarrassment caused Richard!

Thanks To G8UNZ

As I've often mentioned - PW readers are a generous bunch but on occasions it's very difficult to say 'thank you' - particularly when I come up against the (very annoying at times) 'Particulars Withheld' in the RSGB Callbook. Such is the case with the address of G8UNZ who very kindly sent a small box (very heavy of course) filled with lead sulphide (Galena) crystals for use in 'cat's whisker' type detectors.

Apart from his callsign and the fact I've spoken on the telephone to the kind gentleman I've no idea where to contact him - only his callsign appeared on the box. But thank you anyway kind sir - a very generous gesture indeed! So, if you ever do write to me (particularly when you're enclosing something like this)

The response to the 'new look' March issue of PW was very encouraging indeed. Many readers took the opportunity to write, E-mail, telephone and chat to us about the improvement brought about by the new design and use of colour. Overall, everyone who has been in contact with us has been very impressed with what we've achieved. Thank you for all your comments! However, in common with any piece of complex equipment used in the Amateur Radio station - a little 'fine tuning' and adjustment is necessary to get the best results. And again, in common with our radio equipment I've no doubt that the occasional 'tweak' as the months go by will help us produce the best possible magazine for everyone.

Additionally, I'm hoping you will help us to produce the best looking magazine possible by choosing your photographs carefully for use in the 'News', 'Club Spotlight' and within our redesigned 'action packed' 'Radio Scene' section. This section now contains all the regular 'report' features including 'VHF Report', 'HF Far & Wide', 'Radio Scape', 'Broadcast', etc. And to help us make the best of your favourites features I urge you to send in good colour photographs. As you've already seen - it really makes a difference!

please let me know who you are so I can write and say 'thank you' properly!

Identifying Photographs

Finally this month, and once again it's about identifying things (photographs this time) I'd like to ask you to help us keep track of your photographs. Obviously we get many hundreds each year, and if they ever get separated from the article/news item you've sent in - it's very difficult to match them up again!

So, if you're sending in photographs in please label them with the appropriate name, address and callsign and File No. (if it's an 'accepted' article you'll have this number to hand). It will help us to help you - particularly as we want more photographs from you for use in PW.

Rob Mannion G3FXD



ROB G3FXD REALLY DID GO 'MOBILE' WHEN HE BORROWED A BUGGY AT A SUMMER HAMFEST IN 1995!

Letters

COMPILED BY

ROB MANNION G3XFD & ZOE CRABH

STAR LETTER

One Valve Receiver

Dear Sir

I am writing to take up the challenge of constructing the one valve receiver. My efforts were to produce a set from the oldest components I had in the junk box and the photographs enclosed are of the finished set.

The heart of the receiver is a Mullard valve PM1HF 2V filament and up to 150V h.t. line. The oldest component, I think, are the headphones, about 1927 and BBC approved! I made the set for 3.5MHz and have operated it with an 'OXO' transmitter. I hope it will be of interest to your readers.



Regarding crystal sets, I have constructed one in the same vein from original components. I am also enclosing photographs of this set. Thanks for the authors note and crystal.

I have enclosed a set of high impedance 2000Ω headphones with my compliments. Unfortunately, the leads have suffered through old age and will need to be replaced.

Regarding the question posed by the Rev. George Dobbs G3RJV, about the plug-in basket woven coils which used to trade mark 'What are the wild waves saying', the company name on the coil label is Igranic, also on the label is the closed circuit wavelength graph, frequency against capacity and the coil manufacturer's number.

Nigel Ambridge G4FRL
Oxfordshire

Editor's reply: Thanks for the headphones Nigel and for sharing the story behind your simple receiver.

Ecko From The Past

Dear Sir

I'm writing with regards to Ecko! - Past To Present. A long time ago in my youth I spent many hours in the small family kitchen constructing radio sets. Now, having retired, my interest in radio was rekindled when I rediscovered some old issues of *PW* in the loft. As a result of this, I purchased and restored a couple of 1950s radios.

Then, a few months ago, I came across a very dilapidated specimen which looked much older and more of a challenge. Unfortunately, the back was missing, so manufacturer and model number were not immediately apparent, however, on closer inspection, the faded dial confirmed that it was an Ecko receiver.

The radio is mounted in a floor standing cabinet. Judging from the number of holes in the cabinet, woodworm had taken out a long term lease giving it an antique appearance! Functionally, the set has 3 waveband selected by push buttons, another 8 stations selected by push buttons and an extraordinary but non-operational motor-driven tuning mechanism.

Still without the model number, I had not been able to obtain a schematic, so I traced the circuit of the tuning arrangement thereby understanding the basic principles. Co-incident with this, I once again browsed through the old issues of *PW* and was astounded to find pictures of the actual receiver. The issues of the 2nd and 9th September 1939 covering that years' Radio-lympia exhibition show the cabinet and chassis and outlines the principles of motorised tuning, apparently all the rage at the time!

All this was made even more fortuitous when I read the letter from Ron Parry published in the January 1998 issue of *PW*. His excellent description explained precisely how the tuning circuit was meant to function. Also, I now know that I have a circa 58 year old Ecko receiver, model number PB289. Hopefully, this will enable me to obtain a schematic and get the set working once again.

It is still surprising that articles published nearly 60 years ago should still give rise to interest now. Maybe in 50 years time the teenagers of today will reminisce about their multi-Gigabyte computers and early Internet experiences. Somehow I don't think so!

Brian Eeles
Reading

Local Clubs & UKRS

Dear Sir

You write 'the local club is the backbone of our hobby' which certainly explains the balance of your publication. Only, how can you know that? Of all radio enthusiasts, fully licensed, condemned to 'partial licence', or otherwise, how many are active club members?

My personal encounters with fellow enthusiasts were very largely in the surplus shops 40 to 50 years ago, when most of us were certainly not particularly inclined to 'clubbery'. What become of us all I know not, but surely I am not the only survivor, nor is the breed extinct.

As the *PW* Editor travels around the clubs having the 'editorial ear' bent by special interest, or bias, groups, perhaps he should just bear in mind that we are out here too, actual or potential subscribers, and think of what may interest us.

For a start, while you give space to all sorts of parochial items, it distresses me that you give none to the United Kingdom Radio Society (of which I am a member) which concerns itself with matters of much wider interest.

'Sandy' Dick G4OIRZ
Dundee

Editor's reply: It's *PW*'s editorial policy to encourage and support all Amateur Radio activity Sandy. All incoming information is considered on its own merit and if the UKRS did send us

Slide Rules Or Guessing Sticks

Dear Sir

The article by Ray Fautley G3ASG on slide rules (aka 'guessing sticks') in your February 1998 edition bought back many happy memories of welding these devices.

One variant not mentioned by G3ASG was the Fowler's Circular Calculator. This had the appearance of a very large pocket watch with a couple of knobs on the periphery. An effective scale length of some 10 feet was achieved by using a series of concentric circles - thus allowing quite high accuracy, albeit with a tendency to drive the user cross-eyed after any lengthy period of using the beast!

Perhaps the biggest advantage of the slide rule over the digital calculator was that one never took the answer for granted. Some

anything on their activities (which they haven't) we'd be pleased to treat it in the same way.

Morse & Meccano

Dear Sir

On the subject of Morse code I would like to make some comments. As a lad (some 40 years ago or so), I was interested in Meccano, chemistry, nature and was a keen scout. My interest in radio was listening to 'Journey Into Space' on the wireless. I had never heard of 'Hams' (This was long before Hancock!).

On one occasion, when I was eleven, I had a bout of 'flu. I was bored, so my mother bought me a book of *Things To Do On A Rainy Day*. An item that caught my interest was how to build a radio. I quickly recovered from the 'flu and armed with a short shopping list, strolled into a (then) well known emporium in Hammersmith.

I walked up to the proprietor, glanced at my list and asked for a valve! When the laughter stopped, I eventually came out proudly clutching the ubiquitous HL2. The radio, an 0-V-0 was duly built and an interest in the subject kindled.

It just so happened that one of the scout's parents was a Radio Amateur (**G2CAJ**), who has long since passed away. Well, the rest is history, and I was hooked. I

nervously took and passed the RAE at 14, and then started struggling with the Morse. (This was long before Class B licence). I had regular sessions with my Mentor but found it very hard going.

Eventually, I took the test and passed. There I was, 15 years old, keen, licensed and no money! In those days it was easy to get on the air. Surplus receivers were cheap and abundant. Mine was an R1155. A beautiful set that I wish I still had!

Amplitude modulation (a.m.) was the order of the day then, s.s.b. and transceivers were still some way off. 'Top Band' was popular and an easy band to start with. My first 1.8MHz transmitter used parts scrounged from old radios. The p.a. was a 6V6 and the p.a. coil was wound on a toilet roll tube!

The power supply was similarly 'Heath Robinson', and certainly would not have scored any points for safety! However, the pride when this motley collection of bits actually resulted in several watts of r.f. was indescribable.

I had not built a modulator so my first venture on the air was to be Morse. I chose a quiet spot on 1.8MHz (there were not so many than, but QRN was far less) and called CQ. Imagine my joy when someone replied. The joy, however, was short lived.

The response was from another newly licensed amateur (**G3P--** series). I was still not fully comfortable with copying Morse speed so I sent QRS. The reply came

Wild Waves

Dear Sir

In 'Carrying On The Practical Way' in February PW, the Rev. George Dobbs G3RJV challenges readers to come up with the name of the company which used the phrase 'What are the wild waves saying' on its plug-in coils. And I am pretty sure the answer is Igranic.

I just wish I still had some of the wonderful wireless sets that I was given as 'old junk' when a child, some of which used such coils.

Justin Underwood
Berkshire

back to the effect that if I could not copy at that speed, then I should not be licensed. Needless to say, that was my first - and last - c.w. contact. I built a modulator.

Many years later, during a house move, I accidentally let my licence lapse and had to go through the trauma of re-sitting the Morse test. It was just as much hard work, but I passed. However, the earlier scars prevented me from using c.w.

I wonder if my original contact is reading this and can remember the incident? I am certainly not anti-Morse. I love the concept of its simplicity. This can not be surpassed by any other mode and is never likely to be. I just wish that I found it easier to copy, but many hours of dedicated listening never brought the results that I hoped for and expected.

All people are different. Some are extrovert, some are introvert, some are natural athletes, some find it easy to speak several languages, some play musical instruments with ease, some find Morse a 'doddle'. Others, who are keen enough, will struggle with things and, through perseverance, will succeed, some will give up.

So, I would like to say to new or potential Radio Amateurs to persevere with the Morse code and to gain the pleasure of its beauty and simplicity and to all amateurs to encourage not discourage those who might not be as adept as yourself.

Dave Skye G3PLR
Hertfordshire

Letters Received Via The 'Internet'

Many letters intended for 'Receiving You' now arrive via the 'Internet'. And although there's no problem in general with E-Mail, many correspondents are forgetting to provide their postal address. I have to remind readers that although we will not publish a full postal address (unless we are asked to do so), we require it if the letter is to be considered. So, please don't forget to include your full postal address and callsign along with your E-Mail hieroglyphics! Editor

mental arithmetic was always needed, even if only to determine the order of magnitude of the answer, so gross errors tended to be noticed. Calculators are often used with the operator's brain in neutral, glaringly wrong answers are accepted quite happily, and quoted to umpteen decimal places.

A very significant bonus point for slide rules was that you could also use them to draw straight lines - just try that with a calculator!

There were some hazards associated with them though. I still remember with horror a particularly embarrassing experience from my days as a young engineer. The slide rule that I had at the time was a rather ancient pre-war device (made by Unique, from my memory). This used a wooden construction, and the slide had worked rather loose.

One day I spilt some tea on it

and gave it a quick flick to remove the liquid. The slide shot out at high speed and flew between by boss and the rather high level visitor he was showing around the lab, landing with a clatter on the analogue computer being demonstrated at the time. It was a long time before I lived this down. Fortunately, though, my boss at the time had a reputation for being a practical joker (the analogue computer in question was the only one I ever encountered that had been modified to squirt water in the user's face from one of the 4mm sockets on the patch panel) and didn't see anything particularly unusual in the incident!

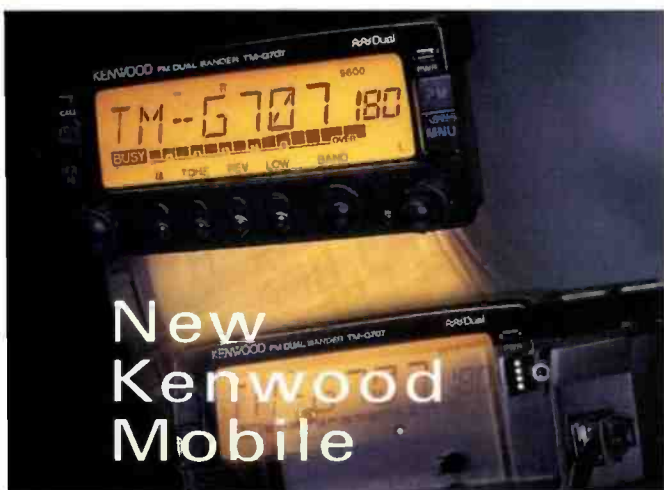
Anthony B Plant G3NXC
Birmingham

cks?

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NEWS

COMPILED BY DONNA VINCENT G7TQB



New Kenwood Mobile

h e a d l i n e n e w s

Just released from the Kenwood 'stable' is the new TM-G707E dual-band v.h.f./u.h.f. mobile transceiver. This has been introduced to complement their TM-V7E but has a simpler format including 'one band at a time' operation rather than full duplex dual receive. Features of the TM-G707E include:

- **High Visibility Display** - capable of displaying up to seven large alphanumeric characters and the orange i.c.d. has a built-in four-step dimmer control.
- **Five-in-One Programmable Memory** - as well as its regular profile, the TM-G707 can store four other operating profiles ready for instant recall at the touch of a button.
- **Memory Name Function** - allows you to identify each of the 180 channels with up to seven alphanumeric characters (and six dots). You can also switch instantly between the frequency and memory name displays.
- **Multi-Scan Functions** - full band and program band scans, memory scan with channel lock-out and call scan can all be carried out.
- **Built-in CTCSS Encoder/Decoder** - enables operation of the 38 EIA standard CTCSS sub-tone frequencies.
- **Quick Release Front Panel Kit** - if you opt for the quick release kit you can mount the front-panel of the TM-G707E virtually anywhere.

The recommended retail price for the TM-G707E is £439.95. For more information contact any Kenwood approved dealer or Kenwood Electronics UK Limited direct at Kenwood House, Dwight Road, Watford, Herts WD1 8EB. Tel: (01923) 8616444.



Monitor Award

The **International Short Wave League (ISWL)** are pleased to announce that their Monitor Award is now open to non ISWL members. To qualify for the award applicants must have 25 confirmed contacts with ISWL members and these can be in the form of QSLs or reception reports.

A certificate will be awarded for the first 25 confirmed contacts and endorsement stickers for every 25 thereafter. To help Monitor Award 'hunters' a *Check Book* containing a list of current ISWL members is available (costing £4 UK, £5 or 10US\$ Europe and 15US\$ Outside Europe) and a list of ISWL Nets can be obtained from the ISWL HQ of from their Website at <http://www.aber.ac.uk/%7Esrj5/iswl.html>

Further details on the Monitor Award are available from **ISWL Awards & Contests Manager, Belle Fleurs, Wade Reach, Walton on the Naze, Essex CO14 8RG.**

Wave shop's vast product range but will also have the unique opportunity to view the Museum's rare collection of electrical equipment.

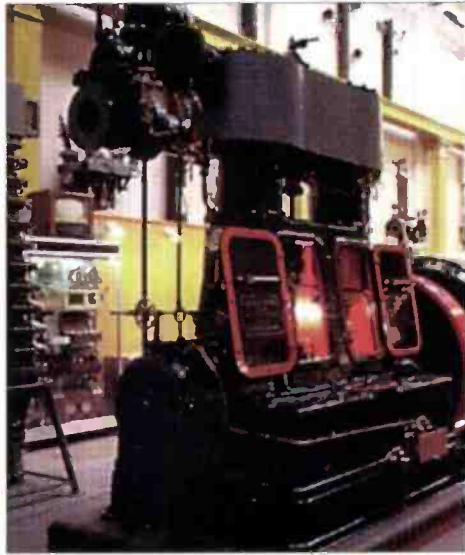
The Southern Electric Museum houses equipment displays dedicated to the supply of electric energy through the ages. The exhibits range from early domestic appliances including radio and television to distribution and generating equipment.

The Museum's doors will be open from **10.30am to 4.30pm** on the Open Day and as this is an extra special event entry will be free. Parking will be available for disabled visitors in the museum grounds and other visitors will find ample parking in the public car parks situated very close to the Museum site.

So, why not make a date in your diary? for what should prove to be both an educational, interesting and thoroughly enjoyable day!

Open Sparks!

The sparks really will be flying on **Sunday 15 March 1998** when **Bob G6DUN** and his team from the **Shortwave Shop** hold their Open Day at the **Southern Electric Museum in Bargates at Christchurch, Dorset** on the **B3073**. Visitors to the open day will not only have the chance to sample the Short



New Regulations

The following report has been kindly supplied by **Lirpa Loof, EEC Director of International Communications, Brussels:**

"It has been reported that the new CEPT regulations will require the RAE and Morse Test must be passed in the three languages that are currently used on the Amateur Radio Validation Document - English, French and German. In due course more languages will be incorporated into the document and will therefore have to be tested. This ruling will be retrospective and all existing Radio Amateurs must be retested in the languages that were not included in their original examinations. Those who do not pass the new multilingual test will only be allowed to conduct QSOs within their own countries."

You have been warned!

Anniversary Weekend

During the weekend of **9 & 10 May** County Morse test teams will on the air to commemorate the 12th Anniversary of the RSGB Morse Test Service. To help with Identification all stations taking part will use a special event GB0 prefix followed by the county code suffix, for example the Isle of Wight will



Busy Again!

Mary Pink MIBUB the manageress of S.R.P. Trading having gained her Class B Amateur Radio licence last year has been busy studying again and is now the proud owner of the Class A callsign MOBMH on passing her 12w.p.m. Morse test. Having achieved this Mary is now very active on the h.f. bands on both 'phone and key.

Mary is a member of the Sandwell Amateur Radio Club and was tutored through her Morse by Clive G0TVR and Steve M0ALH, to both of whom, she extends a large vote of thanks. So, look out for Mary on the air or why not pop-in to SRP for a chat and coffee when you're passing by?



use the callsign GB0IOW.

A 12th anniversary certificate (like the sample shown) will be available to any Amateur who makes contact with at least 10 of the GB station. The cost of claiming the certificate is £2.50 (cheques or postal orders made payable to the RSGB please), \$5 or 6 IRCs. All applications complete with log extracts (QSL cards are not required to claim the award, which is also available to listeners) should be sent to **Roy Clayton G4SSH, Chief Morse Examiner, 9 Green Island, Irton, Scarborough, North Yorkshire YO12 4RN.**

The Special Event stations to listen out for are:

- | | |
|--------|-----------------------------|
| GB0CW | Chief Morse Examiner |
| GB0MTS | Deputy Chief Morse Examiner |
| GB0ARM | Co Armagh |
| GB0ATM | Co Antrim |
| GB0BFD | Bedfordshire |
| GB0BUK | Buckinghamshire |
| GB0CNL | Cornwall (Poldhu) |
| GB0DHN | Co. Durham |
| GB0DVN | Devon |
| GB0ESX | Essex |
| GB0GDD | Gwynedd |
| GB0GRN | Grampian |
| GB0HLD | Highland |
| GB0IOW | Isle of Wight |
| GB0LCN | Lincolnshire |
| GB0LEC | Leicestershire |
| GB0LDN | London |
| GB0MSY | Merseyside |
| GB0NHM | Northamptonshire |
| GB0NOR | Norfolk |

- | | |
|--------|-----------------|
| GB0SCD | Strathclyde |
| GB0SPE | Shropshire |
| GB0SXE | Sussex East |
| GB0TWR | Tyne & Wear |
| GB0YSE | Yorkshire East |
| GB0YSN | Yorkshire North |

Activity will be concentrated on the 3.5 and 7MHz bands and in a bid to encourage newcomers to apply for the award each team will spend some time calling slowly in the Novice c.w. section of the 3.5MHz band. There are no restrictions on the type of key used and everyone is welcome to 'call-in' and enjoy the friendship.



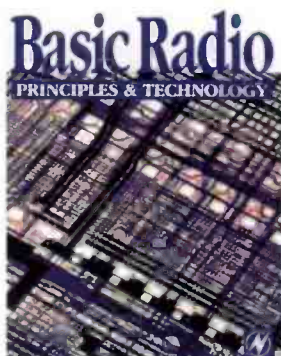
New Book

New this month to the PW Book Store is *Basic Radio Principles and Technology* by **Ian Poole G3YWX**. This paperback hobbyist's book has been written to cover the major aspects of radio (assuming the reader has a basic knowledge of electronics).

Capacitors, inductors, resonance, which of course are crucial to radio, are covered in some detail and naturally radio propagation, modulation techniques, frequency hopping and spread spectrum are all covered. In addition to this receivers, transmitters and antennas are dealt with, as are broadcasting (including digital broadcasting), satellites and cellular 'phones.

Basic Radio Principles and Technology is in stock now and costs just **£14.99 plus £1 P&P UK, £2 P&P overseas**. So, what are you waiting for? Order your copy today by calling **(01202) 659930**.

IAN POOLE



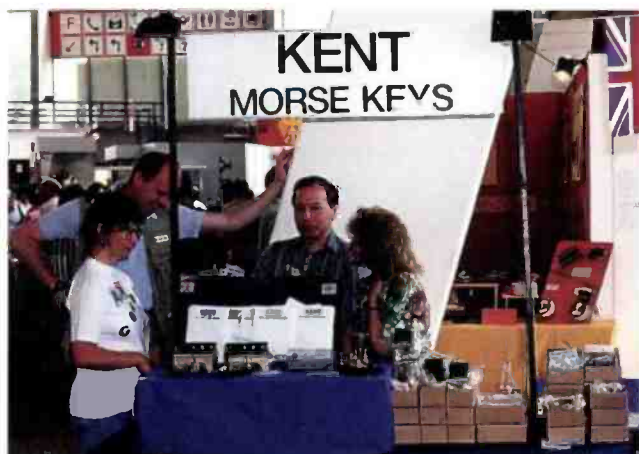
Kent Keys Sunk!

No, don't worry **Bob Kent** has not gone out of business and his keys do not really sink. But one of his straight keys has certainly earned a claim to fame.

One of Bob's straight keys features in the radio scene shot in the block busting movie *Titanic*. The four minute scene cost a staggering eight million dollars to shoot and if you look carefully you'll see Bob's key in view for 20 seconds with

a four second fully focused shot.

So, if you're going to see this watery epic keep an eye open for that Morse key and don't forget Bob is very much on the 'crest of a wave' with his Morse key business. If you're interested in Bob's range of keys why not contact him at **243 Carr Lane, Tarleton, Preston, Lancashire, PR4 6BY. Tel: (01772) 814998?**



March 14: The 5th West Wales Amateur Radio & Computer Rally will be held at Penparcau School, Aberystwyth. Doors open 1030 to 1600 (disabled visitors from 1000). Admission is £1 only. There are good parking facilities with easy access for disabled and traders to all stalls, demonstration area and catering facilities. Features include Amateur Radio, Bring & Buy, computers, software and hardware, electronics, h.f. and v.h.f. on air, packet station, repeater group, RAFARS, RSARS, WAB, RAYNET and other special interest groups, trade stalls and lots more. Talk-in on S22. Come and enjoy yourselves. For details and trade stand bookings contact **Katy GWOSFO** on **(01545) 580675**.

***March 15:** The 'Norbreck' Amateur Radio, Electronics and Computing Exhibition by the Northern Amateur Radio Societies Association is to be held at Norbreck Castle Hotel, Exhibition Centre, Queens Promenade, North Shore, Blackpool. Doors open at 1100 (disabled access from 1045). There will be over 100 trade stands, club stands, Bring & Buy, RSGB stand and book stall, construction competition, amateur computer stands and free car parking at the hotel, bus from extra car park. There is also wheelchair access to all the exhibitor stands. Radio talk-in on S22. Admission is £2, OAPs £1 and under 14s free. **Peter Denton G6CGF** on **0151-630 5790**.

March 15: The Tiverton SW Amateur Radio Club. Starts 1000 with all the usual excellent displays and catering facilities. **Alan GOMAS** on **(0884) 252259**.

March 22: The Bournemouth Radio Society will hold its 11th Annual Sale at the Kinson Community Centre, Pelhams, Kinson, Bournemouth, Dorset. Doors will be open from 1000 until 1600. Talk-in by RAYNET will be available on S22. As usual, there will be a mixture of radio and computer equipment on sale plus a Bring & Buy stall. More information from **John G1HOK** on **(01202) 535219** or mobile on **(0850) 240931** or E-mail: **jburtens@asgard.co.uk** or via Packet as **g1hok@gb7bnm** with 'BRS Sale' as the subject.

***March 29:** The Cunninghame District Amateur Radio & Computer Rally will be held at the Magnum Centre, Harbourside, Irvine, Ayrshire, Scotland. Doors open at 1100 (1030 for disabled visitors). There will be a Bring & Buy, Morse tests and all the usual traders, etc. **Mr W. Gebbie** on **(01560) 321009**, E-mail: **supergit@msn.com** or **gm3us@qsl.net**

March 29: The Pontefract & District Amateur Radio Society Component Fair is to be held at Carlton High School. The venue is 300m from the Carlton Community Centre. Car parking will be at the school as usual. The venue will be signposted from the major roads. There will be a talk-in on 2m. For unlicensed visitors, Nigel Ferguson G0BPK can be contacted 0900 to 1400 on (mobile) **(0411) 420409** for directions. Doors to the fair open at 1100 (disabled visitors will be admitted at 1030). Once again all traders will be on the ground floor. The bar and tea room (tea room open for early visitors) will be on the first floor. Morse tests will be conducted. Admission will be by prize programme. Contact **Nigel G0BPK** on **(01977) 616935** in the evening or on **(01977) 606345** during the day, or E-mail at **g0bpk@aol.com** Traders please contact **Colin GONCE** on **(01977) 677006**.

April 5: The Cambridgeshire Repeater Group (CRG) are holding their annual rally at The Bottisham Sports Centre (Part of Village College), Lode Road, Bottisham, Near Cambridge. The event will feature an Auction Sale, Trade Stands, a Bring & Buy and a Car Boot Trading area. For further details and booking in of traders may be obtained from: **Paul Dyke G0LUC**, **41 High Street, Puckeridge, Ware, Herts SG11 1RX** or telephone on **(01920) 821536**.

April 5: A Radio Fleamarket is to be held at the University Sports Centre - Uia Wilrijk/Antwerpen in Belgium, close to A-12, Belgium. Open from 1200 to 1800 local time. Radio stb: 145.7625MHz Repeater Antwerpen and 145.425MHz simplex freq. Call ON4OSA. More information from **ON4CDV Gaetan CM/OSA**, E-mail: **on4cdv@mail.dma.be** club site: **http://bewoner.dma.be/on4osa/main.htm**

April 18: The SAMS'98 Computer & Electronics Show is to be held in the Bingley Hall, Staffordshire Showground, Weston Road, Stafford (A518 Stafford-Utttoxeter Road), signposted from Junction 14 on M6, (bus shuttle from Stafford Railway Station). Doors open 1000 to 1600. Admission for adults is £3, children under 14 50p, Concessions, OAPs, RSGB Members, Student Card, UB40, £2, (Advance Tickets £2 plus s.a.e.). This is the 10th consecutive year and the 13th AMS (All Micro Show) at Bingley Hall. Last year saw an attendance of approx 3000 and around 100 trade stands covering the computing spectrum,



along with accessories, software, books, components, radio, satellite and much more. There will be masses of free

parking a licensed bar from 11am and refreshments, meals and a cafeteria. A great day out! **Sharon Alward, Sharward Promotions, Knightsdale Business centre, 30 Knightsdale Road, Ipswich, Suffolk IP1 4JJ, Tel: (01473) 741533, FAX: (01473) 741361** or E-mail: **services@sharward.co.uk**

April 19: The Yeovil ARC 14th QRP Convention is to be held at Digby Hall, Hound Street, Sherborne, Dorset. Doors open 0900-1700. There will be high quality lectures with the Reverend George Dobbs as 'VIP', plus trade stands, Bring & Buy and refreshments, etc. Talk-in on S22. Entry is £2, which includes prize draw ticket. **Peter G3CQR, QTHR**, or telephone on **(01935) 813054**.

April 19: The 17th Mobile Rally of the Lough Erne Amateur Radio Club will be held at the Killyhevlin Hotel, Enniskillen, Northern Ireland. Doors open at 12 noon. Tyrone Amateur Electronics will be there and it is hoped Icom, Yaesu, Waters & Stanton as well as the usual interesting variety of other traders and the Bring & Buy. **Keiran G17NET** on **(01365) 348063** (daytime) and **(01365) 327133** (evenings).

May 10: The Drayton Manor Radio & Computer Rally will be held at Drayton Manor Park, Fazeley, Tamworth, Staffordshire on the A4091. Main traders are in four marquees, there will also be a large outside traders flea market, a Bring & Buy stall, local clubs and special interest stands. Doors open 1000 onwards. For Trader information call **Norman** on **0121-422 9787**, for general enquires, call **Peter G6DRN** on **0121-443 1189**, evenings please.

If you're travelling a long distance to a rally, it could be worth phoning the contact number to check all is well, before setting off.
The Editorial Staff of PW cannot be held responsible for information on Rallies, as this is supplied by the organisers and is published in good faith as a service to readers. If you have any queries about a particular event, please contact the organisers direct. Editor

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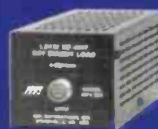
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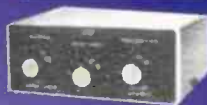
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club spotlight

COMPILED BY ZOE CRABB

The 'Spotlight' Is On Again!

It's time to turn the 'Club Spotlight' on again as we invite you to enter your club magazines into the 1998 *Practical Wireless* & Kenwood Club Spotlight Magazine Competition. Local clubs entering will be competing for the magnificent original trophy - kindly donated by Kenwood - and 'national' clubs will be competing for the 'Bert's Bell' award, which was instituted in 1997 in tribute to the late Bert Newman G2FIX.

It's very simple to enter the Club Spotlight magazine competition and all you need to do is to send us the three most recent copies of your magazine and a covering letter. The covering letter should make it clear what category of club your club is eligible.

For example, the British Amateur Radio Teledata Group - BARTAG - winner of the 1997 national award - can only enter as a national club section, whereas the Cockenzie & Port Seton Club - last year's winners, now have to specify that they are a local club.

National Or Local

For either category (national or local) your covering letter should provide the following details: How many people there are on the Editorial team and the type of job they do/or did (if retired), how long the magazine has been established, how it's produced (on your computer or text supplied to 'outside' printer for professional printing, etc.) and whether or not the publication is 'sponsored', the number of copies printed and membership size of your club. It would also help the judging panel if you could provide some historical details on your club.

The judging panel this year includes Jim Bacon G3YLA, David Barlow G3PLE (who of course first suggested the competition!), Zoë Crabb, Dave Wilkins G5HY and Rob Mannion G3XFD. Additionally - and for entries in the national category only - the Salisbury Club will be providing one extra judge to decide the winner of the Bert's Bell Trophy (Salisbury was of course Bert's Club).



Entry to the competition is open now and all entries should be at the *PW* offices in Broadstone no later than Wednesday 1st July 1998. This is because the presentations are to be made at the Leicester Show in September (the new venue of course) and members of the judging panel live in places as far apart as Cornwall, East Anglia and Greater London, so it will not be possible to consider late entries!

So, make sure your club's entry reaches us in good time by sending it to Zoë Crabb, Club Spotlight Magazine Competition, *Practical*

Wireless, Arrowsmith Court, Station Approach, Broadstone, Dorset BH18 8PW.

The Editor's decision (as head of the adjudication panel) is final and no correspondence will be entered into. Good luck and we look forward to reading YOUR magazine!

Rob Mannion G3XFD

Competition Time!

Back in August of last year, Club Spotlight received a very interesting letter from **Geoff Theasby G8BMI** in Keighley, suggesting a possible club quiz to be run in these pages. Both Rob and I thought it was a great idea, but with limited room in the last few months, we haven't been able to run the quiz, so this month, with space permitting, here it is!

So, what do you have to do? Well, if you (or your club) would like to enter, there are **50 questions** in total to answer. To receive these questions, all you have to do is send an s.a.e. to Geoff at the address below, who will send out the questions on request (**answers to be returned to him also!**). The closing date for the competition is **1st May**

Southampton Amateur Radio Club

Malcolm Troy GOWFQ has recently moved his QTH to South Wales. This means that the **Southampton Amateur Radio Club** has lost its Chairman, but at a recent committee meeting, a new Chairman was elected. He is **Pete Walkling G8RNT**.

Members of the club still meet on the 1st and 3rd Monday of the month at **Cantell School, Violet Road, Southampton**, and the club has recently purchased an h.f. transceiver to help generate interest at club meetings. Full details of membership, etc. can be obtained from **Harold McIntyre G3FLJ (Secretary), 42 Dunvegan Drive, Lordswood, Southampton SO16 8DD. Tel: (01703) 737715.**

Now On Web

The **Coventry Amateur Radio Society** now have a Web site. Find them at **www.xasf.demon.co.uk** Just a few of the up and coming events are as follows: March 13 - Night on the air, v.h.f., h.f. and Packet, 20th - Bowling evening, 27th - Night on the air, demo on how to use v.h.f. Packet, DX Clubs and BBS and a talk is planned for April 3rd.

The Society meet Fridays at 2000 at **Binley Church Hall, Brinklow Road, Coventry**. Visitors are always made welcome.

Find out more about the Society and its activities from **Robin Tew G4JDO** on **(01203) 673999**.

Change Of Name

The **Siemens Plessey Christchurch Amateur Radio Society (SPCARS)** has now changed its name to the **Christchurch Amateur Radio Society (CARS)**. Meetings are held on Thursday evenings at 8pm at **The Radio Club Room, behind the Sports & Social Club, Grange Road, Somerford, Christchurch**. Visitors are

1998, so there's plenty of time for all of you out there to enter!

Once Geoff has marked all of the answers, he will forward the results to us and the winner will receive a one year subscription to *PW*. However, in the event of a tie, Geoff will pose a tie breaker question(s) by post to the relevant clubs, but to avoid replies coming together by post, not knowing which is first, the winner will be the first to telephone Geoff with the correct answer by a particular time on a specified day.

So, contact Geoff Theasby G8BML at 31 Middleton, Cowling, Keighley BD22 0DQ and who knows, you could be a winner!



Geoff Theasby G8BML shown in his 'experimenters' shack and no he's not hiding, it's just very cramped!

most welcome.

Further information can be obtained by ringing Mr Harris G7WSN, Secretary, on (01202) 484892 evenings.

Bromsgrove & DARC

The Bromsgrove & District Amateur Radio Club meet every Friday at 2000 at The Avoncroft Arts Centre (a registered RAE Exam Centre), Bromsgrove. RAE courses are on Mondays at 1930 and Morse classes are held on Tuesday at 1930 with NRAE courses on Thursday at 1930.

Further details from John Burford G4OAZ on (01527) 871903.

CARA is 21!

The Cheltenham Amateur Radio Association (CARA) celebrates its 21st Anniversary in 1998. The club was formed back in 1977 by the amalgamation of The Cheltenham Group of the RSGB and The Cheltenham Amateur Radio Society. Its first meeting was in November of that year and in common with many clubs, CARA has met with mixed fortunes in the years between, but is currently enjoying a renaissance.

Membership has increased from 30+ at the start of 1996 to 60 at the close at 1997.

Everyone is very enthusiastic and particularly pleased to have in their membership several M calls. They also have as members a GM and an Italian s.w.l!

The 21st Anniversary will be marked by a number of special meetings and events. A club dinner will be held during May, when past and potential members will be most welcome. Among the meetings arranged are talks by the Editor of *Practical Wireless*, Rob Mannion G3XFD (August) and a talk by the President of the RSGB, a constructor's contest (March) and a demonstration in April of SSTV.

The actual anniversary talk in November will be given by the same person who addressed the very first meeting, Richard G4ERP. Richard who is one of the members, is also Head of Electronics - Benetton Formula, and he will talk about Radio and Motor Racing.

The Cheltenham Association has also had considerable success over the years in various contests and hopes to take part again this year in HF/NFD in June and SSB/FD in September. The club will also be active at the Cheltenham Radio Rally on April 5th where the club call G5BK will be operated as a talk-in station and the club will also be running the Bring &

Buy stand.

Members of the club meet on the first Friday of every month at **The Library, The Burgage, Prestbury, Cheltenham** at 7.45 for an 8pm start. Meetings are open to all who are interested in Amateur Radio, whether licensed or not. Visitors are most welcome to attend.

For further information on this or any other aspect of CARA, contact the Secretary **Patricia G1NKS** on (01242) 241099 or packet **G1NKS@GB7GLO** or E-mail **g1nks@g3nks.demon.co.uk**

Salop's Activities

Members of the **Salop Amateur Radio Club** meet every Thursday evening at **The Telepost Club, Railway Lane, Abbey Foregate, Shrewsbury**, starting at 8pm. Alternate evenings are Natter Nights and Nights On The Air. The club has a fully functional shack covering most bands.

Visitors are very welcome to attend and can learn first hand about this absorbing hobby. Classes are also held to enable those interested to qualify for an 'A', 'B' or Novice class licence, and recently, the club have enjoyed very high pass rates.

The club enters many of the official contests that take place during the year and also hold a construction contest, quiz contests with local clubs, a Junk Sale and an Equipment Sale, plus social evenings are held each year. Visits are also arranged to various sites of interest, not always radio oriented. More information from **T. G. Davies G0JIX, 20 Kirkwood Court, Shrewsbury SY1 3SX**.

Talk At Cockenzie

The Cockenzie & Port Seton Amateur Radio Club will be hosting a talk by Tom Wylie GM4FDM on the subject of IOTA/IOSA, in Resources Room 2, Port Seton Community Centre in Port Seton on Friday March 20th from 7.30 until 9.30pm. All will be made welcome and a nominal entry fee of £1 will be made, with all proceeds going to the club's adopted charity, the British Heart Foundation.

For more information contact Bob Glasgow on (01875) 811723.

DON'T KEEP ZOE WRITING, SEND IN YOUR CLUB NEWS & INFORMATION NOW!

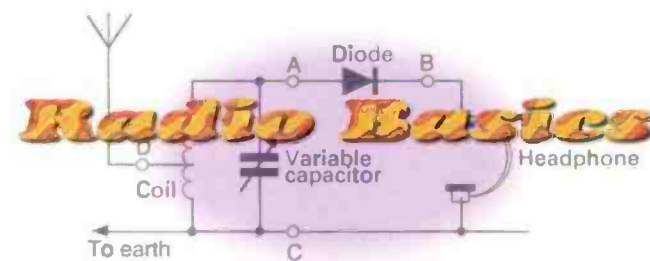
There's no substitute for experience and I've been re-living my early days in radio with the simple 'crystal' diode detector receiver described in 'Basics' recently. And although it does work the audio output is very limited and unless you have access to a good quality pair of high impedance headphones - listening in won't be that easy.

