

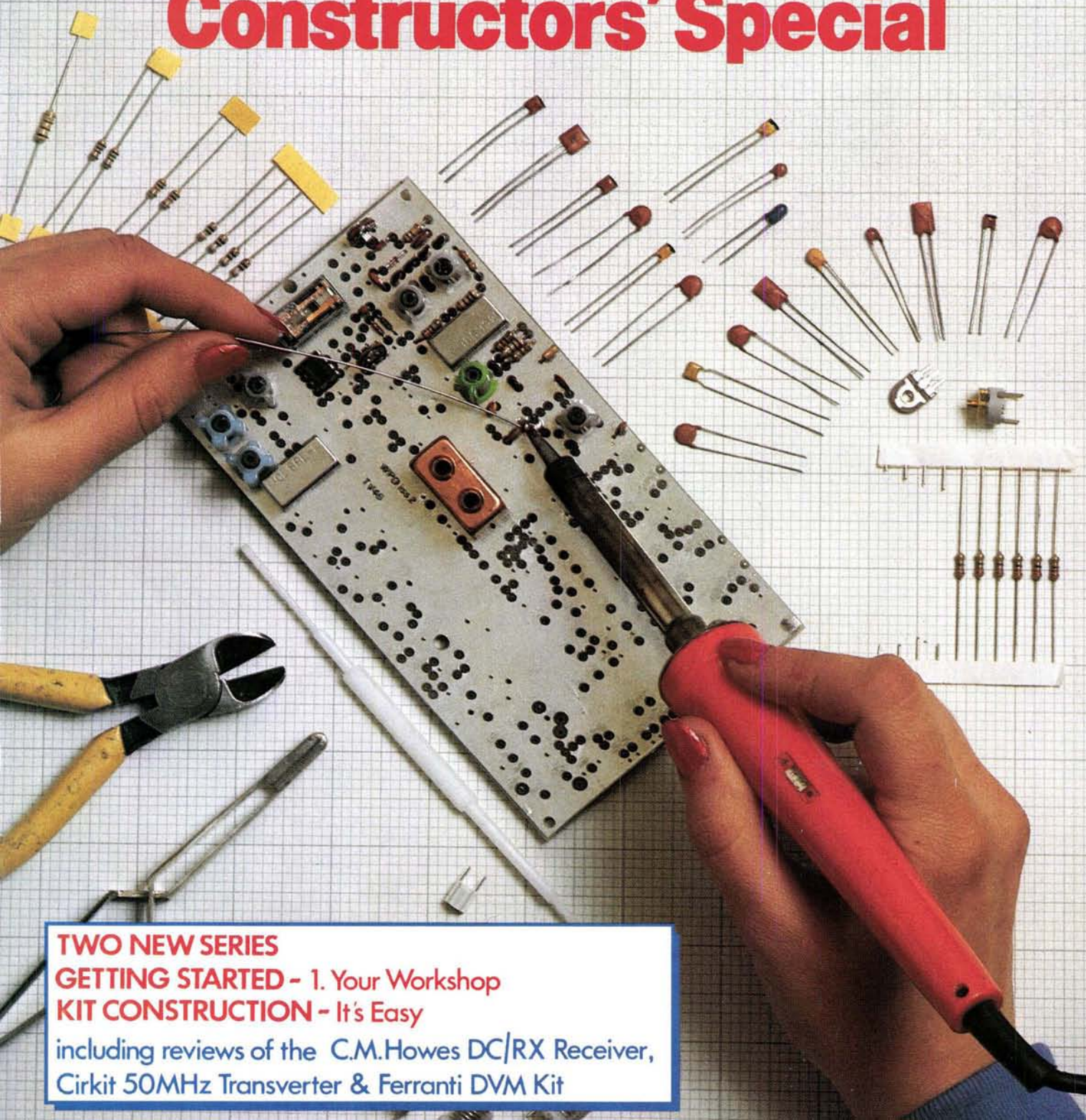
Practical

JULY 1986 £1.10

Wireless

The Radio Magazine

Constructors' Special



TWO NEW SERIES

GETTING STARTED - 1. Your Workshop

KIT CONSTRUCTION - It's Easy

including reviews of the C.M.Howes DC/RX Receiver,
Cirkit 50MHz Transverter & Ferranti DVM Kit

REG. WARD & CO. LTD.

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 | 1795.00 | (—) |
| TS930S | 9 Band TX General Cov RX | 1395.00 | (—) |
| TS440 | NEW 9 Band TX General Cov RX | 950.00 | (—) |
| TS830S | 160-10m Transceiver 9 Bands | 898.00 | (—) |
| AT230 | All Band ATU/Power Meter | 170.65 | (2.00) |
| SP230 | External Speaker Unit | 51.43 | (1.50) |
| TS530SP | 160m-10m Transceiver | 779.79 | (—) |
| TS430S | 160m-10m Transceiver | 750.00 | (—) |
| PS430 | Matching Power Supply | 139.01 | (3.00) |
| SP430 | Matching Speaker | 39.50 | (1.50) |
| MB430 | Mobile Mounting Bracket | 13.56 | (1.50) |
| FM430 | FM Board for TS430 | 45.00 | (1.50) |
| SP120 | Base Station External Speaker | 33.33 | (1.50) |
| MC50 | Dual Impedance Desk Microphone | 39.56 | (1.50) |
| MC35S | Fist Microphone 50K ohm IMP | 18.65 | (1.00) |
| LF30A | HF Low Pass Filter 1kW | 27.70 | (1.00) |
| TR7930 | 2M FM Mobile | 365.60 | (—) |
| TR9130 | 2M Multimode | 544.73 | (—) |
| TR4000A | 2M/70cm mobile | 395.00 | (—) |
| TM201A | 2M 25W mobile | 296.09 | (—) |
| TM401A | 7cms FM 12W | 350.91 | (—) |
| TH21E | 2M Mini-Handhelds | 189.30 | (—) |
| TH41E | 70cm Mini-Handhelds | 220.95 | (—) |
| TM211E | 2M FM Mobiles | 398.00 | (—) |
| TM411E | 70cm FM Mobiles | 466.18 | (—) |
| TS711E | 2M Base Stations | 770.74 | (—) |
| TS811E | 70cm Base Stations | 895.00 | (—) |
| TR3600 | 70cm Handheld | 324.36 | (—) |
| TR2600 | New 2M FM Synthesised Handheld | 299.00 | (—) |
| ST2 | Base Stand | 66.11 | (1.50) |
| SC4 | Soft Case | 16.95 | (1.00) |
| SMC25 | Speaker Mike | 19.78 | (1.00) |
| PS25 | Spare Battery Pack | 32.20 | (1.00) |
| MS1 | Mobile Stand | 38.41 | (1.00) |
| TS440HFX | New £950 | | |
| R2000 | Synthesiser 200KHz-30MHz Receiver | 518.73 | (—) |
| HS5 | Deluxe Headphones | 29.39 | (1.00) |
| SP40 | Mobile External Speaker | 18.08 | (1.00) |
| TL922 | 160/10M 2kW Linear | 1265.00 | (7.00) |
| TS780 | 2M/70cm M/M Transceiver | 1061.20 | (5.00) |
| TS670 | 6, 10, 15, 40M 10W M/M Transceiver | 774.13 | (5.00) |
| TR9300 | 6M M/M Transceiver | 590.49 | (5.00) |

Linear Amps

| | | | |
|----------------|-----------------------|--------|--------|
| TOKYO HI POWER | | | |
| HL 160V | 2m, 10W in, 160W out | 244.52 | (2.00) |
| HL 82V | 2m, 10W in, 85W out | 144.50 | (2.00) |
| HL 110V | 2m, 10W in, 110W out | 249.00 | (2.00) |
| HL 35V | 2m, 3W in, 30W out | 76.00 | (2.00) |
| HL 20U | 70cms, 3W in, 20W out | 122.50 | (2.00) |

MICROWAVE MODULES

| | | | |
|---------------|-------------------------|--------|--------|
| MML144/30-LS | inc preamp (1/3 w up) | 94.30 | (2.00) |
| MML144/50-S | inc preamp, switchable | 106.95 | (2.00) |
| MML144/100-S | inc preamp (10w up) | 149.95 | (2.50) |
| MML144/100-HS | inc preamp (25w up) | 159.95 | (2.50) |
| MML144/100-LS | inc preamp (1/3w up) | 169.95 | (2.50) |
| MML144/200S | inc preamp (3/10/25 up) | 334.65 | (2.50) |
| MML432/30L | inc preamp (1/3w up) | 169.05 | (2.00) |
| MML432/50 | inc preamp (10w up) | 149.50 | (2.00) |
| MML432/100 | linear (10w up) | 334.65 | (2.50) |

B.N.O.S.

| | | | |
|----------------|--------------------------------|--------|--------|
| LPM 144-1-100 | 2m, 1W in, 100W out, preamp | 197.50 | (2.50) |
| LPM 144-3-100 | 2m, 3W in, 100W out, preamp | 197.50 | (2.50) |
| LPM 144-10-100 | 2m, 10W in, 100W out, preamp | 175.00 | (2.50) |
| LPM 144-25-160 | 2m, 25W in, 160W out, preamp | 255.00 | (2.50) |
| LPM 144-3-180 | 2m, 3W in, 180W out, preamp | 295.00 | (2.50) |
| LPM 144-10-180 | 2m, 10W in, 180W out, preamp | 295.00 | (2.50) |
| LP 144-3-50 | 2M 50W out, preamp | 125.00 | (2.50) |
| LP 144-10-50 | 2M 10W in, preamp | 125.00 | (2.50) |
| LPM 432-1-50 | 70cm, 1W in, 50W out, preamp | 225.00 | (2.50) |
| LPM 432-3-50 | 70cm, 3W in, 50W out, preamp | 225.00 | (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

| | | | |
|-------|------------------------|--------|--------|
| SP10X | 1.8-150MHz PWR/SWR | 36.50 | (1.50) |
| SP122 | 1.8-60MHz PWR/SWR/PEP | 85.00 | (1.50) |
| SP220 | 1.8-200MHz PWR/SWR/PEP | 59.99 | (1.50) |
| SP225 | 1.8-200MHz PWR/SWR/PEP | 109.95 | (1.50) |
| SP420 | 140-525MHz PWR/SWR/PEP | 71.00 | (1.50) |
| SP425 | 140-525MHz PWR/SWR/PEP | 109.95 | (1.50) |
| SP825 | 140-525MHz PWR/SWR/PEP | 165.00 | (1.50) |

TOYO

| | | | |
|------|---------------|-------|--------|
| T430 | 144/432 120 W | 52.50 | (1.00) |
| T435 | 144/432 200 W | 58.00 | (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 | 435.00 | (2.50) |

Icom Products

| | | | |
|--------|-----------------------------|--------|--------|
| IC751 | HF Transceiver | P.O.A. | (—) |
| IC745 | HF Transceiver | P.O.A. | (—) |
| IC735 | New HF Transceiver | P.O.A. | (—) |
| PS15 | P.S. Unit | 149.50 | (4.00) |
| PS30 | Systems p.s.u. 25A | 343.85 | (—) |
| SM6 | Base microphone for 751/745 | 39.10 | (1.00) |
| IC505 | 50MHz multi-mode portable | 489.00 | (—) |
| IC220D | 2m 25w M/Mode | 519.00 | (—) |
| IC271E | 2m 25w M/Mode Base Stn. | 779.00 | (—) |
| IC271H | 100W version of above | 979.00 | (—) |
| IC27E | 25W FM mobile | 399.00 | (—) |
| IC47E | 25w 70cm FM mobile | 595.00 | (—) |
| ICBU1 | BU Supply for 25/45/290 | 31.05 | (1.00) |
| ICR71 | General Coverage Receiver | 789.00 | (—) |
| IC02E | 2m H/Hand | 299.00 | (—) |
| IC2E | 2m H/Hand | 199.00 | (—) |
| ML1 | 2m 10w Linear | 79.35 | (2.00) |
| IC4E | 70cm H/Hand | 285.00 | (—) |
| IC04E | 70cm handheld | 299.00 | (—) |
| BC35 | Base Charger | 67.85 | (1.00) |
| HM9 | Speaker mic | 20.70 | (1.00) |
| LC3 | Carry Case | 6.90 | (1.00) |
| ICBP3 | Std Battery Pack | 28.75 | (1.00) |
| BP5 | High Power Battery Pack | 58.65 | (1.00) |
| CP1 | Car Charging Lead | 6.90 | (1.00) |
| DC1 | 12v Adaptor | 17.25 | (1.00) |
| R7000 | VHF/UHF Scanning Receiver | 899.00 | (—) |
| IC3200 | 2M/70cm Mobile Transceiver | 529.00 | (—) |

Mutek Products

| | | | |
|------------|----------------------------------|--------|--------|
| SLNA 50 | 50MHz Switched preamp | 49.50 | (1.50) |
| SLNA 144s | 144MHz Low noise switched preamp | 41.95 | (1.50) |
| SLNA 145sb | Preamp intended for 290 | 31.90 | (1.50) |
| GLNA 432e | 70cm Mast head preamp | 159.90 | (2.50) |
| RPCB 144ub | Front end FT221/225 | 84.90 | (1.50) |
| RPCB 271ub | Front end IC251/211 | 89.90 | (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 | 94.90 | (1.50) |
| TVHF 230c | 2M-FM Transverter | 299.90 | (5.00) |
| LBPF 144v | Bandpass Filter | 24.90 | (1.50) |
| LBPF 432u | Bandpass Filter | 24.90 | (1.50) |
| TVVF 50c | 6M Transverter | 209.90 | (2.50) |
| GLNA 433e | 70cm Pre-amp | 89.90 | (2.50) |
| TVVF 144a | 2M Transverter | 249.90 | (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 550 | Reader | 329.00 | (2.50) |
|----------|--------|--------|--------|

MICROWAVE MODULES

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

BENCHER

| | | | |
|-----|--------------------------|-------|--------|
| BY1 | Squeeze Key, Black base | 67.42 | (2.00) |
| BY2 | Squeeze Key, Chrome base | 76.97 | (2.00) |

HI-MOUND MORSE KEYS

| | | | |
|-------|-------------------------------|-------|--------|
| HK703 | Up down keyer | 29.35 | (1.50) |
| HK704 | Up down keyer | 19.95 | (1.50) |
| HK705 | Up down keyer | 27.60 | (1.50) |
| HK710 | Up down keyer | 39.95 | (2.00) |
| HK802 | Up down solid brass | 96.30 | (2.00) |
| HK803 | Up down solid brass | 82.65 | (2.00) |
| HK806 | 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 | 89.00 | (2.50) |
| KP200 | Memory 4096 Multi Channel | 179.00 | (2.50) |

Yaesu

| | | | |
|-----------|------------------------------------|---------|--------|
| FT1 | HF Transceiver | P.O.A. | (—) |
| FT980 | HF Transceiver | 1759.00 | (2.00) |
| SP980 | Speaker | 86.09 | (2.00) |
| FT757GX | HF Transceiver | 879.00 | (—) |
| FC757 | Auto A.T.U. | 318.00 | (2.00) |
| FP757HD | Heavy Duty PSU | 199.00 | (2.00) |
| FP757GX | Switched Mode PSU | 199.00 | (2.00) |
| FT230 | 2m M/Mode Port/Transceiver | 369.00 | (—) |
| FT290 | With Mutek front end fitted | 399.00 | (—) |
| FT690 | 6M M/M Portable Transceiver | 289.00 | (—) |
| FL2010 | Linear Amplifier | 79.00 | (1.00) |
| MMB11 | Mobile Bracket | 33.00 | (1.00) |
| NC11 | Charger | 10.00 | (1.00) |
| CSC1 | Carrying Case | 6.50 | (1.00) |
| YHA15 | 2m Helical | 7.50 | (1.00) |
| YHA44D | 70cm 1/2wave | 10.95 | (1.00) |
| YM49 | Speaker Mike | 19.00 | (1.00) |
| MMB15 | Mobile Bracket | 14.55 | (1.00) |
| FT203R | NEW 2m H/Hand/CW FNB3 | 225.00 | (—) |
| FT209R | NEW 2m H/Hand/CW FNB3 | 265.00 | (—) |
| FT703R | 70cm H/Hand | 255.00 | (—) |
| FT709R | 70cm H/Hand | 285.00 | (—) |
| FT270R | 2m 25W F.M. | 359.00 | (—) |
| FT270RH | 2m 45W F.M. | 399.00 | (—) |
| FT2700R | 2m/70cm/25W/25W | 499.00 | (—) |
| FRG 9600 | 60-905MHz Scanning RX | 465.00 | (—) |
| MMB10 | Mobile Bracket | 8.50 | (1.00) |
| NC9C | Charger | 9.60 | (1.00) |
| PA3 | Car Adaptor/Charger | 18.00 | (1.00) |
| FNB2 | Spare Battery Pack | 25.00 | (1.00) |
| YM24A | Speaker Mike | 27.00 | (1.00) |
| FT276R | 2m Base Station | 899.00 | (—) |
| 430/726 | 70cm Module for above | 255.00 | (2.50) |
| FRG8800 | HF Receiver | 575.00 | (—) |
| FRV8800 | Converter 118-175 for above | 90.00 | (1.50) |
| FRT7700RX | A.T.U. | 49.85 | (1.50) |
| HM188 | Hand 600 8pin mic | 17.50 | (1.00) |
| MF188 | Desk 600 8pin mic | 75.00 | (1.00) |
| MF1A3B | Boom mobile mic | 23.00 | (1.00) |
| YH77 | Lightweight phones | 17.50 | (1.00) |
| YH55 | Padded phones | 17.50 | (1.00) |
| YH1 | Lightweight Mobile H/Hand-Boom mic | 17.00 | (1.00) |
| SB1 | PTT Switch Box 208/708 | 18.50 | (1.00) |
| SB2 | PTT Switch Box 290/790 | 16.00 | (1.00) |
| SB10 | PTT Switch Box 270/2700 | 18.50 | (1.00) |
| QTR24D | World Time Clock | 39.00 | (1.00) |
| FF501DX | Low Pass Filter | 33.00 | (1.00) |

Power Supplies

| | | | |
|--------|--------|--------|--|
| DRAE | | | |
| 4 amp | 40.50 | (2.00) | |
| 6 amp | 63.00 | (2.50) | |
| 12 amp | 86.50 | (3.00) | |
| 24 amp | 125.00 | (4.00) | |
| BNOS | | | |
| 6 amp | 69.00 | (2.50) | |
| 12 amp | 115.00 | (3.00) | |
| 25 amp | 169.00 | (4.00) | |
| 40 amp | 345.00 | (4.00) | |

| | | | |
|----------|--------------------|-------|--------|
| SMC | | | |
| RU120406 | 4 amp Power Supply | 14.95 | (2.35) |

Aerial Rotators

| | | | |
|---------|------------------------|--------|--------|
| FU200 | Light Duty | 59.00 | (2.00) |
| AR40 | 5 core Medium Duty | 115.00 | (2.00) |
| KR400 | Med/H Duty | 119.00 | (2.50) |
| KR500 | 6 core Elevation | 139.95 | (2.50) |
| KR400RC | 6 core Medium Duty | 147.95 | (2.50) |
| KR600RC | 8 core Heavy Duty | 199.00 | (2.50) |
| HAM1V | 8 core Heavier Duty | 379.00 | (4.00) |
| T2X | 8 core Very Heavy Duty | P.O.A. | (—) |

Switches

| | | | |
|---------------|----------------|-------|--------|
| Sigma | 2 way SO239 | 14.49 | (1.00) |
| Sigma | 2 way 'n' Skts | 19.95 | (1.00) |
| Welz | 2 way SO239 | 26.50 | (1.00) |
| Welz | 2 way 'n' Skts | 46.50 | (1.00) |
| Drae | 3 way SO239 | 15.40 | (1.00) |
| Drae | 3 way 'n' Skts | 19.90 | (1.00) |
| Kenpro KP21N2 | way Switch | 24.15 | (1.00) |

Miscellaneous

| | | | |
|-------|-------------------------|-------|--------|
| DRAE | Wavemeter | 27.50 | (1.00) |
| T30 | 30W Dummy load | 8.50 | (1.00) |
| T100 | 100W Dummy load | 38.00 | (1.00) |
| T200 | 200W Dummy load | 56.00 | (1.50) |
| CT20A | 20W Dummy Load PL259 | 14.25 | (1.00) |
| CT20N | 20W Dummy Load N. Plugs | 22.50 | (1.00) |
| CT530 | 300W Dummy Load | 82.00 | (2.00) |
| DRAE | 2m Pre-set A.T.U. | 14.50 | (1.50) |

Practical Wireless

The Radio Magazine

JULY 1986 VOL 62 NO. 7 ISSUE 952

TWO NEW PW READERS' SERVICES

The PW Book Service
see page 48

The PW PCB Service
see page 51

THIS MONTH'S COVER

The Cirkit 50MHz Transverter Kit in
course of construction

NEXT MONTH

Modifying the
SRX-30D
Safety in the Shack
Portable Contest
Operation

On sale
July 3

PLEASE NOTE
OUR
NEW ADDRESS

22 Kit Construction—It's Easy!

Elaine Richards G4LFM

24 Digital Voltmeter Kit—1

Brian Dance

28 PW Review

Cirkit 50MHz Transverter

30 Getting Started, the Practical Way—1

Rob Mannion GM3XFD

32 The Sooper Loop

Dave Mayhew

40 Weather Watch—3

Jeff Maynard G4EJA

42 50MHz From Day 1

John M. Fell G0API

44 Errors and Updates

PW Programs, Cassette 7

45 Names from the Past

*Michael Faraday
by Tony Smith G4FAI*

Regular Features

| | | |
|-----------------|----------------|--------------|
| 72 Advert Index | 46 Mods | 35 PW |
| 44 Benny | 17, 34 News | Publications |
| 48 Book Service | 52 On the Air | 17 Services |
| 49 Club News | 51 PCB Service | 69 Swap Spot |
| 16 Comment | 20 Products | 16 Write-On |

Editorial and Advertisement Offices:

Practical Wireless
Enefco House
The Quay
Poole, Dorset BH15 1PP
☎ Poole (0202) 678558
Prestel 202671191

Editor Geoff Arnold T.Eng(CEI) FSERT G3GSR
Assistant Editor Dick Ganderton C.Eng. MIERE G8VFH
Art Editor Steve Hunt
Technical Features Editor Elaine Richards G4LFM
Technical Projects Sub-Editor Richard Ayley G6AKG
Technical Artist Rob Mackie
Advertisement Manager Roger Hall G4TNT
Administration Manager Kathy Moore
Accounts Annette Martin

COPYRIGHT © PW Publishing Limited 1986. Copyright in all drawings, photographs, and articles published in *Practical Wireless* is fully protected and reproduction or imitation in whole or in part is expressly forbidden. All reasonable precautions are taken by *Practical Wireless* to ensure that the advice and data given to our readers are reliable. We cannot however guarantee it and we cannot accept legal responsibility for it. Prices are those current as we go to press.

THIS MONTH

Name _____
Address _____

Code _____
TICK YOUR SPECIAL INTEREST ☐ RECEIVERS ☐ VHF/UHF ☐ HF
I ENCLOSE £1 PLEASE SEND ME A COPY OF THE

LOWE CATALOGUE

In Glasgow,
the shop manager is Sim, GM3SAN,
the address, 4/5 Queen Margaret
Road, off Queen Margaret Drive,
Glasgow,
telephone 041-945 2626.

In the North East,
the shop manager is Don, G3GEA,
the address, 56 North Road,
Darlington,
telephone 0325 486121.

In Cambridge,
the shop manager is Tony, G4NBS,
the address, 162 High Street, Ches-
terton, Cambridge,
telephone 0223 311230.

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.

In Cardiff,
the shop manager is Carl, GW0CAB,
the address, c/o South Wales Car-
pets, Clifton Street, Cardiff,
telephone 0222 464154.

In London,
the shop manager is Andy, G4DHQ,
the address, 223/225 Field End
Road, Eastcote, Middlesex,
telephone 01-429 3256.

In Bournemouth,
the shop manager is Colin, G3XAS,
the address, 27 Gillam Road, North-
bourne, Bournemouth,
telephone 0202 577760.

Although not a shop, there is a
source of good advice on the South
Coast, 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 IN NORWICH

On Sunday 22 June 1986 from 2.00 until
4.30 pm, Lowe Electronics will be at the Post
House, Ipswich Road, Norwich. On display in
the Harford suite will be the TRIO range of
equipment. Coffee and biscuits will be free
for the first fifty people to arrive. The Norfolk
Amateur Radio club will operate the 2 metre
talk-in station on S22, callsign G8LOW/A
from 1.30 pm.

So, after the roast beef and Yorkshire pud-
ding, put down your Sunday paper, have
coffee with Lowe Electronics and see the
latest amateur radio equipment from TRIO.

from the Japan Radio Company, a **NEW** general coverage receiver, the **NRD525**.



The enthusiastic short wave listener knows all too well the excellent
performance of the NRD505 and NRD515 general coverage receivers from
the JAPAN RADIO COMPANY. Building on the experience gained from
the production of these outstanding receivers, JRC introduce a new model, the
NRD525 combining advanced performance with the first class construction
of the NRD505.

The NRD525 is a double superheterodyne receiver having a first IF of
70.45399/70.453 MHz and a second of 455 kHz. The receiver covers
frequencies from 90 kHz to 34 MHz. An optional internally fitted converter
(CMK165) will be available adding the following frequency ranges, 34 to 60
MHz, 114 to 174 MHz and 423 to 456 MHz.

Modes of operation for the JRC NRD525 are USB, LSB, CW, AM, FM and
RTTY. An optional RTTY demodulator (CMH530) will be available enabling
a printer to be directly connected to the receiver. The receiver also has a
squelch control which operates on all modes.

The NRD525 has been designed to perform when conditions for reception
are far from perfect. To help copy weak signals on a crowded band both
notch filter and pass band tuning controls are included. The receiver has, as
standard, a 3 kHz filter for USB and LSB (INTER), a 6 kHz filter for AM
(WIDE) and in the AUX position a bandwidth of 12 kHz. If an optional filter is
placed in the AUX position the 12 kHz bandwidth ceases to be available.
For CW and RTTY reception the NARR position can be fitted with the optional
500 Hz filter (CFL232). In the FM mode (narrow band FM), BANDWIDTH
and AGC switches do not function.

The NRD525 is extremely "user friendly" having an easy to use numeric
keypad for frequency entry and memory selection. Whether you are entering a
full shortwave frequency, Vatican Radio on 6185 kHz, or the three digits of
Radio Czechoslovakia's long wave transmission on 272 kHz, entry is simple,
key in the digits as read and press enter. A megahertz only frequency can
also be easily entered into the NRD525, simply key in the required number,
e.g. 6 and press the button marked MHz. Switch pads select mode and
bandwidth whilst a large heavy knob makes fine tuning a pleasure. A quick
tune up or down the band is easily achieved using the up/down switch
pads conveniently located above the tuning knob.

