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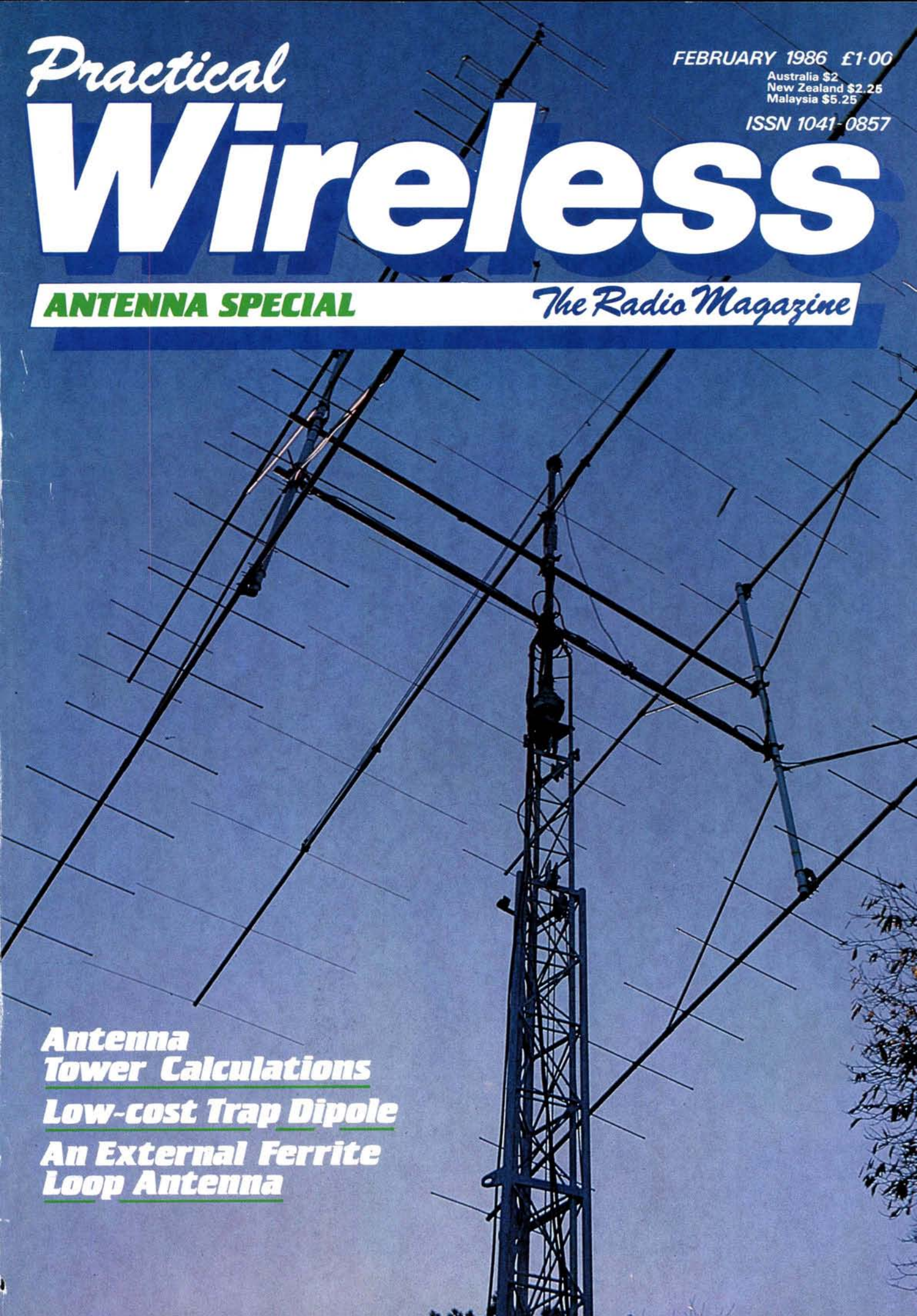
# Practical Wireless

**ANTENNA SPECIAL**

*The Radio Magazine*



**Antenna Tower Calculations**

**Low-cost Trap Dipole**

**An External Ferrite Loop Antenna**

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## 1 WESTERN PARADE, WEST STREET, AXMINSTER, DEVON, EX13 5NY.

THE SOUTH-WEST'S LARGEST AMATEUR RADIO STOCKIST

### Trio

| | | | |
|---|---|---|---|
| TS940S | 9 Band TX General Cov RX | 1695.00 | |
| TS930S | 9 Band TX General Cov RX | 1295.00 | (—) |
| TS830S | 160-10m Transceiver 9 Bands | 832.75 | (—) |
| AT230 | All Band ATU/Power Meter | 157.99 | (2.00) |
| SP230 | External Speaker Unit | 47.73 | (1.50) |
| TS530SP | 160m-10m Transceiver | 698.00 | (—) |
| TS430S | 160m-10m Transceiver | 720.00 | (—) |
| PS430 | Matching Power Supply | 138.00 | (3.00) |
| SP430 | Matching Speaker | 39.50 | (1.50) |
| MB430 | Mobile Mounting Bracket | 13.17 | (1.50) |
| FM430 | FM Board for TS430 | 45.00 | (1.50) |
| SP120 | Base Station External Speaker | 30.74 | (1.50) |
| AT130 | 100W Antenna Tuner | 108.62 | (1.50) |
| MC50 | Dual Impedance Desk Microphone | 36.19 | (1.50) |
| MC35S | Fist Microphone 50K ohm IMP | 17.01 | (1.00) |
| LF30A | HF Low Pass Filter 1kW | 24.68 | (1.00) |
| TR7930 | 2M FM Mobile | 329.00 | (—) |
| TR9130 | 2M Multimode | 499.00 | (—) |
| TW4000A | 2M/70cm mobile | 522.00 | (—) |
| TM201A | 2M 25W mobile | 265.00 | (—) |
| TM401A | 7cms FM 12W | 316.00 | (—) |
| TH21E | 2M Mini-Handhelds | 170.00 | (—) |
| TH41E | 70cm Mini-Handhelds | 199.00 | (—) |
| TM211E | 2M FM Mobiles | 365.00 | (—) |
| TM411E | 70cm FM Mobiles | 399.00 | (—) |
| TS711E | 2M Base Stations | 695.00 | (—) |
| TS811E | 70cm Base Stations | 795.00 | (—) |
| TR3600 | 70cm Handheld | 292.00 | (—) |
| TR2500 | 2M FM Synthesised Handheld | 258.00 | (—) |
| TR3500 | 70cm Handheld | 270.00 | (—) |
| TR2600 | New 2M FM Synthesised Handheld | 275.00 | (—) |
| ST2 | Base Stand | 60.36 | (1.50) |
| SC4 | Soft Case | 15.92 | (1.00) |
| SMC25 | Speaker Mike | 18.66 | (1.00) |
| PB25 | Spare Battery Pack | 29.10 | (1.00) |
| MS1 | Mobile Stand | 37.31 | (1.00) |
| R600 | Gen. Cov. Receiver | 299.52 | (—) |
| R2000 | Synthesiser 200KHz-30MHz Receiver | 479.47 | (—) |
| HC10 | Digital Station World Time Clock | 78.99 | (1.50) |
| HS5 | Deluxe Headphones | 26.88 | (1.00) |
| SP40 | Mobile External Speaker | 16.46 | (1.00) |

### Linear Amps

**TONO (G series)**

| | | | |
|---|---|---|---|
| 2M40G | 2m, 1-3W in, 20-35W out, preamp | 101.81 | (2.00) |
| 2M90G | 2m, 10-15W in, 70-90W out, preamp | 161.20 | (2.00) |
| 2M130G | 2m, 10-15W in, 110-130W out, preamp | 159.00 | (2.50) |
| 4M70G | 70cms, 10-15W in, 40-60W out, preamp | 219.74 | (2.00) |

**TOKYO HIPOWER AMPS. NOW BACK IN STOCK**

**MICROWAVE MODULES**

| | | | |
|---|---|---|---|
| MML144/30-LS | inc preamp (1/3 w i/p) | 82.90 | (2.00) |
| MML144/50-S | inc preamp, switchable | 92.00 | (2.00) |
| ML144/100-S | inc preamp (10w i/p) | 149.95 | (2.50) |
| MML144/100-HS | inc preamp (25w i/p) | 149.95 | (2.50) |
| MML144/100-LS | inc preamp (1/3w i/p) | 169.95 | (2.50) |
| MML144/200S | inc preamp (3/10/25 i/p) | 299.00 | (2.50) |
| MML432/30L | inc preamp (1/3w i/p) | 145.00 | (2.00) |
| MML432/50 | inc preamp (10w i/p) | 129.95 | (2.00) |
| MML432/100 | linear (10w i/p) | 299.00 | (2.50) |

**B.N.O.S.**

| | | | |
|---|---|---|---|
| LPM 144-1-100 | 2m, 1W in, 100W out, preamp | 181.00 | (2.50) |
| LPM 144-3-100 | 2m, 3W in, 100W out, preamp | 181.00 | (2.50) |
| LPM 144-10-100 | 2m, 10W in, 100W out, preamp | 157.00 | (2.50) |
| LPM 144-25-160 | 2m, 25W in, 160W out, preamp | 217.00 | (2.50) |
| LPM 144-3-180 | 2m, 3W in, 180W out, preamp | 247.00 | (2.50) |
| LPM 144-10-180 | 2m, 10W in, 180W out, preamp | 247.00 | (2.50) |
| LP 144-3-50 | 2MN 50W out, preamp | 108.00 | (2.50) |
| LP 144-10-50 | 2M 10W in, preamp | 108.00 | (2.50) |
| LPM 432-1-50 | 70cm, 1W in, 50W out, preamp | 235.00 | (2.50) |
| LPM 432-3-50 | 70cm, 3W in, 50W out, preamp | 235.00 | (2.50) |
| LPM 432-10-50 | 70cm, 10W in, 50W out, preamp | 195.00 | (2.50) |
| LPM 432-10-100 | 70cm, 10W in, 100W out, preamp | 335.00 | (2.50) |

### SWR/PWR Meters

**HANSEN**

| | | | |
|---|---|---|---|
| FS50VP | 50-150MHz 20/200 Interval PEP/SWR | 106.70 | (1.50) |
| FS300V | 50-150MHz 20/200 PWR/SWR | 53.50 | (1.50) |
| FS300H | 1.8-60MHz 20/200/10W | 53.50 | (1.50) |
| FS210 | 1.8-150MHz 20/200 Auto SWR | 63.50 | (1.50) |
| W720 | 140-430MHz 20/200W | 41.50 | (1.50) |

**WELZ**

| | | | |
|---|---|---|---|
| SP45 | 130-470MHz PWR/SWR | 69.00 | (1.50) |
| SP10X | 1.8-150MHz PWR/SWR | 34.00 | (1.50) |
| SP200 | 1.8-160MHz PWR/SWR | 89.00 | (1.50) |
| SP250 | 1.8-60MHz PWR/SWR | 65.00 | (1.50) |
| SP300 | 1.8-500MHz PWR/SWR | 129.00 | (1.50) |
| SP350 | 1.8-500MHz PWR/SWR | 79.00 | (1.50) |
| SP400 | 130-500MHz PWR/SWR | 89.00 | (1.50) |

**NEW RANGE OF WELZ METERS NOW AVAILABLE**

**TOYO**

| | | | |
|---|---|---|---|
| T430 | 144/432 120 W | 44.65 | (1.00) |
| T435 | 144/432 200 W | 49.35 | (1.50) |

### Scanning Receivers

| | | | |
|---|---|---|---|
| SMC8400 | VHF/UHF Scanner | 249.00 | (2.50) |
| SX200 | VHF/UHF Scanner | 325.00 | (2.50) |
| SX400 | VHF/UHF Continuous Coverage | 625.00 | (2.50) |
| AOR2002 | VHF/UHF Continuous Coverage | 375.00 | (2.50) |

### Icom Products

| | | | |
|---|---|---|---|
| IC751 | HF Transceiver | 1299.00 | (—) |
| IC745 | HF Transceiver | 899.00 | (—) |
| IC735 | New HF Transceiver | 849.00 | (—) |
| PS15 | P.S. Unit | 145.00 | (4.00) |
| PS30 | Systems p.s.u. 25A | 297.85 | (—) |
| SM6 | Base microphone for 751/745 | 40.25 | (1.00) |
| IC50S | 50MHz multi-mode portable | 349.00 | (—) |
| IC290D | 2m 25w M/Mode | 479.00 | (—) |
| IC290E | 10w Multi-Mode Mobile | 449.00 | (—) |
| IC271E | 2m 25w M/Mode Base Stn. | 729.00 | (—) |
| IC271H | 100W version of above | 899.00 | (—) |
| IC25H | 2m 45w FM | 359.00 | (—) |
| IC27E | 25W FM mobile | 379.00 | (—) |
| IC45E | 70c 10w FM | 345.00 | (—) |
| IC47E | 25w 70cm FM mobile | 469.00 | (—) |
| ICBU1 | B/U Supply for 25/45/290 | 29.90 | (1.00) |
| ICR71 | General Coverage Receiver | 729.00 | (—) |
| IC02E | 2m H/Held | 269.00 | (—) |
| IC2E | 2m H/Held | 199.00 | (—) |
| ML1 | 2m 10w Linear | 79.35 | (2.00) |
| IC4E | 70cm H/Held | 259.00 | (—) |
| IC04E | 70cm handheld | 279.00 | (—) |
| BC35 | Base Charger | 62.10 | (1.00) |
| HM9 | Speaker mic | 18.56 | (1.00) |
| IC3 | Carry Case | 5.50 | (1.00) |
| ICBP3 | Std Battery Pack | 27.50 | (1.00) |
| BP5 | High Power Battery Pack | 52.80 | (1.00) |
| CP1 | Car Charging Lead | 5.50 | (1.00) |
| DC1 | 12v Adaptor | 13.75 | (1.00) |

### Mutek Products

| | | | |
|---|---|---|---|
| SLNA 50 | 50MHz Switched preamp | 44.90 | (1.50) |
| SLNA 144s | 144MHz Low noise switched preamp | 39.95 | (1.50) |
| SLNA 145sb | Preamp intended for 290 | 29.90 | (1.50) |
| GLNA 432e | 70cm Mast head preamp | 149.90 | (2.50) |
| RPCB 144ub | Front end FT221/225 | 79.90 | (1.50) |
| RPCB 251ub | Front end IC251/211 | 84.90 | (1.50) |
| BBBA 500u | 20-500MHz Preamp | 34.90 | (1.50) |
| GFBA 144e | 2m Mast head preamp | 149.90 | (2.50) |
| SBLA 144e | 2m Mast head preamp | 89.90 | (2.50) |
| RPCB 271ub | Front end for IC271 | 89.90 | (1.50) |
| TVHF 230c | 2M-FM Transverter | 334.90 | (5.00) |
| LBPF 144v | Bandpass Filter | 22.40 | (1.50) |
| LBPF 432u | Bandpass Filter | 22.40 | (1.50) |
| TVVF 50c | 6M Transverter | 199.90 | (2.50) |
| GLNA 433e | 70cm Pre-amp | 79.90 | (2.50) |
| TVVF 144a | 2M Transverter | 239.90 | (2.50) |

### Datong Products

| | | | |
|---|---|---|---|
| PC1 | Gen. Cov. Con. | 137.40 | (1.50) |
| VLF | Very low frequency conv. | 29.90 | (1.50) |
| FL2 | Multi-mode audio filter | 89.70 | (1.50) |
| FL3 | Audio filter for receivers | 129.00 | (1.50) |
| ASP/B | r.f. speech clipper for Trio | 82.80 | (1.50) |
| ASP/A | r.f. speech clipper for Yaesu | 82.80 | (1.50) |
| ASP | As above with 8 pin conn | 89.70 | (1.50) |
| D75 | Manual RF speech clipper | 56.35 | (1.50) |
| D70 | Morse Tutor | 56.35 | (1.50) |
| MK | Keyboard morse sender | 137.40 | (1.50) |
| RFA | RF switched pre-amp | 33.90 | (1.50) |
| AD270-MPU | Active dipole with mains p.s.u. | 51.75 | (1.50) |
| AD370-MPU | Active dipole with mains p.s.u. | 69.00 | (1.50) |
| MPU | Mains power unit | 6.90 | (1.50) |
| DC144/28 | 2m converter | 39.67 | (1.50) |
| PTS1 | Tone squelch unit | 46.00 | (1.50) |
| ANF | Automatic notch filter | 67.85 | (1.50) |
| SRB2 | Auto Woodpecker blanker | 86.25 | (1.50) |

### CW/RTTY Equipment

| | | | |
|---|---|---|---|
| Tono 9000E | Reader/Sender | P.O.A. | (—) |
| Tono 550 | Reader | 329.00 | (2.50) |

**MICROWAVE MODULES**

| | | | |
|---|---|---|---|
| MM2001 | RTTY to TV converter | 189.00 | (2.00) |
| MM4001 | RTTY terminal | 269.00 | (2.00) |
| MM4001KB | RTTY term with keyboard | 299.00 | (2.00) |

**BENCHER**

| | | | |
|---|---|---|---|
| BY1 | Squeeze Key, Black base | 53.95 | (1.50) |
| BY2 | Squeeze Key, Chrome base | 69.95 | (1.50) |

**HI-MOUND MORSE KEYS**

| | | | |
|---|---|---|---|
| HK702 | Up down keyer marble base | 30.95 | (1.50) |
| HK703 | Up down keyer | 29.35 | (1.50) |
| HK704 | Up down keyer | 19.95 | (1.50) |
| HK705 | Up down keyer | 15.49 | (1.50) |
| HK706 | Up down keyer | 16.96 | (1.50) |
| HK708 | Up down keyer | 14.95 | (1.50) |
| HK802 | Up down solid brass | 86.30 | (2.00) |
| HK808 | Up down keyer | 39.95 | (1.50) |
| MK704 | Twin paddle keyer | 13.50 | (1.50) |
| MK705 | Twin paddle keyer marble base | 25.65 | (1.50) |

**KENPRO**

| | | | |
|---|---|---|---|
| KP100 | Squeeze CMOS 230/13.8v | 82.50 | (2.50) |
| KP200 | Memory 4096 Multi Channel | 169.50 | (2.50) |

### Yaesu

| | | | |
|---|---|---|---|
| FT1 | HF Transceiver | P.O.A. | (—) |
| FT980 | HF Transceiver | 1450.00 | (—) |
| SP980 | Speaker | 78.95 | (2.00) |
| FC700 | Tuner | 105.00 | (2.00) |
| FT757GX | HF Transceiver | 739.00 | (—) |
| FC757 | Auto A.T.U. | 255.00 | (2.00) |
| FP757HD | Heavy Duty PSU | 175.00 | (2.00) |
| FP757GX | Switched Mode PSU | 160.00 | (2.00) |
| FL2050 | Linear Amplifier | 115.00 | (2.00) |
| FT290 | 2m M/Mode Port/Transceiver | 315.00 | (—) |
| FT290 | With Mutek front end fitted | 345.00 | (—) |
| FL2010 | Linear Amplifier | 69.00 | (1.00) |
| MMB11 | Mobile Bracket | 30.00 | (1.00) |
| NC11 | Charger | 11.50 | (1.00) |
| CSC1 | Carrying Case | 5.00 | (1.00) |
| YHA15 | 2m Helical | 7.65 | (1.00) |
| YHA44D | 70cm ½wave | 9.95 | (1.00) |
| YM49 | Speaker Mike | 20.20 | (1.00) |
| MMB15 | Mobile Bracket | 14.55 | (1.00) |
| FT203R | NEW 2m H/Held/C/W FNB3 | 195.00 | (—) |
| FT209R | NEW 2m H/Held/C/W FNB3 | 239.00 | (—) |
| FT703R | 70cm H/Held | 235.00 | (—) |
| FT709R | 70cm H/Held | 259.00 | (—) |
| FT270R | 2m 25W F.M. | 315.00 | (—) |
| FT270RH | 2m 45W F.M. | 365.00 | (—) |
| FT2700R | 2m/70cm/25W/25W | 499.00 | (—) |
| FRG 9600 | 60-905MHz Scanning RX | 449.00 | (—) |
| MMB10 | Mobile Bracket | 8.80 | (1.00) |
| NC9C | Charger | 9.60 | (1.00) |
| NC8 | Base/station Charger | 64.80 | (2.00) |
| PA3 | Car Adaptor/Charger | 18.00 | (1.00) |
| FNB2 | Spare Battery Pack | 27.02 | (1.00) |
| YM24A | Speaker Mike | 23.75 | (1.00) |
| FT726R | 2m Base Station | 775.00 | (—) |
| 430/726 | 70cm Module for above | 255.00 | (2.50) |
| FRG8800 | HF Receiver | 475.00 | (—) |
| FRV8800 | Convertor 118-175 for above | 80.00 | (1.50) |
| FRT7700RX | A.T.U. | 49.85 | (1.50) |
| MH1B8 | Hand 600 8pin mic | 15.70 | (1.00) |
| MD1B8 | Desk 600 8pin mic | 64.80 | (1.00) |
| MF1A3B | Boom mobile mic | 18.00 | (1.00) |
| YH77 | Lightweight phones | 14.95 | (1.00) |
| YH55 | Padded phones | 15.35 | (1.00) |
| YH1 | L/weight Mobile H/set-Boom mic | 14.95 | (1.00) |
| SB1 | PTT Switch Box 208/708 | 15.70 | (1.00) |
| SB2 | PTT Switch Box 290/790 | 13.80 | (1.00) |
| SB10 | PTT Switch Box 270/2700 | 14.95 | (1.00) |
| QTR24D | World Time Clock | 33.35 | (1.00) |
| FF501DX | Low Pass Filter | 29.90 | (1.00) |

### Power Supplies

| DRAE | | | BNOS | | |
|---|---|---|---|---|---|
| 4 amp | 40.50 | (2.00) | 6 amp | 58.00 | (2.50) |
| 6 amp | 63.00 | (2.50) | 12 amp | 99.00 | (3.00) |
| 12 amp | 86.50 | (3.00) | 25 amp | 148.00 | (4.00) |
| 24 amp | 125.00 | (4.00) | 40 amp | 296.00 | (4.00) |

### Aerial Rotators

| | | | |
|---|---|---|---|
| FU200 | Light Duty | 49.95 | (2.00) |
| AR40 | 5 core Medium Duty | 115.00 | (2.00) |
| KR400 | Med/H Duty | 109.95 | (2.50) |
| KR500 | 6 core Elevation | 139.95 | (2.50) |
| KR400RC | 6 core Medium Duty | 132.50 | (2.50) |
| CD45 | 8 core Heavy Duty | 189.95 | (2.50) |
| KR600RC | 8 core Heavy Duty | 189.50 | (2.50) |
| HAM1V | 8 core Heavier Duty | 299.00 | (4.00) |
| T2X | 8 core Very Heavy Duty | 365.00 | (4.00) |

### Switches

| | | | |
|---|---|---|---|
| Sigma | 2 way SO239 | 14.49 | (1.00) |
| Sigma | 2 way 'n' Skts | 19.95 | (1.00) |
| Welz | 2 way SO239 | 22.95 | (1.00) |
| Welz | 2 way 'n' Skts | 41.90 | (1.00) |
| Drae | 3 way SO239 | 15.40 | (1.00) |
| Drae | 3 way 'n' Skts | 19.90 | (1.00) |

### Miscellaneous

| | | | |
|---|---|---|---|
| DRAE | Wavemeter | 27.50 | (1.00) |
| T30 | 30W Dummy load | 8.05 | (1.00) |
| T100 | 100W Dummy load | 35.20 | (1.00) |
| T200 | 200W Dummy load | 42.55 | (1.50) |
| CT300 | 300W Dummy load | 69.00 | (2.00) |
| DRAE | 2m Pre-set A.T.U. | 14.50 | (1.50) |
| ALTAI | KDM6 Dip Meter | 68.60 | (1.50) |

**TOKYO HI-POWER**

| | | | |
|---|---|---|---|
| HC200 | 10-80 HF Tuner | 82.50 | (2.00) |
| HC400 | 10-160 HF Tuner | 176.00 | (3.00) |

**AERIALS BY:- JAYBEAM – HYGAIN – G. WHIP – TET – TONNA – MINIBEAM – MET**

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Practical Wireless
The Radio Magazine

FEBRUARY 1986 VOL 62 NO. 2 ISSUE 947

THIS MONTH



## THIS MONTH'S COVER

Antenna topics provide the central theme of this month's issue so not unnaturally our Art Editor was given the task of finding a suitable amateur installation to photograph. This proved to be relatively easy as our Technical Editor is also the Chairman of the Flight Refuelling Amateur Radio Society—the owners of the dominating array captured on the front cover. For the record the G4RFR/G6SFR system consists of four stacked and bayed Jaybeam 14-element 144MHz Parabeams, providing a combined gain of approximately 20dBd. Mounted within this array is a home-brewed 70MHz 12-element Yagi, built to NBS data as published in the *PW* special *Wires and Waves*.





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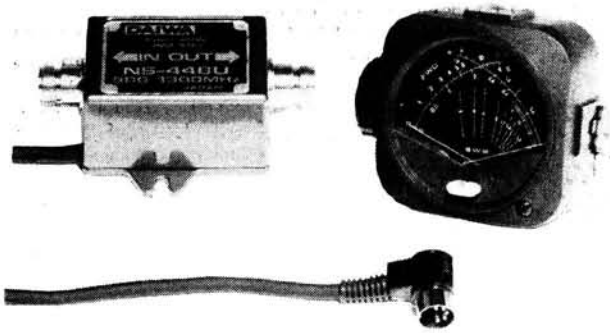
telephone 01-429 3256.

**In Bournemouth,**
the shop manager is Colin, G3XAS, the address, 27 Gillam Road, Northbourne, Bournemouth,
telephone 0202 577760.

Although not a shop, there is on the South Coast a source of good advice and equipment, John, G3JYG. His address is Abbotsley, 14 Grovelands Road, Hailsham, East Sussex. An evening or weekend call will put you in touch with him. His telephone number is 0323 848077.

**LOWE ELECTRONICS SHOPS** are open from 9.00 am to 5.30 pm, Tuesday to Friday and from 9.00 am to 5.00 pm on Saturday. Shop lunch hours vary and are timed to suit local conditions. For exact details please telephone the shop manager.

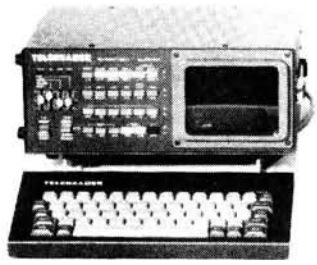
# DAIWA NS448 swr/power meter range..... 900 to 1300 MHz.



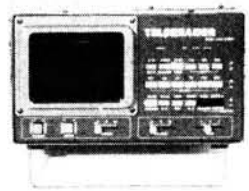

Frequency range 900 to 1300 MHz, impedance 50 ohms, power range forward 5/20W, reflected 1.6/6.6W, connections N type.

**NS448** cross needle power/swr meter . . . **£60.00 inc VAT, carriage £2.50.**

# TELEREADER range of equipment.

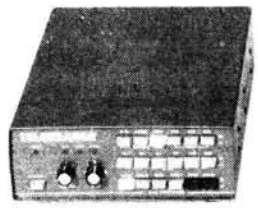


**CWR685E**

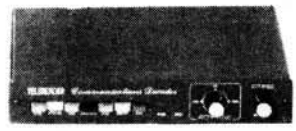


**CWR675E**

**CWR610E**



**CWR670E**



**CD660**

**CWR685E** . . . A radio-teletype terminal designed for use in the shack or out portable. Having a built-in monitor and external keyboard, the unit can receive and transmit CW, Baudot or ASCII codes. High and low RTTY tones, selectable baud rates and frequency shift, together with a buffer memory on transmit make the CWR685E ideal. Add nothing more than a DC power supply and transceiver to create a complete CW/RTTY station.
**CWR685E** . . . . . **£771.64 inc VAT, carriage £7.00**

**CWR675E** . . . A receive only version of the CWR685E, the CWR675E complete with built-in monitor, provides the short wave enthusiast with an additional dimension to his listening.
**CWR675E** . . . . . **£449.17 inc VAT, carriage £7.00**

**CWR670E** . . . For the listener with his own monitor or who prefers to use a television, the CWR670E has similar facilities as the CWR675E.
**CWR670E** . . . . . **£392.80 inc VAT, carriage £7.00**

**CWR610E** . . . Not only a CW/RTTY/ASCII terminal but a CW random generator for morse practice. Requires a monitor or UHF television for display.
**CWR610E** . . . . . **£195.00 inc VAT, carriage £3.00**

**CD660** . . . A receive only unit for not only RTTY/CW/ASCII but TOR/AMTOR plus a morse code practice generator.
**CD660** . . . . . **£231.69 inc VAT, carriage £3.00**

**From TELEREADER, a comprehensive range of equipment!**

# LOWE ELECTRONICS LTD.

**Chesterfield Road, Matlock, Derbyshire DE4 5LE**
**Telephone 0629 2817, 2430, 4057, 4995.**

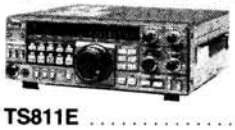
send £1 for complete mail order catalogue.

# TRIO uhf equipment.

**TS780 VHF/UHF dual band transceiver.**
The TS780 is the ideal base station for the enthusiastic operator who wants both 70 centimetres and the 2 metre band in one transceiver. Modes of operation are USB, LSB, CW and FM. full repeater facilities, plus two VFO's, IF shift, two priority channels, memory and band scan combine to make the TRIO TS780 the perfect rig.

**TS780** ..... **£948.00 inc VAT, carriage £7.00**

**TS811E 70 centimetre base station transceiver.**
The TS811E is a perfect 70 centimetre base station transceiver. It produces 25 Watts output and has a full range of operating features. Forty memory channels are available, each of which can be used as a separate VFO. Digital code squelch is also a feature of the TS811E.



**TS811E** ..... **£795.00 inc VAT, carriage £7.00**

**TW4000A FM VHF/UHF dual band transceiver.**
To have both 70 centimetres and 2 metres available in one mobile transceiver has been a desire of the VHF/UHF enthusiast for many years. TRIO with the TW4000A have satisfied that need. The transceiver is now well known for having an excellent receiver and as those who already own and operate one know, is a delight to use. Compact and producing 25 Watts on both bands, the TW4000A is the enthusiast's natural choice.

**TW4000A** ..... **£522.00 inc VAT, carriage £7.00**

**TM401A 70 centimetre mobile FM transceiver.**
Accepting the fact that there is little space in a modern car for anything other than a radio/cassette unit, TRIO have with the TM401A produced the definitive compact transceiver. By removing the speaker and making this separate, TRIO have given you excellent receive audio quality. The TM401A is ideal for the amateur who wants a high performance rig.

**TM401A** ..... **£316.00 inc VAT, carriage £7.00**

**TM411E 70 centimetre FM mobile transceiver.**
By taking the popular TM401A and adding DCS and a tiltable front panel, TRIO have produced a higher specification transceiver. Even easier to fit in tight locations, the TM411E with 25 Watts output is the ideal 70 centimetre FM mobile transceiver.

**TM411E** ..... **£399.00 inc VAT, carriage £7.00**

**TR3600E 70 centimetre FM handheld.**
The TR3600E handheld from TRIO is a natural progression from the much liked TR3500. By adding DCS, the ability to skip particular memory channels, to hold for either a timed period or carrier when scanning, the memory to hold whether the channel is simplex or repeater shift and including an illuminated "S" meter, TRIO have produced a first class transceiver.

**TR3600E** . **£292.00 inc VAT, carriage £7.00**

**TH41E centimetre FM compact transceiver.**
The TH41E is a simple handheld, extremely small yet having full repeater facilities including reverse repeater. Power output is one Watt of 150 milliwatts in the low position and frequency selection is by means of thumbwheel switches. Very small but still convenient to operate, the transceiver is just right for the amateur who wants to stay in touch.

**TH41E** ..... **£199.00 inc VAT, carriage £7.00**

# TRIO hf equipment.

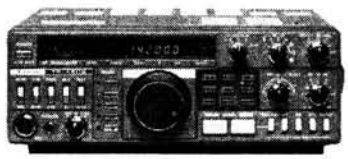
**TS940S HF transceiver with general coverage receiver.**
Top of the range, the TS940S has every operating feature that the discerning HF operator needs. Amateur bands, 160 through to 10 metres plus a general coverage receiver tuning from 150 KHz to 30 MHz. Modes of operation are USB, LSB, CW, AM, FSK and FM which is included as standard. Forty memory channels, each effectively a separate VFO and simple keyboard frequency entry make operation and ownership of a TRIO TS940S a pleasure.

**TS940S** ..... **£1695.00 inc VAT, carriage £7.00**

**TS930S HF transceiver with general coverage receiver.**
Much has been said and written about the TS930S and it now has a place high in the affection of those amateurs fortunate enough to own one. Providing full coverage of the amateur bands from 160 to 10 metres and including a general coverage receiver tuning from 150 KHz to 30 MHz, the TRIO TS930S is ideal for today's crowded frequencies.

**TS930S** ..... **£1295.00 inc VAT, carriage £7.00**

**TS430S HF transceiver with general coverage receiver.**
A compact transceiver suitable for mobile or portable operation, yet having all the facilities necessary for effective radio communication. The TS430S has, in addition to the amateur bands from 160 to 10 metres, a general coverage receiver. Modes of operation are USB, LSB, CW, AM with FM optional. Owned by many radio amateurs worldwide, the TRIO TS430S is an ideal way to combine amateur radio with short wave listening.



**TS430S** ..... **£720.00 inc VAT, carriage £7.00**

**TS830S HF amateur bands transceiver.**
Needing no description, the TS830S, which uses a pair of 6146B valves in the PA, is well known on the amateur bands for its superb signal quality. Having variable bandwidth tuning, IF notch, IF shift and provision for various filters, its receive performance is excellent too.

**TS830S** ..... **£832.75 inc VAT, carriage £7.00**

**TS530SP HF amateur bands transceiver.**
A standard HF valve transceiver without frills but providing today's amateur with all necessary facilities for reliable worldwide communication. Modes of operation USB, LSB and CW. The most popular HF transceiver on the market.

**TS530SP** ..... **£698.00 inc VAT, carriage £7.00**

# SMC — South Midlands

## HQ & MAIL ORDER S.M. HOUSE, RUMBRIDGE ST, TOTTON, SOUTHAMP

## OSCAR 2/10M

The SMC Oscar was designed to satisfy the stringent specifications of MPT1320. It is a solid state, compact, transceiver built to withstand the shock and vibrations experienced in the mobile environment for years to come. It also makes an ideal base station when used in conjunction with an external 12V P.S.U. and optional amplifier such as our type PA10L/25. A high level of frequency stability over a wide temperature range is achieved by the use of low tolerance quartz crystal and the latest in CMOS integrated circuits. The receiver provides good sensitivity allowing excellent reception of even the weakest stations, good selectivity and signal handling allows perfect reception of local signals with minimum interference from adjacent channels. The power output is 5W giving a good range. This coupled with highly controlled modulation and high spurious rejection gives maximum readability with minimum interference to other users.

**ONLY £65 inc.**

## FT2700RH
## £499 inc. VAT


The FT2700R, virtually two transceivers in one case, is designed to be the ultimate in convenience, for FM mobile or base station operation, on the 144 *and* 430MHz bands. Using Yaesu's new one piece die-cast aluminium chassis concept, the FT2700R provides 25 Watts continuous output on either band, for full duplex (or simplex!) operation whilst obtaining optimum circuit shielding and efficient heat dissipation.

Two 4-bit CPU's provide convenient control together with simple operation of the dual VFO's, 10 channel memory with back up and two calling frequencies.

Dual, receiver front ends, local synthesisers, IF's and transmitter RF stages make this the first mobile transceiver capable of *true* duplex cross-band operation.

Comprehensive scanning features include "PMS" (programmable memory scan) which permits continuous or skip-scanning between two memory channels in the same band. A MHz "stepping" switch is fitted for quick transition from one band to another. Priority channel monitoring is available whilst on the same or another band!

Independently programmable transmit and receive frequencies, standard repeater shifts (with reverse facility), offers total freedom of operation.

The large green back-lit dimmable LCD offers an aesthetically pleasing and easy to read display of the complete operating status of the transceiver, including memory and reverse repeater indications at a glance. The PO/S meter incorporated in the main display is a distinctive graphical two colour type. (Optional Voice Synthesiser available, see FT270R/RH text.)

| FT2700RH | |
|---|---|
| Frequency | : 144-146MHz |
| | : 430-440MHz |
| Power out | : 2m 25/3W |
| | : 70cm 25/3W |
| Supply | : 7A (25W Tx) |
| | : 3A (3W Tx) |
| | : 0.6A (Sq Rx) |
| Stability | : 2M ± 10ppm, −5 +50°C |
| | : 70cm ±5ppm, −5 +50°C |

DIMENSIONS (Ex/Inc Projections)
150W, 50H, 130/185D mm, 1.6kg

| GENERAL SPE | |
|---|---|
| Mode | : FM (F3, G3E) |
| Supply | : 13.8V ± 15% |
| Circuit | : Double Conversion |
| | : 21.6MHz, 455KHz |
| Sensitivity | : 0.2µV @ 12dB Sinad |
| | : 1.0µV @ 30dB Sinad |
| Selectivity | : 14KHz −6dB |
| | : 28KHz −60dB |
| Image | : −60dB (or better) |
| Audio | : 4 to 16ohms |
| | : 2W in 8ohms (10% THD) |

## END OF LINE

| | | |
|---|---|---|
| YM40 | (8 pin scan microphone) | 5pcs only **£5** |
| XF8.2HC | (CW(W) filter FT102) | 2pcs only **£10** |
| XF8.2WN | (CW(N) filter FT102) | 3pcs only **£10** |
| XF8.2HSN | (SSBN filter FT102) | 5pcs only **£10** |
| FANB | (Fan FT101 etc.) | 3pcs only **£5** |
| MEM902 | (Memory unit FT901/2) | 2pcs only **£35** |
| MEM7700 | (Memory unit FRG7700) | 2pcs only **£75** |

# FREE

***Proof of purchase from any S.M.C. Branch of appropriate main equipment***

| | | |
|---|---|---|
| DC KIT | FRG7700 | **p&p 50p** |
| FF5 | Filter H.P.F. FRG7700 | **p&p 50p** |
| FHR1 | Horn Relay (Burglar Alarm) | **p&p £1** |
| MMB1 | Mobile Mount FT101 etc. | **p&p £3.50** |
| FMB3 | Mobile Brace for mobile mounts | **p&p 50p** |
| MMB7 | Mobile Bracket for FT7/7B | **p&p £1.50** |
| MMB3 | Mobile Bracket for FT720R | **p&p £1.50** |

## FRG-8800
## £475 inc.
## FRV-8800
## £80 inc.

Continuous coverage from 150kHz to 30MHz. Two speed spin tuned VFO plus keyboard plus computer interface control.

The FRG-8800 demodulates SSB (USB & LSB) CW, AM (Wide and Narrow) and FM narrow as standard, useful for 10M, CB and for VHF.

The FRG-8800 comes with twelve memories, programmed and scanned at the touch of a single button. Any of the memory channels will accept a frequency including the VHF range (optional VHF unit). The mode is also stored in the memory.

Four filters are fitted as standard (SSB/CW, AM, AM-NAR and FM-NAR) chosen for optimum performance, with switchable AGC and variable tone control.

The back-lit green LCD display incorporates easy to read "any angle" 10mm digits.

A twelve function display indicates the status at a glance. It includes memory channel number mode, and frequency to a resolution of 100Hz. Also included is a two dimensional LCD, graphical SIMPO and "S" meter. A 12 button keyboard allows quick accurate changes of frequency and band.

Dual accurate 12 hour clocks, with AM/PM indicators uses the main digital display and features full back-up facilities (mains failure) and can activate the receiver or tape recorder via relay contacts. The FRV-8800, extends coverage to include 118-174MHz all within the main frame, allowing monitoring of, PMR, marine and air bands, as well as 2M. 240-220VAC to 110-120V, 50/60Hz mains standard, 12VDC operation is optional.

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**PAT GILLAN, IPSWICH COMMS, IPSWICH (0473) 402173**

# -Communications ltd.-

AUTHORISED YAESU

## TON, SO4 4DP, ENGLAND. Tel: (0703) 867333. Telex: 477351 SMCOMM G.

The FT270R/RH is constructed on a unique massive diecast aluminium ducted heatsink which enables significantly larger output powers to be obtained from a transceiver substantially smaller than any similar radio to date. The FT270RH, with fan assisted cooling, provides 45W RF output whilst the conventional R version offers 25W. Both FT270R and RH are fitted with a "low" power switch which provides around 10% of full output.

The FT270R/RH uses a high visibility back-lit LCD, with large 5mm digits, providing a readout of frequency and all important transceiver functions. Pleasant green illumination and newly developed wide angle LCD ensure easy visibility day or night from most angles.

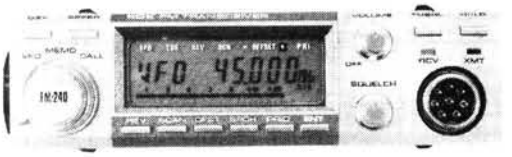
The dual 4-bit microprocessors of the FT270R/RH provide maximum ease of use combined with an extremely wide range of operating functins. Dual VFO's, ten memories and programmable band scan limits are all easily selectable from the front panel.

The FT270R/RH can memorise a number of scanning parameters for maximising performance. Upper and lower limits may be set (for quick scanning of the band). The ten memories may be scanned for a busy channel or for monitoring a priority channel. The scanning can be either manually or carrier controlled.

For easier and safer 'eyes on the road' mobile operation an optional voice synthesiser (FVS-1) is available to give an audible indication of frequency, memory channels and VFO selections at the touch of a convenient microphone mounted button. The FVS-1 is of course ideal for those with impaired vision.

## FT270R £315 inc.
## FT270RH £365 inc.


## COMING SOON KDK FM-240




### CIFICATIONS

| | |
|---|---|
| Antenna | : 50ohms, unbalanced |
| Modulation | : Variable reactance |
| Deviation | : ±5KHz |
| Tone Burst | : 1,750Hz |
| Spurious | : −60dB (or better) |
| Maximum BW | : 16KHz |
| Microphone | : 600ohms, nominal |
| Temperature | : −10°C + 60°C |

**OPTIONS**
FVS-1, MF-1B3B, SP55, YH1, SB10

### FT270R/RH

| | |
|---|---|
| Frequency | : 144-146MHz |
| Power out | : RH; 45W/5W |
| | : R; 25W/3W |
| Supply | : RH; 9A/3.5A Tx |
| | : R; 6A/2.5A Tx |
| | : 0.6A (Sq Rx) R/RH |
| Stability | : ±10ppm (−5 + 50°C) |

DIMENSIONS (Ex/Inc Projections)
140W, 40H, 143/175D mm, 1.25kg

- 2M 25W FM Mobile Transceiver
- Revolutionary M.M.I. Control System
- 16 Memory Channels
- Large Easy to Read L.C.D. Display
- Optional Voice Synthesiser
- 140×40×170(mm) Case

## £ T.B.A.

**SEND S.A.E. FOR COLOUR BROCHURE**


## FRG-9600 £449 inc. PA4C £12.65 inc.

An all mode scanning receiver covering 60 through 905MHz continuously, with 100 key-pad-programmable memory channels.

In addition to FM wide (for FM and TV broadcasts), FM narrow and AM (wide and narrow) the FRG-9600 also provides SSB (single sideband) reception up to 460MHz. A front panel tuning knob simplifies tuning of SSB and narrowband AM. Seven tuning/scanning rates between 100Hz and 100kHz assure fast and efficient scanning while permitting easy tuning of narrowband signals.

The scanning system allows full or limited band scanning and memory channel scanning, with auto-resume. In addition to carrier sensing scan stop, audio scan stop sensing is also selectable to avoid stopping on inactive "carrier-only" channels. Scanning steps are selectable, with the wide steps indicated on the front panel display. Signal strength indicated by a two-colour graphic S-meter. A 24-hour clock/timer, recorder output, cpu band selection outputs, multiplexed (FM wide) output, AF and RF mute and other control signals for maximum expansion potential with future options or for own add-on hardware for special applications.

The direct control link to the cpu in the FRG-9600, allowing virtually unlimited customised control functions; such as multiple, organised memory banks; automatic tuning; and customised scanning systems; using most personal computers and a Yaesu FIF CAT Interface Unit.

The FRG-9600 requires 12VDC.