So, to get over the problem of faint audio I'm describing a very simple add-on audio amplifier this month. The circuit, Fig. 1, shows the original 'crystal' diode receiver on the left, with the added components for the amplifier to the right of the dotted lines.

Amplifier Circuit

The amplifier circuit uses the commonly available BC109 npn type of transistor. It only requires one capacitor and a resistor together with the 9V battery power supply. You don't even need a switch as the battery can be disconnected when the receiver is not in use.

In fact, the audio 'gain' of the amplifier is such that it will provide enough output from a 9V battery source to drive a very small loudspeaker which you could incorporate into 'home-made' headphones or stereo cassette type headsets. I even found that **BBC Radio 4** could be heard using one of the very cheap (and



relatively inefficient) 'in the ear' earphones, which can be bought for around 50p.

Building & Testing

Building and testing the receiver and amplifier is very simple indeed and enjoyable following the 'drawing pin and board' method. So, all you need is a soft wooden board or section of thick cork flooring tile (these take the drawing pins very well) and off you go!

If you've already built the diode receiver all you have to do is to disconnect the headphones/earpiece and following the diagram in Fig. 2, assemble the components after placing the drawing pins. Tin them with solder first as they take a few seconds to cool, but when soldering a component you only have to melt the solder where you're attaching the component.

Take care to connect the transistor correctly as in the diagram, as it can be destroyed quite easily.

And once you have finished the building process you can test the amplifier by providing a potent input signal with your soldering iron on the base input (centre connection of the three on the device)! **However, before you do the test - make sure the headphones are not directly over your ears as the resulting buzz can be quite loud!**

The loud buzz which should be produced by the application of the hot soldering iron comes from the 100Hz (remember - 50 positive and 50 negative pulses from the alternating current mains supply) being radiated from the tip of the tool. And if all is well - connect the antenna and hear your amplifier doing its job.

Best Signal

In practice I've found that the 'centre tap' coil (on any long, medium or short wave frequencies) provides the best strength signal and best separation ('selectivity') between stations. And with

the little amplifier added - reception is much easier.

Here in Dorset, with a 10 metre length of wire for the antenna and a good earth connection I've found that the BBC Radio 4 Droitwich (near Birmingham) 198kHz long wave transmitter comes in very well using a coil of 80 to 100 turns on a small ferrite rod. And with 40 or so turns (coverage will depend of your coil and capacitor combination, so be prepared to experiment) I found that I could hear stations all over Europe.

Fascinating Fun

This little project provides fascinating fun! I found myself sitting with headphones (and using single earphones inserts and small speakers) on and trying all sorts of different coil and capacitor combinations.

The capacitor used and the resistor I've chosen provided the best results I could get. Next time I'm going to describe how you can add a radio frequency amplifying stage to your simple receiver - and the difference this can make will really make yours ear prick up!

Join me next month - and in the meantime have fun discovering the radio basics!

PW

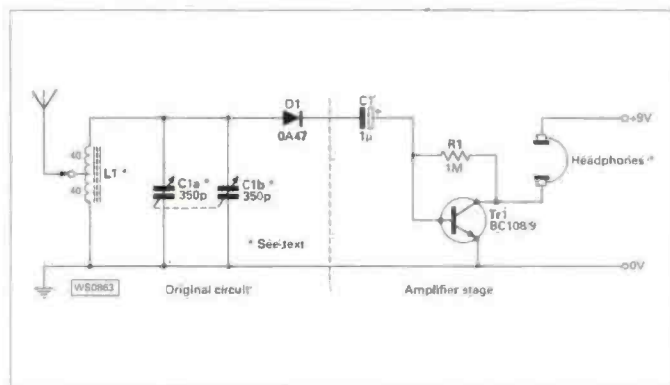


Fig. 1: Circuit of the 'crystal' diode receiver with additional transistor amplifier. The 1MΩ resistor is a nominal choice, experimentation with values between 470kΩ and 1MΩ may provide higher volume depending on the choice of small speaker/earpiece or cassette player headphones (470kΩ choice is shown in Fig. 2).

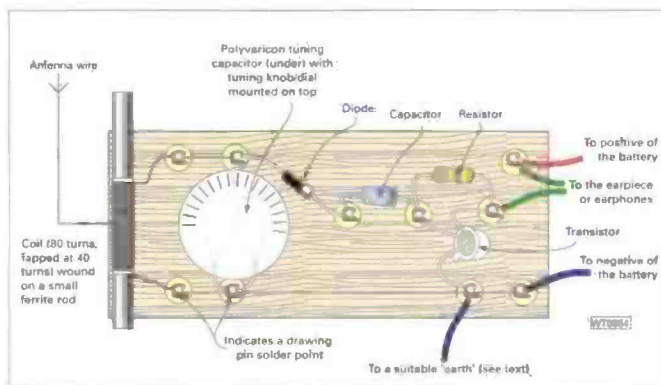


Fig. 2: Diagram showing lay-out of wooden board and components. If stereo cassette headphones are used (minus jack plug) they are connected for mono operation (Join screened leads together for one connection, and the two 'Inners' for the other connection).

From this Issue of PW newcomers to radio can join Rob Mannion G3XFD every month in his column aimed at the beginner in the hobby. This time he describes how you can utilise cheap headphones with a simple amplifier added to a 'crystal' diode receiver.



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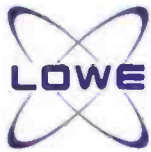
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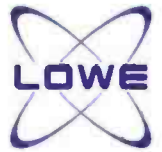
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THE

DIGITAL

DEBATE

4 - page special

The radio broadcasting industry is about to enter the digital age. The world-wide digital revolution has been gathering pace for some time and the developments in Digital Audio Broadcasting (DAB) mean that the UK radio industry will not be left behind. And of course it also will have great advantages to Radio Amateurs in respect of EMC problems.

Advanced technologies are converging, especially in broadcasting and this has led to lengthy debates about the introduction and development of DAB around the world. The European approach has been to define a new digital standard for radio broadcasting and the tailor-made system, Eureka 147, has also been adopted in the UK.

In August 1995, the UK Government's White Paper on Digital Terrestrial Broadcasting gave the 'green light' to the development of DAB for independent national and local radio. Transmission provider to most of the UK's independent radio stations, **NTL**, is a major player within the broadcasting industry and was instrumental in advising the Government on the white paper. The company has been at the forefront of DAB and is committed to the introduction of digital radio services in the UK.

Spectrum Allocation

Out of the seven available frequency blocks, one has been assigned to BBC national radio, one to independent national radio and the remainder to local and regional radio. There are currently three independent national radio operators, **Virgin, Classic** and **Talk Radio** who are already guaranteed places on the national multiplex.

This will leave room for an additional three or more DAB stereo only services or many more mono services. At a local level, there is capacity for six or 12 local or regional services depending on the location.

In preparation, NTL has had full time commercial and technical staff working on DAB since 1995 and is well placed to bring the technology to market. They also operate in satellite services, broad-band telecommunications and the Internet and the synergy with these businesses has resulted in a genuinely innovative technical approach to DAB.

To ease the transition into the digital age, NTL has been running a series of technical trials in conjunction with major broadcasters. In November 1995, the UK's first live DAB multiplex for commercial radio was launched at the Sound Broadcasting Equipment Show in Birmingham.

The following year, in March 1996, NTL launched a similar service for the London area. The broadcaster currently involved consists of **Kiss FM, Capital FM, Melody FM, Sunrise Radio, Talk Radio, Virgin, EKR** and **BBC Radio 5 Live**.

The digital transmissions aim to provide a long term marketing test-bed for commercial DAB. More recently, NTL has conducted a set of field trials to help small scale digital radio planning on behalf of the **Radio Authority**.

With the preparation for the introduction of DAB in place, the spring of 1998, will be a key-time for the industry. Local radio stations are not guaranteed a place on a multiplex and it's the responsibility of the UK regulator, the Radio Authority, to oversee the bidding.

The first commercial digital licences will be advertised early to mid-1998. Radio companies will bid to operate a multiplex of a group of six or more



One of the NTL's transmitter masts situated in Croydon in South East London.

(Photo courtesy NTL.)

distinct digital audio services with the licence awards due for late 1998. At this time, the Radio Authority propose to advertise a national multiplex and six regional multiplexes.

Bright Future

The take-up of DAB in the UK is still unclear, as there are questions that remain unanswered. The Radio Authority is offering an incentive of an eight-year licence extension to any commercial radio company which participates in DAB and there is growing optimism among digital receiver producers that DAB will be a success.

Larger manufacturers have identified the in-car market as the entry point for digital radios and the first prototypes were launched at the IFA consumer electronics exhibition in Berlin last year. The cost for a digital receiver stands at around £500 at the moment, but as with any electronic consumer goods, the costs will no doubt come tumbling down once mass production is up and running.

Emerging Technology

There are bound to be questions about an emerging technology but the benefits of DAB are clear and NTL believes its future will be a bright one. From the listener's point of view, there will be interference free reception, enhanced audio quality and fresh programme formats.

Advertisers will also no doubt welcome DAB as there will be the ability to embed supporting information in the data stream (Programme Associated Data - PAD) and explore the multimedia capabilities of digital radio. Programmers will be able to explore new formats and utilise the powerful data handling capacity of DAB.

Jon Trowsdale, General Manager for the NTL radio group, sums-up the Digital Debate with the following comment: "The Company has the expertise to make digital radio a reality for commercial broadcasters. Radio stations are naturally anxious to secure a return on their investment before committing to a new infrastructure and our aim is to be a technology partner, giving them a helping hand into the digital age".



NTL based in Winchester, Hampshire, are in the forefront of broadcasting developments and technology. The company is active in many fields - from developing digital terrestrial television to developing 'transmitting' packages for broadcasters. Illustrated here is the NTL TX/100/20 Band II v.h.f. f.m. medium power transmitter system including built-in RDS coder. The unit requires the minimum of space and maintenance allowing it to be installed in general purpose sites much to the advantage of the ever cost-conscious broadcasters operating in an increasingly competitive market. (Photo courtesy NTL.)

A Guide to Digital Radio

The following information has been prepared by Jon Trowsdale of NTL in response to the many conversations he's had with people in the radio and music industries who want to know more about Digital Radio but who are baffled or bored by the technicalities. So, this is very much a non-technical guide, concentrating on the programming and business issues.

What is Digital Radio?

Digital Radio is a new transmission system that will in time replace amplitude modulation (a.m.) and frequency modulation (f.m.) broadcasts.

What's wrong with AM and FM?

We live in a digital communication world. Just about every communication process we engage in, from making a 'phone call to booking an airline flight, is in the digital domain. Except, that is, broadcast radio and television.

Incidentally f.m. was invented in the 1940s and a.m. in the 1920s. So, many businesses



Digital techniques are making their mark in Radio! Matt Rogers, is the afternoon presenter with 97.4 Gold Radio in Shaftesbury in North Dorset with the help of the essential DAD (digital audio delivery) system, which makes full 'self drive' economic operation possible.

(Photographic facilities courtesy of 97.4 Gold

Practical Wireless, April 1998



Digital techniques have found their way into most aspects of broadcasting, and soon broadcasts transmitted in digital form will be common place - with much improved EMC characteristics, which will be of benefit to the Radio Amateur. British-based manufacturers are in the forefront of the digital technology whether it be in studio and control equipment - as shown here - or on the transmission side. The example shown - the AMS Neve Capricorn digital console - was built by AMS Neve PLC at their base in Burnley, Lancashire, for use at Danmarks Radio in Copenhagen. From 1981 when they supplied their first music console for Recorded Sound Ltd., this company has gone on to produce and supply the BBC, the famous Abbey Road Studios and broadcasters throughout the world with state of the art equipment. *(Photo courtesy of AMS Neve PLC.)*

are using a delivery system that is anything up to 70 years old. Is this sensible? - You decide!

Is there more than one Digital Radio standard?

For all practical purposes, no. The European standard is called Eureka 147. This has also been adopted by Canada, Mexico, South Africa and Australia. The only country trying to develop an alternative standard is the USA and they are struggling. So, when we talk about Digital Radio, we really mean Eureka 147.

What are the advantages of Digital Radio?

To begin with, DAB is virtually immune from interference and fading. So there will be no more losing programmes when you drive under power lines or through tunnels. And there will also be more annoying f.m. 'flutter' (multi-path distortion) in built-up areas. And it sounds better too - CD quality in fact!

Using digital technology you can transmit data along with your audio. So, broadcasters will be able to tell listeners which song is playing, or broadcast continuous traffic information, or tour date information, or even use it for promotional uses.

Does it use up extra frequencies?

No. Digital radio uses the radio spectrum more efficiently than a.m. or f.m. This is possible because each digital radio transmitter broadcasts up to six stereo services on one frequency, as opposed to just one with a.m. or f.m.. It's also possible for the broadcaster to have 12 mono services. Or four stereo and four mono. It all depends how multiplex is configured.

What is a multiplex?

A multiplex is just a collection of signals all bound up together. Another word for it is ensemble. An important advantage of digital radio is that it's possible to change the configuration of the multiplex at any time.

For example, suppose a broadcaster wanted to

How do I find out more?

For more information you are invited to contact Jon Trowsdale, General Manager Radio, NTL, Crawley Court, Winchester SO21 2QA. Tel: (01962) 822396 or E-mail: trowsdaj@ntl.co.uk



Oxford-based Solid State Logic Ltd., founded in 1969 specialise in inventing, developing and producing technology for the manipulation of sound, providing equipment for professionals all over the world from their modern international headquarters at Begbroke north of the University City, winning the Queen's Award For Export Achievement in 1997. Illustrated is the 'Axiom' digital production system. (Photo courtesy of Solid State Logic Ltd.)



There are some 'parallels' between professionals and Radio Amateurs in that 97.4 Gold Radio has its audio processing and Radio Data System (RDS) and the main 200W transmitter sited literally just outside the studio door. With a 'stand-by' transmitter the units are completely automatic and cooling for the p.a. stages is provided by natural air flow over the large heat-sinks. The station also has its own diesel-powered electrical generator for emergency use.

(Photographic facilities courtesy of 97.4 Gold Radio.)

The PW team would like to thank NTL for supplying this feature for publication and in particular to Jon Trowsdale and Emma Bickerdike of NTL for their help in preparing this article.

broadcast a sports programme, while at the same time continuing with their 'hot rocking' music service. Because you can get away with less bandwidth for speech, you can squeeze the overall bandwidth of your multiplex allocation to accommodate both.

So who looks after the multiplexes?

According to the Broadcasting Act, they'll be looked after by Multiplex Operators. The Radio Authority will award 12 year licences to multiplex operators on a competition basis.

Incidentally the Broadcasting Act is now law and the Radio Authority has said that the first digital radio licences will be advertised very soon in a 'fast burn' rollout. In other words, the digital radio 'train' is about to leave the station!

Is it true that receivers for DAB will be very expensive?

The potential market for digital radio receivers in Europe alone is 400 million sets. That's big money and the manufacturers are already gearing up for mass production. And although initially the receivers will be expensive prices will fall quickly, like any consumer electronics goods.

Does this mean that digital radio will be simulcast with AM/FM broadcasts in the beginning?

Yes, but there's nothing new in that. In the 1970s and a large part of the 1980s most commercial radio stations transmitted the same programmes on a.m. and f.m. This was because most people listened on medium wave (m.w.), with f.m. as the minority 'quality' service. Remember all those station jingles that identified the station by its medium wave dial position in metres?

Will digital radio transmissions be very expensive?

Not necessarily. In fact, our calculations at NTL indicate that, on a per user basis, digital radio transmissions may actually be cheaper than a.m. and f.m.

What does the Radio Authority think about digital radio?

The Radio Authority is very keen to see digital radio spread in the UK. They will licence the national commercial digital radio multiplex in spring next year, which will be followed very soon by licences for the major metropolitan areas. The Authority have already licensed experimental digital radio services and NTL are working very closely with them on this.

Why will businesses invest in Digital Radio?

Apart from the opportunity to develop their business on a new digital platform, there are other reasons to invest in digital radio. The Broadcasting Act allows for rollover of existing analogue licences for stations who invest in digital. Investment in DAB is really investment in the future.



A re-assuring note! Despite the economic necessity (particularly for smaller broadcasters) to use all the 'state-of-the-art' digital recording equipment available - the PW photographer was pleased to see that they still find room for older proven technology and this professional reel-to-reel tape recorder is still in daily use at 97.4 Gold Radio! (Photographic facilities courtesy of 97.4 Gold Radio.)

HAYDON COMMUNICATIONS

MAIL ORDER: 0181-951 5781/2

London showroom & Mail Order
132 High St. Edgware, Middx HA8 7EL.
Tel: 0181-951 5781/2. Fax: 0181-951 5782
Open Mon-Fri 9.30-5.30pm. Sat 9.30-2pm



W. Midlands showroom
Unit 1, Canal View Ind. Est., Brierley Hill, W. Mids.
Tel: 01384 481681
Open Mon-Fri 9.30-5pm. Sat 9.30-2pm



YAESU



FT-1000MP (AC)

The flagship HF transceiver

ONLY **£1799.95**

FT-1000MP (AC)	HF transceiver	£1799.95
FT-1000MP (DC)	HF transceiver	£1699.95
FT-920	With free FM unit & AM filter	£1299.95
FT-840	HF transceiver	£649.00
SP-8	Base speaker	£139.00
MD-100A8X	Base microphone	£109.00
FT-290R	2m all mode mobile.....	£399.95
FT-8100R	2m + 70cm mobile.....	£399.95
FT-50R	2m + 70cm handheld....	£239.00
VX-1R	Miniature 2m + 70cm handheld.....	£249.00

ALINCO



DX-70TH

100W HF + 6m

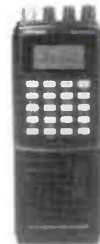
transceiver (all mode).

ONLY

£659.00

DX-70TH	HF + 6m (high power).....	£659.00
DR-M06	6m mobile (20W).....	£219.95
DR-430	70cm mobile	£225.00
DR-140	2m mobile (50W).....	£215.00
DJ-G5	2m + 70cm handheld.....	£259.00
DJ-190	2m handheld.....	£129.95
DJ-S41	70cm handheld.....	£109.95
DJ-S11	2m handheld	£85.00
DJ-C1	2m handheld.....	£159.95
DJ-C4	70cm handheld.....	£159.95

SCANNERS



YUPITERU MVT-7100EU

The UK's best selling handheld scanner. Covers 0.1-1650MHz (all mode).

Include nicads, charger, DC lead + antenna. ONLY

£219.95

MVT-9000	Handheld scanner.....	£319.95
AR-8000	Handheld scanner.....	£295.00
DJX-10	Handheld scanner.....	£299.00
AX-400	Miniature scanner.....	£225.00
Soft case for AR-8000.....		£17.95
Soft case for 7100/9000.....		£19.99
UK Scan Directory 6th edition		£18.50
BC-9000XLT	Base scanner	£249.00
AR-3000A	Base scanner	£695.00
AR-5000	Base scanner.....	£1299.00
IC-8500	Base scanner.....	£Phone

KENWOOD



TH-G71

Dualband handheld with optional wideband receive. Buy one this month and we'll throw in a hand microphone worth £17.

ONLY **£249.00**

TS-870S	HF transceiver	£1699.00
TS-570D	HF transceiver	£1099.95
TM-V7E	2m + 70cm mobile.....	£495.00
TH-235E	2m handheld.....	£149.95
HS-5	Deluxe headphones.....	£52.95
HS-6	Small headphones.....	£35.95
LF-30A	Low pass filter.....	£45.95
HMC-3	Box headset.....	£52.95
EMC-1	Clip mic-earphone	£24.95
WR-2	Waterproof bag.....	£13.95

ICOM



IC-746

Due to a massive bulk purchase we can sell a limited

number of IC-746's at wholesale price.

OUR PRICE

£UNPRINTABLE

IC-775	Flagship HF transceiver.....	£Phone
IC-746	HF + 6 + 2m transceiver.....	£Phone
IC-706 MkII	HF + 6 + 2m transceiver.....	£Phone
IC-706	HF + 6 + 2m transceiver	£749.00
AT-180	Auto ATU	£329.00
SP-21	Base station loudspeaker.....	£65.00
SM-20	Base microphone	£120.00
IC-821	2m + 70cm base (all mode).....	£Phone

COMMUNICATION RECEIVERS



YAESU FRG-100

Award winning

communications receiver covers 50Hz-30MHz (all mode).

OUR PRICE **£399.99**

AR-7030	Communications receiver	£695.00
PCR-1000	PC controlled communications receiver.....	£349.00
HF-3	Communications receiver	£159.00
HF-3M	As above plus WEFAX decoder.....	£199.00
SW-100E	Sony S/W portable	£149.95
SW-55E	Sony S/W portable	£235.00
R-861	Portable S/W + RDS.....	£169.00
RC-828	S/W portable + cassette	£199.95

MANAGER'S SPECIALS



YAESU FT-920

HF + 6m transceiver.

Order one this month and claim a free FM unit and AM filter.

ONLY **£1299.00**



ICOM IC-756

The ultimate HF + 6m transceiver on the market.

ONLY **£1495.00**



STANDARD C-5900R

The only triple band mobile available. 2/6/70cm.

~~£799.00~~

ONLY **£595.00**

HAYDON COMMUNICATIONS

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London showroom & Mail Order
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Unit 1, Canal View Ind. Est., Brierley Hill, W. Mids.
Tel: 01384 481681
Open Mon-Fri 9.30-5pm. Sat 9.30-2pm



SERENE BASE ANTENNA

TSB-3301 GF	144/70, 6.5/9dB (3m)	£69.95
TSB-3302 GF	144/70, 4.5/7.2dB (1.7m)	£54.95
TSB-3303 GF	144/70, 3/6dB (1.1m)	£39.95
TSB-3315 GF	144/70, 8.5/11dB (5.4m)	£149.95
TSB-3608 GF	50/144/70, 2.15/6.2/8.4dBi gain	£79.95

ACCESSORIES P&P £2.00 on the following

TSA-6001N	Duplexer (+Coax) 2/70 (N/N259)	£24.95
TSA-6003	Duplexer (Coax) 2/70 (PL/259's)	£19.95
CFX-514	Triplexer (6/2/70) (Coax)	£56.95

MOBILE ANTENNAS £6.50 delivery

TSM-1612	6/2/70 (2.15/6/8.4dB) 2.1M	£54.95
DB-7900	144/70 cms, (5/7.6dB) 1.5m	£29.99
DB-770M	144/70 cms, (3/5.5dB) 1m	£24.95
DB-1304	144/70 cms, (2.15/3.8dB) .41cms	£19.95
DB-EL2E	144MHz, 1/4ths, 4.5dB (1.8m)	£29.95
DB-285	144MHz, 1/4ths, 3.4dB (1.3m)	£15.95
PL-6M	50MHz 1/4 wave (1m)	£16.95

ACCESSORIES P&P £2.50 on the following

MT-1301	H/Duty Mog Mnt + Coax	Top Quality £24.95
MT-3302	H/Duty Htch/Trunk Mnt	Top Quality £24.95
CF-BPF2	2m band pass filter	£49.95
Q-Tek	6m band pass filter	£42.95

Q-TEK ANTENNAS P&P £8.50

Q-TEK ZL SPECIALS

2m	5ele (boom 45"/9dBd)	£36.00
2m	7ele (boom 60"/11dBd)	£45.00
2m	12ele (boom 126"/13.8dBd)	£69.00
70cm	7ele (boom 28"/11dBd)	£24.00
70cm	12ele (boom 48"/13.8dBd)	£44.00

Q-TEK YAGIS FOR 2/4/6m + 70cm

2m	5ele (boom 63"/9dBd)	£36.00
2m	8ele (boom 125"/11dBd)	£46.00
2m	11ele (boom 186"/12.7dBd)	£65.00
2m	5ele crossed (boom 64"/9dBd)	£69.00
2m	8ele crossed (boom 126"/11dBd)	£85.00
4m	3ele (boom 45"/7dBd)	£39.00
4m	5ele (boom 128"/9dBd)	£59.00
6m	3ele (boom 72"/7dBd)	£49.00
6m	5ele (boom 142"/9dBd)	£69.00
70cm	13ele (boom 76"/12dBd)	£36.00
70cm	13ele crossed (boom 83"/12dBd)	£55.00

Q-TEK HB9-CV

70cm	HB9CV (boom 12")	£16.95
2mtr	HB9CV (boom 20")	£19.95
4mtr	HB9CV (boom 22.5")	£29.00
6mtr	HB9CV (boom 32.5")	£36.00
10mtr	HB9CV (boom 52")	£65.00

NEW HF MOBILE WHIPS (PL-259)

Easy to mount HF mobile whips ready to go with PL-259 fitting.

PL-80	80m whip (approx 1.5m long)	£21.95
PL-40	40m whip (approx 1.5m long)	£19.95
PL-20	20m whip (approx 1.5m long)	£19.95
PL-6m	6m whip (approx 1.2m long)	£16.95

END FED HALF WAVES

Ground plane free

4m	Length 92" (S0239)	£39.00
6m	Length 126" (S0239)	£49.00
2m	Length 52" (S0239)	£25.00
70cm	Length 26" (N-type)	£20.00

NEW TRIBAND MOBILE

TSM-1612

New tri-band mobile covers 6, 2, 70cm. Gain 2.15, 6, 8.4dB. PL-259 fitting. 2.1m max length. Superb quality.

£54.95 P&P £8.50

D-308B BLACK DELUXE DESK MIC

(with up/down). Super quality. (Supplied with 8 pin pre-wired Yaesu lead)

£49.95 P&P £5.50

OPTIONAL LEADS (P&P £1.50)

A-08	8 pin "Alinco" round	£9.95
K-08	8 pin "Kenwood" round	£9.95
I-08	8 pin "Icom" round	£9.95
AM-08	Modular phone "Alinco"	£9.95
YM-08	Modular phone "Yaesu"	£9.95

U-120 headset

A high quality headset that will fit hand portable + most HF & VHF/UHF txvrs via optional interface.

£24.95 P&P £3.50

Supplied with two pin molded plug-will fit Alinco/Yaesu/Standard/ADI/Icom hand holds. Optional leads (P&P £1.50).



F-3035	8 pin "Standard" round	£16.95
F-303Y	8 pin "Yaesu" round	£16.95
F-303K	8 pin "Kenwood" round	£16.95
F-303I	8 pin "Icom" round	£16.95
F-303YP	Modular "Yaesu" phone	£16.95
F-303KP	Modular "Kenwood" phone	£16.95
F-303IP	Modular "Icom" phone	£16.95

DELUXE G5RVs

Multi-stranded plastic coated heavy duty antenna wire. All parts reusable. Stainless steel and galvanised fittings. Full size - 102ft.

Only £39.95

Half size 51ft. Only £29.95 Carriage £6.00.

STANDARD G5RVs

Full size	102ft	£24.00 P&P £4
Half size	51ft	£21.00 P&P £4

NEW Q-TEK INDUCTORS

80mtr inductors. Add them to your 1/2 size G5RV and convert it to a full size. (New length only 69 feet total). £22.95 P&P £2

COPPER WIRE (ALL 50MTR ROLLS)

Enamelled	£9.95 P&P £5
Hard drawn	£12.00 P&P £5
Multi-Stranded (Grey PVC)	£8.95 P&P £5
Extra H/duty (Clear coated)	£20.00 P&P £5
Flexweave (H/duty)	£30.00 P&P £5
Flexweave H/duty (20 mtrs)	£12.00 P&P £5
Flexweave (PVC coated 20 mtrs)	£16.00 P&P £5

NEW PRODUCT

Q-TEK INTREPID

HF single and end fed wire antenna - "requires no ATU". (1kW).

ITP-80	80m version (40.7m)	£69.95 P&P £6
ITP-40	40m version (20.3m)	£59.95 P&P £6
ITP-30	30m version (14.25m)	£49.95 P&P £6
ITP-20	20m version (10.1m)	£49.95 P&P £6
ITP-17	17m version (7.8m)	£49.95 P&P £6
ITP-15	15, version (6.7m)	£49.95 P&P £6
ITP-12	12m version (5.9m)	£49.95 P&P £6
ITP-10	10m version (5m)	£49.95 P&P £6

CUSHCRAFT

R-7000	40-10m vertical	£319.95
R-5	20-10m vertical	£229.95
A-3s	14,21,28MHz 3ele beam	£319.95
AVS	80-10m vertical	£149.95

TELESCOPIC MASTS

5 section telescopic masts. Starting at 2 1/4" in diameter and finishing with a top section of 1 1/4" diameter we offer a 8 metre and a 12 metre version. Each mast is supplied with guy rings and stainless steel pins for locking the sections when erected. The closed height of the 8 metre mast is just 5 feet and the 12 metre version at 10 feet. All sections are extruded aluminium tube with a 16 gauge wall thickness.

8 mtrs £69.95 12 mtrs £99.95 Carriage £10.00. Free standing tripod for the above masts £84.95 P&P £10

GUY WIRE KITS P&P £5

Standard kits	£20.95
Heavy duty kits	£25.95

MAST HEAD PULLEY Easy to fit pulley with mast clamp (up to 2"). £7.50 P&P £1.50

SECTIONAL MASTS Carriage £8.50

4 x 5 foot aluminium sections each swaged at one end.

1 1/4" dia	£19.95
1 1/2" dia	£29.95
1 3/4" dia	£36.95
2" dia	£45.95

WALL BRACKETS + MAST BASE PLATES

2"	Mast base plate	£12.00 P&P £5
6"	Stand off	£6.95 P&P £5
9"	Stand off	£8.95 P&P £5
12"	T&K Brackets	£12.00 P&P £8
18"	T&K Brackets	£18.00 P&P £8
24"	T&K Brackets	£20.00 P&P £8

NEW Q-TEK WINCHES

A range of fully galvanized all steel construction winches with safety ratchet. (SEND SAE FOR SPEC SHEET)

STANDARD WINCHES (DIRECT PULL) P&P £8

QW-400	400LB	£21
QW-800	800LB	£27
QW-1000	1000LB	£31
QW-1200	1200LB	£36
QW-1400	1400LB	£45

BRAKE WINCHES AVAILABLE

AS A PREMIER INDEPENDENT UK AMATEUR RADIO DEALER,

the secret of our success lies in our massive buying power which has given us the best possible deals from the manufacturers. These we then pass on to you, the customer. Even though we have two shops we have always kept our overheads to the minimum enabling us to give our customers the lowest UK price. We pride ourselves on our first class advice, sales and service. If you are one of the hundreds of existing customers that already deal with us then you'll already know this. If you are not, then why not give us a call and find out for yourself.

NISSEI METERS



NISSEI METERS

RS-102	1.8-150MHz (200W)	£59.95 p&p £5
RS-402	125-525MHz (200W)	£59.95 p&p £5
RS-101	1.8-60MHz (3kW)	£79.95 p&p £5
RS-502	1.8-525MHz (200W)	£99.95 p&p £5
RS-40	144/430MHz Pocket PWR/SWR Meter (60W) (S0239)	£34.95 p&p £1
RS-40N	As above with N-type	£39.95 p&p £1

DL-60 ★ Dummy load ★ DC-500MHz ★ 60W max
★ PL-259 fitting **£16.99** P&P £1

THE IDEAL SHACK ACCESSORY

NOW IN STOCK



GARMIN GPS-III

Latest UK version complete with moving map of UK & Europe. **£449.**

OUR PRICE **£339.00**

HF ACCESSORIES



P-2512 'M'

25-30 amp power supply with variable volts (3-15). Dual meters (Volts + amps). The UK's best selling power supply. Most of our competitors are selling the 20A versions for the same price.

RRP **£99.95**. OUR PRICE **£89.95**

CE Approved

P-1012	12 amp PSU	£49.95
PS-200	Portable PSU	£46.95



VECTRONICS VC-300DLP

UK's most popular 300W ATU with built-in dummy load.

SPECIAL OFFER **£129.95**

MFJ-949 Special offer **£139.95**



SGC-230

Superb ATU will work with any HF transceiver. **£349.**

SALE **£289.00**



MFJ-259

HF digital SWR analyser + 1.8-170MHz counter/resistance meter.

RRP **£225.00** P&P £5

Next working day delivery **£10**

HANDHELD ACCESSORIES



Nissei EP-300T

Over the ear earpiece with lapel mic & PTT. Fits Kenwood, Alinco, Yaesu or Icom

£22.95 P & P £1 (Please specify brand of radio when ordering)

This Ear/Mic comes with an "over the ear" earpiece as EP-300
MS-107 FIST MICROPHONE **£16.95**

T-2602

2m/70cm/23cm (2/3/5.5dB) flexible antenna with wideband receive (14" long BNC).

OUR PRICE **£22.95** P&P £1

DB-770H

High gain 2m + 70cm telescopic antenna with wideband receive.

OUR PRICE **£24.95** P&P £1



NB-30W

2M FM handheld amplifier 2-5W input. 30W output (for 5W ip). Turn your handheld into a mobile for under £50

RRP **£49.95** P&P £2



POLICE STYLE HOLSTER HHC-2

Matches all hand holds. Can be worn on the belt or attached to the quick release body holster.

£19.95 +P&P £1

Waterproof case for handheld **£00.00** P&P £1



EP-300

Deluxe over the ear earpiece.

£9.95 + P&P £1



QS-200

Mounts on the air vent grille on a car dashboard to allow easy and safe operation of most handhelds.

£9.95 P&P £2

QS-300 Deskstand **£19.95**



QS-300

A fully adjustable desk top stand for use with all handhelds. Fitted coaxial fly (FAI) with BNC & SO239 connectors

OUR PRICE **£19.95** P&P £2

COAX SWITCHES (P&P £2.50)

CX-401	4 way (SO-239)	£49.95
CX-401 'N'	4 way (N TYPE)	£54.95
CX-201	2 way (SO-239)	£18.95
CX-201 'N'	2 way (N-type)	£24.95



S.W. PORTABLES

SONY SW-100E

Award winning miniature portable SW receiver. Its performance is brilliant for its size. The best shortwave receiver for under £250.



RRP ~~£220~~ SALE PRICE **£149.95**



SONY SW-55E

Superb quality portable SW receiver with 125 presets. 100Hz step tuning for shortwave. Includes compact antenna, stereo headphones and carry case. RRP ~~£299.95~~

SALE PRICE **£235.00**



ROBERTS R-861

Portable SW receiver with SSB and RDS. RRP ~~£199.95~~

OUR PRICE **£169.00**



ROBERTS RC-828

Portable all mode SW receiver with built-in cassette recorder.

OUR PRICE

£199.95

OPTOELECTRONICS



TECHTOYZ MICRO COUNTER

Optoelectronics are ready to pioneer the market by proudly introducing the latest in technology for frequency counter, the

Techtoyz Micro counter. It is the smallest frequency counter in the world with a frequency coverage of 10MHz-2GHz. The AA alkaline battery which powers the counter acts as the antenna, so no external antenna is needed.

INTRO PRICE **£89.95**

TNC-100 Optional antenna **£6.95**



OPTO SCOUT 3.1-Mk2

Latest mini frequency finder from Optoelectronics. It will capture and memorise up to 400 frequencies that can be recalled directly into the AR-8000. Supplied with ant, nicads and fast charger. RRP ~~£399~~

SALE PRICE **£349.95**

Opto Cub	Our price £99.95
Opto Explorer	Our price £795.95
Opto Lynx	Our price £129.95
Micra DTMF decoder	Our price £89.95
R-11 Interceptor	Our price £349.95

Electronics Principles 5.0

'A COMPLETE PC BASED ELECTRONICS COURSE'

If you are looking for an easy and enjoyable way of studying or improving your knowledge of electronics then this is the software for you.

Now includes the PIC16C84 & PIC16C71 hardware and instruction set.

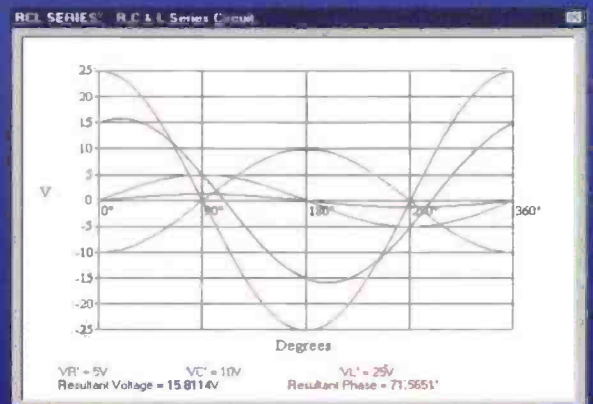
Electronics Principles 5.0 is a significant upgrade of our popular electronics educational software. Now containing even more analogue, digital and microcomputer theory. PLUS over a hundred new mathematics topics to further your understanding of formulae and calculations. Telephone for a comprehensive list or upgrade details.

This software has been developed to teach electronics and is suited to both the complete novice and the more advanced student or hobbyist wanting a quick revision and access to hundreds of electronics formulae. It is extremely easy to use. Just select a topic, which is always presented as a default diagram (no blank screens!) and input your own values. Alternatively, use those from any standard electronics text book to see the results as frequency response curves, calculations, logic states, voltages and currents etc.

Graphics presentation has been enhanced and speeded-up with new menus and indexing which enables a quicker access and more informative description of the extended range of five hundred and sixty electronics and mathematics topics.

The PIC16C84 microcontroller hardware and instruction set has been introduced and brought to life through colourful interactive graphics where you can study the architecture of this device by changing the data values to simulate all of the registers, direct/indirect addressing, program/data memory and input/output port configuration. Along with those analogue to digital functions of the PIC16C71. If you would like to learn more about the principles of these popular microcontrollers then it could not be made easier.

Electronics Principles software is currently used in hundreds of UK and overseas schools and colleges to support City & Guilds, GCSE, A-Level, BTEC and university foundation courses. Also NVQ's and GNVQ's where students are required to have an understanding of electronics principles.



Still only £99.95*

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Tel/Fax: 01376 514008. sales@eptsoft.demon.co.uk <http://www.eptsoft.demon.co.uk>

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ELECTRONICS IN ACTION

Welcome to Electronics-in-Action (E-i-A), a news and views column that you, as readers, decide the direction it is to go in. Pose a question and I'll find an answer for you - or if I can't, I'll try and find a person that can. I also hope to publish your electronic tips and tricks, and the authors of the ideas I use in any month will get a voucher to 'spend' at our PW Book Store. And in each issue I'll have look at a few books to suit all levels of knowledge and skills.

Tex



Once again let me start with a few books that I think may be of use to you. In these days with the need for property security what better than a book to help. The *Practical Alarms Projects* by R.A. Penfold looks into various types of security alarm. There are plans to build your own basic, delayed, infra-red, or audio alarms. Other types of alarms, such as ultrasonic and windows alarms, are not forgotten either. An excellent book if you would like an alarm but are more

frightened of the cost of one, or you have an unusual alarm requirement.