Memory capacity is 200 channels. As well as frequency, each memory
holds mode, bandwidth, AGC setting (slow, fast and off) and whether or not
the attenuator (approx 20 dB) is on or off. Frequencies can be easily
transferred from memory to VFO.

The NRD525 has both memory scan and frequency sweep. The
receiver can be quickly programmed with the START and END memory
channel numbers. Pressing the run button initiates memory channel scan.
Operation of frequency sweep is similar, START and END frequencies being
entered before commencing sweep. Two additional controls are provided
for use in conjunction with scan/sweep. A P LEVEL control adjusts the level at
which an input signal causes the receiver to pause and a SPEED control
sets the rate of scan/sweep.

By pressing numeric key 4 with the MEMO key depressed the input RF
filters are bypassed or inserted in circuit, an excellent feature when receiving
very weak signals. When bypassed the display indicates PASS.

The NRD525 will operate from either 100/120/220/240 volts AC (selectable on
back panel) or 13.8 volts DC so making it suitable for use at home or when
out portable.

Add to the above an audio tone control, a tunable BFO for enhanced CW
operation, an adjustable level noise blanker, a dimmer switch for the
fluorescent display, the ability to connect a high or low impedance aerial
and switch between the two, a mute jack socket for use with a separate
transmitter and the result is the NRD525 from the JAPAN RADIO
COMPANY, a first class receiver purpose built for the dedicated short wave
listener.

NRD525 £1,098 inc. VAT Carriage £7.00

LOWE ELECTRONICS LTD.

Chesterfield Road, Matlock, Derbyshire DE4 5LE

Telephone 0629 2817, 2430, 4057, 4995.

send £1 for complete mail order catalogue.



Remember the TRIO TR9000 2 metre multimode
that revolutionized mobile
operation,



the well respected TRIO TR9130, the rig that
improved the
unimprovable,



now, better than ever, the **NEW** TRIO TR751E
2 metre multimode!



There has been a TRIO two metre multi-mode mobile transceiver for the last six years. Beginning with the successful TR9000 and continuing with the TR9130, amateurs have always found the series to be reliable and above all easy to operate, especially whilst mobile. Advances in technology have enabled TRIO to further improve on the TR9130. Additional operating features have resulted in an even easier to use and smaller transceiver. However TRIO have not discarded the valuable experience gained over the last six years. The result is the TR751E, a new generation of multi-mode mobile transceiver.

The TR751E is the first multi-mode mobile transceiver that can be set to select the correct mode whilst scanning the band. By setting the rig to vfo and selecting AUTO mode before pressing the SCAN button, the TR751E will move up or down the band changing both mode and step rate according to the band plan (5kHz/SSB, 12.5kHz/FM or 1kHz/SSB, 5kHz/FM depending on the selected frequency step).

The transceiver has two VFO's and 10 memory channels. Memory information is easily transferred to either vfo. Each memory holds information on frequency, mode and also the step rate to be set when transferring the memory information to vfo. Memory channel one is also the ALERT frequency, memories 7 and 8 relate to DCL and memory 0 programs the user defined limits of frequency scan.

The TR751E can be set to scan between user programmed limits or around them depending on the frequency set when the scan is started. When AUTO mode is set the transceiver will select the correct mode as it scans. In addition to scanning each memory, the TR751E can be set to scan those memories programmed with the same mode. Pause on an occupied channel is time operated but can be changed to carrier hold by an internal modification.

Operating on 13.8 volts DC, power output from the transceiver is 25

watts (high) and approximately 5 watts (low). The low power setting applies to all modes. When compared with the TR9130, the TR751E is smaller and lighter, TR751E (TR9130) 180mm (175mm) wide, 60mm (68mm) high, 213mm (253mm) deep, 2.1 Kgs (2.4 Kgs).

The TR751E is perfect for base station use. When operating on SSB, signals can easily be found using the frequency step set to 5 kHz, fine tuning quickly achieved by switching to the 50 Hz rate. Operation is also ideal on FM, the rig stepping in either 12.5 or 5 kHz steps. Full repeater facilities are also available including reverse repeater. Receiver performance is excellent, our first sample amazed us, FM, 0.14uV for 12dB SINAD and SSB, 0.09uV for 10dB S+N/N.

As an option, the TR751E can be fitted with DCL. Compatible with the DCS system, DCL (Digital Channel Link) enables your rig to automatically QSY to an open channel. The DCL system searches for an open channel (checks the next eleven 25 kHz spaced frequencies above the one stored in memory 7), remembers it, returns to the original frequency and transmits control information to the other DCL equipped station that switches BOTH rigs to the clear channel.

For the blind operator the TRIO TR751E is perfect. As each mode is selected a tone gives the appropriate morse letter (F for FM, U for USB, etc) and when fitted with the optional VS1 board, a digitally encoded girl's voice will announce on request the operating frequency.

In addition, the TR751E has an illuminated analogue S/R/F meter, all mode squelch, MHz select keys, a noise blanker, semi break-in CW with side tone, RIT, memory channel up/down keys and a frequency lock. TRIO's attention to detail can be seen in the design of the included mobile mount, a clamp system with rubber pads protecting the rig as it is slid in and out for security, the clamp can be easily locked in the closed position.

Better than the TR9130 and at the same price, there is so much more to say about the TR751E, so why not ring us and let's talk about it.

LOWE ELECTRONICS LTD.

Chesterfield Road, Matlock, Derbyshire DE4 5LE

Telephone 0629 2817, 2430, 4057, 4995.



send £1 for complete mail order catalogue.

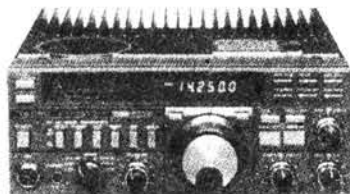


South Midlands

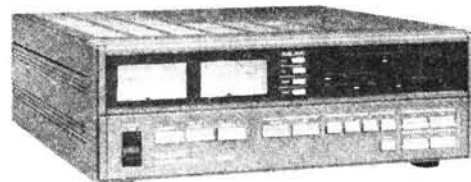
HQ & MAIL ORDER S.M. HOUSE, RUMBRIDGE ST, TOTTON, SOUTHAMPTON

IMPROVED SERVICE
DUE TO
CHANGE OF ADDRESS
AND NEW
LARGER SHOWROOM
SEE NEXT MONTH'S
ISSUE FOR FULL DETAILS

A GREAT COMBINATION



- HF MOBILE TRANSCEIVER
 - MULTIMODE (LSB, USB, AM, CW-W/N, FM)
 - FULLY AUTOMATIC A.T.U. (OPTIONAL)
- FT757GX £879 FC757AT £318

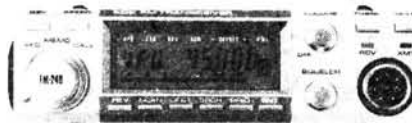


- 500W P.E.P. OUTPUT
 - AUTOMATIC A.T.U.
 - QSK, AMTOR
- FL7000 £???

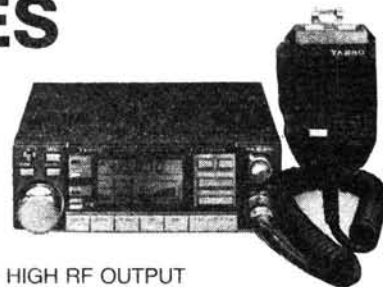
VHF/UHF MOBILES



- MULTIMODE PORTABLE TRANSCEIVER
 - TEN MEMORY CHANNELS
 - FULL LINE OF ACCESSORIES
- FT290R £369 FT690R £289



- MAN MACHINE INTERFACE
 - SIXTEEN MEMORIES
 - OPTIONAL VOICE SYNTHESISER
- FM240 £229 FM £339



- HIGH RF OUTPUT
 - TEN MEMORY CHANNELS
 - OPTIONAL VOICE SYNTHESISER
- FT270RH £399 FT770RH £435

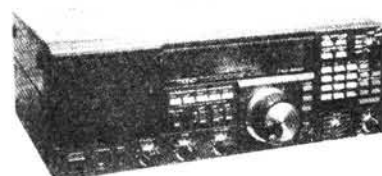
PROFESSIONAL GRADE RECEIVERS



- VHF/UHF SCANNING RECEIVER
 - ALL MODE (INCL. SSB UP TO 460) MHZ
 - 100 MEMORY CHANNELS
- FRG9600 £465 PA4C £14.50



- GENERAL COVERAGE HF RX
 - 200 MEMORY CHANNELS
 - VHF/UHF CONVERTER (OPT.)
- NRD 525 £???

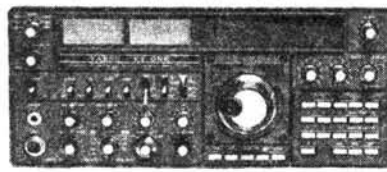


- GENERAL COVERAGE HF RECEIVER
 - TWELVE MEMORY CHANNELS
 - 118-174 MHZ WITH OPT. VHF. CONV.
- FRG8800 £575 FRV8800 £90

TOP FLIGHT TRANSCEIVERS



- MULTIMODE TRIBANDER
 - TRUE FULL DUPLEX CAPABILITY
 - CHOOSE FROM HF, 6M, 2M, & 70CMS
- FT726R(2) £899 430/726 £309



- PROFESSIONAL HF TXCVR
 - LSB, USB, CW, FSK & AM
 - DUAL VFO'S, 10 MEMORIES
- FT-ONE £1999



- HF COMPUTER AIDED TRANSCEIVER
 - ALL MODE (LSB, USB, CW-W/N, AM-W/N, FSK, FM)
 - COMPUTER CONTROL CAPABILITY
- FT980 £1759 SP980 £99

LEEDS
SMC (Leeds)
257 Otley Road,
Leeds 16, Yorkshire
Leeds (0532) 782326
9-5.30 Mon-Sat

CHESTERFIELD
SMC (Jack Tweedy) Ltd
102 High Street
New Whittington,
Chesterfield
Chest. (0246) 453340
9.30-5.30 Tues-Sat

BUCKLEY
SMC (TMP)
Unit 27, Pinfold Lane
Buckley, Clwyd
Buckley (0244) 549563
10-5 Tues, Weds, Fri
10-4 Sat
Southampton Showroom open 9-5.30 pm Monday to Friday, 9-1 pm Saturday.

STOKE
SMC (Stoke)
76 High Street
Talke Pits, Stoke
Kidsgrove (07816) 72644
9-5.30 Tues-Sat

SMC (HUMBERSIDE)
S. HUMBERSIDE
247A Freeman Street
Grimsby
(0472) 59388
9-30 Mon-Sat

JERSEY
SMC (Jersey)
1 Belmont Gardens
St. Helier, Jersey
Jersey (0534) 77067
9-5 pm Mon-Sat
Closed Wed

N. IRELAND
SMC N. Ireland
10 Ward Avenue
Bangor
County Down
0247 464875

AGENTS

NORMAN DILLEY, DARTCOMMS, DARTMOUTH

(08043) 3534

PAT GILLEN, IPSWICH COMMS, IPSWICH

(0473) 462173

JUST BARGAINS Why 'just', because all the items offered below are genuine, S.M.C. are the largest amateur company in Europe and are therefore able to buy at the best prices to provide you with the best bargains and support. S.M.C. the first and only Company who offers both 2-year guarantee and free finance of Yaesu equipment, supports this offer with £100,000 of spares and service engineers. We have more spares and back-up than most amateur companies' total stocks. Buy direct and be content that you have the back-up of the U.K.'s largest (and one of Europe's leading) companies.

| JAY BEAM | OSCAR MOBILE | COAX CABLE | TELO MASTS |
|-----------------------|--------------------------|---------------------------|--------------------------------|
| THIS MONTH'S BARGAINS | ELEMENT ONLY, BASE EXTRA | | TELESCOPIC 10R SECTIONS, GUYED |
| FREE DELIVERY | | | MAST ONLY |
| SAVE POUNDS | | | |
| TB3 hf 3 ele beam | 370F 4m 2dB1/4 | LDF250R | 30ft |
| TB2 hf 2 ele beam | 20W 2m 1/4 | LDF450R | 40ft |
| TB1 hf rotary dipole | 2NE 2m 5/8 3dB1/4 | UR4350R | 50ft |
| CK1-2 conv. kit TB1-2 | 78F 2m 7/8 4.5dB | UR7650R | |
| CK1-3 conv. kit TB1-3 | 78F 2m 7/8 ball mt | UR7075R | |
| CK2-3 conv. kit TB2-3 | 78SF 2m 7/8 short whip | UR3975R | |
| UGP/2m ground plane | 88F 2m 5.2 | UR5775R | |
| CS vert. 4.8dBd Eg | 258 70cm 6dB1/4 | CARRIAGE £1 UP TO 20 MTRS | |
| LR1/2m vert. 4.3dBd | 358 70cm 6.3dB1/4 | £2.50 OVER 20 MTRS | |
| LR2/2m vert. omni | 70N2DX 2m/70 2.7/5.1 | | |
| LWS/2m 5 el 7.8dBd | 2N6M 50/144 | | |
| LW8/2m 8 el 9.5dBd | 72SM 2S 2m/70cm | | |
| LW10/2m 10 el 10.5 | 38F 2m mobile ele | | |
| LW16/2m 16 el 13.4 | HS770 144/432 duplex | | |
| PBM10/2m parabm 11.7 | GCCA Gutter 4m cble | | |
| PMM14/2m parabm 13.7 | SOCA 4m cable + PL259 | | |
| Q4/2m qd 4 el 9.4dBd | SOCAL 6m cable + PL259 | | |
| Q6/2m qd 6 el 10.9dBd | SOCALLR 4m long reach | | |
| Q8/2m qd 8 el 11.9dBd | TMCA5 trunk mount 6m | | |
| D5/2m 5 over 5 10dBd | TMCA H.D. trunk mt | | |
| D8/2m 8 over 8 11.1 | SOMM magnetic mt 4m | | |
| 8X/2m 8 el crossed | SOWM adj wing mount | | |
| 10X/2m 10 el crossed | GCD gutter dft adj | | |
| 10X/137 Sat Xd yagi | BSD bumper strap | | |
| 2X/87G hiness 137 | HS88BK bumper mt ext | | |
| X8/2m X12/70 2m/70cm | CARRIAGE EXTRA £2 | | |
| CB/70 vert. 6.1dBd bg | BASES FREE WITH ELEMENTS | | |
| DB/70 8 over 8 12.3 | | | |
| PBM18/70 parabm 13.1 | | | |
| PBM24/70 parabm 15 | | | |
| LW24/70 24 el 14.8dBd | | | |
| NBM28/70 mult 11.5 | | | |
| NBM48/70 mult 14dBd | | | |
| NBM88/70 mult 16.3 | | | |
| 8X/70 crossed 10dBd | | | |
| 12X/70 crossed 12dBd | | | |
| CR2/23cm on ref 513.5 | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | </ |

DB4 4&6m DUOBAND £115

**TB1, TB2, TB3, VR3
MK3 TRIBANDERS**
TB1 £85 TB2 £170
TB3 £250 VR3 £58

LIMITED STOCKS OF MK2 TRIBANDERS AT OLD PRICES

POWER METERS HANSEN + S.M.C. IN LINE POWER/SWR BRIDGES P.E.P., AVERAGE 1.8-440MHz

The Hansen range covers 30 quality models with top-of-the-line the FS710. This is a flat frequency response, peak envelope power and average in-line wattmeter with many novel features. Notable being the 'power independent' SWR scale - no forward power calibration knob, just direct reading SWR.

| | | | | |
|--------|------------|--------------|--------------|---------|
| FS710V | 50-150MHz | 15/150W | Pep | £107.80 |
| FS50HP | 1.8-60MHz | 20/200/2000W | Pep | £106.70 |
| FS50VP | 1.8-60MHz | 20/200W | Pep | £106.70 |
| FS50OH | 1.8-60MHz | 20/200/2000W | Pep | £81.95 |
| FS50OV | 50-150MHz | 20/200W | Pep | £81.95 |
| FS30OV | 50-150MHz | 20/200W | Pep | £33.50 |
| FS60M1 | 1.8-30MHz | 20/200W | Pep | £52.15 |
| FS60M3 | 430-440MHz | 5/20W | Pep | £52.15 |
| FS210 | 1.8-150MHz | 20/200W | Auto/SWR | £55.50 |
| FS30M1 | 2-30MHz | 20/200W | | £42.25 |
| FS30M2 | 2-30MHz | 200/2000W | | £42.25 |
| FS30M3 | 2-30MHz | 20/200W | Head/Display | £43.65 |
| FS711H | 50-150MHz | 20/200W | Head/Display | £43.65 |
| FS711U | 430-440MHz | 5/20W | Head/Display | £43.65 |
| FSSE | 3.5-150MHz | 20/200/1000W | HF | £42.75 |
| FSSS | 1.8-150MHz | 20/200/2000W | HF | £42.75 |
| SWR3E | 3.5-150MHz | 20/200/1000W | HF | £28.75 |
| SWR50B | 3.5-150MHz | Twin Meter | | £30.50 |
| FS20DL | 3-150MHz | 1/10W | | £43.65 |
| FS20D | 3-150MHz | 5/20W | | £43.65 |

| | | | | |
|---------|-----------------|----------|------------|--------|
| JD110 | 1.5-150MHz | 10/100W | SMC | £16.50 |
| S3-30L | Mini (CB style) | | | £9.20 |
| T3-170L | 3.5-170MHz | Relative | Twin Meter | £17.25 |
| T3-170L | | | FSS500 | |



CARRIAGE PAID POST



WALL BRACKETS



| | | |
|------|--------|-----------|
| W12" | £8.75 | p&p £2.95 |
| W18" | £11.17 | p&p £3.75 |
| W21" | £12.07 | p&p £3.75 |
| W24" | £13.88 | p&p £3.75 |

MINI QUAD



| | |
|------------------------|------|
| 6-20M 12ft ele | £189 |
| Boom only 4.5ft | |
| Carrage £4.00 | |
| or G4MH mini beam | |
| only £38.50 carr £4.50 | |

AMATEUR RADIO AND ELECTRONICS

HOBBY FAIR



To be held at **Wembley** Conference Centre

Saturday 5th & Sunday 6th, July, 1986.

EXCELLENT CATERING & BAR FACILITIES AVAILABLE ALL DAY.

**The first two day fair to be held in the
SOUTH OF ENGLAND.**

**A Major new event in the amateur radio
calendar**

**There will be a host of special interest
groups • Star Prize Raffles • Tombolas
Bring & Buy and lots lots more.**

**Over 200 retail & manufacturers stands
from all over BRITAIN.**

ADMISSIONS: ADULTS £2.00

O.A.P'S & CHILDREN £1.00

UNDER 5's FREE

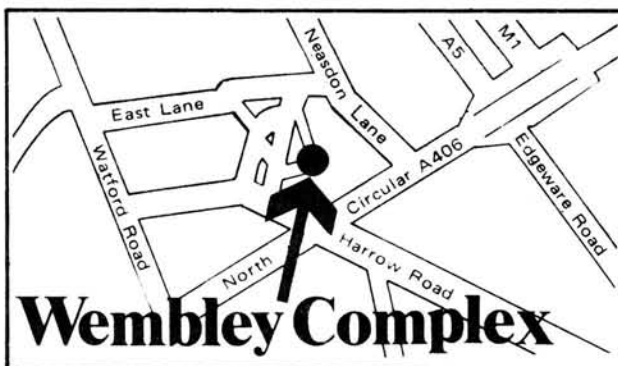
FAMILY TICKET £4.50

OPENING TIMES:

SATURDAY 10.30 - 6p.m.

SUNDAY 10a.m. - 4.30p.m.

Minutes from the M1 and M4 and
well sign posted.



ORGANISERS: AMATEUR RADIO PROMOTIONS LTD., WOODTHORPE HOUSE, CLAPGATE LANE,
BIRMINGHAM B32 3BU. Telephone: 021 - 421 5516.

**191 FRANCIS ROAD
LEYTON · E10**

TEL. 01-558 0854 / 01-556 1415

TELEX 8953609 LEXTON G

dressler

**OPEN: MON -
SAT 9AM - 5.30PM
INTEREST FREE
HP FACILITIES AVAILABLE
ON MANY ITEMS
PROMPT MAIL ORDER**



LATEST NEWS

ICOM R7000
SCANNING RECEIVER
25MHz-2GHz
Full SSB, AM, FM
& Memories



£899 inc ARA500
Active Antenna Worth £99

**YAESU
FT203/703**



**TRIO KENWOOD
TH-21/TH-41**



**YAESU
FT209/709**



**ICOM
IC4E/IC04E**



**ICOM
IC2E/IC02E**



HX 2000E
An excellent
hand-held
scanner
60- 80MHz
118-136MHz
136-174MHz
390-490MHz
490-525MHz
AM/FM
5-10-12½Kc
steps

£260

DATONG P.C.I.

Fit the PCI with the R7000 or
FRG9600
& have 100Kc to 30 MHz general
coverage H.F. USB/LSB/AM/FM for

Only £137.00

or with the FRG9600 and all
power supplies

£575.00

**YAESU FRG-9600
£430**



**60-905MHz
AM · FM · SSB**

AOR 2002



**25-550 MHz
+ 800MHz-1.3GHz**

YAESU FT-757GX



**+ FP757 HD PSU
+ FC757 ATU**

ICOM R71



**100KC-30MHz
AM FM SSB CW
GEN. COV.**

**YAESU FRG 8800
£540**



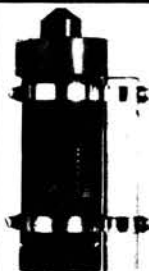
**+ OPTIONAL
FRV8800 CONVERTOR
GEN. COV.**

**TRIO-KENWOOD
TS-940**



**INCLUDING
AUTO-ATU £1,825**

ACTIVE ANTENNAS



**dressler - ara 30 -
active antenna**

200 kHz . . . 40 MHz

Professional electronic circuitry with very wide
dynamic range. Meets professional demands
both in electronics and mechanical ruggedness.
120 cm long glass fibre rod. Circuit is built into
waterproof 2.5 mm thick aluminium tube. Ideal
for commercial and swl-receiving systems. £110.
See Review in August Issue p.15

DRESSLER ARA 500 ACTIVE ANTENNA

50MHz to 1300MHz

Gain 17dB Typical

TECHNICAL SPECIFICATIONS FOR ARA 500

Gain 17dB Typical (14 17dB)

Frequency Range 50-1300MHz

Noise Figure 1dB at 50-180MHz
1.5dB below 300MHz
2.0dB below 350MHz
2.7dB below 400MHz
3.0dB below 500MHz
3.8dB below 650MHz

£110.00

Operation is possible up to 1300MHz
with gain of 10dB

Noise 4-6dB

Intercept Point 3rd Order: +18dbm at Input

LINEARS



D200 2 MTR 500W SSB

£749

D200S 2 MTR 750W SSB

£879

D70 70 CMS 550W SSB

£899

PRE-AMPS - NEW MODELS

| MODEL | FREQ. | NOISE | GAIN | POWER | PRICE |
|-------------|-------------|---------|---------|------------|-------|
| EVV1296S | 1.25-1.3GHz | 0.7-0.9 | 16-19dB | 100W | £149 |
| EVV1296C | 1.25-1.3GHz | 0.9-1.2 | 16-18dB | 100W | £129 |
| EVV1296 | 1.25-1.3GHz | 1.9-2.1 | 14-17dB | 100W | £110 |
| EVV700 | 430-440MHz | 0.5-0.9 | 15-18dB | 500W PEP | £99 |
| EVV2000FB | 144-146 | 0.6-0.9 | 16-18dB | 1000KW PEP | £99 |
| EVV200FB | 144-146 | 0.6-0.9 | 16-18dB | 700W PEP | £89 |
| EVV2000GAAS | 144-146 | 0.6-0.8 | 16-18dB | 1KW PEP | £99 |
| EVV200GAAS | 144-146 | 0.6-1 | 16-18dB | 700W PEP | £89 |
| EV2GAAS | 144-146 | 0.6-0.9 | 15-18dB | 100W PEP | £66 |

VV INTERFACE FOR ABOVE PRE-AMPS

£23

RECEIVE PRE-AMPS

| MODEL | FREQUENCY | NOISE | GAIN | PRICE |
|-----------|-------------|-------|------------|-------|
| EWPA 560 | 50-600-1GHz | | 16.5dB-1dB | £69 |
| IP3 order | +18dBm | | | |
| ERPA 1296 | 1.25-1.30 | 0.8 | 17-18dB | £77 |
| ERPA 435 | 430-440 | 0.5 | 15-18dB | £69 |
| ERPA 144 | 144-146 | 0.7 | 16-18dB | £69 |

MUTEK SPECIALISTS — MET & JAYBEAM ANTENNAS

GAREX THE SCANNER SPECIALISTS

J.I.L. SX-200-N - THE SUPERIOR SCANNER

- ★ The choice of the professionals
- ★ AM + FM all bands
- ★ Wide coverage: 26-88, 108-180, 380-514MHz
- ★ 16 memories ★ Positive action keyboard
- ★ Proven reliability ★ 12v DC & 230v AC
- ★ S-meter & 96-108MHz converter available

£325

REVCO RS-2000-E - THE VERSATILE SCANNER

- ★ 70 memories ★ AM + NBFM all bands
- ★ Covers: 60-180MHz (no gap), 380-520MHz
- ★ Search & store of active channels
- ★ All the usual search & scan functions
- ★ 12v DC & 230v AC operation
- ★ Counts activity of selected channel

**S-METER MOD.
NOW AVAILABLE**

£259

J.I.L. SX-400 - THE PROFESSIONAL SCANNER

- ★ Basic coverage 26-520MHz (no gaps)
- ★ Expandable to 100kHz-1.4GHz, ALL MODES
- ★ AM + FM (manual, automatic or programmable)
- ★ Computer interfacing for limitless memory, remote control & data logging
- ★ Switchable channel spacing & I.F. bandwidths
- ★ I.F. output terminals (10.7MHz & 455KHz)
- ★ Specifications set by the professionals

£625

ACCESSORIES FOR SX400:

- Regulated mains adaptor for SX-400 £29.50
- SX232 (RS232 interface) Built-in "logging mode" £224.25
- RF CONVERTERS (may also suit other receivers)
- RF8014 (800MHz - 1.4GHz) I.F. output 300-500MHz £225.00
- RF5080 (500 - 800MHz) I.F. output 200-300MHz £225.00
- RF1030 (100kHz - 30MHz) with C.W. & S.S.B. £299.00
- ACB300 (Auto antenna control box) £115.00

REGENCY HX2000 - THE HANDHELD SCANNER

- ★ Covers: 60-90, 118-175, 406-496MHz
- ★ AM + FM all bands ★ 5, 10, 12 1/2 KHz steps
- ★ All the usual scan & search functions
- ★ 20 memories. Nicads, charger, flexiwhip antenna

£269

REGENCY MX7000 - WIDE RANGE SCANNER

- ★ 25-550MHz & 800MHz-1.3GHz
- ★ WFM, NFM & AM all bands ★ Superb sensitivity
- ★ 20 memories ★ 12v DC operation

£399

COMING SOON:

- REGENCY MX8000: spec. as MX7000, but new keyboard,
- LED S-meter & up/down step control knob

£POA

ASK FOR OUR LIST OF SECONDHAND SCANNER BARGAINS

★ REVCON ★

A superb quality 16 element, all British made VHF/UHF broadband fixed station aerial from Revco. Ideally suited to all scanners and other VHF/UHF Receivers
Covers 50-500MHz PRICE £29.95 inc

★ RADAC ★

NEW broadband VHF/UHF receiving AND transmitting antenna: Rx coverage 25-500MHz; Tx range according to model.
MODEL 2045 100-480MHz, with options 25-100MHz £69.95
MODEL 2046 Amateur bands: 28/50/70/145/430MHz £69.95
Other versions to customer specification.