## CRYSTAL FILTERS
### FOR HOME CONSTRUCTORS

**10.7MHz**

| | |
|---|---|
| F 10.7H600, CW 600Hz | £12.50 |
| F 10.7F2.5, SSB 2.4KHz | £12.50 |
| F 10.7H12, FM 12KHz | £10.00 |
| USB/LSB/(AM, CW, FM) Xtals | £5.00 |

**9MHz**

| | |
|---|---|
| F 90H600, CW 600Hz | £12.50 |
| F 90F2.4, SSB 2.4KHz | £10.00 |
| F 90H12, FM 12KHz | £12.50 |
| USB/LSB Xtals | £2.50 |

**FT101 I, II, III, B, E**

| | |
|---|---|
| F 30F350, CW 350Hz | £15.00 |
| F 30F600, CW 600Hz | £15.00 |
| F 30FC1, CW 600Hz | £10.00 |
| F 30F12, FM 12KHz | £7.50 |
| F 30H12, FM 12KHz | £10.00 |

## CONVERTORS

| | |
|---|---|
| FRV 7700 A | 118-130, 130-140, 140-150 MHz |
| FRV 7700 D | 118-130, 140-150, 70-80 MHz |
| FRV 7700 F | 150-160, 160-170, 118-130 MHz |

## £49 inc. VAT

★ **FREE FINANCE**
On many regular priced items SMC offers Free Finance (on invoice balances over £120). 20% down and the balance over 6 months or 50% down and the balance over a year. *You pay no more than the cash price!* **details on eligible items on request.**

**SMC SERVICE**
Free Securicor delivery on major equipment.
Access and Barclaycard over the phone.
Biggest branch agent and dealer network.
Securicor 'B' Service contract at £5.00
Biggest stockist of amateur equipment.
Same day despatch possible.

**GUARANTEE**
Importer warranty on Yaesu Musen products.
Ably staffed and equipped Service Department.
Daily contact with the Yaesu Musen factory.
Tens of thousands of spares and test equipment.
Twenty-five years of professional experience.
● **2 Year warranty on regular priced Yaesu products.**

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# HIGHER AND HIGHER WITH

## 2 New models to raise ICOM Amateur frequencies to 1·2GHz.

## IC-1271E Fantastic new multimode 1.2GHz Transceiver

ICOM, a pioneer in 1.2GHz technology are proud to introduce the first full feature 1240 – 1300 MHz base station transceiver. Features include: multimode operation, 32 memories, scanning and 10 watts RF output.
The IC-1271E allows you to explore the world of 1.2GHz thanks to a newly developed PLL circuit that covers the entire band, a total of 60MHz, SSB, CW and FM modes may be used anywhere in the band making the IC-1271E ideal for mobile, DX, repeater, satellite or moonbounce operation. The IC-1271E has outstanding receiver sensitivity, the RF amplifiers use a low noise figure and high-gain disc type GaAs FET's for microwave applications. The rugged power amplifier provides 10 Watts which can be adjusted from 1 to 10 Watts.
A sophisticated scanning system includes memory scan, programme scan, mode-selective scan and auto-stop feature. Scanning of frequencies and memories is possible from either the transceiver or the HM12 scanning microphone. 32 programmable memories are provided to store the mode and frequency in 32 different channels. All functions including memory channel are shown clearly on a seven digit luminescent dual colour display.
The IC-1271E has a dial-lock, noise blanker, RIT, AGC fast or slow and VOX functions. With a powerful 2 Watt audio output the IC-1271E is easily audible even in a noisy environment.
The transceiver operates with either a 240V AC (optional) or 12 volt DC power supply. A variety of options include IC-PS25 internal AC power supply, IC-EX310 voice synthesizer, the TV-1200 TV transceiver adaptor and the IC-EX309 computer interface. The IC-1271E is the most compact and lightest all-mode 1200 MHz transceiver currently available.

## IC-R7000 VHF/UHF scanning receiver

Causing quite a stir at the moment is the ICOM IC-R7000. This new receiver is able to give high frequency coverage up to 1.3MHz without sacrificing SSB stability which is maintained throughout the IC-R7000's entire frequency range. For simplified operation and quick tuning, the IC-R7000 feature direct keyboard entry. Precise frequencies can be selected by pushing the digit keys in sequence of the frequency or by turning the main tuning knob. FM/AM/SSB modes, frequency coverage 25-1000MHz and 1025 – 2000MHz (25 – 1000MHz and 1260 – 1300MHz guaranteed specification). The IC-R7000 has 99 memories available to store your favourite frequencies including the operation mode. Memory channels may be called up by simply pressing the memory switch, then rotating the memory channel knob or by direct keyboard entry.
A sophisticated scanning system provides instant access to most used frequencies. By depressing the Auto-M switch. The IC-R7000 automatically memorises frequencies in use, while the unit is in the scan mode. This allows you to recall frequencies that were in use. Scanning systems include memory selected frequency ranges or priority channels, scanning speed is adjustable. Narrow/wide filter selection. Five tuning speeds: 10Hz, 100Hz, 1.0KHz, 10KHz and 25KHz. All functions including memory channel readout are clearly shown on dual-colour fluorescent display with dimmer switch. The IC-R7000 has dial-lock, noise blanker, S-meter and attentuator. Options include RC-12 infrared remote controller and a voice synthesizer.
For a more detailed specification of the competitively priced IC-R7000 contact your authorised ICOM dealer or telephone us direct on 0800 521145, our FREE Linkline service for Amateurs and SWL's.

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# ICOM

## IC735 compact HF Transceiver

As predicted the ICOM IC-735 has rapidly gained the reputation it deserves. When compared with similar 'top names' transceivers the IC-735 towers above them (despite its smaller size). The IC-735 has a larger number of programmable channels, but notably most important is the superb sensitivity in all modes SSB, CW, AM and FM. This superior sensitivity is due to the excellent front end performance.
All amateur frequencies from 1.8MHz to 30MHz are available including the three new bands 10, 18 and 24MHz. RF output is approximately 100 Watts. Tuning ranges from 100KHz to 30MHz, made continuous by using a high-side IF and a CPU control system. RTTY operation is also possible. Dynamic range is 105dB with a 70.451MHz first IF circuit. Pass-band tuning and a sharp IF notch filter provide clear reception even under duress. Preamp is 10dB and attenuator 20dB. Computer remote control is possible via the RS-232C jack.
Options include: the AT-150 automatic antenna tuner, the PS55 AC power supply and the SM-6 and SM-8 desk mics. Why not find out more about the IC-735 by ringing us or your local ICOM dealer.

Thanet Electronics are proud to offer their continued complete service for all Amateur radio requirements – no matter what your problem may be regarding the smooth operation of your shack Thanet have the answers, and technical 'know-how'.
If you require a demonstration of any ICOM equipment telephone our retail premises on Herne Bay (0227) 369464 where we will be pleased to hear from you.

BARCLAYCARD VISA

## WANT TO LEARN MORE?

Telephone us free-of-charge on:

## HELPLINE 0800-521145.

*This is strictly a helpline for obtaining information about or ordering ICOM equipment. We regret this service cannot be used by dealers or for repair enquiries and parts orders. Thank you.*

## ICOM authorised dealers in the U.K.

Alyntronics, Newcastle, 0632-761002.
Amateur Radio Exchange, London (Ealing), 01-992 5765.
Amcomm, London (S. Harrow), 01-422 9585.
A.R.E. Comms, Earlestown, Merseyside, 09252-29881.
Arrow Electronics Ltd., Chelmsford, Essex, 0245-381673/26.
Beamrite, Cardiff, 0222-486884.
Booth Holdings (Bath) Ltd., Bristol, 02217-2402.
Bredhurst Electronics Ltd., W. Sussex, 0444-400786.
D.P. Hobbs, Norwich, 0603-615786.
Dressler (UK) Ltd., London (Leyton), 01-558 0854.
D.W. Electronics, Widnes, Cheshire, 051-420 2559.
Hobbytronics, Knutsford, Cheshire, 0565-4040. Until 10pm daily.
Poole Logic, Poole, Dorset, 0202 683093.
Photo Acoustics Ltd., Buckinghamshire, 0908-610625.
Radcomm Electronics, Co. Cork, Ireland, 01035321-632725.
Radio Shack Ltd., London NW6, 01-624 7174.
R.A.S. Nottingham, 0602-280267.
Ray Withers Comms, Warley, West Midlands, 021-421 8201.
Scotcomms, Edinburgh, 031-657 2430.
Tyrone Amateur Electronics, Co. Tyrone, N. Ireland, 0662-42043.
Reg Ward & Co. Ltd., S.W. England, 0279-34918.
Waters & Stanton Electronics, Hockley, Essex, 0702-206835.

**Listed here are just some of the authorised dealers who can demonstrate ICOM equipment all year round. This list covers most areas of the U.K. but if you have difficulty finding a dealer near you, contact Thanet Electronics and we will be able to help you.**

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Dept. PW

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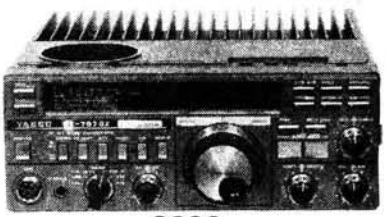

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50MHz to 1300MHz
Gain 17dB Typical

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| Gain | 17dB Typical (14-17dB) |
| Frequency Range | 50-1300MHz |
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Operation is possible up to 1300MHz with gain of 10dB
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**TRIO KENWOOD TH-21/TH-41**

**YAESU FT209/709**

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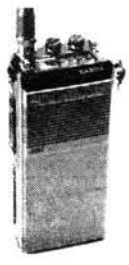


**ICOM IC2E/IC02E**

**ICOM IC4E/IC04E**

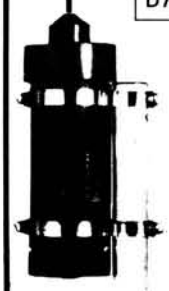
## PRE-AMPS – NEW MODELS

| MODEL | FREQ. | NOISE | GAIN | POWER | PRICE |
|---|---|---|---|---|---|
| EVV1296S | 1.25-1.3GHz | 0.7-0.9 | 16-19dB | 100W | £139 |
| EVV1296C | 1.25-1.3GHz | 0.9-1.2 | 16-18dB | 100W | £119 |
| EVV1296 | 1.25-1.3GHz | 1.9-2.1 | 14-17dB | 100W | £100 |
| EVV700 | 430-440MHz | 0.5-0.9 | 15-18dB | 500W PEP | £90 |
| EVV2000FB | 144-146 | 0.6-0.9 | 16-18dB | 1000KW PEP | £90 |
| EVV200FB | 144-146 | 0.6-0.9 | 16-18dB | 700W PEP | £80 |
| EVV2000GAAS | 144-146 | 0.6-0.8 | 16-18dB | 1KW PEP | £90 |
| EVV200GAAS | 144-146 | 0.6-1 | 16-18dB | 700W PEP | £80 |
| EV2GAAS | 144-146 | 0.6-0.9 | 15-18dB | 100W PEP | £60 |

VV INTERFACE FOR ABOVE PRE-AMPS £20

## LINEARS

| | | |
|---|---|---|
| D200 | 2 MTR 500W SSB | £699 |
| D200S | 2 MTR 750W SSB | £799 |
| D70 | 70 CMS 550W SSB | £799 |



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## RECEIVE PRE-AMPS

| MODEL | FREQUENCY | NOISE | GAIN | PRICE |
|---|---|---|---|---|
| EWPA 560 | 50-600-1GHz | | 16.5dB-1dB | £60 |
| IP3 order | +18dBM | | | |
| ERPA 1296 | 1.25-1.30 | 0.8 | 17-18dB | £70 |
| ERPA 435 | 430-440 | 0.5 | 15-18dB | £60 |
| ERPA 144 | 144-146 | 0.7 | 16-18dB | £60 |

**MUTEK SPECIALISTS**

# WRITE ON ... *the page where you have your say*


## Novice?

**Sir:** I feel I must question the need for a novice licence in this country, another licence level would surely be counter productive to the present system. The City and Guilds Radio Amateur Examination in its present form represents what is probably the fairest way of testing a candidate's ability to be let loose on the air with power levels up to 400 watts. The Morse test for the A class at 12 words per minute is slower than any comparable commercial test. Ian Abel G3ZHI failed to convince me that a novice licence was needed here in his letter in *PW* November 1985. The present system of licensing in the UK represents what must be considered as the minimum qualifications required for the radio amateur. Having gained a licence it is then up to the individual where the hobby should take them. If indeed the present system does produce people who know how the car works but don't know how to drive then I have yet to find much evidence of this. The situation if anything is reversed, in that many operators can drive the car but are scared to look under the bonnet. For those who wish to increase their technical knowledge there are many classes at local clubs and colleges, not to mention the wealth of information in magazines and books. Operating procedures can only be learnt by practice, by listening to other more experienced operators, and I am sure that anyone who is uncertain of themselves when they first come on the air will soon find a local amateur who will take them under their wing.

We must not lose sight of the fact that this is a hobby no matter how seriously we may take it. We are most fortunate that the amateur licence as it stands gives scope for just about any experiments or operations we may wish to conduct. B class licence holders can now apply to practice c.w. on 144MHz, they can send c.w. on h.f. under supervision, even work crossband to h.f.

I would like to issue a challenge through your letters pages to anyone who can demonstrate to myself and many others that there is any need at all to change the present system, let alone introduce yet another form of licence.

To anyone who doubts that the RAE is "easy" enough, then I quote a GM1 station I heard on our local net one night—"I'd like to get on h.f. o.m. but I can't afford a rig" doesn't anyone look at published designs for relatively simple QRP equipment any more? If not then we are all wasting our time.

Finally I quote the recent *PW* survey which showed that 57 per cent of those who took part did not consider that a novice licence was needed in the UK. I fail to see how the object of the amateur licence, "to promote the self education in radio and communications techniques" could be furthered by a novice licence.

***R C Barrett GM6GJZ***
***Inverurie***

## Procedure

**Sir:** I would like to make two suggestions about h.f. operating. First, for skeds and nets where a specific time and frequency have been agreed but the frequency is then found to be busy, the rule would be "1kHz/minute". This means that stations would look further and further from the sked frequency as time passed, for example if contact has not been made by 3 minutes past the sked time both stations would look for each other up to 3kHz from the sked frequency—and they would know they need look no further.

Secondly, when the band is thinly occupied, such as 1·8MHz on a weekday afternoon (or 70MHz anytime!) there should be preferred CQ calling times to enable more contacts to be made. The preferred times would be on the hours, then the half hours and then the quarters.

***M. Mann G4FF0***
***Cambridge***

## Boredom?

**Sir:** Mr. Wardell's letter "Boredom" in December *PW* certainly hits the nail on the head. Just imagine a group of people conversing, each one speaking in turn for up to fifteen minutes, without interruption from the others. Surely a farcical situation, yet this is typical

# PW COMMENT

## Are You Receiving Us?

WELL, YES, I SUPPOSE YOU MUST BE, otherwise you wouldn't be reading this. What I really mean is, are you having problems in getting your copy of *Practical Wireless* each month. I've mentioned before the difficulty in getting shelf-space in the newsagents and bookstalls, among the vast number of radio, electronics, computing, telephone and data communications magazines. Even though there's been a big drop in the number of computing titles recently, the fight goes on.

You should find us in larger newsagents, providing you don't leave it too late in the month. Smaller newsagents, with their limited display area, naturally tend to favour magazines appealing to a wider readership than is found among the strange band who think that radio and TV mean something more than *The Archers* and *Crossroads*! You should, though, have no difficulty in getting *PW* from any newsagent, whether large or small, by placing a regular order.

If you do have problems finding us, or getting a newsagent to accept a regular order, I would appreciate a 'phone call, or better still a letter, telling me the name and address of the newsagents, and the dates you looked for *PW*. With that information, I can begin to track down where the hiccups may be in the distribution system.

The other solution to such problems is to take out a subscription. I would be the first to admit that our subscription service has had a deservedly poor reputation in recent years, with copies dropping through letter-boxes a week and more after the issue went on sale. We've just completed a major investigation into our subs organisation, and have taken steps to remove one cause of delay. It would be rash of me to say that subscribers' problems are over, but you should see a marked improvement. And we're looking at further changes.

Now the bad news. Starting with our next issue, *PW*'s cover price goes up to £1.10. At that it's still the least expensive of all the UK radio magazines, but the better news is that our subscription rates are **not** going up. At £13 for one year to UK addresses, that's cheaper than buying 12 issues at your newsagent. So, why not take out a subscription before our powers-that-be have a change of heart, and make sure you don't miss that special project!

Geoff Arnold

Send your letters to our Editorial Office in Poole, the address is on our contents page: We will pay £10 for the Star Letter each month, £5 for any others published. letters must be original and not duplicated to other magazines. The Editor reserves the right to shorten or modify any letter. We regret that we cannot answer letters by post unless accompanied by an s.a.e. Brief letters may be filed via our Prestel Mailbox number 202671191. The views expressed in letters are not necessarily those of Practical Wireless.

of the average QSO on the 144MHz band. Way back, when amateurs were "rockbound" on different frequencies, this was the only way one could carry out a QSO. However, nowadays all transceivers are fitted with p.t.t. facilities, or VOX—or both—and it is normal to carry out a QSO on the same frequency.

By intelligent use of the mic button, it is possible to converse with each other in just the same way as one carries out a conversation without the use of radio, you can interrupt to add comment, to make suggestions, and most of all, to eliminate waffling and boredom.

Two metre f.m. QSOs are, by nature, boring to the extreme, but a little intelligent use of the excellent equipment available today would most certainly improve the present very sad situation on the band.

***Nev Kirk G3JDK***
***Rotherham***

## Help, Please

**Sir:** My husband, who is passionately interested in building vintage radios, is trying to discover the whereabouts of Mr. G.W. Davey, who produced designs of valve radios for readers of *The Boy's Own Paper,* in the late 40's and early 50's.

Could we ask the assistance of readers of *Practical Wireless* through your correspondence column?

***Cynthia Castellan (Mrs)***
***The Spinney, 91 Bower Lane, Rugeley, Staffs WS15 2TS***

# ERRORS & UPDATES

## Bookshelf, December 1985

The price of *Radio Systems for Technicians* by D.C. Green should have read £7.25. Our apologies to readers and to Pitman Publishing Ltd for any inconvenience caused.

# OUR SERVICES

## QUERIES

Although we will always try to help readers having difficulties with a *Practical Wireless* project, we cannot offer advice on modifications to our designs, nor on commercial radio, TV or electronic equipment. Please address your letters to the **Editor, "Practical Wireless", Westover House, West Quay Road, Poole, Dorset BH15 1JG**, giving a clear description of the problem and enclosing a stamped self-addressed envelope. Only one project per letter please. We cannot deal with technical queries over the telephone.

**Components** for our projects are usually available from advertisers. For more difficult items, a source will be suggested in the article. **Kits** for some of our more recent projects are available from **CPL Electronics**, 8 Southdean Close, Hemlington, Middlesbrough, Cleveland TS8 9HE. Tel: 0642 591157. The **printed circuit boards** are available from **Albol Electronic and Mechanical Products Ltd**, 3 Crown Buildings, Crown Street, London SE5 0JR. Tel: 01-703 2311/2312; **Proto Design**, 14 Downham Road, Ramsden Heath, Billericay, Essex CM11 1PU. Tel: 0268 710722; **Sitec Ltd**, Ridgemond Park, Telford Avenue, Stevenage, Herts. Tel: 0438 312566.

## SUBSCRIPTIONS

Subscriptions are available at £13 per annum to UK addresses and £15 overseas, from **"Practical Wireless" Subscription Department, Oakfield House, 35 Perrymount Road, Haywards Heath, West Sussex RH16 3DH.** Airmail rates for overseas subscriptions can be quoted on request.

## CONSTRUCTION RATING

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

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

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

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

## INSURANCE

A special insurance scheme has been arranged for *PW* readers to cover your radio equipment. Details are available from **PW Radio Users Insurance Scheme, B. A. Laymond & Partners, 562 North Circular Road, London NW2 7QZ. Tel: 01-452 6611.**

## BACK NUMBERS AND BINDERS

Limited stocks of some recent issues of *PW* are available at £1 each, including post and packing to addresses at home and overseas (by surface mail).

Binders are available (Price £5.50 to UK addresses, £5.75 overseas, including post and packing) each accommodating one volume of *PW*. Please state the year and volume number for which the binder is required.

Send your orders to **Post Sales Department, IPC Magazines Ltd., Lavington House, 25 Lavington Street, London SE1 0PF.** All prices include VAT where appropriate.

Please make cheques, postal orders, etc., payable to IPC Magazines Limited.

## Rallies and Events

The following events should be borne in mind when planning your 1986 activities.

The Cambridgeshire Repeater Group 4th Annual Junk Sale Rally Extravaganza takes place on Sunday 23 February at Pye Telecommunications, St. Andrews Road, Cambridge. A large number of trade stands and the now infamous "Monster" junk sale will be open from 1030. Admission is 50p, with all proceeds used to expand the Repeater Group's already extensive services. Talk-in on S22 (G3PYE)—further details from: ***Chris Lorek G4HCL, 11 Bevills Close, Doddington, March, Cambs PE15 0TT or Tel: (0354) 740672.***

Barry College of Further Education Radio Society are holding the 1986 Welsh Amateur Radio Rally on Sunday 2 March at Barry Leisure Centre, which is off Holton Road. Trade and club stands promise items of interest to radio, TV and electronics enthusiasts. Bring and Buy, refreshments/licensed bar and even a swimming pool will all be on hand between 1100–1700; talk-in on S22. Further details from: ***Reg Rowles GW4FOM. Tel: (0222) 565656*** (evenings).

Meanwhile up in Yorkshire on Sunday 16 March the Pontefract and District Amateur Radio Society will be holding their Annual Components Fair. Extra space has been obtained within the Carlton Community Centre with a view to an expansion of the Fair. ***N. Whittingham G4ISU, 7 Ridgedale Mount, Pontefract WF8 1SB. Tel: (0977) 792784*** is the person to contact for further details/bookings, etc. Plenty of advanced warning this time for GB0OS which will be operational non-stop between 24 May–1 June 1986 from Out Skerries (Grid Ref: HU682713), the most easterly group of the Shetland Islands. Permission to operate from the coastguard lookout station on the Island of Housay has been given by H.M. Coastguard, Lerwick. Radio amateurs including members of the Lerwick Radio Club will be operating on all h.f. bands, 50MHz (if available), 144 and 430MHz using s.s.b., a.m., f.m., c.w., RTTY and FAX. Special consideration will be given to QRP stations. Further details from: ***Colin Roberts GM0AVR, 4 Ladieside, Brae, Shetland Islands.***

Over in the east the Spalding and District ARS Mobile Rally will be held on Sunday 1 June at Springfields Gardens, Spalding. Doors open at 1000 with talk-in provided. Further info from the organiser: ***D. Hoult G4OO, Chespool House, Goserton Risegate, Spalding, Lincs PE11 4EU or Tel: (0775) 86382.***

Even more advanced warning this time for Hamfest 86, organised by the Flight Refuelling ARS and RAIBC. Sunday 10 August will find this expanded amateur radio event in full swing with items of interest to all communications enthusiasts and, most importantly, their families. For further details of what promises to be the largest rally in the south, contact: ***Ashley Hulme G0CDY, 71 Victoria Gardens, Ferndown, Wimborne, Dorset BH22 9JQ or Tel: (0202) 872503.***

## PW QRP Contest Trophy

The 1985 Welsh Amateur Radio Convention provided the venue once again for the presentation of the *PW* 144MHz QRP Contest Trophy. Roger GW5NF is seen accepting the overall winner's trophy, on behalf of the Bug Bashers Contest Group (GW4VXE/P), from Joan Heathershaw G4CHH, President of the RSGB.

Will 1986 produce a non-GW winner? In any event our sincere thanks go to Mike Richards G4WNC for the photo, to the contest organising team led by Dr. Neill Taylor G4HLX, to all who took part and of course to Joan Heathershaw for adding that final sparkle to the occasion!

## RAE and CW Courses

Readers in the Leeds/Bradford area will no doubt be pleased to know that 30 week courses, leading up to either the C & G Radio Amateur Examination or BT Morse Test will commence on 6 Jan. Both courses will be held at the Greenhead College, Huddersfield. Full details from: ***Kirklees Adult Education Office. Tel: (0484) 538454*** or ***P. Mercer G6CPM. Tel: (0484) 533036.***

## Can you help?

Has any reader of *PW* got an RTTY program for the Texas TI99/4A computer and an interface. Please contact ***H. R. McAlroy, 75 Roundthorn Road, Baguley, Manchester M23 8EP***

## Spread Spectrum

Mention Spread Spectrum to most people and they tend to think in terms of QRO contest stations "talked-up" over most of the band—not a nice thought. However the concept of vastly increasing the transmitted bandwidth, far in excess of the information bandwidth, results in a correspondingly large decrease in power on any specific frequency. In practice such signals would be at or below the noise floor of normal narrowband receiving systems, allowing further valuable re-use of already crowded bands. Until now such techniques have been confined to military use, requiring exceedingly sophisticated transmitters and receivers employing precise frequency and timing control in order to "de-spread" and recover the original modulation information. Recent proposals by the FCC in the US seek to permit amateur experimentation with spread spectrum on bands above 420MHz. It is unlikely that clearance will be given before mid-1986 which should allow formulation of an agreed protocol. Is anyone contemplating similar experimentation in the UK?

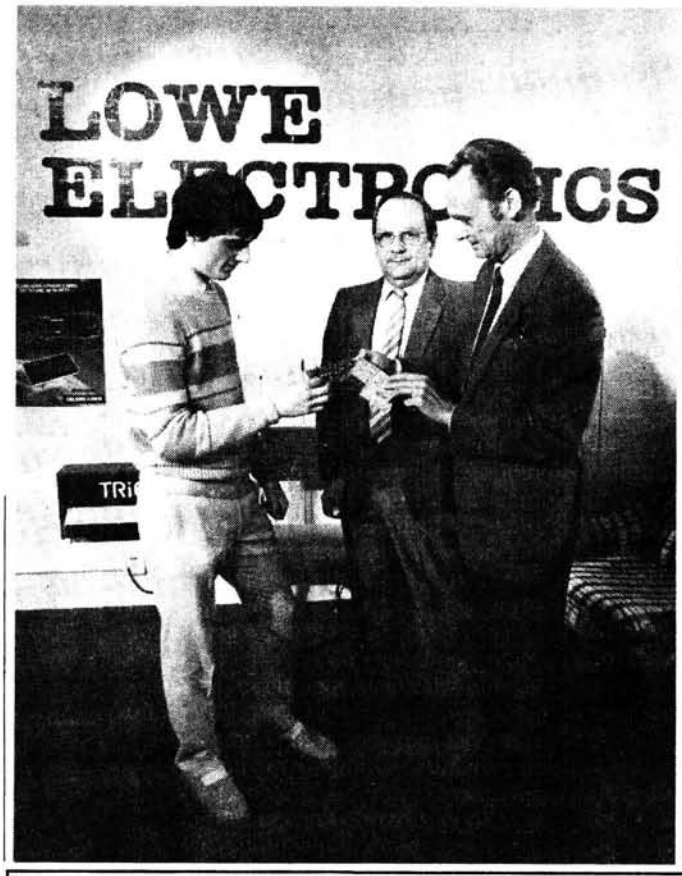
## Dubus Distribution

*Dubus*, the magazine aimed at the active/experimental v.h.f. and u.h.f. amateur, now has a new UK distributor—Ken Hatton G4IZW. The magazine is edited and printed by an amateur in Germany on a non-profit making scheme and is printed in English and other languages. Apart from technical items and news *Dubus* contains comprehensive band-by-band "who's worked what" listings. Your scribe has even found his own (old G8) callsign in there!

Membership subscriptions are currently £7 per annum so for further details contact Ken at: ***Thorneycroft House, Shield Hill, Haltwhistle, Northumberland NE49 9NW or Tel: (0498) 21372.***

## Nuts and Bits

During one of their now legendary "wine and nuts afternoon" sessions held at Lowe Electronics Cardiff emporium, Carl GW0CAB presented Trio TR-7200 receive and transmit boards to members of the Bristol Channel Repeater Group (GB3BC). Seen in the photograph with Carl are Group Chairman Roy GW6MBU and Secretary Doug GW4LOD.




## 75 Years of Amateur Radio in Derby

Following a lecture in the Spring of 1911, entitled "Scientific Progress In Our Time" delivered by Professor G. P. Bailey which demonstrated the ringing of bells and lighting of lamps by means of wireless waves, the Derby Wireless Club was formed. The early experimental callsign QIX was held until after WWII, when in 1947 the Derby and District Amateur Radio Society came into existence. Experimental Radio Derby G3ERD has been held by the Society since then and to celebrate their 75th anniversary the special event callsign GB3ERD will be activated from various locations within the City during 1986.

It is an established fact that the Derby Club was the first to be formed in the UK and it is reported to be the oldest local radio club in the world.

## Local Radio to QSY

The result of decisions taken at the International v.h.f. Band II Conference in Geneva last year are beginning to affect the operating frequencies of many IBA and BBC local radio stations.

When these frequency changes are complete (July 1987) all ILR stations will be found within two specific sub-bands, 96·0–97·6MHz and 102·0–103·5MHz. Space has been earmarked for a new Independent National Radio service, to be opened within the next few years. Medium wave frequencies will remain unaltered. It seems ironic that 2CR, whose IBA transmitter site lies within 3km of the *PW* offices in Poole, will not change frequency—especially when you find it has been assigned (for the last 5 years) a Band II frequency, the receiver image of which (97·3 + 21·4MHz) corresponds to the frequency of the local airport control tower—nice one Crawley Court!

Watch for change details in our "On the Air" pages.

## Bragg Cell Frequency Measurement

A new range of components with important applications in optical signal processing, spectrum analysis and electronic warfare is now available from GEC Research Limited.

Developed at the Marconi Research Centre at Great Baddow, near Chelmsford, Essex, the new devices enable instantaneous measurement and analysis of any number of incoming radio frequency signals simultaneously. In electronic warfare applications, for example, this real-time capability allows jammers to follow frequency agile radars or frequency hopping radios with greater effect than any other technique.

The devices known as Bragg cells, use acoustic energy generated by the incoming r.f. signals to deflect or modulate a laser beam passing through a lithium niobate crystal. The angle of deflection of the laser beam is proportional to the frequency of the incoming signal and thus it is a simple process to determine its frequency. GEC Research's Bragg cells cover bandwidths from 60 to 2000MHz with centre frequencies from 0·16 to 2·9GHz.

It remains to be seen how long it will be before devices using this technology surface on the amateur market to replace the traditional absorption and cavity wavemeter.

## IARU Region 1 News

Two recommendations made at the IARU Region 1 1985 HF Working Group and subsequently adopted should be noted. "In order to protect beacon operation on 14·100MHz, operation between 14·099 and 14·101MHz should be avoided. The International Beacon Project frequency on the 21MHz band should be 21·150MHz. In order to protect beacon operation on 21·150MHz, frequencies between 21·149 and 21·151MHz should be avoided". Radio Societies are requested to note these recommendations with particular reference to including them in contest rules.

Malta has now approved mobile operation for Maltese amateurs and SSTV on an experimental basis for club stations only.

Due to high levels of f.m. activity, the Swedish Society SSA have asked the Swedish PTT for a short term permission to operate repeaters in the 28MHz band.

## Marconi Weather Technology

Marconi Defence Systems have recently been awarded a £ million plus contract to develop Europe's first satellite based 200GHz Advanced Microwave Sounding Unit (AMSU-B). The equipment will be carried by a NOAA advanced TIROS-N weather satellite, to be launched by NASA in 1990 and will allow radiation temperature observation of the upper atmosphere, leading to a better understanding of weather patterns and more accurate met forecasts. Three of the five sensor channels will operate at frequencies near the strong 183GHz water vapour resonance, to sense water vapour profiles and precipitation over land and sea and are particularly sensitive to ice clouds. In conjunction with 60GHz oxygen absorption band sensors the position of frontal zones will be located with a resolution accuracy below 10km, marking not only zones of ascending and descending air masses, but also tops of heavy clouds.

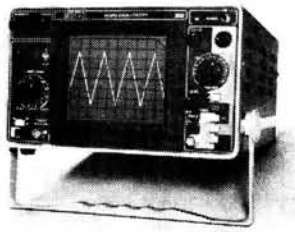
## New Scopes

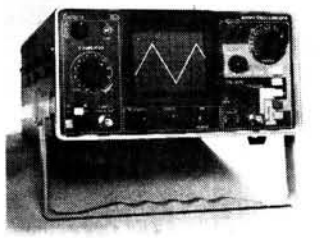
The oscilloscope has become an essential part of the amateur's test gear, particularly if he is into experimental work.

The two new single-trace instruments from Crotech have been designed with the hobbyist in mind and have bandwidths of d.c. to 20MHz and maximum sensitivities of 2mV/div. Timebases of both models are specified as 40 to 200ns/div with triggering to 25MHz in both auto and level modes.

The proven Crotech component tester has been incorporated into both instruments to allow the testing of semiconductor and passive components both in or out of circuit with the characteristics of the component under test displayed on the screen.

The main differences in the two models are the size of the display and the price.





The 3031 has a rectangular 95mm c.r.t. and is priced at £195 plus VAT while the 3036 has a 130mm tube and costs £216 plus VAT.

Further details from ***Crotech Instruments Ltd., 2 Stephenson Road, St. Ives, Huntingdon, Cambridgeshire PE17 4WJ. Tel: (0480) 301818.***

## DMM and Transistor Checker

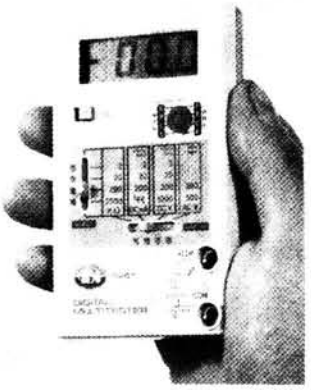
The new 528T multitester from Semiconductor Supplies International incorporates multimeter facilities as well as a transistor checking feature.

The instrument is housed in a convenient book-opening box and is supplied with a manual, battery, probe leads and spare fuse.

Readings are displayed on a 12mm high, $3\frac{1}{2}$ digit l.c.d. with overload circuit protection, automatic polarity and error adjustment facilities inbuilt.

Functions include a.c. volts to 500V over 2 ranges at ± 1·2% accuracy, d.c. volts to 1000V over 4 ranges at ±0·8% accuracy, d.c. current to 200mA over 3 ranges at ± 1·2% accuracy, resistance to 2MΩ over 4 ranges at ± 1% accuracy, and transistor $h_{FE}$ characteristic tests available for both *pnp* and *npn* devices.

The 528T measures 115 × 65 × 24mm, costs £30·50 plus VAT and £1·50 p&p, and is available from: ***Semiconductor Supplies International Ltd., Dawson House, 128/130 Carshalton Road, Sutton, Surrey SM1 4RS. Tel: 01-643 1126.***



## Tuner Kit

Electronic and Computer Workshop have introduced a kit to enable the enthusiast to make a high-quality f.m. tuner.

The kit is priced at £25.57 including VAT and postage, and contains a double-sided p.c.b. and all components needed to complete the tuner. Printed h.f. strip-line coils eliminate the need for adjustment and an h.f. pre-amplifier with a.g.c. is provided. Switchable a.f.c. and muting facilities are among the features. Tuning is electronic and the tuning meter output will drive a 2mA f.s.d. panel meter. The tuning range is 88 to 108MHz and the tuner operates from a 12V d.c. regulated power supply and overall signal-to-noise is 70dB with 50dB a.m. rejection for 30 per cent modulation.

A stereo decoder is also available if desired. Further details of the K2554 f.m. tuner kit are available from

***Electronic and Computer Workshop Ltd., 171 Broomfield Road, Chelmsford, Essex CM1 1RY. Tel: (0245) 262149.***

## ASTRID

Space can provide the stimulus to get teachers to link computers, electronics and radio technology with established subjects for students wanting to become the innovative engineers and scientists of the 21st century. So far, Britain is the only country to provide the initiative of free educational and scientific data from space, including pictures of earth and cloud formations, through two satellites—OSCAR 9 (UOSAT 1) and OSCAR 11 (UOSAT 2).


Now, communicating with these two satellites has been made easier with the introduction of ASTRID—Automatic Satellite Telemetry Receiver and Information Decoder—designed by Steve Webb and developed and produced by M M Microwave.

Priced at £149 including VAT and postage, the system includes receiver, decoder, antenna, power supply and leads, together with a test tape and display software, and should appeal to the serious home computer user and radio amateurs as well as schools. ASTRID will operate with any computer fitted with a suitable serial interface and was originally developed with the BBC-B. Recently, however, it has been adapted for the Sinclair Spectrum and other computers.

The antenna can be attached to a TV mast or even the garden fence, the only criterion being that it can see as much of the sky as possible.

Full details of ASTRID are available direct from ***M M Microwave Ltd., Kirkbymoorside, York YO6 6DW. Tel: (0751) 31620.***

## Spectrum Add-ons

For those of our readers with Sinclair Spectrum computers, and our recent survey showed that they are still very popular, there are a couple of new products just announced to enhance the usefulness of the basic model.

As supplied, the Spectrum will not drive a standard monitor, a failing which is now overcome with the introduction of the Adapt RGB Output module.

The module simply plugs into the expansion port at the rear of the computer and takes its power from the computer. To allow other peripherals to be used, a straight-through extension is provided and, unless your Spectrum is one of the early models, no internal connections or modifications are needed.

The output socket is identical to the BBC-B RGB output and the Amstrad monitor socket so that leads are readily available to couple to any RGB monitor.


For those owners of early Spectrums (pre-serial number D01/25500 or 001/35400) the necessary mods needed to actually get the required outputs at the expansion port connector are very simple and fully explained in the setting-up instructions supplied with the module.

The advantages of using a monitor make this addition very worthwhile, and at £36.95 plus £1 postage, direct from ***Adapt Electronics, 20 Starling Close, Buckhurst Hill, Essex IG9 5TN. Tel: 01-504 2840,*** Spectrum owners need feel inferior no longer.

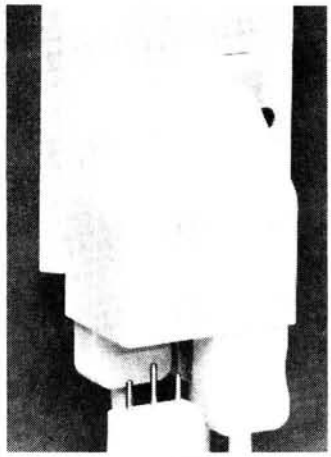
## Neater Mains Adaptors

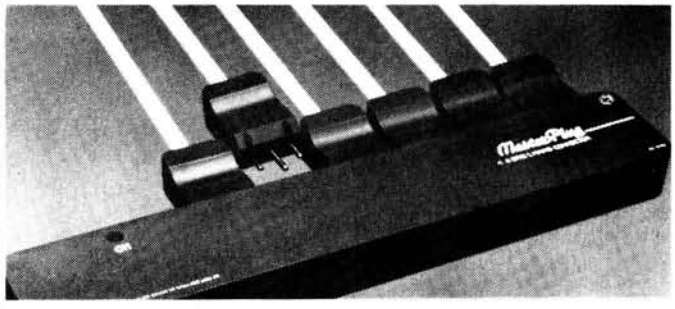
Most amateur stations have a jungle of mains leads under the bench all trying to find their way into one or two 13A sockets. These new adaptors from Conblock have been designed to be neater, more compact and elegant than others on the market.

The in-line six outlet adaptor comes complete with six plugs each having a maximum current rating of 6A and a total current rating of 13A. The use of a p.c.b. within the unit helps to keep the weight down as well as improve reliability. The six sockets are fully shuttered and, being moulded in polycarbonate, claimed to be virtually impossible to chip or break. Conformation with BS 5733 and Electrical Equipment Safety Regulations 1976 (Amended 1985) is claimed and it is supplied with 13A mains lead and plug, neon indicator and fixing screws.

Accepting four of the same 3-pin plugs as the six-way adaptor, the new four-way wallplug just plugs straight into any conventional 13A outlet.

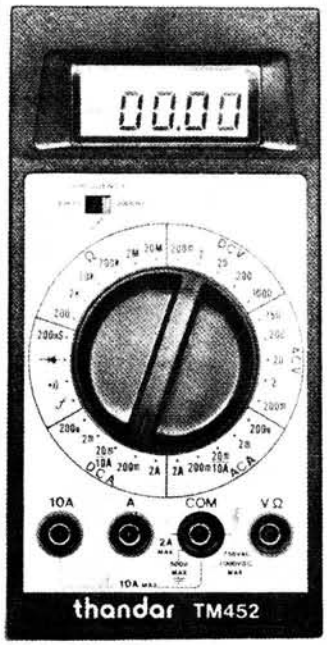
Both types are manufactured by ***Conblock Electrical Ltd., Mochdre Industrial Estate, Newtown, Powys SY16 4LF. Tel: (0686) 27100,*** and are available through most high street electrical stores.





## DMM with DFM Capability

A new hand-held $4\frac{1}{2}$-digit multimeter with in-built frequency counter has been added to the Thandar instrument range.




The TM452 has a basic accuracy of 0·05% and provides functions which include a.c. and d.c. voltage over five ranges; a.c. and d.c. current over six ranges; resistance over six ranges; conductance measurement facility; diode and audible continuity check plus frequency measurements from 20Hz to 200kHz in two ranges.

Supplied complete with probes and housed in a rugged plastics case, the TM452 costs £138·50 plus VAT.

For further information, contact: ***Thandar Electronics Ltd., London Road, St. Ives, Huntingdon, Cambridgeshire PE17 4HJ. Tel: (0480) 64646.***

## DC to Light

A regular at rallies under the Fortop banner, Mike Austin has now branched out with his own company DC to Light.

His aim is to produce finished products to fill those parts of the market which are not reached at present or if they are reached it is with too highly priced goods.

The company's first products are a 50MHz transverter with 144MHz i.f., a 430MHz ATV transceiver, power supply, demodulator/v.s.w.r. bridge/power meter and a range of stacking units to hold all the individual units.

Mike reckons that the days of amateur equipment being sold in "black die-cast boxes" is over and he believes that the use of smart black and alloy instrument cases will make his range more appealing.

Further additions to the range will be available shortly and will include 1·3GHz f.m. ATV and a dedicated 144MHz talk-back transceiver.

Further information and a short-form catalogue is available on receipt of an s.a.e. ***DC to Light, 15 Bursley Way, Bradwell, Stoke-on-Trent ST5 8JQ. Tel: (0782) 639406.***

# Coaxial Cables & Test Gear-1

*Dave Coomber G8UYZ takes a look at coaxial cables and some of the formulae associated with them in Part 1*

By 1923 or so, the construction of the concentric cable carrying around 660V was well known and in commercial use. Rubber insulation was replacing the "gutta percha" of earlier times, and waxed paper and fibres were, and still are, also used. The three-core "delta" layouts were common, and listed for alternating currents[1].

Concentric cable had been in use for some years, but the coaxial cable as we know it apparently developed as a result of a need for a single buried cable for long distance signalling. Telegraph engineers were aware that kilometres of parallel wires were not without their own particular brands of headache. It might fairly be said that the father of the modern coaxial cable was C. S. Franklyn, who was one of Marconi's team about 1926. Having been invented, a great many clever fellows devised all manner of formulae to tell each other why it worked. Some of the formulae are really quite useful to the average radio amateur in his given pursuit of "self training".

## The Maths

Put simply, the actual mechanism of the coaxial cable may be thought of as a uniformly distributed series of inductors (in series) and capacitors (shunt), Fig. 1, which need charging. Such a process takes a little time, which is why it takes longer for an r.f. signal to travel in a coaxial cable than in air. In real terms, there are two more variables used: Leakance ($G$) between the conductors (which is proportional to frequency) and Resistance of the conductors ($R$).

Let us deal with applications of the various formulae. We'll start with impedance:

$$Zo = 10^3 \times \sqrt{\frac{L}{C}}\ \Omega$$

where:

$L$ is the inductance in µH per unit length

$C$ is the capacitance in pF per unit length

You will see quite a lot of the terms $L$ and $C$ in these formulae. They really are important, since one of the most common analogies for a length of coaxial cable is that of a length of $L$s and $C$s all together. It is from these that we get the permittivity, $e$, which we will see later on. So if you've an LCR bridge in the shack, you can make good use of the surplus coaxial cable that often may be found at the local Rally junk stall. If you do not have an LCR bridge handy, the following may be of help:

$$L = 0{\cdot}46 \times \log_{10}(D/d)\ \ \mu\text{H per m}$$

$$C = \frac{(24{\cdot}1 \times e)}{(\log_{10}(D/d)}\ \ \text{pF per m}$$

where:

$D$ is the outer conductor diameter

$d$ is the inner conductor diameter

$e$ is the permittivity (dielectric constant) of the insular

The more often quoted formula for Zo is an old friend:

$$Zo = \left(\frac{138}{\sqrt{k}}\right) \log_{10}(D/d)$$

where:

$D$ is the outer conductor diameter

$d$ is the inner conductor diameter

$k$ is the dielectric constant

I have used $k$ in this formula as it tends to be used more often than $e$ in RSGB books. The 138 is a constant found in the calculations involving the impedance of free space and the speed of light.

The general construction of coaxial cable can be seen in Fig. 2. There are many variations on a theme and so I have deliberately ignored those with sheaths and screens which are more often used in specialist jobs such as Cable TV.