Also from the Babani stable, is a book from A. Flind, *Practical Oscillator Circuits*, and it's just what the name suggests - a book full of circuits covering almost all requirements. The seven chapters in the book cover signal generation using the ubiquitous '555' or similar i.c.s, the 4000 series c.m.o.s. i.c.s, operational amplifiers (op-amps) for audio and with specific waveform generator i.c.s such as the MAX038. Oscillators for radio circuits haven't been forgotten either, two chapters cover LC and crystal oscillator types. A good source of ideas.

From Newnes comes the *Electronics Engineer's Pocket Book* by Keith Brindley. The tall-slim hard-back book is an ideal format to hold in one hand, or slip into a pocket for safekeeping. Over 300 pages of data on a very wide range of electronic topics, and there's three broad sections cover components and their data, miscellaneous electrical data and circuits and systems. It's ideal to slip into the back pocket as an aide-memoire.

The ARRL books are noted for their ease of reading and *The ARRL Electronics Data Book* by the late Doug DeMaw W1FB is no exception. There are nine sections in the book, and I find the

sections on 'Inductor And Transformers', 'Networks And Filters', and the 'Antennas And Transmission Lines' very useful reference material. There are however, sections on time and frequency, transistor, digital and other i.c. pin-out details within the pages. Not to be ignored for everyday use.

From the pen of Joseph J. Carr comes a thick hard-backed book called *Secrets Of RF Circuit Design* (Second edition). It's an excellent reference book for any r.f. design engineer. That is not to say it's difficult to read, because it isn't. It makes fascinating reading throughout the 26 chapters dealing with a subject in simple, but fine detail. You are shown how to design and build radios from v.l.f. to u.h.f., simple direct conversion to radio astronomy receivers. There's something for every part of the hobby in this book, it's inexpensive for such a large amount of information.

News Items

Just a few news items to let you know about this time. Available from PSS Services of 217 Prestbury Road, Cheltenham, Gloucester GL52 3ES, is Tec200, a transfer film that may be used in making your own p.c.b.s from magazine layouts or of your own design. Originally developed by DL2OM in the 1980s, TEC200 film can have an image photocopied, or printed

onto it by laser printer. This image is then transferred to a cleaned piece of p.c.b. material by 'ironing' it on. At about £1 an A4 sheet (depending on quantity) it's an easy way of making your own p.c.b. masks. For more details contact PSS Services at the above address, or Tel: (01242) 254108.

Supplied by The PC Solution of 2a High Road, Leyton, London E15 2BP is WinDRAFT 2 a Windows based schematics or p.c.b. layout design program. The remarkable part about the package is that it can grow as your layouts become bigger. The trial package, although it is the full package, is limited to 100 pins. You buy the capability you need - as and only when you need it. Contact The PC Solution as above, or on Tel: 0181-926 1160 or on E-mail: info@thepcsol.demon.co.uk or look at their home page of: <http://www.thepcsol.demon.co.uk>

The JT6040 hot-air desoldering station from JBC Soldering Solutions Ltd. should make desoldering small or surface mount components both quick and safe. A shield cup that fits tightly against the p.c.b. restricts the hot air to the component to be desoldered. For more details contact JBC at Marshall House, 255 Wellington Road, South Stockport, Cheshire SK2 6NG. Tel: 0161 474 0299 or FAX: 0161 474 0288.

BOOK SELECTION



£8.95

The ARRL Electronics Data Book



£12.95

Electronics Engineer's Pocket Book



£4.99

Practical Alarm Projects (BP416)



£4.99

Practical Oscillator Circuits (BP393)



£19.95

Secrets Of RF Circuit Design

Any of the above books may be obtained from the PW Book Store featured elsewhere in the magazine.

Vann Draper Electronics Ltd. is well known for supplying the Kenwood range of test equipment, but they also supply a range of soldering and desoldering stations. They have recently introduced the SL20 and SL30 temperature controlled soldering iron. Both are 24V 48W units, the SL20 offering a range of 150-420°C and a 12-l.e.d. indication against the digital temperature display of the 160-480° range of the SL30. The SL916 is a combined unit with independent control of the temperature of either tool. For more information contact Vann Draper at: **Unit 5 Premier Works, Canal Street, South Wigston, Leicester LE18 2PL. Tel: 0116-277 1400 or FAX: 0116-277 3945.**

Your Letters

Now let's have look at your letters. From Ron **G3DSV** (G3DSV@aol.com)

came an E-mail saying "Even though I have had my ticket for around 50 years, I still like to read about other peoples ideas. Learning in Amateur Radio need never stop. I was interested in the p.c.b. production. The nearest photocopier to me is in Exeter some six miles away". But Ron has come up with a method similar to the method described, in the February 1998 'E-i-A' column, by **Glyne GW3TFS**.

Ron went on to detail his method of producing p.c.b. artwork using the software *Print Artist* supplied with an Epson inkjet printer and Epson 'Iron-on' transfer paper. He wrote "I first use a simple hand scanner to get the p.c.b. layout from the magazine into the computer, then I clean it up to get it how I want it, this usually only means increasing the width of the connecting tracks a little, then reverse the image

(*Print Artist* caters for this), and print it onto Epson Iron on transfer paper. The print is then ironed onto the p.c.b. board. After cooling it is simply peeled and 99% of the time the result needs no retouching once you have got the iron temperature sorted".

In response to Dave Fairhurst's 'etch-in-a-bag' idea (p19 *PW* Feb '98) Ron said "Using the echant in a plastic bag, why on earth did I not think of such a simple thing! A very useful tip indeed" and I have to agree with you Ron, the simple ideas are often the most difficult to dream-up.

Tex's Conundrum

I'm surprised that no one seems to have noted that the closing date for the conundrum was over 10 years ago. - Oooooops! However, for those who

ignored that date and sent in an answer anyway, I'll continue. The circuit, an inductor L1 (1µH) and two capacitors in parallel, C1 (100pF) and a variable capacitor C2 (3-50pF), certainly appears to have caused some 'fun' amongst you. I've had answers from (sadly) completely wrong to being given to eight decimal places (MHz). I only wanted the answers to within one kilohertz of the nominal frequencies.

The two frequencies I was looking for as the answer, were **12.995MHz**, when the variable is set at the maximum value of 50pF (C_{total} = 150pF), and **15.682MHz**, when the variable is at its minimum value of 3pF (C_{total} = 103pF). The winner, drawn out of the editorial hat on monday 9 February 1998 was **F. Cloke G0EON**. I would however, like to extend a very worthy mention to **Fred Ward G2CVV** who sent in an answer,



Fig. 1: The OsziFOX is both hand-held oscilloscope and a.c./d.c. voltmeter. The inline lead is for the 12V supply and the angled lead is the serial data lead to the computer.



Fig. 2: The small, but well lit screen give a surprisingly good display and is easy to use, with all menus and waveforms displayed on it.



Fig. 3: Two menu control buttons and two range/function select switches are simple to use.



Fig. 4: The OsziFOX In use, displaying a digital pulse train of about 1MHz.

Digital Scope

It's my opinion, that one of the most useful items of test equipment that any amateur can have in his workshops is an oscilloscope. I've heard 'excuses' that they are seen to be both rather large and far too expensive for everyday use. Well the **OsziFOX** combined digital 'scope and voltmeter unit from **No Nuts Ltd.** should take away both of these considerations. Costing a little under £80 and about the size of a large marker pen, it's both affordable and portable.

The OsziFOX needs only a 12V supply at about 100mA to be ready for use. The unit, **Fig. 1**, uses a small, but clearly backlit, liquid crystal display (l.c.d.), **Fig. 2**, to show the digitised input waveform. The various controls are shown in **Fig. 3**: To make the unit more effective a serial connector allows an IBM PC to be used as a larger display unit for the digitised waveform.

The unit is shown in use in **Fig. 4** with three screen 'grabs' in **Figs 5, 6 and 7**. The actual screen on the unit (with scales of 1, 10 and 100V f.s.d.), although small is adequate for field work. It produced a surprisingly useful picture of the waveform, though I found that keeping the PC screen on all the time was the best option. One thing I did find out was that when the OsziFOX is displaying voltages, the PC screen still shows the 'live' waveform.

The PC screen 'grab' of **Fig. 5**, shows the output of a simple oscillator I've been using as the I.o. of a direct conversion rig for the 7MHz band. I'd not used a 'scope on the output before, even though I'd thought several times that it seemed a 'bit rough'. But as 7MHz is a very strong signal band I'd ignored it. The waveform shown in **Fig. 5**, is the basic 7MHz oscillation with a 500kHz modulation on it. (No wonder it sounded rough!).

Although there are only three ranges (1, 10 and 100V) on the unit, it will measure a.c. or d.c. Combine this measuring facility with the unusual zero level offset, set by a very slim toothed control by the side of the display, and you have a very useful piece of test equipment. It's also quite something to have an a.c. voltmeter with a bandwidth of 20MHz. The unit is actually useful to a much higher frequency, but with less accuracy. You can immediately see any changes in level of the voltages being measured.

I think I shall add an OsziFOX to my workshop, even though I have a 'full-sized' dual beam unit already. To get hold of one for your workshop, contact **Adam** at **No Nuts Ltd., New Road, Aldham, Essex CO6 3QT. Tel/FAX: (01376) 561373** or **Kim** on **Tel/FAX: (01206) 213322**



Fig. 5: A 'screen grab' of the basic PC display showing a 7MHz signal with a 500kHz modulation that shouldn't be there.

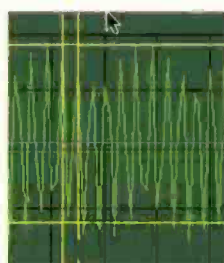


Fig. 6: The two vertical 'timepoint' bars may be set independently and, either time or the frequency between them can be displayed.



Fig. 7: A simple sinusoidal signal, the occasional 'flat-top' is a problem that most digital sampling circuits suffer from sometimes.

with the working all clearly laid-out but, without using a calculator or slide rule. Fred said he would like to see more of them. I'll see what I can do Fred! Thank you all who took part, and if anyone would like a sheet detailing the steps and calculations taken in working out the two frequencies, then send a request (Self addressed label + stamp) marked 'Answers -1' to me at the office and I'll send a copy on. The new conundrum, on a similar vein (but sneakier) is at the end of this column. Good luck to all of you.

Win Two Copies

Two readers have a chance to win copies of *StripboardMagic*. And it even includes anyone who already has a copy, and knows *StripboardMagic* offers excellent value for money. Ambyr have offered to refund the price of the program to anyone who wins, but already has a copy of *StripboardMagic*. I don't have the space for the competition this month, but I've been promised space next time for a the competition, so keep this column, you'll need it then!

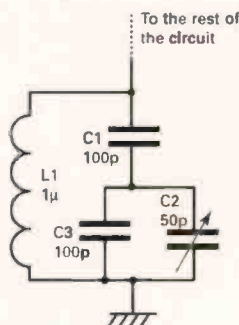


Fig. 10: The circuit of Tex's Conundrum No. 2. (See the text for the questions, then see if you can get the right answers).

Once again I've come to the end of this session of E-i-A. Don't forget to send your electronics ideas and tips to share them with other readers. I also hope to be exploring some of the intricacies of electronic circuits so, let me leave you with the small problem shown in Fig. 10. Assume, this time, that the components are perfect - now what are the upper and lower frequencies (again to within 1kHz) of this circuit? Answers to be sent to the editorial address marked *Tex's Conundrum No. 2*.

The winner, drawn out of the editorial hat on Tuesday 14 April 1998, will get his (or her) name 'in lights' within the June issue of Electronics-in-Action. See you then.

Tex

StripboardMagic

I've been using a rather splendid program called *Stripboard Magic* to draw and layout circuit on Veroboard. Although Veroboard itself is not ideal for r.f. projects (due to unwanted coupling between adjacent tracks), often the prototype circuit is built up on a piece of Veroboard, especially if it's an audio or a simple low frequency r.f. circuit. One problem often experienced is the actual layout of the components and which strips to cut and where.

StripboardMagic, from Ambyr, has been written to make the Veroboard prototyping as painless as possible, it runs on an IBM PC, or clone, running Windows-95. The program itself need a fairly powerful machine to run, and I experienced little in the way of problems on a Pentium 166 class of machine. The only problem is with the Windows-95 256-colour video driver, and this is best avoided for the present time. You should use either the 16 or thousands of colours setting.

Installation onto the PC from the single CD-ROM is both quick and easy. There's little in the way of a printed manual with the program, but an extensive help system covers any problems that a new user might experience. I'd recommend that before using the package 'in anger', it's a good idea to have a look at the getting started section to familiarise yourself with its way of working. It's not that complicated, in use the 'Shift' and 'Alt' keys change the way connecting tracks are handled.

Although *StripboardMagic* is not expensive at less than £40, it has one of the most comprehensive sets of components I've seen on such a package, they are organised in a logical and simple to navigate menu system. The system looks very like the folder (sub-directory) window in the Windows-95 *Filefinder*, and is proved very easy to navigate. One simplified point is that i.c.s are identified only by the number of pins on the package, which keeps everything very simple, but it does mean that you need the pin-out information of every i.c. you intend using.

As I wanted to make up an interface for use with a FAX reception program, I thought I'd have ago with *StripboardMagic* to do it. When working in the 'Schematic' mode, to place any item on the drawing surface you just 'drag-and-drop' the component from the list to its place. When placed on the drawing surface the component may be rotated through 90 or 180° to suit the drawing.

The schematic drawing is shown in Fig. 8. As the mouse pointer moves across the placed item it changes to indicate the different operations that may be carried out. Both left and right hand mouse buttons may be used to modify the actions carried out. The left button is for a movement or connection action, and the right button for a component/track modifying action. Very simple and easy.

During the 'connecting-up' phase of drawing out the circuit diagram, using the 'Shift' and 'Alt' keys allows interconnections to be placed more logically (or 'prettily'). This makes an easier to 'read' circuit diagram, without affecting the way *StripboardMagic* works. So having drawn the circuit diagram, it may be printed out and checked for accuracy and corrected if needed (then of course you should save it again).

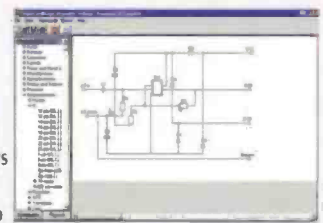


Fig. 8: A 'screen-grab' of *Stripboard Magic* in circuit drawing mode.

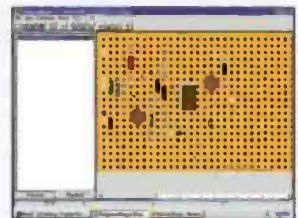


Fig. 9: After autoplacing the components, 'compressing' the layout and enlarging the displayed board on screen.

Select the 'Physical' mode of working. You're presented with a view of an 'empty' piece of Veroboard, with a list of components used on the left hand side. Once again the simple 'drag-and-drop' action takes components from the list on the left, and drops them onto the view of the board. In this way a layout may be build up.

Now we come to the 'Magic' part of the *StripboardMagic*. If in your layout the item you are trying to drop onto the board won't fit, or cannot be placed for any other reason, you cannot drop it and a cross appears on the mouse pointer. But that's only the first of its 'tricks'. A single mouse click on the 'Autoplace' and the list on the left shrinks and the placed component appear on the Veroboard like magic - wonderful.

Very occasionally if the piece of Veroboard you start with is small, then the 'autoplace' drops out, leaving the unplaced components in the list, but I found making the board bigger and letting it try again was all that was needed. When all components are placed the board may be optimised, again with a single mouse click, and the board use is minimised with the layout shown. The screen-grab of Fig. 9 shows the screen display after autoplacing the components and 'compressing' the board, to reduce the amount of Veroboard taken up. It also shows the full screen display of the board after applying the "Magnify" option.

The layout and schematic may be printed out to help with building the prototype, along with a component list (including the supplier's order numbers). You can also have a simple list of operations and placing instructions printed out, making it easy to complete the building stage.

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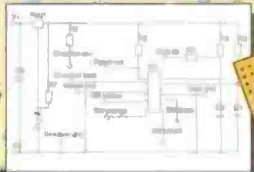
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It's Never Too Late To 'Tri' A T8!

When we said to Richard Newton GORSN 'think of a dual-bander, add 50MHz and what have you got'? He knew instantly that we were about to ask him to test the Icom IC-T8E Tri-band hand-held. Although this radio has been available for a little while as Icom say in their advertising: "It's never too late to try a T8".



I still remember being amazed when I saw and operated my first dual-band hand-held. Technology marches on at a great pace and still leaves me in wonder. When I was a little boy I would watch my father tinkering with his valve driven 144MHz a.m. transceiver. How could I have guessed that one day I would be licensed and holding a radio the size of a deck of playing cards that would happily transmit on 50, 145 and 433MHz. Not to mention receiving in Wide-band f.m. and a.m. I know it has been done before but the

been a little more comprehensive in places.

Having said that, the radio itself does have 'on-line' help. When you enter the 'Set Mode' and don't touch a button for a few seconds, an explanation of the function you have selected starts scrolling across the screen. I liked this and found it useful on those many occasions I had forgotten to take the handbook with me. In fact this radio is so helpful it even tells you the battery voltage every time you turn it on.

The IC-T8 is a relatively small unit for what it offers. It's well finished in dark grey metal

"... the IC-T8 offers an excellent quality triple-band radio with a little more besides."

Icom IC-T8 offers an excellent quality triple band radio with a little more besides. And it has operator selectable 12.5/25kHz channel spacing.

The Icom IC-T8E is supplied with a 6V 700mAh nickel metal-hydride battery, a helical antenna, belt clip and hand strap. It also comes with a wall type charger. The handbook supplied is well written and illustrated however, I did feel that it could have

and plastic and has a good ergonomic design.

The well labelled controls are set out in a sensible way and are easy to operate. The radio's display is easy to see and is automatically back lit for a few seconds when a button is pressed (with the exception of the p.t.t. and can be disabled if you wish.). The back light is very good, alas however, it does not back light the DTMF keyboard or any of the main controls.

The controls are well spaced out. The rotary knob on the top of the radio controls tuning of the v.f.o., paging through the 'Set Menus' and selecting squelch settings.

The external speaker microphone

Table 1: Icom IC-T8E Reception of Airband low power transmission.

Antenna Used	Result Achieved
Supplied Helical Antenna	Signal hardly detectable under squelch
Airband helical Antenna	Signal received 5 and 5
Supplied 145MHz whip	Full deflection

Other Icom Products

Here are just a few of latest products which have been recently added to the Icom range:

IC-706MkII

h.f. 50 & 144MHz mobile transceiver

IC-R8500

receiver

IC-821H

dualband all-mode transceiver

IC-755

DSP base station

For more information on the full Icom range why not take a look at their Web site at: <http://www.icomuk.co.uk>



connections are also on the top of the radio as is the 50Ω SMA type antenna fitting. The **On/Off** control is on the front of the radio, as are the majority of controls. The volume is controlled by up/down buttons on the front panel.

Fingers Fall

What first struck me was just how easy this radio is to use - my fingers seemed to just fall on the buttons as I needed them. This is an excellent reflection on how well thought out the design is.

The Icom IC-T8 has seven bands of operation and a couple of 'bonus' receive bands. The bands include 50MHz, the v.h.f. broadcast band, Airband, 145MHz and 433MHz. The 70MHz band is one of the bonus bands.

The IC-T8 will receive on 70MHz (4 metres). This is at the highest end of the 50MHz v.f.o. range. The other bonus band is the Marine band that can be found in the same v.f.o. band range as 145MHz (the Marine band is a receive only band).

The operation of the Icom tri-bander is very easy indeed. It can be picked up and used as soon as you unpack it. This is always a good test of how user friendly a radio is.

Obviously to use the more advanced features and therefore get the best from the radio a good read of the manual is required. However, changing between the bands couldn't be simpler.

It's a very versatile radio and employs the use of two types of Set Menus to enable the user to set up a multitude of user programmed preferences. These include showing the memories as channel numbers only, the tuning steps for v.f.o. use, power save function and lamp functions to mention just a few.

The T8 has all the functions that modern handhelds normally feature. It has DTMF capability and full CTCSS functions including the ability to scan an incoming signal and display any sub-audible tone that may be present.

The CTCSS also has a 'Pocket Bleep' function. This enables you to agree a matching tone with a friend and use the radio as a simple tone pager as long as you are in simplex range.

Impressive Memory

The IC-T8E has an impressive memory configuration. It boasts 100 memories. On top of these are 10 pairs of 'Scan Edge' channels. It's also possible to 'clone' the transceivers' memories and frequencies to

another T8.

The Scan Edge channels are for scanning between two user defined frequencies. These frequencies can be set to cross-over onto another band. As if that wasn't enough Icom have also included a 'Call' or 'Home' channel for the 50, 145 and 430MHz bands.

The particular facility I liked within the memory configuration was that all memories are grouped together, no matter what band they were from. In other words, you can simultaneously scan memories that include your favourite frequencies on every band.

It does not end there though. The Icom IC-T8E is so adaptable that should you only want to scan your memories in one particular band you can do so with ease.

Scanning with the IC-T8E could not be easier. All you have to do is press the **Scan** button and then quickly toggle through the available options with the rotary switch on the top of the radio.

You can scan an entire band, a limit set in the Scan Edge channels or the entire range of the radio from start to finish. In memory mode you can scan all the memories or just the memories containing frequencies from either Airband, 50, 145 or 433MHz.

On Air

Having got to grips with the IC-T8 I couldn't wait to see how it fared on the air. I wanted to use external antennas to do some tests, and as the antenna connection is SMA I must thank **The Shortwave Shop** for the loan of a SMA to BNC adapter.

In my opinion, the perfect external antenna for my experiments would be the

Manufacturer's Specifications

General

Frequency Coverage Mode	50-52; 144-146; 430-440MHz f.m. (F3E) w.f.m. (RX Only) a.m. (118 - 135.995MHz RX Only)
Frequency Stability	±10ppm (0°C to 50°C)
Power Supply requirements	4.5 - 16V d.c. Negative ground
Current drain Transmit	High 1.8A Low 1.0A
Receive Standby	max. audio 250mA (typical) 16mA (typical)
Usable temperature range	-10°C to 60°C
Dimensions	106 x 58 x 28.5mm
Weight	270g

Transmitter

Output (13.5V d.c.)	High 5W Low 0.5W
Modulation Type	Variable reactance
Spurious emissions	Less than -60dB
Max. freq. Deviation	±5kHz
Microphone Impedance	2kΩ

Receiver

Receive system	Double conversion superhetrodyne
Intermediate frequencies	1st 41.85MHz 13.35MHz w.f.m. 2nd 450 kHz
Sensitivity (12dB SINAD)	<0.18V*
Squelch sensitivity threshold	<0.18V*
Selectivity	<15kHz@-6dB* > 30kHz@-60dB*
Audio output power (13.5v)	250mW typical with 8Ω load * Excluding w.f.m.

W2000 triple band antenna, covering 50, 145 and 43MHz. Unfortunately mine is out of use at the moment so, **Terry G7VJJ** kindly offered me the use of his one Sunday morning. I also used the supplied helical antenna and one of Terry's telescopic whips for some other tests.

Our first test was on the Airband frequency and as Terry has a rather nice dedicated airband receiver, we tuned it to 121.950MHz, the low power continuous loop transmission from Bournemouth International airport, which is only a few miles away from Terry's home.

Terry's receiver was using its own airband helical antenna. The signal was about 5 and 3. So, I tuned the IC-T8 to the same frequency and the results using different antennas are shown in **Table 1**.

The Icom IC-T8 out-performed a dedicated Airband radio using the same antenna. However, I was beginning to suspect that the supplied helical was a bit too much of a compromise.

I then decided to tune the IC-T8 to BBC Radio 2 on 88.5MHz and listen to some music. There was a full deflection on the S-meter and the sound reproduction was really superb considering the unit's size.

The next tests were carried on 145MHz. Call after call on 145.500MHz went unanswered, so I tuned to GB3SC, the local repeater about 6km away from my location in the centre of Bournemouth. With the supplied helical antenna SC was rather scratchy. This was disappointing.

However, it was a different story with a 145MHz telescopic, 5 and 9+ was the result this time. Again confirming my suspicions that Icom may have been expecting a little too much from just one antenna.

Having had no luck calling on 50MHz with the supplied helical antenna I decided to bring in the 'big guns' and connect the IC-T8 to the W2000 base station antenna. I fed the radio with 13.8V, this gave the full output of 5W and called on 51.51 MHz.

I got a reply from **Mike 2E1FTT** in Ferndown. He was about 6km away from Terry and I. Mike was kind enough to give us a very good report on both signal strength and audio.

Mike then very kindly agreed to go to 433MHz and give us a report there too. And this was very favourable. The received audio was also excellent.

Another station, this time it was **Mike 2E1FKG** also called us on 433MHz. He was in Poole, about the same distance away as the other Mike but in the other direction. Mike also had a chat with us on 50MHz and again gave the IC-T8 a very good report indeed.

I then went onto work all the local 433MHz repeaters and spoke to **Steve G1YNY** and **Bob G6DUN**. Bob was mobile and working thorough **GB3SZ**, the 433MHz repeater in Bournemouth.

Bob also listened on simplex and gave a good report both through the repeater and direct. He mentioned how good the audio was before I asked him to comment!

The IC-T8 did get rather hot during my tests. At one point the radio got so hot it was uncomfortable to hold.

Practical Wireless, April 1998

The heatsink did its job well and the radio soon cooled down after use. This is something to perhaps bear in mind but it is not a criticism of the radio. All hand-held radios will tend to do this, so be aware if you like to talk a lot like me!

I also took the IC-T8E to work with me one day. I work in Poole, and as some of you may know this is rather a busy port and listening to the Marine band frequencies can be very interesting.

I tuned to the normal Coastguard frequencies and the Port Control. The radio did very well but I did lose the signal at places and distances that I would not have expected to. I put this down to the supplied antenna. I am certain that if I had remembered to take my Marine band antenna with me things would have been better.

The Icom IC-T8E is very well made. It has a rugged looking design and long lasting feel about it. It performs extremely well on all the amateur bands it's designed to cover.

Its performance overall was most impressive, it even works well on the broadcast and airbands. And I must say I was particularly impressed with the airband tests.

Lots Of Appeal

I am sure that the Icom IC-T8 will appeal to lots of different people for lots of different reasons. Perhaps the casual user who wants as much as possible in a small package to take away on holiday, or maybe the ardent RAYNET operator who needs flexibility of frequency use but does not want to have to carry numerous radios. These include the camping enthusiast who is a licensed Radio Amateur, Airband enthusiasts, marine band listener, and those whose family enjoys listening to the v.h.f. broadcast bands in the morning. I am sure the list is endless.

There have been triple-band hand-held radios before the IC-T8, none of which seemed to be that successful. I am of the opinion that the T8E will enjoy a better fate.

It offers a lot for a 'radio compact' and performs very well. Above all it does not try to be clever, it's designed to look good and do its job well, which in my opinion it does!

My thanks go to **Icom (UK) Ltd., Sea Street, Herne Bay, Kent CT6 8LD. Tel: (01227) 741741** for the loan of the IC-T8, which is available from all Icom approved dealers for the recommended price of **£349**.



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Icom have many approved equipment dealers here's a list of a few:

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Waters & Stanton (Hockley, Essex)

For full address details of these dealers please see their adverts elsewhere in the magazine.

PW

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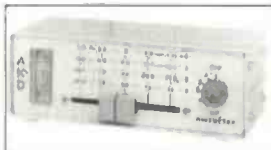
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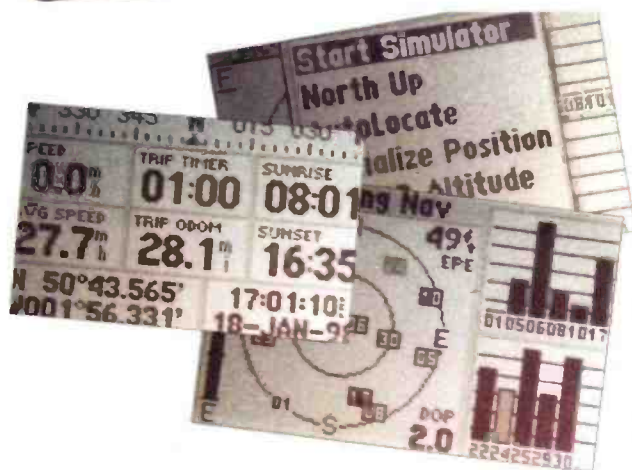
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- 3 In what year was the first GPS satellite launched?



In the March issue of *PW* **David Butler G4ASR** introduced us to the 'Garmin Experience'. In his comprehensive article he provided an insight into the fascinating subject of Global Positioning Systems, together with a review of the latest in 'personal navigators' in the shape of the Garmin GPS III.

If after reading David's article you quite like the idea of owning your very own GPS III unit, this month we're giving you the chance to do just that by entering our competition. All you have to do is answer three very easy GPS questions (all the answers can be found in last month's GPS feature article, back copies available for **£2.30 Inc. P&P** from the Post Sales Dept.), send your entry to us and then wait patiently to see if your entry is the lucky one pulled from the Editor's 'biscuit tin'!

Send your entry to **Garmin Competition, Practical Wireless, PW Publishing Ltd., Arrowsmith Court, Station Approach, Broadstone, Dorset BH18 8PW**. The Editor's decision on the winner is final and no correspondence will be entered into. **Please do not include other correspondence in with your entry (photocopies are acceptable).**

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If you do not wish to receive future mailings as a result of entering this competition please indicate here.

Entries to reach us by Friday 1 May 1998.

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Ian Poole G3YWX asks the question

What Is A ... LED?

Light emitting diodes (l.e.d.s) are in widespread use in today's electronics. This is proved by the fact that over 20 billion are produced each year. They are used in a wide variety of applications from small indicator lamps to more complicated alphanumeric displays.

Although l.e.d.s have been superseded in some areas by the much less current hungry liquid crystal displays (l.c.d.), they are nevertheless still used in vast quantities in many areas with no sign of their use falling. As indicator lamps they have the distinct advantage that they have an almost indefinite life if they are used correctly. As a result the small tungsten lamps which were previously used are now a thing of the past.

the first to see it in 1907 when he was working with Marconi on point contact crystal detectors. These discoveries were first reported in *Electrical World* in 1907.

The idea of the l.e.d. lay dormant for some years before it was observed again by O.V. Losov in 1922. Unfortunately, Losev lived in Leningrad and he was killed during the Second World War. Although he published a total of four patents during the period between 1927 and 1942, his work was not discovered until after his death and it's likely that any examples were destroyed in the war.

The l.e.d. resurfaced in 1951 when a team of researchers led by K. Lehovec started to investigate the effect. The research continued with many companies and researchers including Shockley becoming involved. The diode was eventually refined sufficiently and it started to be marketed in the late 1960s.

Specialised Junction

Light emitting diodes are essentially a specialised form of *p-n* junction fabricated using a compound semiconductor. The most commonly used semiconductors, silicon and germanium are simply elements and cannot be used for l.e.d.s.

However, compounds like gallium arsenide, gallium phosphide and indium phosphide are widely used for l.e.d.s and they are formed from two or more elements. In the example of gallium arsenide, gallium has a valency of three and arsenic a valency of five and as such they are known as group III-V semiconductors. Other compound semiconductors are also formed from group III-V materials.

In a forward biased junction, holes from the *p*-type region and electrons from the *n*-type region enter the junction and recombine like a normal diode. In this way current flows across the

junction. When this occurs energy is released, some of which is in the form of photons (light). It's found that for a number of reasons more light is usually produced from the *p* side of the junction, and this is kept closest to the surface of the device to ensure that the minimum amount of light is absorbed in the structure.

To produce light, which can be seen, the junction must be optimised and the correct materials must be chosen. Pure gallium arsenide releases energy in the infra red portion of the spectrum. To bring the light emission into the visible red end of the spectrum aluminium is added to the semiconductor to give aluminium gallium arsenide (AlGaAs). Phosphorus can also be added to give red light.

For other colours other materials are used. For example gallium phosphide gives green light and aluminium indium gallium phosphide is used for yellow and orange light. Most l.e.d.s are based on gallium semiconductors.

Two Main Structures

Two main structures are used for l.e.d.s. The first is called a surface emitting diode and the second is an edge emitting diode as shown in Figs. 1a & b. Of these the surface emitting diode is the most common because it emits light over a wider angle, although there are a number of applications where a narrow angle is required.

Once the diode structure has been manufactured, it has to be packaged in a form that can be used and protected. Many of the small indicator l.e.d.s are potted in an epoxy whose refractive index is between that of the semiconductor and the outside air (see Fig. 2). In this way the diode can be protected and the light transmitted to the outside world in the most efficient way.

Current Limiting

Like ordinary diodes, l.e.d.s

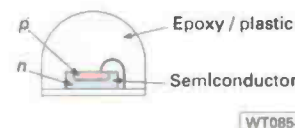


Fig. 2: The mounting of an l.e.d.

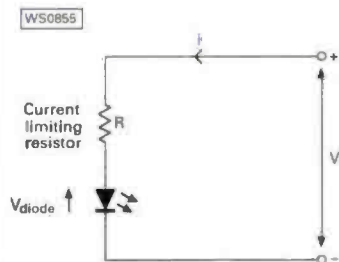


Fig. 3: Utilising an l.e.d. in a circuit.

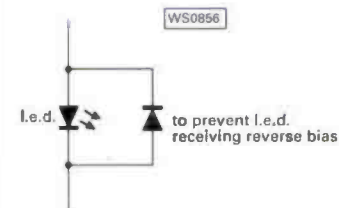


Fig. 4: Protecting an l.e.d. from reverse bias.

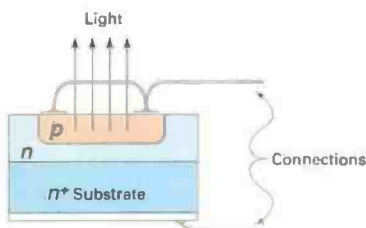


Fig. 1a: The structure of a surface emitting diode.

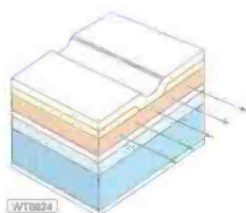


Fig. 1b: The structure of an edge emitting diode.

First Noticed

Although l.e.d.s are thought of as a product of today's high technology semiconductor industry, the effect was first noticed many years ago. One of Marconi's engineers, H. J. Round, also famous for many valve and radio developments, was

have no form of internal current limiting and if placed across a battery they would be destroyed. To prevent distraction, a resistor must be placed in circuit to limit the current. For most devices a maximum current of around 20mA can be used, although if less current is drawn the device will be dimmer.

When calculating the amount of current drawn the voltage across the l.e.d. itself may need to be taken into consideration as shown in Fig. 3. The voltage across a l.e.d. in its forward biased condition is just over a volt, although the exact voltage is dependent upon the diode, and in particular its colour. Typically a red one has a forward voltage of just under 2V, and around 2.5V for green or yellow.

Great care must be taken not to allow a reverse bias to be applied to the diode. Usually they only have a reverse breakdown of a very few volts. If breakdown occurs the l.e.d. will be destroyed. To prevent this happening, an ordinary silicon diode can be placed across the l.e.d. in the reverse direction to prevent any reverse bias being applied.

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Next Time I'll be taking a look at the Gunn Diode.

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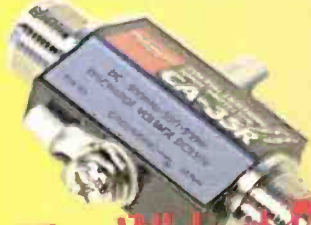
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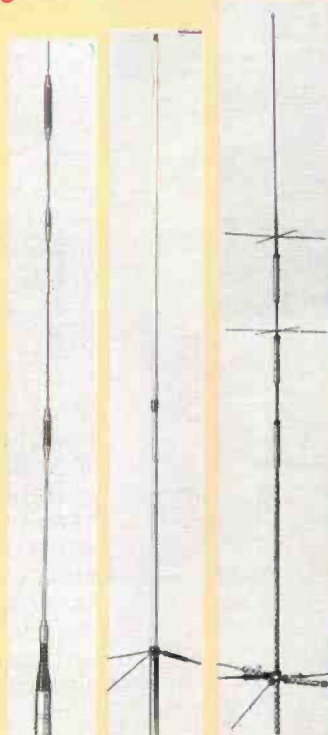
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This month it's a case of 'stock up your library and save' as the PW Book Service has arranged that anyone buying two or more books from this month's selection can get free postage*. So, let's see what the Editorial team have to say about what's on offer.

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Radio Amateurs World Atlas

Published by Callbook Inc.

This atlas is in book form and as such is extremely versatile, easy-to-read and very helpful. There's not much space for large wall maps in the average Amateur Radio operating room nowadays and at one stroke the book format

atlas solves many problems: where's that J6 station? (You'll find it on page 7 and that it's St. Lucia Island).

In full colour throughout, this is an excellently-produced A4-sized booklet with all the prefixes, time zones and other information provided. It will prove to be very useful for Amateur Radio operator and listener alike. **Highly Recommended.**

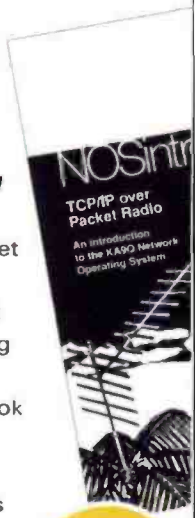
NOSintro TCP/IP over Packet Radio

Ian Wade G3NRW

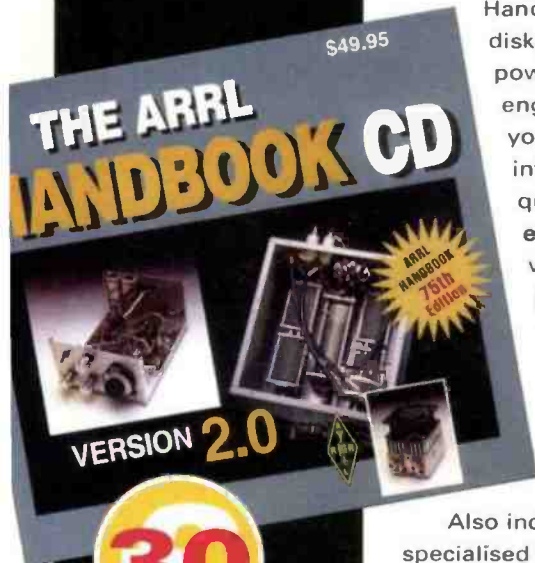
Do you prefer Packet radio and are you keen to learn about the KA9Q Operating system? If so, Ian Wade G3NRW's book will prove to be of interest.