PRE-AMPLIFIERS ★ REVCO PA2 in-line Masthead pre-amp, gain approx 18dB over the range 20-700MHz, with useful gain from 10-1,000MHz. Includes mains psu: £49.95

★ MUTEK BBBA500u pre-amp 20-500MHz, 9dB gain with low noise factor (3dB max) for use at Rx input, requires 12vDC £35.50

DC/DC TRANSISTORISED INVERTERS 12V input, 400V 200mA rectified and fully smoothed output £9.50

This unit is a chassis section cut from used R/T equipment, tidied, fully wired & tested. Free-standing but no luxuries like cabinet. 24v version - same price. SAE for details.

We have in stock a very large range of spare parts for PYE RADIOTELEPHONES. Models include Olympic, Westminster, Whitehall, Europa, Mascots and PF70 Series. Parts also available for Cambridge, Vanguard

SAE requesting "PYE LIST"

MAIN DISTRIBUTOR OF REVCO PRODUCTS

PRICES INCLUDE UK P&P and 15% VAT
Goods normally despatched by return



Phone now for details of our interest free credit

GAREX ELECTRONICS
7 NORVIC ROAD, MARSWORTH, TRING,
HERTS, HP23 4LS

Phone 0296 668684. Callers by appointment only

Books for
radio amateurs

AERIAL
ACCESSORIES
AND
MASTS

THE
'HAM SHACK'

ELLIOTT ELECTRONICS
for the Radio Enthusiast

MICROWAVE MODULES

INSTANT HELP
AVAILABLE

APPOINTED
DISTRIBUTOR

QSY
OLD
MAN TO

JAYBEAM
AMATEUR
ANTENNAS

RIGS, ANTENNAS, SWR BRIDGES,
POWER SUPPLIES, TEST GEAR,
COMPONENTS, MORSE KEYS, COAXIAL
CABLES, ROTATORS, MICS, PLUGS
AND SOCKETS, SWITCHES
Call us on (0533) 553293
OR COME AND LOOK AROUND AT
26/28 Braunstone Gate, Leicester

ANTENNES TONNA (F9FT)

| | | | |
|-------------------------|------------------|-------------------------------|-------------------|
| 50MHz | | 23 element | £27.72(b) |
| 5 element | £37.87(a) | 4x23 element – power splitter | |
| 144MHz | | – stacking frame | £144.74(a) |
| 4 element | £15.82(a) | 55 element | £44.75(a) |
| 4 element crossed (N) | £34.78(a) | | |
| 9 element fixed (N) | £25.62(a) | | |
| 9 element portable (N) | £27.92(a) | | |
| 9 element crossed (N) | £41.03(a) | | |
| 13 element portable (N) | £39.57(a) | | |
| 17 element fixed (N) | £47.83(a) | | |
| 435MHz | | | |
| 9 element (N) | £22.31(a) | | |
| 19 element (N) | £28.75(a) | | |
| 19 element crossed | £36.01(a) | | |
| 21 element 432MHz (N) | £38.12(a) | | |
| 21 element ATV (N) | £38.12(a) | | |
| 144/435MHz | | | |
| 9 & 19 element Oscar | £36.01(a) | | |

We are pleased to introduce a new range of antennas shown thus (N). The dipoles have been redesigned and now include a fully sealed 'N' connector – absolutely NO matching or tuning required. Also a new 1296MHz 55 element yagi. Send for full details.

POWER SPLITTERS – STACKING FRAMES
PORTABLE ALUMINIUM TELESCOPIC MASTS

PLEASE ADD CARRIAGE AS SHOWN (a) £4.00. (b) £2.20. ALL PRICES INCLUDE VAT AT 15%

ACCESS - VISA Just telephone your card number for immediate despatch

FOR FULL SPECIFICATIONS SEND 40p FOR CATALOGUE

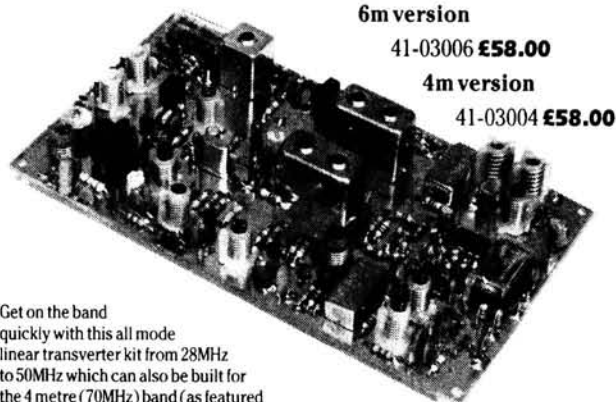
Callers welcome, but by telephone appointment only please. Goods by return.

RANDAM ELECTRONICS (P)

12 Conduit Road, Abingdon, Oxon OX14 1DB. Tel: (0235) 23080 (24 hours)

6m is Here!

Why not explore this new and interesting
band with the Cirkit 6m Transverter?



6m version

41-03006 £58.00

4m version

41-03004 £58.00

Get on the band

quickly with this all mode
linear transverter kit from 28MHz
to 50MHz which can also be built for
the 4 metre (70MHz) band (as featured
in the January issue of Ham Radio Today).

High performance design suitable for modern transceivers can be driven to 0.5W pep SSB
or 1W CW/FM from as little as 1mW drive. RF VOX all-mode switching with adjustable
delay for automatic or PTT operation - IMD better than -35dB at 0.5W pep.

The receive section features -129 dBm (=0.08uV) sensitivity (SSB bandwidths 10dB S/N
+ N for both versions with a system noise figure of around 4dB when used with a modern
HF transceiver. Overall gain is +14dB. Separate Schottky ring mixers are used on both Rx
and Tx sections for best performance with extensive matching and high level stable LO
generation. The transverter runs from +12 to 13.8V power supplies.

Kit includes, high quality PCB all board mounted components with Xtal and pre-wound
coils.

A matching 20W power amp is also available £49.80

All prices include V.A.T. Please add 60p for postage and packing.

Goods normally despatched by return of post.

Cirkit Distribution Ltd

Park Lane, Broxbourne, Herts. EN10 7NQ. Telephone (0992) 444111. Telex 22478

PHOTOACOUSTICS LTD. TEL: 0908 610625

58 HIGH STREET, NEWPORT PAGNELL, BUCKS, MK16 8AQ

MAIL ORDER



Trio

| | | P&P |
|---------------|--|----------------|
| TS440S | NEW Amateur band transceiver/ General coverage RX | 950.00 (—) |
| TS940S | 9 Band TX General Cov RX | 1795.00 (—) |
| TS930S | 9 Band TX General Cov RX | 1395.00 (—) |
| TS830S | 160-10m Transceiver 9 Bands | 898.00 (—) |
| AT230 | All Band ATU/Power Meter | 170.65 (2.00) |
| SP230 | External Speaker Unit | 51.43 (1.50) |
| TS350SP | 160m-10m Transceiver | 779.79 (—) |
| TS430S | 160m-10m Transceiver | 750.00 (—) |
| PS430 | Matching Power Supply | 139.01 (3.00) |
| SP430 | Matching speaker | 39.50 (1.50) |
| MB430 | Mobile Mounting Bracket | 13.56 (1.50) |
| FM430 | FM Board for TS430 | 45.00 (1.50) |
| SP120 | Base Station External Speaker | 33.33 (1.50) |
| MC50 | Dual Impedance Desk Microphone | 39.56 (1.50) |
| MC35S | HF Microphone 50K ohm IMP | 18.65 (1.00) |
| LF30A | HF Low Pass Filter 1kW | 27.70 (1.00) |
| TR930 | 2M FM Mobile | 365.50 (—) |
| TR9130 | 2M Multimode | 544.73 (—) |
| TM201A | 2M 25W mobile | 296.09 (—) |
| TM401A | 70cms FM 12W | 350.51 (—) |
| TH21E | 2M Mini-Handhelds | 189.30 (—) |
| TH41E | 70cm Mini-Handhelds | 220.95 (—) |
| TM211E | 2m FM Mobiles | 398.00 (—) |
| TM411E | 70cm FM Mobiles | 466.18 (—) |
| TS71E | 2m Base Stations | 770.74 (—) |
| TS81E | 70cm Base Stations | 895.00 (—) |
| TR360 | 70cm Handheld | 324.36 (—) |
| TR260 | New 2M FM Synthesised Handheld | 299.00 (—) |
| ST2 | Base Station | 66.11 (1.50) |
| SC4 | Soft Case | 16.95 (1.00) |
| SMC25 | Speaker Mike | 19.78 (1.00) |
| PB25 | Spare Battery Pack | 32.20 (1.00) |
| MS1 | Mobile Stand | 38.41 (1.00) |
| R600 | Gen. Cov. Receiver | 323.78 (—) |
| R2000 | Synthesised 200kHz-30MHz Receiver | 518.73 (—) |
| HS5 | Deluxe Headphones | 29.39 (1.00) |
| SP40 | Mobile External Speaker | 18.08 (1.00) |
| TL922 | 160/10M 2kW Linear | 1265.00 (7.00) |
| TS780 | 2m/70cm M/M Transceiver | 1061.20 (5.00) |
| TS670 | 6, 10, 15, 40M 10W M/M Transceiver | 774.13 (5.00) |
| TR9300 | 6M M/M Transceiver | 499.00 (5.00) |
| SPECIAL OFFER | | |
| TW4000A | 2M/70cms mobile ONLY | 398.00 (3.00) |
| NEW | | |
| TR751E | 2M Multimode with DCL (mobile) | 525.00 (3.00) |

Linear Amps

| MICROWAVE MODULES | | |
|-------------------|--------------------------------|---------------|
| MML144/30-LS | inc preamp (1/3w i/p) | 94.30 (2.00) |
| MML144/50-S | inc preamp, switchable | 106.95 (2.00) |
| MML144/100-S | inc preamp (10w i/p) | 149.95 (2.50) |
| MML144/100-HS | inc preamp (25w i/p) | 159.95 (2.50) |
| MML144/100-LS | inc preamp (1/3w i/p) | 169.95 (2.50) |
| MML144/200S | inc preamp (3/10/25 i/p) | 334.65 (2.50) |
| MML432/30L | inc preamp (1/3w i/p) | 169.05 (2.00) |
| MML432/50 | inc preamp (10w i/p) | 149.50 (2.50) |
| MML432/100 | linear (10w i/p) | 334.65 (2.50) |
| B.N.O.S. | | |
| LPM 144-1-100 | 2m, 1W in, 100W out, preamp | 197.50 (2.50) |
| LPM 144-3-100 | 2m, 3W in, 100W out, preamp | 197.50 (2.50) |
| LPM 144-10-100 | 2m, 10W in, 100W out, preamp | 175.00 (2.50) |
| LPM 144-25-100 | 2m, 25W in, 100W out, preamp | 255.00 (2.50) |
| LPM 144-3-180 | 2m, 3W in, 180W out, preamp | 295.00 (2.50) |
| LPM 144-10-180 | 2m, 10W in, 180W out, preamp | 295.00 (2.50) |
| LP 144-3-50 | 2m, 3W in, 50W out, preamp | 125.00 (2.50) |
| LP 144-10-50 | 2m, 10W in, 50W out, preamp | 125.00 (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

| WELZ | | |
|-------|------------------------|---------------|
| SP10X | 1.8-150MHz PWR/SWR | 34.00 (1.50) |
| SP122 | 1.8-60MHz PWR/SWR/PEP | 75.00 (1.50) |
| SP220 | 1.8-200MHz PWR/SWR/PEP | 59.00 (1.50) |
| SP225 | 1.8-200MHz PWR/SWR/PEP | 99.95 (1.50) |
| SP420 | 140-525MHz PWR/SWR/PEP | 69.00 (1.50) |
| SP425 | 140-525MHz PWR/SWR/PEP | 99.95 (1.50) |
| SP825 | 140-525MHz PWR/SWR/PEP | 149.00 (1.50) |

NEW RANGE OF WELZ METERS NOW AVAILABLE

| DAIWA Power and SWR METERS | | |
|----------------------------|--|---------------|
| CN410M | 3.5-150 MHz mobile cross needle meter | 53.30 (1.50) |
| CN460M | 140-150MHz mobile cross needle meter | 57.75 (1.50) |
| CN630 | 140-150MHz mobile cross pointer meter up to 200W | 108.90 (2.50) |
| NS448 | 900-1300MHz swr power meter 5.20W | 78.00 (2.50) |
| NS660P | 1.8-150MHz PEP Cross Needle Meter up to 1.5KW | 99.50 (2.50) |
| TRIO Power and SWR METERS | | |
| SW100A | SWR/power meter 1.8-150MHz | 42.95 (2.50) |
| SW100B | SWR/power meter 140-450MHz | 92.70 (2.50) |
| SW200A | SWR/power/PEP meter 1.8-150MHz | 92.70 (2.50) |
| SW200B | SWR/power/PEP meter 140-450MHz | 92.70 (2.50) |
| SW2000 | SWR/power/PEP meter 1.8-54MHz up to 2KW | 99.00 (2.50) |
| SWC1 | Optional coupler for SW200 1.8-150MHz | 25.50 (1.50) |

SWC2

VHF Receivers

| | | |
|---------|---------------------------------------|---------------|
| AOR2002 | VHF/UHF continuous coverage scanner | 435.00 (3.00) |
| FRG9600 | 60-905MHz scanning receiver | 465.00 (3.00) |
| HX2000E | Handheld VHF/UHF scanner | 269.00 (3.00) |
| RS37S | Handheld Airband receiver | 64.90 (2.50) |
| RS32 | Mobile/Base/Portable Airband receiver | 209.80 (3.00) |

Icom Products

| | | |
|--------|-----------------------------|---------------|
| IC751A | HF Transceiver | 1399.00 (—) |
| IC745 | HF Transceiver | 989.00 (—) |
| IC735 | New HF Transceiver | 899.00 (—) |
| PS15 | P.S. Unit | 149.50 (4.00) |
| PS30 | Systems p.s.u. 25A | 343.85 (—) |
| SM5 | Base microphone for 751/745 | 39.10 (1.00) |
| IC2900 | 2m 25w M/Mode | 519.00 (—) |
| IC271E | 2m 25w M/Mode Base Stn | 779.00 (—) |
| IC271H | 100W version of above | 979.00 (—) |
| IC27E | 25w 70cm FM mobile | 399.00 (—) |
| IC47E | 25w 70cm FM mobile | 595.00 (—) |
| ICBU1 | B/U Supply for 25/45/290 | 31.05 (1.00) |
| ICR71 | General Coverage Receiver | 789.00 (—) |
| IC02E | 2m H/Hand | 299.00 (—) |
| IC02E | 2m H/Hand | 199.00 (—) |
| ML1 | 2m 10w Linear | 79.35 (2.00) |
| IC4E | 70cm H/Hand | 265.00 (—) |
| IC04E | 70cm handheld | 299.00 (—) |
| BC35 | Base Charger | 87.85 (1.00) |
| HM9 | Speaker mic | 20.70 (1.00) |
| LC3 | Carry Case | 6.90 (1.00) |
| ICBP3 | Std Battery Pack | 28.75 (1.00) |
| BP5 | High Power Battery Pack | 58.65 (1.00) |
| CP1 | Car Charging Lead | 6.90 (1.00) |
| DC1 | 12v Adaptor | 17.25 (1.00) |
| R7000 | VHF/UHF Scanning Receiver | 899.00 (—) |
| IC3200 | 2m/70cm Mobile Transceiver | 529.00 (—) |

SPECIAL OFFER

| | | |
|-------|--------------------------|---------------|
| IC505 | 50MHz multimode 10W ONLY | 349.00 (3.00) |
|-------|--------------------------|---------------|

Mutek Products

| | | |
|------------|----------------------------------|---------------|
| SLNA 50 | 50MHz Switched preamp | 119.95 (2.50) |
| SLNA 144s | 144MHz Low noise switched preamp | 249.90 (2.50) |
| SLNA 145sb | Preamp intended for 290 | 119.95 (2.50) |
| GLNA 432e | 70cm Mast head preamp | 119.95 (2.50) |
| RPCB 144ub | Front end FT251/225 | 119.95 (2.50) |
| RPCB 251ub | Front end IC251/211 | 119.95 (2.50) |
| B8BA 500u | 20-500MHz Preamp | 119.95 (2.50) |
| RPCB 271ub | Front end for IC271 | 119.95 (2.50) |
| UHF 230C | 2M FM Transverter | 119.95 (2.50) |
| LBPF 144u | Bandpass Filter | 119.95 (2.50) |
| LBPF 432u | Bandpass Filter | 119.95 (2.50) |
| TVVF 50c | 6M Transverter | 119.95 (2.50) |
| GLNA 433e | 70cm Pre-amp | 119.95 (2.50) |
| TVVF 144a | 2M Transverter | 119.95 (2.50) |
| GMFA 144e | 2M Mast Head Preamp | 119.95 (2.50) |
| TVVF 50a | 6M Transverter | 249.90 (2.50) |

CW/RTTY Equipment

| BENCHER | | |
|---------------------|--|--------------|
| BY1 | Squeeze Key, Black base | 67.42 (2.00) |
| BY2 | Squeeze Key, Chrome base | 76.97 (2.00) |
| HI-MOUNT MORSE KEYS | | |
| HK708 | Straight key | 18.10 (2.50) |
| HK702 | Deluxe version of above on Marble Base | 34.50 (3.00) |
| HK706 | Straight key | 19.50 (2.50) |
| HK707 | Straight key | 18.50 (2.50) |
| MK704 | Squeeze paddle | 17.50 (2.50) |
| MK705 | Squeeze paddle on Marble Base | 27.90 (3.00) |

RTTY-EQUIPMENT

| | | |
|-------------|---|---------------|
| AMT-2 | Terminal Unit RTTY/AMTOR/ASCII/CW | 245.00 (3.00) |
| AMT-2/CBM64 | Software for the above for the Commodore 64 | 51.75 (2.50) |
| AMT-2/VIC20 | Software for the above for the Commodore VIC 20 | 51.75 (2.50) |
| AMT-2/BBC B | Software for the above for the BBC B | 44.85 (2.50) |
| CWR 610E | RTTY/CW/ASCII Decoder | 216.45 (3.00) |

KEYERS & ACCESSORIES

| | | |
|-----------------|---|--------------|
| Star Master Key | Electronic Keyer | 54.70 (3.00) |
| New Star | Masterkey electronics CMOS memory keyer | 95.00 (3.00) |
| TRX3 | Morse Oscillator | 11.70 (1.50) |
| Drae | Morse Tutor | 52.00 (3.00) |

Yaesu

| | | |
|---------|-----------------------------|---------------|
| FT1 | HF Transceiver | P.O.A. (—) |
| FT980 | HF Transceiver | 1759.00 (—) |
| SP980 | Speaker | 85.09 (2.00) |
| FT757GX | HF Transceiver | 875.00 (—) |
| FC757 | Auto A.T.U. | 318.00 (2.00) |
| TP757HD | Heavy Duty PSU | 199.00 (2.00) |
| FP757GX | Switched Mode PSU | 199.00 (2.00) |
| FT290 | 2m M/Mode Port/Transceiver | 369.00 (—) |
| FT290 | With Mutek front end fitted | 399.00 (—) |
| FT690 | 6M M/M Portable Transceiver | 289.00 (—) |
| FL2010 | Linear Amplifier | 79.00 (1.00) |
| MMB11 | Mobile Bracket | 33.00 (1.00) |

P&P

| | | |
|-----------|--------------------------------|---------------|
| NC11 | Charger | 10.00 (1.00) |
| CSC1A | Carrying Case | 6.50 (1.00) |
| YHA15 | 2m Helical | 7.50 (1.00) |
| YHA44D | 70cm wave | 10.95 (1.00) |
| YMA9 | Speaker Mike | 19.00 (1.00) |
| MMB15 | Mobile Bracket | 14.55 (1.00) |
| FT203R | NEW 2m H/Hand/C/W FN83 | 225.00 (—) |
| FT209R | NEW 2m H/Hand/C/W FN83 | 265.00 (—) |
| FT703R | 70cm H/Hand | 255.00 (—) |
| FT709R | 70cm H/Hand | 285.00 (—) |
| FT270R | 2m 25W F.M. | 359.00 (—) |
| FT270RH | 2m 45W F.M. | 399.00 (—) |
| FT2700R | 2m/70cm/25W/25W | 499.00 (—) |
| FRG 9600 | 60-905MHz Scanning RX | 465.00 (—) |
| MMB10 | Mobile Bracket | 8.50 (1.00) |
| NC9C | Charger | 9.50 (1.00) |
| PA3 | Car Adaptor/Charger | 18.00 (1.00) |
| FN82 | Spare Battery Pack | 25.00 (1.00) |
| YM24A | Speaker Mike | 27.00 (1.00) |
| FT26R | 2m Base Station | 899.00 (—) |
| 430/726 | 70cm Module for above | 255.00 (2.50) |
| FRG8800 | HF Receiver | 575.00 (—) |
| FRV8800 | Converter 118-175 for above | 90.00 (1.50) |
| FRT7700RX | A.T.U. | 49.85 (1.50) |
| MD188 | Hand 800 8pin mic | 17.50 (1.00) |
| MD188 | Desk 600 8pin mic | 75.00 (1.00) |
| MF1A3B | Boom mobile mic | 23.00 (1.00) |
| YH77 | Lightweight phones | 17.50 (1.50) |
| YH55 | Padded phones | 17.50 (1.50) |
| YH1 | L/weight Mobile H/set-Boom mic | 17.00 (1.00) |
| SB1 | PTT Switch Box 208/708 | 18.50 (1.00) |
| SB2 | PTT Switch Box 290/790 | 16.00 (1.00) |
| SB10 | PTT Switch Box 270/2700 | 18.50 (1.00) |
| QTR420 | World Time Clock | 39.00 (1.00) |
| FF501DX | Low Pass Filter | 33.00 (1.00) |

Power Supplies

| DRAE | | BROS | |
|--------|---------------|--------|---------------|
| 4 amp | 40.50 (2.00) | 6 amp | 69.00 (2.50) |
| 6 amp | 63.00 (2.50) | 12 amp | 115.00 (3.00) |
| 12 amp | 86.50 (3.00) | 25 amp | 169.00 (4.00) |
| 24 amp | 125.00 (4.00) | 40 amp | 345.00 (4.00) |

Aerial Rotators

| | | |
|---------|---|---------------|
| KR400 | Med H Duty | 119.00 (2.50) |
| KR500 | 6 core Elevation | 139.95 (2.50) |
| KR400RC | 5 core Medium Duty | 147.95 (2.50) |
| KR600RC | 6 core Heavy Duty | 199.00 (2.50) |
| Yamat | Lightweight VHF rotator | 42.95 (3.00) |
| Unison | Lightweight VHF rotator similar to Hirschmann | 42.95 (3.00) |

Switches

| | | |
|-------|--------------|--------------|
| Sigma | 2 way SO239 | 14.49 (1.00) |
| Sigma | 2 way n Scts | 19.95 (1.00) |
| Welz | 2 way SO239 | 23.95 (1.00) |
| Welz | 2 way n Scts | 43.95 (1.00) |
| Drae | 3 way SO239 | 15.40 (1.00) |
| Drae | 3 way n Scts | 19.99 (1.00) |

Aerials

| | | |
|---------|-------------------------------------|----------------|
| JAYBEAM | TB2 Mk3 HF 3 element Tribander Beam | 287.50 (10.00) |
| Jaybeam | TB2 Mk3 HF 2 element Tribander Beam | 195.50 (10.00) |
| Jaybeam | TB1 Mk3 HF Tribander Rotary Dipole | 97.75 (10.00) |
| Jaybeam | VR3 HF Vertical Tribander | 55.77 (10.00) |

(Full range of Jaybeam VHF and UHF aerials available, please ring for details)

| TONNA | | |
|-------|-----------------------------------|--------------|
| Tonna | 5 element 50MHz | 37.90 (5.00) |
| Tonna | 9 element fixed 'N' socket 144MHz | 25.65 (5.00) |
| Tonna | 2 x 9 element 'N' socket 144MHz | 41.05 (5.00) |
| Tonna | 9 element portable 144MHz | 21.05 (5.00) |
| Tonna | 13 element portable 144MHz | 32.67 (5.00) |
| Tonna | 17 element 'N' socket 144MHz | 47.85 (5.00) |
| Tonna | 9 element 435MHz 'N' socket | 22.35 (5.00) |
| Tonna | 19 element 435MHz 'N' socket | 28.75 (5.00) |
| Tonna | 2 x 19 element 435MHz | 36.00 (5.00) |
| Tonna | 21 element 432MHz 'N' socket | 38.15 (5.00) |
| Tonna | 21 element 438MHz ATV | 38.15 (5.00) |
| Tonna | 23 element 1250MHz | 27.75 (3.00) |
| Tonna | 23 element 1296/1269MHz | 27.75 (3.00) |
| Tonna | 55 element 19 1296/1269MHz | 44.75 (5.00) |

| | | |
|----------------|--|--------------|
| G5RV | Full size 102' | 16.25 (2.00) |
| G5RV | Half size 51' | 14.25 (2.00) |
| HB9CV | 2 metres | 3.95 (2.50) |
| HB9CV | 70cms | 3.95 (2.00) |
| 2 metre | Slim Jim | 8.95 (2.50) |
| 1-1 & 4-1 | Baluns | 12.95 (2.00) |
| 3.7 and 7.1MHz | Traps (pair) | 9.50 (2.00) |
| Dipole | Centrepieces | 2.00 (0.50) |
| Copper wire | 50M rolls hard drawn | 7.95 (2.00) |
| CX140D | Masthead coaxial relay with control box (weatherproof) | 39.95 (3.00) |

BOOKS

| | | |
|--------------|---------------------------|---------|
| MML28/100S | 10m, 10W I/P 100W O/P | £129.95 |
| MML70/100S | 4m, 10W I/P 100W O/P | £149.95 |
| MML144/30-LS | 2m, 1,3W I/P 30W O/P | £94.30 |
| MML144/50S | 2m, 10W I/P 50W O/P | £106.95 |
| MML144/100HS | 2m, 25W I/P 100W O/P | £159.85 |
| MML144/100S | 2m, 10W I/P 100W O/P | £149.95 |
| MML144/100LS | 2m, 1,3W I/P 100W O/P | £169.95 |
| MML144/200S | 2m, 3,10,25W I/P 200W O/P | £334.65 |
| MML432/30L | 70cm, 1,3W I/P 30W O/P | £169.05 |
| MML432/50 | 70cm, 10W I/P 50W O/P | £149.50 |
| MML432/100 | 70cm, 10W I/P 100W O/P | £334.65 |



SEND LARGE SAE FOR DETAILS
SM HOUSE, RUMBRIDGE ST, TOTTON
SOUTHAMPTON SO4 4DP, ENGLAND. TEL: (0703) 867333



MAIL ORDER CO.
Langrex Supplies Ltd.,
Climax House,
159 Fallsbrook Road,
Streatham, SW16 6ED.