Another useful formula is that which can show us why there is a difference between physical and electrical wavelength. The factor is the Velocity Propagation Factor:

$$v \propto \frac{1}{\sqrt{LC}}\ \text{metres/sec}$$

The v.p.f. is usually quoted as a percentage of the speed of light, or a decimal equivalent (0·66 or 66% for example).

Some of the more common values of velocity propagation factor ($v$) are shown in Table 1.

| | | |
|---|---|---|
| Solid Plastics | 0·66 | (as used in UR67) |
| Foam Filled | 0·65 | (some TV cables) |
| Air | 1·0 | (used in commercial TX) |
| Semi-Air | 0·85 | (nylon with airways, low-loss TV) |
| pvc | 0·4-0·5 | (rarely used, audio and video) |

In any dealings with coaxial cables the dielectric constant, $k$ (or permittivity, $e$), is referred to quite frequently, so a little digression into capacitors may not be amiss.

There are three parts to the simple formula for capacitance. They are:

the distance between the plates

the area of the plates and,

the dielectric constant.

It is the latter which can determine a larger or smaller physical size and the voltage rating. If you change the dielectric of a capacitor then the voltage rating and the capacitance value changes. If you move the plates closer together then you can increase the capacitance.

It is the same principle with coaxial cables, a smaller diameter cable will have lots of C and a larger diameter one, although more expensive to produce, will have lower C and therefore lower losses. It's like a balancing act, a matter of compromise.

Some of the more common insulators and their $k$ or $e$ value is shown in Table 2.

| | | | |
|---|---|---|---|
| Dry Air | 1 | Birch | 5·2 |
| Paraffin Oil | 2·7 | Cellulose Acetate | 3–7 |
| Vaseline Oil | 2 | Nylon | 3–4 |
| Dry Paper | 2–3 | Paxolin T | 4·9 |
| Paraffin Wax | 2·3 | Paxolin C | 4·6 |
| Transformer Oil | 2·1–2·3 | Silica | 3·6 |
| | | Tufnol | 5 |
| Mica | 8 | Pure Water | 75 |
| pvc | 4–12 | Slate | 12 |
| Polythene | 2·25 | White Wood | 1·7 |
| Oiled Teak | 2·7 | Oak | 3·3 |

One of the more important formulae, particularly at v.h.f. and above, is that for attenuation.

$$At = 4{\cdot}34((G \times Zo)) + (R/Zo)\ \text{dB per unit length}$$

where:

$G$ is leakance in Ω per unit length

$R$ is resistance in Ω per unit length

$Zo$ is the characteristic impedance in Ω.

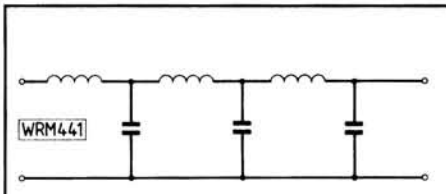



Fig. 1

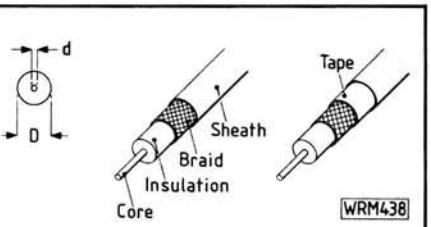



Fig. 2

This formula introduces two new variables, *R* and *G*. These represent the losses in the conductors and dielectric respectively.

Another formula that calculates total attenuation is:

$At = Ac + Ad$ dB per m

where:

$Ac = (36{\cdot}1/Zo) \times ((1/D) + (1/d)) \times \sqrt{F}$

$Ad = 9{\cdot}1 \times \sqrt{k} \times Tan\ X \times F$

where:

*Zo* is characteristic impedance in Ω

*D* is the outer conductor diameter in mm

*d* is the inner conductor diameter in mm

*k* is the dielectric constant

*Tan X* is the loss angle of the dielectric

*F* is the frequency

A rule of thumb for rough calculations of attenuation at other frequencies than that given for a piece of cable is:

If you double the frequency you multiply the attenuation by $\sqrt{2}$ (i.e. 1·414).

For example:

3·4dB attenuation at 50MHz becomes

3·4 × 1·414 = 4·8dB at 100MHz or

4·8 × 1·414 = 6·8dB at 200MHz or

6·8 × 1·414 = 9·6dB at 400MHz so, for 432MHz a "guesstimation" of 10dB won't be too far out.

## Transmission Lines—Uses and Abuses

It's one thing knowing all the formulae, but quite another putting them to some use.

Perhaps the most practical use is the explanation of reflected power along matched and mis-matched lines. An illustration of what happens in these conditions is shown in Fig. 3. The circuit in (a) is a matched line where a generator (*Vs*) with an impedance (*Zs*) is connected to a transmission line (*Zo*) with a load across the line ($Z_L$). As the load is only resistive and $Z_L = Zo$ the current along the line "sees" the load as more transmission line of the same characteristic impedance. So it is said that the power travels along the line to the load where it is absorbed (remember Ohms Law!).

Now let's look at (b), a mismatched line. The load impedance ($Z_L$) has changed and so the circuit no longer "sees" the load as more transmission line of the same characteristic impedance. The more the load impedance is different from *Zo*, the more the circuit is mismatched. The power travelling along the line is not totally absorbed this time as $Z_L$ requires a different voltage-to-current ratio than that travelling along the line. This means that $Z_L$ only absorbs some of the power, the rest is reflected (just like light on a mirror) back towards the generator (the source). This power is called the reflected power and the more the circuit is mismatched the more power is reflected back towards the source.

This example is admittedly somewhat simplified and is fine for resistive loads, but we will not get very far without those two well-known components *L* and *C*. If you had a matched, infinitely long line, then all the power generated would be absorbed by it, as it would forever be charging the *L* and *C* of the line. At the far end of the line shown in Fig. 4 (a) is an open circuit, which will have high voltage and no current at that point. This is duplicated every half wave back to the generator. The open circuit end may be regarded as capacitive, so when the capacitor "discharges", it behaves like a source of energy. If the line were short-circuit, Fig. 4 (b), the end would behave as an inductor, whose "field" collapses, thus behaving as a source of energy. When the line is correctly matched, however, *L* and *C* are in "balance", and little or no reflected energy is apparent. In practice, a line long enough and with sufficient attenuation would work as a dummy load, since the reflected wave would be absorbed by the line.

It should be noted that even a well connected load will present an impedance to the line, even if only because it represents a discontinuity, or change in the type of line. For this reason, it is always better to use the best connectors you can afford, especially at the v.h.f./u.h.f. end of the band spectrum.

Unless you have access to some very pricey test gear, I would suggest that you don't believe a v.s.w.r. reading of lower than 1·2:1. There is a good chance that it may suffer measuring errors, and therefore not be the right measurement. All you have to remember is that less than 1·5:1 is reflecting less than 4 per cent, so further attempts to get the apparent reading lower could be a waste of time. Undue standing waves can be due to a variety of sources. Ingress of moisture, badly made connections and even too tight and too regular cable clipping can all have their effect. The latter causes an effect sometimes called "suck out" —which causes a friend of mine to lose one TV channel altogether! However, this is rare.

(1)—Hamsworths Wireless Encyclopaedia 1923.

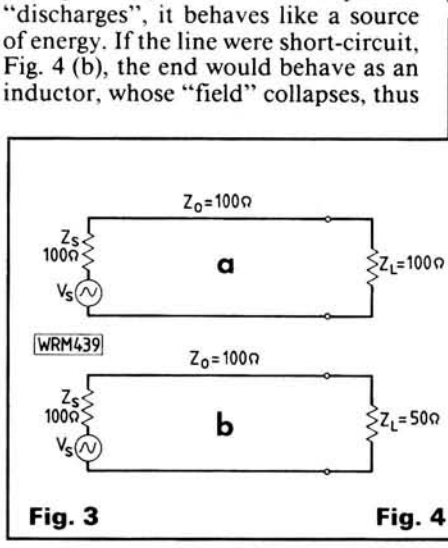



Fig. 3

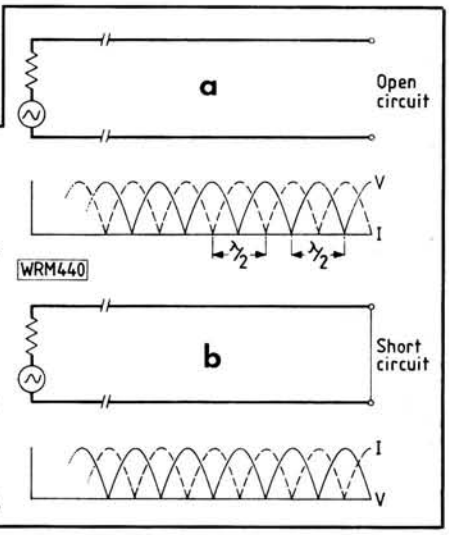



Fig. 4

# SWAP SPOT

Got a camera, want a receiver? Got a v.h.f. rig, want some h.f. gear to go with your new G-zero? In fact, have you got anything to trade radio-wise?

If so, why not advertise it FREE here. Send details, including what equipment you're looking for, to "SWAP SPOT", *Practical Wireless*, Westover House, West Quay Road, Poole, Dorset BH15 1JG, for inclusion in the first available issues of the magazine.

A FEW SIMPLE RULES: Your ad. should follow the format of those appearing below, it must be typed or written in block letters; it must be not more than 40 words long including name and address/telephone number. Swaps only—no items for sale—and one of the items MUST be radio related. Adverts for ILLEGAL CB equipment will not be accepted.

The appropriate licence must be held by anyone installing or operating a radio transmitter.

Have Leslie Organ Speaker, immaculate teak cabinet. Great sounds with adaptor for any organ. Would exchange for the following equipment: scanning or general coverage receiver, all mode 28MHz transceiver, FTV-901R 430MHz module, FV901DM v.f.o. or w.h.y. Bob Edge G0CDT, 6 Yeomans Way, South Anston, Nr Sheffield. *A763*

Have Yaesu FC-757 automatic antenna tuner, mint condition, also good 28MHz transceiver and 28MHz linear. Would exchange for good 144MHz multimode, scanner or other good equipment. G4VIO. Tel: 0388 763501. *A783*

Have over fifty 2V and 4V valves, English and foreign unboxed but v.g.c. Would exchange for mains signal generator 150kHz-30MHz any make. G. Coleman, 35 Ashfield Crescent, Lowestoft, Suffolk. *A786*

Have Elektor programmable disco display (Feb '84). Built and working with light display. Would exchange for AR-2001 or similar scanner. Cash adjustment if needed. B. Taylor, 189 Hawes Side Lane, Blackpool, FY4 4AJ. *A791*

Have Sony ICF-2001, Microwave Modules 144/28MHz converter, 6JS6C valves. Would exchange for w.h.y. N. Cameron, 16 St Mary's Cres, Westport, Co. Mayo, Eire. *A798*

# An External Ferrite Loop Antenna

*In common with many amateurs and s.w.l.s, Richard Marris G2BZQ has communications receivers covering short, medium and long waves. What about a ferrite rod antenna for receivers which require external long wire antennas?*

There are many excellent medium and long wave receivers of the older valve and transistor types, being used with external antennas. Or just lying idle and rotting away, assumed to be obsolete.

For example, the author has a Pye Export 9-Waveband Receiver (with 7 s.w. bands plus m.w. and l.w.) type 3017A which he has restored to its former glory. It is a valve radio—remember valves?—circa 1950. In an attractive polished wood cabinet, it looks like a piece of furniture! With an external antenna on all nine wavebands, its performance is superb, and makes many modern transistor radios look, and sound, like a very inferior product. No doubt many readers will think that this statement about the all-ruling, revered "transistor" is sacrilegeous, but the writer believes in quality of product, and there must be many such receivers being used.

The snag, in the author's case, is that the station's amateur transmitting antenna has to be connected to the Pye receiver to use it for everyday m.w. and l.w. reception.

Such being the case, it was decided to design a simple, external, ferrite loop antenna, for use on m.w. and l.w., for this, and similar receivers, and for communications receivers which also receive m.w. and possibly l.w. bands.

Design and construction are simple, and the results are excellent with good selectivity to reduce interference.

## Circuit

The simple circuit is shown in Fig. 1. It consists of a ferrite rod 200mm long onto which are mounted long wave, medium wave and output coupling coils. They are tuned, or resonated, by means of a standard two-gang 500 + 500pF variable capacitor. The variable capacitor was taken from a defunct transistor receiver, and all other items are available from component suppliers.

## Construction

The l.w. coil (L1) is fixed to one end of the ferrite rod, the coupling coil (L3) at the centre of the rod, and the m.w. coil (L2) to the other end of the rod, as shown in Fig. 2.

The ferrite rod assembly is mounted on a wooden boom 200 × 12·5 × 12·5mm as shown in the drawings. Details of the special plastics mounting clips are given in the parts list.

The assembly is fitted onto a clear plastics box, to protect the variable capacitor and keep it dust free. The dimensions are not critical, and any similar plastics box could be used. Under no circumstances should the moving plates of the tuning capacitor be connected to earth. A thick wooden block was fitted into the box to give weight and stability.

It will be noted that great care has been taken to avoid using metal in the construction. The wooden boom, bearing the ferrite rod assembly, is mounted as high as possible, away from the base, so that the antenna can be placed on the top of a metal-cased receiver. This is alright for reception of the usual BBC stations, providing, of course, that the receiver is not surrounded by other metal cased equipment or structures which might act as an r.f. screen.

## SHOPPING LIST

**Capacitors**

*Air-spaced Variable*

| | | |
|---|---|---|
| 500 + 500pF | 1 | C1,2 (See text) |

**Wound Components**

*Coils*

| | | |
|---|---|---|
| FRCC | 1 | L3 (Cirkit 35-00118) |
| LWC1 | 1 | L1 (Cirkit 35-00108) |
| MWC2 | 1 | L2 (Cirkit 35-00268) |

*Ferrite Rod F14 grade*

| | | |
|---|---|---|
| 200 × 10mm dia. | 1 | Maplin type 102 |

**Miscellaneous**

Ferrite rod clips, Cirkit 35-00128 (2); Plastics box 64 × 76 × 86mm; Wood (see text).

However, for best results, the antenna should be mounted as high and as clear as possible. The author uses approximately 1·2m of coaxial cable, so that the antenna is on a wooden shelf well above the receiver, but still within easy reach. The unit has been tried with a coaxial extension lead 5·5m long—well away from the receiver—with no deterioration of results, apart from having to walk across the room to make adjustments. The real answer is to find a clear spot, conveniently away from any metal objects and mains wiring, but within easy reach to make the necessary adjustments.

It will be seen that a standard coaxial socket is mounted at the rear of the unit, so that it can be connected to the antenna input of the receiver with a coaxial lead. This method of connecting L3 to the receiver was found to be satisfactory in all cases. **PW**

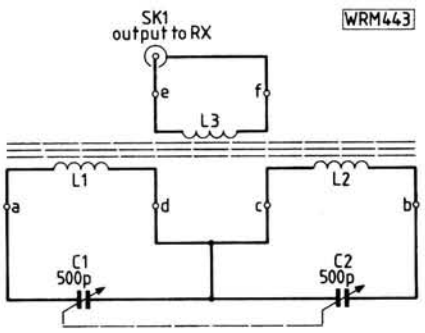



**Fig. 1**

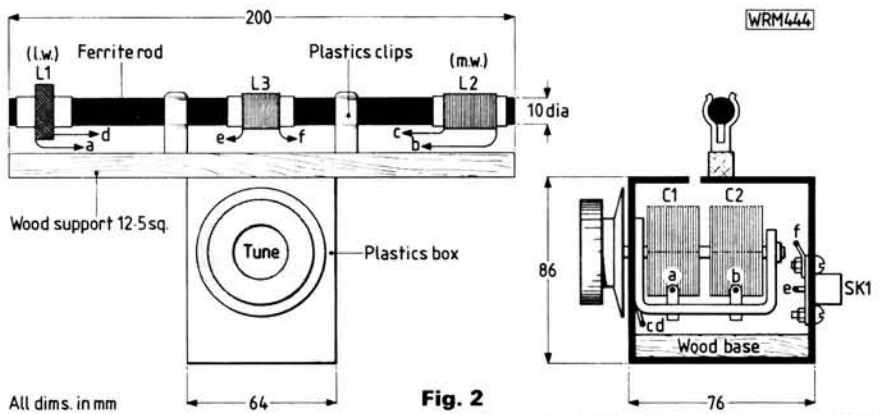



**Fig. 2**

# Antenna Tower Calculations

*This article, written by Sean Linehan EI7CV, was first published in the IRTS Newsletter. It is intended as a guide to anyone who may contemplate installing a tower in a concrete base or a stayed tower.*

Some of the figures may be taken as constants, the others such as tower height, width and weight will depend on the individual's own case, but the method of calculation remains the same, and the precise values of the variables may be substituted.

A typical example could be as follows:

Tower height—10m
Width at top—0·3m
Width at bottom—0·6m
Width of corner members—35mm
Width of diagonals—25mm
Weight of tower plus antenna—200kg
Wind speed—160km.p.h.
Weight of concrete—2400kg per cubic metre
Weight of earth—1600kg per cubic metre

The loads to be catered for in the design are:

(a) Wind on the antenna
(b) Wind on the tower
(c) Weight of the tower

A wind of 160km.p.h. will exert a pressure of 61kg per square metre on exposed surfaces. A typical 6-element beam has a surface area of 0·75 square metres. If we take an area of 0·836 square metres this will cater for the antenna, rotator and pipe.

Thus the wind load on these:

$= 61 \times 0{\cdot}836 = 51\text{kg}$

The moment at ground level:

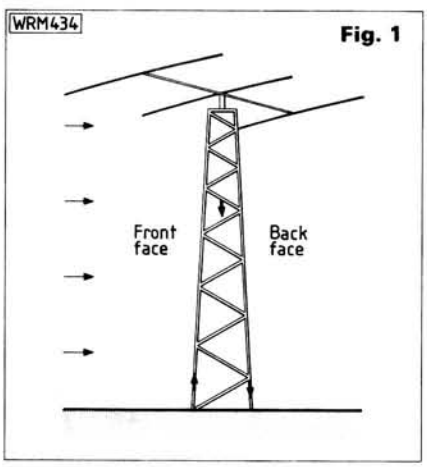
$= 51 \times 10 = 510\text{kgm}$

Next an estimate of the tower surface area must be made. The corners first:

$2 \times 10 \times 0{\cdot}035 = 0{\cdot}7\text{sq m}$

For the diagonals we shall assume 10 of average length 1m:

$10 \times 1 \times 0{\cdot}025 = 0{\cdot}25\text{sq m}$




The total surface area of the front face is:

$0{\cdot}7 + 0{\cdot}25 = 0{\cdot}95\text{sq m}$

We then have to take into account half the area of the back face, since this is partially shielded by the front face. So this is 0·475sq m.

Total area:

$0{\cdot}95 + 0{\cdot}475 = 1{\cdot}425\text{sq m}$

Thus the wind load on the tower is:

$61 \times 1{\cdot}425 = 87\text{kg}$

This acts uniformly along the whole height, but to find its moment at ground level we take:

27kg acting at 8m over ground = 216kgm
20kg acting at 6m over ground = 120kgm
20kg acting at 4m over ground = 80kgm
20kg acting at 2m over ground = 40kgm
Total = 456kgm

Therefore the total overturning moment is:

$510 + 456 = 966\text{kgm}$

The moment load per leg is:

$$\frac{966}{2 \times 0{\cdot}6} = 805\text{kg}$$

That is with 2 legs per face at a width of 0·6m.

We assumed the weight of the tower to be 200kg, or 50kg per leg, which acts downwards. Thus on the compression side we get:

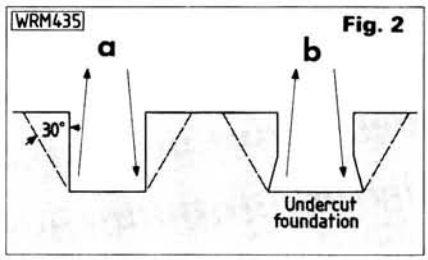
$805 + 50 = 855\text{kg}$ total downward load.

On the tension (uplift) side we get:

$805 - 50 = 755\text{kg}$ total upward load.

If the tower is placed in solid ground there is no need to make special provision for the downward load, so we now need to cater for an uplift of 755kg per leg. For a tower of this size, it would not be practicable to have separate foundations for each leg, so we consider a single block of concrete to enclose the four legs. Of this block, half can be considered as resisting uplift, thus we have to design for a block to resist an uplift of:

$2 \times 755\text{kg} = 1510\text{kg}$ (2 legs)




A suitable size of concrete block to enclose a tower of width 0·6m would be 1m square—which is about the smallest hole a man can dig without getting stuck on a pickaxe! If we dig a hole 1m deep and fill it with concrete, we will have 0·5 cubic m resisting uplift. In addition, an inverted half-pyramid of earth will help to resist uplift, its shape being determined by a 30° angle from the vertical at the bottom of the concrete block (Fig. 2(a) ).

An approximation for this volume of earth is:

$1 \times \frac{1}{3} \times \frac{1}{2} \times 1 \times 2 = 0{\cdot}33\text{ cubic m}$

This amount of earth weighs 528kg. As stated previously, we have 0·5 cubic m of concrete resisting uplift, and this amount of concrete weighs 1200kg. So the total weight resisting uplift is:

$1200 + 528 = 1728\text{kg}$

This is greater than the uplift load of 1510kg calculated previously, so this foundation would be adequate.

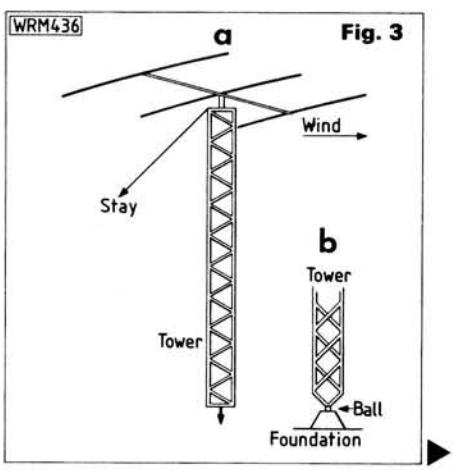
If we are placing the tower in solid ground, not prone to cave-in during digging, for any given size of excavation the strength of the foundation can be increased by undercutting the hole at the bottom by say 0·15m in the last 0·3m of depth, since the volume of earth resisting uplift will thereby be increased considerably. This undercutting should not be done until just before placing of concrete, to avoid danger of collapse (Fig. 2(b) ).

To summarise, a free-standing tower has no outside assistance in the form of stay-wires, and must be capable of resisting within its own structure, all the forces exerted upon it. The design is such that all the forces are transferred downwards and into the foundation, ending up as uplift forces and downward forces. These forces combine in trying to overturn the tower, and so the foundation is designed to resist all these forces without yielding.

## A Stayed Tower

A stayed tower relies on the stays for its stability and is by comparison with a free-standing tower, a relatively flimsy and flexible structure.

Under conditions of no wind, abso-



# Low-cost Trap Dipole

*After a long absence from the h.f. bands John Davies G3LJD was persuaded to return. His antenna array of five dipoles didn't impress his neighbours however, so some compromise was needed.*

How Much? & How Difficult? £3.50 Beginner

With a garden some 40 metres long the antenna system would seem to be no problem and five dipoles covering 3·5 to 28MHz were cut and erected, fed with 75Ω coaxial feeder. However, the neighbours didn't see eye to eye with the beauty of such a system and so the development and construction of a trap dipole was started.

The breakthrough came with the suggestion by Geoff Myatt G3FRN that double-sided, copper-clad board could be used for the capacitor and that its size could be decreased to reduce the capacitance and resonate the trap assembly to 7·1MHz.

Twelve of the traps described here have been made and have proved to be cheap and easy to construct as well as performing well.

## Construction

Two traps will be needed and the first stage is to prepare a suitable former on which to wind the coils. The former can be made from a short length of plastics or cardboard tube of 50mm outside diameter. Plastics waste pipe could be used but the thick cardboard tubes used to send drawings through the post are equally suitable. The length of tube required is about 75mm, and two holes about 4mm diameter are made in the wall of the tube about 50mm apart and centrally disposed along the axis of the tube.

A length of pvc insulation tape is wound around the tube, covering the space between the two holes, **adhesive side outermost.** Strips of the tape, about 12mm wide and 70mm long are next placed along the axis of the tube, **adhesive side outermost** (1). The pvc covered copper wire is passed through one of the holes in the former with about 75mm inside the tube. The wire is then wound around the tube **tightly** and close-spaced, over the adhesive tape for nine complete turns (2). The adhesive strips can now be folded over the windings to hold them firmly and closely together, ensuring that only the nine turns are so bound and that the ends can be pulled out of the holes and left free (3). The coil is now slipped off the former and the rest of the tape slit and wrapped around the coil, finishing with a length of tape, **adhesive side innermost,** around the outside of the coil (4). You should now have two coils each with nine complete turns and with long enough ends to make up the turns to nine and a half.

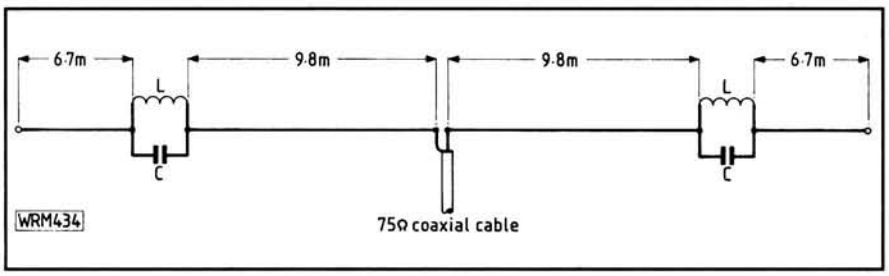
The double-sided p.c.b. material, which should be of the glass fibre variety both for its strength and its moisture-resistant properties, is now prepared as the drawings show with the two holes fitted with plastics eyelets of the snap-together type as sold by camping shops and boat chandlers. Obviously metal eyelets cannot be used as they would short out the capacitor and coil! It is better to make the board oversize than undersize as it is easy to trim the length to reduce the capacitance but very, very difficult to make it larger to increase the capacitance!

The p.c.b. is slipped inside the coil, and it should be a reasonably tight fit, with the coil ends positioned as shown in the drawings. Note that if the tube used for the former is not exactly 50mm outside diameter then the p.c.b. should be cut to suit the former.

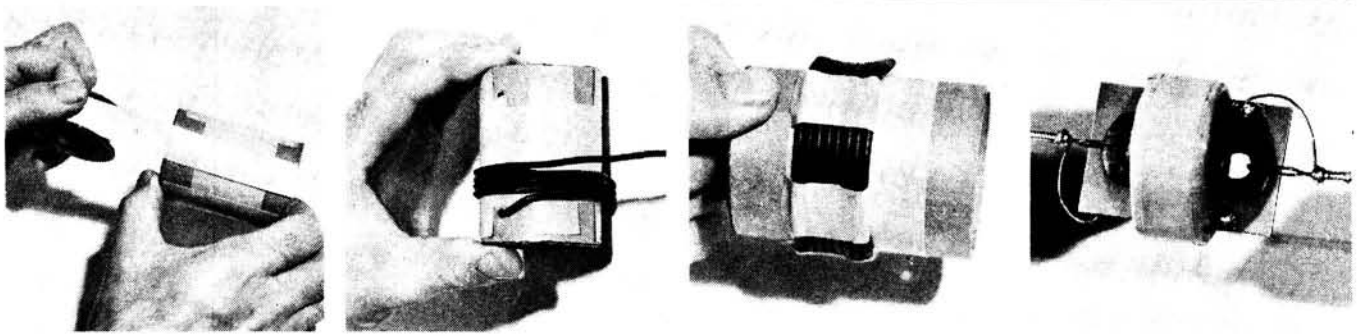
The coil ends are made off and soldered to opposite sides of the p.c.b. ensuring that you end up with the required extra half turn over the full nine turns.

## Tuning

The two traps are now ready to be resonated to the desired trap frequency, suggested at 7·1MHz. For this operation you will need a g.d.o., or




## Picture Sequence for Construction



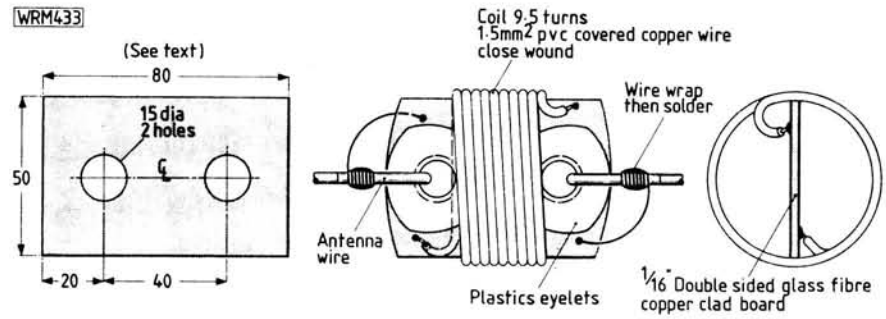
1 2 3 4

f.e.t.d.o. such as the one described in the October 1985 issue of *PW*, and a means of cutting the p.c.b. or removing areas of the copper.

Using the g.d.o. to measure the resonant frequency of the trap, carefully either remove the copper or cut away the corners of the board, as indicated in the drawings until the trap is resonant at 7·1MHz.

## Finishing and Installation

The antenna wires can now be fastened to the traps ensuring that the overlap of the wire ends are securely bound and completely soldered, again as shown in the drawings so that you have a good electrical and strong mechanical joint. The other ends of the copper wire used to bind the joints are soldered to opposite sides of the p.c.b. to connect the trap to the antenna wires. The completed traps must be weatherproofed using either a proprietary antenna sealing compound or car body sealant underseal, ensuring that every bit of the trap assembly is sealed. ***PW***




**SHOPPING LIST**

Cardboard or plastics tube 50mm outside diameter, 75mm long; PVC-covered copper wire 1·5mm² x 4m long (suggested source is a 2m length of 1·5mm² twin and earth electrical cable); Double-sided glass fibre p.c.b. material 80 x 50mm x ⅛in (2); Plastics "snap and fix" Arro eyelets (2); PVC insulating tape; Waterproofing material.

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**25** ▶ lutely still air, the only forces acting on the tower are due to the weight of the antenna and its own weight. These are transferred down through the structure and end up as a simple vertical load. When a wind blows on the tower and antenna, the stays are called upon to resist this force. Ideally, stays should come out horizontally from the tower, and in such a situation the wind force would be resisted by the stays, and the only forces transferred down through the tower would be the original vertical load.

In practice however, we have to bring the stays down to anchorages at ground level so we get involved in calculations of a triangle of forces, since a stay inclined at an angle below the horizontal introduces additional vertical loads in the tower. If we assume that the stay is inclined at an angle A° to the vertical, then:

$$\sin A = \frac{\text{wind force}}{\text{stay force}} \text{ and}$$

$$\tan A = \frac{\text{wind force}}{\text{tower load}}$$

If for example we installed a stay an an angle A = 45°, and if the wind force was 100kg then:

$$\sin 45° = \frac{1}{2} = \frac{100}{\text{stay force}}$$

$$\text{Stay Force} = 100 \times 2 = 141\text{kg}$$

$$\tan 45° = 1 = \frac{100}{\text{tower load}}$$

$$\text{Tower load} = 100\text{kg}.$$

If the stay was at an angle of 30° to the vertical then sin A = 0·5 and tan A = 0·58. Thus for a wind force of 100kg the stay force would be 200kg and the tower load would be 172kg.

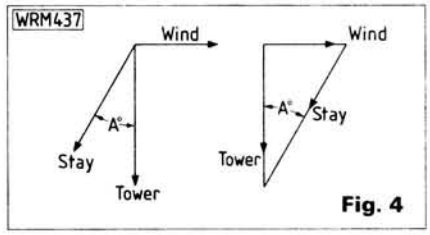

**Fig. 4**

So we see that a horizontal stay takes a pull equal to the wind force and exerts no additional load on the tower, a 45° stay takes 1·41 times the wind force and imposes a tower load equal to the wind force, and a 30° stay takes twice the wind force and imposes a tower load 1·72 times the wind force.

If we refer back to the first example we see that the 160km wind load on a 6-element beam is 61kg. If we assume a wind load of 30kg acting on the top section of the tower body itself, we have a total wind load of 91kg.

With 45° stays, the corresponding stay force would be 128kg, and the tower load would be 91kg.

With 30° stays, the corresponding stay force would be 182kg, and the tower load would be 157kg.

From a practical point of view, we should try to have the highest stay on a tower at 45° inclination, if possible. In cases of space restriction we could reduce this to 30°, but doing so introduces quite severe loads in the stay and in the tower.

To determine the size of wire necessary for a given installation, the wind forces acting on the antenna and tower can be calculated as before and a suitable wire selected from the makers data for safe loadings. It is important that staywires are terminated on suitable galvanised steel or plastics thimbles available from builders providers and ships chandlers to ensure that excessive bends are not made which would weaken the wire. Turnbuckles are recommended for adjusting the tension in the stays. They should not be over-tightened, merely made secure enough to resist the wind forces without pre-stressing.

In regard to the foundation, a massive block of concrete of 1 cubic metre (such as was called for in the case of the free-standing tower) is not necessary. For a typical installation, say two 6m lengths of triangular TV antenna tower, assuming that the ground is solid, not boggy or waterlogged, a pad of concrete 0·6m square by 0·25m thick on a base of gravel would be ample. A few bolts may be embedded in the concrete to provide an anchorage for the tower which simply sits on the concrete, the bolts serving merely to resist any tendency for the tower to skid sideways. The nuts on these bolts need only be hand-tight. Large commercial towers, such as for TV broadcast stations, very often have the tower coming to a point at the bottom, with provision for a large ball-bearing on which the tower rests (Fig. 3).

Three stays are sufficient at any one level; do not attempt to install four or more stays since it can be very difficult to tension them equally. In the case of the 12m tower mentioned, stays would be required at the 6m and 12m levels. If short sections were used, such as 3m sections, it would be advisable to install stays at each joint. ***PW***

# Broadside and Endfire Antenna Systems–3

*F. C. Judd G2BCX tackles the practical aspects of phased arrays*

The first part of this series dealt with the basic method involving the use of a pair of phased λ/4 vertical antennas and the various radiation patterns that can be obtained. It is now time to consider some practical construction, but first some brief details of a commercial system at present on the market.

Telex Communications Inc. of the USA manufacture a series of multi-band antennas, distributed in the UK under the brand names Telex and Hygain. Of these a pair of their 18HT HY-Tower, multi-band, omni-directional verticals can be arranged to provide bi-directional radiation, broadside or endfire, on one or two particularly favoured bands. Change of direction is effected by switching in extra sections of phasing line to the feed system.

The example shown in Fig. 3.1 is for a single band i.e. 7MHz. In the broadside condition the dual radiation pattern has a beamwidth of 60 degrees at −3dB and a forward gain from each lobe of 3·86dB over that obtainable from a single vertical radiator. In the endfire condition the beamwidth is 80 degrees and the gain 2·3dB, also relative to that from a single vertical radiator. The system can be fed directly from a 50 ohm coaxial line. A single 18HT antenna will cover the bands 3·5MHz through to 28MHz, with band selection being obtained by a stub decoupling method.

This antenna system can also be made to operate on 1·8MHz by the addition of a base loading coil. With extra switching and phasing cable sections, a pair of 18HT antennas can be made to function in either broadside or endfire condition for both the 3·5 and 7MHz bands. Other combinations are possible but are too detailed to cover in this article. Interested readers may obtain the Telex/Hy-Gain leaflet called *Amateur Phasing—Engineering Report*, from the UK distributors, ***South Midlands Communications Limited, SM House, Rumbridge Street, Totton, Southampton, Hants.*** This leaflet illustrates the numerous combinations and polar patterns (directivity) possible with phased pairs of vertical 18HT antennas.

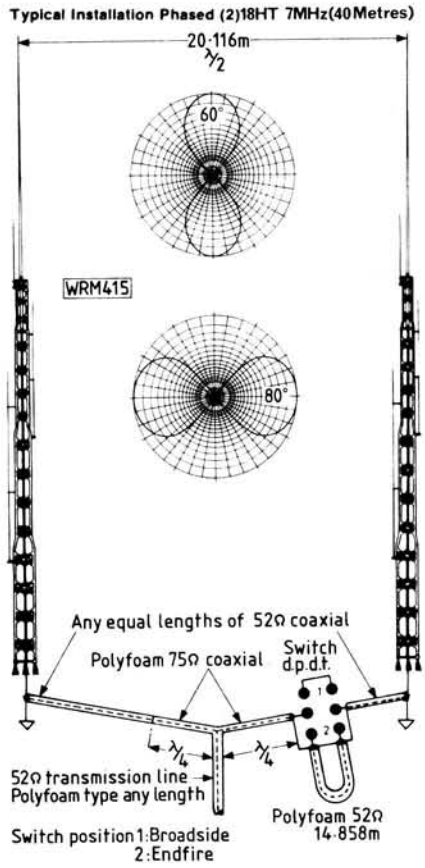


**Fig. 3.1: Example Telex/Hygain system used to obtain endfire or broadside radiation from a pair of 18HT multi-band verticals**

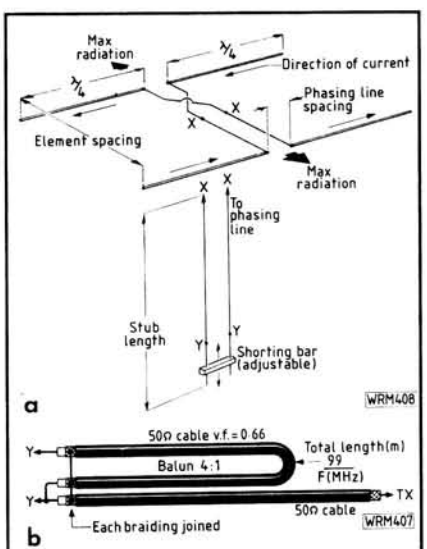


**Fig. 3.2: (a) The W8JK Flat-top endfire array; (b) 50Ω coaxial balun constructional details**

## Combination Driven Arrays

It should be mentioned that the antennas to be described are fairly large and are for single band operation. Broadside and endfire systems with colinear elements can be combined to

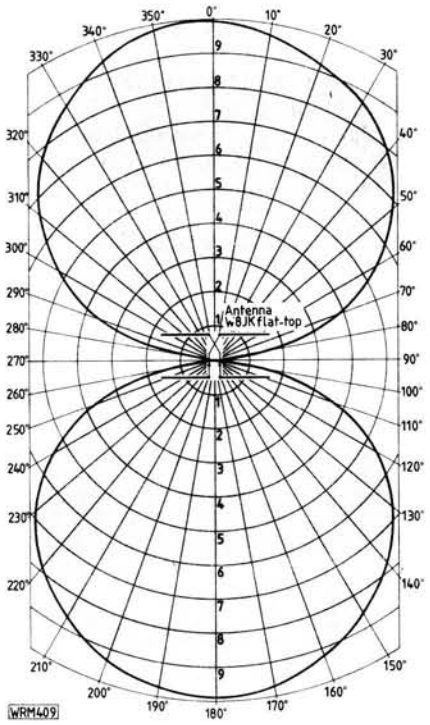


**Fig. 3.3: The freespace horizontal radiation pattern of the W8JK 2-element Flat-top beam**

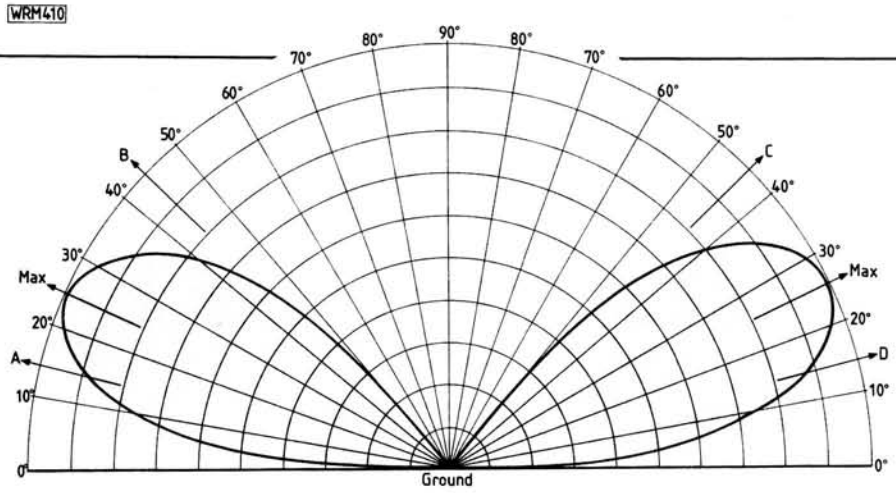


**Fig. 3.4: Vertical angle radiation W8JK at λ/2 above ground. Arrows A–D indicate max. radiation when λ above ground**

provide increased gain and sharper directivity—the combinations possible are almost endless. (More information on the subject and various other designs may be found in the references given). Two will be described and these are the basic W8JK Flat-top, a horizontal two λ/2 element endfire system and a two-element colinear broadside array known as the Lazy H.

There are numerous configurations of the W8JK Flat-top, the most simple being illustrated in Fig. 3.2 (a). The two λ/2 elements are driven in phase opposition (180 degrees out of phase with each other) to provide wide angle bi-directional radiation at right angles to the plane of the antenna, as shown in Fig. 3.3. The gain available is in the region of 4dB with λ/8 spacing between the elements. The vertical radiation pattern for a height above ground of λ/2 is shown in Fig. 3.4. The arrows marked A, B, C and D show that if the height is increased to one wavelength (λ) there will be four main lobes, with maximum radiation at the angles indicated by the arrows.

Matching a 50 ohm coaxial cable to this antenna is achieved by using a closed stub connected at the phasing line junction marked XX in Fig. 3.2 (a). This is used in conjunction with a 4:1 balun terminating the 50 ohm feed cable and coupled to the stub at the points marked YY, which are determined when carrying out adjustments for minimum v.s.w.r.

Dimensions for the element lengths, spacing and matching stub of the twin-element W8JK, illustrated in Fig. 3.2 for the 7, 14, 21 and 28MHz bands, are shown in Table 3.1. All dimensions quoted are in metres. The actual cable length of the λ/2 coaxial balun section, assuming a velocity factor (v.f.) of 0·66 and band centre frequency, is also given in the Table. If the antenna is scaled for a different band the λ/2 section can be found from the formula

$$L = \frac{99}{F} \text{ metres.}$$

The width of the matching stub is the same as the phasing line spacing.

The wire elements may be secured at the required spacing by spreaders made from wood dowel or bamboo of 24–40mm diameter. Wire for the elements, the phasing line and matching stub should be 1·6–2mm, hard drawn or pre-stretched. Spreaders should be given at least two coats of good quality varnish. All joints in wires are soldered and the crossover point in the phasing line arranged so that the wires cannot touch. The feed cable and balun connections must be covered to make them waterproof, self-amalgamating tape is best for this job. A suggested method of construction is illustrated in Fig. 3.5.

Tuning the antenna before connecting the balun and feed cable can be carried out with the aid of a grid-dip meter loosely coupled to the shorting bar at the bottom of the matching stub. The bar is then moved up or down to obtain resonance at mid-band. The balun and feed cable may then be connected and the tapping points YY selected for minimum v.s.w.r. The shorting bar may require a slight further adjustment to obtain the lowest possible v.s.w.r.

## The Lazy H

This is a very effective beam antenna with a gain of about 6dB at centre frequency. It is a broadside array and arranged so that the elements are one above the other as in Fig. 3.6. Each element is a full wavelength (two λ/2 sections per side) and each is fed in phase. They behave as colinear elements so basically we have a four λ/2 element colinear system with the currents in each λ/2 element in phase with each other, hence the crossover phasing lines. Current directions in the system are indicated by the arrows.

Radiation in the broadside condition of this antenna is indicated by the large arrows in Fig. 3.6. The circuit *Q* of the antenna is lower than obtained with a twin-element W8JK Flat-top, so the Lazy H has a wider frequency response and hence a generally more even v.s.w.r. across the band. The free-space horizontal radiation pattern is shown in Fig. 3.7.