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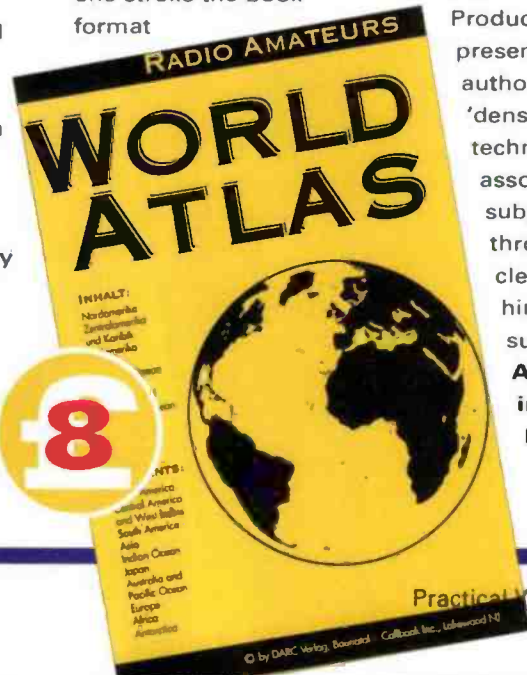
Produced in an informal presentation style the author has avoided the 'dense' and heavy technical reading often associated with this subject. Illustrated throughout with clear diagrams, tips, hints and suggestions. **A helpful introductory book.**



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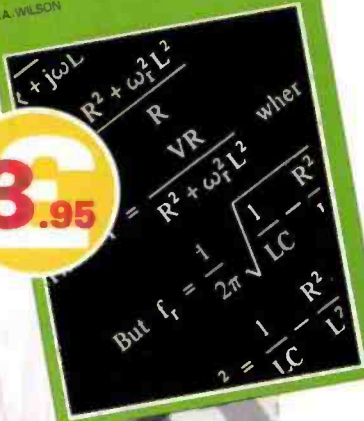
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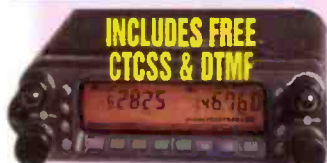
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Don't Miss Out On Ten FM!

Patrick Walton M1BNH says that by building his simple adapter, you too don't have to miss out on the narrow band f.m. activity on 28 and 50MHz.

Many Radio Amateurs and listeners like myself like to listen in to f.m. transmissions on 28MHz (10 metres) using a h.f. receiver and also to 50MHz (6 metres) and above using converters.

Although a.m. receivers can resolve f.m. using slope detection (see Response Diagram in Fig. 1.), this method becomes difficult on a good receiver with a maximum bandwidth of (let's say) 12kHz (6kHz in my case). This is because as the deviation of amateur f.m. transmissions can be greater than this.

The greater deviation results in distorted 'hissy' audio. This is due in part to the receiver's intrinsic lack of bandwidth and also to the need to detune on to the slope of the i.f. response curve, further reducing the bandwidth available.

I have found it frustrating to receive a signal at S9+ only to have to detune it until it is about S7 or so to listen. Obviously, weaker

signals may not be heard at all even though they register on the s-meter. Hence the need for a suitable n.b.f.m. adapter.

Project Described

The project described here was originally developed to add narrow band f.m. capability to my Trio R1000 Communications Receiver using the NE604, see block diagram in Fig. 2. This i.c. requires few external components and can be used with any i.f. up to 21.4MHz with appropriate replacements for filter F1 and the Quadrature Coil.

The circuit is shown in Fig. 3, and in this an f.e.t. buffer prevents loading the stage in the receiver from which the i.f. signal is taken off to the adapter board and also presents the correct 1.5kΩ impedance to the i.c. input on pin 16. I also added a 5V regulator to provide a stabilised supply for the adapter, allowing it to run from any positive voltage line between 7 and 30V in the host receiver without modification.

The a.f. output is taken from pin 6 via a 1μF capacitor, C17, with C9 providing de-emphasis. Thin coaxial cable should be used for the i.f. input and for the a.f. output.

After studying a circuit diagram of my receiver a suitable take-off point was found for the i.f. signal - after the final i.f. amplifier and before any filtering - and a single sided board was designed for use at the final i.f. of 455kHz.

The buffer stage on the n.b.f.m. board is an adaptation of an existing buffer in the receiver and should not require shielding at this i.f.

Two switches are necessary, one for f.m. muting (optional) and one to switch between the f.m. audio output from the adapter and the a.m. audio in the host receiver. This second switch becomes the f.m. selector and should be located between the product detector and the first a.f. stage (see block diagram).

The board, shown in Fig. 4, measures only 50 x 38mm and should fit easily into most receivers.

Printed Circuit Board

Once the board has been produced or purchased, holes can be drilled using the following drills: 0.75mm or 1mm drill for all

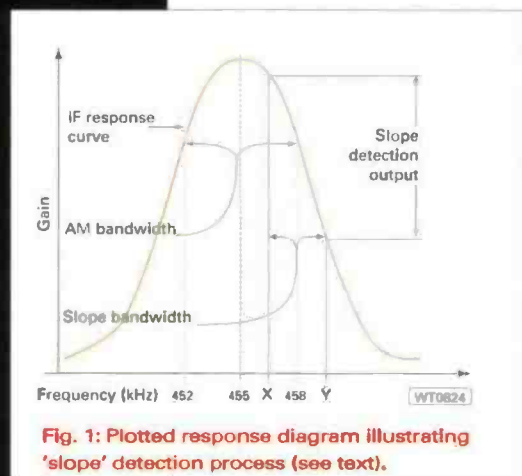


Fig. 1: Plotted response diagram illustrating 'slope' detection process (see text).

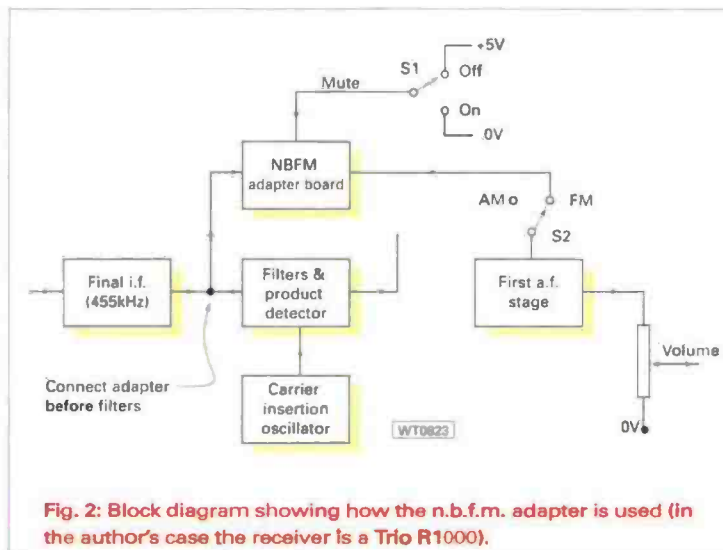


Fig. 2: Block diagram showing how the n.b.f.m. adapter is used (in the author's case the receiver is a Trio R1000).

components, plus a 2mm drill for the quadrature coil can lugs.

To start assembling the project I suggest you begin with the NE604 IC. Ideally, it should be soldered directly onto the board but performance will not suffer too much if a good quality i.c. socket is used.

Filter F1 is next, and as its lower single pin is not a standard distance from the others, a bit of gentle coaxing is needed to get it to fit. If an i.f. other than 455kHz is to be used, F1 may have a different pin-out and possibly a different termination impedance, so R4 may need to be a different value to match this.

The quadrature coil used has an internal 180pF capacitor, Cr, which will resonate it at about 468kHz. Coils for other i.f. frequencies may have their internal capacitors connected differently or may have to have an external capacitor fitted underneath.

Use a heat shunt when soldering the f.e.t. and 7805 regulator which are next, followed by the rest of the components. Some of these are a tight fit so populate the board in stages to make sure they all fit.

The capacitor C7 **must** be a tantalum type. Resistors are mounted vertically. Once the board is complete, the leads can be soldered in place.

Use thin coaxial cable for i.f. and a.f. connections and coloured ribbon cable for the rest. Don't be tempted to cut the leads too short - they can always be cable-tied back inside the host receiver, making relocation and servicing much easier should it be necessary.

Connections & Wiring

I strongly recommend that when it comes to connections and tracing wiring in your receiver that you use a circuit diagram. Take-offs for the adapter supply and i.f. input need to be found in the host receiver. These connections are made in parallel with existing wiring so no track breaks are necessary.

The d.c. biasing **must not** be upset when breaking into the first a.f. stage to locate

Shopping List

Resistors

Metal film miniature 0.25W 5%.

1kΩ	1	R3
1.6kΩ	1	R2 (will also work with 1.5kΩ with no noticeable problems)
2kΩ	2	R4
100kΩ	1	R1, 5

Capacitors

Miniature ceramic low inductance types

6.8pF	1	C1
10pF	1	C14
150pF	1	C11
10nF	1	C3
15nF	1	C13
100nF	8	C5, 6, 8, 9, 10, 15, 16, 17

Tantalum bead type

6.8μF	1	C7
-------	---	----

Electrolytic

100μF	1	C4
-------	---	----

Inductors

Coil	Toko YMCS2A740A (10EZ type) from Cirkit
------	---

Filter

F1	Murata CFW455F (Cirkit)
----	-------------------------

Semiconductors

Transistor

2N3819	1	Tr1
--------	---	-----

Integrated Circuits

78L05	1	IC1
NE604	1	IC2

Miscellaneous

Single sided p.c.b., 1 metre thin coaxial cable, multicoloured ribbon cable, two miniature double pole double throw switches, small cables ties. (The author sourced all the non-polarised capacitors - miniature ceramic low inductance types from Philips Semiconductors r.f. communications products quoting specifications for NE/SA604A.

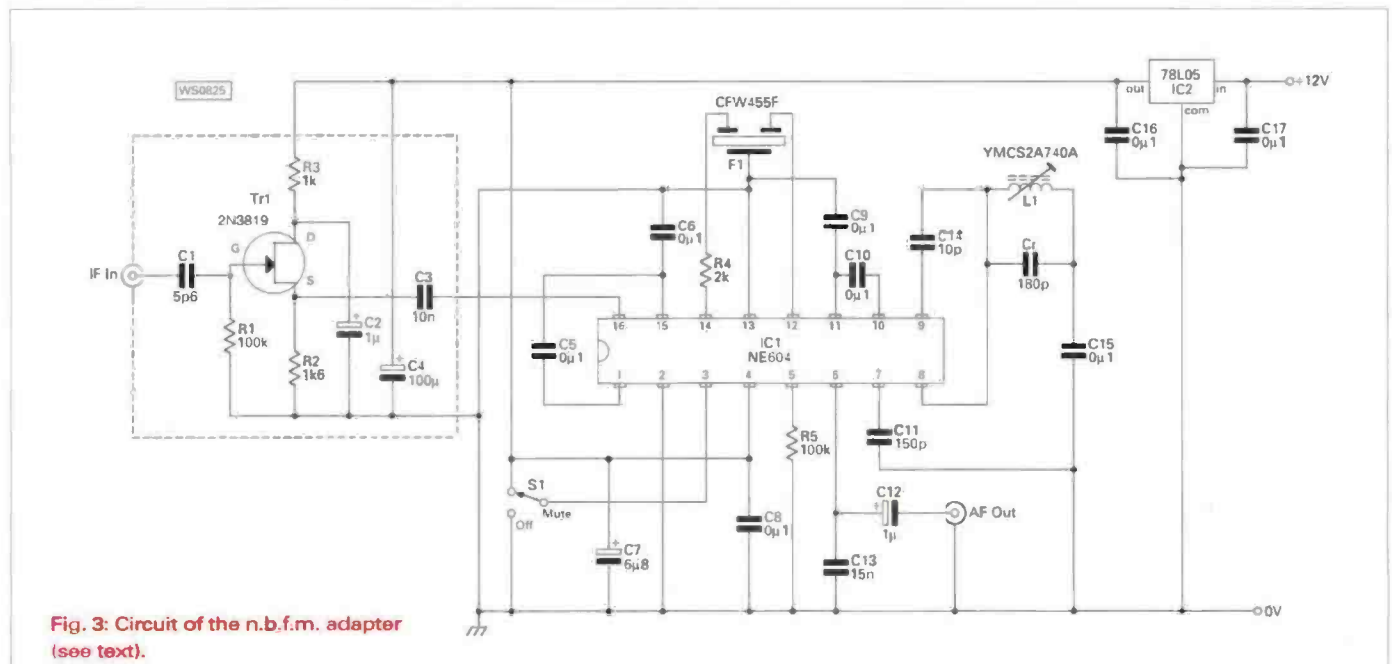


Fig. 3: Circuit of the n.b.f.m. adapter (see text).

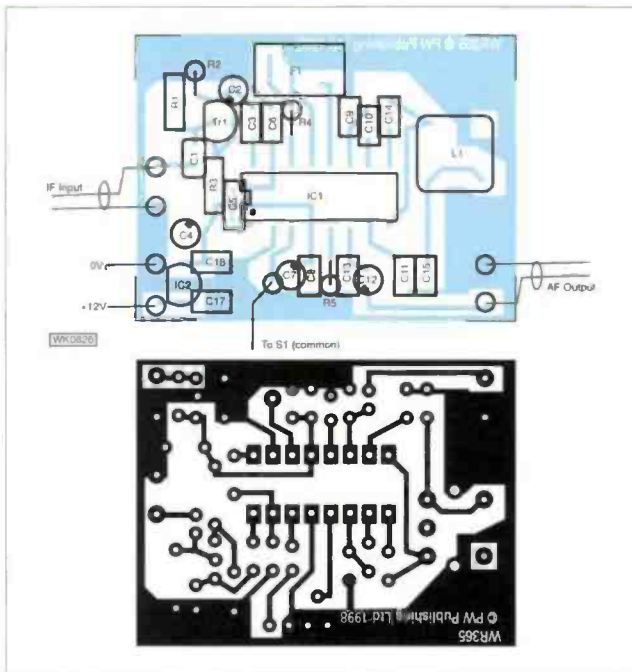


Fig. 4: Printed circuit board design for the adapter, with associated component placement overlay.

wiring points for the a.m./f.m. switch. A track must be broken or an interstage capacitor removed (snip off the body leaving its wires as connecting points) to do this. A replacement for this capacitor must be soldered onto the a.m. side of the switch.

Before installing the board, attach a 9V battery to the power leads and note the current drawn by the adapter. It should be in the region of 6mA.

Testing & Aligning

It's easiest to set up and carry out the aligning of the adapter once it has been installed in the receiver. To do this you should tune in to an f.m. signal and switch the adapter in.

Next you should adjust the core of the quadrature coil using a nylon trimmer only (these cores are fragile) until the audio is optimised. You will most likely have to screw the core down if your i.f. is 455kHz as the coil is tuned to 468kHz. Now switch to a.m. and note the difference in sound quality.

With the mute output connected to the positive rail, muting is OFF. Grounding it will cut the a.f. output. I'm hoping to develop a simple squelch circuit based on received signal strength (RSSI output on pin 5) to control muting in the near future.

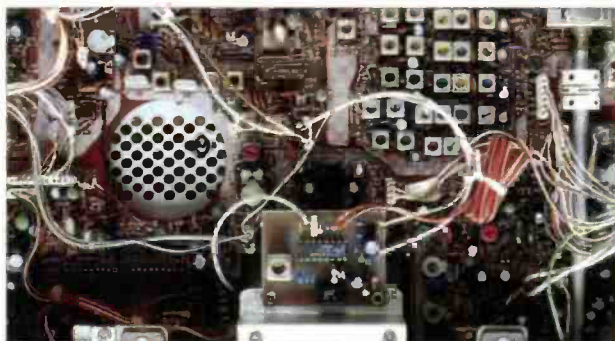


Fig. 5: The p.c.b. (lower centre) installed in the author's Trio R1000 receiver.

the soft plated 'tinplate' used on foods tin or similar canisters. They can be cut to shape with strong scissors or 'tinsnips' and soldered together.

Editorial warning: Anyone contemplating cutting 'tinplate' material with 'tinsnips' are strongly recommended to wear protective gloves and to be fully aware of the extremely sharp edges that can result. **Please take care!**

Ground connections for a buffer screen will require extra holes to be drilled in the p.c.b. for connecting wires (component lead off-cuts). As the copper track at the edges of the p.c.b. is at chassis potential, a complete screen can be soldered around the board edges if desired.

A mounting bracket can also be made from a piece of food tin which can be bent using pliers or a small vice. Make sure the underside of the p.c.b. is kept well away from the circuit of the host receiver.

Filter & Coil Alternatives

Your receiver might employ a 10.7MHz i.f. And to help I've suggested the filter and quadrature coil alternatives listed below for

i.f.	F1	Z(R4)	COIL
10.7MHz	10M08A	1.6KΩ	KACS9339REV +68pF in parallel

use with a 10.7MHz i.f.:

Any i.f. up to approximately 20MHz may be used with this board, but the user will have to research filter and coil data as follows: The filter must have a maximum bandwidth of $\pm 12-15\text{kHz}$ @ -18dB, and R4 must match its termination impedance.

The quadrature coil must be resonant at the i.f. And please note that the p.c.b. track that runs under the coil - may require to be modified, together with the fitting of a resonating capacitor for the coil under the p.c.b.

Adapter Performance

With the specified filter, the adapter performance was as follows on 144MHz: an S9+20 voice on 145.475MHz produced no audio and no s-meter reading on 145.490MHz and 145.455MHz.

As adjacent channels are rarely used on 144MHz in my locality, the 27MHz f.m. CB band with 10kHz channel spacing was tuned in. Two S9 signals on adjacent channels produced no noticeable interference.

My shack computer causes broad spectrum r.f. noise - you might be luckier, but try the adapter with your PC switched off at first!

Performance Improved

The performance of the adapter could be improved by adding another filter between the buffer stage and the NE604 input on pin 16. Impedances are already matched for a filter at this point.

Holes for the three earth pins could be drilled in the ground plane to the right of the existing filter in order to secure the filter by soldering, and 2.5mm clearance holes, countersunk on the copper side, drilled for the input and output pins which would have to be wired directly under the board to the holes left by removing the now redundant C3.

So, armed with this simple adapter - you don't have to miss out on 'Ten' f.m!

PW



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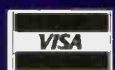
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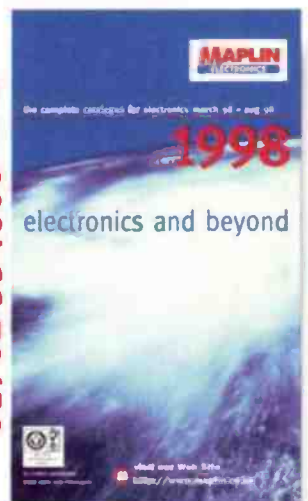
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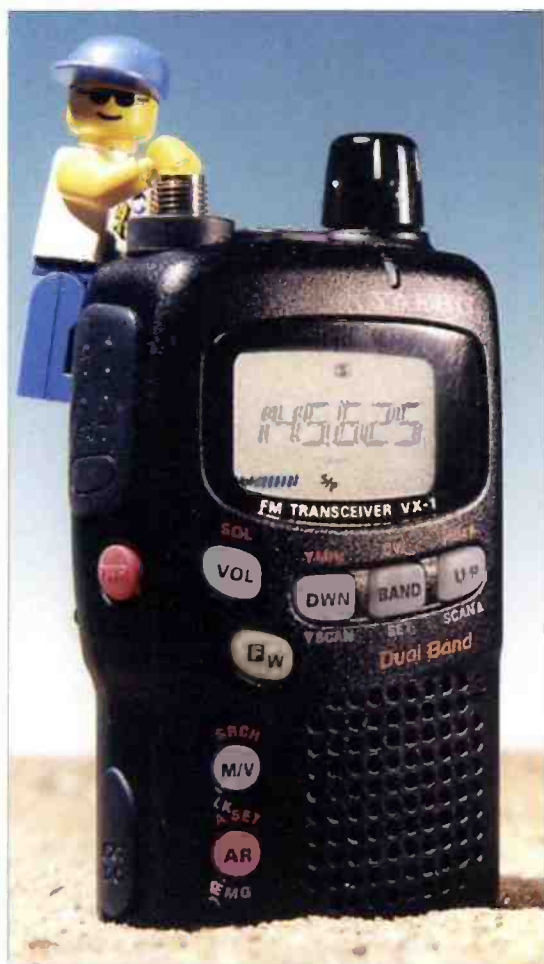
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Practical Wireless, April 1998



The Daventry Experiment

Following the brief mention of early 1930s h.f. experiments at the former BBC Daventry transmitter in PW last year, Brian Kendal, Chairman of The History of Air Navigation Group Royal Institute of Navigation, looks at the fascinating early history of radar.

Idoubt whether there will ever be agreement between nations as to who 'invented' radar. The fact that radio waves could be reflected and refracted had been discovered by Heinrich Hertz in his very earliest experiments long before the turn of the century is usually totally ignored.

In 1904 a German engineer, **Christian Hulsmeyer**, patented a device for detection of ships and other obstructions which he called the 'Telemobiloscope'. The basic equipment gave the bearing of the target but no range indication, but Hulsmeyer also experimented on ranging techniques using a triangulation technique.

Safety At Sea

The Telemobiloscope was effective up to ranges of about five kilometres and as such could have proved a valuable aid to safety at sea. However, ship owners had recently invested in wireless telegraphy equipment and were reluctant to spend any more on 'new fangled' schemes. As a result, there were no sales and Hulsmeyer eventually allowed his patents to lapse.

By the early 1930s pulse techniques had been developed in various ionospheric research programmes, as had the use of the cathode ray tube for timing purposes. In Germany, the basic principles of pulse radar had been established and several companies were developing equipment under a shroud of secrecy.

In Great Britain, however, it was not until 1935 that an official programme of development was initiated. And of course

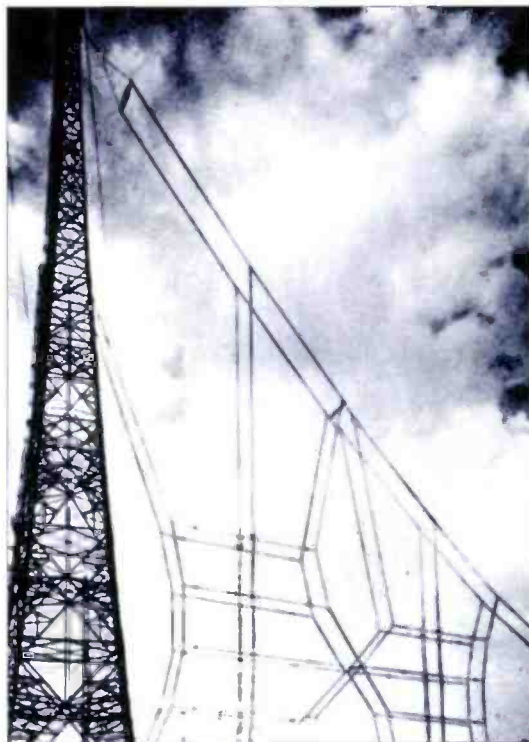


Fig 1: The antenna array used at the former BBC Daventry transmitter during the experiment. (Photo courtesy of Marconi Radar Systems)

this started in a typically British way - by the formation of a Committee.

The Committee for the Scientific Survey of Air Defence was chaired by **Sir Henry Tizard**, Rector of Imperial College, and had as its members, **Professor A.V. Hill**, a Nobel Prize winner, **Professor P.M.S. Blackett**, who had already done the work which would bring him a Nobel Prize after the Second World War, and **H.E. Wimperis**, Director of Scientific Research at the Air Ministry.

The first Committee meeting was held on 28th January 1935. And one of the first subjects which was discussed was the possibility of a 'Death Ray'.

Death Rays

Rumours of Death Rays had been rife in the early 1930s with many claims of success, but despite a prize of £1000 being offered for the first equipment which could kill a sheep at 100 metres, there were no takers.

Wimperis therefore decided that he would decide the problem once and for all. He therefore put the proposal to **Robert Watson Watt** who was Director of the Radio Research Station of the National Physical Laboratory at Slough.

In turn, Watson Watt passed the problem to his assistant **Arnold Wilkins**. But not wishing to reveal the precise enquiry he asked Wilkins to "Please calculate the amount of r.f. power which should be radiated to raise the temperature of 4.5 litres (1 gallon) of water

from 98 to 105°F at a distance of 5km and a height of 1km".

From Watson Watt's wording it was obvious to Wilkins that the instruction for the calculations concerned

"I doubt whether there ever will be agreement between nations as to who 'invented' radar".

the production of fever heat in an airman's blood by a death ray. It took little calculation to realise that the r.f. output power required would be in the order of **five million kilowatts** radiated from a half-wave dipole to have an effective range of 600 metres!

Even if a high gain antenna was used, the r.f. power necessary was still totally beyond the technology of the time. And on receiving this information, Watson Watt replied "Well, if that's not possible, how can we help them"?

Wilkins knew that Post Office Engineers had noticed disturbances to v.h.f. reception when aircraft were in the vicinity and suggested that this may be a possible way of detecting enemy aircraft. A few more calculations then indicated that such a proposition should be quite practical. Furthermore, range, bearing and elevation measurements could be made by techniques already in use for ionospheric research.

Two Memoranda

Armed with the information, Watson Watt produced two memoranda which he presented to the Committee on the 12th February. Considering the timescale, these were very far reaching.

The first memoranda demonstrated the impracticability of the Death Ray whilst the second not only gave the basis of the future 'Chain Home' (CH) radar system, but also considered the principles for a method for the identification of 'friendly' aircraft.

The Committee accepted the reports. But the Air Member for Research and Development, **Air Marshall Sir Hugh Dowding**, felt that a practical demonstration was necessary to show that sufficient power for detection purposes would be reflected from an aircraft.

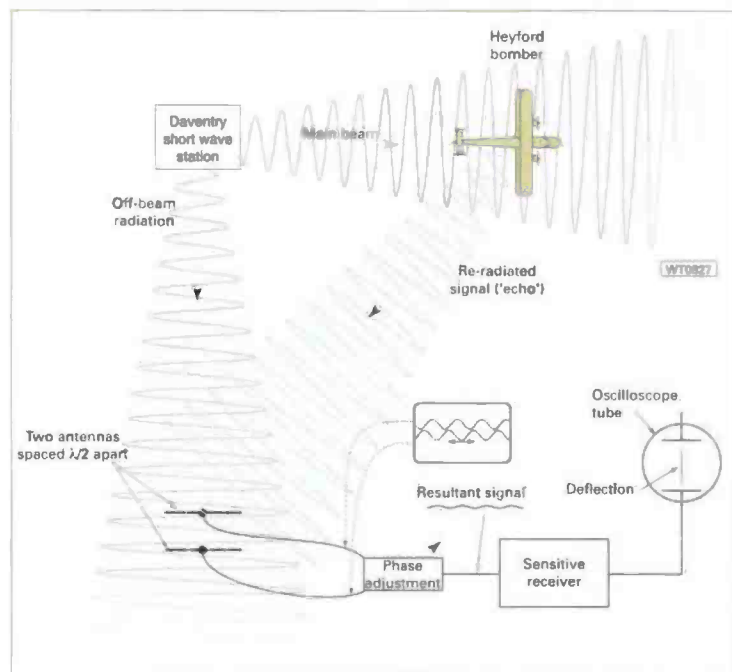
On being told of the requirement for a "practical demonstration", Wilkins realised that, within the time scale available (10 days), it would be impossible to install a transmitter specifically for the purpose. Fortunately however, he knew the BBC Overseas Service transmitter at Daventry (callsign GSA), which he had often used as a signal source during his previous work, had the required characteristics.

Daventry On 49 Metres

Daventry, located in Northamptonshire in the southern English Midlands, operated on 49.8 metres with an output power of 10kW. The antennas, **Fig. 1**, were an array of horizontal dipoles which gave a horizontal beamwidth of 60° and a vertical beamwidth of 10° in a southerly direction.

A transmission on the Daventry wavelength was selected for the tests as the wingspan of the heavy bombers of the period was about 23 metres, corresponding very closely to a half wavelength, thus ensuring optimum echoes.

On the 25th February, Wilkins loaded his equipment in a small Morris Commercial van, **Fig. 2**, (euphemistically called "the travelling laboratory"), left the Radio Research Station at Slough accompanied by a driver, a **Mr Dyer**, and drove to a field



near Weedon Bec, some 11km from the BBC transmitting station at Daventry.

On arrival they found a suitably located but rather muddy field which the owner allowed them to use. There they erected the antennas before leaving to find a Hotel.

After dinner they returned to the site to test the equipment on the transmission from GSA, which was due to close at midnight. Only then did they realise that the test had been arranged in such a hurry that they had forgotten that it would be dark when they were setting up the receiver!

Consequently no provision for lighting inside the vehicle had been made. The internal light of the van was not working with the result that the numerous connections had to be made by the light of flickering matches! Despite this, the receiver was brought to life with five minutes of the transmission remaining and Wilkins was just able to make the necessary adjustments in the time available.

When they came to leave the site, Wilkins and Dyer realised to their dismay that, while they had been working, there had been a keen

Fig. 3: Diagram depicting the antenna set-up and the basis of the 'Daventry' experiment (see text).



Fig. 2: The 'travelling laboratory' used for the Daventry tests. (Photo courtesy of MIRAconL Radar Systems)



Fig. 4: A Royal Air Force 'Heyford' bomber, similar to that flown by Flight Lieutenant 'Bobby' Blucke for the Daventry tests.

frost and the ground had frozen so hard that the van could not be moved. Fortunately, Dyer found a spade in the van tool locker and they were able to dig themselves out and return to their Hotel.

The following morning, Watson Watt and the Air Ministry Observer, **Mr A.P. Rowe**, left London by train, bringing with them Watson Watt's nephew, **Pat** for the ride. As, however, he could not be let into the secret, on the route between the railway station and the site, Pat was unceremoniously deposited at the roadside and told to amuse himself for a couple of hours!

Two Dipoles

At the site, Wilkins and Dyer had erected two dipoles and coupled the feeders to a phase shifter. This had then been adjusted to all but null out the transmission from Daventry, leaving just a small residual signal visible on the cathode ray oscillograph (CRO, or oscilloscope) which was being used as the signal strength indicator. Any increase in signal strength would then be due to reflections from the target aircraft (see Fig. 3).

It had been arranged that a Heyford bomber, Fig. 4, from the Royal Aircraft Establishment (RAE) Boscombe Down in Wiltshire, flown by **Flight Lieutenant 'Bobby' Blucke** (who was destined to lead the squadron which four years later would discover the German Knickebein beams) would fly up and down the Daventry 'beam' to provide a target. The aircraft arrived on time and

immediately the van driver, Mr Dyer was sent to a far corner of the field for he, like Watson Watt's nephew, was not "in the secret".

The first approach of the Heyford was too far to the east and no deflection of the CRO display connected to the receiver (Fig. 5) could be seen. The second approach, however, was far nearer the mark and this time a rhythmic beat was seen on the cathode ray tube. As the aircraft flew off to the south, good 'beats' were observed and it was estimated that the aircraft had been followed for about 13km.

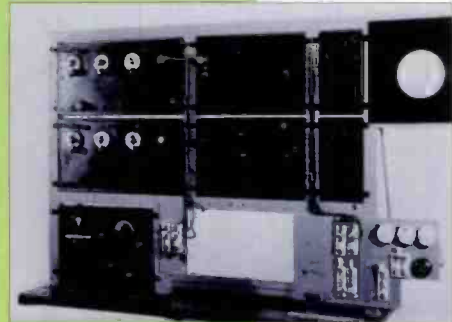


Fig. 5: The receiver used for the Daventry experiment, now on display at the Science Museum in London.

(Photo courtesy of Matt@oni Radar Systems)

Britain Again An Island

After the 'beats' died away from the screen of the cathode ray tube, Watson Watt is reported to have breathed a sigh of relief and then turned to Rowe and said "Britain is again an island". Watson Watt and A.P. Rowe were elated and immediately rushed back to the railway station.

It was only when they arrived at the station did Watson Watt realise that they had completely forgotten to pick up Pat, his nephew, from where they had left him on the roadside. A rapid retracing of the route was therefore necessary before they could catch their train to London. Arnold Wilkins and Dyer then packed up their equipment and started on their long journey home.

When the success of the experiment was made known to the authorities, it was immediately classified 'Top Secret' and £10,000 was allocated for research. As a result of this an experimental site was set up on the Essex coast at Orfordness, the team arriving there on the 13 May.

At the new site, progress was extremely rapid and by the 15th of June the team were able to demonstrate aircraft echoes at a range of 27km. Within a month the range had been doubled and by early 1936, over 160km had been achieved.

During the initial period also, the operational frequency was increased from 6 to 30MHz. The culmination of this work resulted in the Chain Home (CH) radar chain which remained in use until the early 1950s.

Second World War

By the outbreak of the Second World War, a chain of 20 radar stations ringed the southern coast of the United Kingdom. Additionally, the first Airborne Interception radar had been installed in RAF aircraft and the first naval radar equipment was being installed.

By modern standards, the CH radar system was crude, slow and inaccurate, but for its time it was a remarkable achievement. Taking only four years from conception to full operational service it revolutionised the principles of air defence and this was just in 'the nick of time'.

After the war, **Adolf Galland**, who had overall command of the German attack in 1940 said "The British had from the first an extraordinary advantage, never to be balanced out in the whole war: their radar and fighter control network. It was for us and for our leadership a freely expressed surprise, and at that a very bitter one, that Britain had at its disposal a close-meshed radar system, obviously carried to the very highest level of current technique, which supplied Fighter Command with the most complete basis for direction possible. We had nothing like it".

There can be no higher praise for a system which had its origins in a muddy field near Weedon Bec on a cold and frosty morning in February 1935.

PW

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**Dick Pascoe
GOBPS gazes
back into the
past to
describe some
antennas,
which
although not
new, still
work well in a
modern
environment.**

Over the past year or so there has been a lot of very interesting articles in this magazine about modern version of some old style antennas. I thought that this time we could go back in time a little and have a look at some of the old favourites that many of the modern designs are based upon.

Certainly one of the most famous wire antennas of all time is the G5RV from **Louie Varney** of the same **G5RV** callsign. But what we see today is not what Louie originally designed. His original design is shown in **Fig. 1**. The original antenna was fed by a link transformer, made up with a variety of turns of different size. The size of the link transformer and number of turns it consisted of, depended on the constructor's choice.

The pair of matching variable capacitors with their centre to ground made this link transformer the equivalent of the modern a.t.u.. The coupling of the link was variable too (see below). This 'a.t.u.' fed the 31m long dipole section from 300Ω open wire feeder, which at that time would have been home made. In this case, the antenna would have been at least 1/2 wavelength above ground on the preferred band.

Around In Many Forms

The G5RV antenna has been around in many forms over the years with some modern versions using ribbon feed direct to the rig via a balanced a.t.u. The most widely found commercial versions have ribbon feeder part way from the dipole feed point, then coaxial cable the remainder of the way to the shack. The Windom antenna is another named antenna that was hugely popular some years ago. I well remember my article in the April

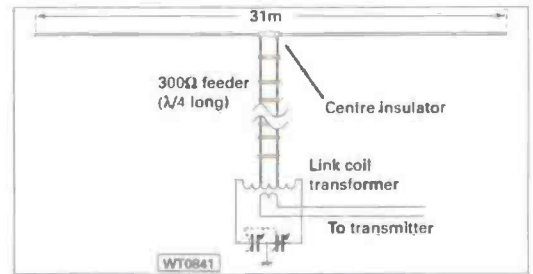


Fig. 1: The original G5RV antenna.

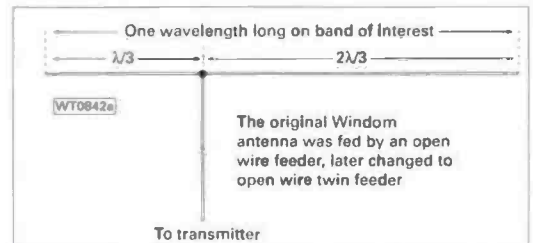


Fig. 2: Was this Windom antenna design 'stolen' from another amateur? (See text).

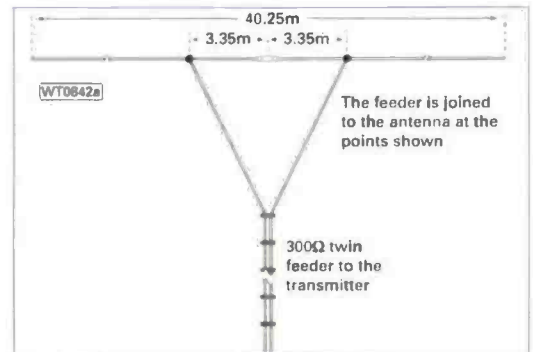


Fig. 3: The 'Double Windom' from DJ2KY.

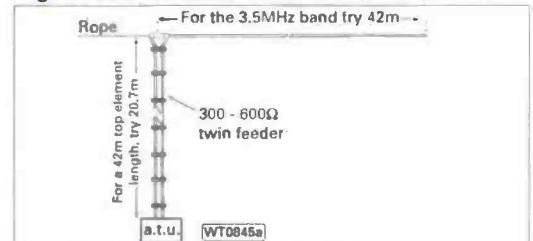


Fig. 4: Airship (Zeppelin) communication antenna, the original 'Zepp' design.

1990 issue of *PW*, when I wrote about 'The Windom revisited'. That article provoked comments from as far afield as Nigeria, where one Amateur claimed it was the 'Bees Knees' ...or as our American cousins say 'The cats meow'.

The Windom Antenna, shown in **Fig. 2**, is named after **General Loren G ('Windy') Windom W8GZ** who allegedly 'stole' the idea from other amateurs who had used it successfully some time before. However, as is often the case 'He who publishes first - gets the credit'.

The original Windom design used a single wire as the feeder, but with modern electrical appliances spreading rapidly around the world this simple feed soon became a 'balanced' type to help stop the feeder picking up, or creating interference.

We even got a 'Double Windom', **Fig. 3**, design from **DJ2KY** where he used two, 'back-to-back' style Windom antennas fed by open wire feeder. The centre point being 3.35m from the feed-point of each wire in the feeder (the diagram shows it better). In this case the 5-band

A 'balanced' feeder reduces feeder pick-up, and transmitter interference

Windom uses two wire lengths, one part length of 16.75 forms half the 'top', and the other part, 4.5m long is connected to the feeder. The middle two 3.35m sections are not wire, but are of an insulated material.

Early Antenna

Another early antenna name often heard, is **Zepp**. This antenna, shown in **Fig. 4**, wasn't named after a person but because the antenna was used successfully by the radio operators in the Zeppelin dirigible airships. The diagram shows the antenna uppermost, but in use with the Zeppelins it would have hung from the airship with the wire trailing from the underside.

To get some idea of the dimensions to use: On the 3.5MHz band try a length of about 42m of wire with 20.75m of open wire feeder. Note that, although the feeder is of the twin-feed form, only at the transmitter end are both sides connected.

The double Zepp antenna, shown in **Fig. 5**, is made up of two Zepp antennas attached to each other. Again, for the 3.5MHz band try a top length of 55m, for the 7MHz band, 27.5m and for the 14MHz band the much more manageable 13.5m length.