**SPECIAL EXPRESS
MAIL ORDER SERVICE**

| | | | | | | | | | |
|--------|-------|--------------|-------|-----------|-------|--------|-------|-----------|-------|
| | Ep | EM81 | 2.50 | PL509 | 6.00 | 6AK5 | 5.99 | 6K8 | 3.00 |
| AZ31 | 2.75 | EM87 | 2.50 | PL519 | 6.00 | 6AL5 | 1.50 | 6K6 | 3.00 |
| CL33 | 4.00 | EN91 | 6.50 | PL602 | 6.00 | 6AM6 | 1.50 | 6L6G | 7.00 |
| DY867 | 1.50 | EY51 | 2.75 | PV33 | 2.50 | 6AN5 | 4.75 | 6L6GC | 3.75 |
| DY802 | 1.50 | EY86 | 1.75 | PV81 | 1.50 | 6AN8A | 3.50 | 6L7 | 2.50 |
| EB8CC | 10.33 | EY88 | 1.75 | PV82 | 1.50 | 6AQ5 | 3.25 | 6L06 | 7.50 |
| E180F | 12.05 | EY500A | 3.00 | PV83 | 1.25 | 6AR5 | 25.00 | 607 | 3.75 |
| E1810F | 35.48 | EZ80 | 1.50 | PV88 | 2.00 | 6AS6 | 8.66 | 6RH8B6KN8 | 10.00 |
| EACB80 | 1.25 | EZ81 | 1.50 | PV500A | 4.00 | 6ASG7 | 8.75 | 6SA7 | 3.75 |
| EB91 | 1.50 | GY501 | 3.00 | PY800 | 1.50 | 6AT6 | 1.25 | 6SC7 | 2.75 |
| EBF80 | 1.50 | GZ32 | 4.00 | PY801 | 1.50 | 6AGT | 5.00 | 6S7 | 3.25 |
| EC91 | 8.00 | GZ33 | 4.75 | QQV02-6 | 35.70 | 6AU6 | 2.50 | 6SKJ | 3.50 |
| EC93 | 4.50 | GZ34 | 4.00 | QQV03-10 | 26.25 | 6AW8A | 5.00 | 6SL7GT | 3.00 |
| EC033 | 4.50 | GZ37 | 7.75 | QQV03-20A | | 6B7 | 3.25 | 6SNPT | 3.00 |
| EC081 | 1.75 | TK61 | 5.00 | | 48.38 | 6B8 | 3.25 | 6SS7 | 2.75 |
| EC082 | 1.75 | TK66 | 15.00 | QQV06-4A | | 6B8A | 1.50 | 6SG7M | 2.50 |
| EC083 | 1.75 | KT77 GOLD-12 | | QV03-12 | 46.00 | 6B87 | 5.00 | 608A | 2.25 |
| EC085 | 1.75 | KT88 LION-20 | | R18 | 3.00 | 6B8E | 1.50 | 6V6GT | 4.25 |
| EC088 | 3.50 | N78 | 15.00 | R19 | 3.00 | 6BH6 | 2.25 | 6X4 | 3.00 |
| EC091 | 8.93 | OA2 | 3.25 | SP41 | 6.00 | 6B8N6 | 2.00 | 12AX7 | 1.75 |
| EC093 | 3.00 | OB2 | 4.35 | SP61 | 4.00 | 6B07A | 3.50 | 12BA6 | 2.50 |
| EC42 | 3.50 | OC3 | 2.50 | U19 | 13.75 | 6B87 | 6.00 | 12BE6 | 3.50 |
| EC081 | 3.00 | OD3 | 2.50 | U26 | 2.50 | 6BP8A | 6.00 | 12BY7A | 3.00 |
| EC180 | 1.50 | PC86 | 2.50 | U37 | 12.00 | 6B8W6 | 6.00 | 12E1 | 4.00 |
| ECCL82 | 1.50 | PC88 | 2.50 | UABCB0 | 1.25 | 6B8V7 | 1.50 | 12H6T | 20.50 |
| ECCL83 | 3.00 | PC87 | 1.75 | UBF89 | 1.50 | 6B26 | 2.75 | 30P12 | 1.38 |
| ECCL87 | 1.75 | PC92 | 1.75 | UCH42 | 2.50 | 6C4 | 1.25 | 30P4 | 2.50 |
| EF37A | 5.00 | PC900 | 1.75 | UCH81 | 2.50 | 6C6 | 1.25 | 30P19 | 2.50 |
| EF39 | 2.75 | PCF80 | 2.00 | UCL81 | 1.75 | 6C8B6A | 2.50 | 30PL13 | 1.80 |
| EF41 | 3.50 | PCF82 | 1.50 | UCL83 | 2.75 | 6CD6GA | 5.00 | 30PL14 | 1.80 |
| EF42 | 4.50 | PCF86 | 2.50 | UF89 | 2.00 | 6CL6 | 1.50 | 57B8 | 55.00 |
| EF50 | 2.50 | PCF801 | 2.50 | UL41 | 5.00 | 6CH6 | 13.00 | 807 | 46.00 |
| EF54 | 5.00 | PCF802 | 2.50 | UL84 | 1.75 | 6CV4 | 8.00 | 811A | 3.75 |
| EF55 | 3.50 | PCF805 | 1.75 | PY41 | 2.25 | 6D6 | 3.50 | 812A | 35.00 |
| EF80 | 1.75 | PCF808 | 1.70 | UY85 | 2.25 | 6D5 | 3.00 | 812A | 35.00 |
| EF86 | 3.50 | PCM200 | 3.00 | VR105-30 | 2.50 | 6D06B | 4.75 | 813 | 65.00 |
| EF91 | 2.95 | PLC82 | 2.00 | VR150-30 | 2.50 | 6E48 | 3.00 | 866A | 35.00 |
| EF92 | 6.37 | PLC83 | 3.00 | Z759 | 25.00 | 6EH5 | 1.85 | 931A | 18.50 |
| EF183 | 2.00 | PL80A | 2.00 | Z803U | 25.00 | 6F6 | 3.00 | 20950 | 75.00 |
| EF184 | 2.00 | PL85 | 2.50 | 2021 | 3.25 | 6G6 | 2.75 | 5763 | 4.50 |
| EH90 | 1.75 | PLC86 | 2.50 | ACX250B | 58.00 | 6H56 | 3.77 | 5814A | 4.00 |
| EL32 | 2.50 | PLC805 | 2.50 | 4C250B | | 6H56 | 3.77 | 5814A | 4.00 |
| EL33 | 4.00 | PD500 | 6.00 | 5R4G1 | 5.50 | 6J5 | 4.50 | 5842 | 12.00 |
| EL34 | 4.00 | PLF200 | 2.50 | 5U4G | 3.00 | 6J6 | 8.93 | 6146A | 12.00 |
| EL36 | 1.50 | PL36 | 2.50 | 5V4G | 2.50 | 6J7 | 4.75 | 6146B | 12.00 |
| EL80 | 19.00 | PL81 | 1.75 | 5Y3GT | 2.50 | 6J8GA | 5.00 | 6550 | 8.00 |
| LLB81 | 5.25 | PL82 | 1.50 | 5Z4G | 2.50 | 6J9C | 7.50 | 6683B | 7.50 |
| EL84 | 2.25 | PL83 | 2.50 | 5Z4GT | 2.50 | 6J9C6 | 6.00 | 6883B | 12.50 |
| EL86 | 2.75 | PL84 | 2.00 | 6930L2 | 1.75 | 6KAN | 2.50 | 6973 | 7.50 |
| EL91 | 7.39 | PL504 | 2.50 | 6AB7 | 3.00 | 6KSGT | 2.75 | 7025 | 10.00 |
| EL95 | 2.00 | PL508 | 5.50 | 6AH6 | 5.00 | 6K7 | 3.00 | 7027A | 8.00 |
| EL360 | | | | | | | | 7360 | 10.00 |

Open daily to callers: Mon-Fri 9 a.m.-5p.m.
Valves, Tubes and Transistors - Closed Saturday
Terms C.W.O. only, allow 7 days for delivery. Tel. 01-677 2424/7.
Prices excluding VAT add 15%
Quotations for any types not listed S.A.E.
Post and packing 50p per order

Telex
946709



BREDHURST ELECTRONICS LTD.
HIGH ST, HANDCROSS, W. SX.
(0444) 400786 RH17 6BW

MAIL ORDER
AND RETAIL

SITUATED AT SOUTHERN END OF M23 — EASY ACCESS TO M25 AND SOUTH LONDON

POWER SUPPLIES – LINEARS – PREAMPS – ROTATORS – MORSE EQUIPMENT – DUMMY LOADS – SPEECH PROCESSORS

| HF RECEIVERS | £ | (c&p) |
|--------------------------------|--------|--------|
| Icom ICR71 | 789.00 | (—) |
| Trio R2000 | 518.00 | (—) |
| Trio VC10 V.H.F. Converter | 139.00 | (2.00) |
| Yaesu FRG8800 | 575.00 | (—) |
| Yaesu FRV8800 V.H.F. Converter | 90.00 | (2.00) |

HF TRANSCEIVERS

| | | | |
|-------|---------|---------|-----|
| Trío | TS940S | 1795.00 | (—) |
| Trío | TS930S | 1395.00 | (—) |
| Trío | TS430S | 750.00 | (—) |
| Trío | TS440S | 950.00 | (—) |
| Trío | TS830S | 898.00 | (—) |
| Trío | TS530SP | 779.00 | (—) |
| Yaesu | FT980 | 1759.00 | (—) |
| Yaesu | FT757GX | 879.00 | (—) |
| Icom | IC745 | 989.00 | (—) |
| Icom | IC735 | 899.00 | (—) |

V.H.F. SCANNING RECEIVERS

| | | | |
|--------|----------------|--------|-----|
| Icom | ICR7000 | 899.00 | (—) |
| Yaesu | FRG9600 | 465.00 | (—) |
| A.O.R. | AR2002 | 435.00 | (—) |
| Signal | R532 "Airband" | 209.00 | (—) |

V.H.F. HANDHELD RECEIVERS

| | | | |
|--------|-----------------------|---------------|--------|
| F.D.K. | ATC720 "Airband" | 189.00 | (2.50) |
| F.D.K. | RX40 141-179 Mhz F.M. | 159.00 | (2.00) |
| Signal | R537S "Airband" | 64.89 | (2.00) |

ANTENNA TUNER UNITS

| | | | |
|-------|------------------------------|--------|--------|
| Yaesu | FRT7700 Short wave listening | 53.50 | (2.00) |
| Yaesu | FC757AT | 318.00 | (—) |
| Trio | AT230 | 170.00 | (2.50) |
| Trio | AT250 auto | 314.00 | (—) |
| Daiwa | CNW518 High power | 258.00 | (—) |

2 M TRANSCEIVERS

| Model | Price (€) |
|-----------------------------------|-----------|
| Trio TH21E Handheld | 189.00 |
| Trio TR2600E Handheld | 299.00 |
| Trio TM201A 25w F.M. mobile | 296.00 |
| Trio TR19130 25w multimode | 544.00 |
| Trio TS71E base station | 770.00 |
| Trio TH400A 2M/70cm F.M. mobile | 396.00 |
| Yaesu FT900 Portable multimode | 368.00 |
| Yaesu FT203R + FN83 Handheld | 275.00 |
| Yaesu FT209RH + FN83 Handheld | 275.00 |
| Yaesu FT2070RH 45w F.M. mobile | 399.00 |
| Yaesu FT2700R 2M/70cm F.M. mobile | 499.00 |
| Yaesu FT276B base station 170cm | — |

Icom optional)
IC2E Handheld

| | | | |
|------|-----------------------------|--------|-----|
| Icom | IC02E Handheld | 299.00 | (—) |
| Icom | IC27E 25w mobile | 399.00 | (—) |
| Icom | IC271E base station | 779.00 | (—) |
| Icom | IC3200E 2M/70cm F.M. mobile | 529.00 | (—) |

70cm TRANSCEIVERS

| | | | |
|-------|------------------------|--------|-----|
| Trio | TH41E Handheld | 220.00 | (—) |
| Trio | TR3600E Handheld | 324.00 | (—) |
| Trio | TM401A 12w mobile | 350.00 | (—) |
| Trio | TS811E base station | 895.00 | (—) |
| Yaesu | FT703R + FNB3 Handheld | 255.00 | (—) |
| Yaesu | FT709R + FNB3 Handheld | 285.00 | (—) |
| Yaesu | 70cm module for FT726R | 309.00 | (—) |
| Icom | IC4E Handheld | 285.00 | (—) |
| Icom | IC04E Handheld | 299.00 | (—) |
| Icom | IC471E base station | 889.00 | (—) |

OTHER BANDS

| | | | |
|-------|---------------------------------|---------|-----|
| Yaesu | FT690R 6M portable | 289.00 | (—) |
| Yaesu | 6M module for FT726R | 228.00 | (—) |
| Yaesu | 21/24/28 H.F. module for FT726R | 249.00 | (—) |
| Icom | IC1271E 1.2 GHz | 1099.00 | (—) |

STATION ACCESSORIES

| STATION ACCESSORIES | | £ (cap) |
|---------------------|-----------------------------------|--------------|
| Drac | V.H.F. wavemeter | 27.50 (1.50) |
| A.K.D. | V.H.F. wavemeter | 24.95 (1.50) |
| Yaesu | FF501DX low pass filter 30MHz 1kW | 33.00 (2.00) |
| Trios | LF30A low pass filter 30MHz 1kW | 27.70 (2.00) |
| Adonis | AM303G desk mic with pre-amp | 46.00 (2.00) |
| Adonis | AM503G desk mic with compression | 59.00 (2.00) |
| S.M.C. | Polar-phase II | 49.00 (2.50) |

ANTENNA SWITCHES

| | | | |
|---------|-----------------------------|-------|--------|
| Welz | CH20N 1300MHz N skts. | 46.50 | (1.50) |
| Welz | CH20A 900MHz SO239 skts. | 26.50 | (1.50) |
| SA 450N | 2way diecast 500MHz N skts. | 22.00 | (1.00) |
| SA 450 | as above but SO239 skts. | 15.00 | (1.00) |
| Drae | 3way N skts. | 19.90 | (1.00) |
| Drae | 3way SO239 skts. | 15.40 | (1.00) |
| CS 4 | 4way B.N.C. skts. 1500MHz | 26.08 | (2.00) |

ANTENNA BITS

| | | | |
|--------|---------------------------------|-------|--------|
| HI-Q | Balun 1:1 5kW P.E.P. | 11.95 | (1.00) |
| Ralcom | Balun 4:1 1kW | 11.20 | (1.00) |
| Ralcom | 7.1MHz Epoxy Traps (pair) | 9.95 | (1.50) |
| | Self Amalgamating Tape 10Mx25mm | 3.95 | (0.75) |
| | T-piece polyprop Dipole centre | 1.50 | (0.25) |
| | Small ceramic egg insulators | 0.50 | (0.15) |
| | Large ceramic egg insulators | 0.75 | (0.15) |

CABLES ETC.

| | | | | |
|---------|-------------------------------|-----------|-------------|--------|
| URM67 | low loss coax 50 ohm | per metre | 0.75 | (0.25) |
| URJ76 | 50 ohm coax dia. 5mm | per metre | 0.30 | (0.10) |
| URJ70 | 70 ohm coax | per metre | 0.35 | (0.10) |
| UR95 | 50 ohm coax dia. 2.3mm | per metre | 0.40 | (0.10) |
| 4mm | Polyester Guy Rope (400kg) | per metre | 0.16 | (0.10) |
| 50mtrs. | 16 swg hard drawn copper wire | | 6.90 | (1.50) |
| 75 ohm | Twin Feeder – light duty | per metre | 0.16 | (0.04) |
| 300 ohm | Twin Feeder | per metre | 0.16 | (0.04) |

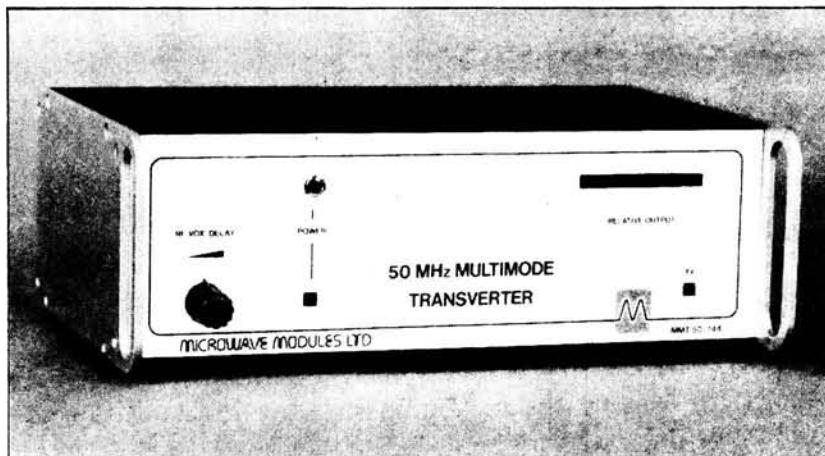
BASE ANTENNAS – MOBILE ANTENNAS – ACTIVE ANTENNAS – TRANSVERTERS – CONVERTERS – SPEAKERS – MICROPHONES

GOODS NORMALLY DESPATCHED WITHIN 24 HRS. — PRICES CORRECT AT TIME OF GOING TO PRESS — F&OF



MICROWAVE MODULES LTD

THE NEW 50MHz TRANSVERTER



General:
 Input Frequency Range: 144-148MHz
 Output Frequency Range: 50-54MHz
 Modes of Operation: SSB, FM, CW, FSK, AM
 Input/Output Impedance: 50 ohm
 RF Connectors: SO239
 Power Connector: 5 pin DIN 240 degree
 DC Power Requirements: 13.8 volts at 4 Amps peak

Transmit Section
 Output power: 20 watts at -23dB 3rd order IM
 15 watts at -28dB 3rd order IM
 10 watts at -32dB 3rd order IM

Input level range: 150 milliwatts to 15 watts
 ALC range: 20dB
 Level of spurious output: better than -65dB

Receive Section
 Conversion gain: 10dB \pm 1dB
 Noise figure: better than 3.8dB
 Input 3rd order intermod intercept point: better than +10dB
 Spurious response rejection: better than -80dB

PRICE £245.00 inc VAT

Transit power output of 20 Watts

This power level of 20 watts, when used in conjunction with a typical antenna of 7dB gain, gives an ERP of 100 watts (the maximum permissible in UK). This power level is also ideal for driving a grounded-grid amplifier.

Purity of transmission

The MMT50/144 transverter has been optimally designed to ensure that spurious radiation falling within the 88-108MHz broadcast band are typically better than 90dB below full output. This has been achieved by the use of 16 poles of filtering, well-balanced mixing and push-pull amplification.

Exceptional large signal receiver performance

The 50MHz transverter enjoys a uniquely high overload characteristic of typically +12dBm (third order intercept point at transverter input). This has been achieved by the use of parallel FET's in the front end driving a balanced pair of

FET's in the mixer. Given that the background sky noise at this frequency represents an equivalent noise figure of greater than 8dB, the low noise figure achieved in the transverter ensures that external noise is the limiting factor. The conversion gain of 10dB is provided to ensure that the 144MHz transceiver in use will detect the weakest of signals, while not being subjected to overload in the presence of strong signals on the 50MHz band. In other words, a system of impressive dynamic range is guaranteed.

Further features

The transverter will accept a drive level at 144MHz of between 150 milliwatts and 15 watts. The automatic level control (ALC) ensures that the 20 watt output signal is of consistently high quality. An LED bargraph display indicates the relative transmit output power, and the RF VOX control allows the operator to select the "hang" time to anything from 20 milliseconds to 1.5 seconds.

| | | Total inc VAT | Post Rate | | | Total inc VAT | Post Rate |
|---------------|----------------------------------|---------------|-----------|---------------|---------------------------------|---------------|-----------|
| MML28/100-S | 10m 100W Linear, 10W input | 129.95 | C | MMT432/28-S | 70cm Linear Transverter | 195.50 | B |
| MML144/30-LS | 2m 30W Linear, 1 or 3W input | 94.30 | B | MMT1296/144-G | 23cm Linear Transverter | 258.75 | D |
| MML144/50-S | 2m 50W Linear, 10W input | 106.95 | B | MMX1286/144 | 1268MHz Transmit Up-Converter | 195.50 | D |
| MLL144/100-S | 2m 100W Linear, 10W input | 149.95 | C | | | | |
| MML144/100-HS | 2m 100W Linear, 25W input | 159.85 | C | MMC50/28 | 6m down to 10m Converter | 35.65 | A |
| MML144/100-LS | 2m 100W Linear, 1 or 3W input | 169.95 | C | MMC144/28 | 2m down to 10m Converter | 35.65 | A |
| MML144/200-S | 2m 200W Linear, 3, 10, 25W input | 334.65 | D | MMC144/28-HP | 2m High Performance Converter | 47.90 | A |
| MML432/30-L | 70cm 30W Linear, 1 or 3W input | 169.05 | C | MMC432/28-S | 70cm down to 10m Converter | 39.90 | A |
| MML432/50 | 70cm 50W Linear, 10W input | 149.50 | C | MMC432/144-S | 70cm down to 2m Converter | 39.90 | A |
| MML432/100 | 70cm 100W Linear, 10W input | 334.65 | D | MMK1296/144 | 23cm down to 2m Converter | 129.95 | B |
| MMC435/600 | 70cm ATV Converter, UHF output | 35.65 | A | MMK1691/137-5 | 1690MHz WX Satellite Converter | 145.00 | B |
| MTV435 | 70cm ATV 20W Transmitter | 197.80 | B | | | | |
| MM2001 | RTTY to TV Converter | 189.00 | B | MMG144V | 2m RF Switched GaAsFET Preamp | 37.90 | A |
| MM4001-KB | RTTY Transceiver with keyboard | 299.00 | D | MMG1296 | 23cm GaAsFET Preamplifier | 75.00 | A |
| MMS1 | The Morsetalker | 115.00 | B | MMG1691 | 1690MHz GaAsFET Preamp | 129.95 | B |
| MMS2 | Advanced Morse Trainer | 169.00 | B | | | | |
| MMT50/144 | 6m Linear Transverter, 20W o/p | 245.00 | B | MMD1500P | 1500MHz Divide by Ten Prescaler | 119.60 | A |
| MMT144/28 | 2m Linear Transverter, 10W o/p | 129.95 | B | MMR3/25 | 3dB 25 Watt Attenuator | 19.95 | A |
| MMT144/28-R | 2m Linear Transverter, 25W o/p | 236.90 | B | MMR7/3 | 7dB 3 Watt Attenuator | 14.50 | A |
| | | | | MMR15/10 | 15dB 10 Watt Attenuator | 14.50 | A |

Postage/Packing Charges: A = £1.84 B = £3.91 C = £4.60 D = £5.98

ALL MICROWAVE MODULES PRODUCTS ARE FULLY GUARANTEED FOR 12 MONTHS (INCLUDING PA TRANSISTORS)



WELCOME

MICROWAVE MODULES LTD

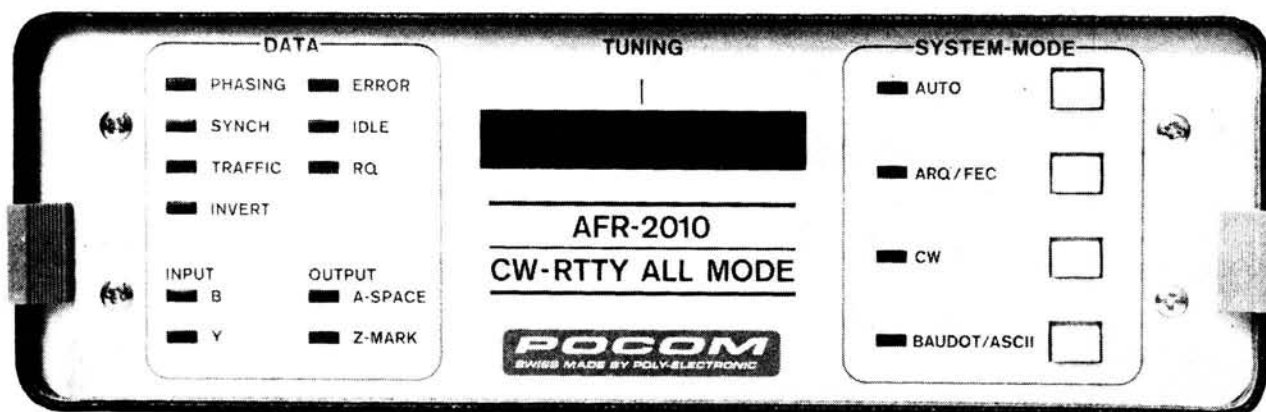
BROOKFIELD DRIVE, AINTREE, LIVERPOOL L9 7AN, ENGLAND

Telephone: 051-523 4011 Telex: 628608 MICRO G

CALLERS ARE WELCOME, PLEASE TELEPHONE FIRST

HOURS:
MONDAY-FRIDAY
9-12.30, 1-5.00
 E. & O.E.

WHAT MAKES THIS DECODER WORTH £1500?