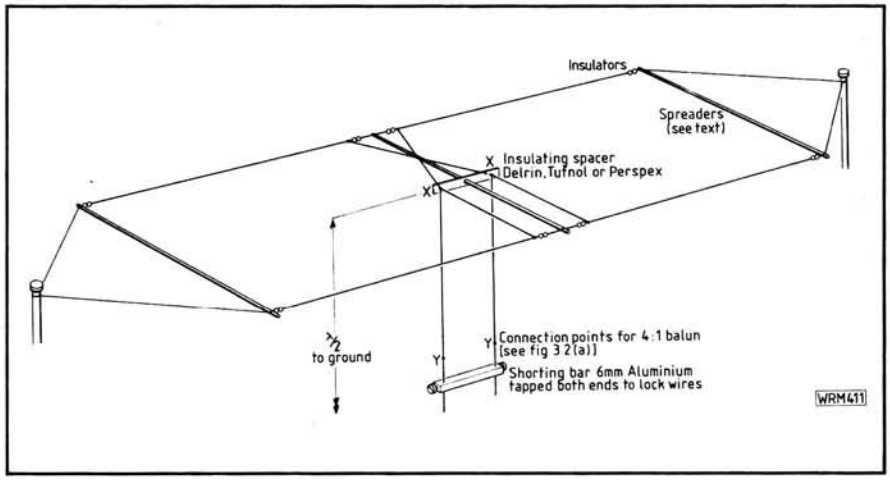


**Fig. 3.5: Suggested constructional details of the W8JK 2-element Flat-top beam**

**TABLE 3.1**

| Band | Element spacing | Half element length | Phasing line spacing | Matching stub length | Balun length |
|---|---|---|---|---|---|
| 28MHz | 1·524 | 2·590 | 0·305 | 2·132 | 3·432 |
| 21MHz | 2·032 | 3·429 | 0·305 | 2·590 | 4·664 |
| 14MHz | 3·175 | 5·181 | 0·305 | 3·657 | 6·984 |
| 7MHz | 6·350 | 10·210 | 0·588 | 7·924 | 14·043 |

# AMSTRAD PCW8256

## Personal Computer Word Processor

*It is reckoned that more microcomputers are used in industry and commerce for word-processing than for any other single application. Surprisingly in many ways, many home computers are also beginning to be used for word processing. Amstrad, never slow to spot a trend, have capitalised on this with the PCW8256, which we review this month.*

Whatever is word processing anyway, some of you may be asking. Well, consider it as a sophisticated electronic typewriter which, instead of reproducing your typing character-by-character or line-by-line directly onto the paper, stores it in memory and displays it on a monitor screen while you correct spelling mistakes, re-arrange sentences and paragraphs until you are entirely happy with it. Only then do you print it out on paper. The main attraction for the home-computer user is probably that even a one-finger typist can produce an immaculate letter with a little practice.

Now, what's so special about this new Amstrad machine? Well, there are usually two approaches to word-processing. One is the dedicated word-processor, which is a microcomputer designed to do that job, and that job only, with clearly labelled keys for such things as DELETE, INSERT, CUT, PASTE, COPY, etc., but you can't use it as a computer. The other is the general-purpose micro which can be used for w.p. with the appropriate software, but has the disadvantage that the various editing keys are marked with cryptic codes, or at best some sort of overlay label is provided. The PCW8256, on the other hand, has all the usual w.p. function keys, but by loading the appropriate software can also be used as a general-purpose microcomputer.

The PCW8256 comprises computer (Z80A processor and 256KB of RAM, of which about 112K is configured as RAM-disk, giving greatly increased speed of memory access), 14in green-screen monitor (90 columns × 32 lines display), integral 3in floppy disk drive (2 × 180K formatted), keyboard (82 keys), and dot-matrix printer (20 c.p.s. in near-letter-quality or NLQ mode, 90 c.p.s. in draft mode, with tractor feed and automatic single-sheet feed). The cost of this outfit is kept down by the use of custom-designed l.s.i. chips for printer and keyboard control, and concentrating all the electronics apart from the keyboard controller in the monitor unit, run from a single power supply. More about that later.

Software supplied includes LocoScript word processing, featuring pull-down menus and a selection of type pitches and faces. An attraction for radio and electronics work is the inclusion of super-scripts and sub-scripts and all the commonly used Greek characters. The CP/M+ (CP/M3.0) operating system gives access to a host of standard software such as spreadsheets, databases, etc. A second disk carries Locomotive Software's Mallard BASIC and Digital Research Dr Logo.

Optional extras available are an RS232 Serial and Centronics Parallel interface, which plugs onto an edge connector on the back of the monitor, and a second floppy disk drive (720KB formatted capacity) which fits in place of the label plate below drive A on the monitor front panel.

## Impressions

Such was the demand for evaluation models that we could borrow a PCW8256 for only one week. There was something wrong with the BASIC/Dr Logo disk, so I was unable to check those features within the time available. Two thick instruction books are provided, one for BASIC and the other for LocoScript, CP/M and Dr Logo. The LocoScript instructions lead the w.p. tyro gently through a series of exercises to demonstrate the various editing features available, but they do sometimes tend to stop short of telling you how to go on to apply that knowledge to real-life documents. In a machine so obviously aimed by its price at the newcomer to w.p., the instructions should be at the most elementary level. As it is, you have to discover some things by trial and error.

After a first session with the exercises, I went on to write and edit a real article using the more elementary w.p. features. All went well and I had just decided the article was in a state to be saved on disk when there was "splat" as one of the c.r.t. safety spark-gaps flashed over. The monitor screen went momentarily dark and the whole system reset itself to the switch-on state. Where was my article? You've guessed it—totally lost! After that, the system behaved itself for the rest of the week, but this is obviously a disadvantage of having a single power supply driving the monitor, computer, keyboard and printer. The display quality on the monitor is better than a TV, but not as good as a pukka monitor. I found it pleasant to use for some fairly extended operating periods. One odd thing about the monitor—the case looks as if it's meant to tilt and swivel on its base, but in fact it doesn't. The ribbon cable connection to the printer was a bit on the short side. If you put the printer on the left of the monitor you couldn't get at the paper-feed knob, and if you put it on the right it was pushing against the DIN connector for the keyboard. About 50mm longer would do the trick. The printer quality in either draft or NLQ mode was very acceptable.

A peep at the monitor innards showed them to be very clean in design and well assembled. Tests for radiated r.f.i. produced less happy results. There was some general hash over the h.f. bands close-in to the computer, but quite vicious harmonics of the 4MHz m.p.u. clock extended well into the v.h.f. bands and could be detected on a 144MHz hand-held at ranges of up to 5m. They were clean signals though, affecting a very narrow bandwidth.

## Price

The Amstrad PCW8256 is available at around £460 or less, including VAT, a very attractive package for the price. Our thanks for the loan of the review machine go to **Amstrad Consumer Electronics plc, Brentwood House, 169 Kings Road, Brentwood, Essex CM14 4EF, telephone 0277 228888.**

*Geoff Arnold*

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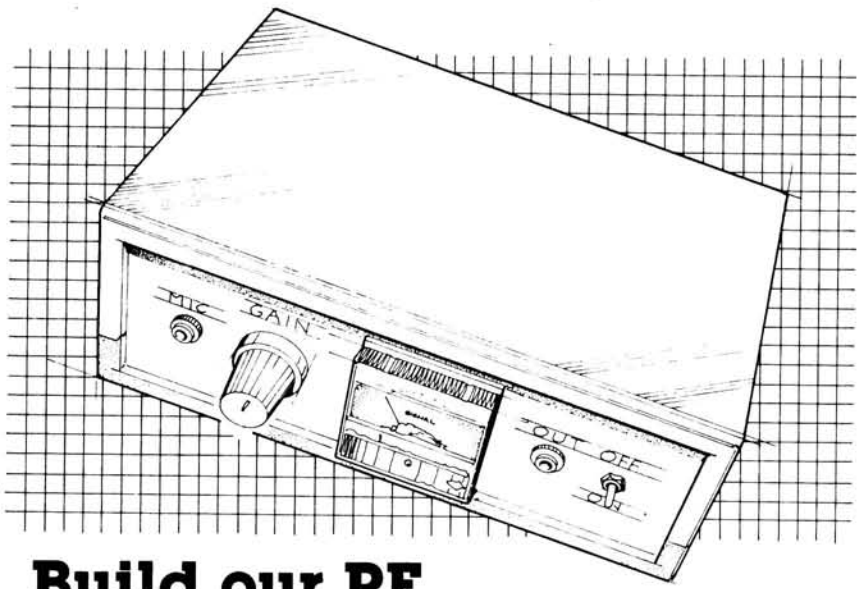


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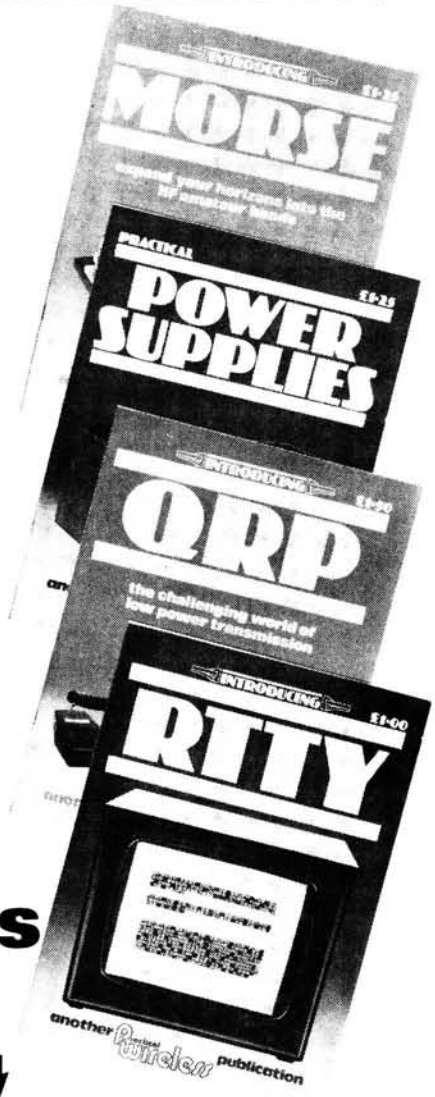


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Have Bronica ECTL camera 75mm lens, 2× converter, 50mm lens, spare back Pentaprism, filters, flash, s/h value £600. Would exchange for best h.f. bands transceiver offered. Dolphin, 3 Buckmore Avenue, Petersfield, Hants GU32 2EF. *A219*

Have 400mm tele-lens preset, Canon or Pentax mount. Would exchange for frequency meter up to 500MHz. Tel: 061-969 0394 early mornings after 7am. *A220*

Have Realistic 50-channel direct entry programmable scanner (v.h.f.–u.h.f.–f.m.–a.m.) PRO2002. Would exchange for general coverage s.w. RX, a.m./s.s.b. etc., Sony ICF7600DX or similar type suitable for a flat dweller. A. Whitehead. Tel: Sunderland 43868. *A507*

Have 5-digit 500MHz frequency counter, acoustic modem for 1200/75 baud rate with power supply and Jupiter Ace microcomputer with leads and manual. Would exchange for good general coverage receiver or multimode 144MHz transceiver plus cash adjustment. Adrian. Tel: Luton 459468. *A508*

Have electronic items. Would exchange for a video head-wheel with good heads for a Grundig SVR4004 video recorder. Write to: 112 Marsden Hall Road (North), Nelson, Lancs. *A531*

Have Merlin-Rocket 1437 MkXII plus "trailer" boat cover. Would exchange for receiver, i.e. FRG-7700 or IC-70. Tel: 061-998 6674. *A538*

Have brass key on wood plinth. Would exchange for 3·5–28MHz trapped dipole, or w.h.y. Also have four copies of *Radio & TV Servicing*—1965–69. Would exchange for recent copy of *World Radio TV Handbook*. Have four old copies of *PW*—1943–45, offers? Mr Aldridge, 5 Prodger, Longfield, London NW9 5TD. *A543*

Have Polaroid button camera. Would exchange for Tandy PRO20 4-channel scanner, cash adjustment possible. John GJ8RRP. No. 2 Thornley, Bagatelle Road, Jersey CI. *A556*

Have Icom IC-02E 144MHz handheld, keypad entry, l.c.d. readout, scanning etc., with soft case. Would exchange for Trio R-1000 receiver or SX-200N scanner. Also have Yaesu FP-80A p.s.u. suitable for the FT-480R, 290R etc. W.h.y? Ian. Tel: 0509 502989 after 6pm (Leics). *A558*

Have Olympus OM10 camera, 200mm Tamron lens, OM2 winder and Ded flash—all in custom case, mint. Would exchange for Yaesu or Trio general coverage receiver. Tel: Thursford 436 (Norfolk). *A604*

Have new Panasonic communications receiver, RFB600BE. Would exchange for AR-2001 in mint condition. W. J. Bannister, 3 Eastbourne Walk, Liverpool 6 1LW. *A626*

Have Vega 402D DXTV tunable v.h.f./u.h.f. and Antiference high gain antenna (never used outdoors). Would exchange for Sony portable communications receiver or w.h.y. Chorley. Tel: Lymington 45231 *A627*

Have JIL SX-400 professional scanner 26–520MHz (no gaps) in mint condition with p.s.u., only a few months old. Would exchange for Yaesu FT-757GX or Trio TS-430S. Tel: 0524 791414 (Lancs). *A658*

Have TR-3500 brand new, NiCads, charger and soft case. Would exchange for FT-790R or w.h.y. Also have Marconi signal generator 1·5–200MHz. Would exchange for h.f. beam, w.h.y? Ian Sallis G4YXN, 118 Stanley Road, Forest Fields, Nottingham. Tel: 0625 788239. *A680*

Have fine landscape paintings (oil, wooden frame), expert opinion value £700+. Would exchange for Icom IC-R71A receiver or Amstrad CPC464RGB. Any condition if working OK. Jan Szafaryn, 06-400 Ciechanow, Nadfosna 4/17, Poland. *A691*

Have Yaesu FT-290R multimode 144MHz rig. In box and in good condition. Would exchange for Yaesu FRG-7700 general coverage receiver, in good condition. Mr R. J. Twose. Tel: Oxford 60251 after 6pm. *A699*

Have Icom IC-290E 144MHz multimode transceiver, 18 months old, MML144/50S linear amplifier 12 months old. Would exchange for FT-290R with muTek and MML144/30S plus difference. Would do a straight swap for FT-290R with muTek and MML144/100LS. Terry G4OXD. Tel: Hitchin 35248. *A708*

Have Spectrum plus computer, Interface one, two microdrive units, joystick, datacorder, over £160 original software. Would exchange for a high quality scanner, e.g. AR2002/1, etc. Not interested in Tandy scanners. Bob. Tel: Maidstone 675798. *A713*

Have KW2000 s.s.b./c.w. transceiver 90W p.e.p. in v.g.c. Would exchange for FRG-7 or similar receiver. J. Smith, 4 Ancrum Court, Stirches, Hawick, Scotland. *A715*

Have Chaser MC3000 Midland 100M—needs attention. Also have Sirtel CBE2005 base mic, Solartron d.v.m., Scientific p.s.u. Would exchange for 144MHz equipment, h.f. TX/RX, w.h.y. G1RLA. Tel: 0608 3558. *A724*

Have Unimat 3 lathe and milling machine base plus attachments—value approx £380. Would exchange for modern communication RX, e.g. R2000 or FRG-8000. Tel: Pontefract 792817. Would consider RTTY or satellite equipment. *A725*

Have Icom IC-271E as new, very little used and boxed with all paper work. Would exchange for Yaesu 755GX in same condition. G4YVT. QTHR. Tel: St Helens 20370. *A739*

Have Torglow solid fuel stove with back boiler for hot water and radiators plus coal bunker and set of pokers, tongs, etc. Would exchange for anything to do with radio, e.g. h.f. TX/RX w.h.y. Dave G0CAD. Tel: Oxford 863565. *A747*

Have Yaesu FT-290R multimode 144MHz portable with NiCads and charger in v.g.c. Would exchange for scanning RX AR2001/SX200N or similar. S. Rook G6IMT, 8 Southview Road, West Thurrock, Essex. Tel: 0708 865899 (days). *A749*

Have KW160 top band TX with manual, good condition. Also have Sharp portable s.w. RX with digital display. Would exchange for AR88 signal strength meter, metal trims, badge, valves, any expensive Heathkit equipment. G4VNG. Tel: 0733 231639. *A755*

# PW REVIEW

*Peter Rouse GU1DKD looks at two modules aimed at owners of the FRG–7 and other similar receivers*

Readers may recall that last year in the series on modifying the FRG-7 I mentioned that it was hardly worth building a digital frequency readout as relatively inexpensive units were already available. One such unit, the DFC70, is supplied by Timestep Electronics who also make an add-on f.m. demodulator for the FRG-7 and other receivers. The DFC70 digital frequency counter with its liquid crystal display will also work with the Drake SSR/1 receiver and early versions of the SRX-30 (supplied under a variety of brand names including Lowe, Century, Sommerkamp, etc.).

All these receivers work on the same principle of using an interpolation oscillator running between 2·455 and 3·455MHz for the kilohertz tuning. This oscillator works on an inversion principle, i.e. tuning from 2·455 to 3·455MHz produces a tuning range that goes from high to low. Because of this inversion, standard d.f.m. modules will not work with these receivers no matter what i.f. offsets can be programmed into them. The way Timestep have tackled the problem is to use a standard d.f.m. module fed from a separate circuit.

The circuit consists of a crystal controlled oscillator running at 4·55MHz which is mixed with the oscillator output. That output is then filtered to extract the negative-going product which will span 1·000 to 2·000. Modifications to the standard d.f.m. module ensure that the megahertz figure is suppressed just leaving the kilohertz/hertz readout.

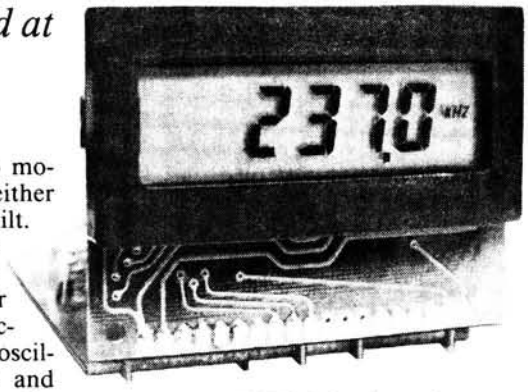
## Fitting

The circuit is supplied as two modules that plug together and can either be bought in kit form or ready-built. The p.c.b., plugs and components are good quality and assembly shouldn't take more than an hour or two. Once complete, the instructions say that four connections—oscillator output, screen, +12 volts and ground—need to be made to easily identified points on the set's circuit.

The module is the least expensive on offer for the FRG-7 and this has obviously been made possible by making use of a standard production frequency display module. However, therein lies the penalty because the module will not fit in the set and must be housed "outboard". Unlike some modules that fit in place of the normal kilohertz dial, this unit will need to be housed in a small case connected via cables to the FRG-7. Timestep suggest running the cable through the back of the set, but I would suggest a neater solution would be a socket on the set's rear panel. At the low frequency involved a good quality DIN socket should do.

## 100Hz Resolution

The module on test had an accuracy of 100Hz and due to manufacturing tolerances in i.f. filters this is more than adequate. I was pleased to find that it did not exhibit the same annoying and constant hunting on the final digit that I get with my own built-in l.e.d. read-out nor did it produce as much r.f. noise. It should be easy to fit the unit in an inexpensive case and the built-in module should take no more than a few minutes to connect and is well within the capabilities of anyone who can use a soldering iron. Current consumption of the unit was measured at 20mA and so the d.f.m. should present no problems when the set is battery operated.



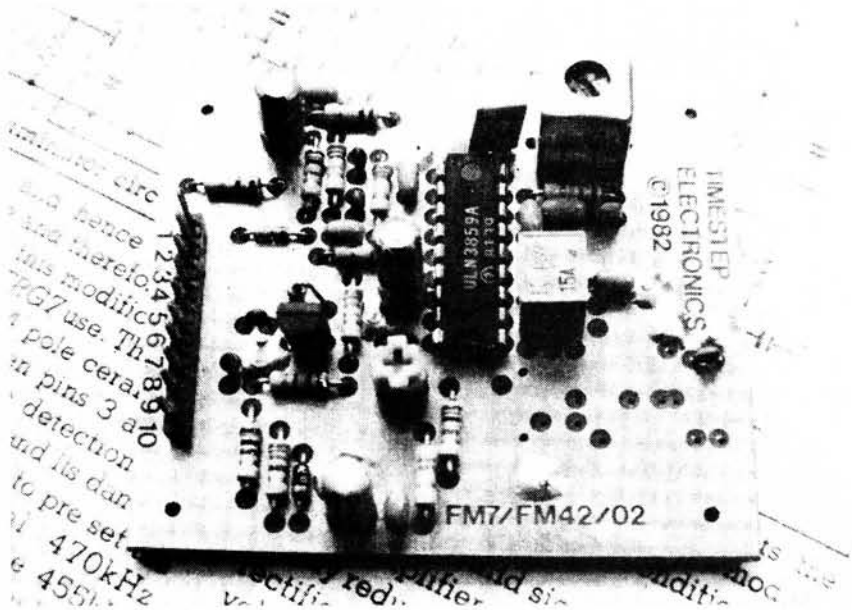

**The DFCTO d.f.c. board**

## FM Demodulator

The FM7 board is aimed directly at owners of the FRG-7 but in fact should work with virtually any receiver with a 455kHz i.f. Built on a small double-sided p.c.b., all the circuitry is based around a ULN3859A i.c. This is the pepped-up version of the very popular MC3357. It is a dual-conversion i.f. strip, demodulator and squelch—although in this application it operates only at 455kHz. The module will easily fit behind the mode selector switch and is supplied with the p.c.b. plugging system for easy removal.

## Operating Impressions

It was only natural that I should compare this module with the *PW* design that was published in the November 1984 edition. In practice there was little difference between the two on most signals but on really marginal signals, the Timestep module had an edge in that background noise was less (sensitivity is 0·5µV for 12dB SINAD) although in fairness the *PW* design was only intended as a simple low-cost circuit. The FM7 unit employs "noise" squelch which copes a lot better than signal level squelch on bands where there is a mixture of modes in use.




**◀ The FM7 board**

However, the *PW* design extended its squelch for use on a.m. as well which the FM7 does not. I did have one criticism of the squelch on the FM7. It is controlled by a pre-set resistor on the p.c.b. with a recommendation that the FRG-7's light switch be rewired as a mute override. As someone who tunes anywhere between the distant quietness of 28MHz f.m. and the powerful local CB bedlam I found pre-set squelch a handicap. However, there is no reason why a squelch potentiometer should not be used and readers should refer to the August 1984 issue of *PW*. In the introductory article on modifications to the FRG-7 a range of options were given for re-arranging some front panel facilities so that other controls could be included, including a fully variable potentiometer for f.m. in place of the RECORD socket.

The *PW* design relied on the FRG-7's existing filter for selectivity and to some extent the FM7 does as well. The module connects after the set's filter but still has an onboard filter with 15kHz bandwidth. Should this wideband capability be needed (i.e. for use with a 144MHz converter) then the module can be connected further up the i.f. chain and the instructions contain details of how to do this—although a fair amount of surgery is needed on the FRG-7.

As with the d.f.m. there should be no difficulty in fitting this module and it comes with step-by-step instructions.

The DFC70 kit costs £29.50, or £34.50 ready built and tested. The FM7 kit costs £12.95, or £15.95 for the ready built version. Timestep will also supply the f.m. board for any i.f. up to 50MHz for a small extra charge. I would like to thank David Cawley at **Timestep Electronics Ltd. Wickhambrook, Newmarket, Suffolk,** for supplying modules for evaluation.

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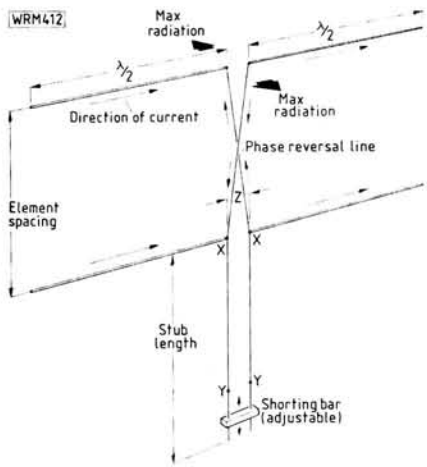



**Fig. 3.6: The Lazy H colinear broadside antenna. See Fig. 3.2(a) for suitable balun for 50Ω coaxial feed**

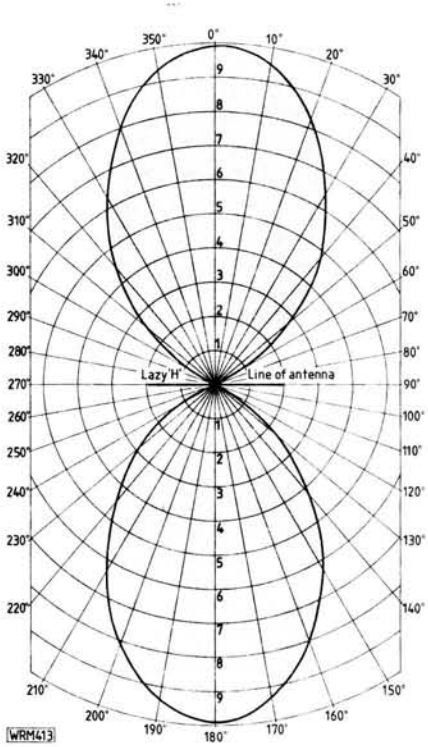



**Fig. 3.7: Lazy H horizontal free-space pattern—vertical similar to W8JK**

## TABLE 3.2

| Band | Half element length | Element spacing | Stub/Phasing line spacing Z |
|---|---|---|---|
| 28MHz | 5·029 | 5·080 | 0·152 |
| 21MHz | 6·706 | 7·010 | 0·152 |
| 14MHz | 10·059 | 10·465 | 0·152 |
| 7MHz | 20·015 | 20·930 | 0·152 |

Construction is similar to that shown for the W8JK in Fig. 3.2 (a) except of course that the elements are one above the other. The balun for the 50 ohm feed cable is the same as for the W8JK. Adjustment for tuning is also similar to that described for the W8JK, including adjustment for minimum v.s.w.r. when the balun and coaxial cable are connected. Again it is important that wire joints are soldered and that connections of the balun to the line at points YY are watertight. This also includes the ends of the cables to prevent moisture seeping down into the cable itself. As already mentioned self-amalgamating tape is most suitable for this purpose.

The dimensions in metres for the elements, element spacing, stub line and phasing line spacing, are shown in Table 3.2. Suggested construction, although similar to that used for the W8JK is shown in Fig. 3.8. The height above ground of the lowest element may be λ/2 at the frequency of operation for optimum performance and lowest angle of radiation.

Antennas of this nature have been well tried and tested over the years and although they are for single frequency bands are far more efficient than trap-loaded, so called "all-band" antennas and multi-band minibeams.

In the concluding part of this series full constructional details will be given for a 5-element ZL Special for 28MHz with its dual end-fire driving system —also a 3-element vertically polarised broadside array for 14MHz known as the Bobtail, plus a version of this for the 144MHz band using a stub match for direct connection of 50 ohm coaxial cable.

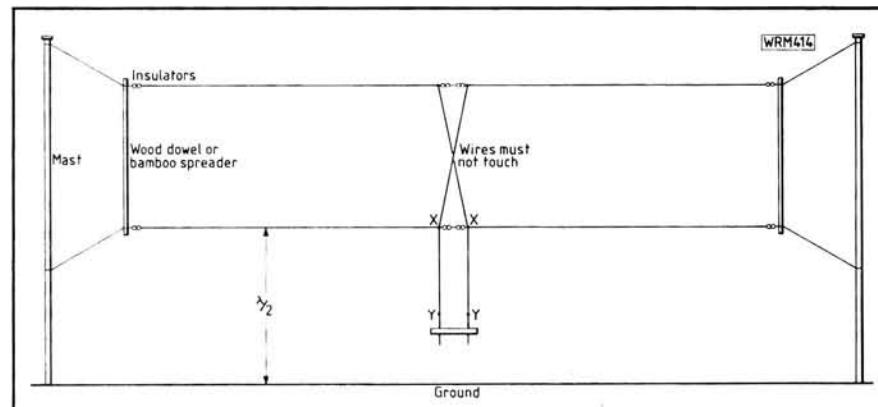



**Fig. 3.8: Suggested constructional details of the Lazy H colinear broadside array**

# The Origins of Morse

*Tony Smith G4FAI takes a look at the life of the "father" of telegraph*

Samuel F. B. Morse was a painter of ability. He studied art in England and exhibited at the Royal Academy in 1813. Returning home in 1815, he took up portraiture as a profession, and painted many prominent people of his day.

He later studied and painted in France and Italy, returning again to America in 1832, when he was appointed Professor of Painting and Sculpture at the University of the City of New York.

During the voyage home, in 1832, on the packet ship *Sully*, discussions about recent electrical experiments in Paris aroused his interest. He had some knowledge of the subject, having attended lectures and assisted with laboratory experiments back home, and he spent the rest of the journey trying to devise a practical electro-magnetic telegraph system capable of carrying messages rapidly over great distances.

## Earliest Code

His 1832 notes, setting out his first ideas, are of great interest, and were eventually reflected in his first successful system, i.e.

- a sending apparatus to transmit signals by the closing and opening of an electric circuit
- a receiving apparatus operated by an electro-magnet to record the signals as dots and spaces on a strip of paper moved by clockwork
- a code translating the dots and spaces into numbers and letters

His first code used figures only, coupled with a dictionary of numbered words. It was very simple, and his notebook spells out a message showing various numbers with their word equivalents underneath:

4030 141
"... Wednesday 6th August
322 32
C u v i e r naturalist died."
1.6.8.5.4.3.


**Selection of advertisements from the Journal of the Telegraph, 1886-7**

The numbers and dots under "Cuvier" suggest that Morse intended to spell out unusual words or names letter by letter, and this assumption is strengthened by a reference in his caveat (i.e. specification of what he intended to patent) of 1837, to the dictionary having numbered words, "beginning with the letters of the alphabet".

Other matters took his attention over the next few years until his appointment to a new academic post in 1835. He was now given rooms at the university, where he renewed his experiments with home-made batteries and various primitive instruments.

His first successful receiver (register) was made from a canvas stretching frame, a hand wound electro-magnet, and a hanging lever, with pencil attached, to draw on a moving strip of paper. A dot could be read from the lower point of a V, and a dash from an extended V, shown in Fig. 1.

**Fig. 1**

Lack of funds, coupled with a need for practical assistance, led to a partnership with a colleague, Professor Leonard Gale; with Alfred Vail, who offered funds, and facilities at his family's ironworks to make proper instruments when required; and with F. O. J. Smith, a Congressman with business and legal experience. Working together the three main partners contributed to the subsequent development of the Morse telegraph and code, although it was finally patented in Morse's name alone.

## First Alphabetic Code

All of the early experiments and demonstrations had used Morse's number code. On 24 January 1838, however, he demonstrated a new code, comprising letters instead of numbers,

achieving a transmission speed of 10 w.p.m., double that attained previously.

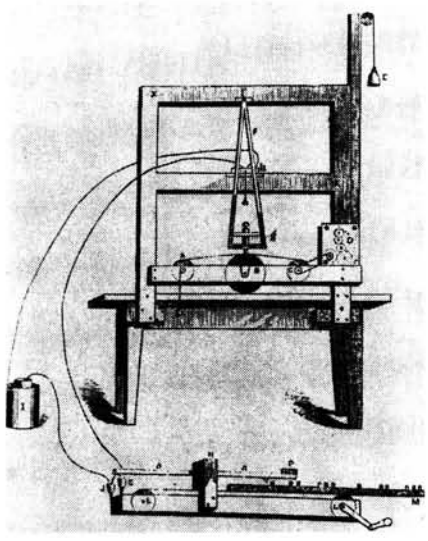
The transmitter (correspondent) had a printer's port-rule with cast type inserted in it as required, each type letter having saw-teeth to activate the circuit as it passed through the machine. This continued in use, until about 1840, when it was replaced by a simple hand key, the forerunner of today's Morse keys, which was later claimed by Vail to be his invention.

In 1843, with funds running out, Morse petitioned Congress for financial assistance, and was allocated $30000 to evaluate the merits of his system. He planned an underground line, believing that Wheatstone's needle telegraph in England had successfully used buried conductors. After 14km had been laid, it was found that the pipe-encased wire had faulty insulation caused by heat in the manufacturing process. It was then discovered that the English underground wires had also been a failure, and had been replaced by overhead wires on poles.

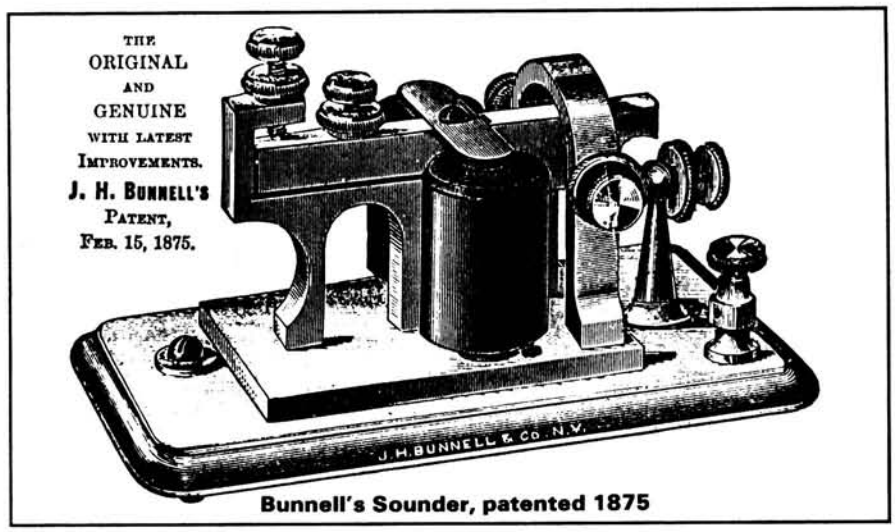
By 1 May 1844, the wires, now overhead, had reached Annapolis Junction, 35km from Washington, in time to pick up news from the railway of the proceedings of the Whig National Convention at Baltimore, and its nominations for president and vice-president.

## Sending Errors

On the day before the convention Morse wrote to Vail from Washington, "Get everything ready in the morning . . . When you learn the name of the candidate see if you cannot give it to me . . . before the (rail) cars leave you . . ." Next day he wrote, "Things went well today. Your last writing was good. You did not correct your error of running your letters together until some time. Better be deliberate . . . I may have some of the Cabinet tomorrow . . ."



**Morse's first sender. (From an illustration in Les Merveilles de la Science, about 1866)**

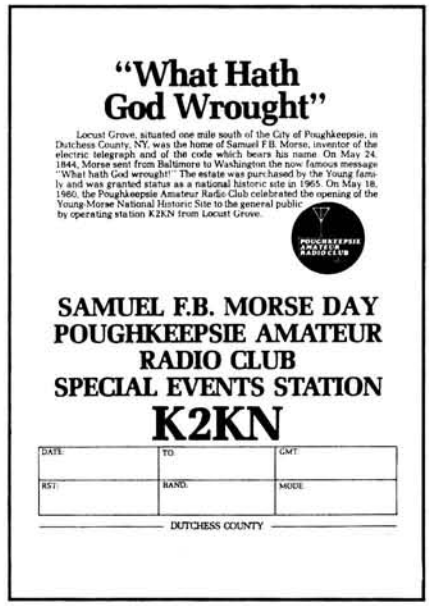



**Bunnell's Sounder, patented 1875**

**Reading from Morse's first self-recording register. (From Samuel F. B. Morse, his Letters and Journals. By E. L. Morse, 1914)**

Finally, the line from Washington to Baltimore was completed, and, on 24 May 1844, the first official demonstration took place before invited observers. Annie Ellsworth, daughter of a friend, chose the first words to be transmitted, and the phrase, "What hath God wrought!", took its place in history.

Now the Democratic convention was gathering in Baltimore, and Morse had a wonderful opportunity to demonstrate the potential of his invention. Senator Silas Wright was nominated as candidate for vice-president. He was not at the convention, but in Washington. Vail telegraphed details to Morse who passed them to the Senator. Wright declined the nomination and Morse sent his reply to an incredulous convention only minutes later. They telegraphed again, received the same reply, and then sent a delegation by train to make sure they had received the message correctly.




**Annual Morse Day QSL card**

## American Morse

About this time Morse, probably with Vail's assistance, devised a new code alphabet, which became known as American Morse. The exact date is not known, although Morse's remarks to Vail about his sending on the new line suggest an unfamiliarity with the code which would not have existed had they still been using the 1837 version.

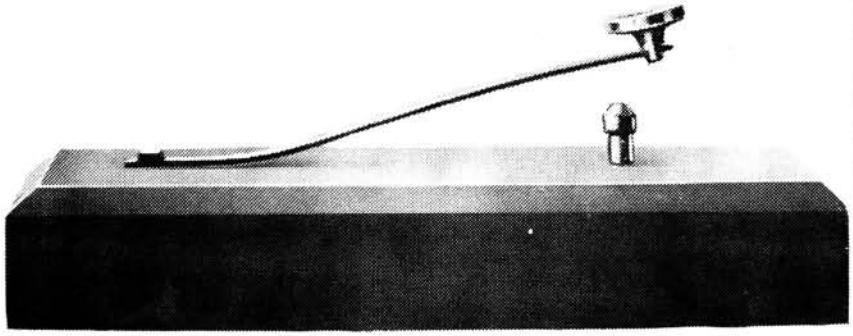
An undated note by Morse lists the different quantities of type found in a printing-office to determine which were the most frequently used letters of the alphabet. He gave every letter a separate symbol, unlike the previous code, which had the same symbol for phonetically similar letters. He weighted each symbol, to determine its length, counting a dot as 1, a space between groups of dots as 1, a dash as 2 and a long dash as 4.

The shortest symbols were allocated to the most commonly used letters, and longer ones to the less frequently used. In this early draft, no letter exceeded a count of 5, and, with one explicable exception, this became the code used throughout North America well into the twentieth century. The exception was the letter J. His notes show it as ···· which counts as 5, fitting in with the pattern of symbols used for other letters. The symbol finally chosen, however, was ·---, counting as 6 and contrasting strangely with the logical process used to select the rest of the alphabet.

## Sounders

Morse's original "self-recording" instrument was soon replaced with improved versions, involving perforation of the moving tape, or the use of an inked wheel. About 1856 the recorder was replaced by the "sounder", when it was realised that telegraphists had developed an ability to read the messages coming off the instruments by listening to the clicks of the pen-lever.

Sounders were simple electro-magnetic devices which pulled a metal bar in one direction, striking a limiting screw, when the sending key was depressed, and another screw, in the



**First form of key. (From Morse's notebook. Letters and Journals)**

opposite direction, when the key was released. This re-created the sound of the clicks of the sending key, and the technique was to listen to the length of the spaces between the clicks.

Average operators achieved 20–25 w.p.m., exceptional ones, 30–35 w.p.m. and champions, up to 46 w.p.m. By the late 1850's the automatic sender was invented, necessitating the re-introduction of ink recorders and perforators, and speeds of up to 70 w.p.m. were then attained.

## International Morse

When the Morse code was first used in Europe, it was not entirely satisfactory, not having symbols for the accented letters used in many European languages. An international conference in Berlin, in 1851, revised the code once again, taking symbols from American Morse and three other systems, to form Continental, or International Morse—the code which remains in use today.

As the years went on, the Morse telegraph became big business around the world, creating ever expanding work for those who manufactured or laid the lines, overland or undersea; those who made the equipment; and those who operated it—the telegraphists.

These were a new breed of men and women having, for the first time, the world at their fingertips. In 1887, the Journal of the Telegraph reported on the seventh annual re-union of the Old Time Telegraphers' Association. Many members looked back to the pioneering days of over 40 years earlier, and there was much discussion as to who had been the first "sound" reader.

A correspondent recalled that, in 1846-7, more and more operators were "picking up sound reading, but except for conversation, this was positively prohibited on all lines. Some of us did more than talk by sound. We drummed musical rhythm on the key, and set others to guessing what tunes they were".

**Locust Grove**

## All Lines Cleared

As Morse approached his 80th birthday, the telegraphists determined to honour him in a very special way. On 10 June 1871, two thousand of them converged on Central Park, New York, for the unveiling of his statue, paid for by contributions from telegraph offices throughout the US and Canada. Morse did not attend the ceremony, but that evening was present on the stage of the Academy of Music, in front of a packed audience, when, after speeches paying tribute to his achievements, the telegraph lines to all offices in North America, and many overseas, were cleared.

Using an original instrument from the Washington-Baltimore line, a young lady operator sent what was, in effect, Morse's farewell message to the telegraph fraternity. He was escorted to the table to key his name at the end of the message, becoming overcome with emotion as wild applause rose from the auditorium. Congratulatory messages from home and abroad flooded in, and he concluded the evening with a speech recalling his early struggles, and paying tribute, by name, to all those who had helped him bring his dream to reality.

He had not long to live. He spent the summer months on his estate at Locust Grove, Poughkeepsie, and had a telegraph line wired into his office there from the main route close by. In the winter he lived in New York, and there he died on 2 April 1872.

## Father of the Telegraph

Although his fame as "father of the telegraph" was eclipsed by later developments in communications, the Morse code remains as his memorial, still alive and fulfilling its original purpose. It is also doing something which Morse could not have foreseen. It is enabling radio amateurs around the world to communicate with each other, whilst knowing little of each other's language, giving such pleasure and satisfaction that it will surely continue in use as long as amateur radio exists.

Once a year the Morse code can still be heard at Locust Grove. In honour of his memory, the Poughkeepsie Amateur Radio Club's special event station, K2KN, celebrates "Morse Day", when its signals are heard around the world. What better tribute can amateur radio give to a man to whom it owes so much? ***PW***

**Top—Morse's saw-tooth type and first alphabetical code, 1837. Bottom—Changes made in compiling American Morse. (From Morse's notebook. Letters and Journals, as above)**

| | *1837 code* | *American Morse (1844)* | *International Morse (1851)* |
|---|---|---|---|
| A | ··· | ·– | ·– |
| B | ·· ·· | –··· | –··· |
| C | ··· | ··· | –·–· |
| D | ···· | –·· | –·· |
| E | · | · | · |
| F | ···· | ··–· | ··–· |
| G | ··· | ––· | ––· |
| H | ···· | ···· | ···· |
| I | ·– | ·· | ·· |
| J | ··· | –·–· | ·––– |
| K | –·– | –·– | –·– |
| L | ——— | ——— | ·–·· |
| M | –·· | –– | –– |
| N | –· | –· | –· |
| O | ·· | ·· | ––– |
| P | ····· | ····· | ·––· |
| Q | ··–· | ··–· | ––·– |
| R | ·· | ··· | ·–· |
| S | ·–· | ··· | ··· |
| T | ––· | – | – |
| U | ·–– | ··– | ··– |
| V | – | ···– | ···– |
| W | ··– | ·–– | ·–– |
| X | –– | ·–·· | –··– |
| Y | ·– | ···· | –·–– |
| Z | ·–· | ···· | ––·· |

**Changes in Morse over the years**

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# Radio Data Systems Progress

*An exciting new generation of radio receivers is promised as a result of work carried out by members of the European Broadcasting Union (EBU). The Radio Data System (RDS) standard for Europe, based on research pioneered in Sweden, will allow receivers to incorporate all sorts of features that will make listening easier and will provide a wide range of new radio-based services. James Archer reports on the latest developments.*

The digital data pulses used by RDS are carried along with the usual v.h.f./f.m. sound transmissions. A low-level 57kHz subcarrier is amplitude modulated by the bi-phase coded data signals, but the subcarrier is suppressed before transmission so that the data is transmitted as a 2-phase p.s.k. signal. The data should not interfere in any way with the normal sound transmissions, and although there were some reports of the RDS signals upsetting the German ARI road-traffic information service that is also transmitted on v.h.f., this turned out to be because of performance limitations with some Japanese radios, and the cause of the problem has now been sorted out.