Long Time

The **W3DZZ** antenna has been around for a long time and is typical of the 'Trap Antenna' where a trap is fitted to make the antenna resonant on two or more bands. Many verticals and multi-band beam antennas use traps. In this case shown in **Fig. 6**, the inductance and capacitance making up the trap, are resonant on 7.17MHz, which gives an antenna that can be used on 3.5MHz through to 28MHz. A fellow amateur **Alan G4YFP**, has used one of these antennas for several years and swears by it.

The **W3EDP** antenna, **Fig. 7**, is another fed by open wire feeder and, like the G5RV described earlier, is fed by a link transformer and a variable capacitor. In the case of the W3EDP antenna, we can see the relationship with the feeder link and the band used. With an antenna length of 25.6m, the counterpoise lengths are as shown.

The final antenna of this selection is an antenna of wire box section that has a fair amount of gain over the ever so 'humble dipole'. I'm referring to an antenna called the '**Sterba Curtain**', made up from several $\lambda/2$ long sections of wire as shown in **Fig. 8**, with $\lambda/4$ wave vertical sections. Extra sections can be added as space permits.

You can probably imagine that on 28 or even 50MHz the 'Sterba' antenna can be quite small. Imagine though, a Sterba Curtain antenna for the 1.8MHz band. Now that would be impressive! Note the feed arrangements, one side to the right. The other to the left.

The link transformer method of feeding antennas, is not new, many of our elder statesmen in the hobby used this method to feed their antenna systems. I remember helping with a shack clearance after an elderly G2 became a silent key. His a.t.u. was made on a plank of wood, an elderly, but robust huge variable capacitor and a small coil of wire on an adjustable rod.

The feeder arrangement came into the shack Practical Wireless, April 1998

via two plate capacitors on the window (the original 'through glass' feed) and to a larger coil. Moving the smaller coil towards the larger provided the necessary adjustment.

Open Wires

During this article I've made reference to 'open wire' or 'ribbon' feeder. Normally this will refer to ribbon feeder, as there are many commercial versions available through various sources in the UK and elsewhere. In general use, the twin feeder commonly used, may have a characteristic impedance of 300Ω or even higher impedance (400 and 600Ω are common commercial values found).

Open wire feeder is more often a home-brew version but that doesn't mean it less useful or efficient. Remember that, in amateur circles, coaxial cable didn't appear in any quantity until after the Second World War and, before that time Radio Amateurs used what they could make easily, which was very often just open wire feeder.

Open wire feeder may be made up of a parallel run of two length of any type of wire kept apart by spreaders. Commercial spreaders are available these days, but I have seen many methods used to keep the wire apart. I've seen separators made from the plastic rings, cut from old plastic bottles to hand carved wooden spreaders that were works of art. The source of the material doesn't matter.

When making spacers, use whatever insulated material you have available. Use enough of them to maintain the spread and stop the wires touching. The impedance will vary according to the wire you select and the spacing, but I've seen and used separations distances of up to 100mm with success.

So, that's it. Get out there into the garden, and try one of these oldies, you may be surprised at how well they work when compared to a modern computer-designed antenna.

PW

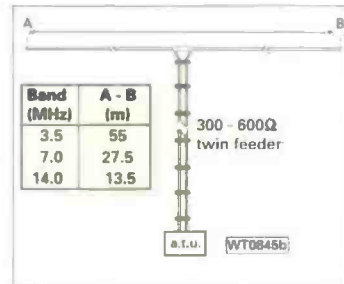


Fig. 5: A 'double Zepp' adds another radiator starting to look very like the G5RV design.

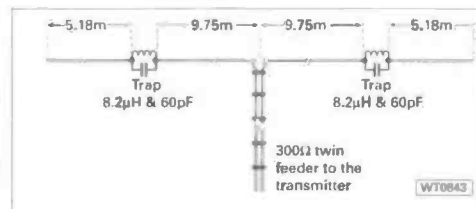


Fig. 6: The W3DZZ trapped dipole antenna to be efficient on two bands.

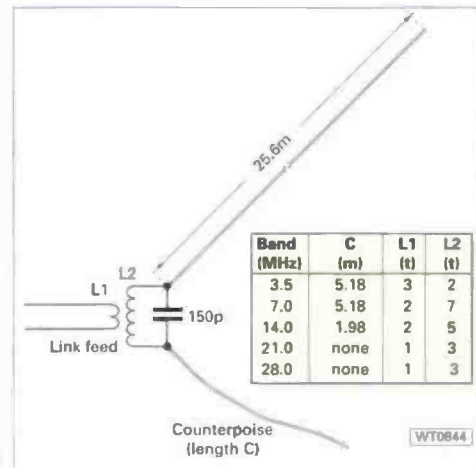


Fig. 7: The W3EDP changes the counterpoise length for various bands.

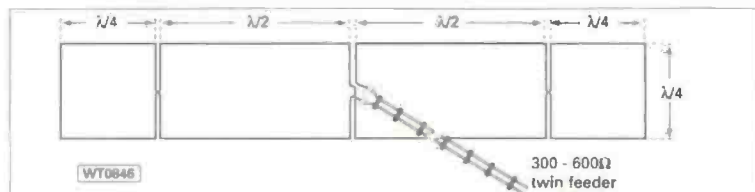


Fig. 8: The Sterba Curtain is a wire antenna with a great deal of gain over a simple dipole.

To Be The Best!

Patrick Allely GW3KJW is an avid keeper of v.h.f. and u.h.f. achievements and in this thought provoking article he shares some of the 'first and furthest' achievements he has documented.

Radio Amateurs are competitive, make no mistake about it, we all want to be the best, we want to be first to work the rare DX and we don't mind climbing all over our fellow enthusiasts in order to do it! In order to satisfy our

needs to excel, we organise contests, draw up lists and use different frequencies, some of which are totally unsuitable for the task in hand.

Inevitably, it's the 'big guns' who succeed most often, their high power and large antenna systems working to their advantage, but every now and again, the little station will do something unexpected and gain grudging recognition by the rest of us, secretly jealous that we weren't first or that we didn't work as far as the next man. The satisfying thing about succeeding is that the contact is often publicised in the amateur press so that everyone can read and share the joy of the person who made that all important contact.

First & Furthest

Over a number of years I have been collating 'Firsts' and 'Furthest' claims on the frequencies of 50MHz (6 metres) and above and although I am well aware that my records are far from complete, I have found that UK radio amateurs have displayed an enthusiasm for the hobby that shows no sign of abating. There are many firsts which have yet to be claimed and the 'furthest' is merely an arbitrary figure just begging to be beaten!

My sources of information have come from magazines, direct information over the air and from correspondence. I have accepted these claims without any proof in the belief that if someone says something is true then it is.

I have no doubt that what I say may be disputed. Some will say 'I did that first, not him', this being the case, please let me know



The 70MHz band allocation was granted to UK amateurs on the 1 November 1956 (but not if you lived near Jodrell Bank!).

in order that I may modify my records, (which, incidentally, I collate on behalf of the Radio Society of Great Britain).

Now let me get down to the odd facts that I have found, what you might term the 'did you know corner?' The 50MHz band is comparatively new, but for many years before it was open to all, certain amateurs had special licences to operate on it. It was on the 5th November 1947 that **G6DH** worked **W1HDQ** for the first trans-Atlantic 50MHz contact.

It is another fact that the 'claimed' distance record for the 50MHz band is a staggering 17239km between **GJ4ICD** and **VK2FLR** in a contact made on the 14 October 1991. This can be beaten as the equatorial circumference of the earth is 40 076.5km, so a distance of more than 20000km is possible. But to where I know not. As far as I can ascertain, the first inter-G QSO on 50MHz was made in 1958 between **G4LX** and **G2BDQ**, whilst **G5BY** worked **ZS7P** on the 1 April 1948 - definitely not a joke!

The frequency 58.5MHz was in use just after the Second World War and before TV closed it down, this band produced good contacts. I was interested to learn that **G5MQ** worked **I1IRA**, **GW6OK** and **F3JB** on the 19th May 1946, the band was in use up to 1948. The 70MHz band was granted to UK amateurs on the 1 November 1956 (but not if you lived near Jodrell Bank!) and became very popular, with amateurs sitting on 70.260MHz night after night waiting to 'hi-jack' the unwary newcomer to the band.

On the 2nd November 1956 **G5KW** worked **G8KW**, perhaps the first recorded 70MHz (4m) QSO, the problem with this band is its restricted use by other countries, but certainly CT1, FA (Algeria), TF, 5B4, ZB, CN, PX (Andorra), EI and HB9 as well as the UK countries have been worked at various times. Distance has never been a problem, just lack of countries, but in May 1960 **G5MR** worked **CN8MG** at 2061km and in June 1981 **GW4ASR/P** worked **5B4AZ** over a distance of 3471km.

Favourite VHF Band

So, how about the 144MHz (2m) band, the favourite v.h.f. band I think. This band was granted to Radio Amateurs on the 1 September 1948 and **not because of pressure by Class B licencees** as I was once informed!

The first QSO apparently took place at 0015 on 1.9.48 between **G6VX** and **G2XC** and six days after the band was granted **G2AJ/P** worked **G5MQ/A** over a distance of 225km and since that time the distance achieved on 144MHz has increased enormously.

In March 1952 **G5UF** worked **SM6ANR** over a path of 1210km, **G3DAO** had a QSO with **LZ2FA** of 2172km in June 1974, while in September 1981 **GD8EXI** worked **EA8XS** over a sea path of 3025km. This distance had been exceeded three months earlier when **G3VYF** grabbed a first and furthest with a 3540km QSO with **4X4IX**.

Impressive as these distances appear, they do not compare with a 4000+km QSO Practical Wireless, April 1998

between **EA8XS** and **TF6IG** in August 1981 or a contact between **W6NLZ** and **KH6UK** in July 1957 over 4186km. Even these records have been beaten by trans-equatorial propagation (t.e.p.) contacts such as the one between **ZS6DN** and **SV1DH** in February 1979 over a path of 7100km and two weeks later a contact between **I4EAT** and **ZS3B** over 7450km. (You will note that I haven't included contacts by satellite, man-made or artificial in this article).

Records On 430MHz

My 430MHz (70cm) records are woefully lacking in content, it would appear that the 432MHz exponents are bashful about their deeds, or perhaps they think it's all been done before! However, I do know that **G2FKZ** worked **G3CU** on the 30 October 1948, just two months after the band was allocated for

"Distance has never been a problem, just lack of countries"

Amateur use. The distance worked was 2km, I know this sounds miniscule and that you can shout the distance, but it was, at the time, the leading edge of electronic experimentation, and these amateurs were showing us all what to do.

Some 11 years later in June 1959 **G3KEQ** worked the well known v.h.f. exponent **SM6ANR** over a distance of 1047km. The present claimed UK distance record is 2884km between **GW3KJW** (*Pat himself of course, being modest!* Editor) and **EA8ACW** on a sea path on the 10th September 1988. I fail to see why this has not been exceeded, I'm sure it has, and I'd love to hear from whom and when. The distance has been exceeded on a number of occasions by contacts of 3982km between W6 and KH6, again on a sea path.

Going Up

Going up the frequency to the 1296MHz (23cm) band has produced little information from Amateurs, but I do have a record of **G6CW** working **G8DD** on the 17 November 1949. The distance claimed was 7.2km.

Some 36 years later in June 1985 **G6LEU** in Cornwall using 4 x 23 element Yagis and 10W of 'power-out' had a QSO with **Salva EA8XS** who was also using 10W fed into a dish antenna. This QSO over a sea path of 2620km and started on 144MHz, moved up to 430MHz, and then again moved to 1296MHz for a great record. It just shows what can be done if the conditions are favourable for maritime ducting.

The 13cm or 2.3GHz band is too high for me, but not for **G8IH** and **G3BGN** who on the 6 June 1948 made a contact over a distance of 3.5km. I suppose magnetrons or klystrons were used. The thought of a gunn diode had not yet germinated.

Some four months later in October 1948 **G8IH** now /P worked **G3CBN** over a path of

39km, imagine, 13cm in 1948 from a portable location. I wonder how wide the carrier frequency was?

As the years passed, the expertise widened and in 1972 the well known u.h.f. exponent **G3LOE** using 1W to a dish antenna worked **PA0DBQ** over a distance of 224km. Two years later in January 1974, now with 15W to a dish, he worked **DJ2HF/P** over 400km.

In October 1982 **G4BVY** using 15W generated by a 2C39 tube, 2 x NGF1402 front-

“... some will say I did that first, not him ...”

end receiver and a 6in dish worked **OK1AIY/P** over 1028km. This was exceeded by **GOVHF/P** in October 1995 when this contest station contacted **OE3EFS/3** over a distance of 1100km.

Records for 3.4GHz are hard to find unless you are one of the select few who use this frequency. However, I do know that in October 1995 **G8IFT/P** worked **DF0RB** over a distance of 825km, no mean feat!

Oddly enough, there is more information on the next band 5.6GHz (6cm), although I have no early history, (perhaps someone would enlighten me) it would be a shame to lose the exploits of the pioneers of amateur radio in the u.h.f. field. However, in July 1974 **G3YLV** worked **GU3WJG**, a distance of 113km.

Some 20 years later in October 1994, **G3FYX** jointly with **G3JMY** worked **SM6ESG**, the distance being 1137km which had been beaten two days earlier by **G4BCH** when he worked **SM6HYG** over a distance of 1178km. Again, sea ducting making long distance contacts possible. This theory of sea ducting being borne out by the fact that distances of 3982km have been made on this

“... a log book showing contacts made over 50 years ago is far more valuable ...”

frequency between W6 and KH6.

Going up another band to 10GHz (3cm), the records are poor, which is surprising considering how popular the band is. The first record I can find is a QSO between **G3LZ** and **G3BAK** on the 20th January 1950, this is reported to be the first 10GHz QSO in the UK and the distance was just a few kilometres.

How technology has changed! I say this because during the October 1995 contest **GOVHF/P** worked over a path of 1185km to **OE4MDA/1**. The claimed world record was 1191km achieved by **VK5KZ** with a VK6 in January 1995, but on the 14 January 1997

G3GNR worked **SM6ESG** over a 1275km path.

The Esoteric Bands

Now we come to the esoteric bands. On the 24GHz band in August 1974 **G3BNL** worked **G3EEZ** over a distance of 74km from Cleeve Hill to Clee Hill in Shropshire. Imagine the planning and dedication that must have gone into setting-up these two stations and the satisfaction of having achieved what they set out to do! Another u.h.f. expert **G4DDK** worked **PA0EZ** in June 1995, the distance being 268km, beating the claimed record of 208km worked by **OZ/DB6NT** with **OZ1UM** in June 1993. This distance was exceeded by **G4KGC** who worked **PA0EZ** over a path of 391km on the 14 January 1997.

Up again now to 47GHz and there's just two mentions for the UK. Two well known amateurs **G3HBR** and **G3HBW** worked over 13km on the 21 August 1991 whilst in 1993 **OZ/DB6NT** worked **OZ1UM** over 208km, beating the then world record of 166km set up by **HB9MIN** with **HB9MIO** in 1992. The UK record of 41km was achieved on the 14 December 1996 when **G4KNZ/P** worked **G3FYX/P**.

I have no 76GHz record for the UK but the Danish challenge of **OZ/DB6NT** and **OZ1UM** worked over a path of 8.8km in June 1993, using mW and 25cm dishes.

Finally, 147GHz, again no UK mention, but on the Continent on the 9 June 1993, **DF6NT/DF9LN** worked **OZ9ZI/DJ5HN** over open water having several QSOs, the longest being 3.1km, each station using 5mW of power. Even this was exceeded in January 1995, when **OZ9ZI** worked **OZ1UM** over 11km using a talk back frequency of 47GHz!

Radio Achievements

There you have it, a potted history of v.h.f. and u.h.f. radio achievements, the first and the furthest, but are they? As the years go by we lose more and more of the original experimenters, often without knowing what they achieved.

Every month I look in the radio magazines and see silent key sales with transceivers and associated gear for sale, but what happens to their log books, QSL cards, the important parts of their stations, and as far as we are concerned, the important part of our history? I fear that these valuable documents are thrown on the back of fires or binned, a situation which is deplorable.

To my mind, a log book showing contacts made over 50 years ago is far more valuable than a commercial piece of electronics, which is only as good as its operator. So, if anyone is looking after such a sale feels inclined to throw away a logbook or QSL cards, **please throw them in my direction.**

Also, please remember that my records are only as good as the information received, if you think you have a first or furthest please get in touch. I will be delighted to hear from you and update the history of our hobby.

PW

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A DXpedition To LES MINQUIERS

[IOTA-099]

**Phil
Whitchurch
G3SWH
activates an
unusual
island station
and visits the
most
southerly
public
conveniences
in the British
Isles!**

Jim Kellaway G3RTE and I first started talking about a joint IOTA expedition in mid-1995, shortly after Jim had returned from his trip to Rathlin Island (EU-122). We both had various projects in mind, but it was not until we met at the 1995 RSGB HF Convention that we agreed to do 'something' together in 1996.

Jim had taken a holiday in Jersey in 1995 and whilst there had made some useful contacts whilst investigating the possibility of an expedition to Les Minquiers.

Les Minquiers are a group of islands and rocks about 18km south of St Helier. Commonly known as 'The Minkies' by Jerseymen, there is only one habitable island, Maitresse Ile, which is about 200m long by 50m wide at high tide.

Island Ownership

There has been a long standing Anglo-French dispute concerning ownership of the islands originating in 933AD, when William the Conqueror extended his rule to the Channel Islands. Although they have been administered by Jersey for many decades, in the years following the Second World War, the dispute was revived and became important as sovereignty of the islands determines the allocation of rights to the economic development (specifically petroleum) of the continental shelf.

As a result of a non-contentious hearing in November 1953, the International Court of Justice in The Hague found in Britain's favour. The same case allocated Les Iles Chausey to the French. These events are immortalised in Nancy Mitford's hilarious novel of the period, *Don't Tell Alfred*.

Geographical Area

Although Les Minquiers count as Jersey (GJ) for DXCC purposes, the total geographical area covered exceeds 130 square kilometres. They therefore count separately from Jersey for IOTA purposes, having been allocated the reference number of EU-099.

There have been several previous operations from the islands, the most recent being by G3OZF and G4JVG in the 1994 IOTA Contest. Another expedition thus

seemed timely.

Although neither of us are WAB Square chasers, we do recognise that many people are. Enquiries on the BBS and PacketCluster system brought a general consensus that the Channel Islands do not count for WAB. One person suggested that the islands were in TV41 Square, which proved totally incorrect.

Another helpful soul gave me the reference of my home QTH! When we got to the island, the correct reference of WV84 was provided by a Jersey amateur.

Jim had made contact with the owner of a small boat who also owns a cottage on the island. He agreed to transport us to and from the island and to make his cottage, with cooking and sleeping facilities, available to us. Jim also negotiated the use of the Customs House. We thus had two habitable buildings available and set about planning our operation.

It was our intention to run two stations simultaneously, one on s.s.b. using the callsign GJ3RTE/P and one on c.w. using the callsign GJ3SWH/P. To minimise mutual interference, we needed two generators and the maximum spacing between antennas which could be achieved. We believed computerised logging to be essential.

Weekend Decided

We decided upon the weekend of 29/30th June as good weather was likely and it avoided major contests. After many 'phone calls and letters, I met Jim at his brother's house near Crewkerne on the evening of Thursday 27th June. My car was already full of equipment, we added his to it and set off for Weymouth to catch the 11.30pm sailing of the M/V *Havelot*, arriving in St Helier at 7.30am on the Friday.

On arrival, we were met by Frank Lawrence, the skipper of the *Barbarella B*, which was to take us to the island. Frank is a Jerseyman from a family of five generations standing, a retired Master Mariner and until recently responsible for training the Jersey Harbour Pilots. We could not have been in better hands.

The *Barbarella B* is a diesel driven, 20 foot cabin cruiser which can carry up to 10 passengers. Maurice, (his crew!) used to be a senior Jersey policeman before retiring.

The boat was moored at the Jersey marina and Frank kindly organised parking space for my car within the compound. We made a quick trip into town to collect the keys to the Customs House and to buy final food, water and petrol stocks. We then loaded all our equipment, plus a generator of Frank's onto the *Barbarella B* and set off for the island at about 0930.

Plotting Our Course

The sea was calm, the sun shone and I had great fun plotting our course on the GPS display unit. We made good time, arriving after about 1¹/₄ hours sailing. At low tide, there is a naturally sheltered harbour formed by the surrounding rocks and we moored to a buoy within it. Our position was: lat. 48° 58' N, long. 02° 03' W.

There are four or five buildings in a good
Practical Wireless, April 1998

GJ3RTE/P

Jim

GJ3SWH/P

Phil

Maitresse Ile, Les Minquiers, Jersey
IOTA EU-099



state of repair, a few ruins, a concrete slipway, a helicopter landing pad and a 10m flagpole. The communal toilet has the doubtful distinction of being the most southerly building in the British Isles!

We had to transfer all the equipment from the *Barbarella B* to shore using an inflatable 'Zodiac' rubber dinghy. This was achieved without mishap in four or five trips. I was first ashore and started to manhandle it to the top of the slipway.

The island is home to many species of birds. Great black backed gulls, such as: Cormorants, Oystercatchers, Turnstones and several other species. It was the end of the breeding season, and Maurice warned us that many had chicks, as they can sometimes be quite aggressive when protecting them.

The first task was to run up the States of Jersey flag, which flew all the time we were on the island. Following a recent series of thefts and vandalism, all the habitable buildings are heavily shuttered, and the next job was to remove the shutters and let in some daylight.

Frank's cottage is very well appointed. It's equipped with a table, easy chairs, double bed, gas stove, fireplace and a simple electrical installation powered by Frank's own generator.

After showing us the various facilities, Frank and Maurice re-boarded the *Barbarella B* and set

off back for St Helier, promising to return on Monday morning. By mutual agreement, Jim set up his station in Frank's house and I set-up mine in the Customs House, which had a table, chair and four bunk beds.

Perfect Support

The flagpole at the north end of the island was the perfect support for my multi-band wire dipoles, even though it was about 75m away. I had brought a drum of UR-M70 coaxial cable which was quickly run out. When rigged as inverted 'vees', the centres of the dipoles were about 25 metres above sea level at low tide, with a clear take off over 360°.

Jim put up a 20m ground plane at the south end of the Island and used sloping dipoles on 7 and 3.5MHz. Experiments proved that we could operate simultaneously on 14MHz, Jim on 14260kHz and me on about 14015kHz.

We both made our first QSOs about 1315UTC on Friday 28 June. Operating from separate buildings with different generators was a great success. We were each able to vary our operating times without upsetting the sleep pattern of the other.

I laid out my sleeping bag on an old mattress in one of the bunks in the Customs House, and Jim laid his out in Frank's cottage. However, apart from cooking and eating times we saw very little of each other!

Number Equal

The s.s.b. station proved to be the more popular, although the final numbers of QSOs Practical Wireless, April 1998



(L to R) Phil G3SWH, Frank Lawrence and Jim Kellaway G3RTE.

were almost equal. We gained the impression that those working the s.s.b. station were mostly interested in DXCC, whereas those working the c.w. station were mainly interested in DXCC. As far as we have been able to confirm, this was the first operation from Les Minquiers to use the WARC bands.

Our last QSO was at 0635UTC on 1st July, after which we started to dismantle the stations and pack up ready to leave. The wind had increased overnight and was blowing at about force 4-5 from the north-west.

Frank and Maurice arrived at about 9.30am, just before low tide. They very obviously wanted to get loaded and back to Jersey as soon as possible. The sea outside

"It was out intention to run two stations simultaneously..."

the little harbour was really quite rough, with white-capped waves.

We again used the 'Zodiac' to transfer the gear to the *Barbarella B* without mishap. Once aboard, we securely stowed it below and set off back to St. Helier.

Uncomfortable Trip

The one and a half hour trip was very uncomfortable as the poor *Barbarella B* was tossed around in some quite heavy seas and Frank was kept very busy keeping us on course. Jim and I stood on the afterdeck and hung on to whatever piece of superstructure we could find. Nobody disgraced themselves by being sick, I'm pleased to say!

On arrival back at the marina, Frank arranged access for us to use the shower facilities as by then we were in desperate need of refreshing ourselves. Much refreshed, we spent a very pleasant day exploring Jersey before taking the evening ferry back to Weymouth.

I dropped Jim back at his brother's house and drove home from there. We were both very tired but reasonably pleased with our efforts, having made over 5200 QSOs from the island.

Full colour QSL cards have been printed. I am handling the QSL chores for both callsigns, and will respond to either direct (I'm QTHR in any callbook since 1970) or bureau requests.

PW

Thanks To

Our special thanks must go to our XYLs, **Cheryl** and **Jan** for allowing us to go, to Frank Lawrence and Maurice for safely getting us there and back, and for the use of the cottages. And to **Neville Cheadle G3NUG** for the loan of the FT-900AT, without whom this operation would not have been possible!

The Rev. George Dobbs G3RJV describes his 'Utility Transmitter', an easy-to-build c.w. transmitter with several band options. And of course - he hasn't forgotten the appropriate quotation!

Practical Way



Like standard little circuits which can be easily duplicated and perform to order but the usual problem is that most of them are limited in their application. How much better it is to have a circuit which is uniform and widely useable. As Bacon suggested "... uniformity and usefulness are a good mix".

In 1977 the late Doug Demaw W1FB and Wes Hayward W7ZOI, described a universal transmitter board in their book, *Solid State Design for the Radio Amateur*. This was a two stage crystal controlled transmitter which, by the changing of some components, could be used on a variety of bands.

Over the years I have built the 'universal'

"... let use be preferred before uniformity, except where both may be had"

Francis Bacon (1561 - 1626)

circuit a number of times. It has always performed well, without any problems.

Recently I thought that the circuit's usefulness could be improved by bringing it up-to-date. With a few changes it could be even more universal!

Band (MHz)	C2* (pF)	C3 (pF)	C3 (pF)	R1 (Ω)	RFC (μH)	T1(p) (turns)	T1(a) (turns)	Core (type)
3.5	120	100	220	39	25	43	6	T50-2
7.0	120	100	None	39	15	35	5	T50-2
10.1	60	47	None	47	15	35	4	T50-6
14.0	60	33	none	47	15	27	4	T50-6

* Murata 5mm Ceramic Trimmers [120p - Black, 60p - Brown]

Table 1: Transmitter components that change depending on the band in use.

Variable Crystal Oscillator

In the version I'm describing here the crystal controlled oscillator is converted to variable crystal oscillator control (VXO). Additionally, there's an option to obtain a wide VXO 'swing'.

The original lowpass filter was a simple 3-element, Pi type, filter. However, even with only about 1W of output, this hardly provides enough harmonic suppression to make it legal within the licence requirements. So, I have added a 7-element filter based on the W3NQN values for standard values of capacitance.

The original circuit did not indicate how to use the transmitter in conjunction with a receiver. Fortunately though it's easy enough to provide a changeover switch or a semi break-in system using a d.c. switched relay (but full break-in is a better option).

I have added the break-in circuit based upon the W7EL circuit used in his 'Optimised Transceiver' (QST for August 1980). This circuit has re-appeared in countless other transceiver designs. I have called the finished design the Utility Transmitter - a useful and easy-to-build transmitter board for a range of bands

Final Circuit

The final circuit of the Utility Transmitter is shown in Fig. 1. The transmitter uses a crystal controlled oscillator feeding a bipolar transistor power amplifier.

In my design the crystal oscillator has the facility to shift the frequency of the crystal and has a tuned output for the band in use. The oscillator is keyed which is useful because there is no r.f. output at all during the receive mode.

A whole variety of npn transistors may be

Band (MHz)	C9, 12 (pF)	C10, 11 (pF)	L2, 4 (μH)	L3 (turns)	Core (type)	Wire (mm) (s.w.g.)
3.5	470	1200	25	27	T37-2	0.375 28
7.0	270	680	19	21	T37-6	0.45 26
10.1	270	560	19	20	T37-6	0.45 26
14.0	180	390	16	17	T37-6	0.56 24

Note: Wire size is not critical. Wind the turns to fill 75% of the core circumference

Table 2: The seven pole low-pass filters, using the W3NQN calculated values, reduce harmonic output significantly.

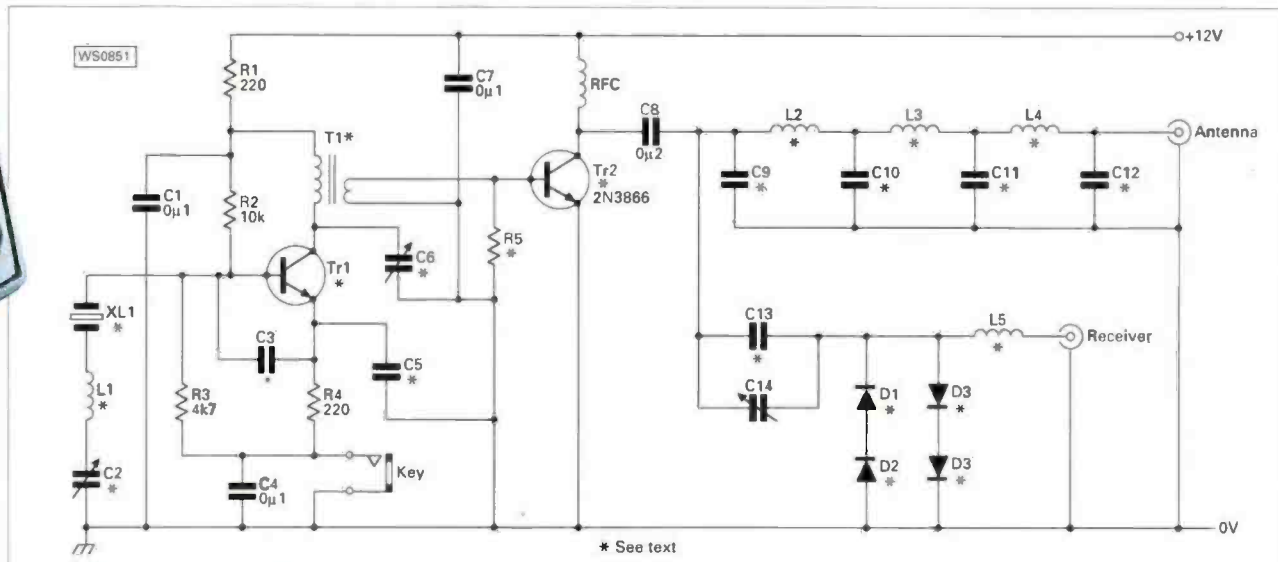


Fig. 1: Circuit for the G3RJV transmitter (see text).

used for the oscillator, Tr1. My prototypes used the 2N2222A, although I have had similar results with both the BC182 and the BC183. Any junk box transistor with similar properties will probably do the job.

The crystal used, must be operated in the fundamental mode. The values for C2 and C3 and the tuned circuit in the collector vary according to band (see tables).

The output from the oscillator tuned circuit forms an r.f. voltage across R5 and drives the power amplifier transistor, Tr2, into Class C. The resistor R5 and the radio frequency choke (RFC) in the amplifier collector vary according to band.

Since the output from the power amplifier (p.a.) is about 1W, the impedance presented to the collector is near enough to 50Ω. This output from the power amplifier is coupled via a capacitor, C8, to the low-pass filter.

As the amplifier is operating in Class C, the output is rich in harmonic content which could cause problems. The seven-element lowpass filter effectively attenuates them and all the examples I built the harmonics were all at least 40dB down after the low-pass filter.

Change-over Circuit

The change-over circuit takes the receiver input from the antenna via the low-pass filter, adding a little more input filtering to the receiver. This input is taken through C13 and C14 via L5 to the receiver.

When transmitting, the diodes, D1-D4, protect the receiver and the capacitors become part of the lowpass filter circuit. When receiving the capacitors and the inductor form a low-Q series resonant network to reduce signal attenuation.

The values are chosen to maintain an approximate 50Ω impedance to the receiver input. The capacitor C14 is adjusted for best results with the receiver.

You'll finally end up with a small transmitter board with complete break-in. The operator simply plugs in the antenna and the receiver and keys the Practical Wireless, April 1998

transmitter.

It may be that the receiver will require some extra muting if its automatic gain control (a.g.c.) cannot deal with the considerable (even at QRP levels) r.f. input. This may be possible with some receivers but I just turn down the audio gain control!

The result is a 'plug in and play' transmitter that can offer an easy option to get on to a range of bands with a 1W signal. My first prototype was built for 14MHz and I worked seven countries in the first two days of use. You could do the same!

PW

Band (MHz)	C13 (pF)	C14 (pF)	L5 (turns)	Core (type)
3.5	470	1200	25	FT47-61
7.0	270	680	19	FT47-61
10.1	270	560	19	FT47-61
14.0	180	390	16	FT47-61

Note: Wire size is not critical. Wind the turns to fill 75% of the core circumference

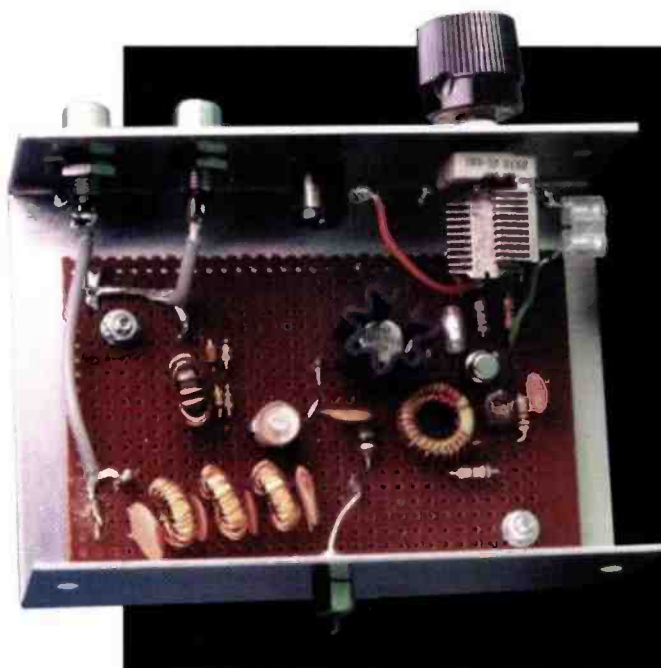
Band (MHz)	C2 (pF)	L1 (μH)	Alternative for L1	
			(μH)	(μH)
3.5	100	39	39	+ 39
7.0	60	33	39	+ 33
10.1	60	22	22	+ 15
14.0	60	22	15	+ 15



Alternative circuit in place of L1 (see text)

Table 3: The components, making up the receiver interface, also change depending on the band used.

Table 4: To make up the VXCO circuit, use either the combination of fixed L1/C2 or the system suggested by DJ1ZB using two close coupled inductors for L1.



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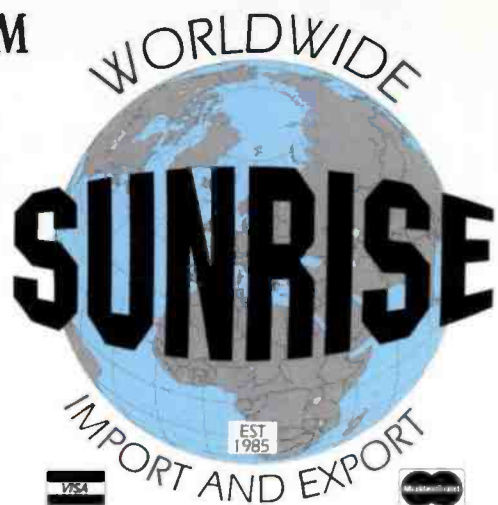


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E180F	3.50	OA2	3.00	6AS7G	7.50	6X5GT	3.00
E810F	20.00	OB2	3.00	6AUSGT	4.00	12A7T	3.50
EABC80	2.00	OC3	3.00	6AU6	2.00	12AU7	5.00
EB91	1.50	OD3	3.00	6AV8A	4.00	12AX7	7.50
EBF80	1.50	PCF80	2.00	6B4G	22.00	12AX7A	6.00
EBF89	1.50	PCL82	2.00	6BA6	1.50	12AX7WA	2.00
EBL31	15.00	PCL85/805	2.50	6BE6	1.50	12BA6	2.00
ECC33	12.00	PCL86	2.50	6BH6	2.00	12BE6	2.00
ECC35	12.00	PD500	6.00	6BQ7A	2.00	12BH7A	10.00
ECC81	3.00	PL36	3.00	6BR7	4.00	12BY7A	7.00
ECC82	3.50	PL81	2.00	6BR8	4.00	12DV7	15.00
ECC83	5.00	PL504	3.00	6BWB	4.00	12E1	10.00
ECC85	3.50	PL508	3.00	6BW7	3.00	13E1	85.00
ECC88	6.00	PL509/519	10.00	6BZ6	3.00	57ZB	95.00
ECC808	15.00	PL802	4.00	6C4	2.00	805	45.00
ECF80	1.50	PY500A	3.00	6CB6A	3.00	807	7.50
ECH35	3.50	PY800/801	1.50	6CD6G	5.00	811A	25.00
ECH42	3.50	QV02-6	12.00	6CL6	3.00	812A	55.00
ECH81	3.00	QV03-10	5.00	6CG7	7.50	813	27.50
ECL82	3.50	QV03-20A	10.00	6CH6	3.00	833A	85.00
ECL86	3.50	QV06-40A	12.00	6CWA	6.00	865A	20.00
ECL800	25.00	UI9	8.00	6D35	17.50	872A	30.00
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EF39	2.75	UCH42	5.50	6F6G	6.00	2050A	12.50
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EF91	2.00	UF89	4.00	6J5G	6.00	5814A	5.00
EF183/4	2.00	UL41	12.00	6J5M	4.00	5842	12.00
EL33	15.00	UL84	3.00	6J7	3.00	6072A	6.00
EL34G	6.00	UY41	4.00	6JB6A	27.50	6080	6.00
EL36	5.00	UY85	2.00	6JEB	27.50	6146B	15.00
EL41	3.50	VR105/30	3.00	6JS8C	27.50	6201	8.50
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EL95	2.00	Z75	10.00	6L6G	15.00	6550A	25.00
EL360	15.00	Z803U	15.00	6L6GC	15.00	6883B	15.00
EL509/519	12.00	2D21	3.50	6L6WGB	10.00	7025	7.50
EM34	15.00	3B26	12.00	6Q7	3.00	7027A	25.00
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EN91	7.50	5R4G	7.50	6SC7	3.00	7360	25.00
EZ80/81	3.50	5U4G	10.00	6SG7	3.00	7581A	15.00
G232	8.50	5V4G	4.00	6SJ7	3.00	7586	15.00
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73 from Dave G4KQH, Technical Manager.

Valve & Vintage

The faint smell of acid from 2V accumulators on charge and large high tension batteries lying about tells us that Charles Miller is looking after the 'wireless shop' this month while he continues the fascinating story of valve manufacturers in Britain.