To be able to answer that question it is necessary to appreciate the different parameters that have to be determined when attempting to decode an RTTY signal. Valuable time can be wasted setting the speed, shift and phase but the AFR series of decoders determines all of these automatically – within 5 seconds of tuning in the station! The **POCOM** is the first RTTY reception device to become available on the consumer market that automatically synchronizes to the incoming signal without the operator having to select the baud rates and phase (normal/reverse). One press of the AUTO button is all that is needed. However, the **POCOM** does not offer ease of operation at the expense of quality. Inside the AFR there is a novel quadrature detector that is of the same type as is used in professional equipment and the demodulator is capable of accepting all offsets between **50** and **1000Hz**. Additionally, most rates up to **300** bauds can be decoded (including the **200** baud ASCII press service).

The linear modulator uses an unusual tuning indicator in the form of a 16 bar l.e.d. display. The indicated value shown on this display is derived from the actual frequency deviation and tuning the receiver is incredibly simple, far easier than the old-fashioned two blinking l.e.d. method that has been common up until now. Even using an oscilloscope would not make the tuning any easier.

Naturally the **POCOM** is microprocessor controlled and this allows the use of extremely high sampling rates (**1600** times a second) in order to guarantee a secure evaluation of the received data characters, even under disturbed propagation conditions.

As well as **BAUDOT** and **ASCII**, the **POCOM** is capable of decoding MORSE CODE, TOR and **ARQ/FEC** (SITOR, AMTOR, SPECTOR) and can even cope with the special **FEC** codes that are used by various international government departments.

In the **ARQ/FEC** modes there is a steady automatic post synchronization in order to prevent running time shifts which can cause received character error.

As the **POCOM** is microprocessor controlled, future developments can be easily incorporated by simply replacing the **EPROM**.

The **POCOM** is so easy to use that it is ideal for shortwave listeners and radio amateurs as well as commercial users such as Press Agencies, Embassies, ship and boat owners and so on.

The standard **POCOM AFR 2010** decoder is available for just **£533:84**.

The **POCOM AFR 2010** is ready to go in its standard form, but for the specialist user who may want to decode some of the more unusual signals that are to be found, a range of expansion boards is available. These just plug into the 2010 and turn it into what must be the most versatile decoder on the market.

| | |
|---|-----------------|
| RTTY Baudot CCITT No. 1 Standard 45/50/57/75/100/150/200 Baud | AFR-2010 |
| RTTY Baudot CCITT No. 2 Standard 45/50/57/75/100/150/200 Baud | OPTION |
| RTTY Baudot CCITT No. 1 Variable 30-250 Baud, Accuracy 1/1000 Baud | YES |
| RTTY Baudot CCITT No. 2 Variable 30-250 Baud, Accuracy 1/1000 Baud | OPTION |
| RTTY Baudot CCITT No. 1 Bit-Inversion, Variable 30-250 Baud, Accuracy 1/1000 Baud | OPTION |
| RTTY Baudot CCITT No. 2 Bit-Inversion, Variable 30-250 Baud, Accuracy 1/1000 Baud | OPTION |
| RTTY 8 Channel 200 Baud Press Service (SID, KNA, etc.) | YES |
| NEW RTTY CODE 8 Channel 200 (300 Baud) Press Service (DPA, VWD, etc.) | OPTION |
| RTTY ASCII CCITT No. 5 Standard 110/150/200/300 Baud | YES |
| RTTY ASCII CCITT No. 5 Variable 30-250 Baud, Accuracy 1/1000 Baud | OPTION |
| RTTY Baudot Synchron-Printer, Variable 30-250 Baud, Accuracy 1/1000 Baud | OPTION |
| RTTY Baudot Mode 32, Variable 30-250 Baud, Accuracy 1/1000 Baud | OPTION |
| RTTY Autospec, Variable 30-250 Baud, Accuracy 1/1000 Baud | OPTION |
| MORSE (CW) 15-250 Characters Per Minute (CPM) | YES |
| TOR (SITOR/SPECTOR/AMTOR, ARQ-FEC according to CCIR 476-2), 100 Baud | YES |
| ARQ Multi Channel (Time Div. Multiplex, Moore) 2 Sub-channels 86, 96, 100 Baud | OPTION |
| ARQ Multi Channel (Time Div. Multiplex, Moore) 4 Sub-channels 172, 192, 200 Baud | OPTION |
| ARQ Multi Channel (TDM) Mode PLEX 2 Sub-channels 86, 96, 100 Baud | OPTION |
| ARQ Multi Channel (TDM) Mode PLEX 4 Sub-channels 172, 192, 200 Baud | OPTION |
| ARQ One Channel Standard 48, 64, 72, 85, 96 Baud | OPTION |
| FEC System with 7 BIT Code according to CCITT No. 3, 96, 100, 192, 200 Baud | OPTION |
| FEC System with 7 BIT Code Self Checking (Convulgenter Code) 30-250 Baud | OPTION |
| FEC System with 7 BIT Code according to CCITT No. 3, 30-250 Baud | OPTION |
| BIT ANALYSE (Analysis of received BIT format) | OPTION |
| AUTO SPEED-CHECK Baud Rate Indication 30-250 Baud with 1/1000 Baud Accuracy | YES |

The price of individual expansion units is available on request and a fully expanded **AFR 2010**, capable of decoding virtually any transmission in any mode, costs about **£1500**.

This ad cannot really do justice to this marvellous piece of equipment, so next time you are in the area, come in and try it for yourself – you will be convinced.

FULL RANGE OF TRIO PRODUCTS STOCKED
We are also stockists of DAIWA—MET ANTENNAS—MUTEK—WOOD & DOUGLAS—TASCO TELEREADERS—
MICROWAVE MODULES—ICS AMTOR—AEA PRODUCTS—DRAE

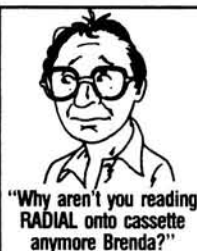
Dewsbury Electronics, 176 Lower High Street, Stourbridge, West Midlands.

Telephone: Stourbridge (0384) 390063/371228.

Telex: 337675 TELPES G

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



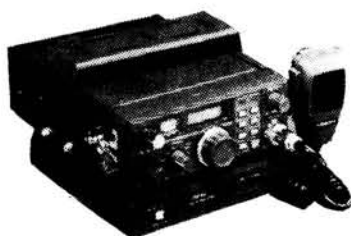


A.R.E. Communications Ltd.

38 BRIDGE STREET,
EARLESTOWN,
NEWTON-LE-WILLOWS,
MERSEYSIDE WA12 9BA.
TEL: 09252-29881



This month we have selected 3 items which, we consider, offer top value but, remember, at Earlestown we hold massive stocks of all types and models of amateur radio equipment which can be purchased by telephone through our mail order system.



FT690 For 6 Metres

At a price less than you would expect to pay for a 6m transverter we are offering an all-mode transceiver which, in its 2m version, is the most popular transceiver ever produced. FM-AM-SSB-CW-3 watts RF will operate on internal batteries. 10 memories – 2 VFO's
£229.00 inc. VAT



FT209R

Undoubtedly the best of the bunch.

Keyboard entry.
10 memories.
Variable duplex operation.
3 watts out.
Scan.
LCD display.
Normal list price
£279.00

**OUR PRICE
£225.00**
including charger
and carrying case.



TELEREADER CWR880

We are pleased to announce a new TELEREADER for CW, RTTY and TOR.

CW 4-40 WPM.

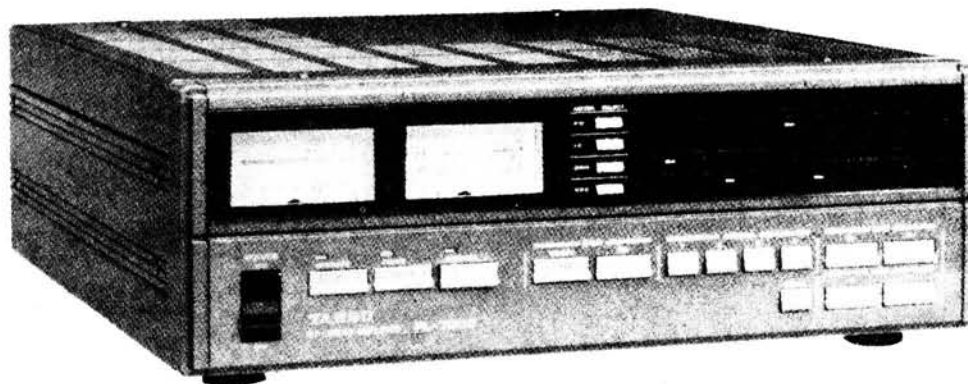
BAUDOT 4515-50-57-75

TOR MODE A & B

ASC11 75-110-300

Video display or L.C.D. display or will couple to printer.

AT LAST!



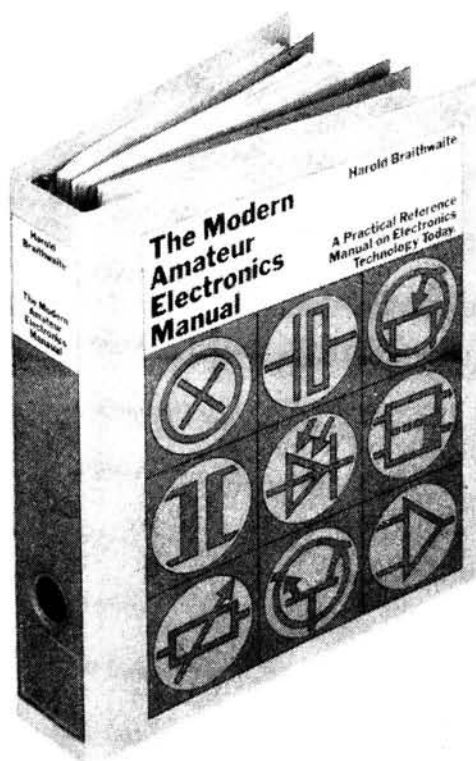
The long-awaited Solid State HF Linear with Built-in automatic A.T.U. is about to arrive from Yaesu.
500 Watts P.E.P. from a 100 Watt drive.
Built-in Antenna Switching.

Phone 09252-29881 for all mail order – Access & Barclaycard accepted

Trade enquiries welcome

All prices include VAT and are correct as we go to press

Opening hours: Tuesday-Saturday
10am-5pm



A major new publication – for anyone with a real interest in electronics

The brand new **MODERN AMATEUR ELECTRONICS MANUAL** provides you with a single comprehensive and practical reference work — to keep you completely up-to-date with all aspects of amateur electronics.

From tape machines to microcomputers, the MODERN AMATEUR ELECTRONICS MANUAL gives you full assembly and repair instructions for hundreds of different items. It provides innumerable ideas for experiments, projects and equipment. Its contents cover all types of consumer electronics equipment, measuring technology, digital technology and microcomputers.

In addition, the Manual comes with a selection of specially designed PCB layouts — ready for immediate transfer onto copper clad plates. These are one of the most popular items with our readers.

The manual also includes full lists and advice on components and their alternatives, together with details of key sources of supply.

THE MODERN AMATEUR ELECTRONICS MANUAL comes to you direct from the publishers in a special 400 page looseleaf format. We will regularly send you further supplements to ensure its contents remain completely up-to-date. These supplements will include new projects and experiments to try.

All these items are available to you at the special price direct from the publisher of £29.95 for the 400 page basic reference work plus 12p per page for each Updating Supplement sent to you subsequently. You may of course cancel your subscription to the supplement updating service at any time.

Try THE MODERN AMATEUR ELECTRONICS MANUAL — at no risk under our 10-day Guarantee of Satisfaction. Order the book today!

ORDER FORM

**To: WEKA Publishing Limited,
16 Jacobs Well Mews, George Street,
London W1H 6BD. Telephone 01-628 0898**

YES, please send me immediately, with subsequent Updating Supplements, the **MODERN AMATEUR ELECTRONICS MANUAL**, covering specimen assembly and repair instructions for consumer electronics equipment, measuring technology, digital technology and microcomputer electronics.

I shall pay only £29.95 for this work within 10 days of receipt.

I shall receive the appropriate Updating Supplements several times a year (price 12p per page). These can be discontinued at any time.

FULL NAME _____
(CAPITALS PLEASE)
ADDRESS _____

CITY/TOWN _____

COUNTY _____

POST CODE _____ AGE (if under 18) _____

SIGNATURE _____

**Cut out coupon and forward IMMEDIATELY to: WEKA Publishing Limited,
16 Jacobs Well Mews, George Street,
London W1H 6BD**

A Member of the International WEKA Publishing Group
Austria France Germany Italy Netherlands Spain Switzerland
United Kingdom

C

Where a good deal more costs a good deal less . . .

ICOM

IC 745



Call or telephone 01-992 5765 for latest prices and information plus full range of H.F. equipment and accessories.

IC 751A



NEW FROM YAESU — FL7000



A major leap forward in amplifier design YAESU's new HF fully automatic unit will soon be available and introduces a whole new approach to transistor use at high power. Incorporates fully automatic antenna coupling and band changing!

FULL DETAILS NOW AVAILABLE
— WRITE OR PHONE 01-992 5765

FT 757

YAESU

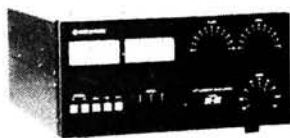


Telephone 01-992 5765 for latest information on the YAESU value for money high performance equipment. Full range of accessories available.

FT 980



NEW THE TOKYO TRIPLETS . . .



Available in June — 3 new HF linears from Tokyo High Power. All Amateur bands with power levels up to 3kw. Call now for details on HL-1KGX, HL-2K and HL-3K. Telephone today: 01-992 5765.

EXPECTED
EARLY JUNE

CAPCO S.P.C. 300 ANTENNA COUPLER



We are now sole worldwide distributor of this remarkably robust unit. Will match anything from a piece of wire to a halfwave 160m through to 10m — up to 1kw P.E.P.

ICOM R71 General Coverage Receiver



Keypad entry, 32 memories SSB, AM, RTTY, CW & FM (optional) 0.1-30 MHz. Twin VFO's Scanning, Selectable AGC, noise blanker, pass band tuning and deep notch filter! Super value!!

MASSIVE STOCKS

OF MANY

HAND HELD

TRANSCIVERS

INCLUDING

PMR UNITS

— CALL

01-992 5765

FOR PRICES

AND DESCRIPTIVE

LEAFLETS

WITH FULL

SPECIFICATION.



IC 02



IC 04 E



IC 2 E



IC 4 E



FT 209 RH



FT 209 R



FT 703 R



FT 709 R

YAESU FRG 8800 — Continuous Coverage Receiver



Twin VFO's plus keyboard / computer interface control — all mode SSB, CW, AM & FM. Memories, scanning, filters. Includes 2-dimensional LCD, graphical SIMPO.

YAESU FT 770

Extremely rugged, yet highly compact. High visibility display LCD. Dual microprocessor design — two VFO's, 10 memories, flexible scanning, etc. Voice synthesizer option.

70 cms TCVR



— 25W/3W FM

**OUR BIG
BUYING POWER
GUARANTEES YOU
EUROPE'S No. 1 DEAL
ALL ROUND. SEND 90p
FOR OUR BUMPER
LITERATURE
PACK!**

FREE ANTENNA
WITH ANY HF RIG BOUGHT THIS MONTH,
TAKE YOUR CHOICE FROM 3, 4 OR 5
BAND VERTICALS — 10 AND 15M QUADS
— WHILE STOCKS LAST!

MASSIVE WORKING DISPLAY
FIFTY (50) NEW TRANSCIVERS HF / VHF
AND UHF ALL WORKING. SELECTION OF
RECEIVERS — UHF / VHF ALL WORKING!

AMCOMM — ARE
— WHERE A
GOOD DEAL MORE
COSTS A GOOD
DEAL LESS!!!



ICOM 7000 £849



FRG 9600 £449



AR 2002 £425

HOURS: 9:30 — 5:00
CLOSED MONDAYS.

AMCOMM WARE

Prices subject to currency fluctuations.

373 Uxbridge Road, London W3 9RN Tel: 01-992 5765/6 Telex: 334312

E. & O.E.

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.



Morse Tests

Sir: The RSGB took over responsibility for administering the amateur Morse test from 1 April 1986. The RSGB have known for two years that they were almost certain to get the franchise because they tendered at a very low price which was far below that which a commercial organisation would consider economic. Despite this they appear to have done little or

no effective preparation until the franchise was in the bag, with the net result that no testing facilities will be available for several months.

Contrast this with the situation in the USA where the amateur community, led by the ARRL, took over the running of all Morse tests and the technical exams at fairly short notice from the FCC. Whilst there have been some minor hiccups, the volunteer examiner programme has generally gone very smoothly. Also note that all the exams are free and the candidate has to pay a maximum of \$4.25 in out-of-pocket expenses regardless of how many exam elements he takes! Why can't our national society get it right for once?

Peter L Crosland G6JNS
Worcester

Unbeatable Bargain?

My daughter was moaning because her hi-fi had developed a fault—but since she also possesses two transistorised radios, plus remote control TV and video recorder, I couldn't find much sympathy!

In the 1950s when my husband and I were married, we bought a second-hand wireless for ten shillings (50p in today's money) and this old set gave us the first episode of *The Archers* and thousands of other old favourites for twenty-one years—before we finally retired it. How many sets today could equal such a feat for ten shillings.

B. L. Cuthbertson
Hull

This reminds me of my first TV, a 14 inch 405-line Bush, which cost £20 second-hand. It worked perfectly for about

eight years, apart from having one faulty a.f. coupling capacitor replaced. Finally the tube got so dim that the picture could only be watched in a darkened room, and as a new one would have cost more than the original purchase of the set, an old friend was pensioned off.
Editor.

SUBSCRIPTION SERVICE

Please note that our subscription service is now handled from a new address. "Practical Wireless" Subscription Department, Competition House, Farndon Road, Market Harborough, Leicestershire LE16 9NR. Tel: (0858) 34567.

PW COMMENT

Amateur Radio in Decline?

It is fashionable nowadays to "knock" the establishment, authority in general, the old brigade, call it what you will. It is also very easy to do so—easy to be destructive in your criticism—far, far more difficult to be constructive, to put forward plans for changes which will not simply create as many problems as they will solve.

For the UK amateur radio fraternity, the DTI as licensing authority and the RSGB as national society are the twin whipping boys, subject to an ever-increasing barrage of abuse. This month's letter from G6JNS is one of the few on the state of amateur radio arriving in my mailbag which is actually printable, surely a sad comment in itself.

As an observer of happenings and feelings in the hobby, it distresses me greatly to see how the DTI, the RSGB, and the agitators for change have developed such an unhappy knack of scoring "own goals" in their actions and pronouncements.

Take, for example, the DTI, who after the fiasco of the revised Amateur Licence Schedule of 12 February 1982, promised that steps would be taken to ensure that nothing like it could ever happen again. So what have they just done? Without consulting or even telling the RSGB, they produced a new policy document on dealing with complaints of interference to domestic radio and TV reception, and circulated it to Radio Investigation Service district offices throughout the UK. That document seems to consider the radio amateur's transmitter is the villain of the piece, and puts forward the delightfully simple solutions: 1. limit his power output; 2. limit his hours of operation; 3. if all else fails close him down. See also *Comment* in last month's *PW*.

Now why did the DTI do this? Despite what many people think, the technical and legal branches of the DTI are not fools, yet somehow they managed to produce this draconian yet totally ineffective solution to a real and growing problem. Did some underling at the DTI devise, print and circulate the document while his bosses were away at some international conference?

Why did the RSGB not know about the new document, when they have regular monthly meetings with the DTI's Radio Regulatory Department and, we are told, are in touch with them also on a

day-to-day basis? Was it, as has been suggested to me by a number of radio amateurs, simply the DTI reminding the RSGB: "We're in charge round here—you count for little in the scheme of things". If this were true, it would be an insult not only to the membership but to the UK amateur radio movement in general.

The DTI have no monopoly of foolishness and poor public relations, however. Towards the end of January 1986, news emerged that Mrs Joan Heathershaw G4CHH was to be RSGB President again in 1987. There is nothing in the Society's rules to prevent a member serving more than one term as President, and indeed it has happened before. However, it is an event sufficiently unusual that, in my opinion at least, it warranted a clear explanation of the reasons being given to the membership at the earliest possible opportunity. In the event, *RadCom* was silent on the matter until the April issue, and then carried only a bland statement that RSGB Council had been unanimous in their selection, and that "This clearly reflects Mrs Heathershaw's great achievements during her earlier term of office in 1985".

Now I have the greatest respect for Joan Heathershaw, having had the pleasure of meeting her at several events during 1985, but surely if Council truly felt that there was no other possible candidate who was qualified, willing and able to assume the office, they could at least have the common courtesy (and the common sense, in view of the volume of recent criticism of their functioning) to say why. Not to do so is to miss a golden opportunity to improve their image, beside being an insult to every RSGB member. One can only hope that this was not their intention.

Lastly, those "agitators for change". Whilst I can appreciate their frustration in trying to achieve change in what they see as a seemingly immovable establishment, there is little point in resorting to mudslinging. Nor is an argument strengthened by obstinately refusing to acknowledge that there is a single good point about the existing system or even one snag to be overcome in putting the new ideas into effect. Constructive criticism and reasoned argument are far more likely to persuade a majority of radio enthusiasts of the need for change, and this is what must be done if the "agitators" are to progress their case.

Geoff Arnold

Note—Morse tests are now available at major rallies.

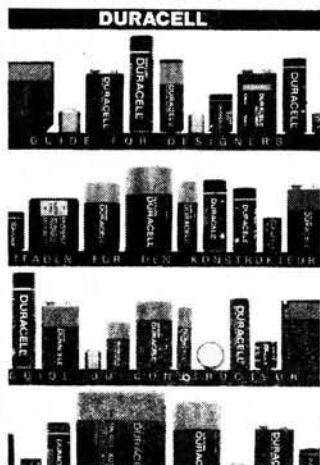
Designers Guide from Duracell

Duracell have published the latest edition of their *Guide for Designers* handbook. It contains all the key information that a designer requires when deciding on the type and size of battery needed for a project.

The Guide covers the full range of Duracell's products (mercury, alkaline manganese, zinc air, silver oxide batteries, etc) with detailed information on each product's external dimensions, nominal voltage and capacity, weight, life and typical discharge characteristics.

There is information on the relative benefits of each chemical system, its voltage range, current capability, temperature performance and storage life so the best system can be selected for a given application. Other important factors that should be considered in the design of the battery compartment, e.g. recommended contact materials to prevent galvanic corrosion occurring, and polarised battery contacts, etc. is also given.

Several new designs of cells are included for the first



time in the guide such as the DL223A lithium manganese dioxide battery designed for high rate, long storage applications and the new range of eleven zinc air cells. Details are also given of the improved capacities of Duracell's alkaline range of batteries.

The Guide is written with an English, French, German and Italian section and for a free copy please contact: **John Bellamy, Duracell Technical Division, Duracell House, Church Road, Lowfield Heath, Crawley, West Sussex RH11 0QP.**

ON4CLM Award

This award has been going now four years, and is sent to amateurs who have worked the ON4CLM special event station in the week of November 1 each year and have sent their contribution to the welfare fund.

This year the station will be on air again to commemorate the liberation of Knokke and to pay tribute to ON4UM (silent key on February 4) who has run the station in past years.

The story behind the award is, in the autumn of 1944, Canadian troops fought in the Belgian coast area. On November 1 the town of Knokke was finally liberated and each year the Canadians are remembered with ceremonies, festivities and a Canadian Liberation March.

The special event station

ON4CLM will once again be on the air from October 27 until November 2. The award is a five colour printed certificate and is available for all contacts with ON4CLM.

The cost of the award is £2, \$5 or 10 IRCs or equivalent, with all proceeds going towards a welfare fund.

The frequencies to be used are:

3-685, 7-045, 14-145, 21-245, 28-545 and 144-250MHz s.s.b. and 3-515, 7-012, 14-020, 21-020, 28-020 and 144-020MHz c.w. They will also be on 145-475 MHz f.m.

For QSLs, s.w.l.s or additional information contact: **Radio ON4CLM, PO Box 140, 8300 Knokke, Belgium.**

International Conference

Plenty of warning for this event! The conference will be held between 7 and 10 April 1987, at the University of Surrey, Guildford. It is being organised by The Institute of Electronic and Radio Engineers. The

subject for the conference will be "Frequency Control and Synthesis".

If you would like a copy of the programme/registration form when it becomes available you should write to: **Conference Secretariat, IERE, 99 Gower Street, London WC1E 6AZ. Tel: 01-388 3071.**

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", Enefc House, The Quay, Poole, Dorset BH15 1PP, 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, KITS AND PCB'S

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 our new **PCB SERVICE.** For details see p. 51.

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 £1.25 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, "Practical Wireless", Enefc House, The Quay, Poole, Dorset BH15 1PP.** All prices include VAT where appropriate.

Please make cheques, postal orders, etc., payable to Practical Wireless.

SUBSCRIPTIONS

Subscriptions are available at £13 per annum to UK addresses and £15 overseas, from "Practical Wireless" **Subscription Department, Competition House, Farndon Road, Market Harborough, Leicestershire LE16 9NR. Tel: (0858) 34567.** Airmail rates for overseas subscriptions can be quoted on request.

Special Event Stations

GB4LAD: Dunstable Portable ARG and Dunstable Down RC are joining to operate this station on June 7. It is being staged for the Luton and Dunstable Hospital Fete, and they are being sponsored for the number of contacts made.

All money is going towards a much needed extension unit for the hospital's Surgical Laser.

The station will be operational on four bands, the frequencies being 144-375, 14-3, 3-740 and 1-93MHz \pm QRM.

More details can be obtained from **Tony G0COQ, Tel: 0582 508259.**

GB4WPS: This station will be active on June 21 from 0330 until 1730 at the Westbury Park School Fair. Operation is planned on all bands on a rotational basis, as well as 144MHz and 430MHz RTTY and SSTV.

Westbury Park School is in Bayswater Road,

Westbury Park, North Bristol, with talk-in on S22.

All contacts will receive a QSL via the bureau, and the group is hoping for plenty of contacts as the school children are looking forward to the event.

GB0RAF: The station will be operational from the Royal Air Force Hendon Museum on July 12 only, using 144, 14 and 3-5MHz bands, f.m., s.s.b. and c.w., from 0900 to 1600GMT. Hopefully they will be able to operate on the following frequencies, depending on propagation and QRM, 3-74MHz s.s.b., 14-015MHz c.w. and 144-17MHz s.s.b.

RAFARS members are needed to man the station, if anyone is interested they should contact **Terry G4PSH, QTHR. Tel: 01-446 0266.**

All contacts will be sent QSL cards via the bureau or direct.