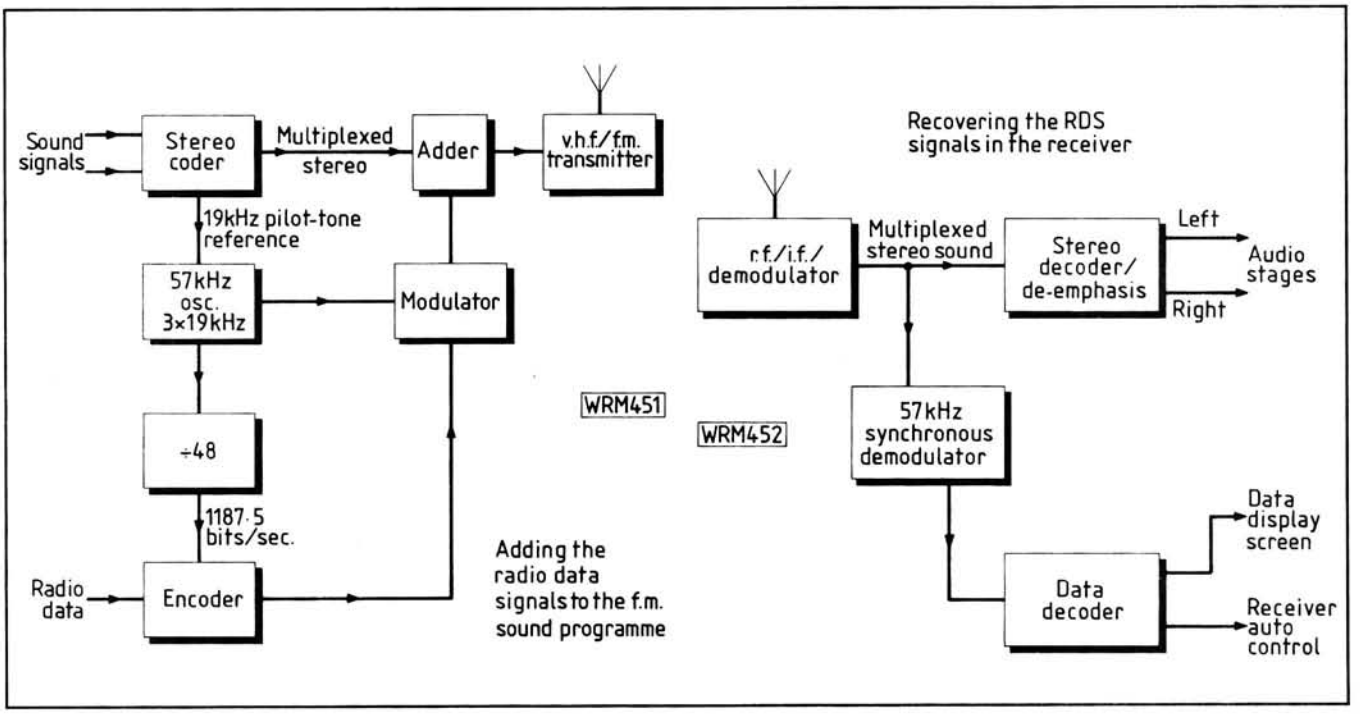
## Automatic Tuning

The RDS system provides automatic tuning to the station of your choice, and gives the receiver the ability to try various alternative frequencies carrying the desired programme, so as always to give optimum reception. Some receivers may be fitted with twin "front-ends", so that one can be feeding the received signal to the loudspeakers whilst the other is searching for the same programme on other frequencies, automatic switchover taking place inaudibly whenever a better channel is found. The receiver can be asked to search through all music channels or all sound channels, and it can automatically alert the driver to relevant traffic announcements, even if these are being broadcast on a different frequency from the one on which he is listening. The RDS signals could even be used to briefly switch a car radio from its cassette-playing mode whenever a traffic announcement is made.

A small calculator-type display will be fitted to RDS receivers, and this will give information about the station to which the receiver is tuned and about the programme, rather like a sort of miniature teletext display. Time and date information forms part of the data, and this will help listeners to preselect specific programmes for recording. Messages up to 64 characters long can be displayed, so that it would be possible to carry notes about the programme, such as the title of the music or the record number.

## Steam Radio Revival

Flexibility has been built in to the RDS system, so that further generations of receivers will have even more sophisticated facilities. The IBA has recently completed some tests of the system using the LBC v.h.f. transmitter at Croydon, and the BBC has indicated that it is looking for partners in the receiver manufacturing industry to build RDS receivers. Several European manufacturers have already expressed considerable interest in the system, so let's hope that it will not be too long before these receivers appear in our shops. The introduction of RDS could be just the fillip that radio needs to bring it out of the high-tech shadow cast by all the recent developments in the TV and video fields. **PW**



*Activating a rare location calls for detailed planning. Lionel Parker G5LP provides the details*

The team (l to r) Pat G4ZCY, John G4ZPL, Dave G4RST, Lionel G5LP, Roy G1AUY, Roy G4TTX and Malcolm G4XBN

# Lundy Expedition Report

I suppose as we sat on the coaster *Polar Bear*, watching the island disappear into the shroud of mist, all of the seven member team from the Nene Valley Radio Club felt a quiet satisfaction at having spent an enjoyable week of amateur radio in ideal surroundings.

It seemed so long ago that over a pint at our weekly club gathering, John G4ZPL, suggested Lundy. From then on, for nearly 18 months, planning, logistics and tactics were discussed and discussed again, until we were sure we had it right. We knew that once on the island we would have no second chance.

Lundy, to most people, must be one of those strange names only heard occasionally when tuned into "The World at One" on Radio 3, or perhaps the cricket, and inadvertently you caught the weather forecast for shipping. Along with Dogger, Tiree and other unpronounceable areas, it was somewhere to catch fish, avoid storms and hoist south cones. But Lundy is definitely not a place to be avoided. Its inhabitation can be traced to prehistoric settlements where flint scrapers, etc. have been found and through the middle ages, when the De Marisco family held influence. It was a Royalist stronghold in the civil war, the home of convicts in the 18th century (for whom we can thank for some of the major buildings and stone walls). Sir Vere Hurst purchased the island in the early 1800's for £100, and his son lost it with the roll of a dice in a casino. A succession of owners failed to make the island a viable concern and it was in 1970, when the Heaven family could no longer continue with the management, that it was again offered for sale. Several interested parties made enquiries, including the Scientologists seeking a rest home for their members, and several Americans, attracted by the island's ill-found reputation as a tax-free haven. However, in the interest of the nation, the then Liberal MP for North Devon, Jeremy Thorpe, and the National Trust made efforts to raise the asking price of £100 000. You can imagine the surprise when the Barbadian-based business man "Union Jack" Hayward appeared "out of the blue" with a cheque for £150 000. The Landmark Trust agreed to manage the island's affairs, and this security has been maintained ever since.

## Transportation

Two regular methods of transport to Lundy are available. The 250 tonne, red-painted ex Greenland Navy Icebreaker renamed the *Polar Bear* leaves Bideford on Tuesdays, Thursdays and Saturdays. With a sailing time of around three hours it is a relaxing way of travelling the 45km across the Bristol Channel. Alternatively, you can fly to Lundy by helicopter from Hartland Point, but whilst the cost of both methods of transport is the same, the 6½ minutes by air is no doubt more appealing to the majority of visitors. The helicopter on duty during our stay was the one recently used in the popular Westward Television series *Treasure Hunt* where the bonny Anneka Rice kept us all glued to the TV screen. The logistics of taking six transceivers, together with attendant power supplies, antennas, portable masts, etc. had forced our hand. Since the weight restriction of 11·5kg per person by air could not be met, we would be taking the sea route.

The choice of equipment had, I suppose, given us the greatest cause for concern. It soon became evident that nearly all the ten members had h.f., v.h.f. and u.h.f. gear, but it wasn't all suitable for transporting to Lundy. It was decided to use solid-state equipment, and where we couldn't provide this ourselves, an approach was made to local dealers who, in return for what publicity we could offer, would make loan equipment available. The final manifest looked impressive, and with hindsight, fitted the bill admirably. HF transceivers: Icom 720A from Thanet Electronics, Kenwood TS-430S from Roy G4TTX. 144MHz: Yaesu FT-221 from John G4ZPL, Trio TR-9130 from Roy G1AUY. 430MHz: Icom 451E from Photo Acoustics. Both 200W 144MHz and 50W 430MHz linear amplifiers were kindly loaned by Microwave Modules—add to this a hefty 35 amp power supply from Gary G1DKT and a GM3HAT Multiband dipole for h.f. The list was completed by a brace of FT-290s that proved invaluable for portable and general on-island communication work.

So at last we were all loaded aboard the *Polar Bear*, the 450km car journey from Northamptonshire having been uneventful, and we chugged happily along the Torridge Estuary bound for Lundy. The sun shone, we all settled down to the crossing, but, where was Lundy? Still shrouded in mist, it would be almost three hours before we first sighted our goal. And then, there it was, towering some 137m from the sea, sheer cliffs on all sides with only the smallest of beaches suitable for any

landing. Atop the cliffs, standing very proud and visible from the very first sighting, was the "Old Lighthouse"—our expedition QTH. At 168m a.s.l., the original light was so often shrouded in cloud and mist it could not fulfil its obligations and was replaced by two smaller lighthouses at either end of the island, soon after its construction in 1816. We came into the landing bay, dropped anchor about 300m off shore and waited.

Blue smoke and the familiar diesel engine noise drew our attention to a small landing craft type boat which rapidly drew alongside. The passengers were shepherded to jump from one boat to another for the beach landing. To our horror, the central part of the landing craft was awash! Surely our gear wasn't going in there? The landing craft cast off and headed for the shore. It was the only time we had been separated from our precious cargo and for the next half hour the concern must have shown on all our faces.

The engine on the small boat roared as it pushed its nose onto the rocky beach, down went the flap on the front. Shades of *Gung Ho* and the beaches of Normandy; had the radio amateurs from Nene Valley Radio Club taken Lundy without a shot being fired? A tractor engine burst into life and reversed a farm trailer into the yawning craft, we were again ushered onto the trailer and then driven across the stony beach to dry land. This process was repeated and, thankfully, the costly equipment had been transferred to the trailer with great care and attention by the crew.

## Lundy at last

On a warm May afternoon we were all grateful that one of the only three vehicles on the island had met us and that the gear was being taken up the steep cliff path in advance of our weary steps. Within half an hour or so we had climbed the 137m rise and had our first close sighting of the QTH, a magnificent structure, over 150 years old but built of sturdy Lundy granite, well-preserved and maintained by the Landmark Trust. It was our home for the week—ideal sleeping and operating rooms, ample cooking facilities and a 28m mast thrown in for good measure.

It was time for a swift cup of tea and then on with the antenna erection. For 430MHz it was decided that a single 88-element Multibeam would suffice. On 144MHz, two 9-element phased portable Tonna beams were erected and for h.f., half-wave dipoles for 1·8, 3·5 and 14MHz with the dual-band version of the GM3HAT "Dipole of Delight" operating on both 3·5 and 7MHz. All dipoles were in inverted-V configuration, with the centre as high as possible from the guard rail on top of the lighthouse.

The action was fast and furious. We divided up into operating teams, so that four bands could be operated simultaneously, for we had to utilise available a.c. power to the maximum. Diesel-generated power on the island was available from 7 a.m. to midday, and from 5 p.m. until midnight. If the wind was strong enough, the huge windmill generator would supply power continuously, but alas the weather was so kind to us, we could not benefit from its technology. We had brought two d.c. car battery supplies with us and these provided QRP operating during the periods without the island supply.

The first CQ call was made—an immediate pile up on all four frequencies—where had they all come from? Had the whole world been waiting for us? GB4LI was operational and didn't we know it! On that first evening over 200 QSOs in three hours, and by the end of the week we would have nearly 2 000 QSOs in the logs. It would have been more, but the inevitable breakdowns occurred. The TS-430S had been damaged in transit and promptly burst into smoke, the pre-amp on the 430MHz linear developed a fault, but by and large, thanks to swift work from our on-site engineer G4RST, we kept going.

## Thirsts and Firsts

The breaks in a.c. power during the afternoons came as a breath of fresh air since we all took advantage of the spare time to traverse the island. We explored disused quarries, old gun batteries, crashed planes from the last war, the lighthouses to the north and south of the island, and we marvelled at the total peace and solitude. It wasn't all sunshine and silence though. The island brewery supplied a fair pint of "Puffins Purge", and the hospitality at the Marisco Tavern made a welcome change. With 12 resident inhabitants, a party of archaeologists, and the week's visitors, the island population totalled about 40, enough room for everyone! It wasn't surprising that the island shop doubled as the post office, general store, doctor's surgery, tavern and hotel.

Well, there you are, that was Lundy 1985. GB4LI had surpassed all our wildest dreams, but there had to be some "firsts" for us. We were quite sure that we had chalked up the first v.h.f. QSO from Lundy to the Scilly Isles, and we can thank G0AEA for that privilege, and we imagine the h.f. contact with Andorra may also have been the first, thanks to C31YF. Our intrepid QRP/Portable op was determined to activate Rat Island, on the southern tip of Lundy, for the first time. On his fourth attempt, he managed to judge the tides right and climb onto the rocky island, only to be scared out of his wits by two huge rockets which whizzed past him. His first thought was that they were distress flares, but he was soon to find that not only was Rat Island having its first v.h.f. radio activity, but two enterprising visitors had inaugurated the Rat Island rocket mail! John had more luck with the radio, for the rockets went in opposite directions—one into the sheer cliffs above the landing beach and the other disintegrated into a burst of blue stars over the bay. With 2·5 watts, an FT-290R with a muTek front-end and an HB9CV antenna, John successfully worked two stations back home, G1DKT and G6ZYF—almost 400km and obviously worth the trouble. However, the incoming tide ensured John's stay on Rat Island wasn't too long and he returned to the fold happy with his afternoon activity.

Our thanks go to the Landmark Trust, Microwave Modules Limited, Photo Acoustics Limited, Thanet Electronics Limited, GM3HAT, Randam Electronics and all those who helped keep us company and provided encouragement. ***PW***

**The Old Lighthouse, Lundy Island: "an ideal QTH, 137m a.s.l. with a 28m mast included for good measure."**

# Modifying the No. 88 Set

*Dave Rycroft GW4OKO/ZC4DR takes the ex-army Wireless Set No. 88 and modifies it for 28MHz f.m. operation.*

The author recalls with nostalgia his teenage life of the mid to late 1950s, during the government surplus equipment boom, when time after school and Saturdays was spent searching through the wonders of Aladdin Caves of the government surplus shops in Keighley, Bradford and Leeds. The half-crown (12½p) a week pocket money was put to good use in securing numerous bargains, many of which continue in use today in the author's shack. During that same period the amateur radio magazines flourished with features on modifications and conversions to improve specifications and convert war surplus equipment for amateur use. In addition to being a cheap option for many s.w.l.s and radio amateurs, modifications to surplus equipment provided technical insight into the hobby and practical self-training at low cost which is within the principles of the amateur radio licence and the spirit of true amateur radio. With today's black box technology there are fewer opportunities for the "apprentice" to cut-his-teeth-on so to speak. This article is written with the previous in mind and the availability on the surplus market of a number of the ex-army Wireless Set No. 88 which, to the author's knowledge, have received no publicity in the amateur radio press.

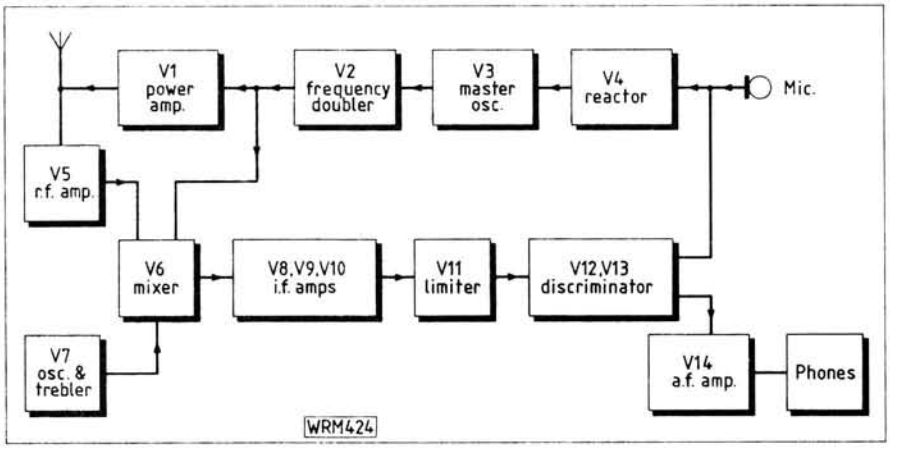
**TABLE 1**

| WS 88 Type | Channel | Xtal Location | Xtal Frequency (MHz) | Signal Frequency (MHz) |
|---|---|---|---|---|
| A | A | XL1 | 6·525 | 42·15 |
| | B | XL2 | 6·400 | 41·40 |
| | C | XL3 | 6·317 | 40·90 |
| | D | XL4 | 6·200 | 40·20 |
| B | E | XL1 | 6·117 | 39·70 |
| | F | XL2 | 6·050 | 39·30 |
| | G | XL3 | 5·933 | 38·60 |
| | H | XL4 | 5·835 | 38·01 |

## The No. 88 Set

The No. 88 Set to be described is the v.h.f. f.m. manpack transceiver and **not to be confused** with the ubiquitous RCA AR88 receiver. The No. 88 set, which measures 240 × 127 × 90mm, is a 14-valve transceiver made during the 1950s by E. K. Cole Ltd. It is mechanically well designed and despite being compact it is relatively easy to work on. The set is housed in a tropicalised waterproof case and is fitted with a humidity desiccator. Because of this protection the majority of sets examined by the author have been found to be almost as new inside with no evidence of internal corrosion or dust despite age and external appearances sometimes to the contrary. The basic block diagram is shown in Fig. 1. The transmitter employs four valves giving an output of about 250mW at 38 to 45MHz. The receiver is a ten-valve single conversion superhet with an i.f. of 3MHz and a four-channel crystal controlled oscillator. A sample of the transmitter r.f. output is fed through the receiver where the discriminator d.c. output is used to bias the reactance modulator valve thereby providing automatic frequency control (a.f.c.) of the transmitter by phase locked loop action.

In the manpack configuration there are two versions of the set—type A with an olive drab control panel and type B with a black control panel. The difference lies in their frequency ranges, see Table 1. The power requirements are an h.t. of 90V at 12mA on receive and 32mA on transmit and an l.t. of 1·4V at 1A. This was provided from a dry battery carried in a separate pouch. The layout of the control panel is shown in Fig. 2, where it can be seen




▲ **Fig. 1: The block diagram of the No. 88 set**

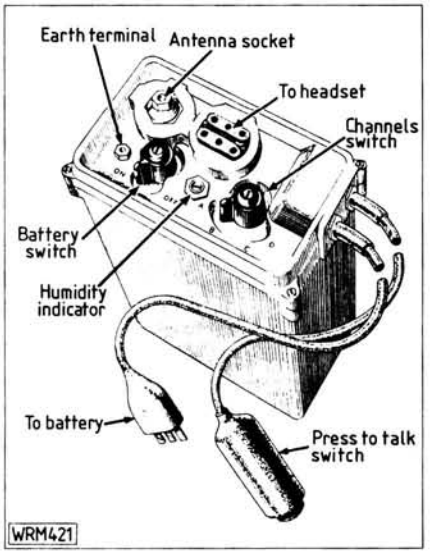
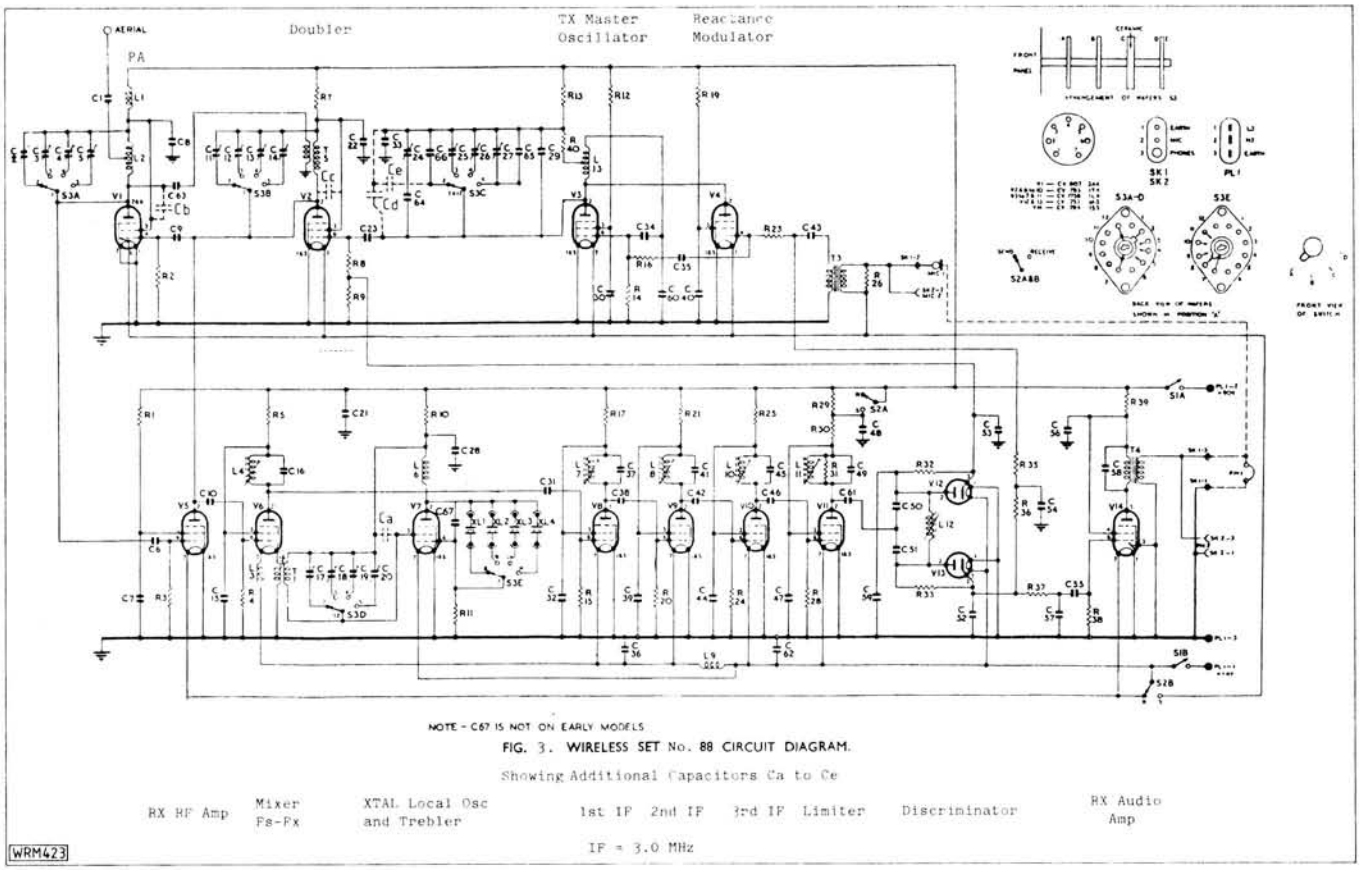



**Fig. 2: The front panel of the No. 88 set** ▶




NOTE - C67 IS NOT ON EARLY MODELS

FIG. 3. WIRELESS SET No. 88 CIRCUIT DIAGRAM.

Showing Additional Capacitors Ca to Ce

**Fig. 3: The circuit diagram of the No. 88 set**

that the transmit/receive switch is a rubber covered hand grip. The headset or miniature telephone type handset incorporates a carbon microphone and earphones of 140Ω impedance. The antenna is a 1·2m whip.

The No. 88 Set was adapted for use in armoured fighting vehicles and formed part of the vehicle's fixed installation superseding the VHF B-set of the WS No. 19 and the WS 38 AFV. Sets in this configuration are identified as WS No. 88 type A-AFV and the main physical difference from the manpack version is that the battery and press-to-talk flying leads are replaced with a single connecting cable terminated in a six-way Plessey plug. This connects with a power supply unit, powered from the vehicle's 12V batteries, in which a vibrating reed interrupter circuit generates the 90V h.t. The power supply, identified as "Power Supply and LF Amplifier Unit No. 2", also incorporates a microphone amplifier for use with an electromagnetic microphone and an audio output amplifier to boost the output to the headphones. A carbon pile regulator maintains the l.t. at a constant 1·4V counteracting variations on the vehicle's battery voltage. Transmit/receive switching is accomplished by a changeover relay in the power unit. The No. 88 A-AFV Set has the ON/OFF switch electrically disconnected, switching being accomplished at the power supply unit.

In the knowledge that many of these sets are still lurking in the corners of radio shacks and attics and that they are still available for purchase from Messrs Weirmead Ltd. of 218 St Albans Road, Watford, Herts. WD2 4AU (with whom, it should be added, the author has no vested interest or commercial connection), it was decided to investigate the feasibility of modification to permit operation within the terms of the amateur radio licence. Conversion to 50MHz was considered but major surgery would be required to remove the coils for rewinding. Discretion being the better part of valour and with increasing 28MHz f.m. activity, a conversion to the 28MHz band was considered as an alternative. Detailed examination of the circuit diagram and chassis layout revealed that such modification was not only feasible but simplicity in itself requiring only five capacitors, crystals as necessary, skill of hand and patience. The prototype modification took a weekend and some trial and error to perfect and the results were sufficiently encouraging that four other sets were promptly modified. These included both the manpack and AFV versions.

## Circuit Description

For those unfamiliar with the No. 88 Set and valve technology the following description may be helpful as an introduction and for fault finding. It may also stimulate further experimentation. Starting with the receiver and with reference to Fig. 3, the valve lineup is: V5—r.f. amplifier, V6—mixer, V7—crystal controlled local oscillator, V8 to V10—i.f. amplifier, V11—limiter, V12 and V13—discriminator, V14—a.f. amplifier. The grid and anode load tuned circuits of V5 are also common to the transmitter p.a. and doubler stages comprising L2 and T5 with their respective capacitors. The mixer stage receives the amplified signal frequency at the control grid via C10. The local oscillator frequency is fed into the filament circuit via T1. Choke L3 is an r.f. filament choke. The mixer operates with the local oscillator frequency 3MHz lower than the signal frequency. The local oscillator is a conventional Pierce crystal oscillator with one of four crystals selected by switch S3E. Choke L6 forms the anode load. The crystal frequency is one-sixth of the frequency required for mixing. The high grid bias provided by R11 produces a large third harmonic of the crystal frequency at the screen grid of V7 and this is selected by the tuned circuit of T1 and C17 to C20. This signal is applied to the filament circuit of the mixer valve where the second harmonic of it is mixed with the signal frequency. The 3MHz i.f. output is selected by L4/C16. The i.f. amplifier is quite conventional with capacitive inter-stage coupling. Most of the i.f amplitude limiting takes place in the limiter stage V11. This operates as a Class C amplifier with a very low anode voltage. Resistor R31 in the anode circuit damps the tuned circuit so that it presents a low $Q$ to the discriminator.

The i.f. amplifier output is fed to the discriminator between the junction of C50/C51 and earth. The tuned circuit comprising L12 and C50 and C51 resonates at the unmodulated i.f. of 3MHz. With an unmodulated signal the voltages applied to V12 and V13 are exactly 180 degrees out of phase but of equal magnitude. Variation in frequency produces unequal voltages and, after rectification, the voltage difference between the cathodes fol-

lows this variation. Since the cathode of V12 is effectively grounded by C53 and R9 the audio signal appears at the cathode of V13. This is fed to the a.f. amplifier V14 via the r.f. filter formed by C52, R37 and C57.

Moving on to the transmitter the valve line-up is: V4—reactance modulator, V3—master oscillator, V2—frequency doubler and driver, V1—power amplifier. The master oscillator (m.o.) is a Colpitts oscillator operating at half the required output frequency. The output is fed via C23 to the frequency doubler where T5 and C11 to C14 select the second harmonic of the m.o. frequency. The output is then taken via C9 to the grid of the power amplifier.

The reactance modulator stage operates as an electronic capacitor and is the thermionic equivalent of a Varicap diode although its operation is a little more complex. The grid and anode of V4 are effectively connected to opposite ends of L13 of the master oscillator tuned circuit. The purpose of this stage is to vary the master oscillator frequency by an amount dependant upon the audio frequency input from the microphone and to correct for frequency drift. The value of effective capacitance is determined by the d.c. grid bias fed from the discriminator circuit and the a.c voltage from the microphone. The d.c. bias voltage controls, within small limits, the frequency of the unmodulated carrier, the a.c. voltage determines the frequency modulation component of the signal.

The automatic frequency control circuit warrants description. The frequency stability of both the receiver and transmitter is determined by a single crystal on each channel; the crystal being part of the receiver local oscillator. A sample of the r.f. signal at the output of V2 is fed via C10 to the grid of the mixer V6. It then passes through the receiver i.f. amplifier to the discriminator. If the transmitter is on the correct frequency, the mean d.c. output voltage developed across the discriminator will be zero. If the transmitter centre frequency drifts, a d.c. voltage is developed across the discriminator which is passed from the cathode of V13 via the filter R36, C54 and R35 to the grid circuit of the reactance valve V4. This d.c. bias voltage causes the effective capacitance of V4 to change so that it corrects the frequency drift of the master oscillator.

## Conversion for 28MHz Operation

The first step is to ensure that the set to be modified is serviceable. Before removing the case, connect the l.t. and h.t. supplies and headset. In the absence of a received signal a strong rushing sound, typical of the noise on an unsquelched v.h.f. f.m. receiver, should be heard (the No. 88 Set has no squelch circuit). If no noise is present then suspect a faulty valve. If only a weak noise is heard then it is likely that the i.f. amplifier or discriminator circuits are off-tune. Choke L12 should be adjusted only as a last resort as even a slight maladjustment will significantly off-set the transmitter frequency. If all is well then couple a signal generator or dip oscillator to the antenna socket. For each channel in turn, tune to the frequencies shown in Table 1. The background hiss should reduce to a fully quieting output.

To check the transmitter a very low power dummy load and power meter could be used. Alternatively, couple a wavemeter or dip oscillator to a small single turn loop of wire connected between the antenna and adjacent earth terminals and check for the presence of r.f.

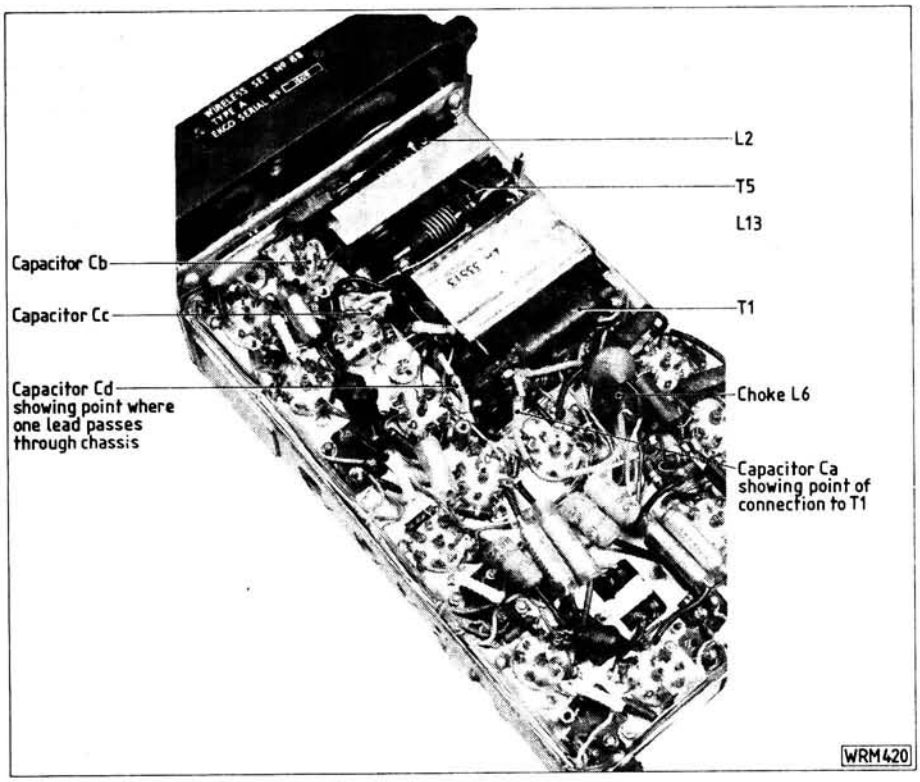
Next, remove the case. Remove the screening plate attached to the underside of the chassis and examine the components and wiring for signs of damage. The four crystals XL1 to XL4 are held in place by a top plate secured with two split pins. Removal of one of the split pins will allow this plate to hinge up. The crystals should be pulled out and set aside for later use.

Modification to the circuit is the next stage. This is relatively simple but requires a little skill of hand and patience if one is to do a good job. Referring to the circuit diagram in Fig. 3, the intention is to reduce the frequencies of the three tuned circuits in the transmitter and the one in the receiver local oscillator by inserting additional capacitors. Direct connections to L2, T5 and L13 are impractical due to inaccessibility within the channel switching unit. The majority of these connections, however, terminate on pins of valve bases and these are accessible.

To modify the receiver solder a 33pF 5 per cent silver mica or polystyrene capacitor (designated Ca) between pin 3 of the V7 valve base and the tag of T1 which is connected to the hidden end of L6. Choke L6 is recessed into the chassis directly beneath the humidity desiccator. This completes the receiver modification. All that remains is the selection and fitting of the new crystals and the retuning of the local oscillator and this will be discussed later.

For the transmitter p.a. and doubler stages solder a 47pF capacitor (designated Cb) between pins 2 and 3 of the V1 valve base and a 47pF capacitor (designated Cc) between pins 2 and 3 of the V2 valve base. Both capacitors should be 5 per cent silver mica or polystyrene.

The master oscillator tuned circuit is a little more difficult for two reasons; access and the unusual configuration of the tuning capacitors switched by S3C which causes gaps in the tuning range across the four channels. Also any adjustment made to C24 affects all four channels. Two capacitors are required to be added to the master oscillator, Cd reduces the frequency from about 20MHz to 14·5MHz (half the output frequency) and Ce is included to eliminate the gap in tuning coverage between channel A and the other three channels. Capacitor Cd should be a good quality silver mica or polystyrene 100pF 1 per cent and this is the next to be inserted with one end connected below chassis and the other end above the chassis. On the top of the chassis the point of connection is the metal plate supporting the beehive




**The interior of the No. 88 set**

capacitors C24 to C27 (see Fig. 4). Insulate the leads of Cd with plastic or rubber sleeving and solder one lead to the end of the metal plate below C27. It will be necessary to remove V2, V5 and V6 to make room for the soldering iron. The other lead of Cd is fed slightly rearwards then down through the chassis where it should emerge close to V3 valve base. Locate the heavy gauge wire which connects V4 pin 2, V3 pin 2 and coil L13 and solder the other lead of Cd to this wire or to pin 2 of V3 valve holder whichever is found to be the more convenient. Capacitor Cd needs to be mechanically rigid so ensure it is held firmly by its leads which should be no longer than necessary to reach the terminations.

The last component to be added is Ce which is a 2·2pF 10 per cent silver mica or polystyrene capacitor. It is mounted on the top side of the chassis adjacent to beehive capacitor C24 (see Fig. 4). Solder one lead of Ce to the same beehive capacitor mounting plate that Cd is connected to but at the opposite end and below C24. Solder the other end of Ce to the nearest contact of the rotary switch ceramic wafer immediately to the rear of C24. As in the case of Cd, Ce should also be rigidly mounted with short leads. Take care to avoid a short circuit between the capacitor mounting plate, which is h.t. positive, and the earthed vertical silver plated screen just below the point of contact of Ce. This concludes the circuit modifications which are well within the scope of an evening's work even for the relatively inexperienced constructor.

## Crystals

The final task is to re-crystal the set and align the r.f. tuned circuits. The formula for the crystal frequency is:

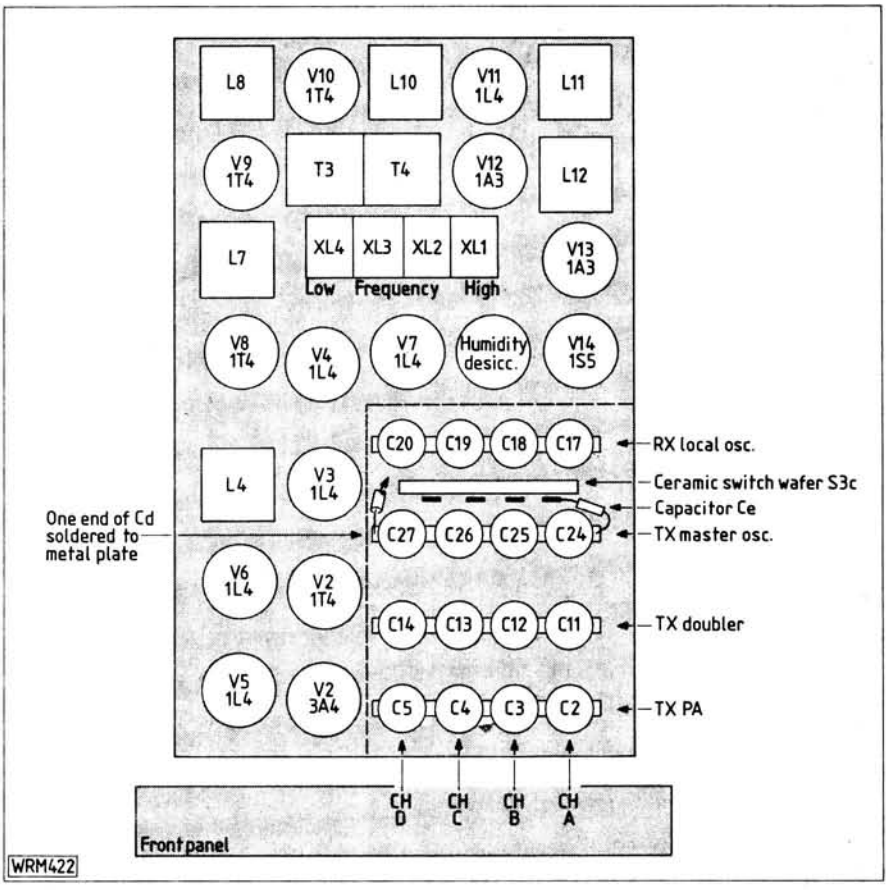



**Fig. 4**

$$Fx = \frac{Fs - 3}{6}$$

where Fx is the crystal frequency (MHz) and Fs is the required signal frequency (MHz)

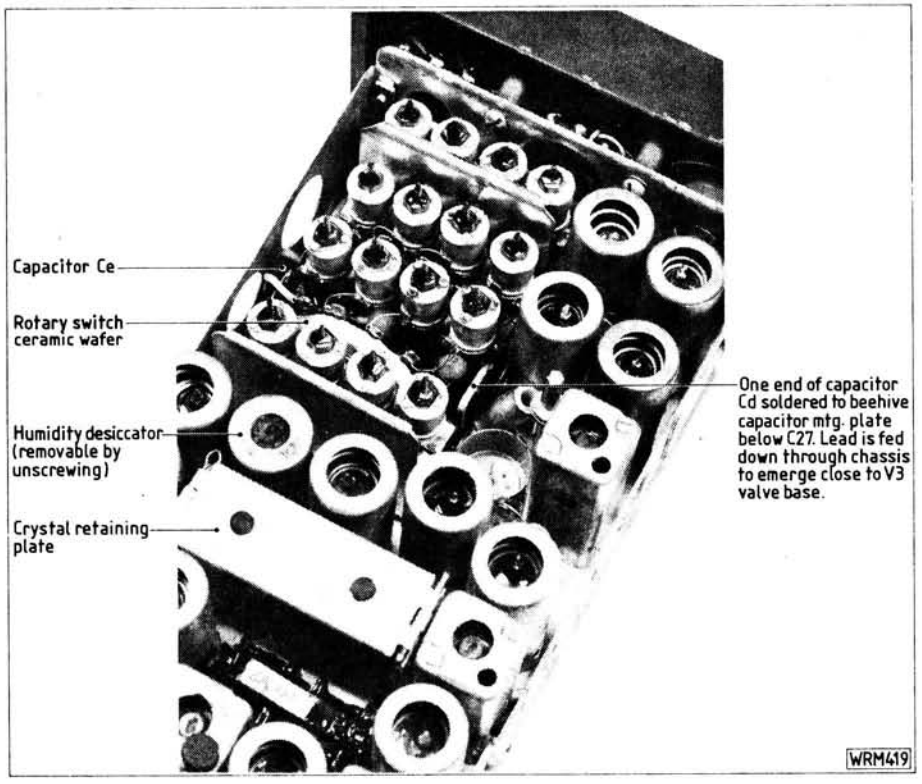
For example to transmit and receive on a frequency (Fs) of 29·6MHz the crystal frequency (Fx) will be

$$\frac{29{\cdot}6-3}{6} = \frac{26{\cdot}6}{6} = 4{\cdot}4333\text{MHz}$$

Note that the television colour burst crystal on 4·433619 comes out on 29·6016MHz and is within the bandwidth of channelised f.m. receivers tuned to 29·6000MHz. Any crystal in the range 4·166 to 4·4500MHz will fall into the 28MHz band (28–29·7MHz). As a bonus the author found it was possible to use the fourth harmonic of 6MHz crystals. The formula in this case is:

$$Fx = \frac{Fs - 3}{4}$$

and crystals between 6·250 and 6·675MHz fall within the 28MHz band. The original crystals fitted to the WS 88 A Set and A-AFV Set on channels A, B and C have frequencies of 6·525, 6·400 and 6·317MHz which will tune to signal frequencies of 29·1, 28·6 and 28·268MHz respectively. The crystal socket has dimensions for FT243 style crystals. The more common HC6 style may be used and Fig. 5 shows how the pins of the original crystals may be removed and fitted to HC6 crystals to allow them to be installed correctly. The smaller dimensions of HC6 crystals allows space for fitting a small capacitor between the pins if it is required to pull the crystal frequency slightly l.f. There is no provision in the No. 88 Set for individual crystal frequency trimming. Select crystals within a signal frequency (Fs) range of about 400kHz of each other to avoid exceeding the tuning range and fit these in descending frequency order with the highest frequency channel in channel A position, XL1, adjacent to valve V13. Refit the crystal retaining plate with the split pins.




**The interior of the No. 88 set**

## Alignment

The chassis screening plate is to be secured in position with all seven screws during the following alignment procedure. The alignment involves adjustments to all 16 beehive trimmer capacitors. If the correct alignment tool is not available one will have to be fabricated from an insulating material. A 50mm length of plastics sleeving removed from some mains cable of a diameter to grip the hexagonal top of the beehive trimmer could be used and this may be attached to a short plastics rod to serve as a handle. A general coverage receiver (g.c.r.) fitted with an S-meter serves as the test set and about 0·9m of insulated wire connected to its antenna socket is used as a pick-up probe. The No. 88 Set receiver local oscillator is the first stage to be aligned. With h.t. and l.t. supplies connected, switch on the No. 88 Set and select channel A on receive. The No. 88 Set antenna should be disconnected. Position the g.c.r. pick-up probe close to T1 which is mounted underneath C17 to C20. Tune the g.c.r. to the third harmonic of channel A crystal frequency if a 4MHz crystal is fitted or the second harmonic if a 6MHz crystal is fitted. This will be somewhere between 12·5 and 13·35MHz. Adjust C17 and the g.c.r until the heterodyne is heard. Zero beat on the g.c.r. b.f.o. and confirm the frequency is correct. Carefully adjust C17 for maximum S-meter reading. Repeat for channels B, C and D in turn adjusting C18, 19 and 20 respectively. This completes the No. 88 Set receiver adjustment bearing in mind that the receiver r.f. amplifier grid and anode tuned circuits are aligned during the transmitter adjustments as they are common to both transmit and receive circuits.

The next stage to be tuned is the transmitter master oscillator and this is the trickiest to get right. Capacitor C24 which is used to tune channel A also affects the tuning of channels B, C and D so C24 must be adjusted first. If C24 is later re-adjusted for any reason then C25 to C27 will have to be re-adjusted to bring the frequencies of channels B, C and D back to where they should be. Calculate the signal frequency (Fs) corresponding to the frequency of the crystal fitted to channel A and divide this by 2. The result should fall between 14·00 and 14·85MHz. Accurately tune the g.c.r. to this frequency. Position the wire pick-up probe close to L13 which is located beneath the trimmers C24 to C27 and surrounded by a silver plated screen. With the No. 88 Set switched on, channel A selected, antenna removed, switch to transmit and adjust C24 for zero beat with the g.c.r. The zero beat should tune in smoothly. If the tuning position of C24 is found to be very sharp or erratic then the action of the phase locked loop may be suspect and most probably due to the discriminator being off tune. If all else fails try carefully adjusting L12 noting

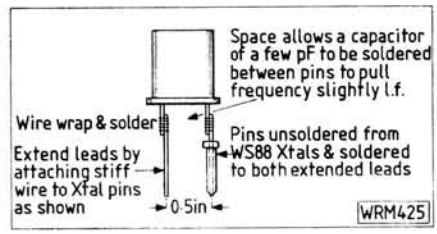



**Fig. 5**

the intitial position of the tuning slug so that it may be restored to its original setting if necessary. Adjustment of L12 will cause a shift in frequency of the master oscillator which must be compensated for by re-adjustment to C24. Removing the appropriate crystal will cause the phase locked loop to cease functioning and it is a good exercise at this point to compare the differences in the ability to tune the master oscillator under free running conditions and under phase locked loop control conditions. When satisfied that channel A is accurately tuned in and that the phase locked loop is working select channel B, retune the g.c.r. as appropriate to channel B crystal and adjust C25 for zero beat. Repeat likewise for channels C (C26) and D (C27). This completes the tuning of the master oscillator.

The doubler driver stage is aligned next. Retune the g.c.r. to the signal frequency (Fs) appropriate to channel A crystal. This will be between 28·0 and 29·7MHz. Position the pick-up probe in the vicinity of T5 which is immediately below trimmers C11 to C14. Select channel A and switch to transmit. Adjust C11 for maximum S-meter reading. If necessary zero beat the g.c.r. and adjust its r.f. gain to achieve a usable S-meter indication. Repeat for channels B, C and D retuning the g.c.r. as appropriate. This completes the provisional alignment of the doubler driver stage. Final peaking is done after the p.a. tuning.