For a businessman, the nearest thing to being given a licence to print money is to be awarded an open-ended Government contract. And it was in this agreeable sort of financial climate that the mass-production of valves began in this country.

I've already mentioned previously, how, in the First World War, once the Generals had discovered that the 'new-fangled' wireless could assist them in slaughtering as many of the opposing forces as

possible, they demanded more and more radio equipment. This in turn called for huge quantities of valves.

The obvious candidates for valve manufacturing contracts were firms already possessing the necessary glassware and vacuum pumping techniques. These included of course firms such as electric light bulb manufacturers.

Included in the list were the Edison-Swan Electric Light Co. (Ediswan), the British Thomson-Houston Co. (BT-H.), The General Electric Co. (GEC) which used the trade name Osram, The Metropolitan-Vickers Co. (Metrovick) and the Z Electric Lamp Co. Also engaged was the old-established scientific instrument firm of A.C. Cossor & Co., which had made cathode ray tubes as long ago as the end of the 19th century.

complex. After the end of the war combined production of R type valves continued for a while until the various valve companies started to develop new types to be sold under their own brand names.

Now, when for years you have been selling valves at an agreed price without the threat of anyone undercutting you, it comes as a most disagreeable shock to find that competition might enter the scene! 'Private enterprise' might be a fine-sounding slogan, but for heaven's sake let's not be too enterprising at the expense of profits!

As a result something called a 'Valve Makers' Conference' appeared in 1923. This appears to have had as its aim the first steps toward price control.

By this time changes had already taken place in the valve-making world. The Z Electric company had metamorphosed into the Mullard Radio Valve Co. whilst GEC and MWT had set up a jointly owned firm called the Marconi-Osram Valve Co. (M-OV).

From 1919 valves made at the GEC/MWT plant were sold under the Marconi brand name, although others were supplied to Marconi by Ediswan. Apart from its stake in M-OV, GEC also had a substantial holding in A.C. Cossor and Co. The financial 'net' was beginning to be set up!

Manufacturers' Association

In 1924 the Valves Makers' Conference became the 'Valve Manufacturers' Association' (VMA). In that year no fewer than 2.5 million valves were made in Britain, the vast majority of them by members of the VMA.

Even so, minor brands (most of them imported from the Continent) were gaining a foothold on sales due to generally lower prices. Their impression on the VMA members' profits must have been no more than a pin prick, but even this can be irritating if in the area of the back pocket!

The answer to the challenge was the setting up of the British Radio Valve Manufacturers' Association (BVA) in 1926 as a fully-fledged 'trade union' with an imposing sounding policy. This was stated as being to: "...promote, encourage, foster develop and protect the interests of the Public, the Trade and the Manufacturers of Thermionic Valves and to impose such conditions on the conduct of the Trade as in the opinion of the Association may be conducive to that object".

In his book *Saga of the Vacuum Tube* the American writer Gerald F. J. Tyne commented wryly that: "the list of beneficiaries should have been reversed to show the true order of priorities". The original members of the BVA were BT-H, A.C. Cossor Ltd., Ediswan, GEC, MWT and Mullard Radio Valve Co., plus three other small concerns, **Burndep Wireless Ltd., Cleartron Radio Ltd. and Electron Ltd.**

Burndep in 1926 was a company with a bright future behind it. Once powerful, it had been one of the founder members of the **British Broadcasting Company** but was already 'on the skids' and would last only another twelve months.

Cleartron was a wholly-owned subsidiary of the American Cleartron Vacuum Tube Co. This concern simply imported most of its stocks from its parent although it did produce a small number over here, presumably to justify its being included in a British association. In any case, it appears to have faded away only a year later.

Electron was making valves at a plant near Ealing and selling them under the brand name 'Six-Sixty'. But in the same year as the formation of the BVA it ceased manufacture and started to buy in from Mullard.

Two years later Mullard took the Electron company over altogether. Despite this fact, it would never have been guessed by the public from Six-Sixty's

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Fig. 1: Mullard valves were widely advertised.

Shared Designs

By the end of the First World War all the firms I've mentioned were producing shared designs, notably the 'R' type triode. This large pool of shared knowledge alone was an obvious breeding ground for a future cosy quasi-monopoly.

However, below the surface was a network of inter-locking financial interests that grew ever more

CALLING ALL VINTAGE ENTHUSIASTS - MAKE SURE YOU STOP OFF AT THE PW 'WIRELESS SHOP'

advertisements: "...no valves on the market today...can boast of a longer life..." was a masterpiece of ambiguity.

Metrovick, with its Cosmos valve range was the only major firm outside the BVA on its formation but joined a month later and promptly upped its prices to BVA levels. It was also wholesaling valves to two other firms for resale under their brand names, which was against BVA rules but was allowed to carry on doing so for another year or so.

In any case, Metrovick's days were also limited. In 1928 it merged with BT-H and Ediswan to form **Associated Electrical Industries (AEI)**, when the Cosmos production lines were taken over by Ediswan.

Numbers Reduced

The number of players in the lucrative valve game were beginning to be reduced most satisfactorily from the point of view of the BVA. In 1928 GEC sold its interest in A.C. Cossor to M-OV, which resulted in the latter firm obtaining a seat on the Cossor board and a useful ear for new developments at its Highbury works.

The following year MWT, strapped for cash, sold its domestic receiver subsidiary, Marconiphone, plus its half-share of M-OV to The Gramophone Company (better known as HMV) which was itself owned by the Radio Corporation of America (RCA).

Then RCA brokered a merger between HMV and the Columbia Gramophone Co. in 1931 as Electric and Musical Industries (EMI). This concern then started large scale production of radio receivers using, of course, Osram valves obtained from M-OV at advantageous prices. Neither did it do RCA any harm to have access to valve developments at M-OV and, indirectly, to those at A.C. Cossor.

Another Independent

Meanwhile another 'independent' valve name had arrived on the scene. This was Lissen, a name already being used by a firm set up in 1923 to exploit the radio home construction market.

In 1928 Lissen was bought by the **Ever-Ready** battery concern and the sale of valves was announced. Initially these were obsolete Ediswan and BT-H types, bought in and re-based. When supplies of these ran out Ever-Ready turned to manufacturers on the Continent.

Eventually, in 1935, Ever-Ready bought the **Six-Sixty Valve Co.** from Mullard. They scrapped its name but continued to buy in valves from its previous owner to be sold under the Ever-Ready banner.

Not surprisingly, Ever-Ready valves were to be found in Ever-Ready radio sets and also those sold under the name of Lissen. Little wonder that by this time the hapless British valve buyer had but little idea of whose products they were really purchasing, but if they read American magazines they might well have wondered why valve prices 'over there' were a fraction of those 'over here'!

Another nominally independent valve maker was **Standard Telephones and Cables, Ltd.** (STC). This was in fact a larger reincarnation of the old Western Electric Co.

In the early 1920s Western Electric produced the **Practical Wireless**, April 1998

first true miniature valves. They were sold here in the UK under the firm's own name (STC after 1925) and also by Mullard under the name 'Weecovalve'.

For some years STC flirted in an 'on and off' fashion with domestic valve manufactures before finally getting down to business in earnest in 1932 with the brand name 'Micromesh'. Two years later this was changed to 'Brimar', an acronym for British Made American Range and STC duly became a member of the BVA.

Old Established

The old-established electrical manufacturer **Ferranti Ltd.** commenced making valves in 1932 and immediately signed up to the BVA. Curiously enough though, it was not until this year that Philips, which owned Mullard, was admitted to the BVA as a manufacturer under its own name.

The radio set manufacturer E. K. Cole, made non-BVA valves between about 1935 and 1938. But these were used exclusively in the firm's own products and not sold to the public.

The only significant competition to the BVA came from **British Tungfram**. This was a subsidiary of a large firm based in Hungary whence valve components were sent to this country for assembly at plant in London.

Another company - **The High Vacuum Valve Co.** (Hivac), was known chiefly for its miniature valves and the multi-purpose Harries valve. Both British Tungfram and Hivac gained a certain share of the market but in general by the mid-1930s the vast majority of valves sold in this country were done so under the price-fixing and other agreements of the BVA.

Just how effective and lucrative the agreements were is demonstrated by the famous '88' receiver sold just before the Second World War by the London mail order store of Barker, Ltd. This complete eight-valve - using non-BVA imports - set sold for eight guineas, far below what the valves alone would have cost from BVA sources!

Second World War

With the coming of the Second World War and the resumption of Government contracts, plus the cessation of imports, BVA members must have felt that heaven on earth had arrived! However, Britain's precarious financial position after the war largely ruled out the resumption of valve imports...but just in case Philips bought out British Tungfram in 1952.

After 30 years, the bubble finally burst in 1956. This was when the Board of Trade's Monopolies and Restrictive Practices Commission, set up especially for the job, filed a damning report on the BVA.

The report was followed by a general shake-up of the valve industry in which amalgamations, take-overs and re-branding abounded. And you might ask - Did it make much difference to the price of valves though? And in reply I can say that's a different story for me to tell you later!

Fig. 2: Although branded 'Six-Sixty' these valves were manufactured by Mullard - and the 'end user' was never the wiser!

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VHF REPORT

REPORTS & INFORMATION BY
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THIS MONTH DAVID BUTLER G4ASR HAS REPORTS OF RECENT METEOR SHOWER ACTIVITY AND THE RETURN OF F2-LAYER PROPAGATION ON THE 50MHz BAND.

A part from a brief spell of activity during the Quadrantids meteor shower in early January the period was devoid of any significant propagation events. The Ascension Island beacon ZD8VHF (50.032MHz) was heard very weakly in Jersey at 0030UTC on January 9 and there was a small Sporadic-E (Sp-E) opening around 1830UTC on January 11 when the station of CT1DYX heard G1VMH (IO93) and G4VPD (IO92).



Fig. 1: The DF7KF Digital Tape Recorder for c.w. meteor scatter.

On the following day, January 12, a number of stations in southern and central England mentioned hearing CT0WW (the Portuguese beacon on 50.030MHz), IW0GDC, I0WTD and S57JA between 1600-1800UTC. The station of YU1QC reported an Sp-E opening to Cyprus (5B4) and Lebanon (OD5) at

1630UTC on January 14 but nothing was heard in the UK.

Tropospheric conditions on higher frequencies were very poor with only a small enhancement being noted on January 10-11. On the 144MHz band stations, predominantly in south-east England, reported making s.s.b. contacts with F1ABW (IN97), F6IFR (JN09) and DB3WR (JO31).

Strangely, up on the 430MHz band, the best propagation was in a completely opposite direction. Stations in eastern England reported seeing u.h.f. television from Denmark and hearing the beacons OZ1UHF (JO54) and SK6UHF (JO67).

A coronal mass ejection (c.m.e.) from the Sun occurred on January 25 giving rise to a very weak auroral opening a few days later on January 31. The event occurred between 1930-2130UTC although no activity was reported from the UK on either the 50 and 144MHz band.

However, a few stations in The Netherlands and Germany did report working DK1KO (JO53), DL1SUN (JO53), DK8LV (JO44), LA3BO (JO59), LA8AJA (JP50), PA3CEE (JO33), SM4SJV (JO70), SK5CG (JP80) and SM5BSZ (JO89). All of these were on the 144MHz band and via c.w. of course.

METEOR SHOWER

Although the Quadrantids meteor stream is classed as a major shower, this annual event is still relatively short-lived. In practical terms, it's

only usable between January 2-4 with the peak occurring this year on Saturday January 3 between 1230-1530UTC.

Because the peak is very short, (usually less than three hours and difficult to predict), making schedules can be a bit of a hit and miss affair.

At my QTH (IO81) I had arranged two scheduled contacts (both arranged via E-mail incidentally) with the stations of ES2RJ (KO29) and IK7UXY (JN90). My first sked was on the 144MHz band with ES2RJ between 0400-0500UTC on January 4, the morning after the peak of the shower. Unfortunately, nothing was heard both-ways over the 1913km path.

My next schedule, also on the 144MHz band, was another one

hour long test between 0500-0600UTC with IK7UXY. The distance for this attempt was 2092km and although brief signals were heard at both ends of the path the contact could not be completed.

At my QTH I received three bursts of high speed c.w. containing both our call signs but no signal reports. I also received 16 very short duration 'pings' containing no decipherable information at all. At the QTH of UK7UXY only three pings of approximately 0.1 second duration were received.

One technique of extracting as much information as possible from the transitory bursts of information received via meteor scatter (m.s.) is to increase the transmitted c.w. speed. In Europe it's conventional practice to use c.w. at speeds of between 1500 - 2000 letters per minute (l.p.m.), equating to 300 - 400 words per minute (w.p.m.). However, with the introduction of the DF7KF Digital Tape Recorder (the d.t.r. is shown in the photograph, Fig. 1) or by using computer processing with a built-in sound card it's possible to significantly increase the throughput of information.

Surprisingly, high speed meteor scatter (h.s.m.s.) in North America (NA) has only recently started to take-off in the last 12 months. Before that there was very little c.w. meteor scatter activity, unlike Europe where this technique has been established for over 25-years. Because stations in NA are new to h.s.m.s. they are using the very latest PC processing techniques unlike Europe where multi-speed tape recorders have been the norm, especially in eastern Europe and the ex-Russian Republics.

Using specialist m.s. software a few USA operators have been pushing back the barriers and on January 30 the stations of W8WN and K0OU/1 set a new speed record of 16,500l.p.m. (3300w.p.m.). At this speed you can receive 275 letters (55 words) in one second.

More importantly a ping of say 0.1 second will contain 27 letters or approximately five words. Thus it's now possible to receive both call signs and reports (G4ASR IK7UXY R26 R26 G4ASR) within a time frame that previously would have been impossible to decode with a tape recorder or even the d.t.r.

What this means in reality is that you can now attempt to work stations with high power over far greater distances than were normally thought possible. Paths over 2000km always produce weaker signals with more short duration pings than bursts.

Similarly you could also use lower transmit powers over medium-term distances. The use of QRP over optimum path lengths of between 1000-1500km will also produce a number of very short duration pings but these can now be effectively deciphered. The only snag to increased c.w. speeds in Europe is that the majority of operators are using old 'slow speed' technology and it's impossible to change to more efficient techniques overnight.

What's happening is similar to the situation that established telephone providers are having at the present time. Their networks have been built on an ageing copper (cable/wire) infrastructure whereas new providers are coming into the business with totally new fibre (cable) infrastructures. What the existing providers want to do is to rip up all the copper wires and replace them with optical fibre systems but this is a lengthy (and expensive) process. Nevertheless, it will happen and so will the increased use of very high speed c.w. for meteor scatter work.

Another problem with high speed c.w. is finding an 'off-the-shelf' transceiver that is capable of being keyed at such high speed. Although a few old transceivers, such as the Yaesu FT-221 or FT-225, are able to work up to 600w.p.m. by simply taking out one capacitor in the keying circuit, the same cannot be said of newer radios.

So, to get round the problem a number of stations are using audio keying instead of conventional hard keying. The audio output (around 1kHz or so) from a function generator, keyed by a PC or memory keyer, is applied to the microphone socket. The transmitter is switched to s.s.b. mode and every time the audio generator produces an audio dot or dash the transmitter produces a similar r.f. output. This technique is very simple and effective.

One station that has been using low power for m.s. tests is that of Miguel Vallejo EA4EOZ (IN80). He uses an FT-290R running only 5W into a 9-element Tonna Yagi. The high speed c.w. keying is provided by the use of OH5IY m.s. software and the decoding is carried out using the DF7KF d.t.r.

During the Quadrantids meteor shower Miguel worked PE1OGF (also running 5W) over a 1400km path. So, if you're able to generate medium power but unable to put up big antennas then the use of h.s.m.s. will make you more competitive.

At the QTH of Steffen DD0VF (JO61) there is a restriction on putting up large antennas so he has to make use of a small 2-element HB9CV antenna mounted outside his window. Although the antenna has a gain of less than 4dB he has been successful in making h.s.m.s. contacts with G0FIG and ISWBE. Steffen runs 100W and as the feed-line has a 1dB loss this gives an effective radiated power (e.r.p.) of 200W, more than sufficient to make m.s. contacts when conditions are right.

MARITIME MOBILE

Andy Adams GW0KZG/MM has sent me two E-mails from the Royal Research Ship (RRS) *Charles Darwin* located off the north-west coast of Spain. The first was sent from locator IN52 where he was active during the Quadrantids shower on January 3 between 1300-1630UTC.

Andy reckons that the shower peak was around 1400UTC with good reflections being heard between 1315-1445UTC. Five random (unscheduled) c.w. contacts were made on 144.125MHz with the stations of DL1EAP (1600km), DK8ZJ (1600km), ON4AMX (1400km), ON4FI (1400km) and PA2DWH (1500km). Andy was also briefly heard by the station of DH0LS (JO61) who received a two-second burst at S8 over the 2050km path.

The second E-mail from Andy was 'posted' on January 8 from locator square IN42 in the Atlantic Ocean. Andy reported that the weather was horrendous with gales and 40ft waves making m.s. operation rather difficult!

However, Andy did manage to complete two c.w. schedules before going QRT. Both the rotator and 11-element Yagi were damaged in the storms but replacement parts have been ordered and will be repaired when he is back on dry land.

Andy reports that he has been operating Maritime Mobile on the 144MHz band for over ten years. In that time he has operated from 145 different locator squares, 85 of them totally (or virtually) wet.

The 'virtual' squares are those with a small bit of rare land in them such as JM17, JM27, JM37, JM47 and JM57 off the north coast of Algeria and Tunisia. He has only five wet squares left to activate in the North Sea and 35 left in the 'IO' field and wants to finish these off before starting all over again on the 50MHz band.

Andy's next two trips, both of five weeks duration aboard the RRS *Charles Darwin*, have already been scheduled. On Sunday April 20 he will sail from Southampton (IO90) around the coast to work areas in IO12, IO25 and IO35 (400-500km west of Ireland) and then sail to Fairlie, Scotland (IO75) to arrive there on May 15. A few days later, on May 19 he will set sail from Fairlie to work areas in IP80, IP81 and IP90 (Shetland Islands) before returning to Fairlie on June 24.

Andy will as usual be active on the 144MHz band, his specific frequencies of operation being 144.240MHz s.s.b., 144.125MHz c.w. for random m.s. and 144.120MHz c.w. for scheduled m.s. contacts. Although he now has a high power permit allowing 1kW output for ship-board operation he normally runs about 600W output to conserve the 3CX800 p.a. valve.

His operating times are usually 0500-0730, 1200-1300 and 1800-2130 subject to work loads. The times are ship times, which can either be UTC or BST, apparently up to the discretion of the Captain on

board the ship at the time! Some operation is possible on Saturday or Sunday afternoons, again dependant on work loads.

For m.s. operation Andy will transmit during the first 2.5 minute period at a speed of 1200l.p.m. His preferred receive speed is 1500l.p.m. as this saves him having to change the operating parameters of the d.t.r. unit for each m.s. contact.

It's expected there will be much activity from Andy GW0KZG/MM as his first trip will coincide with the Lyrids meteor shower (April 16-25, peaking on Wednesday April 22 at 2100UTC) and the Eta Aquarids shower (April 19 to May 28, peaking on Tuesday May 5 at 1100UTC). His second trip to the west of the Shetland Islands should be even more exciting as it will not only coincide with three meteor showers but it will also occur during the peak of the summer Sp-E season. The meteor showers by the way are the Arietids (May 29 to June 19, peaking on Sunday June 7 at 1500UTC), the Zeta Perseids (May 20 to July 5, peaking on Tuesday June 9 at 1500UTC) and the June Lyrids (June 10-21, peaking on Monday June 15 at 0400UTC).

WIDESPREAD OPENINGS

Although Europe was not favoured with Sp-E propagation during January, the same cannot be said for other parts of the northern hemisphere. In the USA for example there were some widespread openings on the 50MHz band particularly during the first two weeks of the year with January 1, 2, 8, 11, 12 and 15 experiencing some excellent propagation.

On January 12 the station of KD5BUR reported a field aligned (f.a.i.) opening on the 144MHz band following a massive 50MHz opening which lasted for over 6-hours. On January 20 there was a Sp-E opening on the 144MHz band across the southern part of the USA. Also that day the stations of WP4O and WP4MSL (Puerto Rico) were heard by LU5EGQ (Argentina) on 144.300MHz c.w. Unfortunately, LU5EGQ was only running 25W so he was unheard over the 6000km path.

The really extraordinary 50MHz news of the month however was the first reports of true F2-layer propagation made from the USA for Solar Cycle-23. Emil Pocock W3EP passes on the news that on December 31 at 2342UTC the station of K6QXY worked ZL2TPY followed quickly by ZL3NW.

No doubt's Bob's 1.5kW and four stacked 10-element Yagis helped but soon afterwards other alert 50MHz DXers, mostly in Texas, also found the New Zealand stations. Although the main action was between New Zealand and Texas there were indications that propagation was more widespread.

Mike Foubister ZL3TIC (RE66) reported working W7CI in Arizona and hearing W2 and XE2 (Mexico).

The station of ZL2TPY heard W4DR in Virginia on 50.110MHz but couldn't attract his attention.

From Illinois N9BJG heard ZL3AAU around 0055UTC on s.s.b. and tried calling on c.w. but to no avail. According to informed sources the station of XE1ABA also worked a few New Zealand stations. Finally, VK2BA (Australia) worked K5IUA and heard several other stations but couldn't attract their attention.

According to W3EP the W-ZL path is one of those 'easy paths' in terms of maximum usable frequency (m.u.f.) expectations. Areas that lie adjacent to or cross the geomagnetic equator tend to have the highest F-layer density and therefore the highest m.u.f.'s. (Other easy paths are USA to northern South America, eastern USA to South Africa, southern Europe to southern Africa and western Europe to South America and so on).

The W-ZL path although 'multiple-hop' is more or less along the equator. Normally the 'single-hop' north-south paths are expected first but the W-ZL path is not unusually early in the cycle.

STATION ACTIVITY

Henk PA3AWW passed on the news that he will be active on the 50MHz band from Ghana from February. He will be using a Yaesu FT-920, an Icom IC-706 and a 50MHz Yagi antenna. Look out for Henk using his previous callsign 9G1AA. This is a welcome addition to the other operators, 9G1BJ (GM0FQV) and 9G1YR who I mentioned previously in the January issue. Incidentally the RSCG donated a number of RAE and Novice RAE Manuals to PA3AWW so that Henk could train some potential Radio Amateurs in Ghana.

The Support To the Amateur Radio Service (STARS) committee (run by the Region 1, International Amateur Radio Union) has also arranged sponsorship by Schaart Communications, Netherlands, of a Yaesu FT-920. The equipment is to be given to the Ghanaian Amateur Radio Society (GARS) as a means of developing amateur radio in Ghana.

Jim Martin MM1BGI (IO85) reports that he was pleased to catch an auroral opening late last year on November 22. On the 144MHz band he contacted the stations of SM6TZX and GI3PDN. He was also pleased to work the GI on the 50MHz band especially as his QTH is completely blocked to the west. This is one advantage of making contacts via auroral back-scatter. You don't have to point your antenna at the other station, you only need to direct your beam towards the (normally) northerly located auroral curtain.

Jim mentions that he is working at his c.w. (well done!) and hopes to pass the test soon. Then he will be able to participate in working the 'real' DX that is often found on the 50 and 144MHz bands.

The c.w. will also come in useful for contest working, an aspect of the hobby that Jim is very interested in. He says that working

with a low power station from Scotland is a problem as the QSO rate is never high and it seems that radio waves stop just south of Yorkshire!

Jim has recently upgraded his portable antennas to a 6-element Yagi on the 50MHz band, a 17-element on 144MHz and a 21-element Yagi for the 430MHz band. So, point your beams to the north and keep a look out for MM1BGI/P during this year's v.h.f. contests.

SATELLITE NEWS

Reports from around the world confirm that RS-17 ceased transmitting on December 29. The little satellite, (a one-third scale replica of the original Sputnik-1) beeped its way around the globe for 55 days, more than two weeks longer than it was expected to last.

The Sputnik beacon on 145.820MHz was widely monitored and recorded around the world. Those tracking RS-17 reported that the beacon signal had continued to get weaker as the end approached. Even after the 'beep-beep' ceased the unmodulated oscillator continued to transmit for a little while longer.

Maurice de Silva G0WMD reports that he was very pleased to hear RS-17 on a number of occasions. He simply used an Alinco hand-held transceiver and a colinear antenna placed on a cardboard box in his front room. He found it interesting to hear the change in frequency, higher as the Sputnik approached his QTH and lower as it disappeared away from him.

Maurice also mentions that he has been a reader of *PW* for nearly 50 years. He recalls that in 1949 it was called *Practical Wireless and Television* and only cost 6d (2 1/2 pence)!

Finally a reminder that AMSAT-UK's long standing Secretary Ron Broadbent G3AAJ has now retired from the post. Please allow him a well earned rest by directing all enquiries about Amateur Radio satellites to the new Secretary, Fred Southwell G6ZRU (QTHR). The new telephone number for AMSAT-UK is (01273) 495733 and the FAX number is (01273) 492927.

That's it again for another month. Propagation is slowly taking a turn for the better and I want to hear what you've been up to. Forward any news, views, comments or photographs to the address and by the date given at the top of the column.

THANKS FOR YOUR LETTERS AND GOOD LUCK WITH THE DX. SEE YOU AGAIN NEXT MONTH.

73 David GAASR

RadioScene

HF FAR & WIDE

REPORTS & INFORMATION (AND PHOTOGRAPHS) BY THE 15TH OF EACH MONTH PLEASE.

- ◆ LEIGHTON SMART GW0LBI, 33 NANT GWYN, TRELEWIS, MID-GLAMORGAN CF46 6DB, WALES.
- ◆ TEL: (01443) 710749 (9am - 6pm)
- ◆ FAX: (01443) 710789 (9am - 6pm)

THE MONTH OF JANUARY SAW CONDITIONS ON THE H.F. BANDS MORE OR LESS AS GOOD AS THEY HAD BEEN OVER THE PREVIOUS COUPLE OF MONTHS.

The higher bands are certainly now carrying more regular DX traffic compared to a couple of years ago, and many amateurs are having a great time digging for the DX!

However, the l.f. bands have really come into their own, with 1.8, 3.5, and 7MHz offering amateurs some very good opportunities. North Americans have been very prominent on all three bands, with New Zealand, stations in Japan and Australia being

high-angle end-fed wire only permits me to hear the DX, not to work it! (Drat it!).

On the subject of DX, news comes from **Eddie G0HXL** that the semi-submersible oil-drilling rig *Borgny Dolphin* is enroute from UK waters to the Falklands Island in the South Atlantic with **Carl G4VFU/MM** on board. Carl plans to be active on 3.750, 7.050, 14.150 and 21.360MHz. Best times (recommended by Eddie G0HXL) are 1145 hours most days and 1745 hours on 1.972MHz 'Top Band' each night.

The *Borgny Dolphin* (featured in the article by G0HXL and G4VFU in the June 1997 PW) will be in VP8 for quite a long period. Further details from Eddie on E-mail at e.calro@virgin.net Good DX everybody and thanks for the information Eddie.

BEWARE OF INTRUDERS

Beware of intruders! No, not the unlicensed type this time, but the more vindictive and plain nasty kind. I say this because at the latter part of 1997, **Steve Locke GW0SGL**, a dedicated and enthusiastic DXer who has often reported to this column, was visited by an individual or individuals of this kind. They for reasons best known to themselves, decided to completely wreck his tower along with the TH-7 beam antenna which it held aloft, and the results are shown in Fig. 1.

"Under cover of darkness" says Steve "they knocked out the pin which secured the tower in place. The result was that the antenna was completely smashed, and the tower is a write-off".

Steve reminds me that the same thing also happened to the tower and antenna installed in a local Amateur Radio club around four or five years ago. So, it seems that this is purely a local phenomenon.

However, Steve says that he offers the information to the column in order to remind Radio Amateurs elsewhere just how easily accessible their antenna installations are to unwelcome and unstable people such as these. "Chain it all up" seems to be the advice from Steve.

YOUR REPORTS

Space is limited this month, so I'll start with your reports for the 7MHz band. First off the mark is **Ted Trowell G2HKU** on the Isle of Sheppey. Apologies to Ted, as I inadvertently stated in the February issue that he was operating with s.s.b.!

As we all know, Ted is an all-c.w. man, and his report this month shows contacts with **DJ4GX/H13** (Dominican Republic) at 0900, while operating between 1800 and 2000 brought him contacts with **5B4/EU1AA** (Cyprus), and **BV2FT** (Taiwan).

Sean Gilbert G4UCJ in Milton Keynes is also a 'man of the key' and lists his 7MHz contacts with **1X5AA** (Chechnya) at 2353, **CO8EI** (Cuba) at 0113, **8P9EM** (Barbados) at 0043, **LU1ZC** (South Shetland Islands) at 0103, and **J8/DF255** (St. Vincent Island) at 0133. Sean uses powers of 5 or 25W for all contacts.

Someone who has been spending a little more time on 7MHz of late is **Don McLean G3NOF** of Yeovil, in Somerset. In his monthly propagation report, Don says "On 7MHz, I only checked the band between 2200 and 0100. Conditions were good to north and south America as well as Africa at these times. The 14MHz band has only been open during daylight hours, with north American signals coming in very strongly from the west coast. A few Asian signals were heard around 1500 to 1600 on the short path.

"Up on 18MHz, the long path to Australia and New Zealand was sometimes open between 0830 and 1000, with the short path to the same areas open between 1100 and 1300. The short path to Australia was open on 21MHz between 1100 and 1200, with north America coming in during the afternoons. Both 24 and 28MHz have been patchy, but north America has been heard during the afternoons on an irregular basis".

Don's log for 7MHz lists s.s.b. contacts with **FM5GU** (Martinique Island), **H13FVA** (Dominican Republic) QSL via **IK0FVC**, **J69EE** (St. Lucia Island) QSL via **POB 1298**, **Castries, St. Lucia**, **VP2EY** (Anguila Island). Also worked were **YN1GSR/3C1** (Equatorial Guinea) QSL to **EA5BYP**, **YV5DPO** (Venezuela), and **8P9EM** (Barbados) all between 2200 and 0100UTC.

"Bashing the key" was what **John Constance G0VGD** from Kent did this month. His c.w. went out to **VE3RU** (Canada), **XE1EK** (Mexico), **N4NO** (USA), and **CM2JZ** (Cuba) all contacts taking place around 0500UTC.

THE 14MHZ BAND

Operating with an Index Labs QRP Plus rig and G5RV dipole we find **Carl Mason GW0VSW** of Skewen in West Glamorgan. With his 5W of c.w. Carl worked **7X4AN** (Algeria), and **CT1/G3KJX** (Portugal) during a morning session. While operation later in the day brought contacts with **W3TS** (USA), **FM5CW** (Martinique Island), and **EABWWS** (Canary Islands).

Follow QRP enthusiast **Eric Masters G0KRT** of Surrey has also been busy with his powerful mini-signals. His log includes c.w. contacts on 14MHz with **RW3AI** (Russia), **CT1BQH** (Portugal), **SMSAGI** (Sweden), and **HA7ZT** (Hungary) between the hours of

1200 and 1300UTC

Meanwhile on the other end of the power scale, **Richard Lewis GW0WRI** from Brynamman uses the legal limit of 400W on the 14MHz band, showing s.s.b. contacts with **ZS97GSH** (South Africa) at 1837, **VK5NP** (Australia) at 1226, **H50/K4MRH** (Thailand) at 1457, **5R8KH** (Madagascar) at 1649. Also worked **AH6JN** (Anna Maria Island) at 1538, and **JA6BP** in Nagasaki, Japan) at 0848UTC.

It's over now to short wave listener **Derek Blunden BR5171057** from Swindon. Derek's been experimenting with RTTY on 14MHz, and his log shows reception of **PY8AJD** (Brazil) **K4ZQX** (USA) during the morning, while afternoon operation brought in **UA2BD** (Kaliningrad), and **NR9K** (USA).

Operation on s.s.b. was the order of the day for **Charlie Blake M0AIJ** in Milton Keynes, who uses simple wire antennas all round. Charlie lists contacts on 14MHz with **R1ASP** (Kotlin Island) at 0757, **UN8LA** (Khazakstan) at 1140, **RZ9OZ** (Siberia) and **5B5ES** (Cyprus) at around midday, and **VK6LC** (Australia) at 1355UTC.

SIGNING-OFF

Well that's all we've got time for this month, folks! It looks as though the Editor is going to have to find me some more space! With nine reporters this month alone, the column is getting claustrophobic!

THANKS AGAIN FOR ALL YOUR SUPPORT AND SEE YOU NEXT TIME!

73s Leighton GW0LBI

RADIO 'SCAPE

REPORTS & INFORMATION TO ME PLEASE.

- ◆ **MIKE RICHARDS G4WNC**, PO BOX 1863, RINGWOOD, HANTS BH24 2ZD.
- ◆ **E-MAIL:** mike.elaine@btinternet.com
- ◆ **WEB SITE:** <http://www.btinternet.com/~mikespage>

BY NOW YOU WILL HAVE NO DOUBT NOTICED THE NEW NAME TO MY COLUMN, SO WHY THE NEW NAME? AND IF YOU'RE IN ANY WAY INTO COMPUTING YOU EITHER ALREADY HAVE AN INTERNET CONNECTION OR ARE PROBABLY PONDERING ON HOW TO GET STARTED IT WILL HAVE CAUGHT YOUR EYE.

The change in the title and content has been designed to cater for this changing interest by providing a greater Internet content. Additionally, I'll also be



Fig. 1: The result of vindictive vandalism to **GW0SGL's** mast and antenna system in the winter of 1997 (see text).

worked by many amateurs on a very regular basis on 1.8MHz.

This time of year has always been a favourite for the 'Low Frequency gang', and armed with their verticals and other very effective antennas for these bands, they've been having a whale of a time, although, I must admit that my

providing some tutorials on various aspects of the Internet.

You could argue that you can find out about the Internet by buying one of the many computer magazines on the market. However, I will be giving you the information with a strong radio bias, so I hope I can satisfy your curiosity without you having to buy another magazine!

GETTING STARTED

Where to start is a real challenge for those that are just considering moving into the Internet. The decision can be likened to buying a car before you've even started to learn to drive! This means it's very easy to make mistakes and choose completely the wrong option for you.

The starting point for most is to get a modem. The choice you make here is vital as a few pounds saved on a slower speed unit may well be paid for in increased 'phone bills.

You really should be buying the fastest modem you can afford and at the time of writing the best value is a v34 plus 33.6k unit. The v34 plus is just the name of the protocol used by the modem, whilst 33.6 is the maximum speed that the modem can transfer data - 33.6 meaning it can send and receive 33600 bits per second.

The important point to note here is that the quoted speed is the maximum you can expect to see and the rate you actually get depends on the ability of your modem to work with the distant modem to accurately compensate for, and adapt to, the 'phone link. In most cases you will find that the flow of information from the Internet to you is primarily limited by the server you are connected to and its links into the Internet.

Some of you are probably wondering why I've made no mention of 56k technology? The prime reason is that at the time of writing there has been no agreement on which of the two conflicting 56k standards will be taken-up by the Internet Service Providers (ISP). This makes buying a 56k modem a risky business as there's a 50:50 chance that you will choose the wrong standard and your investment may be wasted.

A second reason for holding back is the rapid development in other technologies such as ATM (Asynchronous Transfer Mode) and ISDN (Integrated Services Digital Network). These systems are already used in the business world to provide very fast data connections and the market looks set to make these technologies more affordable for domestic use.

If the timing works out right 56k technology could just have a very short life! But if you really want to go for 56k technology, I would recommend you contact your ISP to see which of the two systems they are favouring.

The knock-on effect of the intense 56k battle has meant a drastic cut in the price of 33.6k modems so that they really are

excellent value. Looking at the main suppliers, I note that you can get a 33.6k unit for as little as £45 inclusive of VAT whereas 56k modems cost at least 70% more.

The next dilemma is whether to go for an internal or external modem. My advice would be to go for an external unit. This is because serial ports on the PC are a precious commodity.

Although the humble PC has the capability to handle up to 4 serial ports, the two prime ports, COM1 and COM2 are the ones that are used by a large proportion of Amateur Radio software that requires a serial port. As you will often find your mouse uses COM1 and so the second port becomes your only route to the outside world!

If you use an internal modem this will most likely take-up the second port and leave you with a real problem if you want to branch out into any of the data modes. The solution is to use an external modem and connect it to the COM port via a readily available multi-way data switch. In this way you can connect an infinite number of devices to this one port - you just have to select the correct one when you start the program.

The other great advantage of using the multi-way data switch system of connecting a modem, is that you don't have to take the covers off your PC and try and work out which slot to use and all the risks associated with delving inside something that you don't fully understand. You do have to pay a little more for an external modem (about 10-20%), but it's well worth it for the flexibility you get.

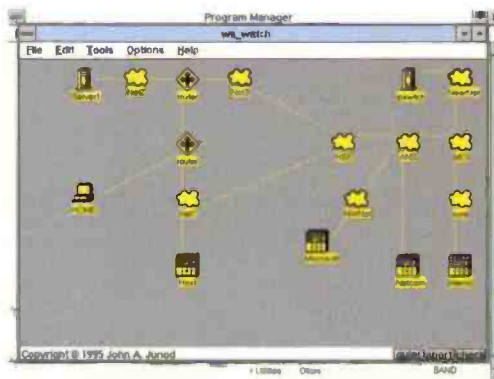
CHOICE CRITICAL

The Internet Service Provider provides your route into the Internet along with a host of additional services such as E-mail and Web space. The choice of supplier is absolutely critical. A wrong choice can cost you dearly in 'phone charges or just pure frustration. I know many new users have been put off the Internet by the frustration of having a slow connection or busy lines.

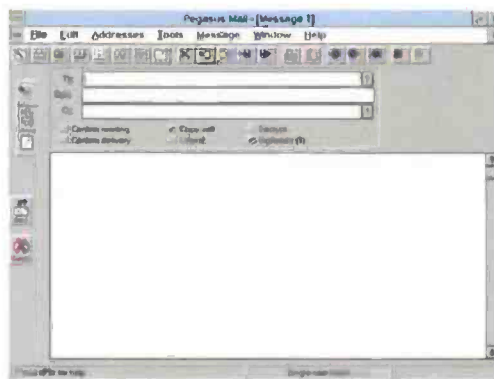
When making your choice there are two basic options either a) one of the national ISPs or b) a local ISP. The national ISPs are led by the likes of Pipex Dial, Demon and BTInternet to name a few. In addition to providing full national coverage at local call rate, you can expect these companies to provide top quality support services to help you get started and keep going. You can expect to pay between £10 and £15 per month for unlimited connections with these companies.

If you have any local Internet companies it may well be worth giving them a try as they often provide very good value for money. If you're going to do this make sure you either get a free trial or sign-up for no more than one month at a time.

Another type of service provider to consider is what are



Network Monitor for Windows Network Map.