Morse Testing

Scarborough ARS are holding their annual rally on July 27 at The Spa, Scarborough, opening at 11.00am, with talk-in available on S22 and SU8, and on RBO via GB3NY. Scarborough is a large seaside resort with many attractions so why not take the family along for a day out. The organisers tell me they have arranged for fine weather on the day!

An RSGB Morse Testing Station will be in operation at the rally, and early application for bookings is advised. For further details, contact Ian Hunter G4UQP on 0723 376847.

Help!

"I am restoring an Icom IC-202E 144MHz s.s.b. transceiver, and would be pleased to hear from any reader or dealer who has the correct NiCads and internal charger for this unit available."

Anyone able to help should write to: **Bob Sayers, 120 Birmingham Road, Redditch, Worcs B97 6EP.**

Lowe in Norwich

On Sunday, June 22, from 2.00 until 4.30pm, Lowe Electronics will be displaying the Trio range of equipment in the Harford Suite in the Post House, Ipswich Road, Norwich. Coffee and biscuits will be free for the first 50 people to arrive. Talk-in will be provided from 1.30pm on S22 by the Norwich Amateur Radio Club, using the callsign G8LOW/P.

Magazines Merge

Two well-known US radio magazines, *Monitoring Times* and *International Radio* are to combine into a single operation beginning with the July, 1986 issue.

The expanded 60-page tabloid will be the largest periodical in the monitoring industry. Annual subscription rates for addresses outside the United States will be \$27 for surface mail despatch or \$49 for airmail. For further details contact **MT** headquarters at 140 Dog Branch Road, PO Box 98, Brasstown, NC 28902.



St Dunstan's ARS

Back in March I was fortunate enough to be invited to the 10th Anniversary Luncheon of the St Dunstan's ARS.

It is a radio society for Forces men and women blinded either in war service or active service. The society have the objective, "To create and encourage interest in, and further the knowledge of, amateur radio amongst St Dunstaners, their contacts and friends."

The photograph shows Frances Woolley G3LWY, representing the RAIBC, receiving a cheque from Ted John G3SEJ, the newly elected chairman.

The society were very fortunate as many guests came to join their celebrations. The Guest of Honour was Sir John Anderson KBE, Executive Director, Armed Forces Communications and Electronics Association Europe, and Lady Anderson.

Chalk Pits Museum

"Now that wireless communication is accepted as a matter of course, and as many as 50 000 words are transmitted to and from a single ship during a transatlantic voyage—in many cases over the whole width of the ocean—it seems strange to think that it is only 30 years since the first wireless signal was received across the Atlantic."

So wrote the author of an illustrated booklet, issued by the Marconi International Marine Communication Company Limited to commemorate the 30th anniversary of the reception at St John's, Newfoundland, on 12 December 1901, by Guglielmo Marconi and his colleagues G. S. Kemp and P. W. Paget, of the letter "S"—three dots in Morse

code—transmitted from Poldhu in Cornwall.

Now, almost 85 years later, a surviving booklet signed by Kemp, and a signed photograph of Marconi dated 1898, believed to have been a gift from Marconi to Kemp, have been donated to the radio archives of the Chalk Pits Museum, Amberley, Sussex. An enlarged copy of the photograph, bearing the words "Yours very truly, G. Marconi" now adorns the entrance area of the museum's radio exhibition building.

Visitors wishing to see these and other early wireless documents should ask to see Ron or Joan Ham, who are usually to be found at the museum on Sundays and bank holidays during the season.



Young Electronic Designer Awards Scheme

The photograph shows the assortment of electronic components supplied by

Circuit and Texas Instruments to each educational establishment whose students' projects have been accepted as entries in the 1986 Young Electronic Designer Awards Scheme.

Mobile Rally

The 17th Elvaston Castle Mobile Radio Rally is being held on June 8. The Country Park is situated 8km south-east of Derby on the B5010, and is well signposted.

There should be plenty to do for all the family, including a free-fall parachute jump by members of the Skydivers Parachute Display Team—weather permitting!

There will be over 90 trade stands for the radio and electronics enthusiast and admission is free. For more details contact: **John Robson G4PZY. Tel: 0332 767994.**

DXpedition

A group of around 25 members of the Stroud Amateur Radio Society, led by G4MOH, G4SJK and G4VZR, will be taking to the waters of the Bristol Channel on Saturday, June 7. They will sail from Weston-super-Mare to the 50 acre uninhabited island of Steep Holme, scene of early experiments by Marconi, where from around noon on that day until 4.00pm on Sunday, June 8, they will be operating G4SRS/P on h.f. s.s.b., mainly in the 1-8, 3-5 and 7MHz bands, and on 144MHz s.s.b. and f.m. A special QSL card will be available for stations contacting this rare location.

Southern 10m FM Group

Enthusiasts in the south have formed this group to keep the 28MHz (10m) band active during sunspot minimum.

A regular newsletter aims to give information covering propagation, technical tips, availability of equipment, members ads and news.

One year's subs costs £1 to cover postage costs and membership is open to anyone interested in 10m. This includes listeners and Class B operators, who can work cross band to 10m.

Subs and written contributions are welcomed by: **Jim Hicks G4XRU, 33 Hayling Rise, Worthing BN13 3AL.**

A New Company

Qubik Consultants are a new company, who aim to set up a definitive database of Test and Measurement equipment. Once established they will provide a free consultancy service for people who are looking to purchase new equipment.

A list of services they can provide can be obtained by contacting **Qubik Consultants, 7 The Bourne, Albury, Near Ware, Herts SG11 2JR.**

Frequency Changes

BBC Radio Northampton has changed the frequency used at the Moulton Park and Geddington v.h.f. f.m. stereo radio transmitting stations.

The Moulton Park transmitter moves to 104.2MHz and the Geddington transmitter moves to 103.6MHz. The Moulton Park transmitter covers an area from Desborough in the north to Brackley in the south, and from Daventry in the west to Rushden in the east, while the Geddington transmitter provides additional coverage for Corby and Kettering, in the far north of the county.

At these transmitters, a specially designed antenna system is used to provide a

Availability

Recent increase in demand for *Practical Wireless* has caught some newsagents unawares, with the result that we have been selling out in several parts of the UK only a few days after going on sale each month. We are taking steps to overcome the problem, but to make sure you don't miss your copy of *PW*, why not place a firm order with your newsagent, or take out a subscription—at £13 for one year to UK addresses, you can actually save money!

signal suitable for car radios and portable receivers, as well as for fixed receiving installations in the home.

Radio Northampton's medium-wave broadcasts from King's Heath transmitters on 1107kHz (271m) will stay the same.

G4V Series Award

The requirements for this award are:

To work or hear 30 G4V series callsigns (this reduces to 15 for people outside the UK). A maximum of half the total claimed must be made within the G4V-Net. To claim the award you send in your log extracts, countersigned by two others, complete with 75p (£1 outside UK) to the G4V Series Award Manager, **Mr N. J. Ludlow G4VJM, 5 Laburnum Avenue, Laffak, St. Helens, Merseyside WA11 9DZ.**

Instrumentation '87

Two exhibitions are due to be staged in 1987, one in Harrogate and the other in Bristol.

25/26 February 1987: Harrogate Exhibition Centre.

25/26 March 1987: Bristol Crest Hotel.

The first instrumentation show held in Bristol proved a success attracting visitors from Wales, the South West and the South East.

Therefore, holding another show in Harrogate in 1987 it is hoped to attract visitors from the Midlands, the North and Scotland.

New TV Relays

Cumbria: A new TV relay station should shortly bring much better reception to people in Crosby Ravensworth, Cumbria.

The relay, built by the BBC and IBA, is at Crosby Hall—just north-west of the village. Viewers will need group C/D antennas, mounted vertically and set-top antennas are not recommended.

The new channels are: Channel 53—Channel 4 Channel 57—BBC1 NE Channel 60—Border TV Channel 63—BBC2 North Yorkshire: Another

new TV relay is due on air to bring better reception to people in parts of Rosedale Abbey, 22km south-west of Whitby.

This relay has been built at Heygate Farm and should be on the air by the time you read this.

The new channels are: Channel 40—BBC1 Channel 43—Tyne Tees TV Channel 46—BBC2 Channel 50—Channel 4

Viewers will need group B antennas, mounted outside and with the rods vertical, again set-top antennas are not recommended.

Catalogues and Brochures

I have received some interesting catalogues and leaflets recently which should be of interest to readers.

The Vintage Wireless Company Ltd. have just published their first new catalogue for four years.

Containing 166 pages, liberally laced with half-tones and vintage drawings, this is a mine of information on all aspects of vintage wireless—components, valves, product information, service data and manuals as well as books. They can even supply your needs for steel gramophone needles—still in production apparently at 99p for a pack of 100 in three grades!

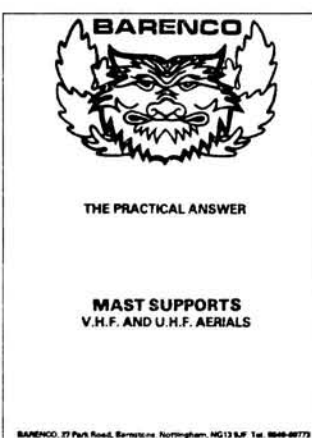
You can get a copy direct from **The Vintage Wireless Company Ltd., Tudor House, Cossham Street, Mangotsfield, Bristol BS17 3EN. Tel: (0272) 565472** for the princely sum of £2 (post paid) if you live in the UK or £3 (via surface mail) if you live overseas.



ANTIQUE WIRELESS CATALOGUE

Alpha Omega Instruments Ltd. are a new company specialising in lower cost instrumentation via a free direct mail order catalogue. The first issue consists of 16 pages covering 80 items which should appeal to users in industry, education research and development as well as the hobbyist and d.i.y. enthusiast.

All prices are shown and orders can be placed by post or telephone using credit cards if you wish. For your free copy write to **Alpha Omega Instruments Ltd.,**

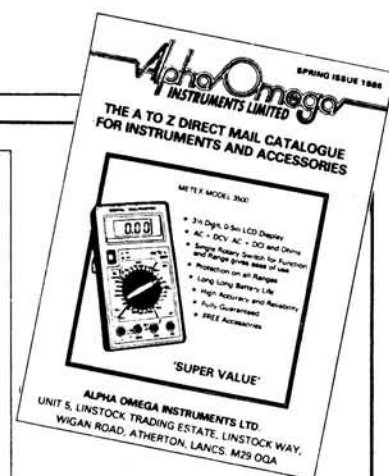


BARENCO, 27 Park Road, Barnstone, Nottingham, NG13 9JF. Tel: 06048-80773

Unit 5, Linstock Trading Estate, Linstock Way, Wigan Road, Atherton, Lancs M29 0QA. Tel: (0942) 873558.

Looking for some form of support for your v.h.f. and u.h.f. antennas? Unless you insist on using a sky-hook then Barenco have the answers in their new catalogue. Get in touch with them for your copy.

Barenco, 27 Park Road, Barnstone, Nottingham NG13 9JF. Tel: (0949) 60773.



Eraser International Ltd. have a new eight-page brochure which describes their complete range of Model DCF wire strippers and twisters.

The brochure includes technical and application data for four different models which are used to strip magnet and enamel coated wires—round or rectangular in section. Application data is also given on two tools used to make twisted pairs or for twisting stranded wires.

The brochure is available free on request from **Eraser International Ltd., Unit M, Portway Industrial Estate, Andover, Hants. SP10 3LU. Tel: (0264) 51347.**

Hamtel RTTY

The GW4WRD RTTY program is written for the BBC-B computer, which seems to be one of the most popular computers with radio amateurs.

Some of the features included in the program are well worth mentioning. It is fully menu driven so you can select various parts of the program quickly and easily. Mode 7 teletext graphics are

used and the program is displayed in full colour, using a 40 column display so that you don't need a high resolution monitor—an ordinary colour television can be used. The type-ahead buffer holds over a thousand characters—ideal for those who can't type very quickly and like to start preparing their answers in advance.

The program has four standard baud rates pre-programmed, although you can directly enter anything between 16 to 999 baud

using the keyboard. You can use a printer during both RX and TX so hard copy can be kept. Pre-edited text can also be sent from any one of nine pages, and these pages can be stored on tape or disc and re-loaded later.

A tuning facility is provided on-screen permitting simple designs of t.u. to be used. Also on-screen is a 24 hour clock with hourly time signals and current time may be sent during a QSO.

The GW4WRD RTTY

program costs £12 on tape and £14.50 on disc (40 or 80 track) inclusive of postage and VAT from **HAMTELEcommunications, "Rock Hill", Llanarthne, Carmarthen, Dyfed SA32 8LJ.**

Your callsign must be given when ordering otherwise you will get a program with a dummy callsign.

Other programs claimed to be "coming soon" are a Mark II RTTY, AMTOR, and a Morse Tutor.

See the NEW TRIO TR751E on display at a LOWE shop.

In Glasgow, the shop manager is Sim, GM3SAN, the address, 4/5 Queen Margaret Road, off Queen Margaret Drive, Glasgow, telephone 041-945 2626.

In the North East, the shop manager is Don, G3GEA, the address, 56 North Road, Darlington, telephone 0325 486121.

In Cambridge, the shop manager is Tony, G4NBS, the address, 162 High Street, Chesterton, Cambridge, telephone 0223 311230.

In Cardiff, the shop manager is Carl, GW0CAB, the address, c/o South Wales Carpets, Clifton Street, Cardiff, telephone 0222 464154.

In London, the shop manager is Andy, G4DHQ, the address, 223/225 Field End Road, Eastcote, Middlesex, telephone 01-429 3256.

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

LOWE ELECTRONICS LIMITED

Chesterfield Road, Matlock, Derbyshire DE4 5LE
Telephone 0629 2817, 2430, 4057, 4995 Telex 377482 LOWLEC G

Toroidal Transformer Kits

Toroidal transformers have many advantages over conventional laminated core types, including smaller physical size, lower weight and the virtual elimination of stray magnetic fields.

Now Electronic & Computer Workshop have introduced a series of toroidal transformer kits to enable enthusiasts to make transformers to suit their own particular needs.

The kits come in five

power ratings—50, 120, 225, 500 and 1000VA and all have pre-wound 240V a.c. primary windings.

The user can easily wind the secondary to give any fixed voltage and full instructions are provided with each kit.

The 50VA kit (KT050) costs £12.46 with the 1000VA version (KT1000) costing £48.76 including VAT and postage, from **Electronic & Computer Workshop Ltd., 171 Broomfield Road, Chelmsford, Essex CM1 1RY. Tel: (0245) 262149.**

Magnetic Clip

I was intrigued by a small, colourful plastics clip sent to me by Pelltech Ltd.

The Combicoclip is a magnetised plastics clip which, it is claimed, can often be used instead of paper clips, drawing pins, adhesive tape, etc.

The clips can be used to hang papers or cloth, up to a total thickness of almost 0.5mm and a weight of 200gm, by sticking the clip to any dry surface using the self-adhesive backing. Just what you can hang up is limited only by your imagination.

Combicoclips come in six standard colours—white, red, blue, green, yellow and brown, and can be obtained from graphic arts dealers or commercial stationers.

If you are interested in using these clips for



promotional purposes then **Pelltech Ltd., FREEPOST, Witney, Oxon OX8 6BR. Tel: (0993) 76451** will be pleased to give you a quote.

Desk PSU for Icom Hand-helds

The MRZ desk top power supply has been designed for use in conjunction with the Icom range of hand-held portable rigs.

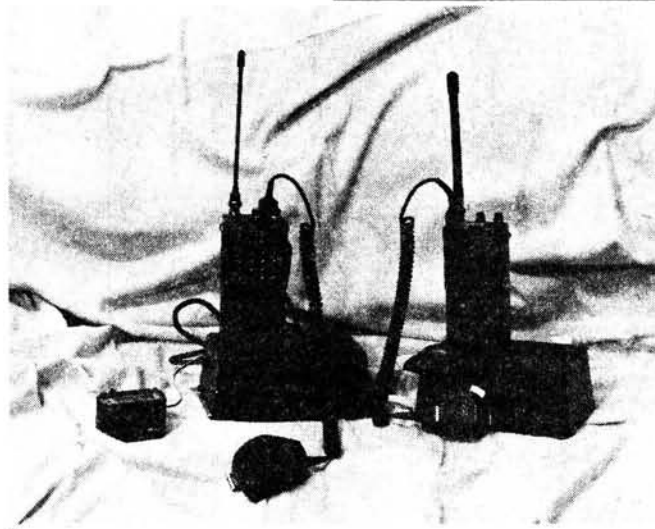
In one quick operation any of Icom's portable battery packs can be easily removed allowing the body of the radio to slide firmly onto the mounting on the MRZ unit.

With an external microphone plugged into the miniature jack socket the radio is ready for base station operation.

The unit incorporates over-voltage and over-current protection and the output voltage is regulated. Two models are available—the BPU which is a desk d.c. supply for base station operating and the BPU/BC which also has a built-in charging system to

recharge the BP.3 battery packs.

Further details from **MRZ Communications Ltd., Newton House, 248 Uttoxeter Road, Longton, Stoke-on-Trent ST3 5QL. Tel: (0782) 619658.**



144MHz Mobile Rig

The Alinco ALR-206E 144MHz mobile transceiver is a compact 25/5 watt unit recently introduced into the UK by **ICS Electronics Ltd., PO Box 2, Arundel, W. Sussex BN18 0NX. Tel: (024 365) 590.**

A back-lit liquid crystal display gives frequency and S-meter read-outs and all programmable features are accessed by the key-pad on the rear of the microphone. These are band scan; 10 memory channels and memory scan. Frequency selection is by means of a large front panel knob or from the UP/DOWN buttons on the microphone.

The price of the rig, complete with mobile mounting bracket, is £295 incl. VAT with postage and insurance an extra £3.

Also from ICS Electronics is a complete 30 watt 144MHz hand-held system selling at £249.95 incl. VAT.

The system is based on the Alinco ALM-203E hand-held with a separate 30 watt f.m. amplifier and 10dB gain GaAs f.e.t. pre-amp. The amplifier can be left permanently fitted in the car while the hand-held can be removed and used on its own when required.

Antenna Couplers

News has just come through that Amcomm/ARE have been appointed sole world-wide distributors for the British made range of Cap.Co Electronics antenna couplers.

Alec Allan G5VS tells me that the company is taking every opportunity to promote some of the finest and most promising new products, and he reckons that the SPC300 antenna coupler fits the bill.

The current model is built into a steel cabinet 305 x 76 x 324mm and the stator and rotor blades of the capacitors are made of high grade NS4 alloy with all

other parts from solid brass. Control is by two slow-motion drives for the two capacitors, with calibrated

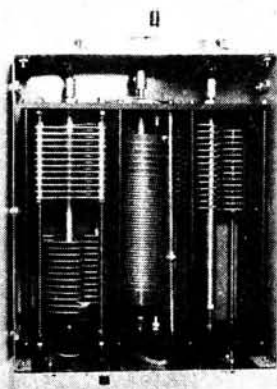
scales over 100 degrees, while for the inductor there is a digital turns counter.

The inductor is of the "roller coaster" type with a maximum inductance of 28µH and a high Q.

The unit can be connected in seven different configurations by altering a series of links.

Four models are available catering for 1kW and 3kW r.f. power either in a cabinet or "naked" and they all cover 1.8 to 29.7MHz.

Further details from **Amcomm/ARE, 373 Uxbridge Road, Acton, London W3 9RN. Tel: 01-992 5765.**



Kit Construction— It's Easy

Frightened by the idea of building something for yourself? Elaine Richards G4LFM seeks to dispel your fears.

Building kits is easy. Well it can be easy. A great deal depends on the quality of the kit you intend to build. There is nothing worse than opening up the package and finding that some of the parts are missing, or worse, the instructions are not there.

Obviously the well known kit manufacturers have quality control departments and this type of mistake is unlikely to happen. So if you are building your first kit my advice would be to buy a simple kit from a well known manufacturer. If you have never built anything before and this is your first home construction project you can always ask advice from the companies as to which kits they feel are suitable for you to attempt. If, when the kit arrives you don't feel capable of completing the project you can usually return the kit and for an extra fee they will send you a ready assembled p.c.b.

Direct Conversion Receiver

The DcRx Direct Conversion Receiver from C.M. Howes Communications was the kit chosen as a suitable beginners project. So a few details about the receiver would not go amiss. It is available in four versions, 14MHz (20m), 7MHz (40m), 3.5MHz (80m) and 1.8MHz (160m) and if you are well versed in project building you could always modify it for just about any other band.

The receiver can be run from a 12V d.c. supply and will drive a loudspeaker or headphones. Obviously you will need an external antenna, but instructions for a suitable antenna are provided with the kit.

The instructions with this kit assume that you have never built an electronic kit and so take up five pages. This includes a complete parts list and

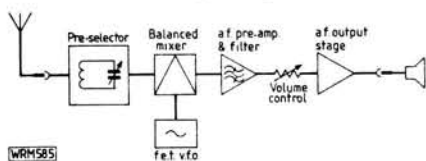


Fig. 1: The DcRx block diagram

circuit diagram—very useful if you make a mistake.

There are certain steps that should be followed in kit building, if you want to increase the chances of success. To give a pictorial guide the kit was built during a photography session, in about a tenth of the time I would normally take. So there was some anxiety when I connected the receiver up—but it worked first time. I was pleasantly surprised with how well the assembled kit worked. Even if you are used to building projects it's really nice when they work first time.

Easy as ABC?

The first step is always to collect all the tools you will need together; a small soldering iron (maximum 30 watts), side cutters, long-nosed pliers and a trimming tool. It doesn't do any harm to have one or two extras available, like de-soldering braid (well, mistakes can happen) and tweezers.

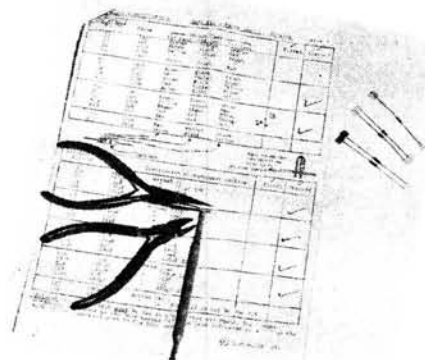
Next, read the instructions right through before starting. It doesn't matter how many projects and kits you have built this step should never be missed out. It can save so much time, trouble and hair tearing later on—I can vouch for this from experience. Next check the kit to see if it is complete. C.M. Howes provide a check list so you can mark each component before and after you have fitted it into the kit. In the instructions each resistor and capacitor is identified by its colour code or markings, so there should be no doubt about which component is which.



Construction

If you have not used a soldering iron before then read up on the best techniques, and practice on a piece of Veroboard with some junk components. It's always a shame to see a project ruined with bad soldering, just through lack of practice.

The resistors should be the first components soldered onto the board, making careful checks that the right resistor goes in the right place. On the receiver kit some resistors are mounted on end as there is not enough room on the board to mount them horizontally. It's really easy to tell which ones are, as the p.c.b. is marked with short lines between the holes for end-on resistors and long lines for horizontal ones. After each resistor is soldered in place as close to the p.c.b. as possible,



Check you have all the components in the kit

cut off the excess leads close to the solder joint (Photo 1).

Next it's the turn of the capacitors. The most important point here is take care with the electrolytics. Check before you solder each one that you have the polarity correct (Photo 2).

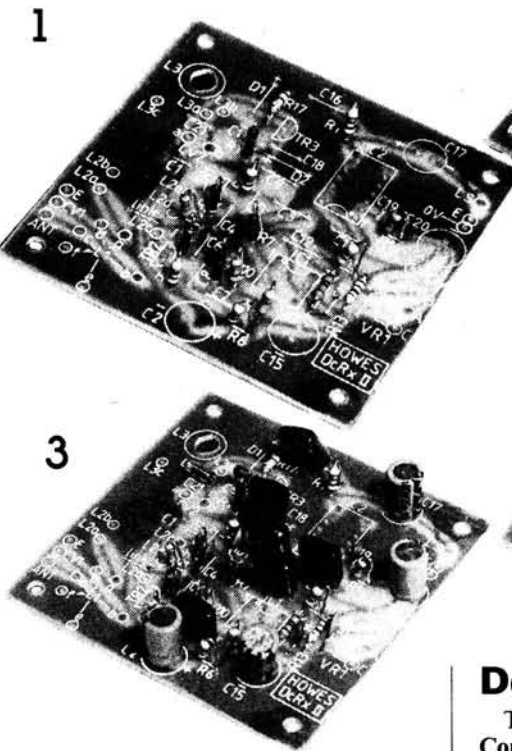
The semiconductors (diodes, integrated circuits and transistors) are fitted next. Again, care should be taken with polarity of these components. Any mistake now could take a long time to find later. As you can see it's just a methodical process of soldering components onto the p.c.b. in a logical order, small components first followed by the larger ones. It's also a process that I follow when building other electronic projects (Photo 3).

Any links that are on the board should be fitted next, and you don't usually need to buy wire for these as you can use the discarded leg of a component. With this project the last components to be fitted onto the board were the coils, and great care was taken making sure the right wires went into the right holes! (Photo 4).

Once all the components are fitted onto the board, it's time to connect the external components to the project. The instructions with the kit show very clearly how this is done.

The last thing to do before switching on and testing is a final good look over all the solder joints. Are they all good and shiny? Now check the polarity of the components once more.

Then, if this is your first project, it's



hold your breath, cross fingers and switch on. Any setting up details will be included with the kit, and if they are anything like the ones provided here you'll have no difficulties setting things up correctly.

Since finishing the kit, I have boxed it—just for neatness—and so it doesn't look too untidy in the shack.

DcRx Kit

This kit comes from C.M. Howes Communications, 139 Highview, Meopham, Kent DA13 0UT and is priced at £14.80 (inclusive of VAT), plus £3.00 for the two air-spaced capacitors and 80p post and packing.

If you would like details of the kits that C.M. Howes produce then an s.a.e. will bring a two page catalogue. They also can provide information on any one of their kits, again for an s.a.e.

C. M. HOWES COMMUNICATIONS

EASY TO BUILD KITS BY MAIL ORDER



139 HIGHVIEW,
VIGO, MEOPHAM,
KENT DA13 0UT, ENGLAND.
TEL: FAIRSEAT (0732) 823129

NEW!

HOWES CTU30 ANTENNA MATCHING UNIT

We are pleased to announce the new CTU30 ATU. This design builds on the strengths of its very popular predecessor, the CTU25 — but with a few new features added! Most importantly the CTU30 boasts a broadband balun transformer for feeding balanced antennas — this in addition to being able to feed normal longwire and other unbalanced types. We have also rearranged the mechanical layout to offer a much lower profile, in keeping with modern design trends. Two airspaced Jackson Brothers tuning capacitors are used in conjunction with a switched inductance (12 ranges) to provide accurate impedance matching from 1.8 to 30MHz. All parts are PCB mounted.