The power amplifier must be tuned against the antenna to be used in order to radiate maximum power. The No. 88 Set will match a quarter wave whip antenna connected directly to its antenna socket or fed via a 50Ω coaxial cable. A half wave dipole, beam or end fed wire with an a.t.u. are also suitable. Whichever antenna is to be used this should now be connected to the front panel antenna socket with the adjacent hexagonal earth terminal being used as required. Tune the g.c.r. to the signal frequency (Fs) of channel A and position the pick-up probe in the vicinity of the antenna. Select channel A and switch to transmit. Adjust C2 for maximum S-meter reading. If necessary zero beat the receiver and adjust the r.f. gain to avoid overload and to obtain a usable S-meter reading. Without moving the pick-up probe, re-adjust C11 of the doubler driver stage and then re-adjust C2 to obtain a peak indication. Check the output frequency and if necessary re-adjust C24 of the master oscillator to correct any frequency drift followed again by peaking C11 and C2. Retune the g.c.r. to the signal frequency of channel B, select channel B and repeat the process for C3, C12 and C25. Repeat likewise for channels C and D. Refitting the case may result in a slight frequency change and detuning of the doubler driver and p.a. stages due to capacitive coupling to the case. The answer to this problem is to fit the case, measure the frequency change on each channel then remove the case and adjust C24 to C27 to compensate for the change. This may have to be repeated a few times to get it correct and can prove a little frustrating. If the output power drops significantly on fitting the case a similar procedure will have to be adopted for C2 to C5 and C11 to C14. When all 16 capacitors have been set to their optimum settings a small dab of shellac varnish or molten candle wax may be applied to the top of each beehive capacitor, using an artist's paint brush, to prevent any movement due to vibration when in use.

Refit the case and secure with the four screws and nuts. Apply h.t. and l.t. supplies, attach the antenna and headset and switch on. Carry out a receiver check on all channels using a signal generator, dip oscillator or another 28MHz f.m. transceiver. A dip oscillator will produce a fully quieting signal in a correctly aligned receiver. Transmission tests are probably most conveniently carried out on-the-air with another set, initially at short range, and with the assistance of a fellow radio amateur. As designed, the maximum modulation deviation is ±15kHz, this is greater than that required on the 28MHz band. The modification carried out on the master oscillator will result in a lower deviation level and speaking with a soft voice or further from the microphone will keep the deviation down to about an acceptable ±3kHz. The filaments of V5 and V14 are switched off on transmit and the filaments of V1 and V4 are switched off on receive. When switching from receive to transmit pause for about a second before speaking to allow the valves time to warm up.

The author admits to that well known feeling of excitement and achievement when, after putting out the first CQ call on the modified No. 88 Set, a station, albeit only 3km away, replied. It is hoped that others will be encouraged to experiment with this lesser well known but still available piece of surplus equipment without the worry of causing expensive damage or invalidating warranties. It also serves as a reminder that valves are still alive and kicking and will continue to soldier on despite the silicon opposition!

## Notes

The Wireless Set No. 88 (untested) is available from Weirmead Ltd. at a cost of £10.50 per unit. Copies of the circuit diagrams and component lists as well as full service manuals are available for £1.50 and £4.53 respectively. All prices include carriage and VAT. ***PW***

# CLUB NEWS

**Compiled by Eric Dowdeswell G4AR**
Reports to: Eric Dowdeswell,
57 The Kingsway, Ewell Village,
Epsom, Surrey KT17 1NA
**PLEASE MARK "CLUB NEWS"**

## Avon

**Bristol ARC: D. Gully G4YOC (Bitton 4116).** Meets Tuesdays, 7.30pm at the YMCA, Park Road, Kingswood, Bristol.

**City of Bristol RSGB Group: C. R. Hollister G4SQQ (Bristol 508451).** Meets 7.30pm in the Small Lecture Theatre, Queens Building, University Walk, Clifton. Jan 27—AGM.

**North Bristol ARC: Ted Bidmead G4EUV, 4 Pine Grove, Northville, Bristol 7.** Meets Fridays, 7pm in SHE—7, 7 Braemar Crescent, Northville. Jan 31—AGM.

**Bristol (Shirehampton) ARC: Ron Ford G4GTD (Bristol 770504).** Meets Fridays, 7.30pm in Twyford House, Lower High Street, Shirehampton, Bristol.

**South Bristol ARC: Len Baker G4RZY (Whitchurch 834282).** Meets Wednesdays, 7.30pm at the Whitchurch Folk House, East Dundry Road, Whitchurch, Bristol. Jan 8—CW Activity; 15th—Computer Activity; 22nd—RTTY Activity.

**Gordano AR Group: John Davies G3LJD, 273 Down Road, Portishead, Bristol.** Meets 4th Wednesdays, 8pm in The Ship, Redcliffe Bay, Portishead.

## Bedfordshire

**Dunstable Downs RC: Phil Morris G6EES (Dunstable 607623).** Meets Fridays, 8pm in Room 3, Chews House, High Street South, Dunstable. Jan 17—Junk Sale; 31st—Film Show.

## Berkshire

**Newbury & District RS: M. J. Fereday G3VOW (Newbury 43048).** Meets 2nd Tuesday at Newbury Technical College.

## Cambridgeshire

**Cambridge & District ARC: Brian Davy G4TRO (Cambridge 353664).** Meets Fridays, 7.30pm in the Visual Aids Room, Coleridge CC, Radegund Road, Cambridge. Jan 10—Facsimile Reception; 24th—Lasers.

## Cheshire

**South Cheshire ARS: Chris Wiseman G1PUV (Kidsgrove 73185).** Meets 2nd and 4th Mondays, 8pm at the Victoria Club, Gatefield Street, Crewe. Jan 13—Crime Prevention Officer.

**Chester & District RS: Dave Hicks G6IFA (Chester 336639).** Meets Tuesdays, 8pm at the Chester RUFC, Hare Lane, Vicars Cross, Chester. Jan 7—AGM; 14th—Construction Winners Talks; 21st—"What to do with Failed Projects"; 28th—Satellite Comms and WOORE Lecture Videos. CW at 7.15pm.

## Clywd

**Rhyl & District ARC: Melfyn Allington GW1AKT (Nantglyn 469).** Meets 1st and 3rd Mondays, 7.30pm in the Mona Hotel, Market Street, Rhyl.

## Cornwall

**Cornish RAC: Tony Bevington G4ZUI (Stithians 860572).** Meets 1st Thurdays, Computer Club meets 2nd Mondays and Constructors Meeting 3rd Mondays. Feb 6—Impedance Matching by G1AJB.

## Cumbria

**Eden Valley RS: Alison Telford G4XPO, Ivy House, Culgaith, Penrith, Cumbria.** Meets 3rd Thursdays, 7.30pm in the Kings Arms, Temple Sowerby, on the A66. Jan 16—Table Top Rally.

**South Lakeland ARS: Dave Warburton G6LKB (Barrow-in-Furness 54982).** Meets 1st and 3rd Thursdays, 8pm in the NORWEB S&SC, (rear of Ormsgill Hotel), Barrow-in-Furness.

## Derbyshire

**Bolsover ARS: David Fleetwood G1GNC (Chesterfield 824061).** Meets Wednesdays, 7.30pm in the Black Bull, Bolsover (upstairs).

## Devon

**Axe Vale ARC: Bob Newland G3VW (Lyme Regis 5282).** Meets 1st Fridays, 7.30pm in the Cavalier, West Street, Axminster. Jan 3—Construction Contest.

## Dorset

**Poole RAS: Phil Dykes, 68 Egmont Road, Poole.** Meets last Fridays, 7.30pm at Commanders House, Constitution Hill Road, Poole. Jan 31—G3KWU The Region Rep; Feb 28—50MHz.

## Dyfed

**Carmarthen ARS: A. F. Dowling GW3GUE (Carmarthen 883460).** Meets 2nd and 4th Fridays, 7.30pm in the Carmarthen Boat Club, The Quay, Carmarthen.

## Essex

**Braintree & District ARS: Melvin Kendall G6THE (Braintree 25587).** Meets 1st & 3rd Mondays, 7.30pm in the Braintree CC, Victoria Street, Braintree.

**Havering & District ARC: D. St. J. Gray G0BOI (Hornchurch 41532).** Meets Wednesdays, 8pm at Fairkytes AC, Billet Lane, Hornchurch. Jan 15—AGM; 22nd—SHF by G8DPB; 29th—Informal; Feb 5—Junk Sale.

**Stanford-le-Hope & District ARC: J. R. Thompson G4OVG (S-I-H 642312).** Meets Mondays, 8pm in St Joseph's Parish Rooms, Scratton Road, S-I-H. Jan 13—VHF Night; 27th—RSGB Video.

## Glamorgan

**Bridgend & District ARC: T. C. Morgan GW4SML, 4 Rhiw Tremaen, Brackla, Bridgend.** Meets 1st and 3rd Fridays, 7.30pm in the YMCA, Bridgend.

## Gloucestershire

**Smiths Industries RS: Roger Hawkins G8UJG (Cheltenham 673333 ext 2557).** Meets alternate Thursdays, 8pm in the S & SC, Evesham Road, Bishops Cleeve, Cheltenham. Jan 9—RTTY.

## Greater Manchester

**Trafford ARC: Graham Oldfield G1IJK (061-748 9804).** Meets Thursdays, 7.30pm in the 9th Urmston Scout Group HQ, Brafield Road, Urmston.

## Gwynedd

**Merion ARS: Ken Judge GW4KEV, Tyddyn Mawr, Arthog.** Meets 1st Thursdays, 7.30pm in the Dolserau Hall Hotel, Dolgellau. Feb 6—Junk Sale.

## Hampshire

**Amateur Radio & Computer Club (AMRAC): Trevor Tugwell G8KMV (Fareham 43031 ext 2591).** Meets every 4th Friday, 8pm in the Crown, Bishops Waltham. Next meeting Jan 10.

**Basingstoke ARC: Dave Burleigh G4WIZ (Tadley 5185).** Meets 1st Mondays, 7.30pm in the Forest Ring CC, Sycamore Way, Winklebury. Jan 6—23cm Operation; Feb 3—RSGB Film Show.

**Farnborough & District RS: Peter Taylor G4MBZ, 12 Dunbar Road, Paddock Hill, Frimley, Camberley.** Meets 2nd and 4th Wednesdays in the Railway Enthusiasts Club, Access Road, off Hawley Lane, Farnborough. Jan 8—Film Night; 22nd—Celebration for G8ATK, the construction winner.

**Winchester ARC: Robert Stone G4FPC (Winchester 64747).** Meets 3rd Saturdays, 7.30pm at the Log Cabin, Stockbridge, Winchester.

## Hereford & Worcester

**Bromsgrove & District ARC: Norman Westwood G4NYH (Bromsgrove 73847).** Meets 2nd and 4th Fridays, 8pm in the Avoncraft AC, Bromsgrove.

**Hereford ARS: F. Cox G3WRQ, 35 Thompson Place, Hereford.** Meets 1st and 3rd Fridays, 7.30pm in the County Council CD HQ, Gaol Street, Hereford. Feb 7—AGM.

**Kidderminster & District ARS: Tony Hartland G8WOX (Kidderminster 751584).** Meets 1st and 3rd Tuesdays, 8pm in the Harriers FC, Hoo Road, Kidderminster. Jan 22—RTTY/AMTOR Techniques by G3WHO; Feb 4—70cm Repeaters by G8NTU.

**Worcester & District ARC: D. W. Batchelor G4RBD (Worcester 641733).** Meets 1st and 3rd Mondays, 8pm in the Oddfellows Hall, New Street, Worcester.

## Hertfordshire

**Verulam ARC: Hilary Claytonsmith G4JKS (St Albans 59318).** Meets 2nd & 4th Tuesdays, 7.30pm at the RAFA HQ, New Kent Road, off Marlborough Road, St Albans. Jan 28—Weather Satellites.

**Welwyn Hatfield ARC: Dave Fairbank G0AII (Welwyn Garden City 26138).** Meets 1st & 3rd Mondays, 8pm in the Knightfield Scout HQ, Welwyn Garden City. CW on Thursdays. Jan 6—RTTY Demo; 20th—3·5MHz Activity Night.

## Highland

**Inverness ARC: Brian Adam GM1GFX (Inverness 242463).** Meets Thursdays, 7.30pm in the Cameroon Youth Centre, Planefield Road, Inverness.

## Humberside

**Hull & District ARS: Cliff North G3PEP (Hull 77249).** Meets Fridays, 8pm in the West Park RC, Walton Street, Hull.

## Isle of Man

**Isle of Man ARS: Anthea Matthewman GD4GWQ (Douglas 22295).** Meets Mondays, 8pm at the Howstrake Hotel, Onchan; Tuesdays at the Peveril Court Hotel, Ramsey; Thursdays at the Tynwald Inn, St Johns; Fridays at the Perwick Bay Hotel, Port St Mary.

## Kent

**Biggin Hill ARC: Bob Senft GOAMP (Farnborough 57848).** Meets 3rd Tuesdays, 8.30pm in St Marks Church Hall, Church Road, Biggin Hill.

**Bredhurst Radio & Transmitting Society: A. S. White G4EGH (Medway 388760).** Meets Thursdays, 8.15pm in Parkwood CC, Parkwood, Rainham. Jan 23—Junk Sale.

**Darenth Valley RS: Mrs S. Hillman G1NMX (Orpington 26951).** Meets twice monthly Wednesdays, 8pm in the Crockenhall Village Hall, Near Swanley, Kent. Jan 29—KW Electronics Rep.

**SE Kent (YMCA) ARC: John Dobson (Dover 211638).** Meets Wednesdays, 7.45pm in the Dover YMCA, Godwynehurst, Leyburne Road, Dover. Jan 8—G2CJC Trophy Quiz; 22nd—Amateur TV by G3ZYZ; 29th—Film Evening.

**West Kent ARS: Nigel Peacock G4KIU (Tunbridge Wells 33586).** Meets Fridays, 8pm at the AEC Annex, Quarry Road, Tunbridge Wells. Feb 7—Junk Sale.

## Lancashire

**Bury RS: B. Tyldsley G4TBT (Burnley 24254).** Meets Tuesdays, 8pm at the Mosses Centre, Cecil Street, Bury. Feb 9—Hamfeast.

**Fylde ARS: H. M. Fenton G8GG (Lytham 725717).** Meets 1st & 3rd Tuesdays, 7.45pm in the Kite Club, Blackpool Airport. Jan 7—AGM; Feb 4—Amateur TV by G8AMY.

**Morecambe Bay ARS: W. E. Delamere G3PER (Heysham 52659).** Meets Mondays, 7.30pm in the canteen, Luneside Eng. Co., Mill Lane, Halton.

**Oldham ARC: Kath Catlow G4ZEP (061-624 7354).** Meets Thursdays, 8.30pm at the Moorside CC, Ripponden Road, Moorside, Oldham. Jan 26—1st Mobile Rally at Birch Hall Hotel, Rhodes Hill, Lees, Oldham. Starts 10.30am, S22 talk-in.

## Leicestershire

**Welland Valley ARS: Judith Bay G60FZ, POB 16, Market Harborough.** Meets Mondays, 7.15pm at the Welland Bank CC, Market Harborough.

## Lincolnshire

**Sleaford & District ARC: Dave Beilby G2HHK (Sleaford 304454).** Meets 3rd Sundays, 7.45pm at the Hale Magna Village Hall, Great Hale.

## London

**Acton, Brentford & Chiswick ARC: W. G. Dyer G3GEH, 188 Gunnersbury Avenue, Acton, W3.** Meets 3rd Tuesdays, 7.30pm in Chiswick Town Hall, High Road, W4. Jan 21—AGM.

**Southgate ARC: R. F. Snary G4OBE, 12 Borden Avenue, Enfield.** Meets 2nd Thursdays, 7.30pm in St Thomas' Church Hall, Prince Georges Avenue, Oakwood, N14.

**Wimbledon & District ARC: G. Cripps G3DWW (01-540 2180).** Meets 2nd and last Fridays, 7.30pm in the St John Ambulance HQ, 124 Kingston Road, Wimbledon. Jan 10—EGM; 31st—Cellular Radio by G4ULM.

## Merseyside

**St Helens & District ARC: Alan Riley G6MXT (051-430 9227).** Meets Thursdays, 8pm at St Helens ITC, Water Street, St Helens.

**Wirral & District ARC: Gerry Scott G8TRY (051-630 1393).** Meets 2nd and 4th Wednesdays, 8pm in Irby Cricket Club, Irby.

## Middlesex

**Echelford ARS: Peter Coleson G4VAZ (Sunbury 783823).** Meets 2nd Mondays and last Thursdays, 7.30pm in The Hall, St Martins Court, Kingston Crescent, Ashford. Jan 13—Frequency and Power Measurements by G4PHS; 30th—The Radio Section of the Science Museum by G3JUL.

**RS of Harrow: Dave Atkins G8XBZ (Rickmansworth 779942).** Meets Fridays, 8.15pm in the Roxeth Room, Harrow Arts Centre, High Road, Harrow Weald. Jan 17—Film Show; 31st—Contests by G4JNZ.

## Northumberland

**Border ARS: Mrs S. P. Jones G1IUK (Berwick-on-Tweed 305465).** Meets 1st and 3rd Fridays, 8pm in the Tweed Hotel, B-on-T.

## Nottinghamshire

**Mansfield ARS: Angela Fisher G1DZH (Mansfield 652812).** Meets 1st Fridays & 3rd Tuesdays at the Victoria SC, Mansfield. Jan 21—Talk by G4SVU; Feb 7—Film Show.

**ARC of Nottingham: Ian Miller G4JAE (Nottingham 232604).** Meets Thursdays, 7.30pm at Sherwood CA, Woodthorpe House, Mansfield Road, Nottingham. Jan 9—Video Matters; 16th—G4MHBs Trip to China; 30th—Forum; Feb 6—Fibre Optics.

## Oxfordshire

**Vale of White Horse ARS: Ian White G3SEK (Abingdon 31559).** Meets 1st and 3rd Tuesdays, 7.30pm in the upstairs clubroom, Waterwitch, Cockroft Road, Didcot.

## Shropshire

**Salop ARS: Simon Pryce G6MOJ (Shrewsbury 67799).** Meets Thursdays, 8pm in the Olde Bucks Head, Frankwell. Jan 9—Fast Scan TV by G8DIR; Feb 6—Antennas.

**Telford & District ARS: Tom Crosbie G6PZZ (Telford 597506).** Meets Wednesdays, 8pm at the Dawley Bank CC, Bank Road, Dawley. Jan 8—Plan for '86; 22nd—SSTV by G4IUT; 29th—Using Test Equipment by G6UDX.

## Somerset

**Yeovil ARC: Eric Godfrey G3GC (Yeovil 75533).** Meets Thursdays, 7.30pm at the Recreation Centre, Chilton Grove, Yeovil. Jan 9—Tuned Circuits by G3MYM; 16th—QRP TX Design by G3MYM; 23rd—QSLs and the Bureau by G3GC; Feb 6—Antennas for QRP by G3MYM.

## Strathclyde

**West of Scotland ARS: Ian McGarvie GM4DJU (Brediland 2708).** Meets Fridays, 7.30pm in the clubrooms, 154 Ingram Street, Glasgow. CW from 7–7.30pm. Jan 10—Video Show; 24th—Slides of GM3EDZ's trip to VS6 and JA.

## Surrey

**Dorking & District RS: J. Greenwell G3AEZ (Newdigate 236).** Meets 2nd and 4th Tuesdays, 8pm in the Star and Garter Hotel, Dorking. Jan 28—AGM.

**Sutton & Cheam RS: Alan Keech G4BOX, 26 St Albans Road, Cheam.** Meets 3rd Fridays, 7.30pm in the Downs LT Club, Holland Avenue, Cheam. Jan 17—Solders and Fluxes by G6YAF; Feb 15—37th Annual Dinner at the Worcester Hotel.

## Sussex

**Brighton & District ARS: Peter Turner G4IIL (Brighton 607737).** Meets 1st and 3rd Wednesdays, 8pm in the Seven Furlong Bar, Brighton Racecourse.

**Hastings Electronic & RC: Dave Shirley G4NVQ (Hastings 420608).** Meets 3rd Wednesdays, 7.45pm in the West Hill CC, Croft Road, Hastings. Also Fridays, 8pm at Ashdown Farm CC, Downey Close, off Harrow Lane. Jan 15—Antennas.

**Horsham ARC: Pete Head G4LKW (Horsham 64580).** Meets 1st Thursdays, 8pm in the Guide HQ, Denne Road, Horsham.

**Mid-Sussex ARS: C. R. Cook G1FRF (Hassocks 2937).** Meets Thursdays, 7.30pm (during term time) at Marle Place AEC, Leylands Road, Burgess Hill.

**Worthing & District ARC: Roy Jones G4SWH, POB 599, Worthing.** Meets Wednesdays, 7.30pm in Lancing Parish Hall, South Street, Lancing.

## Tyneside

**South Tyneside ARS: P. W. Grainger (South Shields 543955).** Meets Mondays, 7.30pm at the Martec Club, South Shields Marine and Technical College.

## Warwickshire

**Rugby ATS: Kevin Marriott G8TWH, 41 Foxon's Barn Road, Brownsover, Rugby.** Meets Tuesdays, 7.30pm in the Cricket Pavilion, BTI Radio Station, "B" Building Entrance, on the A5. Jan 7—Region 3 Rep; 29th—Visit to BTI radio station.

**Stratford upon Avon & District ARC, David Boocock G8OVC (S-u-A 750584).** Meets 2nd and 4th Mondays, 7.30pm in the Baptist Church, Payton Street, S-u-A. Jan 13—Chairman's Talk by G3MXH; 17th—Contest Strategy—G3HCT.

## West Midlands

**Coventry ARS: Robin Tew G4JDO (Coventry 73999).** Meets Fridays, 8pm in Baden Powell House, 121 St Nicholas Street, Radford.

**Stourbridge & District ARS: Malcolm Davies G8JTL (Lye 4019).** Meets 1st and 3rd Mondays, 8pm at the Robin Woods Centre, School Street, Stourbridge.

**Walsall ARC: Linda Prince G6HZI (Walsall 32607).** Meets Wednesdays, 8pm at the Forest Comprehensive School, Hawbush Road, Bloxwich, Walsall.

**Wolverhampton ARS: Keith Jenkinson G1OIA (Wolverhampton 24870).** Meets Tuesdays, 8pm at Wolverhampton Electricity S & SC, St Marks Road, Chapel Ash, Wolverhampton. Jan 7—Your Problems Solved; 21st Radio Regulatory Division by G4ZPA; 28th—Members' Topics.

## Wiltshire

**Blackmore Vale ARS: M. R. Bailey, 11 Brines Orchard, Templecombe.** Meets 2nd and 4th Tuesdays in The Bell and Crown Inn, Zeals. Jan 14—RAYNET.

**Swindon & District ARC: Dave Ineson G4ZAZ (Swindon 37489).** Meets Thursdays, 7.30pm at Oakfield School, Marlowe Avenue, Swindon.

## Yorkshire

**Pontefract & District ARS: Colin Mills GOAAO (Pontefract 43101).** Meets Thursdays, 8pm in the Charlton CC, Pontefract. Jan 16—Junk Sale.

**Spen Valley ARS: Tim Clough G4PHR (Mirfield 499397).** Meets Thursdays, 8pm at the Old Bank WMC, Mirfield. Jan 16—FSTV Link-up with N. Wakefield ARC; Feb 6—G3DSY.

**White Rose ARS: Steve Clark G4YEK (Harrogate 884481).** Meets Wednesdays, 8pm at the Moortown RUFC, Moss Valley, King Lane, Leeds. Jan 8—Test Gear Night with G4ATZ/JY9WR on Amateur Radio in Jordan; Feb 5—Video of DXpedition to Laccadive Islands.

# ON THE AIR

## AMATEUR BANDS

Reports to: Eric Dowdeswell G4AR, 57 The Kingsway, Ewell Village, Epsom, Surrey KT17 1NA.
Logs by bands in alphabetical order.

by Eric Dowdeswell G4AR

Readers who may be studying or contemplating studying for the Radio Amateur's Examination would be well advised to get hold of a copy of the new edition of the RSGB's *RAE Manual* by George Benbow G3HB which should be available very soon. Covering amateur licensing legislation up to early 1985 it also covers changes to the RAE syllabus for 1986-88, principally concerning Paper 2, Section 2, on electrical theory. These include transistors for switching, the decibel, expressions of power in terms of dBW, and the reasons for amateur band planning.

This new issue of the *RAE Manual* is the 11th edition and will be particularly useful to the people who are studying at home for the RAE. Teachers taking RAE classes will, no doubt, already have details of these changes in the RAE syllabus.

### General

I learn from the Carshalton College (Surrey) that an RAE course is already under way in the Engineering department. If it turns out to be successful further courses will be held. For more details contact Mr C. M. Ferrier at the Carshalton College of Further Education, Nightingale Road, Carshalton, Surrey, or ring 01-647 0021/8.

There can be few radio amateurs who have not heard of the Radio Amateur Invalid & Blind Club (RAIBC) but it may not be realised that outside helpers are always welcome to assist members needing assistance in studies at home or, in fact, with the many aspects of amateur radio. If you can help, write to the secretary Cathy Clark G1GQJ, 9 Conigre, Chinnor, Oxon, who will put you in touch with a member or file your name, etc., for future reference. No qualifications are required just a little time now and then.

### DX Bands

From the Southdown ARS club magazine I learn that G4RUL has been offered a place on the round-the-world expedition Operation Raleigh. Alistair will be on the converted deep-sea trawler *Sir Walter Raleigh* for the crossing of the Pacific in May/June this year, delayed from January.

Much of the work on the crossing will be of a scientific nature but amateur operation is scheduled from some very interesting spots like Juan Fernandez Islands, Easter Island (CE0), Henderson and Pitcairn Islands (VR6), the Cook Islands (ZK), American Samoa (KH8), W. Samoa (5W1), Tonga (A35), and New Zealand, taking an h.f. rig ashore wherever possible.

There will be three amateurs on board using the call GB0SWR/MM when work permits. Although it is a bit early to formulate anything definite G4RUL says that he and G4TAW are hoping to try some v.h.f./u.h.f. activity possibly by trans-equatorial propagation, or even moonbounce, plus satellite operation from a shore-based station, "so that, in theory, even Class B ops should be able to contact us"! A nice thought!

Getting back to reality **John Kojan ex-W8NHZ** residing in St Cyprien, France, comments on the unusual conditions existing a bit back in September when "I was hearing everything on 14MHz from mid-USSR to the west coast USA plus the usual South Americans and South Africans, all at S7 or better, having to keep the r.f. gain down to prevent overloading the FRG-7700". A similar condition existed during the s.s.b. contest at the end of the month. John uses a 15m-long wire in the loft plus an a.t.u. although a Dressler ara30 antenna ought to be installed by now.

So DX logged by John includes TK5BF, VK3RE, CO7GC, J87A, TI2CC, VP2MW all on 7MHz s.s.b. and on c.w. BY3AK/MM and 8P9A. On 14MHz it was KA1AHO/MM, the ship that found the *Titanic*, A71AD, H5AY, KP6ZFU, S79CW, VU2USA, and W7MG around 1600Z, all on s.s.b. VP9DR and a couple of W7's were heard on c.w. at about 1700Z. John seems to have done well on 21MHz c.w. with A92EM, HK1IOE, ZP3KJ, 5T5RG, 6W1AE, 9Y4GR, TA1A, TZ6FE, YV4DOK, ZS2FP, with EL2CO, HC8X (Galapagos Is), TA1C, TG9VT, V44K (St Kitts), VP2VCW, VP9AD, ZS6AEO, W6EL, ZY5NW, 4X4LO, 5R8AL, 7P8CM and 9J2BO on s.s.b. The 28MHz band opened long enough to catch EA8AMT, PY5EG, 6AR8JLD (?) and 9Y4BA on s.s.b. and LU2WM, PP5OV and 3X0HAB on c.w. An excellent late catch was JT0DJT in Ulan Bator for a rare zone and country on c.w. around 21·015MHz at 1100Z.

A new reporter to the column is **George Hitchins** in Frimley, Surrey, who has deserted the BC bands for amateur radio. He runs a Panasonic DR31 and 12m-long wire "going somewhere in the garden", with an a.t.u. anticipated very soon. So far the DX has been poor on the 3·5MHz band with only WA1EKV and W7IVX just above 3·8MHz, although a late note reports VK9NM around 3·8MHz.

The White Rose ARS 6th SWL LF bands contest runs for 24 hours from 1200Z Saturday 18 January with up to 18 hours logging allowed during that period. Phone and c.w. modes only with Class B licensees allowed to enter as listeners. Operation on 1·8, 3·5 and 7MHz only—one point for each station heard on each band in one's own continent and five points outside. Total points on each band multiplied by number of countries heard gets the final score. A list of countries heard must be furnished with a separate log for each band. Full details from **John Hart G3ZGA**, 146 Street Lane, Leeds LS8 2AD. Entries not later than Monday 24 February.

I don't make a lot of QSOs on the h.f. bands, mainly because of a poor antenna and TVI, but I did hear some nice ones around 3·8MHz including SV0DV/5, YB0ARA, TA1C, JW0A, VP2MIX and N7DF/TT8, mostly during the small hours. The 14MHz band was quite lively with HL1CW, OX3UD, N7DF/TT8 again, TR8IG and OD5LX.

**Simon de Tute** of Ruislip, Middx, although a newcomer to amateur radio, is already studying for the RAE, so best wishes OM. He uses a Barlow-Wadley XCR30 receiver with a 20m inverted Vee antenna. His log shows mainly Europeans which is hardly surprising but he says he is moving soon to a larger house which will be coupled with the acquisition of a new communications receiver.

A very nicely laid out log from another newcomer to the column, **Andy Banthorpe BRS87730**, who resides in Hitchin, Herts. He runs an AR88D fed from a 25m-long antenna via an a.t.u., and he has been DXing for a couple of years. Good catch around 3·8MHz was VK6LK and on 7MHz it was N3RD/VP9 and OH0BA. On to 14MHz and DK8ZB/VP9, EL2EN, HR1EB (QSL POB 491, Tegucigalpa), VU2GI, YB3ARL, Z21GN and 5H3HM. The 21MHz band seemed to be the best with HC8X (QSL K8CW), JG1FVZ, KP4BZ (QSL KZ0C), TI2HP, VP2VCW (QSL N6LW), VP9AD (QSL W3HNK), YC0HLB, YV5IPZ, ZD7JAM, ZS3IL and ZS6WRS. Finally, on 28MHz Andy caught CE3ESS, PJ2FR, TR8JLD, VP2MU (QSL WA6AHF) and XQ0ZFZ on Juan Fernandez Island (QSL POB 13312 Santiago 21). That old AR88D can still deliver the goods!

Regular **Brian Fields G4XDJ** of Billingham, Cleveland, is still going strong with his *PW Severn* with 1W output on c.w., a.t.u. and half-sized grounded delta loop antenna. He comments that the rig, a.t.u. and s.w.r./power meter cost him just about £20 so no excuses for the newly-licensed amateur not getting going on the h.f. bands. Brian is in the middle of building a 14MHz version of the *PW Severn*. He found the c.w. end of the 7MHz band very quiet as far as BC QRM is concerned. He did however work EA2SG, UR2RFG, 4N3LI, UB5MBE, EA6NB, HB9BXE, IT9AXZ and UO5OCV. Brian has heard plenty of ZL and JAs around but no QSOs so far. He has found that adding/QRP to his call attracts more QSOs. I have an idea this may be an infringement of the licence conditions but it is very effective, and widely used.

A big catch for **Dick Stanbridge** (Leiston, Suffolk) with the logging on c.w. of ZL3DQ on Top Band, 1·837MHz to be precise. Congratulations OM. These openings are few and far between and usually the station is only up and readable for a few minutes. Dick has an Icom R70 receiver with AT1000 a.t.u. and vertical antenna for 1·8MHz and a half-sized G5RV for the other bands. Others on c.w. on 1·8MHz were K4PI, T77C, VG1ASJ (Canada), ZB2EO and 4U1ITU. Goodies around 3·8MHz were J87BZ, JW0A, PY0FG on Fernando de Noronha, YB0JH and ZL4KF, another fine catch, all on s.s.b. A couple on 7MHz were K8GVS/KH2 on Guam and VQ9LD on Diego Garcia on s.s.b. and c.w. respectively. Of note on 14MHz were J5WAD and ZD7BJ while sole DX noted on 21MHz was 7P8BE.

**Marcus Walden BRS86996** of Harrogate, Yorks, had a ball in the CQ WW contest and had a job deciding what to put in his log for the column. He has a DX302 and a 30m-long wire antenna. On 1·8MHz he heard K7NJ/4X and W2HCW around midnight and on 3·5MHz TR8JLD and VP2EC. Heard on 7MHz, by several other readers, was G4CNY/VP9, also JA5BJC. The 21MHz band seemed the best for Marcus with HC1OT, J87DX, P48K, TG9VT, TI2HP, TL8CK (QSL F6EWM), ZD7CW (QSL N4CTD), 3D6DX, 8P6AW and 8R1Z (QSL WI4K). I missed out VK9XZ, on the 14MHz band. The 28MHz band produced just TR8AHO and 3B8MS.

**Bruce Milburn** (Alfreton, Derbys) sent in his first log derived from a DX200 and 40m-long antenna and 20m dipole. He has been on holiday in Wales and while there met his uncle who is GW1MEW but regretted not having a battery type receiver with him on what would have seemed to be a good DX site. To the log and, on 14MHz LU9DOK and ZL2BCG, then to 7MHz and VP2ET and 4U1ITU. Better on 3·5MHz with JA1UQP, JH6RYY, OD5BP, VE1LI and 9K2NA.

**Melvyn Dunn BRS86500** lives in Grimsby, S. Humberside, and has a Yaesu FRG-7700 plus a 40m-long wire antenna and now has 52 countries confirmed. On 21MHz he found 9H3IHQ (QSL POB 31, Valetta), 9H4VSG on Gozo Island (cards to 9H4L), 5Z4EU (QSL PA0GMM), ZS6KD and YC0DNK. On 14MHz it was just FY5YE (QSL W5JLU), so down to 7MHz and CO6KW, PJ3AG, G4CNY/VP9 and J87A (QSL N4PN), all around 7·060. The 3·8MHz end of 80m found JA6GIJ, V44KAC (QSL WB2LCH), HH2MC (QSL POB1404, Port Au Prince) and JY5OYJ, special prefix celebrating 50th birthday of King Hussein.

Earlier in the column I was complimenting Dick Stanbridge for logging a ZL on c.w. on Top Band but now **Robert Parsey** of New Malden, Surrey, comes up with ZL2BT logged on s.s.b. on Top Band with an RS43 report on 0648Z. Needless to say the confirmation QSL card is awaited eagerly. Congrats Robert. This catch was during the CQ WW contest and the ZL was working G3ZEM who no doubt will also be a happy man. Back to Robert's log and OH0BA and T77V on Top Band, and to 3·8MHz with D44BC (QSL POB 36 Mindelo), ZF2FL, HC1FF, HP1XXO (QSL W0ANZ), J87BZ, JW0A (QSL SP2HMT), WB7RFA/V2A and VP2MW. KL7XO was sole catch of note on 7MHz and 14MHz was given a miss. On 21MHz Robert found A4XRS, 3D6BP and 9Y4BA.

**Andy Durrant** (Aldershot, Hants) seems to do most of his DXing in the early mornings finding little to comment on when it gets dark, except maybe 3·5MHz. He runs an FRG-8800 plus FRT-7700 a.t.u. and an inverted Vee antenna. Starting with 21MHz Andy logged a fine one with BT1BK in China, C53EZ, EA8TE, EL2DC, JH3JUZ, KG6DX on Guam and YC0H0B. Then, on 14MHz JA7MQH, JY50CH, TU2NH (QSL POB1083, Amoukrouz, Mauritania), ZD7AL, 5B4NX, 5L2EF and 9U5JB. Only finds on 7MHz were KL7E and J5WAD (QSL UA4PW). Now to around 3·8MHz and KN6M/5, VE3BVD, WB7RFA/V2A on Antigua, YV5ANF and 4U1ITU.

**Mike Willgoss G4XRR** has been having fun running mobile with a converted Cobra CB rig giving 10W p.e.p. into a top-loaded whip and thereby managed to work ZS6WRS, DL6KBT/EA8, EA8NP, YU2QS, CT1DIA, EA6WA, and I3PVB which is

**Last October the Hornsea ARC staged the ELHOEX show at the Floral Hall, Hornsea, promoting our hobby and involving local clubs and traders. Home-brew construction, ATV, SSTV and AMTOR were demonstrated. Shown here, on the RAYNET stand are G5CTE on the microphone and G8KFK doing the logging**

pretty respectable by any standard. Heard but not worked included ZD7, PY, LU, ZS3, UP1, PZ1, 7P8 and others. From home Mike had contacts with CE3DNP, C53FE, LU1BSN, PJ2FR, W6KG/ZS, CX2AAL, OH1RY/C56 and 8R1Z. The two-element quad has been taken down and by now should have had two extra elements fitted plus a new rotator with the G5RV filling in meantime.

Don't forget to let me have your logs s.w.l. or licensed amateur. Sample log sheets are available from me for an s.a.s.e. Good listening.

## VHF Forum

During 1986 13 different stations, each in a different county, will operate on the 70MHz band using the special call GB4MTR. Two-way QSOs, cross-band QSOs and s.w.l. reports will be welcome. An award will be available, details of which are available for an s.a.e. The call GB4MTR will be used by G4VOZ from January 1 to 28, G4ENA from January 29 to February 25, GW4HBK from February 26 to March 25 and G4ENB from March 26 to April 22. Further schedules available later on.

Volunteer stations operating on 70MHz are required, particularly from the north of England and GU, GJ, GD and GI. Details of the project from Jerry Russell G4SEU, 49 Lincoln Avenue, Nuneaton, Warks, Tel (0203) 394742 or from R. M. Bank G4WND, Rivendell, 59 Kiln Way, Polesworth, Staffs.

A very interesting article on the use of f.m. for TV transmissions was noted in the North Bristol ARC's recent newsletter *Q5*, by **Roger Worth G4ZQF**. The background to his work on this mode arises from the controversy among both amateurs and professionals as to whether the way forward should be a.m. or f.m. The present BC standard for most of the world's terrestrial TV services is a.m. vision with f.m. sound, and is used by most amateur TV stations, usually on the 430MHz band.

Because of bandwidth problems, says Roger, a.m. is used on the 430MHz band but the conventional use of intercarrier sound is precluded as it is normally displaced by 6MHz from the vision carrier. Full colour TV will occupy up to 8MHz bandwidth although 4MHz can contain sufficient colour information. Regretably, says G4ZQF, no-one has told computer manufacturers this fact because most composite video outputs of micros can occupy 10 to 12MHz unless adequately filtered. The 430MHz band did not offer much room for further experimentation but the 1·3GHz band "was a whole new world" with plenty of bandwidth available, enough for several ATV channels with intercarrier sound and full colour information.

It was agreed with other amateurs to go for an f.m. system, which can still be picked up on a.m. receivers using slope detection. So a nominal frequency of 1255MHz was chosen with sound displaced 6MHz. Roger says this choice was vindicated by Wood & Douglas, leading kit manufacturers, who endorsed the system. There are now several full two-way amateur TV stations in the Bristol area using full colour. G4ZQF and G8VPG also experiment with pre-emphasis and de-emphasis techniques on the video signal similar to that employed in satellite TV, to enhance the picture quality.

The two stations each use about 5W of r.f. feeding into 18-element Yagis and work over a range of about 18km. Roger says that talk-back takes place on 144·750MHz most evenings but particularly on Sundays and Wednesdays. He hopes that his experimentation will act as a spur to others to take up amateur TV on 1·3GHz.

It is learned from the RSGB's *Council Letter* that a couple of quite remarkable QSOs have taken place during a tropospheric opening between Hawaii and the west coast of the USA. KH6HME operating at some 2500m a.s.l. worked into San Francisco on 430MHz and into Los Angeles with N6CA on 1296MHz, both contacts thought to be new world records for those bands. The previous record was between KH6HME and WB6NMT in 1979.

October 1985 will probably be remembered by most European v.h.f./u.h.f. addicts as *the* month for tropo DX. During the period 12–14th conditions opened up into Europe between Northern Germany and Switzerland. **John Fell G0API** in Dorset (IO80) contacted stations in Y37, LX, DD, PE, ON and HB on 144MHz with signal exchanges averaging 5/6. John believes this widespread opening exceeded all logged tropo events during the preceding 18 months, in terms of signal stability, duration and geographical distribution. Subsequent band monitoring during the following week produced "selective" lifts into Holland and Germany, falling back to be replaced with well defined ducting into EI. Many Southern G stations worked EI7FJ/P(WM) and EI9FE (VM), who both reported earlier openings during which all stations heard/worked were in D or PA—the ducting clearly extended completely over the top of the UK! This period of well defined but short lived ducting continued up to and through the JOTA weekend of 19 October. Several such GB special event stations found brief contacts into Europe as far as Denmark, but all this gave way to the "massive" event of 24–26 October. During this period an extensive static high pressure system covered most of Europe producing sustained DX contacts throughout the region. **Nick Foot G4WHO** (Dorset) was monitoring 144·750MHz for ATV skeds when Johnny SM4CFL appeared on the channel calling CQ. G0API who was visiting at the time noted the electrifying effect of this 5/5 f.m. signal from GT square—a distance of 1379km being worked on approximately 25W into a 9-element Yagi.

Back at his home G0API, using 30W and a 19-element NBS Yagi, concentrated on 144MHz s.s.b. and worked SM4POB (HU) at 1491km, SM4LXZ (GT), LA8IE (ES) and

OZ1FGP(EQ). The following morning produced the best DX yet with SM1LPU on the island of Gutland giving a 5/7 report from JR32D—some 1515km. Several other SM stations were contacted on the 25th, with G8AAY reporting that OH had been worked from Dorset on 144 and 432MHz.

**John Regnault G4SWX** in Woodbridge (AM) is known to have contacted OH, UP, SP and OY on 144MHz c.w. during this period. John's station, with its "full legal" capability, box of four 19-element MET NBS Yagi antennas, which are well decoupled from the influence of local obstructions, and the operating finesse to back it up, indicate what is possible. To have worked 175 European QTH locator squares in five months is a fine achievement.

As the event finally drew towards its close on the 26th G0API heard a weak response to a CQ GM call, which was followed some seconds later by an apologetic GM8PNP explaining that he had forgotten to switch on the p.a.—GM8PNP was calling from the Shetland Islands (ZU) and provided a first time contact for both stations.

**Reports by the 13th please**

## RTTY

*Reports: as for VHF Bands, but please keep separate.*

*by Ron Ham BRS15744*

How good it was at 1032 on November 10, to copy, "CQ WAEDC CONTEST DE G3UUP," on 28MHz RTTY. The operator was making a long call and at 1034, his good signal became massive for a few seconds while it was influenced by a meteor ping.

Contests are usually full of activity and this event, on November 9 and 10, was no exception, in fact I heard one "G" say, while operating on another band, "now back to the chaos on 14MHz." How right he was, the band was packed with stations. For example I logged 10 countries, mainly from Europe, the Mediterranean area and the USSR, in the 15 minutes before 0900 on the 10th. Around that time, 21MHz was dominated by hefty signals from SV5TS and UB0MA and a strong, but watery, signal from G3UUP. This suggests that conditions were, at times, a bit strange. Signals seemed to get stronger as the contest progressed and around noon on the 10th, the Russian stations UZ2FWA on 14MHz and UB0MA, UK3KP and UZ3AYR on 21MHz, all had "rock crushing" signals, as did the QSB peaks of VE3IR and VE2ATD while in QSO at 1750, on 14MHz. My QTH must have been just in the right spot for the skip, hi!

On November 6 I copied, "Almost anyone can talk on the bands, but it takes a little more talent and effort to use this mode and that makes it more interesting." I am sure that many RTTY operators will share that point of view. One I liked on the 9th was, "A real pleasure for me to (chat) with the keys and (listen) through the screen," I wonder just how many of us think about RTTY in that way?

I found band conditions reasonable during the month prior to November 14 and, by taking a turn around each day, I copied RTTY signals from 9 countries on 3·5MHz, 13 on 7MHz, 33 on 14MHz, 13 on 21MHz and 2 on 28MHz (as listed in Fig. 2), they covered the 5 continents, ranging from both Americas to Japan and from Greenland to South Africa. Among the interesting items I logged were, "CQ CORONA TEST DE EA1AUN" on 28MHz at 1142 on November 2, the ITU station 4U1ITU on 3·5MHz during the WAE contest on the 10th and both sides of a QSO across Brazil between PP7AAD and PP8II at 0950 on the 13th.