The Heathkit Virtual Museum



There are several Amateur Radio related sites to be found on the Internet.



known as on-line service providers. Examples of these are AOL, CompuServe, LineOne and Microsoft Network (MSN). As well as providing Internet access these companies provide a dedicated site packed full of useful information that can save you having to search around the Internet. These companies are often a good bet for

those that are completely new to on-line computing as they usually come with dedicated software packages that give the user a very easy to interface service. The downside is that the charging can sometimes get a bit complicated and you may soon lose interest in the built-in data. It's generally very easy to try these

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services-out as they usually tout for business by offering free connections.

So, what do you get from an ISP? If you've never worked on-line you will be wondering what software you need to get going. This has been made easy by most of the ISP companies. When you use their services you normally get a complete software package with its own installation routine to load all the files in the correct place and guide you through the sign-up routine.

The only point to note here is that, unless you really know what you're doing you can only have one system loaded at a time. This is because they all make changes to the configuration of your system so that whenever you start an on-line application the ISP can be automatically dialled-up.

APPLICATIONS & ACCESS

Let's now take a quick look at the range of software applications that are required for typical Internet access. At the heart of the system is the WINSOCK which is an acronym for WINdows SOCKets. This forms the core of your connection and links with a protocol and dialler program to make the connection. These three packages do all the technical bits like setting-up your modem, dialling the ISP and sorting out the flow of information between your computer and the Internet.

You can visualise the WINSOCK application rather like a mains multiway extension block except in this case it provides sockets that software programs can use. This means you can run several Internet programs at the same time without suffering any conflicts. As a result you can carry-on looking around the Web whilst you're downloading a large file or maybe checking your E-mail.

Moving on to the main applications, the 'star of the show' is the Internet browser. For most people the browser provides the most attractive and easiest link with the Internet. This area of the market is dominated by Netscape and Microsoft. Netscape have their Navigator browser which is currently at version 4.x and is available for many different computer systems.

From Microsoft there is the Internet Explorer which is available in version 3.x for Windows 3.x or version 4.x for Windows '95 (I've used .x for the version number as they change so frequently!). The new Windows '98 was originally designed to be launched with a very sophisticated browser built-in, but there have been a few legal problems that may prevent this.

After the browser the next vital package is the E-mail system so that you can start communicating with others. All the ISPs supply a compatible mail system, but the front runners from independent suppliers are Pegasus Mail and Eudora. These programs are packed with helpful features to make the management of E-mail as simple as possible. My personal favourite is Pegasus because of its price and easy to use features.

A good 'news reader' is probably the next in line and the FreeAgent series seem to have remained at the top for a very long time. It's secret is the use of a very clever and obvious interface that makes finding a retrieving news article a real 'doddle'.

The state-of-the-art in Internet software comes in the form of the latest fully integrated suits such as Netscape Communicator. These come complete with browser, mail, news, file transfer, chat and many other utilities and can really make life easy. The only drawback I've found is that you really need an up-to-date PC as they require lots of processor speed and huge amounts of memory.

One of the newer developments that's really worth a look is Gozilla. I'll cover this in more detail in a future column, but it's great for those who want to download files from the Internet as it helps ensure you are connected to the fastest download site. Not only does this take some of the frustration out of downloads but it saves you money on the 'phone bill. The latest version can be found at www.gizmo.net/gozilla

TELEPHONE BILLS

If you really get hooked on the Internet you'll need to make sure you make the best use of the 'phone connection. Here are a few fairly obvious tips.

- Get in contact with your 'phone company and make sure you know the cheapest times to make local calls.
- Make sure you're signed-up for all the various discount options, i.e. BT's Friends & Family.
- If you want to download a large file especially from a US site, do it during their small hours of the morning if you can - it will be much quicker and therefore cheaper.

NETWORK MONITORING

Once you've gained some experience on the Internet you will probably build-up a set of regular favourite web sites that you tend to visit to keep you up-to-date with your particular interest. You will also know how frustrating it

becomes when you spend long periods waiting for one of these sites to download a Web page.

To help a little you can use a 'network monitor' to keep an eye on your favourite sites and give you a condition report on their availability. One such program is Network Monitor for Windows by John Junod. This excellent program provides a map of the network with the state of each site illustrated by its colour.

In the version of Network Monitor for Windows which I reviewed green was used for a good site, yellow for border-line and red for poor availability. The program can be fully customised so you can add and delete hosts and alter the timing thresholds for good/bad sites.

One excellent development in the latest version is the ability to nest the network maps. As a result you can store lots of different layers of the Internet and then choose, with the click of a mouse, which one you want to monitor.

No only does this program provide an excellent Internet tool but it's distributed as freeware! If you want a copy you can find it on just about all the shareware sites under the filename WS_Watch.

SPECIAL OFFERS

As a special offer for readers wanting radio related software for use on IBM PCs. I've collated a set of programs for you. If you'd like a copy of Hamcomm/JVFX, etc. I've arranged a very special offer with the Public Domain and Shareware Library (PDSL). They have put together a library set of all five disks for just £12, all inclusive.

Using PDSL also makes ordering simpler as they accept all the usual credit cards so you can order by 'phone, you don't even have to write a letter. Please direct all orders and enquiries about this disk set to PDSL, Winscombe House, Beacon Road, Crowborough, Sussex TN6 1UL. Tel: (01892) 663298 and request library volume: H008739abcde.

The software is only available as a set of five disks as follows: IBM PC Software (1.44Mb disks): Disk A - JVFX 7.1, HAMCOMM 3.1 and WXFAX 3.2; Disk B - DSP Starter plus Texas device selection software; Disk C - NuMorse 1.3; Disk D - UltraPak 4.0 and Disk E - Mscan 1.3 and 2.0.

THAT'S IT FOR ANOTHER MONTH, SO UNTIL NEXT TIME KEEP SURFIN' THE 'NET AND LET ME KNOW OF ANY INTERESTING RADIO SITES THAT YOU COME ACROSS. PLEASE SEND ALL YOUR NEWS TO ME AT THE ADDRESS AT THE TOP OF THE COLUMN AND DON'T FORGET TO POINT YOUR BROWSER AT MY WEB SITE!

73 Mike G4WNC

SCENE USA

REPORTS & INFORMATION FOR MY JULY COLUMN TO ME BY THE 15TH APRIL PLEASE.

- ◆ ED TAYLOR N0ED,
PO BOX 261304,
DENVER,
COLORADO 80226, USA.
- ◆ E-MAIL:
EdTaylor@compuserve.com

WE TEND TO THINK OF RADIO AS A EUROPEAN INVENTION, BUT SIGNIFICANT ADVANCES WERE MADE ON THE OTHER SIDE OF THE ATLANTIC. IN THIS, THE FIRST OF A TWO-PART SERIES, ED INVESTIGATES SOME AMERICAN PIONEERS OF THE EARLY DAYS OF RADIO.

The United States of 1870 would have been an interesting place for a scientist. The 19th century, and particularly the period after the American civil war, was an era in which many scientific and technical advances were being made. Technologically, the USA was beginning to become a world leader.

Engineers were putting up very tall buildings, thanks partly to the American invention of the elevator. Long bridges were being constructed and the railways were expanding.

The electric telegraph was connecting the Atlantic and Pacific, as well as linking the USA to the rest of the world. There were developments in photography, oil exploration, transport, sound reproduction and power distribution.

On top of all this, the US population was growing at a dramatic pace. Millions of immigrants were pouring in from Europe. The interior was becoming better explored, and there was undoubtedly a feeling that the country was becoming a major power. It's not surprising, in this atmosphere of advancement and change, that American contributions were being made to the development of radio.

RECOGNITION OF HENRY

I suppose one of the highest marks of recognition by the scientific community is for a unit of measurement to be named after a scientist. Such was the case with the Henry, unit of inductance, named after Joseph Henry.

Joseph Henry was an American physicist, who experimented in the 1830s with coils and electromagnetism. Although he worked independently of Michael Faraday in Britain, he made similar discoveries, specifically that electricity can be converted to magnetism and vice versa.

Henry also invented a form of electric motor, and devised a type of relay, which was further developed by Samuel Morse and used in

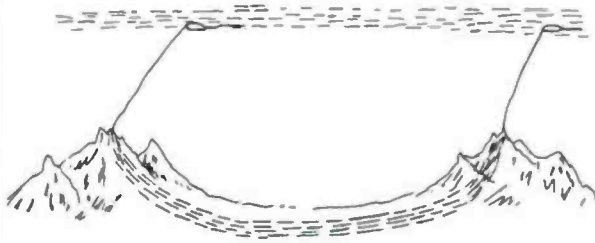


Fig. 1: Loomis and his aerials tapped into the 'electrical sea'.

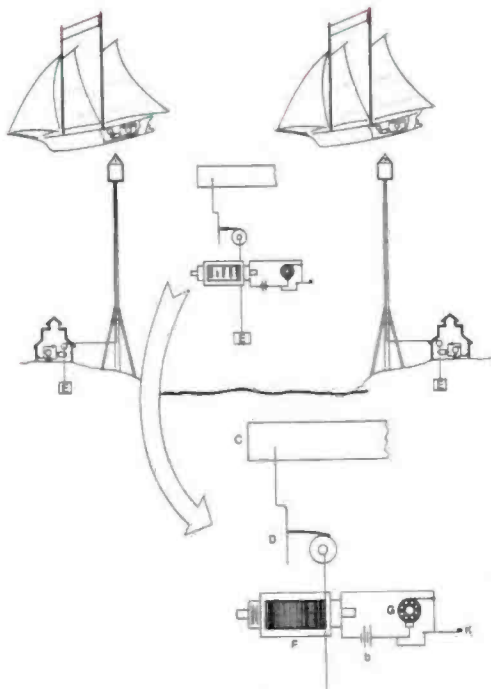


Fig. 2: A diagram from Edison's patent showing the use of 'etheric force'.

telegraph systems. He also built the largest electromagnet of the time. It could lift a third of a ton, which was a stupendous achievement in those days.

Joseph Henry's work laid the foundation for the principle of resonance, critical to the development of radio. And for example in 1842, he observed that electrical discharges into a coil caused damped oscillation (at a frequency which depended on the size of the coil).

It was later discovered that by connecting a coil and a condenser (or an inductor and a capacitor, as we would say now), a circuit can be made to resonate at a certain frequency. This idea became the basis for tuned circuits in all subsequent communications equipment. Henry achieved fame and distinction, and like many scientists of those days was something of a polymath, being involved in founding the US Weather Bureau and the National Academy of Sciences.

OTHER HEROES

Other heroes in the story of radio are not well remembered now. We all know about Heinrich Hertz and Guglielmo Marconi, but how many

have heard of Mahlon Loomis? He was a dentist in Washington DC, who became interested in "Hertzian waves". Although we would consider his theories inaccurate now, in 1865 he conducted significant experiments.

Loomis thought the upper atmosphere contained an electric field which we could utilise. He called it the 'electrical sea', and sought to tap into it by using a kite to hold up a wire which he called an 'aerial' (the inventor of that term in connection with wireless).

By making and breaking a contact at the lower end of one aerial, he was able to send signals to another over a distance of some 20km. His sketch in Fig. 1 shows how he thought the apparatus worked.

The deflections of his galvanometer (a current measuring device) must have been rather weak, and such an experiment nowadays would probably fail because of the high level of radio and other man-made noise. Loomis discovered that the reliability of the system was not consistent, and that sometimes the signals would become fainter. We now know he was experiencing, for the first time, the vagaries of ionospheric

propagation, which later became well-known to Radio Amateurs.

It might seem that Loomis' experiments led to a dead end, but he actually established a couple of useful principles for others to follow. Firstly, he showed that an electric field could really carry a message over quite a distance without the use of wires.

Secondly, Loomis demonstrated that an elevated aerial was a good way to achieve this, although it was a while before it was realised that the length of the aerial was also an important factor. Nonetheless, every Radio Amateur knows something about antennas which Loomis established over 100 years ago: the higher the better!

PROLIFIC INVENTOR

One of the most prolific inventors of the 1800s was Thomas Edison. He is credited with more than 1000 patents over a period of six decades.

Many of Edison's patents do not relate to radio, but to cover even those which do would require a whole book! I will mention one though, which (like most similar developments) pushed forward the boundaries of knowledge, so that the next person could make more progress.

Edison was born in Ohio in 1847 and was, apparently, a troublemaker at school. One of his teachers described him as 'addled'. These days, it might be recognised that he was 'gifted', and bored with the slow pace of lessons.

Thomas Edison received very little conventional schooling as a result and was taught by his mother. He was an enthusiastic reader of books from where he got most of his knowledge.

Edison worked for a while on the railways, and quickly became interested in the telegraph, which had become essential for operation of the rail system. Learning all the time and applying his enormous energy, he quickly suggested improvements to the telegraph system. After years of prodigious invention, he set up a large research laboratory in New Jersey.

In 1875, Edison said he had discovered a new 'etheric force'. He had been experimenting with a magnetic vibrator, producing a train of sparks, which affected equipment some distance away. Although, he couldn't exactly explain what was happening, he was sure he had found some sort of new phenomenon. We now know that his instruments were only capable of detecting d.c. and the crude radio

transmission he had created depended on alternating current, which he could not initially measure.

Edison continued to develop his etheric force system (see Fig. 2) and received a patent. There was some confusion at the time as to whether the effects being noted were the result of magnetic force, or whether there really was a new kind of ether wave. It took a little longer for experimenters to find out that radio signals depended on waves of a type discovered by Hertz, and that 'etheric force' was actually electromagnetic radiation.

Other scientists investigated Edison's results and a notable demonstration took place in London, England in 1882. Amos Dolbear, of Massachusetts, used a spark coil and automatic interrupter to send signals throughout a building.

Dolbear also gave what was probably the first display of wireless telephony, albeit with a range of only a few feet. He was awarded a patent for the system, but did not seek to exploit it, being more interested in research than the rewards to be had from improving communications.

NICOLA TESLA

Nicola Tesla is not well-known, but deserves to be, not least because he also joins that group who had a fundamental unit named after him. The tesla, unit of magnetic flux density. Some would argue he was the true inventor of radio.

It might be more accurate to say that Tesla played a significant part, and that there is no single person who could be described as the inventor of radio. Marconi was the chief exploiter of the new invention, but (as is often the case) many earlier inventors contributed to his success.

Tesla was born in 1856 in Croatia. He received a good education, although suffering from bouts of ill-health. He was



Fig. 3: Thomas Edison pictured in his Laboratory.

THE AMERICAN PIONEERS ARE OFTEN FORGOTTEN WHEN THE ORIGINS OF RADIO ARE DISCUSSED

RadioScene

fascinated by electricity and was determined to learn as much as possible about this emerging science. After working in Budapest and Paris, he emigrated to the USA in 1884, arriving in New York with four cents in his pocket and a letter of introduction to Thomas Edison.

It seems that Tesla was impressed by Edison at first. He was amazed that a man of such limited education could accomplish so much in technical fields. Edison, however, was unimpressed by Tesla, who was likely to solve a problem by sitting down and thinking for a while. To Edison, who used trial-and-error methods, the long cogitations that Tesla indulged in were a waste of time, even though Tesla was quickly achieving exceptional results.

The association of the two men did not last long. They fell out over the issue of

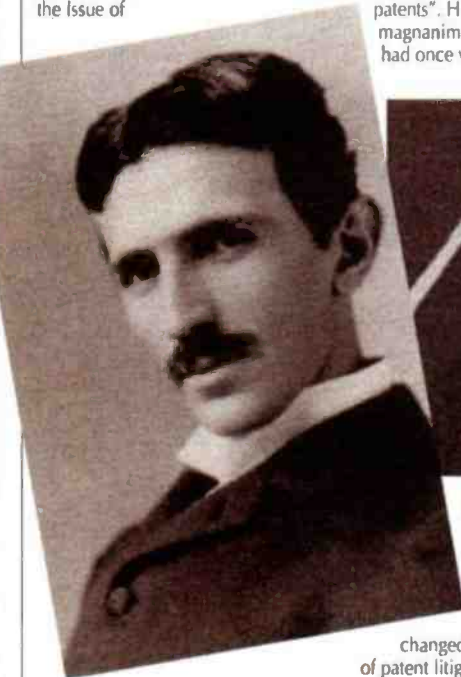


Fig. 4: Nicola Tesla, whose contribution to radio technology is often forgotten.

whether power should be distributed by a.c. or d.c. Tesla, favouring a.c., won the battle in the end, although it took many years to prove the point. He began working with the Westinghouse company and soon became a wealthy man.

Tesla was granted a large number of patents, some in connection with polyphase generators and transformers. As far as radio is concerned in 1890 he began to apply the principles of tuned circuits to his coils, and discovered that he was able to

produce large-scale resonance effects.

Nicola Tesla worked out a way of charging capacitors and discharging them through air-core step-up transformers, which came to be known as Tesla coils. These produced very high voltages, which could be utilised in several ways, one of which was to generate radio signals.

In 1893 Tesla gave a lecture in New York about his experiments on radio transmission with tuned circuits. His system had developed by 1899 to the extent that he was able to demonstrate wireless control of model boats at New York's Madison Square Garden.

When asked what he thought about Marconi's transatlantic transmissions in 1901, Tesla said, "Marconi is a good fellow, let him continue. He is using 17 of my patents". He was being magnanimous to Marconi, who had once worked as his assistant,

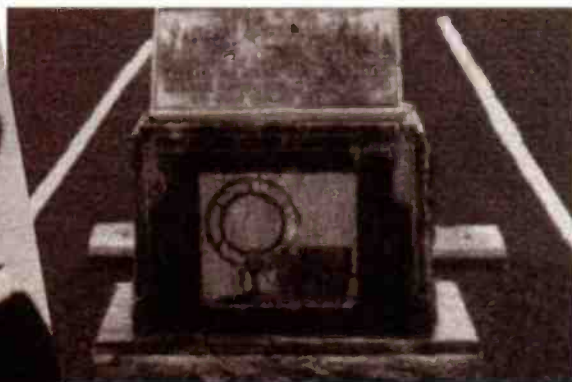


Fig. 5: The monument in Kentucky to Nathan Stubblefield, the 'inventor of radio'!

but his attitude later changed, following many years of patent litigation between the two men.

A long time afterwards (in 1943) the US Supreme Court ruled in favour of Tesla and against Marconi. Of course, by that time, the point was rather academic, but nonetheless Tesla appears to have beaten Marconi by a couple of years in the patent race.

CURIOUS TALE

I'll close with a curious tale, which sometimes gets distorted in the retelling. Look at Fig. 5 which shows a monument to be found in Murray, Kentucky, stating that **Nathan B. Stubblefield** was the inventor of radio. What! Another one? you might ask.

Stubblefield carried out some interesting experiments, and might

have gone on to become rich and famous. However, he suffered from a paranoia which made him excessively secretive about what he was doing. This secrecy also led to a belief by his neighbours that he was working on radio, which was not really the case.

Stubblefield had been interested in telephones and had an idea which he thought would eliminate the need for telephone poles and wires. He had been reading about electromagnetic induction, which was then well-known.

Electromagnetic induction is the principle used by the transformer, where a primary coil of wire is positioned around a secondary. A varying current passed through the primary will induce current in the secondary.

If the primary is large, say room-size, the secondary can be contained in and drive, a set of headphones worn within the room. This method has been used in theatres to distribute sound to the hard of hearing.

One afternoon in 1892, Stubblefield called upon the assistance of a local boy, **Rainey Wells**. He gave him a telephone receiver connected to a 1000-turn coil about 250mm in diameter.

Stubblefield had previously wound his primary of over 100

ground, (a technique since used by the military).

Stubblefield died in poverty and became the subject of local folklore, built up to some extent by the media. He was however, a fascinating individual, well worthy of being included with the other colourful characters who helped to form our hobby into what it is today.

THIS ENDS MY BRIEF LOOK AT SOME OF THE AMERICAN PIONEERS OF RADIO FOR NOW. LATER THIS YEAR I'LL DISCUSS AMERICAN CONTRIBUTIONS TO RADIO IN THE CURRENT CENTURY. IN THE MEANTIME LET ME KNOW WHAT YOU THINK.

73 Ed NoED

FOCAL POINT

REPORTS & INFORMATION TO ME PLEASE.

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THIS MONTH GRAHAM TAKES A LOOK AT THE WORK OF THE BRITISH AMATEUR TELEVISION CLUB AS WELL AS KEEPING YOU UP-DATED WITH THE LATEST REPEATER NEWS.

After connecting to my local Packet mailbox (GB7SOL), this month I am going to list all the bulletins or messages relating to Amateur Television which have appeared in the ATV category. All manner of ATV questions have appeared on the Packet network.

A 'callsign' in Manchester wanted to know which type of antenna is best for 1270MHz (24cm); another asked if a 24cm transmitter p.c.b. could be obtained anywhere. There are also messages from people seeking advice on converting satellite receivers for ATV use. One amateur (with a very recent callsign and keen on 10GHz ATV) was looking for the necessary kits.

I try to respond to Packet ATV messages with as direct an answer as possible. But my reply always includes a question of my own - does the keen 10GHz ATVer know about the **British Amateur Television Club (BATC)**? ATV is a specialised mode, so any amateur station with ATV should really be among the BATC's 2000 strong membership.

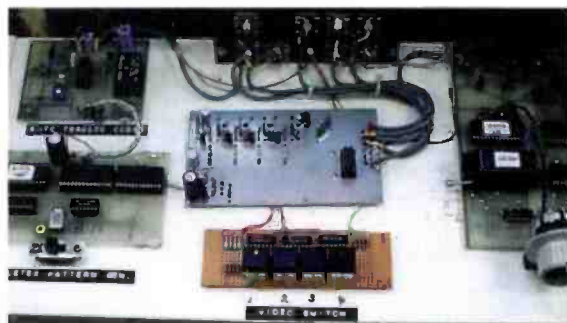
THE BATC

The British Amateur TV Club aims to encourage and co-ordinate all aspects of television as a hobby, and is the world's largest such specialist

turns around the trees in an orchard. He told Rainey to go into the orchard and listen. Unsurprisingly, when Stubblefield spoke into the microphone connected to batteries and the primary coil, Rainey heard the voice and almost jumped out of his skin!

Of course, Stubblefield experiment is not Radio as we know it, since induction does not involve the transmission of waves and the effects are not perceptible for more than a few metres. Still, Stubblefield could have made more scientific contributions if he had been willing to co-operate with others.

Stubblefield was afraid that his inventions would be stolen, a valid concern, since later in his career he was the victim of fraud. He worked with some success on what was called 'natural conduction', the transmission of signals through the



Some of the video processing p.c.b.s that have been available from the BATC.

organisation. The club maintains a technical library, publishes books and a regular magazine, stocks many video components and holds p.c.b.s for magazine projects. The BATC also offers support to affiliated Repeater groups and represents Amateur TV interests at national and international level.

The BATC's quarterly magazine *CQ-TV* began in October 1949 and early editions, like the broadcast TV at the time, were 'black and white.' By contrast, the latest issues of *CQ-TV* could easily stand with every other magazine along a newsagents shelf. A gloss cover, in colour, encloses nearly 100 pages of ATV news, circuits, repeater updates and available kits.

A regular feature in *CQ-TV* is 'Satellite TV News' by Paul Holland G3TZO. Here, Paul gives updates of the latest 'birds' (satellites) plus new channels, products, recent and upcoming launches with plenty of frequencies, transponder details and 'footprint' maps.

The BATC Publications currently stocks three ATV handbook titles, including one on Slow-Scan ATV. This is called the *The Best of CQ-TV* and is a compilation of the most popular recent constructional articles and a limited number of back-numbers are still available.

The centre pages of *CQ-TV* contain the 'Members Services' supplement. Here club members can order vidicon camera tubes, video circuit p.c.b.s and video components - particularly vision processing integrated circuits. It's perhaps worth emphasising here that 'Members Services' means exactly that, the value added tax (VAT) regulations mean that goods can only be bought by club subscribers.

ANNUAL RALLY

On Sunday April 26 the BATC will be holding its annual ATV rally at the Sports Connexion near Ryton, just outside Coventry. This is the place to go for ATV kits, bits and lots more too. Maybe your local Repeater Group will be there? Visit the club display to join the BATC, meet committee people, spend money or simply just talk ATV - we just love doing lots of that!

The ATV Rally also attracts a contingent of privately owned and

equipped 'scanners'. These are sizeable vehicles fitted with ex-broadcast studio suites - monitors, fader and vision mixing consoles, open-reel video recorders and, of course, several weighty cameras. 'Wannabe' camera operators can be seen panning or focusing, while inside the vans an assortment of 'directors' are found selecting 'shots'. This is great fun, believe me!

Every two years, the BATC organises a Conference on Amateur Television (CAT). A CAT is not a rally, there would be fewer but more specialised trading stands and a running lecture programme, CAT '98 is due to take place around September, so watch this space.

REPEATER NEWS

Now some news from two ATV repeaters, GB3TT in Derbyshire and GB3KT on the Isle of Sheppey.

Tony G0NHF is the contact for GB3TT in Chesterfield and confirms: "Yes 'TT' is still on air, but now uses timed control to cut down on electricity costs during the day when the repeater is little or never used. The repeater now only transmits during the day at the required intervals for identification purposes".

The GB3TT repeater is very active most evenings. Local users in Chesterfield are Ian G1XRA, Malcolm G1HFT, Paul G6AMM, Ray G7TZO, Ian G6ZVE and of course Tony G0NHF.

About 45km further away is Bob G7AVU, whose QTH is Gainsborough, Lincolnshire. Tony comments: "Not a bad distance I guess! Mind you our Bob spends a lot of time building amplifiers and bits and pieces to get that little bit further".

The Kent Television Group

(KTC) secretary and technical co-ordinator

Chris Gibbs G8GHH

sends an update for the Isle of Sheppey

1.3GHz repeater

GB3KT: "GB3KT

continues to give good

service, although the

ageing dual-slot

antenna will need

replacing this year.

The KTG has now

grown to 45 members

and its existence has

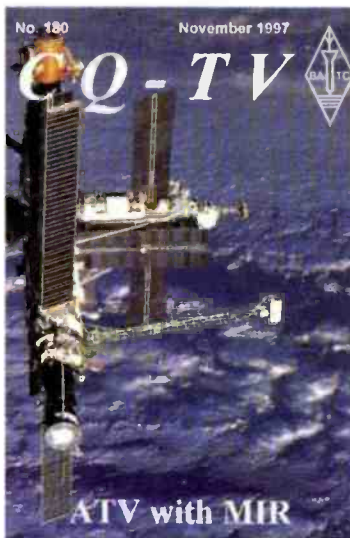
stirred up some local

enthusiasm for ATV -

including a bit of

home-brew, which is

all too scarce in these



Join the BATC and receive *CQ-TV* four times a year.

days of 'plug and play'! Thanks for that Chris.

We have ATV pictures, but what about the sound? The 24cm f.m. (and higher bands) band has the advantage of sub-carrier audio, providing a simultaneous speech channel.

In New Zealand, the Auckland ATV Interest Group are taking this a stage further, says Michael Sheffield ZL1ABS: "The ATV kits being considered by the Auckland Group include a German/Australian sub-carrier stereo sound generator, using 5.5MHz plus 5.74MHz f.m. carriers with stereo/bilingual mode switching sub-tones. A complete set of boards for this and a companion receiver is nearly ready". Stereo audio is already being used for all 24cm ATV contacts between Wayne ZL1UJK and Grant ZL1WTT.

THAT'S ALL FOR THIS TIME. SO CHEERIO FOR NOW, KEEP SENDING ME YOUR ATV NEWS, FROM WHEREVER YOU MAY BE! SEE YOU AGAIN IN THE JUNE ISSUE.

73 Graham G8EMX

SOME USEFUL ATV ADDRESSES:

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BATC Membership Secretary
'Grenehurst',
Pinewood Road,
High Wycombe,
Bucks HP12 4DD

E-mail: memsec@batc.org.uk
Web site: <http://www.batc.org.uk>

The Chesterfield ATV Group
Web site: <http://visitweb.com/hamnet-uk/>

BROADCAST

REPORTS & INFORMATION TO ME PLEASE

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RADIO NEW ZEALAND IS UNDER THREAT AND THE VOICE OF CHINA NOW HAS A NEW NAME. READ ON AND SEE WHAT ELSE IS HAPPENING ON THE BROADCAST BANDS!

Last month I reported how it's possible to be your own high frequency engineer using the same propagation computer program that the professionals employ in some of the world's leading international broadcasters. Now I've learned about another Internet resource that allows anyone to look at the important maximum and lowest useable frequencies for propagational paths between key geographic regions. If you can access the World Wide Web, check out <http://www.concentric.net/~jerrhall/>

Bad news from the Pacific. Radio New Zealand International (RNZI) is under threat. There are plans afoot, proposed by the New Zealand Treasury, to close this respected service.

The usual to-ing and fro-ing between politicians, radio experts and the public is underway (with a similar level of response seen during the Radio Canada International and Radio Australia crises of recent years). As we go to press there is no decision; so, keep your ears on these RNZI frequencies: 0459-0816 on 11905 (to 0758 Saturday and Sunday); 0816-1206 on 9700 (from 0758 Saturday and Sunday); 1650-1850 on 9810 (Mon-Fri); 1951-2050 on 15115 (from 1859 Saturday); 2156-0458 on 17675 (from 2205 Friday and Saturday) and 2306-0458 on 15115MHz.

DEPRESSING NEWS

There's also depressing news from Moscow. The Voice of Russia is facing continued pressure from the Russian Foreign Ministry, despite extensive lobbying from the station. It seems that the Foreign Minister does not appreciate the value of international radio from Russia.

Eight hours of English were cut at the beginning of January along with reductions in Albanian, Polish, Portuguese, Spanish, Chinese and Serbo-Croat. There may be further cuts during 1998, so tune in while you can!

English from the Voice of Russia to Europe is on at: 1500-1600 on 4.94, 4.975, 7.13, 7.235, 7.26, 7.39, 9.47, 9.725, 9.84, 9.86MHz; 1600-1700 on 4.94,

RadioScene

4.975, 6.13, 6.175, 7.21, 7.38, 9.47, 9.705, 9.815, 9.975MHz; 1700-1800 on 4.92, 5.965, 7.175, 7.185, 7.325, 7.355, 7.38, 9.45, 9.89MHz; 1800-1900 on 6.13, 7.21, 7.44, 9.89MHz; 1900-2000 on 4.92, 5.94, 5.965, 6.13, 7.21, 7.255, 7.305, 7.325, 7.44, 7.49, 9.44, 9.89MHz; 2000-2100 on 1494kHz medium wave plus 4.92, 5.94, 5.965, 6.13, 6.145, 7.305, 7.325, 7.33, 7.39MHz; 2100-2200 on 1323 and 1494kHz plus 5.94, 5.965, 7.205, 7.36, 7.39, 9.89MHz

NEW NAME

There is a new name for an Asian international radio broadcaster. The Voice of Free China ceased operations at the end of December 1997, but it was reborn the following day as **Radio Taipei International**. The station retains much of the same output heard under its old name, but the new title is clearly an attempt to placate Chinese authorities in Beijing who had always complained about the 'provocative' name.

Tune in to the English service of Radio Taipei International at: 0200-0300 on 5.95, 7.13, 9.68, 11.74, 11.745, 11.825, 15.345MHz; 0300-0400 on 5.95, 9.68, 11.745, 11.825, 15.345MHz; 0700-0800 on 5.95MHz; 1100-1200 on 7.445MHz; 1200-1300 on 7.13,

9.61MHz and 2200-2300 on 5.81, 9.985MHz.

You can contact the station at **PO Box 24-38, Taipei 106, Taiwan** and if you send a reception report, you could receive one of the stations newly designed QSL cards together with the latest schedule and a copy of the bi-monthly newsletter. I've heard that one listener in the USA also received a colourful pennant celebrating the relaunch.

LATE NIGHT EAR

Anyone with a keen late night ear on the medium wave band may have come across a variety of unusual international stations on 954kHz. Since the middle of December last year, **World Radio Network's** English-language service, WRN1, has been relayed from an m.f. transmitter in Israel on 954kHz between 2000 and 0400UTC.

Reports on the relay service can be sent to **PO Box 1212, London SW8 2ZF**.

TRANSMITTER NEWS

Closer to home, 261kHz long wave now has a mix of **Radio France Internationale** in French and **BBC World Service** in German and English. This transmitter is situated near Berlin in Germany, and during the Cold War carried programmes

for Soviet troops stationed in East Germany. Then the transmitter radiated 250kW and could be well received across much of central and northern Europe.

In the early 1990s, German entrepreneur **Peter Lepper**, bought the rights to the transmitter to allow his news and information station **RadioRopa** to be broadcast, albeit at the reduced power of 50kW. But now RadioRopa has suffered a cut in its operating budget, and is being restructured as a type of rebroadcaster, simply relaying international programmes, plus some two hours a day of local and regional programmes.

The number of listeners to long wave in Germany is small. However, RadioRopa claimed that it had 25,000 long wave listeners, while the major national broadcaster **Deutschlandradio** says its research reveals just 15,000 long wave listeners every day.

STATION INFORMATION

Polish Radio's first programme is now back on the air on long wave. The transmitter on 225kHz has been active since late January after the recommissioning of the masts which support the long wave antenna at Raszyn.

West Coast Radio Ireland (WCRI) has been on the verge of

closure on short wave because of funding problems. The WCRI service broadcasts on short wave on Wednesdays at 2000 on 5.905MHz and on Saturdays at 1500UTC on 6.175MHz, so keep your ear on these channels.

Radio Almaty International in Kazakhstan is on the air three days a week with English, and four days in

German. The station can be heard on Sunday, Monday, Wednesday and Thursday at 1000UTC in German on 9.62 and 11.84MHz and on Tuesday, Friday and Saturday at the same time on 9.505, 9.62 and 11.84MHz. There is also an English broadcast on Wednesday at 1020 for another 20 minutes on 9.62 and 11.84MHz.

The **HCJB** station in Quito, Ecuador, is now beaming programmes in a variety of languages from the Merlin Communications (formerly BBC) site at Skelton in Cumbria. Russian, Tajik and Uzbek are among the services carried on 250 and 500kW senders, for example try 5.86MHz at 0115UTC for Tajik.

THAT'S ALL FOR THIS TIME. KEEP ENJOYING THE BROADCAST BANDS UNTIL THE NEXT EDITION OF PRACTICAL WIRELESS IS PUBLISHED IN A MONTH'S TIME.

Good Listening, Peter

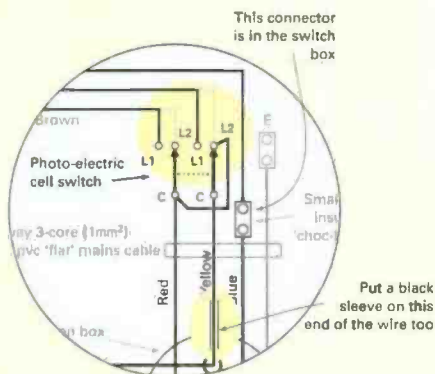


ERRORS & UPDATES

ON GUARD WITH A PHOTO-ELECTRIC 'SENTRY'

Page 42 PW March 1998

There was an unfortunate error that crept into the circuit shown on page 42 of the March 1998 issue of *PW*. The two lines (brown and sleeved green/yellow), from the switch, out to the photo-electric cell unit should be connected to the 'L1' terminals in each case (and not the L2 terminals as shown). The green/yellow wire should, in the interests of safety, have a black sleeve fitted at the L1 switch end also. Please note that the small insulated 'choc-bloc' connector shown near the switch is sited inside of the switch.

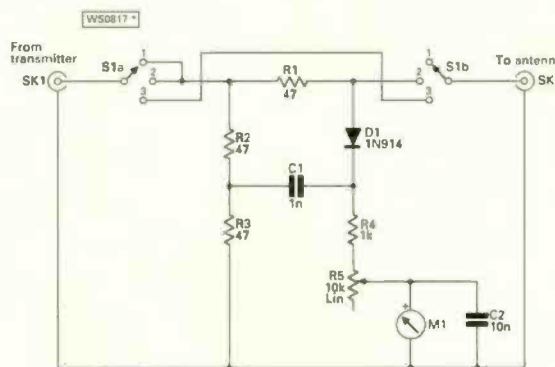


CARRYING ON THE PRACTICAL WAY

Page 44 PW February 1998

The layout around S1b in Fig. 2 on page 44 of the February 1998 issue has an error, please amend your circuit diagram to be as shown here. In the paragraph headed 'Simple Calibration', the capacitor C2 is adjusted to give the lowest reading in the reflected position.

My apologies for these errors Ed.



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SERVICE

Rig problems? You'll want to know that when things go wrong, they're put right - back to the way the manufacturer specifies, and back to the way the rig worked when new. Castle Electronics has been servicing rigs for years; is trusted by some of the largest names in the industry to put their equipment into good shape, and can be trusted by you to make your station operational in the best and most efficient way. Make Castle your first stop for service!

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A visit to Castle Electronics showroom could be your best move. We always have a large stock of good secondhand equipment, lots of components and accessories, and all the well known quality new products at very competitive prices. We will always do our best to match or better prices found elsewhere. We are main dealers for all the brand leaders

SERVICE
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Castle Electronics

Unit 20, Halfpenny Green Airport
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West Midlands, DY7 5DY

Telephone 01384 221036 Fax 01384 221037



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Amateur Radio Communications Ltd

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We are the largest stockists of both new and secondhand amateur radio equipment in the north of England - fact not fiction! Our company boasts a full time service department authorised by all the major suppliers.

When you buy from us you have complete peace of mind!

HF TRANSCEIVERS



ICOM IC-706 MkII

The only HF + 2 + 6m HF transceiver the size of a dualband mobile.

If you are looking for a rig you can't live without, your search has ended. £1099 RRP.

PHONE NOW FOR OUR SPECIAL CASH PRICE!!

NEW HF MODELS ON THE MARKET



ICOM IC-746

Latest HF/VHF transceiver from Icom. Superior design, HF to 50MHz through to 144MHz, possessing VHF base station capabilities, DSP and 100W RF output. Sure to be one of the best selling radios of 1998!!

YAESU FT-847
★ 100W on HF ★ 100W on 6m ★ 50W on 2m

★ 50W on 70cm This ultra compact satellite + all mode transceiver has everything, dare you not buy one? **£1695 approx. Phone now for details. We also are taking deposits.**

ICOM IC-756

The perfect HF-6m all mode transceiver for hams who enjoy chasing rare DX's. Full of functions designed to give you the edge! It is an impressive looking radio, sure to be another Icom winner. **£2495 RRP**

PHONE NOW FOR OUR CASH PRICE!

VHF/UHF MOBILES



DOWN IN PRICE. ICOM IC-207H DUALBAND MOBILE

New RRP £369 ★ 2m + 70cms 50W/30W ★ Detachable head ★ Packet 9600 bps ready ★ 180 memory channels

★ CTCSS & 1750MHz tone.

TEL FOR SPECIAL ARC PRICE!

YAESU FT-8100R

The new FT-8100R from Yaesu combines high power and the industry's most versatile memory system with the ease of installation afforded by its remote-head capability. Be a part of the dual-band revolution with the FT-8100R. £499 RRP.