A correctly matched antenna will give you stronger signals on both receive and transmit, compared with an unmatched antenna. There are also considerable benefits provided by the CTU30 in terms of helping reject unwanted, spurious signals, particularly with many of today's popular general coverage receivers. If you have a shortwave receiver, or modest power transmitter (up to 30W RF), then the neat and very attractive CTU30 deserves a place in your radio shack!

CTU30 Kit: £24.90

Assembled PCB Module: £29.90

DcRx DIRECT CONVERSION COMMUNICATIONS RECEIVER.

This simple, but very effective, single band receiver is available for 20, 30, 40, 80 & 160M. Up to 1W audio output, stable FET, VFO, and amazingly good performance for a simple set. A case and a couple of tuning capacitors are the only major parts to add to finish your receiver. Suitable tuning capacitors for all but the 160M version are £1.50 each.

DcRx Kit: £14.80

Assembled PCB Module: £19.90

MTX20 10W 20M CW TRANSMITTER

The MTX20 can be considered to be the "big brother" to our very popular CTX40 and CTX80 QRP kits. Like the CTX transmitters, the output power is adjustable, all the heatsinking is onboard, and one crystal is included. The maximum output power of the MTX20 is rather greater at about 10W, but you can still turn it down to about 2W to take part in the G-QRP clubs activities

- * RF output adjustable from around 2 to 10W at 13.8V DC.
- * Output transistor will survive the unplugged antenna!
- * One crystal provided — room for two more on the PCB.
- * Provision to VFO the crystal by adding a tuning capacitor.
- * All heatsinking mounted onboard.
- * Full key shaping and output filtering.
- * Provision for adding an external VFO.
- * Easy to build and align.

You can use the MTX20 with your general coverage receiver, or you can use it in conjunction with our DcRx20 for a simple, but very effective station. Great for holiday and portable use!

MTX20 Kit: £19.95

Assembled PCB Module: £26.95

SOME OTHER HOWES PRODUCTS

HC220 2M in, 20M out transverter
HC280 2M in, 80M out transverter
CTX40 3W 40M CW transmitter
CTX80 5W 80M CW transmitter
CVF40 VFO for use with CTX/DcRx40
CVF80 VFO for use with CTX/DcRx80
TRF3 Shortwave Broadcast Receiver
ST2 Side-tone/Practice oscillator
AP3 Automatic Speech Processor
CM2 Quality Mic with "VOGAD"
XM1 Crystal Calibrator with 8 o/p
PA2/15 10dB 2M 15W Linear Amplifier
PA2/30 8dB 2M 30W Linear Amplifier
CO1 TX/RX switching for linears
EM1 Electret Microphone Capsule
Lightweight Headphones, 3.5mm Mono

KIT ASSEMBLED

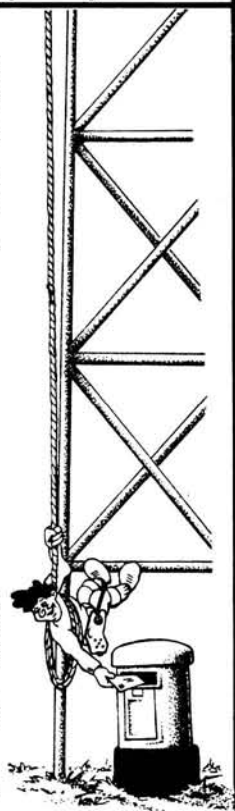
| | |
|--------|--------|
| £48.90 | £79.90 |
| £48.90 | £79.90 |
| £12.95 | £18.95 |
| £12.95 | £18.95 |
| £9.30 | £14.90 |
| £9.30 | £14.90 |
| £13.90 | £18.90 |
| £7.30 | £10.80 |
| £15.90 | £21.40 |
| £10.25 | £13.75 |
| £16.80 | £21.30 |
| £18.90 | £23.90 |
| £22.90 | £27.90 |
| £9.80 | £13.80 |
| — | £1.90 |
| — | £3.30 |

All HOWES kits have a good quality glass-fibre printed circuit board. The holes are drilled, the tracks are tinned, and the parts locations are screen printed on the board for easy, accurate assembly. All board mounted components are provided, as are good clear instructions, circuit etc. You don't have to be an "old hand" to enjoy the pleasures of using "home-brew" gear with a kit from C. M. HOWES COMMUNICATIONS.

If you would like further information on any item, simply drop us a line, enclosing an SAE. We have an information sheet for each kit, plus a general catalogue of our goodies.

Please add 80p P&P to your total order value.

Export — use prices as listed, add £2.00 for airmail delivery outside Europe. UK delivery is normally within 7 days.



Digital Voltmeter Kit

In Part 1 of this article Brian Dance shows how a very sensitive high performance digital meter can be made using a kit of parts from Ferranti Electronics Ltd.

Inexperienced constructors are often deterred from building their own digital voltmeters not only because of the relatively complex principles involved in the operation of the circuitry, but also because of the vitally important component layout and grounding problems encountered in the low-level circuitry.

The ZN451 evaluation kit, marketed by Ferranti Electronics Ltd, contains all of the components required to construct a basic digital voltmeter—including the complex ZN451E Ferranti d.v.m. i.c., the liquid crystal display (l.c.d.) and p.c.b. This basic circuit provides a single range of $\pm 1999\mu\text{V}$ using a $3\frac{1}{2}$ digit display. In a $3\frac{1}{2}$ digit display, the last three positions can show any digit, but the first position can be only a blank or the digit "1" (the so-called half-digit), thus effectively doubling the range. Each range of an instrument using such a display has a full scale reading of 1999 (or nominally 2000) with a negative sign available, and also a choice of three positions for a decimal point—if used.

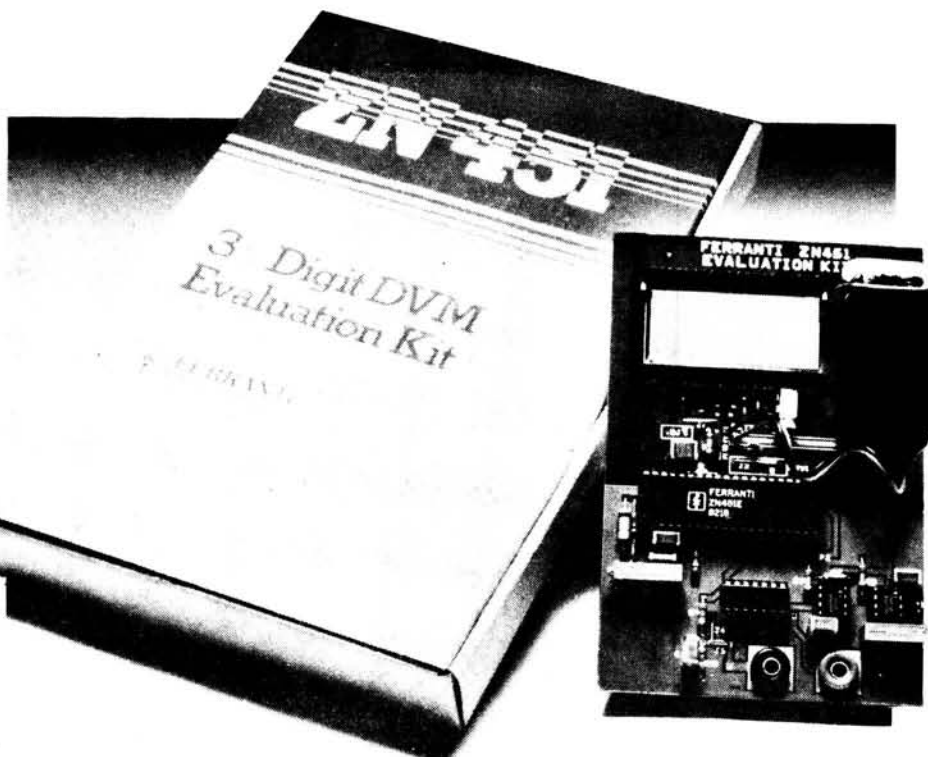
The number of possible variations in the circuitry of the instrument is almost unlimited. This project has therefore been made an open-ended one; after making the basic d.v.m. circuit, the constructor can add whatever ranges and other facilities he wishes and can easily modify them or add other ranges.

Although the kit has been prepared mainly to enable manufacturers to quickly evaluate the capabilities of the ZN451, it is equally suitable for the home constructor.

Basic Range

The basic $\pm 1999\mu\text{V}$ circuit provided by the completed kit may be compared with the single range of a simple moving coil analogue meter. Just as one can convert the simple moving coil meter into a multi-range analogue meter, one can add additional circuitry to the digital meter (not normally on the p.c.b. provided in the kit) so as to provide other voltage, current and resistance ranges, circuits for measuring alternating input signals, etc. Indeed, one can use the kit as a basis for a digital temperature meter, a weighing machine, a pressure meter or anything within the limits of the constructor's ingenuity and the $3\frac{1}{2}$ digit display.

Naturally, the kit does not contain the components required for any range



other than the basic $\pm 1999\mu\text{V}$ display, neither does it contain a box for the finished instrument. Additional facilities which can be provided with extra components include a decimal point in a fixed or variable position, a display hold facility (using an extra switch on the kit p.c.b.), low battery voltage indication, a provision for adjusting the internal oscillator frequency and circuitry for the automatic selection of the instrument range according to the magnitude of the applied input signal to be measured.

Digital or Analogue?

A digital voltmeter measures the input voltage and takes a short time (known as the conversion time) to make the measurement before the voltage can be displayed. The instrument repeatedly measures the input signal. Thus any change in the input voltage may not be displayed until perhaps a second after the change has occurred. Some early types of digital voltmeter could not display a measured voltage whilst making the succeeding measurement, so such instruments showed no reading for a substantial part of the measurement cycle. This does not apply to the ZN451 circuit which displays the last measured value until the display is updated as soon as the next measurement has been made.

The constructor may well ask: "Do I need a digital meter anyway?" If one is adjusting a trimmer for a peak signal display, the movement of the needle of an analogue meter normally provides a far more satisfactory indication than the periodic changes of the display of a digital meter. In other words, if one wishes to have an immediate indication of the trend of changes of an input so as to obtain the "feel" for the direction and rate of variations in the monitored signal value, an analogue meter is normally ideal. Similarly analogue meters are normally best for measuring fluctuating or oscillating signals. They also have the minor advantage that they usually do not require any power source other than the signal being measured.

On the other hand, the accuracy provided by an analogue meter is normally very limited and reading an analogue meter for optimum accuracy requires some care. If one considers a high quality analogue meter with a large scale and an anti-parallax mirror (such as a Model 8 Avometer), the optimum accuracy is seldom better than ± 1 per cent of the full scale deflection of the range in use. The accuracy of a small, cheap analogue meter is more likely to be about ± 5 per cent—or worse.

The figures may be compared with the accuracy of digital meters (which

Practical Wireless, July 1986

depends on the number of displayed digits and other factors). In the case of the digital meter under discussion with a range of $\pm 1999\mu\text{V}$, the resolution provided by the least significant digit represents 1 part in 2000 or 0.05 per cent of the full scale value. Furthermore, a meter with a digital display can be unambiguously and easily read from almost any angle and often from a considerable distance even in poor lighting.

Digital meters can have extremely low input current requirements, but so can analogue meters if appropriate electronic circuitry is employed.

Thus it is clear that there is a definite place for both analogue and digital meters. They are different tools and the most appropriate meter should be selected for various applications. An analogue meter is the most essential instrument for the experimenter; however, as he becomes accustomed to the use of such a meter and appreciates its limitations, he will begin to understand that the inclusion of a digital meter in his equipment will add a new dimension to his work for the less frequent cases where such a meter is required.

The ZN451E

Apart from the availability of the ZN451E in a kit of parts which enables the basic circuit to be constructed very easily, are there any other reasons why one should choose this particular device? It is certainly desirable to employ a complex purpose-dedicated d.v.m. i.c. rather than to employ large numbers of components or even discrete devices, the use of which would result in a highly complex circuit.

The ZN451E employs the fairly new charge balancing technique which provides some advantages over the more conventional dual-slope integration circuitry, including excellent linearity of the displayed voltage with respect to the input signal and a well-defined conversion time which is independent of the input level. The ZN451E includes a very stable "on-chip" precision band-gap voltage reference circuit and provides direct drive for an l.c.d. It is claimed to be free from the layout-dependent stray capacitance problems sometimes found in "dual-slope" d.v.m. designs.

In some digital voltmeters the zero of the scale tends to drift and may require frequent re-setting by a potentiometer, especially if the temperature changes. This does not apply in the case of the ZN451 circuits, since the input voltage and the zero error are measured alternately and the difference between these two measurements is displayed. Such "auto-zero" circuitry is now common and is very desirable for convenience of operation.

However, the ZN451E is the first d.v.m. i.c. to be marketed which not only provides for auto-zero circuitry, but which also allows for external

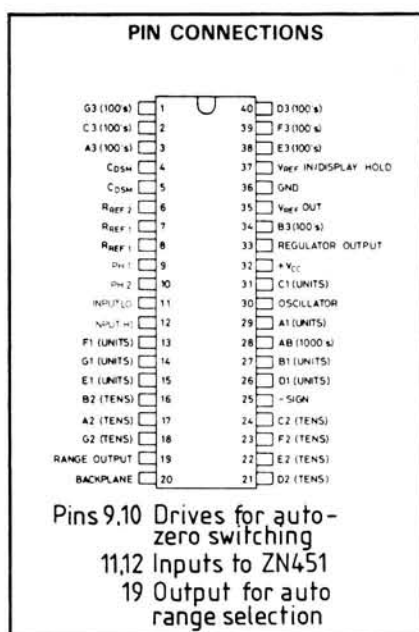


Fig. 1.1: ZN451E pin-outs

circuit components to be included in the auto-zero circuit loop. Thus operational amplifiers can be included in the input circuit and in the auto-zero loop, so that any drift of the voltage offset of these amplifiers is automatically compensated by the operation of the auto-zero circuit. Such amplifiers may be used to raise the sensitivity of the circuit.

In the basic circuit for use with the p.c.b. supplied with the kit, an operational amplifier circuit with a standard gain of fifty is employed to increase the input sensitivity from the $\pm 100\text{mV}$ range provided by the ZN451E alone to $\pm 1.999\text{mV}$ ($1999\mu\text{V}$) with a guarantee that a zero reading will be obtained

when the applied input voltage is zero. When one is dealing with signal inputs down to a level of a microvolt, the auto-zero circuit is extremely useful. This ability to measure small voltages will often make the basic ZN451E circuit ideal for use with strain gauges, thermocouples, pressure transducers, etc. which have low-voltage outputs.

The ZN451E Kit

The kit contains a 40-pin ZN451E dual-in-line (d.i.l.) device, two TL091 Texas Instruments 8-pin d.i.l. operational amplifiers together with a CD4066 c.m.o.s. 14-pin d.i.l. quad-bilateral switch to perform the auto-zero switching function. Sockets are included for all of these i.c.s and also for the two sides of the "lucid" type 108F111 l.c.d. A 24-page detailed data sheet on the ZN451E d.v.m. i.c. and an 8-page booklet on the kit itself are provided. The constructor must obtain a 9V battery.

The dimensions of the p.c.b. in the kit obtained by the author are $137 \times 91\text{mm}$. It is a high quality board with connections on both sides and plated through holes. A screen is incorporated into the input section of the board. The position of every component is clearly marked on this board, so the construction could not be easier.

The pin connections of the ZN451E are shown in Fig. 1.1 and its internal circuit in block form in Fig. 1.2. The basic circuit used to provide the $1999\mu\text{V}$ range is given in Fig. 1.3, but the components shown dotted are optional extras not provided in the kit. The ZTX108 transistor forms part of a voltage regulator circuit used to pro-

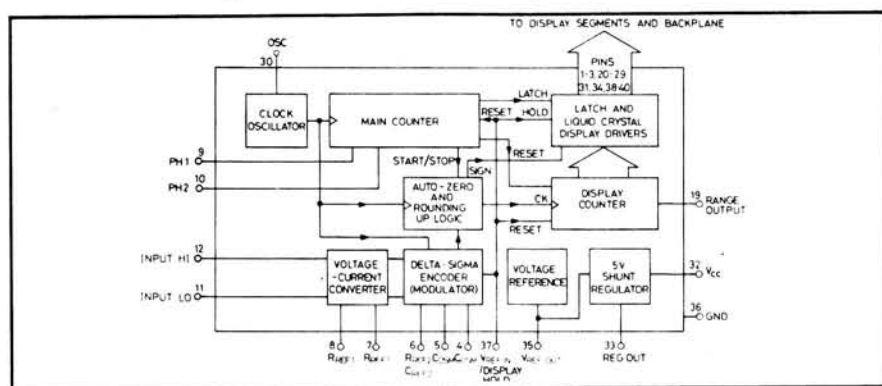


Fig. 1.2: ZN451 system diagram

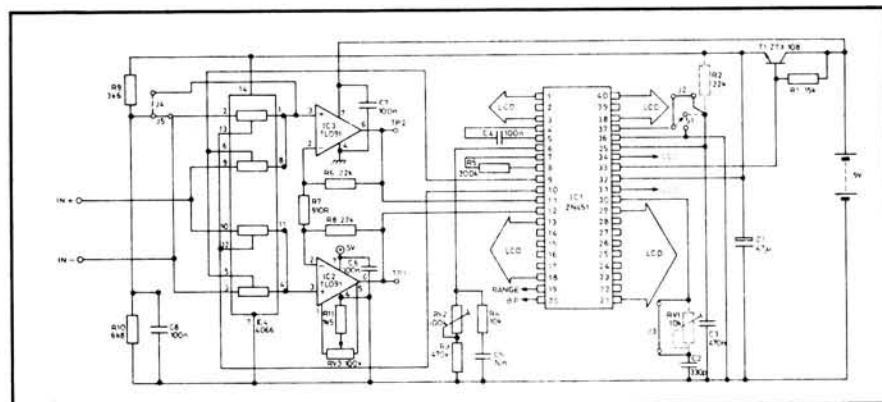


Fig. 1.3: Circuit diagram of the Evaluation Kit

vide the required +5V at pin 32, in conjunction with the internal voltage regulator in the i.c.

Unless it is desired to include a facility for holding a displayed value, the resistor R2 and the switch S1 of Fig. 1.3 can be omitted and the link J2 used to join pins 35 and 37.

Construction

A fine pointed soldering iron, solder, pliers/forceps, sidecutters and perhaps a magnifying glass are all of the tools required for the construction of the kit. As with any kit, it is wise to carefully check the component list before starting the work. Resistors may be fitted first, attention being paid to the additional band marked to provide the third significant figure of the value of 2 per cent or 1 per cent components supplied in the kit. The negative side of the 47 μ F capacitor is marked by a dark violet line; it is convenient to adjust the wiring of this capacitor so that the component can be folded over onto its side in front of the display.

The two multi-turn potentiometers RV2 and RV3 (each about 15 turns) are fitted so that their adjusting screws are at the outer edges of the board. The red and the black 4mm input sockets are each fitted with a single nut and the connection from the bottom of each of these terminals must be made to the nearby points on the board.

The "lucid" display is sandwiched between two pieces of glass and has a conducting backplate. It is 51mm long by 31mm wide, but the upper glass plate does not extend over the full width. The exposed edges of the lower glass plate carry the transparent electrode connections. A connector is fitted to the edge of each display as shown in Fig. 1.4. First the edge of the display is inserted gently into the connector at an angle of about 30 degrees, the display is then pivoted so as to open the connector jaws and very gentle pressure will then cause the display to go fully home. The other connector is fitted along the opposite edge in the same way. Both connectors can now be soldered into the p.c.b. taking care to ensure that the decimal points are at the bottom of the display.

Before the display was fitted, it was noted that merely wiping a finger across the upper surface of the glass generated enough electrostatic charge to cause some of the segments to be

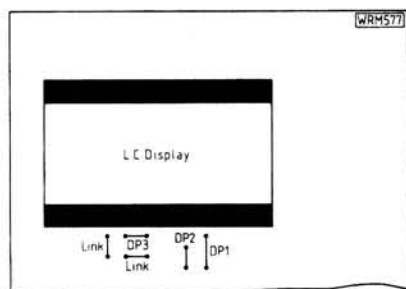


Fig. 1.5: Link positions

displayed. When the display had been fitted into its circuit, this effect was no longer found, as the connections could remove the electrostatic charge.

Constructors should ensure that the wire jumper links J1, J2, J3 and J5 are not omitted. (J4 is not used unless the circuit is modified for a single ended input). The kit sheet states that if any of the decimal point displays (marked DP1, DP2 and DP3 on the board) are not to be used, then they should be linked to the display backplane (marked BP on the board). The author found that no functional problem occurred if the decimal point electrodes were left unconnected. However, they should be linked to the backplane as shown in Fig. 1.5 when first constructing the circuit, since the extra decimal point circuitry is best added later if needed.

The battery clip may now be fitted—the round headed bolts supplied in the kit prevented the battery from lying flat in its clip and countersunk screws are much better.

The four integrated circuits were plugged into their sockets last of all so that they were not subjected to any potentials which may have existed on the soldering iron.

Note, all c.m.o.s. devices have an inherently high input impedance and are very susceptible to damage by static discharge. Under no circumstances must you remove the device from its protective conductive foil or foam packaging until ready to insert into circuit. This operation should be done on a metallic surface that is at earth potential or with you using a charge-guard wrist strap or similar. When soldering components on the board ensure the iron tip is earthed and if this is not so, allow it to reach working temperature and remove the mains plug.

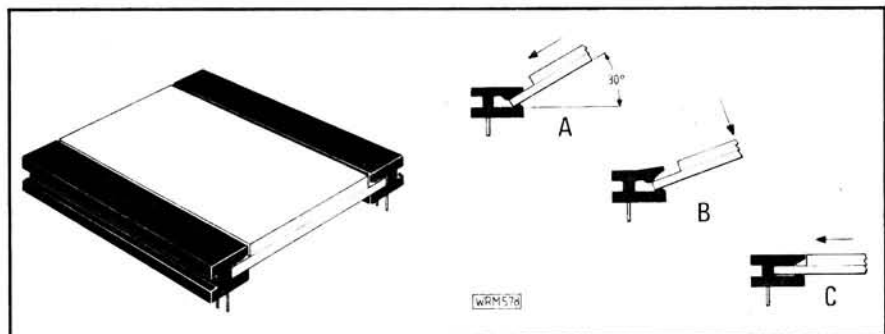


Fig. 1.4: Display preparation

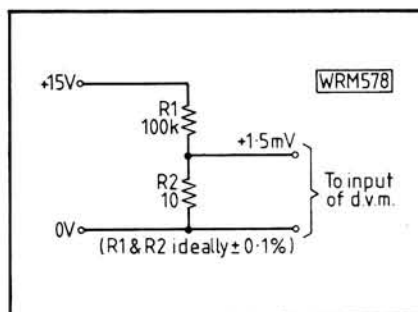


Fig. 1.6: Calibration circuit

Testing and Adjustments

The battery connector may now be fitted onto the battery to apply power. The author found the total current consumption was 7.8mA, but this value can vary somewhat. One should not expect to obtain any display if the input terminals are unconnected, since stray pick-up from 50Hz mains fields will produce input potentials far above the ± 1.999 mV full scale reading.

A sensitive meter (with a full scale deflection of about 1V) may be connected between the test points TP1 and TP2 marked on the board which are connected to the outputs of the two TL091 devices shown in Fig. 1.3. The input terminals are now shorted, power is applied from the 9V battery and the multi-turn potentiometer RV3 is adjusted for a zero voltage reading on the external meter. It is easy to make the adjustments for less than 10mV between TP1 and TP2. The external meter can now be removed and the display should indicate zero with the input shorted.

This adjustment of RV3 is required, since the auto-zero circuit can null out zero errors of up to ± 150 per cent of the full scale reading, namely ± 3 mV. The TL091 offset can be greater than this, but once trimmed in this way, the auto-zero circuit will compensate for any long-term drift or temperature drift of the TL091 offset voltage; thus no further trimming will be required. Adjustment of RV3 produced a variation of the potential between TP1 and TP2 from over 8V in one direction to over 8V in the other over the full range of RV3.

The sensitivity control, RV2, is used to calibrate the instrument. This calibration can be a problem unless one has access to an instrument of known accuracy or to an accurate reference voltage, but a local society or college may be able to help. For most purposes only relative measurements are required, so very accurate calibration is often unnecessary.

The author used the circuit of Fig. 1.6 in which a stabilised 15V ± 0.1 per cent supply was divided by a resistive circuit by a factor of 10 000 to prove an accurately known input of 1.5mV to the digital voltmeter. Potentiometer RV2 was adjusted until a display of 1500 μ V was obtained. It was found

RV2 provided a total adjustment of almost ± 10 per cent. If the input leads are reversed, the "roll over" error should result in a display within ± 2 digits of the previous value together with a minus sign. It should be noted that an input of over 1.999mV will produce a display of the left hand "1" or "-1" according to the polarity, while a blank display can be obtained with higher input potentials.

For many purposes adequate accuracy may be obtained using a calibrating voltage known only to about 1 per cent.

The meter is now ready for use on its basic ± 1.999 mV scale. The high sensitivity of the instrument inevitably leads to it being susceptible to effects from thermal voltages at the junctions of different metals. Such junctions should therefore be avoided and the signal paths to each input should be as nearly identical as possible. Sudden changes in the temperature of the circuit board components during a measurement can result in zero errors due to thermal drift in the short time between the input signal measurement and the zero error determination. It may be noted that the high input impedance of the meter falls dramatically if its power supply battery is disconnected.

Circuit Options

A few variations can be made on the board supplied in the kit.

(1) The omission of the jumper J2 between pins 35 and 37 of the ZN451 and the inclusion of R2 and S1 of Fig. 1.3 enables a displayed value to be held indefinitely. When S1 connects pin 37 to ground (pin 36), the display will continue to show the last valid measurement until S1 is operated to re-connect pin 37 to pin 35.

(2) The gain of the differential input/differential output amplifier comprising IC2 and IC3 is:

$$A = 1 + \frac{(R6 + R8)}{R7}$$

or nearly 50 with the values shown. Other resistor values may be employed to alter the gain and hence the full scale of the basic range. This full scale is equal to $\pm(100/A)$ mV. Good quality metal film or metal oxide resistors should be employed to obtain good gain stability.

(3) If the link J3 of Fig. 1.3 is replaced by a 10k Ω variable resistor RV1 (for which the circuit board has been prepared), the internal oscillator clock frequency may be adjusted from the value of about 50kHz when this resistor is at its minimum value up to about 95kHz. This changes the ZN451 conversion rate. Alternatively the value of C2 in Fig. 1.3 may be changed.