One of the most dedicated RTTY operators for many years both as an s.w.l. and licensed amateur is **Ted Double G8CDW,** seen with some of his earlier RTTY gear in Fig. 1. Ted holds many national and international awards for his work in this field and readers who are interested in working for some of the awards offered by the British Amateur Radio Teleprinter Group, should send an s.a.e. to Ted at 89, Linden Gardens, Enfield, Middlesex.

"Data traffic, my favourite viewing, has been excellent, with a contribution only one or two less than last month's offering. New ones for me this time are Burundi, Paraguay and Rhodes on RTTY and Colombia on AMTOR," writes **Len Fennelow G4ODH,** Wisbech. His remarkable haul of countries has been included in Fig. 2. In Aldershot, Peter Lincoln had a good haul of Europeans, plus UB0, 4X6, a lone PY2 and a few north-Americans during the contest on the 9th and on October 18, he copied 9M2DW and a new country for him, HV2VO.

**Fig. 1**

| Country (Prefix) | Band (MHz) 3·5 | 7 | 14 | 21 | 28 |
|---|---|---|---|---|---|
| Argentina (LU | | | | X | |
| Austria (OE) | | X | | X | |
| Balearic Is (EA6) | | | X | X | |
| Belgium (ON) | X | | | | |
| Brazil (PP8, PY) | | | X | | |
| Bulgaria (LZ) | X | | X | X | |
| Burundi (9U5) | | | X | | |
| Canada (VE) | | | X | X | |
| Canary Is (EA8) | | | X | | |
| Ceuta & Melilla (EA9) | | | X | | |
| Chile (CE) | | | X | | |
| Czechoslovakia (OK) | | X | X | | |
| Denmark (OZ) | X | | X | | |
| England (G) | X | X | X | X | X |
| Finland (OH) | | X | X | | |
| France (F) | X | X | X | X | |
| E. Germany (Y2) | X | | X | | |
| W. Germany (DJ, DK, DL) | X | X | X | | |
| Gozo & Comino (9H4) | | | X | | |
| Greece (SV) | | | X | X | |
| Greenland (OX) | | | X | | |
| Holland (PA) | X | | X | | |
| Hungary (HA, HG) | X | | X | X | |
| Ireland (EI) | | X | | | |
| Israel (4X4, 4Z4) | | | X | | |
| Italy (I) | X | X | X | X | |
| Japan (JA, JR, KA) | | | X | | |
| Malta (9H1) | | | X | | |
| Nigeria (5N) | | | X | X | |
| Norway (LA) | | | X | X | |
| Oman (A4X) | | | X | | |
| Paraguay (ZP2) | | | X | | |
| Poland (SP) | X | X | X | | |
| Portugal (CT1) | | | X | X | |
| Puerto Rico (WP/KP) | | | X | | |
| Rhodes (SV5) | | | | X | |
| Romania (YO) | | | X | | |
| S. Africa (ZS) | | | X | | |
| Sardinia (ISO) | | | X | | |
| Scotland (GM) | X | X | X | | |
| Sicily (IT9) | | | X | | |
| Spain (EA) | | X | X | X | X |
| Sweden (SM) | X | | X | X | |
| Switzerland (HB9) | X | X | X | X | |
| Trinidad & Tobago (9Y4) | | | X | | |
| USA (K, N, W,) | | | X | X | |
| USSR (UA, UB, UK, UT, UZ, RB) | X | X | X | X | |
| Venezuela (YV) | | | X | | |
| Wales (GW) | X | | | | |
| Yugoslavia (YU) | | | X | | |

**Fig. 2**

## SPACE & SATELLITES

*Reports to: Pat Gowen G3IOR, 17 Heath Crescent, Hellesdon, Norwich, Norfolk NR6 6XD.*

*by Pat Gowen G3IOR*

### 'RS' Radio Satellites

As this column is being written in early November, we find all of the currently active RS satellites in periods of deep shadow, and thus with their temperatures dropping fast. This particular eclipse period will see the series out of the sun for periods of greater than 35 minutes of each two hour orbit. Consequently, the demise of these ageing satellites due to battery freezing is a distinct possibility. A schedule of transponder on-times to attempt to maintain operations means that RS-5 will be active each Tuesday and Saturday, with RS-7 on each Wednesday, Friday and Sunday. (Note that Wednesdays are normally for listed experiments only). RS-7 will emerge from eclipse into full sunlight on December 11, and RS-5 on December 14. So, if the Soviet DOSAAF command team are successful in nursing both the RADIO pair through this testing period, they should be back with us in full time operation by the time that you read this issue.

The latest information from UA3CR via the 14·280MHz European AMSAT net on the forthcoming USSR satellites is that both RS-9 and RS-10 are complete, working to full expectation, and are now fully prepared for final integration with the

launch vehicle. It is generally thought that a "piggy-back" ride with a COSMOS satellite from Plasetsk into a 2000km circular orbit (close to a two hour period) is the most likely probability, with the end of January or the beginning of February the expected date. (See *PW* June 1985 page 64-65 for details).

ISKRA-4 is approaching completion rapidly, and it is still hoped that a transponder will be flown when it is released from SALYUT-7. It will be transported to the space-station in late January by the automatic *Progress* supply rocket, and will be put out from the SALYUT-7 airlock with little delay. The initial orbital period will be similar to that of the mother craft, e.g. some 92 minutes, but, as this will rapidly decay, and is likely to burn out within six weeks of placing into orbit, observers should regularly monitor the likely downlink frequencies and the nets for update information over the critical period. (See *PW* October '85 page 62 for earlier ISKRA characteristics).

## Sidereal Time

Those with computers will need to know the figure for sidereal time conversion to put into the programs using the W3IWI based spherical triangle mathematics. Mainly because programs such as GM4IHJs earlier "MCP3" will cease to perform after midnight on December 31 without the number for the new year. Here are the figures for the current (as a guide) and for the next fourteen years, as year, and GMST:

| | |
|---|---|
| '85 0·27668226, | '86 0·27601916, |
| '87 0·27535606, | '88 0·27469296, |
| '89 0·27676777, | '90 0·27610467, |
| '91 0·27544157, | '92 0·27477847, |
| '93 0·27685328, | '94 0·27619018, |
| '95 0·27552708, | '96 0·27486399, |
| '97 0·27693880, | '98 0·27627570, |
| '99 0·27561260. | |

## AMSAT-GEOSAT

Phase IV has come a step closer following the announcement by NASA that the Advanced Communications Technology Satellite (ACTS for short) that is scheduled for launch in the Autumn of 1988 might include Amateur Radio interfaces. Jan King W3GEY, AMSAT Vice President for Engineering found that the possibility exists for AMSAT to fly its own transponder(s) on board ACTS, and further, Arianespace has informed AMSAT that they are developing a "piggy-back" pricing policy for small payloads aboard the *Ariane IV* launcher.

Research into the first concept tends to indicate that the demands of the very high speed digital switching at 30/32GHZ for ACTS might overtax AMSAT's limited resources, but, that it offers an excellent group "gateway" opportunity. (See *PW* February '85 page 64 about Gateway).

The second possibility would require AMSAT to provide a Mode L and S band transponder (and perhaps even amateur C band) plus their own antennas, making use of the power, attitude control and general housekeeping provided by the satellite itself. Packet radio could be included, as well as the possibility of linking selected terrestrial repeaters on a hemispheric basis.

The third opportunity on *Ariane IV* could be used for a dual satellite system, one over the equator at 47° west, the other at 148° west, with an interlink, each at 35 801km altitude, or, for AMSAT-DL's project of a Mode L 300 watt transponder advanced from Phase IIIc. Alternatively, a GEOSAT "drifter" that slowly traverses earth's equator over a period of weeks could be deployed.

Those interested in participating with proposals are invited to write to AMSAT at WA2LQQ, PO Box 177, Warwick, NY 10990, USA so that the user aspect is fully represented.

## Shuttle Missions

On the second day into orbit, October 31, the STS-61-A Shuttle carrying the D-1 European *Spacelab* and its crew of eight, including our three licensed European Astronauts came up surprisingly early on 145·575MHz (S23) with the auto system. This was sending "CQ DPOSL record on tape K" and listening on the 437MHz uplinks for one minute, occasionally coming up with speech, mainly with DF0VR. No beacon operation was evidenced, and the 20 hour microtape must have been well stretched, as the operation was virtually continuous until they closed down prior to the 1720 November 11 touch down at Edwards Air-Force Base in California. The advantage of the external antenna was obvious, as the signal often peaked some 30dB over S9 on a tracking beam, and was fully quieting on a handheld. On Orbit 32 at 1618:22 November 1, PE1LFO conducted his propagation experiment, with 36 full groups of the three letter co-ordinates copied solidly at G3IOR QTHR, from where many excellent visual sightings were made to confirm the tracking accuracy.

Followers now await returns from both VERON and DARC to confirm their communications effectiveness.

Yet another new mode is planned for the ASTRO-1 STS-61-E Space Shuttle mission nominally planned for 6 March 1986 (with a probable follow-up mission on either ASTRO-2 or 3) when Dr. Ron Parise WA4SIR, has the intention of taking packet radio into space. A special version of the TAPR TNC-2 (Tucson Area Packet Radio Terminal Node Controller) is now being rapidly put together for the project.

In the meanwhile, Jeff Kelly KT2K, has edited the W0ORE audio tapes, and AMSAT plans to transmit these "on the air" in the near future.

John Branegan GM4IHJ offers some interesting details on the STS Shuttle missions, in that the clue to whether a particular mission will come into range of the UK is in the flight number. Any flight with a figure "2" in its number, e.g. 62A, is a polar launch into high inclination from California. All of these flights cross the UK going from north to south for a couple of orbits, and then some twelve hours of each rotation later will give two more orbits going from south to north.

Flights with a "1" in the number, e.g. 51J, emanate from Florida, mainly carrying commercial satellites destined for equatorial geostationary orbits, thus the Shuttle never comes above its original launch latitude of 28° north or south, and none of these flights ever see the UK so far to their north. Just a few of these carry scientific payloads, and on the proviso that their inclination is above 40°, they will be heard in the UK for some parts of some orbits. Fortunately most scientific missions use inclinations high enough to overfly Paris, and these can be heard over the entire United Kingdom. Furthermore, one or two *Spacelab* missions, e.g. 61A, fly even further north, even tracking over Glasgow.

Here follows a list of planned *Shuttle* missions that come into the range of the UK, with **unguaranteed** nominal launch dates:

| | |
|---|---|
| STS-62-A, March '86. | 61-K September '86. |
| 72-A February '87. | STS-71-J May '87. |
| 71-K May '87. | 71-P September '87 |

For update information, Keplerian data, passes, etc., listen during interesting missions to; RSGB bulletins from GB2RS daily at 1200 and 1700 on 3·650MHz; the shuttle audio from the TDRS satellites rebroadcast by WA3NAN of the Goddard Spaceflight Center ARC on 14·295MHz; the Jet Propulsion Laboratory amateur club stations on 14·280MHz u.s.b.; and the AMSAT nets previously given. The RSGB Prestel compatible DataBox can be dialled on (0707) 52242 for daily data.

## AMPTE

The 9.00pm PDT 18 July dual-can final Barium release 118 000km above Tahiti produced a 400km diameter artificial comet that sprouted a 7000km long tail. It was seen by observers on an Argentine Boeing 707 overflying the coast of Mexico, on the ground at observatories at Kitt Peak, Mount Palomar, McDonald and Peru, and by a few amateur astronomers also. They reported that the event ". . . began with a light green colour, then turning red, persisting for several minutes, finally developing a very visible tail which dissipated after a few minutes . . .". However, not a trace of the materials reached the waiting Charge Composition Explorer Satellite, which has upset quite a lot of theories, and finalised the £55 000 000 experiment.

## UoSAT Eclipse

Our December column showed Harold Meerza's study of the UoSAT-1 alias OSCAR-9 satellite, and pointed out the September period when it was due for first-time whole orbit illumination. In following the end of the eclipse of September 5, Harold has produced for us some fascinating graphs of the spacecraft behaviour from telemetry taken at this time.

Although the battery charge was unbroken throughout the orbit, thus confirming continuous solar panel illumination, there occurred a noticeable 14° C drop in the +Y facet temperature over a five minute period (Fig. 1). Using updated Keplerian elements in GM4IHJ's "SATSOL" Spectrum computer program, the satellite was found to be placed barely clear of earths shadow during the period shown by the dotted line in Fig. 1.

A more accurate picture of the ringed portion of Fig. 1 is shown by Fig. 2, by plotting values at 5·28 second intervals. It would appear that under marginal near-eclipse conditions, when the sun is seen through the blanket of earth's atmosphere, the heating of the infra-red part of the modified solar-spectrum is reduced, whilst the solar-cell performance remains unaffected. As we observers on terra-firma are accustomed to red sunrises and sunsets, due to attenuation of the blue end of the spectrum, Harold's evidence poses some new thinking on this phenomena, as the results are rather the opposite of that which we might have otherwise assumed. The current fluctuation bears a remarkable resemblance to the flutter of otherwise steady radio-beacons that is noticeable when satellites traverse from marginally sub to post-horizon, and it just could be the intermittent open-ended light guide ducting effect posed by the banked ionospheric discontinuity layers!

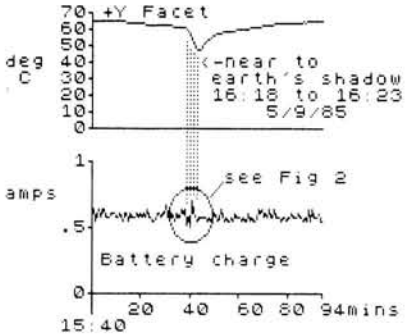



**Fig. 1: End of UoSAT 1 eclipses**

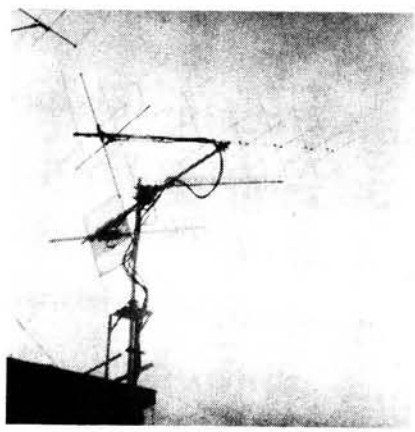


**Fig. 4: OSCAR-10 Mode L and B antennas at EA4EO**

## *Our Beginners Series, Part II*

Now that we know where and when to find the satellites, the next step is to identify what we hear, initially from the onboard beacons and the telemetry.

The RS-5 beacon is normally to be found on 29·452MHz, but can be switched to 29·331MHz. RS-7 is usually at 29·501MHz, but can be put to 29·341MHz as an alternative. (The beacons will first be heard a little higher than the frequency given, and go out with a slightly lower one, due to the speed of the satellites giving a Doppler shift to the observer). Each beacon transmits in Morse code c.w., giving the satellite callsign indicator, followed by the telemetry listing all of the satellites "housekeeping data" such as the various temperatures, powers, voltages, currents, etc.

The TLM-12 system in use was designed and built by Alexander Papkov, who also developed the command, codestore and ROBOT systems, as he has for the forthcoming RS-9 and 10 spacecraft. It consumes only 1mA from a positive supply rail, which increases to 5mA for 200ms at the moment of measurement. The accuracy is within ± 1 per cent e.g. within plus or minus 2mV on the 9V parameter. Up to five groups of blocks of seven parameters are sent, followed by the identifier of the satellite, e.g. "RS-5", "RS-7", etc. The ground control stations can command the telemetry to send any one line or group either on or off, according to requirement and the particular parameter under investigation, but, when a single channel is continuously monitored, the callsign identifier is not added.

The basic frame of the seven parameter lines are prefixed by a letter, and the run follows the series "K, D, O, G, U, S, W", with each letter followed by two figures, and then the callsign at the end of the block. If the ground command station is activating the satellite, an additional "dit" (Morse "E") is sent prior to the letter

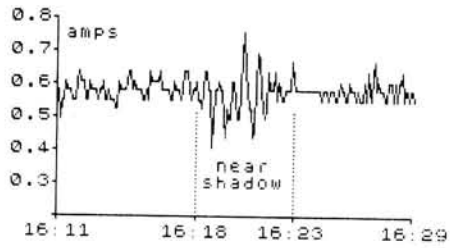



**Fig. 2: Every-frame detail**

prefix, thus giving "EK, ED, EO, EG, EU, ES, EW" as the channel indicators prior to the figures read, but the parameters transmitted remain identical.

Following frames have their own prefix indicators of "I", "N", "A" or "M", but these two may be prefixed with the "E" "dit" when the satellite is under command, so that "I" becomes "S", "N" goes to "R", "A" changes to "U", and "M" to "W" for the same telemetry lines. The telemetry will normally appear upon the primary beacon frequency at the upper edge of the transponder passband, but may be commanded to the lower frequency alternative.

| Satellite | Primary Beacon Frequency (MHz) | Secondary Beacon Frequency (MHz) |
|---|---|---|
| RS 3 | 29·321 | 29·401 |
| RS 4 | 29·403 | 29·360 |
| RS 5 | 29·452 | 29·331* |
| RS 6 | 29·453 | 29·411 |
| RS 7 | 29·501 | 29·341* |
| RS 8 | 29·502 | 29·461 |

* Normally ROBOT
Note that the Doppler shift will offset these frequencies from the mean value, but within the RX passband

**Table 1**

| Letter | Contents | Calculation |
|---|---|---|
| K | Output Power | 0·2 × N² = op in mW of transponder |
| D | Voltage of Source | N × 0·2 = power source in V |
| O | Charge Current | 20 × (100 – n) = charge in mA |
| G | Command Indicator | Reading = N confirmation indicator of correct command received |
| U | Gas Pressure of sealed system | N = relative kg m² |
| S | Temp. Regulator | T = N = Temp of voltage regulator in °C |
| W | Temp. 29MHz TX cooling fins | T = N = Temp of 29MHz output stage in °C |

**Table 2**

All of the satellites with their primary and secondary beacon frequencies, including RS-3, 4, 6 and 8 should they return to active service are shown in Table 1.

Table 2 shows the satellite's first channel, prefixed with the single letter, or with the "E" prefixed if under command.

From this frame alone, a number of factors may be determined. If "K" is reading a defined figure above 00 then the transponder is active and functional. The battery state may be confirmed by "D", while the charge rate from the regulator after the solar power source is shown by "O" which immediately indicates if the satellite is in sunlight or darkness.

"G" gives a response that the command

**Fig. 3: Dish-feed for Mode L uplink and downlink at VE7CLD**

| Letter | Contents | Calculation |
|---|---|---|
| K | Output power, transponder | As previous |
| D | Zero adj. of TLM calibration | Figure given, e.g. 00 level correct |
| O | Beacon output power | 0·2 × N² = Beacon output in mW |
| G | Sensitivity, transponder | N = dB (regulated) (10 = –10dB) |
| U | S-meter, 1st RX | 0·1 × (N – 10) = S-units relative |
| S | S-meter, ROBOT RX | As above (ROBOT 145·826/ 835MHz uplink) |
| W | S-meter, 2nd service RX | As above (Radio Link RX) (145·850MHz uplink) |

"IO" (or "SO") gives the power output of the Beacon being heard, whilst "IG" (or "SG") shows whether the 10dB attenuator pad is in or out, e.g. if N = 10 then the RX is 10dB down to help prevent blocking by high power abusers, if "00" then the transponder RX is at full sensitivity

**Table 3**

| Letter | Content | Calculation |
|---|---|---|
| K | Transponder output power | 0·2 × N² = transponder output in mW |
| D | Total solar panel output | 50N = solar current in mA (charge rate) |
| O | 1st solar panel temperature | 2·7 (N –26) = temperature in °C |
| G | 2nd solar panel temp | As above |
| U | 3rd solar panel temp | As above |
| E | Equipment structure temp | 0·8 (N –5) = temp in °C |
| W | Hermetically sealed section (Gas temp) | 0·8 (N –10) = temp in °C |

**Table 4**

instruction issued has been confirmed by the number given. "U" is the indicator for those sections of some of the satellites that are pressurised and hermetically sealed from space (not on all the RS series). No pressure = 00. "S" shows the stabiliser block temperature, and "W" the transponder TX heatsink radiator.

Table 3 in the second channel, with each numerical pair prefixed with the letter "I", or with "S" if under command station influence.

Table 4 shows the third channel, prefix "N" (or "R"). The S-meter readings are relative units, and not necessarily calibrated to any mythical "international standard". Whilst "IU" is the main RX, and "IS" can give the effective "RST" of your

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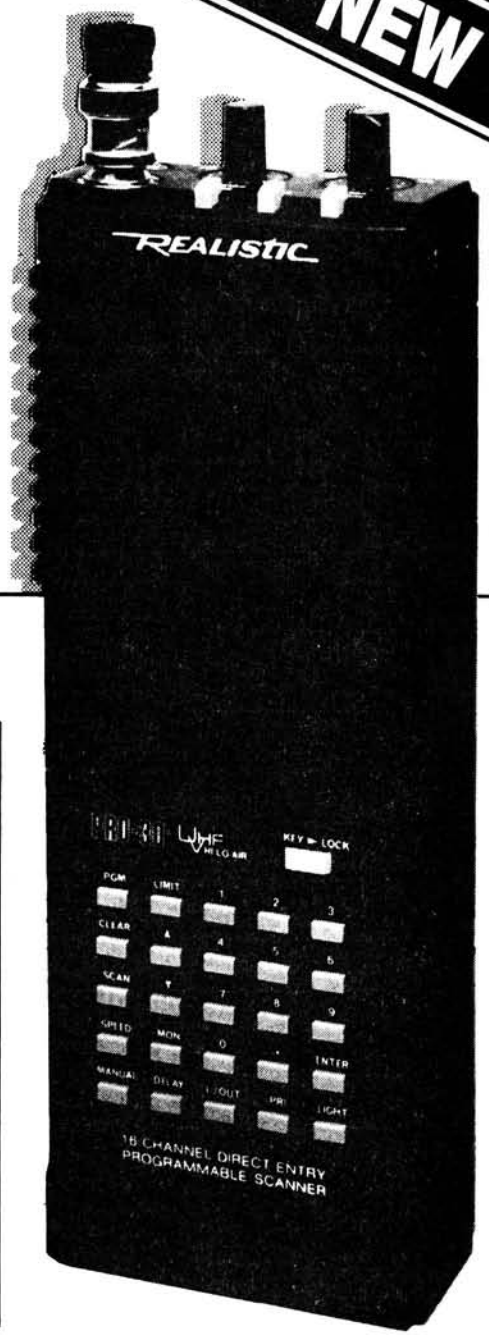


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| Satellite | OSCAR 9 | OSCAR 10 | OSCAR 11 | RS 5 | RS 7 | RS 8 |
|---|---|---|---|---|---|---|
| Epoch Time | 85276·41448399 | 85275·85372603 | 85275·71454271 | 85272·36987969 | 85274·01345740 | 85274·03973838 |
| Inclination | 97·6414° | 26·2273° | 98·1810° | 82·9525° | 82·9550° | 82·9531° |
| RAAN | 266·6496° | 116·0561° | 340·8135° | 248·3138° | 242·0455° | 250·3508° |
| Eccentricity | 0·0001081 | 0·5965246 | 0·0012070 | 0·0007975 | 0·0022494 | 0·0017936 |
| Arg of Perigee | 212·6663° | 50·5133° | 250·2792° | 209·7411° | 134·9399° | 273·3515° |
| Mean Anomaly | 147·4512° | 348·9904° | 109·7087° | 150·3195° | 225·3514° | 86·5464° |
| Mean Motion (r.p.d.) | 15·27626729 | 2·05856198 | 14·61994195 | 12·05049503 | 12·08694756 | 12·02955854 |
| Decay Rate (r/d²) | $1{\cdot}126e^{-05}$ | $-4{\cdot}8e^{-07}$ | $8e^{-07}$ | $4e^{-08}$ | $3e^{-08}$ | $4e^{-08}$ |
| Epoch Rev | 22175 | 1735 | 8474 | 16645 | 16715 | 16636 |
| SMA (km) | 6858·011 | 26105·451 | 7061·956 | 8033·857 | 8017·686 | 8043·182 |
| Anom Period (min) | 94·263865 | 699·517437 | 98·495603 | 119·497166 | 119·136779 | 119·705141 |
| Apogee (km) | 486·727 | 35302·337 | 710·901 | 1667·303 | 1668·130 | 1700·455 |
| Perigee (km) | 485·245 | 4157·250 | 693·854 | 1654·489 | 1632·060 | 1671·602 |
| Beacon (MHz) | 145·825 | 145·810 | 145·8260 | 29·451 | 29·501 | 29·502 |

**Fig. 5 ▲**

| Satellite | NOAA 8 | NOAA 9 |
|---|---|---|
| Epoch Time | 85257·38501718 | 85262·22641727 |
| Inclination | 98·6591° | 98·9553° |
| RAAN | 287·6163° | 215·7717° |
| Eccentricity | 0·0016697 | 0·0014817 |
| Arg of Perigee | 175·4269° | 194·3161° |
| Mean Anomaly | 184·7063° | 165·7587° |
| Mean Motion (r.p.d.) | 14·22470367 | 14·11381042 |
| Decay Rate (r/d²) | $6{\cdot}1e^{-07}$ | $1{\cdot}2e^{-06}$ |
| Epoch Rev | 12804 | 3960 |
| SMA (km) | 7192·300 | 7229·968 |
| Anom Period (min) | 101·232337 | 102·027727 |
| Apogee (km) | 826·297 | 863·812 |
| Perigee (km) | 802·279 | 842·386 |
| Beacon (MHz) | 137·5 | 137·5 |

**Fig. 6 ▲**

| Letter | Content | Calculation |
|---|---|---|
| K | Output power of transponder | As previous |
| D | On-board log | N = No of QSOs ± 1 made on ROBOT |
| O | Heater radiation control | N x 0·1 = watts, power of heating system for thermal regulation |
| G | Robot output power | N x 20 = power in mW |
| U | Power of service channel | N x 20 = mW of TX power of 29·350MHz |
| S | Sensitivity pad of ROBOT | N = –dB of ROBOT RX (10 = –10dB) |
| W | Sensitivity of service RX | N = –dB of 145·850MHz RX |

**Table 5**

| Letter | Content | Calculation |
|---|---|---|
| K | Output power of transponder | As previous |
| D | 9V transponder line | 0·1 x N = transponder supply in V |
| O | 7·5V transponder line | As above |
| G | 9V 1st stabiliser | As above |
| U | 7·5V 1st stabiliser | As above |
| S | 9V 2nd stabiliser | As above |
| W | 7·5V 2nd stabiliser | |

**Table 6**

signal at the satellite during a ROBOT QSO. "IW" reads the a.g.c. of a special RX, that is used to give communication between the primary and secondary command stations. (145·850 to 29·350MHz).

We thus have some interesting physical data which should be of value to those considering the thermo-dynamics of solar effects in vacuum, or satellite rotation by graphing O, G and U against time.

Table 5 shows the fourth channel, prefix "A" (or "U"), e.g. AK or RK, etc.

Apart from the AK (or RK) again giving the transponder output as before, the rest gives the various voltage levels used in the satellite's system. By merely placing a decimal point between the two figures of the last six levels an immediate check figure of the stabilised supply voltage is given.

Table 6 shows the fifth channel, prefix M (or W), e.g. MK or WK, etc.

Finally, the fifth channel again has the same first figure as the transponder output. This time the frame is prefixed with M, or with the extra "dit" active as W, reading thus MK or WK, MD or WD and so on. MD or WD now gives the number of QSOs which have been made by the ROBOT in its travels around the world, and it will be noticed by comparing the number before and after making a ROBOT QSO that this has clocked up by one. The O channel indicates the power in the heating elements used in the satellites as part of the thermal design to keep the temperature environment within required limits, between the intense heat of raw space sunlight and the deep cold of dark space. This can be left on automatic, or can be commanded on and off by the control command.



# VHF BANDS

Reports to: Ron Ham BRS15744, Faraday, Greyfriars, Storrington, West Sussex RH20 4HE.

by Ron Ham BRS15744

"It was a great experience while it lasted," writes **Bill Kelly** from Belfast after sorting out a great deal of DX from the 144MHz repeater network which was placed in chaos by an extensive tropospheric opening in mid-October. Under such conditions, awards are won, records are broken and scientific knowledge is gained and, as Bill remarked, "This is what makes amateur radio really worthwhile."

## Solar

Only a few years ago, solar radio astronomers and a wide variety of scientific observers learnt a lot about the effect of solar flares on the earth's atmosphere as one event on the sun followed another. However, now the sun is very quiet, and opinions vary as to how long this may be, we have the chance to extract as much information as possible from each isolated event as it takes place and to try out the various instruments that are suggested for solar work. Given clear skies, sunspots can be seen by projecting the sun's image, through a telescope, on to your own white card or use one of the special **solar blanks,** available from the British Astronomical Association or the London Solar Committee. Any sunspots seen during these observations are drawn on the chart with a pencil and taking care to get the exact shape of the spot and shade the lighter areas. **NEVER LOOK AT THE SUN DIRECT BECAUSE THIS CAN CAUSE SERIOUS EYE DAMAGE.** It is now well known that solar flares, associated with sunspots, emit radio waves over a broad band around 140MHz and can be detected with a simple radio telescope, or by listening for variations in the background noise, of a 144MHz receiver, providing that the antenna is directed toward the sun and the a.m. mode is selected.

Fluctuations in receiver noise, caused by the sun, will sound like the sea rolling over the shore and, in the case of the radio telescope these variations are drawn on the chart of a pen recorder. Solar radio noise recorded by the author at 143MHz is shown in Fig. 2; note also the general rise in noise level as the sun moves toward the main lobe of the antenna during an active period in February 1984. Solar radio waves reach earth in 8·3 minutes, but the streams of particles, ejected at the same time, may take between 20 and 40 hours to make the journey and, if they strike the earth's atmosphere, they can cause an aurora to manifest or disturb the natural state of the ionosphere.

Both of these events can upset a wide spectrum of terrestrial radio communications. "You can detect solar flares by monitoring the strength of a distant v.l.f. (very low frequency) radio station and by looking for a sudden change in night-time signal level, one can get 30 hours advance warning of auroral conditions," write Cambridge Kits in their August 1985 leaf-

let, *Kit News*. This leaflet is available to readers, free of charge, by sending an s.a.e. (2 IRCs for overseas readers) to J. M. Mann, Cambridge Kits, 45 Old School Lane, Milton, Cambridge, CB4 4BS. This is an interesting area of research and I will be pleased to hear more about it, especially the size and type of antenna that readers, already active in this field, are using. "We must be either very close to sunspot minimum or in for a long period of low solar activity," writes Robert Mackenzie, in the October issue of *Solar News*. He continues, "If we are near the minimum, it is strange that, so far, there is no sign of any new cycle spots." *Solar News* is published by the London Solar Committee and is available from Bert Chapman, "Brindles", Mill Lane, Hooe, Battle, E. Sussex, TN33 9HT, at £3.50 per annum or £1 per specimen copy.

The October issue contains an interesting radio section report, with a sketch by Colin Clements of a suggested mount for adjusting the elevation of a solar antenna (something I have to do about five times per year), and sunspot numbers compared with solar flux at 2800MHz for the period June to September inclusive. Other articles, headed Magnetic Field of Sunspots, Polar Faculae and The Zurich Sunspot Classification, makes for good reading.

"We have a sunspotl," said **Patrick Moore** in Selsey, after his observation at 1145 on October 20, Fig. 3, which accounts for the radio noise that I recorded from the sun, at 143MHz, on October 19, 20, 21 and 22. **Cmdr. Henry Hatfield** in Sevenoaks, also observed these spots with his spectrohelioscope and identified an active plage, 6 filaments and a few quiescent prominences and after seeing another small spot during the morning of November 10, Henry remarked, "Sun is looking more active than for many weeks."

"Visual aurora were reported overnight on October 15/16, 16/17, 17/18, 22/23 and 25/26," writes **Ron Livesey** in Glasgow. Ron is the auroral co-ordinator for the British Astronomical Association. His own magnetometer recorded strong field disturbances on the 13th and 26th. The events on days 15, 16 and 17, were observed by the Royal Dutch weathership, *Cumulus*, at station Lima and were seen down to a latitude of 63°. The aurora on days 22 and 25 were observed from 56 and 60° respectively. The observatory at Boulder, Colorado, reported, "unsettled to active" conditions from October 14 to 21, "minor to major storm" for 22 and 23 and "unsettled" again from 23 to 27, plus a reference to a "disappearing filament" on 22/23.

In Bristol, **Ted Waring** counted 18 sunspots on October 24, 7 on the 26th and 4 on November 10. In Johannesburg, **Bob Anderson**'s group observed, 3,7,9,0,15,17,36,30,30,34,34,23,5 and 2 sunspots for the period October 15 to 28 inclusive. "We recorded a surprise group of spots on the 15th, which peaked on the 21st and again on the 25th, coinciding with a report from Danie Overbeek who recorded a flare between 0400 and 0500 on 22·3kHz from NWC, Australia, on the 26th."

During the weekend October 25/26, **Filip Rogister ON1BRL**, Overijse, received signals from HK1HHX, OD5FN, some VP2 and VK stations, VC0DBO, YV5JEM/P, 4X6KJ and 8R1Z on phone and A4XZG, C53EK, PP5OV and TR8IG on c.w. Norman Hyde G2AIH, Epsom, heard stations on Austria, Italy, Portugal, Spain and VE1BNN, Nova Scotia during the late afternoon of November 2. "On the 3rd the band was open to Scandinavia, but by midday it was flat again," said Norman.

## The 28MHz (10m) Band

The 28MHz band is the favourite of 16-year-old **Douglas Maxwell** of Hamilton, a keen s.w.l. for about 3 years. Douglas is currently studying for the RAE and we wish him the best of luck with this and a future Morse test, because when he gets his licence he can exploit this band to the full.

During a 28MHz opening on November 2 and 3, Douglas received signals from CT1DIA, DJ0AAT, EA4CJJ, HA1UF, HG1MHB, I2ZJW, K1YZW, OE1LPM, OK1HBT, OK1PM, OZ1JQW, SM5DYC, SM7BAU, VO1BBN, ZS3BI and ZS6CAY.

Apart from the International Beacon Project stations and the amateur satellites that use this band, solar noise is often heard during major storms on the sun, plus interesting short skip activity while sporadic-E is about, and some really super DX can be heard and worked when the band is wide open. Between 1720 and 1740 on October 19, **Fred Pallant G3RNM** from Storrington logged c.w. signals from stations in Argentina and Brazil working into the UK and a couple of Spaniards on s.s.b. Fred heard LUs again around the same time on the 21st and 22nd and a Russian station at 0931 on the 26th and remarked, "Got a bit dull in early November."

Around noon on November 2, my Trio R-2000 communications receiver and Tono Theta 550 terminal copied c.w. signals from stations in Austria, Italy and Spain during a very short period of sporadic-E, however it shows that operators are prepared to use the band whenever conditions permit. The majority of 28MHz enthusiasts keep a regular watch on the International Beacon Project frequencies between 28·200 and 28·300MHz.

## Tropospheric

The atmospheric pressure, measured at my QTH, was predominantly high, with a few variations, between October 15 and 28 when it began to fall gradually to reach 30·0in (1015mb) by 0200 on the 31st. The slightly rounded figures on our monthly pressure chart, Fig. 2, are the readings taken at noon and midnight from the calibrated chart on my continuously recording barograph. During this period of high pressure, with its slight ups and downs, v.h.f. conditions were generally good and as expected a fair bit of DX was worked. Right on my deadline for our January issue, October 15, the pressure was around 30·6in (1036mb) and a tropospheric opening was in progress. Obviously, many reports about that event were too late for the January column, however, I can now put that to rights. "There was a good lift on 144MHz when I heard two German stations and LA8EY working through the Scottish Borders repeater GB3SB R2, as well as such prefixes as EI, G, GM and GW on October 16," writes Douglas Maxwell. "Exceptional tropo opening on October 13 and 14," said **Paul Burnett G1DAT**, Cleveland, who heard GMs and GWs in QSO on a 144MHz simplex channel.

"Over the weekend October 12/13, I just left my beam pointing towards London and worked stations on 144MHz from W. Germany to Spain," reports **Dave Hewett G8ZRE**, Chester. Dave uses a Yaesu FT-480R, Sota linear and an 8XY Yagi some 12m a.g.l. and although his QTH is only about 30m a.s.l., he also contacted stations in the Channel Islands and France on the 12th and 13th and an OZ YL, coping very well with a pile up, and a couple of SMs on the 20th. Dave is working for the "All Jersey Award" and while driving through Chester at 1150 on the 13th, he received a 55 signal from GJ6OZB, using only the 5λ8 whip antenna on his car.

"My station is only 24m above sea level," writes **Peter Labron G1EON**, Alnwick and using an FT-290R, Microwave Modules linear and 9-element Tonna antenna, on 144MHz worked F1DZB on the 13th, GI4TSC/P on f.m. in West Antrim and OZ1IWT on the 16th and OK1JKT/P and PE3CEG on the 17th. Peter tells me that his atmospheric pressure readings were 1040, 1037 and 1033mb on days 13, 16 and 17 respectively. "The f.m. contact with the GI proved interesting as he was only using 10W to a 5λ8 whip antenna on his car," said Peter.

"The big talking point for many a day was the tremendous conditions prevailing between October 11 and 16. Never heard the like of it, at times great confusion as amateurs opened up several repeaters and sometimes the band was impossible with so much cross-talk," writes Bill Kelly. This was after hearing signals from 30 144MHz repeaters, notably from Cork EI3EF on R6, Dyfed GB3WW R7, Elgin GB3SS R0, Fife GB3FF R0, a new one for Bill Galway EI7AMB R1, Isle of Mull GB3HI R4, Norfolk GB3NB R1 and West Devon GB3WD R4. Bill also heard the repeater in Limerick EI4LRC on R5 swamping out GB3NI in Belfast on the same channel.

"It would be true to say that things took off on October 12," remarked **Andy Stafford G4VPM**, Paignton, at the start of his most impressive v.h.f./u.h.f. log. It began on the 12th listing QSOs with stations in France, Germany and Switzerland on 144MHz and France, Holland and Germany on 432MHz and ended early on the 27th with LA5XAA on 144MHz. Meanwhile he worked Dutch and German stations like locals and added Czechoslovakia on 144 and 432MHz on the 13th, Denmark on both bands and EI4CEB/P on the 14th, GI4TAJ/P on the 15th, heard DJ9DL working SP9FG on 432MHz c.w. on the 17th, and contacted SP6GWB/6, gaining a new country on 144MHz on the 18th. Then he heard weak Scandinavian stations on 144MHz on the 20th and worked into Sweden and Austria on 144MHz on the 24th and 26th respectively. However, his best came on the 26th when he had 59 reports both ways with a couple of OZs on 432MHz, in Bornholm Island using 10W to a 19-element Tonna. Andy's score at November 5 was 111 QRA squares and 27 countries worked on 144MHz and 46 squares and 14 countries on 432MHz. A fine achievement by any standard Andy.

## Propagation Beacons

My thanks to **John Allaway G3FKM**, Editor and Secretary of IARU Region 1, for regular copies of their publication *Region 1 News*. From the October issue I learnt that the robot beacon IY4M (which many readers have already heard on 28·195MHz) is installed at Villa Grifone in Ponecchio Marconi, where the special station IY4FGM has been working for several years. "The special prefix IY4 is well known internationally; the suffix 'M' means Marconi since the QTC command of the beacon will transmit historical and

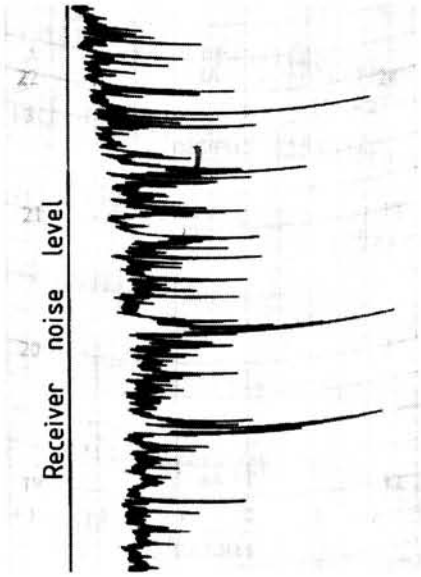
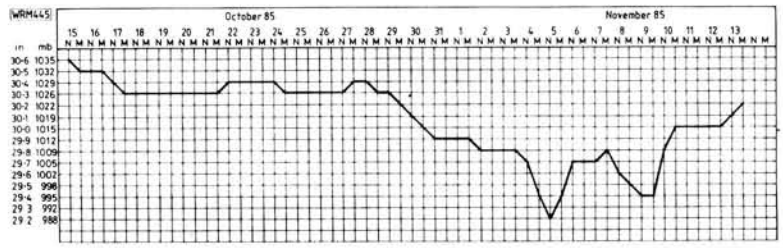



Fig. 1

Fig. 2 ▶



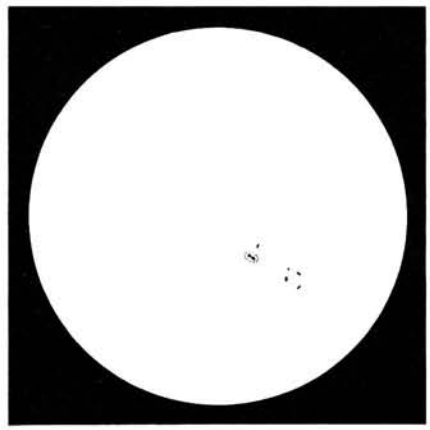



Fig. 3

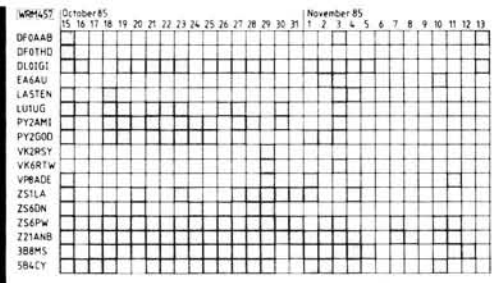



Fig. 4

geographical information about Villa Grifone itself," says the report. I note that the International Beacon Project (IBP) and the RSGB have co-operated to produce a special log sheet for beacon reception on all h.f. bands. Sheets may be sent to or obtained from John Gilbert G4CEB, Building R25, Rutherford Appleton Laboratory, Chilton, Didcot, Oxon OX11 0QX. The data will then be stored on the laboratory's computer for subsequent retrieval and analysis. Once again we see the value of routine observations and co-operation between amateur and professional bodies and I hope that many of you will take part.

"At 2007 on October 25, DL0IGI was very strong," writes Fred Pallant. Every day around 0800 from October 15 to November 14, I received reasonably strong signals from the RSGB beacons at Wrotham GB3VHF on 144·925MHz and from their headquarters in Potters Bar, GB3NHQ on the 50MHz band.

Len Fennelow G4ODH, logged the 14MHz beacons CT3B, W6WX/B and 4U1UN/B, almost daily and OH2B, LU4AA, ZS6DN/B and 4X6TV/B on most days between October 15 and 31. Chris van den Berg heard the UK 144MHz beacons in Cornwall GB3CTC 144·915MHz on October 17, 20, 26 and 27 and Wrotham GB3VHF 144·925MHz on most days between the 17th and November 8. He also received signals from the beacons in Belgium ON4VHF 144·985MHz on most days from October 17 to November 4 and Germany DL0PR 144·910MHz on the 24th and 25th.

My thanks to Chris van den Berg, The Hague, Len Fennelow, Wisbech, Henry Hatfield, Norman Hyde, Bill Kelly, Douglas Maxwell, Ted Owen, Malden, Fred Pallant, Gordon Pheasant, Filip Rogister and Ted Waring for the logs which enabled me to complete the monthly beacon chart, Fig. 4. I know this is referred to by many people. Gordon and Filip logged most of the south-American beacons on the chart and Norman has been hearing the 50MHz beacons GB3RMK and GB3SIX, almost daily by meteor trail reflection. Gordon also logged the VP and VK beacons in Fig. 4, and heard the Gibraltar beacon ZB2VHF, on 50MHz, on November 3.

## Band II

"VHF broadcast band also very good between October 11 and 16," writes **Bill Kelly**, who, using a Grundig 3000 receiver, logged most midland and Scottish stations including BBC Radios Lancaster and Merseyside and ILR Piccadilly and Radio Nova, but no continentals. While using the v.h.f. radio section of my Plustron TVR5D, some 200m a.s.l. in Ashdown Forest, Sussex, at 1145 on the 15th, I heard several French stations around 100MHz and, despite the good conditions, I noted that the polarity, vertical or horizontal, of the telescopic antenna was extremely important. Whenever weather conditons look promising, it is always worth having a portable in the car with you ready for a tune through Band II when you reach some high ground with a clear take off. With Christmas over and the sales beginning in the shops, now is a good time to look for one of those sets with good technical features on the f.m. broadcast band and, which is always important, at the right price.