OUR PRICE £449

KENWOOD TM-V7E

RRP down to £589.95
ARC price £515.
Deposit £55, 12 monthly payments of £44.
Fast selling dualbander!
Now an even better buy than ever before.

USE YOUR CREDIT CARD FOR SAME DAY DISPATCH

VHF/UHF HANDHELDS

NEW ON THE MARKET

ICOM T-8E TRIPLEBANDER

Another first from Icom! This compact handy enables you to operate on 2m/6m/70cms, plus wideband receive and many more features. The first to use Ni-MH battery pack which means you can charge it when you like. Don't miss out on this super handheld. RRP £349.



PHONE FOR ARC PRICE

LATEST KENWOOD HANDIE. TH-G71E

It only takes one glance to see that this 6W dualbander from Kenwood is something special. Just take a look at the following: ★ 200 memories ★ Alphanumeric display ★ Full CTCSS ★ DTMF ★ Wideband Rx ★ Illuminated keypad ★ PC compatible ★ Windows programming

TEL FOR ARC PRICE

STOP PRESS ICOM IC-17E NOW DOWN TO £259 RRP. PHONE NOW FOR OUR SPECIAL PRICE

YAESU VX1-R

Smallest ever dualbander, seeing is believing! Already a top seller at ARC. **£269 RRP**



HP AVAILABLE UP TO 3 YEARS REPAYMENT PERIOD

PROBLEMS WITH YOUR RIG?

Come to the EXPERTS. We are one of the select number of officially appointed service centres for Alinco, Icom, Kenwood and Yaesu. In fact, we have been servicing and carrying out repairs to amateur radio equipment over the past 16 years and our reputation goes without saying! If you want a job done efficiently, quickly and at an affordable price, (our rates are probably the lowest in the UK), then phone us on

01925 229881

E-mail us on: arcoms@globalnet.co.uk



Tel: 01925 229881/Fax: 01925 229882



Due to the fast turn around of popular secondhand items, readers should check on availability of advertised stock. In other words...if you spot something you fancy...don't delay or you could miss it!

Traders

YOUR GUIDE TO SECOND-HAND EQUIPMENT

WATERS & STANTON 01702 206835

PLEASE NOTE SECONDHAND ITEMS COME WITH FULL 3 MONTH PARTS & LABOUR GUARANTEE. FOR MORE INFORMATION PHONE 01702-206835 OR FAX 01702-205847

HF TRANSCIEVERS
Icom IC-726 x2 Base Transceiver with 6m 12V £549
Icom IC-765 Base Transceiver with Built-in ATU £1149
Inlex QRP Mk1 Base QRP Transceiver 12V £299
Kenwood TS-930S Base Transceiver £750
Kenwood TS-940SAT Base Transceiver with Built-in ATU £1049
Kenwood TS-950S Base Transceiver £1895
MFJ MFJ-9020 x2 20m CW QRP Transceiver £125
MFJ MFJ-9040 40m CW QRP Transceiver £125
Ten-Tec Scout 555 Mobile Transceiver (80m, 40m) £379
Yaesu FT-77 x2 Base Transceiver 12V £249
Yaesu FT-100MP Base Transceiver £1449

VHF/UHF BASE/MOBILE TRANSCIEVER
Alinco DR-590 2m/70cm FM Mobile £239
Icom IC-551 6m All Mode Base £395
Kenwood TM-451E 70cm FM Mobile £279
Kenwood TS-790E 2m/70cm All Mode Base £950
Kenwood TR-9000 2m All Mode Mobile £199
MFJ MFJ-9406 6m SSB 10w Transceiver £165
Yaesu FT-290DRH 2m/70cm FM Mobile £269
Yaesu FT-290R11 x4 2m All Mode Portable £209
Yaesu FT-5200 2m/70cm FM Mobile £349
Yaesu FT-8500 2m/70cm FM Mobile £379

VHF/UHF HAND HELD TRANSCIEVER
ADI AT-400 70cm FM H/Hand £99
Alinco DJ-560 2m/70cm FM H/Hand £169
Alinco DJ-F1 2m FM H/Hand £119
Icom IC-24ET 2m/70cm FM H/Hand £179
Icom IC-2E 2m FM H/Hand £79
Icom IC-P4E 70cm FM H/Hand £169
Icom IC-M11 VHF Marine H/Hand £219
Icom IC-T7E 2m/70cm FM H/Hand £199
Icom IC-W21E x2 2m/70cm FM H/Hand £199
Kenwood TH-26E 2m FM H/Hand £99
Kenwood TH-28E 2m FM H/Hand £199
Yaesu FT-203R x2 2m FM H/Hand £79
Yaesu FT-470R x2 2m/70cm FM H/Hand £199

SHORTWAVE RECEIVERS
AKD HF-3M Target 12V Base/Mobile Receiver £135
Drake R8E x2 Base Station Receiver (P-Sale) £695
Grundig YB-206 Portable Receiver with FM £69
Icom IC-R70 Base Station Receiver £449
Icom IC-R71 x4 Base Station Receiver £499
Icom IC-R72 Base Station Receiver £549
JRC NRD-525 Base Station Receiver £549
Kenwood R-5000 Base Station Receiver £549
Lowe HF-150 12V Base/Mobile Receiver £279
Lowe HF-225 x4 12V Base/Mobile Receiver £299
Lowe HF-250 x2 12V Base/Mobile Receiver £449
Panasonic RFB-65 Portable Receiver with SSB £109
Roberts RC-818 Portable Receiver with cassette £119
Sangean ATS-803A x3 Portable Receiver with SSB £89
Sony ICF-SW55 x2 Portable Receiver with SSB £189
Sony ICF-SW7600G x2 Portable Receiver with SSB £135
Yaesu FRG-7700 x3 Base Receiver with JKT-7700 £225

SCANNERS MOBILE/BASE
Realistic Pro-2022 68-960MHz (with gaps) 200Ch £145
Realistic Pro-9200 66-512MHz (with gaps) 16Ch £99

SCANNERS HAND HELD
Alinco DJ-X1 100kHz-1300MHz AM, FM, WFM £139
AOR AR-1000 x2 0.8-1300MHz (with gaps) AM, FM, WFM £149
AOR AR-8000 500kHz-1900MHz All Mode 1000Ch £229
CommTel Com-102 68-512MHz (with gaps) £79
CommTel Com-204 68-999MHz (with gaps) £129
Netset Pro-46 66-956MHz (with gaps) AM, FM 100Ch £109
Realistic Pro-26 25-1300MHz AM, FM, WFM 200Ch £139
Realistic Pro-50 66-512MHz (with gaps) £59
Sony ICF-Pro80 x2 150kHz-108MHz (no converter) £79

LOWE ELECTRONICS 01629 580800

HF TRANSCIEVERS

Icom IC707 £599
Icom IC751 £550
JRC JST135 £900
Trio TS520SE £350
Yaesu FT840 £595
Yaesu FT767R £995

VHF/UHF TRANSCIEVERS

Alinco DJ160E £140
Alinco DJ180 £140
Alinco DJ500 £229
Alinco DR599 £399
Icom IC229H £229
Icom IC2SE £185
Icom IC32E £225
Kenwood TH21E £89
Kenwood TH205E £55
Kenwood TM251E £269
Kenwood TH22E £129
Kenwood TH27E £195
Kenwood TH46 £145
Yaesu FT11R £199
Yaesu FT23R £149
Yaesu FT290R I £195
Yaesu FT470 £259
Yaesu FT703R £85

RECEIVERS

AOR AR3030 £450
Lowe HF150 £275
Lowe HF225 £350
Yaesu FRG7700 £259
Yaesu FRG8800 £375
Yaesu FRG100 £399

SCANNERS

AOR AR900 £119
AOR AR1000 £130
AOR AR1500 £195
AOR AR2000 £195
AOR AR3000A £525
AOR SDU5000 £495
Icom ICR7100 £750
Icom ICR7000 £575
Yupiteru MVT7100 £200

Items are held at various branches, please contact our Mallock branch for further details on 01629 580800

SOUTH EAST COMMUNICATIONS (REP OF IRELAND) 00353 51 871278

H.F. TRANSCIEVERS:

Yaesu FT920 ATU 6M etc £1049
Yaesu FT1000 mp/ac base transceiver £1899
Kenwood 850 sat auto ATU filters etc. £949
Kenwood TS690AT HF+6M, ATU mint £799
Kenwood TS440S base/mobile transceiver £575
Icom IC735 base transceiver £599
Alinco DX70 HF+6M mobile rig £549

VHF/UHF TRANSCIEVERS:

Kenwood TM733E 2m/70cm 50 watt mobile £349
Yaesu FT50R 2m/70cm handi+charger £199
Yaesu FT51R 2m/70cm handi+charger £265
Icom ICT7E 2m/70cm handi inc accessories £249
Kenwood TH-G71E latest dual bander demo £199
Alinco DJ190 2m handheld with charger £119
Icom IC260A 10 watt 2m multimode £149
Yaesu FT736R 2m/70cm base transceiver £899
Kenwood TS790 2m/70cm multimode base £1099

SHORTWAVE RECEIVERS:

AOR 7030 base station receiver as new £499
JRC NRD535 Deluxe base station receiver £899
Lowe HF150 complete with PSU £299
Yaesu FRG8800as new 0-30mhz £299
Yaesu FRG7700 boxed as new £249
AOR 3030 boxed as new £375
Sony 2001D portable receiver with airband £179
Realistic DX349 base/mobile short wave RX £149
Sony ICF-SW55 portable receiver inc PSU+case £179

BASE/MOBILE SCANNERS:

Icom IC7100 25-2000mhz mint £899
Icom IC7000 5-2000mhz mint £699
AOR 3000A 0-2036mhz ssb etc £595
Bearcat 9000XLT 25-1300mhz with gaps £229
Yupiteru MVT8000 8-1300mhz £249
Yupiteru MVT7100 with case nicads and charger £179
Yupiteru MVT9000 top of the range scanner £275

STATION ACCESSORIES:

Diamond GSV-3000 30amp PSU £109
Diamond SX-200 SWR/PWR meter £55
Yaesu FC-10 auto ATU a bargain at £229
Pakratt PK232MBX multimode decoder £199
Pakratt DSP2232 multimode decoder £299
MFJ949E 0-30mhz tuner £109
Autek antenna analyzer £109

All prices are in Sterling.

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ALINCO DR-605 £325.00
AMP UK HUNTER 600W £895.00
ALINCO DJG5E + EXTRAS £299.00
AOR 3000A £575.00
AOR 7030 £599.00
ATLAS 350XL HF £299.00
BEARCAT DX1000, rare £185.00
DAIWA PS304 II PSU £89.00
DRAE 24A PSU £79.00
DRAKE R8A £825.00
DRAKE R8E £750.00
ICOM IC-W2E £199.00
ICOM IC-72R £629.00
ICOM R-72 £675.00
JRC 525 RX £699.00
JST 100 COMPLETE £499.00
KENWOOD MC-50 £55.00
KENWOOD R-2000 + VHF £399.00
KENWOOD TH-215E £145.00
KENWOOD TM-241E £225.00
KENWOOD TM-451E £299.00
KENWOOD TR-751E £425.00
KENWOOD TS-440s £525.00
KENWOOD TS-680s HF+6m £625.00
KENWOOD TS-850 £999.00
Choice from - £999.00
KENWOOD TS-450S - MINT £675.00
KENWOOD TS-940 SAT £899.00
LOWE AP 150 £155.00
LOWE HF 225 + Extras £425.00
MFJ-784 DSP Filter £175.00
REALISTIC 2036 £179.00
REALISTIC PRO-50 £69.00
SANGEAN ATS-803A £85.00
SENTEC 20M HANDIE £195.00
SG-230 TUNER £275.00
STANDARD C78 + AMP £199.00
STANDARD C500 £185.00
STANDARD C8900 £189.00
TEN TEC CORSAIR II £475.00
TEN TEC OMNI VI S.O.B. £1999.00
TIMEWAVE DSPs from £99.00
TOKYO HC-200 ATU £99.00
TOKYO HL-1KGX AMP £799.00
TOKYO HX-640 £175.00
TOKYO HX-650 £199.00
TRIO AT-120 £65.00
TRIO AT-230 ATU £189.00
TRIO JR-599 RX £125.00
TRIO TL-922 £1195.00
TRIO TR-9130 £299.00
TRIO TS-700 £245.00
TRIO TS-830S £399.00
TRIO TS-930S £695.00
W9-GR DSP II £185.00
YAESU PP-707 20A PSU £139.00
YAESU FRG-8800 + VHF £425.00
YAESU FT-11R £169.00
YAESU FT-77 FM £399.00
YAESU FT-107M 100W £425.00
YAESU FT-208 + EXTRAS £179.00
YAESU FT-290 I £245.00
YAESU FT-290 II £325.00
YAESU FT-411 + EXTRAS £189.00
YAESU FT-470 + ACCS £225.00
YAESU FT-707 £349.00
YAESU FT-727 £169.00
YAESU FT-747 FM £450.00
YAESU FT-757 AT £225.00
YAESU FT-757 + PSU + ATU £895.00
YAESU FT-840 + FM £599.00
YAESU FT-1000D £1699.00
YAESU FT-2500M CTCSS £249.00
YAESU FT-5100 £349.00
YAESU VX-1 £215.00

PLEASE MENTION TRADERS' TABLE WHEN ENQUIRING ABOUT ANY ITEMS ON THESE PAGES!

's Table

YOUR GUIDE TO SECOND-HAND EQUIPMENT

ARC EARLESTOWN 01925 229881

HF TRANSCEIVERS

2 x Yaesu FT-757GX1 + boxed.....	£TEL
Yaesu FT-980.....	£799
Yaesu FT-101ZD MkIII + FC-902/FCV-901R Incl 2m/6m.....	£799
Yaesu FT-747 + FC-700 boxed.....	£TEL
Yaesu FT-102.....	£375
Yaesu FT-101Z.....	£299
Yaesu FT-757GX + FC-750SAT.....	£680
Kenwood TS-140S boxed.....	£499
Icom IC-735 boxed.....	£550
Yaesu FT-767GX + 2m/70cms speaker.....	£899
2 x Icom IC-765 VGC.....	from £1300
Yaesu FT-707.....	£275
Yaesu FC-700 boxed.....	£99
Icom IC-706 boxed mint condition.....	£699
Kenwood TS-520.....	£275
Kenwood TS-850SAT.....	£TEL

MOBILE/BASE VHF/UHF TRANSCEIVERS

Kenwood TS-700S.....	£450
Icom IC-229 - boxed.....	£225
Icom IC-290D.....	£300
Yaesu FT-230.....	£175
Icom IC-271H +100W internal PSU.....	£550
Yaesu FT-790R + linear.....	£TEL
2 x FT-290R1.....	from £200
Kenwood TR-751 - boxed.....	£350
Icom IC-251E.....	£TEL
Yaesu FT-290R1I boxed.....	£325
Yaesu FL-2025.....	£99
Yaesu FT-690R1I ex cond.....	£299
Yaesu FT-8500 boxed mint condition.....	£350
Icom IC-240 + MB/mic/hand book.....	£99

RECEIVERS/SCANNERS

ICOM IC-R71E boxed.....	£999
Regency MX-7000.....	£TEL
Lowie HF-225.....	£299
Yaesu FRG-9600 - HF converter.....	£350
Icom IC-R7100 boxed.....	£TEL
Grundig Satellite 500 + IC-FAX 1/Datong AD-270.....	£175
Icom IC-R100 - mint condition.....	£275
Yaesu FRG-7700M + ATU.....	£325
Pocom AFR-2070.....	£75
Icom IC-R2 handheld.....	£150
8 x Realistic DX-394.....	from £125

HANDHELDS

Icom IC-4E.....	£115
Kenwood TH-79 as new boxed.....	£225
Yaesu FT-51R boxed.....	£275
Alinco DJ-G5 boxed.....	£175
Icom IC-77E vgc.....	£175

MISC.

SDU-5000 Spectrum Display Unit - as new.....	£599
AT-230 - box.....	£175
MFJ-784 boxed.....	£175
Mutek 230C HF transceiver.....	£199
FC-901.....	£175
ASS desk microphones.....	£TEL
SP-102 speaker.....	£50
Scout boxed as new.....	£250
HF-232.....	£50
PK-232MBX.....	£199
PAC Com 220 boxed.....	£80
Yaesu FC-707 ATU.....	£TEL

SHORTWAVE SHOP 01202 490099

HF TRANSCEIVERS

Alinco DX70T HF & 6M 100W/10W Mobile.....	£495
Icom IC706MKII HF, 6M, 2M M/Mode Mobile.....	£795
Index QRP PLUS HF 5W CW/SSB All Bands.....	£350
Kenwood TS680S - HF & 6M.....	£595
Kenwood TS570D Latest HF with DSP.....	£945
Kenwood TS450SAT HF & WARC, Auto ATU.....	£695
Kenwood TS140S Basic HF & Warc.....	£525

VHF/UHF

ADI AT48 70cms Handheld c/w Keypad.....	£95
Alinco DJ180 2M Handheld with Drop-In Charger.....	£85
Icom IC2350H 2/70 50/35W Mobile.....	£345
Kenwood TM251E 50W 2M Mobile.....	£249
Kenwood TH22E - 2M H/Hand c/w Keypad.....	£175
Kenwood TH22E Basic Spec.....	£135
Trio TM221E 25W FM Mobile.....	£135
Yaesu FT530 Dualband Handheld with Remote Mic.....	£235
Yaesu FT290R1I - 2M M/Mode Mobile.....	£325

RECEIVERS

Kenwood R600 HF Gen Cov Rx.....	£225
Sony Air7 Air and Marine Rcv.....	£195
Trio R1000 HF General Coverage Receiver.....	£235
Trio JR500S Ham Band HF Receiver.....	£85
Yaesu FRG8800 with VHF.....	£495
Yaesu FRG7700 - General Coverage RX.....	£195

MISCELLANEOUS

Diamond SX-400 VHF/UHF 200W SWR Meter.....	£59
Diawa CNA1001 - Auto ATU.....	£145
Diawa DK210 Keyer.....	£85
Garmin GPS38 B-Track Handheld GPS.....	£95
Icom AG-25 2M Masthead Prcamp.....	£89
JRC NFG97 Matching ATU.....	£135
Kenwood AT230 Deluxe Manual ATU.....	£175
MFJ 407B - Keyer.....	£49
Microset R432-90 - 90W 70cms Amplifier.....	£349
Microwave Modules 30W 70cms Amplifier.....	£95
Optoelectronics 3300 - Frequency Counter.....	£100
Optoelectronics 3000A - Frequency Counter.....	£120
Rever P300 30A 12V PSU.....	£85
SEM QRM Eliminator Filter Unit.....	£50
Tokyo Hy-Power HX240 - 2M->HF Transverter.....	£145
Yaesu G500A Elevation Unit - VGC.....	£165

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<http://www.shortwave.co.uk> For latest updates...

PHOTO ACOUSTICS 01908 610625

SHORTWAVE RECEIVERS

Trio R600 Shortwave receiver.....	£215.00
Yaesu FRG-100 Shortwave receiver.....	£375.00
Grundig Yacht Boy 206 portable receiver.....	£79.00
Sony ICF-7600 portable receiver.....	£58.00
Siemens RK-702 portable receiver.....	£49.00
Lowie HF-250 Receiver c/w FM/AMS & speaker.....	£499.00
Realistic DX-394 Receiver.....	£189.00
Icom IC-R70 Receiver.....	£449.00

SCANNERS

AOR-3000 wideband scanner.....	£499.00
Icom IC-R1 handheld scanner.....	£169.00
AOR-2000 handheld scanner.....	£149.00
Fairmate HP-100 handheld scanner.....	£149.00

HF TRANSCEIVERS

Kenwood TS-850S.....	£899.00
Icom IC-720A c/w PSU.....	£479.00
Yaesu FT-890AT.....	£689.00
Icom IC-735.....	£549.00
Icom IC-745 with internal AC PSU.....	£489.00
Icom IC-751.....	£589.00
Yaesu FT-757GX.....	£499.00
Yaesu FT-707 80 - 10M transceiver.....	£299.00
Alinco DX-70T HF + 6M.....	£580.00
JRC JST-135 transceiver c/w matching PSU.....	£999.00

VHF/UHF

Yaesu FT-4700 dualband mobile.....	£279.00
Kenwood TM-701 dualband mobile.....	£299.00
Alinco DJ-580E Dualband handheld.....	£219.00
JRC NRD-525 AS NEW.....	£599.00
Alinco DJ-F1 2M handheld.....	£159.00
Kenwood TH-75E 2m/70cms handheld.....	£229.00
Kenwood TM-431E 70cms mobile.....	£239.00
Trio TS-770E 2m/70cms Base station.....	£469.00
Yaesu FT-50R 2m/70cms handheld.....	£229.00
Kenwood TH-42E 70cms handheld.....	£189.00

OTHER ITEMS

PK-88 Packet terminal.....	£89.00
FL-2 Audio Filter.....	£89.00
FX-1 GDO meter.....	£39.00

MULTICOMM 2000 01480 406770

TRANSCEIVERS

ICOM IC-706 MK-1 AS NEW.....	£650.00
JCOM IC-706 MK-1 AS NEW.....	£675.00
KENWOOD TS-440S HF GENERAL COV.....	£529.00
KENWOOD TS-440SAT.....	£599.00
KENWOOD TS-690S MINT HF + 6.....	£749.00
YAESU FT-757GX (BOXED).....	£495.00
YAESU FT-757GX (BOXED) MINT.....	£699.00

VHF/UHF TRANSCEIVERS

ALINCO DJ-191 2-MTR. HAND HELD.....	£110.00
ICOM IC-2350 (EX-DEMO).....	£329.00
ICOM IC-245E 2MTR MULTIMODE.....	£139.00
ICOM IC-290E 2-METRE MULTI-MODE 25W.....	£249.00
ICOM ICW-21-ET DUAL BAND HANDIE.....	£199.00
ICOM ICW-32E DUAL BAND HANDHELD.....	£169.00
KENWOOD TH-28E DUAL BAND.....	£175.00
KENWOOD TH-79E HAND HELD.....	£299.00
KENWOOD TR-751E 2-METER MULTIMODE.....	£299.00
KENWOOD TR-751E 2-METER MULTIMODE.....	£299.00
YAESU FT-10R 2-METER HAND HELD.....	£129.00
YAESU FT-2500M + EXT KIT.....	£229.00
YAESU FT-290R MK-1 MULTIMODE.....	£195.00
YAESU FT-290R MK-1 MULTIMODE.....	£190.00
YAESU FT-3000M (3-WEEKS OLD).....	£335.00
YAESU FT-480R (MINT CONDITION).....	£300.00
YAESU FT-480R (MINT CONDITION).....	£325.00
YAESU FT-726 270HF.....	£668.00
YAESU FT-726 PLUS 6/270 SAT.....	£725.00
YAESU FT-727R DUALBAND WITH ALL ACCESSORIES.....	£199.00
YAESU FT-780R 70CMS MULTIMODE.....	£225.00
YAESU FT-790 70CMS MULTIMODE.....	£219.00
YAESU FT-911 23CMS HANDHELD AS NEW.....	£159.00

SHORT-WAVE RECEIVERS

AOR AR-7030 AS NEW.....	£575.00
AOR AR-7030 LATEST HOT RECEIVER.....	£575.00
AOR AR-7030 PLUS THE TOP OF THE RANGE RX.....	£799.00
AOR AR-7030 WITH NOTCH FILTERS.....	£625.00
DRAKE SW-8 SHORTWAVE + AIRBAND (MINT).....	£399.00
DRAKE SW-8 SHORTWAVE + AIRBAND (MINT).....	£349.00
ICOM IC-R-71E AS NEW WITH SSB-CW FILTERS.....	£499.00
ICOM IC-R-71E AS NEW WITH SSB-CW FILTERS.....	£469.00
JRC NRD 535 4-MONTHS OLD.....	£958.00
JRC NRD-525 AS NEW.....	£599.00
KENWOOD R-1000 GREAT CONDITION.....	£215.00
KENWOOD R-5000 DELUXE SHORTWAVE RX.....	£515.00
KENWOOD R-5000 DELUXE SHORTWAVE RX.....	£599.00
KENWOOD R-5000 DELUXE SW RX.....	£579.00
LOWIE HF-150 AS NEW.....	£249.00
LOWIE HF-150 AS NEW.....	£249.00
LOWIE HF-225 GENERAL COVERAGE RECEIVER+KEYPAD.....	£289.00
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YUPITERU VT-225 (BOXED).....	£185.00

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The Publishers of *Practical Wireless* also wish to point out that it is the responsibility of the buyer to ascertain the suitability of goods offered for purchase.

For Sale

Acorn Electron with 40/80 disk drive and view, plus printer Brother M-1109 plus manuals, disks, amateur radio, c.w., RTTY, log, etc., lot £30, plus post, also BBC Master. Tel: Warwick area (01295) 670108.

Alinco DJ-X10 scanner, 100kHz to 1300MHz, as new, boxed, £150. Tel: Coventry (01203) 730669.

AOR AR8000 with CU8232 computer interface and DOS and Windows software, as new, boxed with manuals, £325. Dave, Scunthorpe. Tel: (0410) 912844.

AOR2002 scanner with booklet and mains power pack, 25MHz upward, a.m. f.m., wide and narrow, g.w.o., clean cabinet, £170 o.n.o. or exchange for 70cm (430MHz) gear. Mr White on (01244) 310267.

AOR2700 scanner, 500kHz to 1300MHz, no gaps, boxed as new including p.s.u., manual, car adaptor, data clone, computer control, voice record optional, full featured, £150. Gary on 0181-751 1697.

AOR3000A, customised, excellent condition, boxed with manual, £525. Realistic scanner PRO-2039, mint, £95. Tel: Birmingham 0121-308 8350.

AOR7030, almost new, £500. Eddystone 1837/2 digital, five filters, excellent receiver, £300. FRG-7, like new, digital, £110. Racal RA-17, v.g.c., £110. Collins 51-J4 general coverage, v.g.c., £450. Sony 77, £185. Grundig 230, Roberts R808, Toshiba, 11 bands, boxed, £60. Grundig MkII Traveller, £40. Tel: London 0181-813 9193.

AR3036, new 16/9/97, cost £684, fitted Collins 2.5kHz filter, v.h.f. converter, 140-169.99MHz, boxed, manual, power supply plus G5RV antenna 50ft, CTUB antenna tuner, short wave International frequency book, sell, £450. Mr Rigby, Morecambe, Tel: (mobile) (0961) 894216.

Atari 1040STE, Hi-res monitor, second disc drive, radio, professional, and games software, joysticks, mouse, Scart lead, £100 o.n.o. TNC220 with mailbox, £100 o.n.o. 13V switchmode, 75A p.s.u., £30. Scott GM4CLQ on (01698) 883982.

BBC Masters complete systems colour monitors, mostly twin or single 40/80 track disc drives, some with monitor/computer stands, also some BBC-Bs, system price, £30. Buyer collects. Robert G4ZJE, QTHR. Tel: (01428) 684982.

BC221 with original internal a.c. p.s.u., £35. AVO test meter No. 1, £45. Lake PM20 power meter, £20. Home-brew

GDO, £15. All plus carriage. Tel: N. Wales (01745) 570538.

Brand new Hilton transformer for PVW Marchwood power supply, £28. Also bits and pieces, IC-3A hand-held in Neptune fluorescent marine case (IC-2E f.m.), £40, carriage extra. Mervyn, Chichester. Tel: (01243) 783605.

Brother word processor LW-20, little used, new condition, £150. Tel: Salisbury (01722) 329315.

Datong DC144/28 v.h.f. converter, £25. BNDS 13.8V/6A p.s.u., £25. 2m (144MHz) Oscar-2NE 7/8 whip with magmount, £25. AKD WA1 wavemeter, £15. Nietzsche CX201 coaxial switch, £9. Howes AA2 active antenna unit, £8. Gerry GM4NQT, Berwickshire. Tel: (01890) 818195.

Eddystone 730/4 RX in g.w.o., £115. Racal RA17L RX in g.w.o., £130. Both are heavy, suggest collection. Jim, Coventry. Tel: (0467) 430545 or E-mail: jvlce@msa.com

Eddystone 940, excellent condition with manual, £75 o.n.o. Tel: (01562) 755370 after 7pm.

EF-80 low-pass filter, as new, in the box, 0-30MHz, 500W max, £15 including postage. 18ft aluminium dipole, as new, 25-30MHz, 1kW max with 7m of low loss coaxial, £20 including postage, £30 including postage together. Tel: (01222) 488723.

Electronic components i.e. resistors, etc. also selection of TV valves. Pete, Bournemouth. Tel: (01202) 427476.

FDK multi 750E 2m (144MHz) multi-mode transceiver, excellent condition, 7/8 mobile antenna, £250 o.n.o. Dural 2in dia antenna poles, £10. Mike, Gwynedd. Tel: (01766) 522591.

French maps printed by IGN, approx 30 available, £60. G3XZF, QTHR. Tel: (01945) 588102.

FRG-8800 receiver with CAT fitted, under warranty, manual, £295 o.n.o. share carriage, indoor active antenna MFJ-1020B, mint, still under warranty, power pack, manual, £50 o.n.o. Share carriage cost. Tel: 0191-526 6230.

FT-290R1 with MuTek pre-amp, £180. Dymar Lynx 2m (144MHz) transceiver, 100 channels, 15W with base station, power supply and toneburst, £45. MuTek SLNA 145sb pre-amp for FT-290R1, unused, £25. Mike G7NBE, Leics. Tel: (01530) 414473.

FT-980, £575 o.n.o. VC300DLP a.t.u., £110 o.n.o. MFJ 704LPF, £15. Tri-band vertical, £30. D400014 connection cable for FT-980/FC-757AT, £15. ARRL Morse cassette course, three sets 5-10w.p.m., 10-

15w.p.m., 15-22w.p.m., 2 tapes each, £15 the lot. Steve, Hull. Tel: (01482) 795646.

Hallicrafters SX-100 comms receiver, dual conversion, 540kHz to 34MHz, good filters, £130. AVO CT160 valve tester, £95. Racal RA17L with RA137A I.f. adaptor and RA218 sideband adaptor, £180. R210 army comms receiver, £80. Taylor 62A a.m./f.m. sig. gen. and sweeper with marker generator, 4-120MHz, £80. GEC Miniscope, mini portable scope mains/battery, £35. Admiralty B40 640-30.5MHz, £75. Most have manuals. Tel: (01344) 627868.

Heathkit s.b. receiver SB301E, complete assembly, manual, 14 spare valves, £60. Tel: (01329) 842357.

HF station, comprising of TS-940S transceiver, SP940 speaker, FL2100Z linear, all excellent condition, £1300. FT-707 h.f. TX/RX, £300. TS-510 h.f. TX/RX, £80. Heathkit SB10U, £30. KW Vanguard, £30. Tel: (01722) 743270.

HRO receiver, working or spares, modified 6BA6, etc., original 'S' meter, AC/PP with built-in speaker, manual, some literature, five coils 160-10m (1.8-28MHz) (4 bands spread), coil for 180-430kHz, collect only, £45. Alan, Near Bury St Edmunds. Tel: (01284) 827379.

Icom 706, MB65, MB63, OPC5E1, £725 or 706 only, £675. Kenwood TS-690S, v.g.c., 1.8kHz filter, £850. Both shack use only, TX 50MHz. Bob G8ZGI, Essex. Tel: (01245) 495230.

Icom 730, £325. FT-77, £190. Motorola 70cm (430MHz) 20 channel micro, £90. Baycom modem, £20. AKD 70cm (430MHz), £85 or w.h.y.? Alistair GM4UQD, Livingston. Tel: (01506) 467351.

Icom 737A, as new, internal a.t.u., boxed with manuals, £750. Mark on 0181-429 2814 after 6pm.

Icom 745, f.m., c.w. filters, 200W p.e.p., mint, boxed with IC-SM2 desk mic., £550 o.n.o. or Swap Kenwood TM-V7. For sale AR300XL rotator with mast bearing with 21-element Tonna for 432-500MHz, £80 with cables. Mick on (01226) 742971 after 6pm.

Icom IC-3220E mobile dual-band f.m. transceiver, 25W cross-band repeater, extended receive, £210. Tel/FAX: Bedford (01234) 781862.

Icom IC-505 50MHz transceiver with NiCads, £325. Icom IC-290D 2m (144MHz) all-mode 25W transceiver, £275. Icom IC-735 h.f. transceiver, £475. All v.g.c., boxed, etc., buyer collects. Peter G0KUX, QTHR or Tel: 0181-482 6856 evenings/weekends.

Icom IC-745 h.f. radio, mint, s.b. and c.w. filters, f.m. fitted, boxed, sell for £550 o.n.o. or swap Alinco DX70T with cash

difference, just used as a receiver, want h.f./6m (50MHz). Mike, 18a High Street, Hoyland, Nr. Barnsley, Tel: (01226) 742971.

Icom IC-M120 marine transceiver, Hailer/intercom facility, immaculate, manuals, original box, 8dB whip, s/steel mount plus accessories. 88 Int/USA channels, 10 WX X3 mem, six scanning functions, rugged model, only used receive so far. £380. Bruce Salt ZD7VC, Box 58 Jamestown, St Helena Island, s.a.e. or enquire G3CLUN on 0121-494 4856.

Icom IC-R7000 scanning receiver, 25-2000MHz, all modes, 99 memories, as new with manual, packing, etc., includes Icom wide-band discone antenna, (cost over £900), only, £550. Dave G8MGD, Glos. Tel: (01242) 675139.

Icom T7E hand-held dual-band, lots of accessories, £185. G0WMC, Kent. Tel: (01322) 405497.

Interested in passing Amateur Radio Exam? then these video tapes would be a great help. Wanted Yaesu FT-8000, owners manual or photocopy. For details ring Bill on (01684) 295770.

JRC100 with matching power supply and Shure 444 stand mic., boxed, manual, immaculate condition, £475 o.n.o. Super 80-10m set. Alan GOWAS, QTHR. Tel: Bedfordshire (01525) 841182.

Kenwood TH-75E dual-band hand-held with charger, soft case, headset with VOX/p.t.t. two new 1100mAh NiCad battery packs, battery case for AA cells, power lead, speaker mic, v.g.c., boxed, bargain, £185. Tel: Staffs (01283) 716634.

Kenwood TM-251E 2m (144MHz) f.m. transceiver (receive on 70cm (430MHz) also), 50/10/5W, mint condition with mobile mount, mobile and fist mics, manual, etc., £220 inc. UK postage. G3YCC on (01482) 650410.

Kenwood transceiver TS-850SAT with built-in a.t.u. and DRU2, also VS2, complete with matching Kenwood PS-50 p.s.u., all mint condition, boxed with manuals. Tel: (01333) 351330.

Kenwood TS-120S 100W 10-80m (3.5-28MHz) h.f. transceiver, perfect mobile rig, £260 o.n.o. Tel: (01752) 225181.

Kenwood TS-140S and PS-430, nice condition and g.w.o. with manuals, mic. and cables, buyer collects, £400 the pair, no split. G4MNB, QTHR. Tel: Swindon (01793) 826325.

Kenwood TS-440S transceiver, matching speaker plus a 20W power supply, £400. Cybernet Delta 934MHz transceiver, £25. Tel: Portsmouth (01705) 649604.

Kenwood TS-440S with mic., manual, boxed, superb condition, general coverage, s.s.b., a.m., f.m., f.s.k., £475. Also 70cm (430MHz) hand-held PFX 60+ channels, 2 batteries, £70. John, Coventry. Tel: (01203) 450476.

Kenwood TS-440S, internal a.t.u., plus mic., £525. Yaesu FT-690 MkII plus 25W linear FBA8 handbook, NiCads, £350. Paccorn Tiny 2 MkII TNC plus data transfer switch, £75. 2m (144MHz) band pass filter, £25, low price, silent key, quick sale, no haggle, all boxed. Tel: E. Sledge on 0161-682 0907.

Kenwood TS-520SE h.f., s.s.b., c.w., 160-10m (1.8-28MHz), mint condition, c/w mic. and manual, boxed, £260. Niall G0VOK, Northwich. Tel: (01606) 871413.

Kenwood TS-850S TX/RX, 0-30MHz, g.c., box and manual, £750. Yaesu FT-290R MkII 2m (144MHz) MM NiCads, charger, £150. Microset 45W linear + pre-amp, £60. 2m (144MHz) used with FT-290. G00NH, QTHR. Tel: Halesowen (01384) 565614.

Lowe HF-150 plus Lowe PR-150, complete with keypad, used a second set, excellent condition, all are boxed with manuals, £325 for set, only two years old. Ring after 1800 on (01924) 267509.

Modern Practical Radio & Television, volumes 1, 2, 3, published 1946/1952, £20. 30' heli-coax cable with N type connectors, plus 9' length, ideal for TX a.t.u., £20, buyer collects or P.P. Harold Bent, 97 Nottingham Road, Selston, Nottingham NE16 6BU, Tel: (01773) 810010.

R210, ex-mod, modified as per GM3NHQ, SV/M 1990, full working order with P.P.-L.S. converter, a.t.u., handbook, mounted in portable wooden trolley, £50. No offers, buyer must collect from Amesbury, Wiltshire. Tel: John on (01980) 621047.

RCA AR88 cabinet, manual, g.w.o., £110. Marconi-marine (valve) RG42 receiver, £110. Racal RA17L in cabinet, superb, £165. LF converter (RA137), £60. Hallicrafters 500V h.f. linear, £175. Sony ICF2001 synth-RX, £45. Tel: (01482) 869682.

RF clipper G3LL for FT-101 holdings, manuals, £15. New base station microphone frequency 50/60Hz, also has 24 hour clock i.e. display impedance, 600V, £30. Tel: (01245) 236496.

Sangean ATS-803A receiver, as new, boxed with mains adapter, £65. Microset 2m (144MHz) linear 5.25/5V s.s.b., f.m., with pre-amp, little used, £55. Paul G7SRV on (01444) 458372.

Satellite system, fully motorised, Pace 506i Eurocrypt 02 mac, sattrack motor, 1m dish, Universal L.n.b., six months old, owner going abroad, £450 o.n.o., quick sale, may exchange for a Kenwood radio later model than TS-440S. Colin on (01944) 710414.

Silent key disposal: Drake R8E, mint, boxed, £700. TS-780 2m/70cm (144/430MHz) multi-mode with speaker, £450. Crated Creed 75 teleprinter, £18. WW2 W1191 wavemeter, £15. Double beam transistor scope, £30. Keith on (01375) 674092 after 6pm.

Silent key sale: Yaesu FR-101 communications receiver, Datong up converter, aerials, vintage Second World War set, PCR No. 3 MkII/I, books, etc (late husband's). Tel: 0181-579 2689.

Tear drop mic. for sale, good condition, £20. CapCo aerial mag mount 14-21-28MHz wanted. Grundig portable radios, offers? John on (01283) 221870.

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Shareware

HAM/SCANNER SHAREWARE External range. Free disk list. Tel: 01732 852146. Pentium systems also sold.

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