At times, during October opening, **Harold Brodribb**, St. Leonards-on-Sea, using a Roberts 505 receiver, logged signals from the French locals FTF, Radio Classique and Paris Metropole between 104 and 107MHz and below 102MHz he found 7 editions of France Culture and 5 each of Inter and Musique mainly from Abbeville, Caen, Paris, Reims and Rouen.

**Reports by the 13th please**

# TELEVISION

*Reports: as for VHF Bands, but please keep separate.*

*by Ron Ham BRS15744*

As you read this, we are approximately half-way between the end of the 1985 and the beginning of the 1986 sporadic-E seasons, that extraordinary period of propagation that all TVDXers look forward to. Every year, more radio enthusiasts add DXTV equipment to their stations and some have yet to face the chaotic state of Band I (40 to 68MHz) as signals from Europe, Russia and Scandinavia fight for predominance on their screens during the life-span of an event.

A sporadic-E disturbance can occur at anytime between sunrise and sunset, from about mid-April to the end of September and the intensity of individual events can ebb and flow for several hours. However, during the peak months of June and July, disturbances may continue all day and produce some very interesting and often exciting results. Now, to help me whet the newcomers' appetite for pictures from afar, my thanks are due to **Paul Drinkwater** in Sutton Coldfield, **Len Eastman G8UUE** of Bristol, **Asim Aziz** and **Rehan Mullick**, Lahore and **Major Rana Roy**, from India, for their pictures of people seen during programmes from Switzerland, (Fig. 1), Iceland, Poland and Spain (Figs. 2-4), Dubai TV (Fig. 5) and the USSR (Figs. 6 and 7). Also seen were test cards from Norway (Fig. 8), by **Tony Palfreyman** in Sheffield and Germany (Fig. 9), by **Roger Wallis** of Solihull, a weather chart from Spain (Fig. 10) from **Dave Cawser** in Burton-on-Trent and a Hungarian caption (Fig. 11) received by **Peter Baylis**. Although these pictures were seen during earlier seasons, they are just a sample of what a good sporadic-E can produce and the excitement comes in not knowing what will appear next when one tunes through Chs.E2 48·25MHz, E3 55·25MHz, E4 62·25MHz, Ia 53·75MHz, Ib 62·25MHz, R1 49·75MHz and R2 59·25MHz. Under normal conditions, stations sharing the same or similar frequencies do not interfere with each other, but when sporadic-E is present, their operating range can be multiplied by at least 10. The main source of station information and frequencies is the *World Radio TV Handbook*. Another book, almost a must for the TVDXer, is *Guide to World-Wide Television Test Cards*,

by two well known enthusiasts, Keith Hamer and Garry Smith. This is published by HS Publications, 7 Epping Close, Derby, DE3 4HR. Yet another book, recently released, which I think is a must for the TV enthusiasts book shelf is *How to Improve Television and Radio Reception,* published by the Department of Trade and Industry and available, on request, at the Post Office counter.

## Band I

"There was a very strong opening between 1030 and 1430 on October 15," writes Len Eastman, after receiving test cards from Austria ORF, W. Germany and Sweden on Ch. E2 and USSR on Chs. R1, 2 and 3. Between 0900 and 1030 on November 2, Len received pictures, sometimes in colour from Italy RAI on their Chs. A and B, 53·75 and 62·25MHz respectively and at 1100 on the 3rd he saw Scandinavian test cards fighting for predominance on Chs. E2 and 3 and he identified the Norwegian stations Bagn, Gamlemsveten and Melhus and a programme from Sweden.

At 1302 on the 2nd, I watched, for about 10 minutes, a programme on Ch. R1 about the testing of car seat belts with the appropriate sound on 56·25MHz. During the morning of October 15 **Neil Purling** in Hull, logged test cards sometimes with multiple ghosts from Germany ARD/ZDF, Sweden TV1 Sverige and Switzerland +PTT SRG1 and Ch. E2, Poland TVP, on Ch. R1. He also saw programmes of dancing and news with the NPORPAMMA logo and HOBOCTN caption from the USSR.

**Ian Davidson** from Carmarthen reports seeing pictures from Spain TVE 1 and Ch. E2 on October 26. **Mike Bennet** in Slough, watched a film from TVE on Chs. E2, 3 and 4 at 1130 on November 2. Mike also logged test cards from Belgium RTBF at 0817 and one scribed RTBF LIEGE CANAL 3 at 1120 on October 14. During the early afternoon of the 15th he received test cards from Austria ORF FS1 and Ch. E2, Czechoslovakia CST RS-KH and news from the USSR on Ch. R1 and CST and the regional test card SRTV BRATISLAVA on Ch. R2.

On November 2 **Keith Chaplin** from Barrow-on-Soar received test cards from Italy RAI-1, Spain TVE-1 and the Norwegian regional GULEN on Chs. Ia, E3 and E2 respectively.

At 1143 on November 2, **Gordon Pheasant**, Walsall, watched the Beatles possibly from Spain on Ch. E4 and, during the following morning he received test cards, in colour, from the Norwegian regionals, Melhus Ch. E2 and Kongsberg Ch.E4 and Sweden TV1 Sverige.

## Tropospheric

The slightly varying high pressure between October 14 and 28, as expected, was a major contributor to the cause of the variety of tropospheric openings which affected Bands III, IV and V during that period.

Soon after moving to a new QTH on high ground, Ian Davidson tried out his Vega 402DE and Sanyo receivers. On October 26 and 27 he logged negative pictures from France FR3 on Ch. 21, a test card from Holland PTT-NED2 on Ch. 27 and pictures from TVS at Rowridge and Ulster TV. As Ian is without a rotator, he uses a Tandy wideband antenna facing south east and separate group C/D antennas looking north-east and south-west, all installed in his attic.

I received a test card from Belgium BRT on Chs. E8 and 10 at 1110 on the 16th, long bursts of PTT-NED1 on Ch. E4 early on the 18th and strong pictures, in colour, from an unidentified station around Chs. E7 and 11 at 1812 on the 24th. I also logged a test card from Denmark DR with QSB on Ch. E5 and a football match on Ch. E10 at 0748 and 1914 respectively on the 27th. I then saw the programme caption WIR KOMMEN GLEICH, SESAM STRASSE, followed by pictures of birds, deer and children on Ch. E10 at 0810 on the 28th.

"What a surprise October was with the vigorous tropospheric opening between days 10 and 27, with Band III opening first on the 10th and u.h.f. on the 12th, with pictures like locals," writes Mike Bennett. His comprehensive log includes details of seeing captions, cartoons, election results, films, news, sport, test cards, telex and weather reports from stations in Belgium, France and Luxembourg in Band III and similar programmes from the French networks, AT2, FR3, TF1 and TDF on several u.h.f. channels. He also saw the French caption A2/RES 2, Reseau Specialise and RFP (Rege Frances De Publicity), on Chs. 24, 27 and 21, respectively. "All u.h.f. channels were received on a homemade Band I antenna," said Mike, which just goes to show how potent these DX signals were.

"Atmospheric pressure was 1030mb, which covered the north-sea area, with Scandinavians dominating Band III. RTE signals were about normal but France and Holland were weak. Denmark, Norway, E. and W. Germany and Belgium were 'romping' in and on given channels, I could separate four programmes by rotating even the telescopic rod," writes **Simon Hamer**, New Radnor. All this was after a DXpedition in near freezing temperatures to Penyfforest Hill on October 27. Simon has special knowledge of Denmark and he identified South-West Jutland on Ch. E5, S. Jutland on E6, Southern Jutland on E7, Arhus Jutland on E8 and W. Jutland on E10. From Denmark, he saw tennis from Brighton at 1445 and 1610, *Dynasty* with Danish subtitles, the soap opera *Dollars* and an interference caption, "Atmosferik Kraeftig I Hele Landet" and a Daffy Duck cartoon from Belgium RTBF-1 from Wavre on E8 and Leglise on E11. His entertainment continued with, *Bring 'Em Back Alive* with Flemish subtitles from BRT-1 on E10, *Akuelle Kamera*, with news from DFF-1 on E7 from Schwerin, a documentary from Norway NRK on E5,6,7,8 and 9 and a German language period film from W. Germany ARD on E8,9 and 10. He also received pictures from the German ZDF on the u.h.f. channels 30, 34, 35 and 37 and a caption with a digital clock from WDR III, Munster on Ch. 47. Follow that Simon, hi.

Between the 13th and 20th **Harold Brodribb** of St. Leonards-on-Sea received pictures from Belgium, France and Luxembourg in Band III and identified signals from Liege, Leglise and Wavre and the captions RTBF-1 and RTL.

Keith Chaplin, using Luxor and Vega receivers, logged pictures from Belgium, Denmark, Eire, France, Germany, Luxembourg for the first time and Sweden in Band III and Belgium, Germany and Holland in Bands IV and V between the 13th and 29th. On the 23rd there was a tremendous signal from Tyne Tees at Bilsdale.

"I have recently started TVDXing," writes **David Meredith** from Dudley, using an Antiference XG8 antenna and wideband mast head amplifier. He received pictures in Band III from Norway around 2015 on the 24th and Belgium RTBF-1 at 1845 on the 27th. During the evening of the 24th, David checked the u.h.f. band and found pictures from Anglia TV from Sandy Heath, HTV from Moel-y-Parc and S4C from Presely.

Gordon Pheasant saw a wide-screen cowboy film on Ch.E11 and a Scandinavian TV programme on all Channels from E6 to E10 on the 26th and Danish and German test cards on Ch. E5 and E9 respectively on the 27th.

## SSTV

Although our survey in 1985 showed that Slow Scan Television has only a small following among our readers, I feel sure that this will grow especially now that both receiving and transmitting equipment, for this mode, is more readily available either by using a dedicated box, or a program for the home computer. Although at present the most popular frequency for SSTV is 14·230MHz, amateurs around the world also exchange pictures on 3·730, 7·040, 21·340, 28·680 and 144·500MHz, giving plenty of scope for some interesting DX especially on the bands above 21MHz which are subject to a variety of atmospheric disturbances. The recent success of the SSTV pictures from the space shuttle *Challenger* and the article, *SSTV from Space*, in our December issue, should whet more appetites for this type of communication.

Earlier in 1985, **Peter Lincoln** in Aldershot received pictures from Yugoslavia, YZ2RTN while in QSO with a GW, Fig. 12 and at 1531 on November 2, I copied pictures from I1BWB in contact with a DJ on 14·230MHz and read the captions, "My name is Carl", "Ok Ok 100x100" and "RIG FT101 422A". Around 1145 on the 10th, I copied the captions, "VY 73" in large letters on the screen, "BTU OM DF3PU" and "PSE KK IC8POF", using a Spectrum computer with Scarab software.

The rumour, apparently rife among SSTVers in the USA, that Richard Thurlow G3WW, March is quitting amateur radio especially SSTV because he has sold his tower and beam is **FALSE**. He is only planning a move of QTH to be nearer to his family. On November 11, Richard had held an amateur licence for 47 years and on the 3rd, DL1KAD/A gave him his 2100th, first time, SSTV QSO. During the "W" Saturday 14MHz SSTV net on the 9th, Richard exchanged 36 and 12 seconds colour pictures with W1JKF and K4KG, the latter reporting 90 per cent reception on an opening band, however, later 100 per cent colour pictures were received by G3WW.

"Conditions were very poor for slow-scan in October, but still a few new callsigns, CT5BER, I2II, I4YMO, LA4LN, SP6BNG, W1SGA and YU1NR, appeared on my screen," writes **Lester Curno**, Cornwall. On the 18th he had a very interesting hour watching a transatlantic QSO with CT1AKD, G3NOX, G4ZEK, WA1NNB and W4CVS taking part. "Very weak signals, but some frames reasonably visible," said Lester. He also copied pictures from GB4ES and GB4SVS on 3·5MHz and LA4LN on 14MHz during the Scout Jamboree on the 20th, the caption "CQ GJ4YCR JERSEY ISLAND" at 0947 on the 27th and signals from I3XQW working G4GOZ on November 9. During

Fig. 1

Fig. 2

Fig. 3

Fig. 4

Fig. 5

Fig. 6

Fig. 7

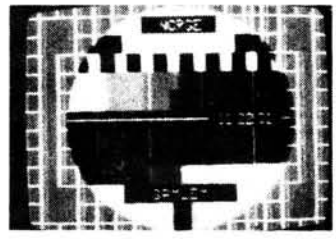


Fig. 8

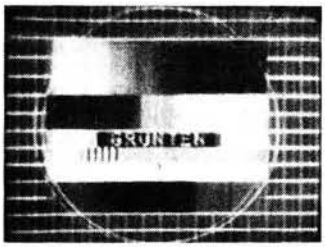


Fig. 9

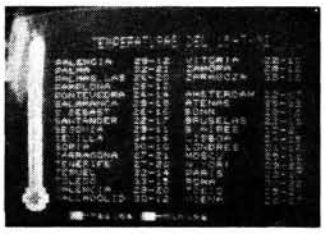


Fig. 10


Fig. 11

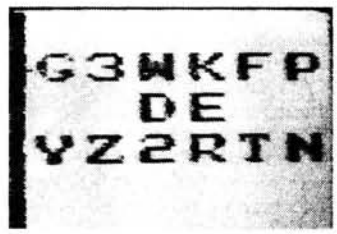



Fig. 12

the month prior to November 13, **Peter Lincoln**, Aldershot, copied a few weak frames of SSTV from N. America and although he knew GJ was being worked he reckons that he is too close to copy that area on 14MHz and must wait for short skip conditions.

**Reports by the 13th please**

# MW BROADCAST BAND DX

*Reports to: Brian Oddy G3FEX, Three Corners, Merryfield Way, Storrington, W. Sussex RH20 4NS*

*by Brian Oddy G3FEX*

The dedication of some "Old Timer" s.w.l.s is quite amazing, after so many years. Their constant enthusiasm in searching the broadcast bands for interesting signals and programmes is just one reason why this is such a great hobby. Take, for example, a real "Old Timer", **Bill Kelly** of Belfast: he says "To look at my list of m.w. DX you would think that the main object is DXing the USA. This is not so, for I spend many hours of the night searching up and down the m.w. band for other stations in Europe and abroad. Many Russian and Arabic broadcasts are heard but are difficult to identify positively by announcements—for example, Radio Moscow is Radio Moscow even when relayed by other stations."

When conditions on m.w. are poor, Bill moves down to the Tropical Bands to have a look there. He says "I may sit for an hour waiting to identify a station only to note that it is just a near European relay. It's the only way, though, it's no good trotting up and down the band—a rolling stone gathers no moss!"

## DX Report

Note: Frequencies in kHz. Times in UTC = GMT.

**Transatlantic DX:** With the longer winter evenings now upon us, m.w. DX reception is improving.

During October, Bill Kelly heard the "Memory Station" WMRE 1510 as early as 2320 from Boston. First-hand news was received about Hurricane Juan in the Gulf of Mexico at 0115 on two nights from Washington's WTOP 1500. Although WGAR 1220 could be heard from Cleveland, Ohio at 0130 it was rather weak but by 0610 it was very good. New York too, was better later, WHN 1050 being noted at 0545.

Bill says conditions were very good on October 28. WCAU 1210 was logged from Philadelphia at 0135 and WBAL 1090, Baltimore was also a good signal. Excellent signals were heard, too, from Canada that night, including CKYQ 610 from Grand Bank, Newfoundland at 0215. This station was also received on several other nights—usually around 0145—with football match commentaries.

CJYQ 930 from St. John's, Newfoundland was by far the most consistent DX signal on the band and put in an appearance as early as 2300 some nights! Others logged were CKCM 620 and CIYQ 680, both from Grand Falls.

From South America, Bill found Radio Globo, Rio 1220 a good signal by 0200.

**Calum Macleod,** Isle of Lewis, Scotland, has been DXing on the band and was surprised to hear the Caribbean Beacon 1610 from Anguilla so well at 0100, especially as this is only a 15kW station. His receiver is an FRG-7700 plus a.t.u. and Windom antenna cut for the 31m band.

**Dave Mayhew** of Yapton, Sussex also found conditions good on October 28 but did not stay up later than 0100. Dave says—"I always listen for CJYQ 930 first, for if the band is going to be open then CJYQ comes through!" Using his loop antenna, Dave logged CKCW 1220 Moncton NB (after hearing CJYQ) and then listened to WMRE 1510 from Boston, WTOP 1500 of Washington and WCAU 1210 from Philadelphia.

Turning his loop next to Mexico, XEBBC 1470 of Tijuana was found to be coming in well and then, on to South America where Radio Globo was a good signal from Rio on 1220kHz.

**Sent in by Keith Fernie**

**Other DX:** Algeria was a new country for **Bert Trickey** of Bristol on l.w. and m.w. Their transmissions on 254 and 981kHz were both well received using a Vega 206 with just its whip antenna.

Solvesborg (Sweden) 1179, RBI Berlin 1359, Polonia (Warsaw) 1503 and Vatican Radio 1530 were logged by **Alan Williams** of Helston.

**Phil Englehard G8UFU** of Macclesfield heard Ljublijana 918 and Radio Zagreb 1134 (Yugoslavia)—which he says is a massive signal in the evenings.

**Paul Logan** of Co. Fermanagh logged NRK Romdal (Norway) 630, Praha (Czechoslovakia) 639, NDR (W. Germany) 972 and Studio Brussel (local service of BRT Belgium) 1512.

## Local Radio DX

At his listening post in the Isle of Lewis, Calum Macleod received BBC local Radios Devon (Barnstaple) 801, Guernsey 1116, Derby 1116, Stoke-on-Trent 1503 and Furness 837; also ILRs County Sound 1476, Wyvern 1530, Pennine (Vicar's Lot) 1530, Red Rose 999, Hereward 1332, Forth 1548, Clyde 1152, West Sound, Ayr 1035, Tay 1584 (Perth) & 1161 (Dundee), Moray Firth 1107 and Downtown, Belfast 1026—mainly around 0700.

**Darren Taplin** of Tunbridge Wells, Kent took his DX-150A receiver along with him on holiday to Port Isaac, Cornwall. Using a 10m-long antenna, he heard BBC local Radios London 1458 and Bristol (Mangotsfield) 1548 and ILRs Plymouth Sound 1152, Swansea Sound 1170 and Mercury 1521—all during daylight hours.

Alan Williams' log included BBC local Radios Merseyside 1485*, WM (Langley Mill) 1458 and Bristol 1548; also ILRs 2CR 828, Pennine (Vicar's Lot) 1530* and DevonAir (Occombe) 954—all during daytime, except those marked *.

While away in Buckinghamshire, Bert Trickey checked the band and heard BBC local Radios London 1458, Kent 1035, Bedfordshire 1161, Sussex 1368 and ILRs LBC 1152, Chiltern 828 and County Sound 1476. Upon returning to Bristol, ILRs 2CR 828, BRMB 1152 and BBC Merseyside 1485 were logged as new ones.

**Sent in by Martyn Whyte** ▶

# I'M TUNED TO TAY Radio TAY

## Community Radio

Permission has been granted for the establishment of 21 new Community radio stations to be set up for a two-year experimental period. Five of these stations will be operating with an e.r.p. of up to 100 watts (1kW in Shetlands) and are expected to cover quite extensive areas, while the remainder will be limited to 10 watts on v.h.f. or 25 watts on m.w. (and may be lower in certain cases).

The expected coverage of the *small neighbourhood* stations will be about 5 kilometres. *Large neighbourhood* stations will have considerably more coverage and the *community of interest* stations will have a radius of about 10 kilometres. The tables show the proposed areas of operation and the type of system envisaged.

| Small Neighbourhood Stations | |
|---|---|
| Location | System(s) to be tested |
| Dumfries, Rhondda, Wirral, Calderdale, Solihull, Rutland | v.h.f. |
| Lincoln | m.w. |
| Colchester, Cambridge, Purbeck, Penzance, Aylesbury | v.h.f. |
| London | 2 × v.h.f.<br>1 × m.w. |

| Large Neighbourhood Stations | |
|---|---|
| Location | System to be tested |
| Shetland Isles, North West Wales | m.w. |
| **Community of Interest Stations** | |
| Location | System to be tested |
| Greater Manchester | v.h.f. |
| North London | m.w. |
| South London | v.h.f. |

My thanks to **David Jayne** of Dagenham, Essex for sending along these details. When these stations become operational, please send along details about the m.w. ones to me, for "On the Air".

## Books

A useful book for m.w. DXers is the 136-page *White's Radio Log*. This book has a three-way listing of callsign, frequency and location of all the m.w. stations in the USA and Canada. Station transmitter power and status (e.g. daytime only) is also included. Published by Worldwide Publications Inc., of New Jersey, it costs £4·80 (inc. UK p. & p.) from the MW Circle Editor, Steve Whitt G8KDL, 103 Foxhall Road, Ipswich IP3 8JZ.

## QSL Addresses

BBC Radio Cleveland: PO Box 1548, Broadcasting House, Newport Road, Middlesbrough, Cleveland TS1 5DG.
BBC Radio London: 35a Marylebone High Street, London W1A 4LG.
BBC Radio York: 20 Bootham Row, York YO3 7BR.
Trans World Radio: 45 London Road, Biggleswade, Bedfordshire SG18 8ED.

# SW BROADCAST BANDS

*Reports as for Medium Wave DX, but please keep separate*

*by Brian Oddy G3FEX*

## For the Newcomer SWL

One of the more important aspects of short-wave listening is the identification of signals from countries around the world and the keeping of records about them for future use.

Prior knowledge of exactly where to look for particular signals is obviously a great help. Details of frequencies and times of transmissions, together with target areas, are given in *Broadcast Schedules* issued by many broadcasters on request. However, to obtain these, it will be necessary to write to all those of interest up to four times a year, because seasonal changes in the ionosphere result in schedule alterations.

Perhaps a more useful idea is to subscribe to one of the organisations devoted to publishing DX guide books—for example, The DX Listeners' Service of West Germany, who produce four booklets a year called the *International Listening Guide* (see Books, later).

While such schedules and booklets are of assistance when listening to signals from stations intended for your country or, at least, in your language, the identification of foreign language transmissions is quite a different matter, for no s.w.l. can expect to master all the languages used by broadcasters on the s.w. bands! While a knowledge of the normal occupants of a band and their operating frequencies will help to narrow the choice of possible languages; a good way to tackle the problem is to listen consistently to broadcasts from known foreign countries first; the sound pattern of an unrecognised language can then be compared with this later to provide the clue to identity. A cassette tape recorder will be of help here. Remember, however, that the known broadcaster may also use languages foreign to them—so tread carefully!

**Fig. 1: A photograph of Margaret Sadler at her listening post in Leeds**

Many broadcasters use signature tunes—often a few bars of a well-known melody written by one of that country's composers—interval signals, bird calls, animals calling (e.g. lions), bells of one kind or another and drums, too. By recording these sounds when they are radiated just prior to a programme in your language a library can be built up which can be used to identify a station when transmitting a foreign language programme.

Broadcasts intended for home consumption, for example on the Tropical Bands, usually consist of a balanced continuous programme of speech, music,

| STATION | LOCATION | Frequency MW kHz SW MHz | UTC TIME | DATE | S | I | N | P | O | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|
| HCJB | QUITO ECUADOR | 17·790 | 1912 | 12/11/85 | 4 | 5 | 4 | 4 | 4 | SENT QSL 12/11/85 |

WRM442

**Fig. 2: A typical layout of a log book**

**Fig. 3: The SINPFEMO code table ▼**

| Symbol | Meaning of Symbol | Rating 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|---|
| S | Signal Strength | Just Audible | Poor | Fair | Good | Excellent |
| I | Interference | Extreme | Severe | Moderate | Slight | None |
| N | Noise | Extreme | Severe | Moderate | Slight | None |
| P | Propagation Disturbances | Extreme | Severe | Moderate | Slight | None |
| F | Type of Fading | Very Rapid | Fast | Moderate | Slow | None |
| E | Modulation Quality | Very Poor | Poor | Fair | Good | Excellent |
| M | Modulation Depth | Over Modulated | Very Low Level | Fair | Good | Maximum |
| O | Overall Merit | Unusable | Poor | Fair | Good | Excellent |

drama and news. The times of commencement and end of such transmissions may well give a clue to the time of day in the country concerned.

Short items, mainly of speech, may well suggest a transmission for outside the country concerned. By careful listening for clock chimes preceding speech, both the time and the type of chime may narrow the field considerably. (A word of caution here, for local clock time may well contain summer or daylight saving time.)

Many stations use tone to "line up" their transmitters prior to the start of a broadcast. For example, the BBC use 40 per cent modulation of 1kHz tone, while other countries may use 900Hz or 440Hz.

Signal strength is not a good guide to identity for it does not follow that a near station will be stronger than a distant one—that will depend on the conditions prevailing at the time. However, some knowledge of the "skip" conditions existing at the time may well give a guide as to the likely area of location in the world. (Another word of caution here, for signals can arrive the long way round the world —"via the long path" as it is called—to give a false impression!)

It is often worthwhile to replay the tape recording several times in an attempt to spot clues to identity. It is quite a detective game but, with practice, it is possible to recognise languages without understanding them!

It is important to keep an accurate log of everything heard. This should be in a book kept for the purpose, with simple headings to provide a degree of consistency. List all frequencies as accurately as possible and times in UTC. The "Remarks" section could contain details about programme content and a note of tape recordings made, etc. A typical lay-out is shown in Fig. 2. You will notice that additional columns have been included using the letters SINPO. Each of these letters signifies a particular aspect of reception and has a rating 1 to 5. The full code SINPFEMO shown in Fig. 3 is now usually abbreviated to SINPO, or even SIO.

The signal heard should be carefully analysed and enthusiasm should not be allowed to distort the facts! Let us just consider each letter in turn:

**S.** Very few signals would rate as S5—all ratings are possible and some receivers have a signal strength meter which may be helpful.

**I.** Listen to the kind of interference present. A strong heterodyne whistle can be more annoying than a background of other signals.

**N.** Except during ionospheric disturbance, summer static and electrified rain, the noise rating is seldom worse than N3. Ignore receiver background noise.

**P.** This relates to the degree of fading and atmospheric noise. High noise and rapid fading, mutilating the programme would rate as P1 but similar conditions, with programme acceptable, rate as P3; shallow fades and little or no noise rate as P4 or P5.

**O.** Take the average of the ratings, to the nearest whole number, to arrive at this figure of merit.

These codes will provide a convenient form of record about the signal received and, because they are internationally understood, they may be used to form the basis of a report of a particular station about their transmission. Notes about programme content, date, time, frequency and your name and address should be included, too—if you have made good use of your log they will have been detailed in it. You could set out your logs for inclusion in "On the Air" in this form, too—that would be a great help to me!

## Conditions on 21 and 25MHz

Note: Frequencies in MHz. Times in UTC = GMT.

Because of our present position in the 11-year sun spot cycle the m.u.f. is unlikely to rise sufficiently to permit any reliable service to be established on the 25MHz (11m) band; consequently, most broadcasters have ceased operation on 11m. However, **Bill Kelly** of Belfast has kept a careful listening watch during early November and has occasionally heard a weak signal on 25·690. I have received weak bursts of a Russian programme there, too, which may be Radio Liberty.

During daylight hours the 21MHz (13m) transmissions from some countries are excellent. For example, the UAE 21·605 signal from Dubai is usually very strong in the UK; **Robert Taylor** of Edinburgh finds the built-in whip antenna of his Toshiba F11/1 receiver adequate for clear reception of their well-prepared and interesting English programmes at 1330. **Leslie Biss** of Knaresborough, N. Yorkshire, has been listening at 1100 to their news and other items. (They require reports and will QSL.)

The signal from the Radio Nederland's transmitter in Madagascar is mentioned in **Alan Williams'** log from Helston in Cornwall on 21·485 at 0830. This can also be heard on 21·480 at 1130 with a programme intended for Europe, Asia and the

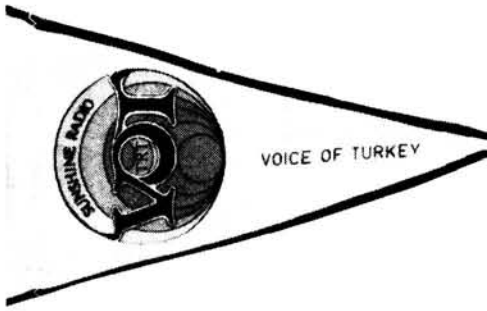



**Fig. 4: A pennant from The Voice of Turkey sent in by Paul Logan of Co. Fermanagh**

Middle East. At 1830 a transmission for South and Central Africa radiated on 21·685 by their Bonaire, Caribbean transmitter has been received by **Bert Trickey** of Bristol.

Family Radio WYFR transmits in various languages from Oakland, California, USA, on 21·525 and can be heard in the UK around 1900.

## The 17 and 15MHz Bands

Radio Pakistan is a strong signal on the 17MHz (16m) band at 1000. **Calum Macleod** receives their English News then on 17·660 at his Isle of Lewis outpost. Also at 1000, the songs and musical items from the Voice of Israel 17·630, while not in English, are very enjoyable. Unfortunately, signals from Australia on 17·715 suffer from interference and fading by 0900 and the transmissions from South Africa's Radio RSA 17·780 have similar problems at 1430—their 11MHz evening transmission is far superior to the UK.

HCJB Quito, Ecuador 17·790 is a regular favourite with **Fred Pallant G3RNM** of Storrington, Sussex, around 1912 and Canada's RCI 17·875 transmissions are popular, too. Listen for their *Inovation Canada* programme on Saturdays at 1915.

Many of the 15MHz (19m) transmissions are being subjected to illegal jamming. Nevertheless, signals from all contintents can be received. There is still no sign of Radio New Zealand on 15·320. **Len**

**Fig. 5: A pennant from Radio Bras, Brazil sent in by J. R. Sadler of Bishop's Stortford**

**Eastman G8UUE** of Bristol received recent written confirmation of their schedule from NZ—this agrees with the list on page 72, November 1985 *PW*.

## The 11, 9, 7 and 6MHz Bands

These bands are packed with strong signals, especially at night. Radio RSA Johannesburg 11·900 is like a local at 2100—**J. S. Wood** of Buckie, Scotland, uses a Trio R-2000 and 3m wire to receive it!

**Clive Powell** of Southport, **Tim Shirley** of Bristol and **Darren Taplin** of Tunbridge Wells all listen to Radio Australia on 6·035—**Margaret Sadler** of Leeds tunes in their World News at 1900, too!

**Albert Fisher G4VBH** of Hounslow logged RAI Rome 5·985 at 2200 Radio Mediterran, Malta 6·110 at 2300 and Radio Sophia, Bulgaria 6·070 at 2130. Much jamming was noted, too.

## The 5, 4, 3 and 2MHz Bands

A location on the 5th floor of a 15-storey block of flats is not exactly ideal for DXing. However, Radio Botswana 3·356 at 1900, ZBC Zimbabwe 3·396 at 1925 and Radio Tropical Peru 4·934 at 0310 have all been heard by **Martyn Whyte** of Edinburgh. He uses a Dressler ara30 antenna and an FRG-8800 receiver, from this site.

**John Parry G4AKX** of Northwich, Cheshire, can receive South Africa's SABC English Language service 4·835 as early as 1800 some days but finds that this is a noisy frequency. This station plays classical music requests on Saturdays.

Very strong signals during the evening are heard from Kharkov, Ukraine 4·060 and Kalinin, USSR 4·055. John finds, however, that the signals from FRCN Lagos, Nigeria 4·990 are far better around 0600 than during the evening.

**Edward Stone** of Kingston upon Thames carried out an interesting experiment. Listening to the BBC's Kranji, Singapore, relay 3·915 at 1710 on one receiver and to a UK-based s.w. transmitter on another receiver, a half-second delay was observed due to the satellite link! His extensive log mentions Djibouti 4·780 at 1845 (closing at 1900 with an anthem), ORTM Mauritania 4·845 at 1900, Radio Capital Caracas, Venezuela 4·850 at 0700 and RRI Yogyakarta, Indonesia 5·046 with interference from Togo on 5·047 between 1645 and 1700.

Radio Reloj, Costa Rica 4·832 and Radio Zaracay, Ecuador 3·395 were received by **Graham Powell** of Pontypridd.

The announcement "Radio Afghanistan, Kabul" on 4·740 was heard by Bill Kelly at 0215—however this may well be a relay from the USSR. Bill also listened to Radio Nacional de Manaus, Brazil 4·845 which gave news in Spanish from different areas of Brazil between 0120 and 0200. Tim Shirley heard this station with his DX-400 receiver, also a programme of classical music from Radio Apintie, Paramaribo, Suriname 5·005 at 0220.

The BBC's relay station at Kranji, Singapore 3·915 was received by Calum Macleod at 2240 on his FRG-7700 receiver. ELBC Radio Monrovia, Liberia 3·255 was logged too, at 2300.

News in English was received from FRCN Kaduna, Nigeria 4·770 by Margaret Sadler at 2102 and music and frequent station identification were noted from Africa No. 1, Gabon 4·810 at 2238. Margaret uses a Satellit 1400SL receiver.

Bert Trickey has been looking at the Tropical Band for the first time. He found Swiss Radio International 3·985 at 1815 and BBC 3·975 at 2000. A good start, Bert—try looking on 4·810 from 1800 for Gabon, for it is usually a good signal and will introduce you to Tropical DXing on these Bands, which is not easy.

Alan Williams has also been checking the Tropical Bands. He heard All India Radio, Delhi 3·905 at 2046 and Swiss Radio International 3·985 at 1700.

Gabon 4·810 is a regular station, received as early as 1800 by Fred Pallant. During most evenings, Ghana 4·915, Chad 4·904 and Radio Yaounde, Cameroon 4·972 (?) are heard. Zaire 5·066 and Botswana 4·820 (which signs off with the hymn *Abide with Me*) and Senegal ORTS 4·890 are new ones for Fred.

## Books

*International Listening Guide*—as mentioned in "Newcomer SWL"—is published by the DX Listeners' Service in March, May, September and November, to correspond with broadcasters' schedule changes and is a most useful reference guide for the newcomer and old-timer. March and September issues contain 64 pages of occupancy/frequency charts, while May and November issues are extended to 104 pages to provide a World Frequency Survey.

A UK subscription costs £7.00, post paid, for four issues. Send cheque, payable to "DX Listeners' Service", to Bernd Friedewald, Merianstr, 2, D-3588 Homberg, West Germany. (Overseas readers should send to Bernd Friedewald for the rates applicable in their area.)

## Station Addresses

Radio Beijing: English Dept., Radio Beijing, Beijing, China.
Radio Sweden International: S-105 10 Stockholm, Sweden.
Swiss Radio International: Swiss Broadcasting Corporation, CH-3000 Berne 15. Switzerland.

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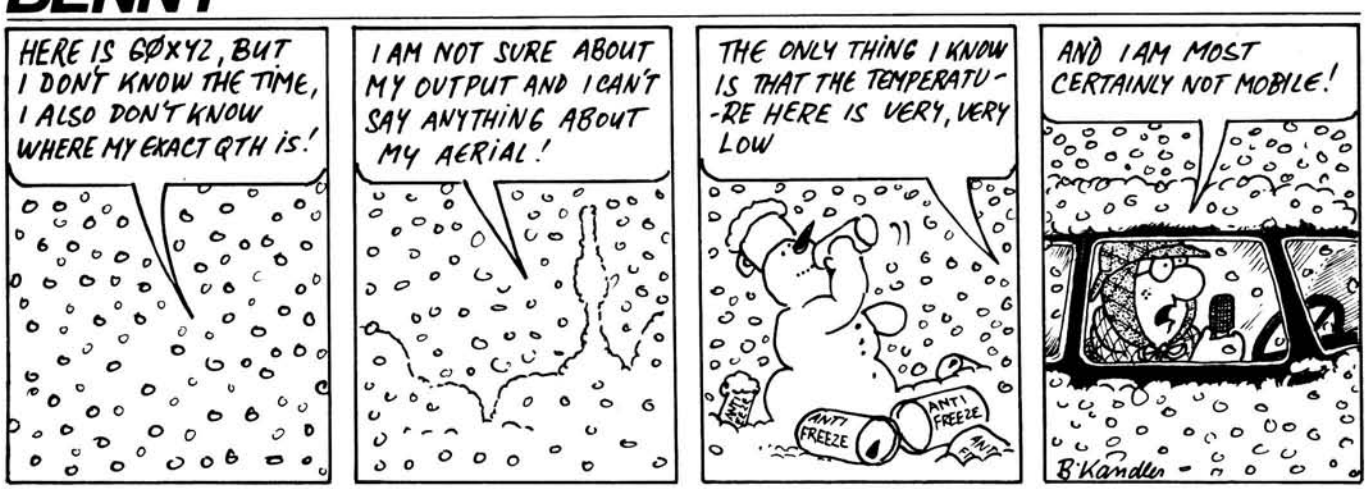
Have a Fisher 1220X metal detector, 1 year old (already paid for itself!) cost £299. Also have fishing tackle worth £100. Would exchange for FT-101ZD or similar valved TX/RX. D. Fry, 73 Northport Drive, Wareham, Dorset. Tel: 51293 (evenings). *A757*

Have 200 issues *PW* 1960/1983, also first 14 issues *Practical Television* Vol. 1, 1950/51. Also have early 2V valves PM1HF etc, 2 pin type Lewcos tuning coils with holders, Blue Spot and Ormond balanced arm speaker units and many early items. Would exchange for w.h.y. in s.w.l. equipment. Tel: 0222 628708. *A760*

Have signal generator that covers 88–160MHz. No. SG-IA/ARN. Would exchange for B40D RX. A. Baker, 34 Wenny Estate, Chatteris, Cambs. *A782*

# BENNY



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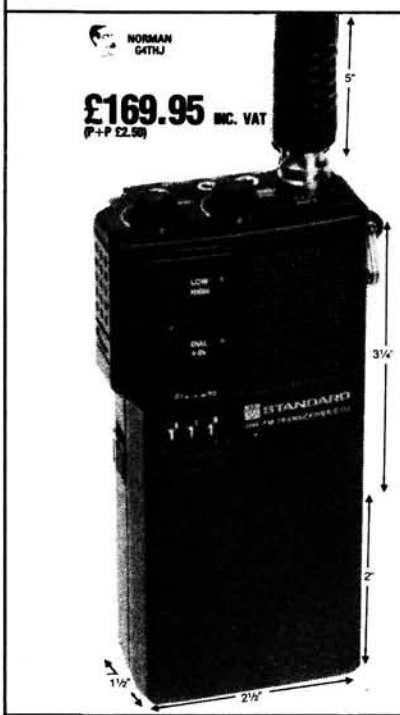


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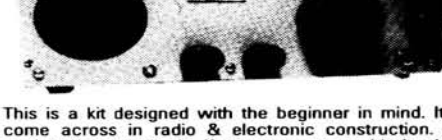

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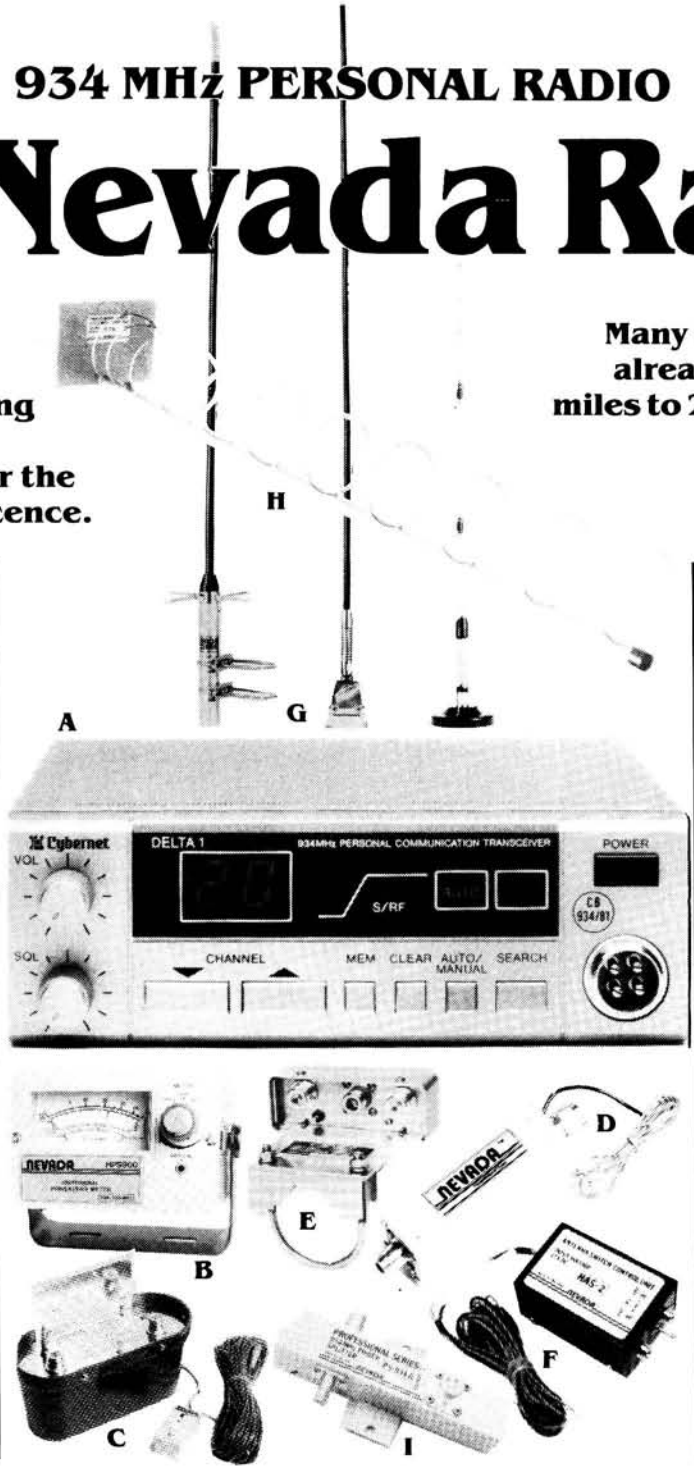


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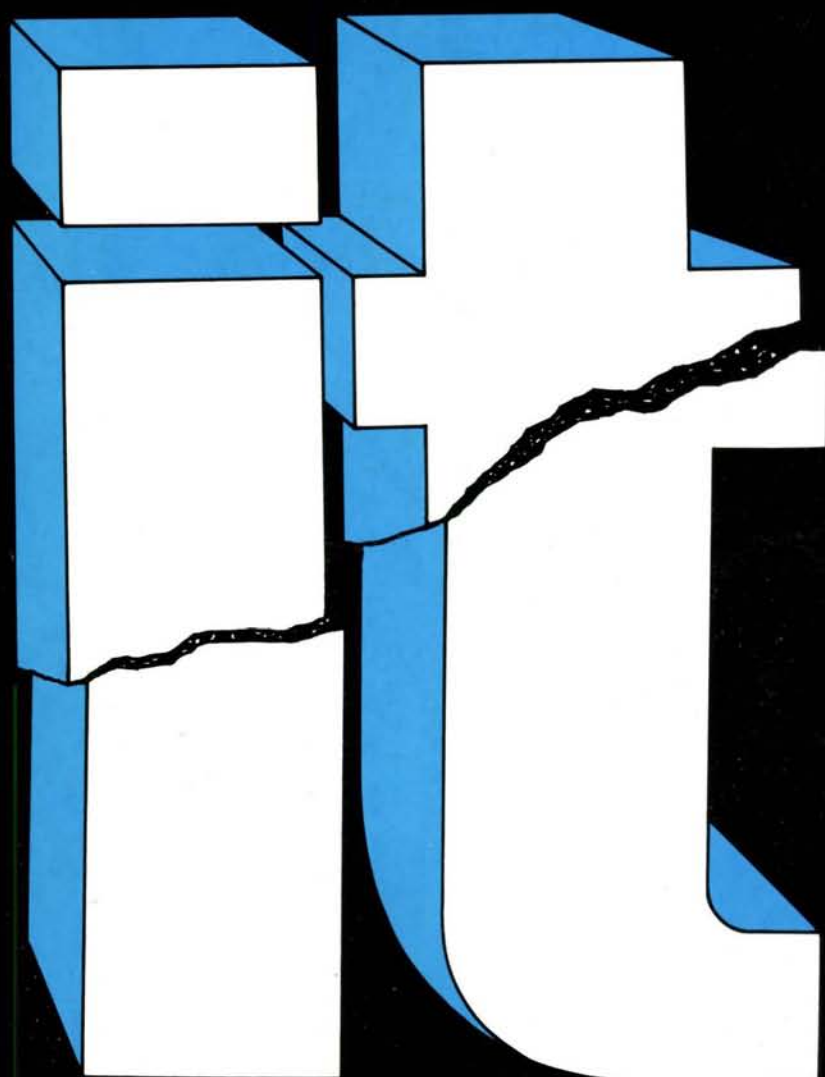

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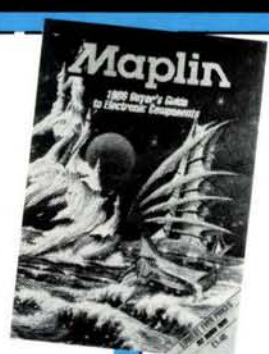


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