The total conversion time of the circuit is the sum of the initial settling period of 4000 clock cycles, the auto-zero measurement time of 20 000 clock cycles, a further settling period of 4000 clock cycles and signal voltage measurement period (the integration time) of 20 000 clock cycles; thus the conversion time totals 48 000 clock cycles. The value of C2 (330pF) shown in Fig. 1.3 is used to provide a clock frequency of about 50kHz and hence a conversion time of approximately 1 second. The author measured the rate of updating of the display using the components supplied in the kit and found it was almost exactly once per second.

When an 820pF capacitor was added in parallel with the existing 330pF capacitor C2, the total conversion time was increased to about 3.3 seconds. It was noted that the display now flickered rapidly when viewed from one corner with a frequency of about 5Hz, but remained without flicker when viewed directly from above.

Changing the clock frequency does not change the sensitivity of the instrument, but it alters the integration time over which the signal measurement is averaged. If this integration time is equal to a whole number of cycles of the mains frequency, the effect of any mains hum voltages on the input signal will be minimised, since an equal

number of positive and negative half-cycles will be included in the measurement period and these half-cycles will tend to mutually cancel one another. However, it is important that any mains frequency or other interference on the input should have a peak amplitude no greater than 25 per cent of the full scale so that saturation of the circuit is avoided.

The clock frequency can be set very accurately if C2 is replaced by a crystal in series with its recommended value of load capacitance or by a ceramic resonator. For example, a 100kHz crystal will provide an integration time of 200ms, since the integration time is 20 000 clock cycles. This time is equal to ten cycles of the 50Hz mains frequency. The 100kHz clock frequency will provide a total conversion time of 480ms and there will be just over two display updatings per second.

The data sheet quotes the maximum oscillator frequency as 300kHz, but the conversion time has a minimum value of 0.25s and the latter corresponds to a 192kHz frequency.

(4) The circuit of Fig. 1.3 has a differential input. It may be converted into a single input circuit by: (a) removing the jumper link J5 and inserting J4; (b) replacing R6 with a jumper link; (c) changing R8 to 47k Ω if the sensitivity is to be unchanged; and (d) removing IC3 and linking pins 3 and 6 of its socket.

(5) In Fig. 1.3 the ZTX108 forms an external series regulator circuit. This transistor can be omitted and its base and emitter terminals linked if the value of R1 is changed to $(V_{\text{supply}} - 5)/6.5$ k Ω . Alternatively the circuit may be fed from a regulated supply of +5V if R1 and the ZTX108 are omitted and the +5V supply is connected to the point on the p.c.b. which was previously the transistor emitter.

NEXT MONTH: In Part 2, extra ranges for Voltage Current and Resistance, plus display options.

AVAILABILITY

Kits are available by mail order from Midwiche Computer Company Ltd, Gilray Road, Diss, Norfolk IP22 3EU. Cost £32.09 including VAT plus post and packing.

**TABLE 1.1
FIVE-BAND RESISTOR CODES**

| Colour | Band 1 1st Figure | Band 2 2nd Figure | Band 3 Multiplier | Band 4 Tolerance | Band 5 Temperature Coefficient |
|--------|-------------------------|-------------------------|-----------------------|---------------------|--------------------------------------|
| Black | 0 | 0 | $\times 1$ | | 200ppm/ $^{\circ}$ C |
| Brown | 1 | 1 | $\times 10$ | 1% | 100ppm/ $^{\circ}$ C |
| Red | 2 | 2 | $\times 100$ | 2% | 50ppm/ $^{\circ}$ C |
| Orange | 3 | 3 | $\times 1000$ | | 15ppm/ $^{\circ}$ C |
| Yellow | 4 | 4 | $\times 10\ 000$ | | 25ppm/ $^{\circ}$ C |
| Green | 5 | 5 | $\times 100\ 000$ | 0.5% | |
| Blue | 6 | 6 | $\times 1\ 000\ 000$ | 0.25% | 10ppm/ $^{\circ}$ C |
| Violet | 7 | 7 | $\times 10\ 000\ 000$ | 0.1% | 5ppm/ $^{\circ}$ C |
| Grey | 8 | 8 | | | 1ppm/ $^{\circ}$ C |
| White | 9 | 9 | | | |
| Gold | | | $\times 0.1$ | 5% | |
| Silver | | | $\times 0.01$ | 10% | |
| None | | | | 20% | |

Now radio amateurs have access to the 50MHz band, home construction again is becoming popular. G4LFM builds the Cirkit 6m kit.

The Cirkit 6m transverter is not a kit for beginners. For a start it is a double-sided p.c.b., needing earth connections to be made directly to the top side of the board. So a little experience in soldering and project building would be more than helpful.

As soon as the transverter kit arrived it was carefully checked through and found to be complete, even the coaxial cable and enamelled copper wire was included. All the components supplied were of good quality with none being damaged in transit—the kit was packed in a sturdy box. Although this sounds a trivial matter, it's not funny if the project you have been patiently waiting for arrives damaged and has to be returned.

The *Cirkit Catalogue* gives fairly comprehensive details of the kit, but a few points worth noting should be mentioned. Both the receiver and transmitter use Schottky diode ring mixers, the popular SBL-1 device used in so many projects these days.

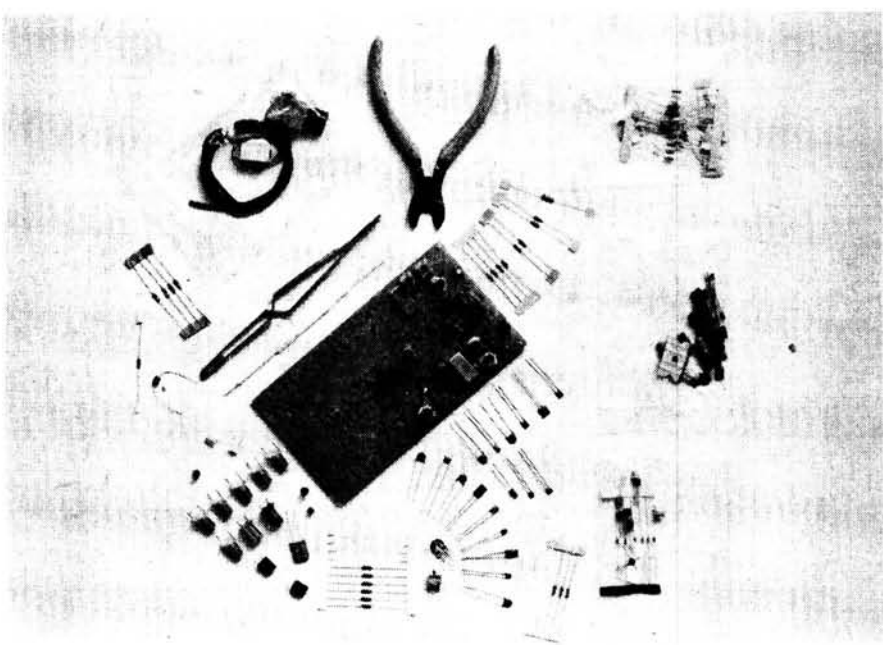
The output level from the transverter is 0.5W p.e.p. s.s.b. or 1W c.w./f.m., and this is for drive levels of between 1mW and 1W. The transverter incorporates a *pin* diode and resistor attenuator network allowing drive levels of up to 1W.

Other features include r.f. sensing with adjustable delay for p.t.t. switching or automatic operation using the on-board VOX.

The specifications mentioned are: harmonics better than -45dB and intermodulation distortion better than -35dB at 0.5W p.e.p. The receiver has 0.08µV sensitivity at 10dB S/N + N (s.s.b.), and the system noise figure is around 4dB when used with a modern transceiver.

The kit builds into an all-mode transverter working from 28 to 50MHz, and a 70MHz version is also available. The kit comes complete with a photocopy of the original magazine article describing the project fully. A word of warning here—read it through very carefully as the article, especially the components list, was written for both the 50 and 70MHz versions. Some components are only necessary for one or other version, and if you don't notice that straightaway you could spend a long time looking for a component that's not there!

The kit comes with the double sided



p.c.b., the various components separately packed by type and the instructions.

Listening to the stations using 50MHz, home-construction seems to be very popular on the new band. There are a few kits on the market at the moment, mainly resulting from magazine articles, such as the *PW* Meon and the Cirkit 6m transverter. These projects are not only useful for Class A licence holders but also those Class B operators wishing to work cross-band.

In these days of "the black box" it is refreshing to hear of so much home construction being successfully completed and used.

Although normally I follow the logical method of building kits, or the instructions provided, this kit was needed for photography so had to be built in the wrong order for the most part. Anyone else building this kit would be well advised to follow the instructions. Soldering connections to the earth plane can be tricky if you don't notice the marks on the component layout as you are working. Trying to go back over the p.c.b. and find the missing earth connections is not always easy—not to mention a great time waster. If you are impatient about getting the transverter "on air" there is nothing more frustrating than chasing round in circles looking for a fault, so care taken in construction is worth it.

All the usual rules for construction need to be followed, i.e. mounting components close to the board unless otherwise instructed and always following the component layout.

Unlike most kits, which start with

the smallest components first, this kit is built stage by stage—to make testing and setting up easier.

The instructions suggest that the crystal oscillator stages are the first to be tackled. Once the stage has been assembled according to the instructions, a frequency counter is used to set the oscillator correctly.

Next is the receiver section, both building and alignment. It is much easier to set up if you have a suitable signal generator, but instructions are provided for those without this type of equipment.

The final section to be built is the transmitter, again by following the instruction the job is quick and easy. An s.w.r. bridge and dummy load need to be used to set up the transmitter. Assuming no mistakes the unit will work correctly (it's not impossible assuming you have taken care and checked the board as each stage was finished). Don't forget the kit needs a metal box before you put it on the air.

Unfortunately there wasn't enough time to really give the kit an airing on the band, but it did perform well with the limited tests possible. Once time permits there is likely to be another call sign on 50MHz as it is a band worth exploring. There is only one thing, if I ever build another kit like this I shall definitely follow the instructions, as the way I had to work was not the easiest and I'm sure I've acquired a few extra grey hairs in the process.

The kit is available from Cirkit, Park Lane, Broxbourne, Herts. Tel: (0992) 444111. It costs £50.43 plus VAT and 60p post and packing. Many thanks to Cirkit for supplying the review kit.

Practical Wireless, July 1986

R. WITHERS LTD.



LOOKING FOR GOOD SERVICE AND GOOD PRICES?

ICOM



READ ON...

We could of course book a full page advertisement and show you pictures of products and print our price lists which are generally much the same as everybody else's! So why buy off us? Well the choice is yours! if we do not spend so much money on advertising (which is currently in excess of £2,000.00 per month) then surely we can offer a better price on that Rig you always wanted? Our company offers more facilities than ANY company in our field, we offer you the technical expertise essential in today's world of High Technology. We make those Super Radios a little better with our well known Mod-Kits at NO EXTRA COST to yourselves when purchasing New. We offer our own UK Made Power Amplifiers and Antenna Products which we export Worldwide. We also distribute our own Imported Range of Amateur and Business Radio Handheld Transceivers, and we have the Best test and repair facilities in the country, as Amateur Radio is NOT our only field we have many strings to our Bow! Not to mention our Scanning Receivers!

Why not give us a try? Send us £1.00 (REFUNDABLE AGAINST PURCHASES) and we in turn will send you BY RETURN our Exclusive Product catalogue and our latest Used list, along with any Product leaflets you require. We offer £1,000.00 Instant Finance to Licensed Amateurs, Free Finance on selected products and TAKE ALL MAJOR CREDITCARDS OVER THE PHONE FOR SAME DAY DESPATCH and offer you ANY BRAND OF AMATEUR RADIO EQUIPMENT IMPORTED INTO THE UK at REALISTIC PRICES, with the current trend of Increasing Prices we all need a BARGAIN!

Have a look at all those other EXPENSIVE advertisements...

THEN CONTACT US... NOW... TODAY!

RWC LTD. WE OFFER MORE ALLIED RADIO SERVICES UNDER ONE ROOF THAN ANY OTHER COMPANY IN THE UK! CALL US NOW...

EXPORT AND TRADE ENQUIRIES INVITED

584, Hagley Rd. West, Quinton, Birmingham B68 0BS.
Tel: 021-421 8201 (24hrs) Telex: 334303-TXAGWM-G

AUDIO FILTERS MODELS FL2, FL3, FL2/A

Model FL3 represents the ultimate in audio filters for SSB and CW. Connected in series with the loudspeaker, it gives variable extra selectivity better than a whole bank of expensive crystal filters. In addition it contains an automatic notch filter which can remove a "tuner-upper" all by itself. Model FL2 is exactly the same but without the auto-notch. Any existing or new FL2 can be up-graded to an FL3 by adding Model FL2/A conversion kit, which is a stand-alone auto-notch unit. Datong filters frequently allow continued copy when otherwise a QSO would have to be abandoned.

Prices: FL2 £89.70, FL3 £129.37, FL2/A £39.67



ACTIVE RECEIVING ANTENNAS

Datong active antennas are ideal for modern broadband communications receiver—especially where space is limited.

- highly sensitive (comparable to full-size dipoles).
- Broadband coverage (below 200 kHz to over 30 MHz).
- needs no tuning, matching or other adjustments.
- two versions AD270 for indoor mounting or AD370 (illustrated) for outdoor use
- very compact, only 3 metres overall length. • professional performance standards.

Prices: Model AD270 (indoor use only) £51.75 Both prices include mains power unit. Model AD370 (for outdoor use) £69.00



MORSE TUTOR

The uniquely effective method of improving and maintaining Morse Code proficiency. Effectiveness proven by thousands of users world-wide.

- Practise anywhere, anytime at your convenience.
- Generates a random stream of perfect Morse in five character groups.
- D70's unique "DELAY" control allows you to learn each character with its correct high speed sound. Start with a long delay between each character and as you improve reduce the delay. The speed within each character always remains as set on the independent "SPEED" control.
- Features: long life battery operation, compact size, built-in loudspeaker plus personal earpiece.

Price: £56.35

Our full catalogue plus further details of any product are available free on request. All prices include VAT and postage and packing. Goods normally despatched within 3 days subject to availability.

Barclaycard, Access Orders—Tel: (0532) 552461



**DATONG
ELECTRONICS
LIMITED**

write to dept. P.W.
Spence Mills, Mill Lane
Bramley, Leeds LS13 3HE
England
Tel (0532) 552461

B.N.O.S. ELECTRONICS

DON'T FORGET OUR NEW ADDRESS
BNOS ELECTRONICS LTD. DEPT PW,
STEBBING, ESSEX CM6 3SL. Tel
(037186) 681

1986 PRICE LIST

2M LINEARS

| | |
|---------------|--------|
| LP144-3-50 | 125.00 |
| LP144-10-50 | 125.00 |
| L144-1-100 | 172.50 |
| L144-3-100 | 172.50 |
| L144-10-100 | 150.00 |
| L144-25-160 | 230.00 |
| L144-3-180 | 270.00 |
| L144-10-180 | 270.00 |
| LPM144-1-100 | 197.50 |
| LPM144-3-100 | 197.50 |
| LPM144-10-100 | 175.00 |
| LPM144-25-160 | 255.00 |
| LPM144-3-180 | 295.00 |
| LPM144-10-180 | 295.00 |

NEW LOW-PASS FILTERS

| | |
|----------|-------|
| F50-L/U | 24.95 |
| F70-L/U | 24.95 |
| F144-L/U | 24.95 |
| F144-L/N | 28.50 |
| F432-L/N | 28.50 |

70CM LINEARS

| | |
|---------------|--------|
| L432-1-50 | 195.00 |
| L432-3-50 | 195.00 |
| L132-10-50 | 155.00 |
| L432-3-100 | 295.00 |
| L432-10-100 | 295.00 |
| L432-25-100 | 255.00 |
| LPM432-1-50 | 235.00 |
| LPM432-3-50 | 235.00 |
| LPM432-10-50 | 195.00 |
| LPM432-3-100 | 335.00 |
| LPM432-10-100 | 335.00 |
| LPM432-25-100 | 295.00 |

6M LINEARS

| | |
|--------------|--------|
| LP50-3-50 | 135.00 |
| LPM50-10-100 | 195.00 |

4M LINEARS

| | |
|--------------|--------|
| LPM70-10-100 | 195.00 |
|--------------|--------|

POWER SUPPLIES

| | |
|--------|--------|
| 12/6A | 69.00 |
| 12/12A | 115.00 |
| 12/25A | 169.00 |
| 12/40 | 345.00 |

NEW PROFESSIONAL VARIABLE VOLTAGE MODELS AVAILABLE

NICADS

| Format | Capacity (Ah) | 1-9 | 10-24 | 25-49 |
|------------|---------------|------|-------|-------|
| AAA | 0.18 | 2.23 | 2.12 | 2.01 |
| N* | 0.15 | 2.00 | 1.90 | 1.81 |
| 1/3AA | 0.10 | 1.50 | 1.43 | 1.35 |
| 1/2AA | 0.24 | 1.20 | 1.14 | 1.08 |
| AA | 0.50 | 1.23 | 1.17 | 1.11 |
| AA (Super) | 0.60 | 1.35 | 1.28 | 1.22 |
| AA* | 0.50 | 1.25 | 1.19 | 1.13 |
| 1/2A* | 0.45 | 1.40 | 1.33 | 1.26 |
| RR | 1.20 | 2.38 | 2.26 | 2.15 |
| C | 2.20 | 3.10 | 2.95 | 2.80 |
| D (SUB) | 1.20 | 3.25 | 3.09 | 2.93 |
| D | 4.0 | 5.75 | 5.46 | 5.19 |
| D* | 4.0 | 5.80 | 5.51 | 5.23 |
| F | 7.0 | 8.63 | 8.20 | 7.79 |
| PP3 | 0.11 | 5.25 | 4.99 | 4.74 |

Available direct or from all good radio dealers. SAE for more details.



Delivery Free (For orders over £10)
those under add £1 to order total
Securicor 'B' available at £5 extra



Getting Started... The Practical Way

In the first part of this new series Rob Mannion GM3XFD shows you how to get over the problems associated with starting off in radio construction, where to do it, and how to go about obtaining those elusive but all-important parts.

There is certainly no doubt in my mind, that getting started in our hobby today is far more difficult than it ever was, and rather more expensive! A glance at what is on offer from the average "High Street" shop selling components may make you feel that the preceding statement is absurd, until you try and buy the parts to make the simplest radio receiver, and count the cost! You will quickly realise that it is very much cheaper to get a ready-made "oriental" receiver!

Even if you can afford it, and eventually do buy a multi-waveband receiver, nothing can beat the thrill of hearing the world on your own home-made equipment. The knowledge that is acquired from constructing it is never wasted either! Easily said perhaps, but how do you go about home construction, with the ever decreasing space in modern homes, coupled with even more limited funds for the younger enthusiast (often paired with parental opposition to "wires and things" about the house).

The Shack

Certainly, for most people the biggest single problem to be solved is where can they work? The work demands a relatively quiet situation, to help develop the concentration which is required. Don't despair! Although many modern homes lack cellars, attics or even built-in sheds which can be used, the enthusiast is nothing, if not versatile! He, or she, can improvise. In this situation that is what our hobby is all about!

If you are forced to use a small space indoors, the kitchen table is perhaps not the best place! Even though the amount of "metal bashing" in our hobby today is limited, it would be extremely easy for you to scratch a table or burn it with the soldering iron. You can make a trolley that can be wheeled under the stairs or into the conservatory, but an old fashioned stout wooden tea trolley will save you the job! One young friend of mine put piano castors under an old laundry table which was small enough to be wheeled about.

Another option is an ironing board, the asbestos pad at the end is more

than useful. The metal-based boards can take a small vice which will make it even more useful. The advantage of the ironing board is that you will have a very wide spread, although with a limited depth. Taking a tip from many housewives, one can use a stool to work from, and you will find that the height of the stool will be just about right, unless you are over 2m or below 1.5m tall! Seriously though, you will find a stool far better than a chair especially when you are "up and down" looking for parts.

Storage Problems

Unfortunately you then have a storage problem, but that can be overcome by making a portable shelving unit to hold your tools and parts. For many years GM3XFD used wooden trays measuring approximately 305 x 230mm. These trays started off as fish cake boxes which came from the local chip shop. However, with plastics and other materials around nowadays, this method is mentioned only to give you ideas. An extremely useful and readily available storage box, is one of the "multi-tray" tool/fishing boxes. With their multiple small storage spaces, and room for tools, they are ideal... at a price.

Find yourself a quiet place in the house if you can but almost certainly you will finish up in the kitchen, dining room or conservatory. The loft, if you have one, is not recommended unless it is properly lined and floored. It will be useful for antennas later on though! Having, hopefully, found somewhere you can now come up against the next problem... power and lighting.

Power

Today, fortunately, power to the "shack" need not be a problem with the use of semiconductors. The soldering iron need not be a problem either, there are excellent 12 volt types available. In fact many people prefer to use a low voltage iron at all times, as they are versatile and give added protection against static damage to f.e.t.s.

The advantages in only needing a 12 volt power supply are many, not the

least being the cost! Safety is yet another advantage, with the most pessimistic protective parent being at ease with 12 volts in the vicinity rather than mains.

New batteries are not cheap, the cheapest usually being around £12 or so. However, a trip to the local garage may be useful. A car battery that has failed the "3 minute shunt test" may be available for a small sum. These batteries have been given a brutal test by having 300 amps drawn from them, whilst the volt drop is measured. One that fails will not perhaps be good enough to start a car on a cold morning, but will suffice to run a 24 watt 2 amp iron and your electronics.

It should be possible to buy the battery from the garage for about £2, which is the figure that the battery reclaim company allows them. It may be a surprise, but the vast majority of old batteries do go for "rebuilding"! My experience has taught me that it is not worth approaching the specialist "quick fit" depots where batteries, tyres etc are fitted "while-you-wait". Their whole operation is geared up to recycle as much as they can, and you will be fortunate to obtain a battery this way.

Once you have the battery, and with the help of the garage have chosen one that is not too bad, charging it will be a priority. It may not be necessary for you to buy a charger though, you may have one in the house, or have a model railway or you can use the family car! The latter way however, can be expensive and dangerous. Charging the battery via "jump leads" **should only be undertaken outside, well away from enclosed areas.** Carbon monoxide present in car exhausts is extremely deadly and strikes quickly. Even in the open, in still air it is very hazardous. And unfortunately I am speaking with first hand, nearly fatal experience.

An efficient low current charger can be utilised from a model railway transformer-rectifier unit. The main problem is that they can only normally supply 1 amp or so, but this can be overcome by "trickle charging". Safety-wise, the transformer units have a big advantage in that they are "double wound" (the mains winding and the low voltage winding are totally

isolated from each other) and are robust indeed.

You must limit the current drawn by the battery on charge with a suitable resistance. A 12 volt car sidelight bulb, in series with the positive terminal (marked +), will keep the current to a safe limit. You may be able to buy a cheap car ammeter from an accessory shop, but unfortunately they are not reliable at low current levels, and for accuracy, a multimeter is required.

Warning!

The use of car batteries to provide a 12 volt supply has certain dangers. The batteries contain dilute sulphuric acid, and will produce explosive hydrogen gas and possibly sulphuric acid spray whilst being charged. They should be kept well clear of furnishings, and should not be charged in an unventilated room. They must be kept upright.

You should also be aware that dropping metal objects, such as tools or bare wires, across the battery terminals, will cause arcing with a risk of fire or possible explosion.

Car batteries are a useful power source, but they must be treated with care and respect.

Lighting

Almost certainly you will find that the lighting, even in the house, will be inadequate when you start work, and to avoid undue eye strain some extra lighting is recommended. A desk lamp is ideal, some cheaper imported types are really small, with flexible "goose neck" adjustable stands, although they do not have the "reach" of the better lamps.

Suitable desk lamps are often to be found at a local "sale", and it cannot be stressed enough, what a useful source of "difficult to find bits" they are! Attend every jumble sale you can, and it's often possible to buy the once popular bedside spotlamps for a few pence. These were in vogue in the 60s, and have an integral 12 volt transformer in the base, running a 24 watt or so car bulb. However, whether running on mains or 12 volts, they are most useful.

A visit to your local caravan accessory shop can be very profitable, for of course caravan equipment is designed for those who are away from the mains. For around £10 or so, it will be possible to buy a 12 volt inverter powered fluorescent light. These useful lights

give "glare free" illumination, but watch out for possible interference from the inverter unit. Each lamp is equipped with a small oscillator unit which electronically switches the 12 volt d.c. via a transformer, to around 240 volts. Good quality lights will be adequately protected, but in close proximity, the radiated signal from the oscillator could prove a problem on long and medium waves.

Collecting Junk

Once you have started to collect broken down radio and other electronic items from "jumble sales" you will quickly be able to break up items for spares. This is the best thing to do with modern "oriental" items. Currently a favourite source of spares seems to be from the once popular "8-track" cartridge player/radio receivers.

Other radio receivers you should look out for when attending the next "jumble", are the older and cheaper type of car radio, and the very common "attache case" dry battery valve radio. Most UK manufacturers produced these excellent little radios in the 50s, with valves that would operate with as little as 36 volts on the anode! Each radio, in a substantial wooden case, came with frame antenna in the lid, for only latterly did the now universal "ferrite rod" antenna make an appearance in these portable sets.

Many are still in daily use with "mains adaptors", and they are well worth collecting for spares. The cases are most useful for storing parts, the speakers are nearly always of good quality, as are the variable capacitors and other components. Mostly they will be in very good condition, having been stored since the introduction of 9 volt powered transistor portables, which killed them off virtually overnight. The 90 volt and 1.5 volt battery prices saw to that!

Occasionally, it is possible to buy an older type "positive earth" car radio at a sale. Don't hesitate! The low price will usually be because of the polarity of the chassis. That will not work against us at all. A 12 volt car radio, such as this, with its screened coaxial antenna input, will make an ideal "foundation" for your first "communications receiver".

Using the radio as a "tunable i.f.", and utilising the most useful "screened input", which greatly reduces "breakthrough", you will later on in the series be able to build and add a "converter" so that the car radio will

become a versatile short wave receiver able to tune into the "short wave" band of your choice.

With other little "add-on" units, made up from very simple circuits, Morse and s.s.b. (single sideband) speech from amateur stations will be available. The cheap car radio will then have the facilities to equal much more expensive equipment. It will be, in fact, a "double conversion" receiver, and you'll have made most of it yourself!

Economical Approach

This approach must surely be the most economical, and enjoyable introduction to Amateur Radio and construction, but you must "put yourself out" quite a bit, and should make friends in the hobby too. It is all too easy to be a "loner" in our hobby, to great disadvantage at times! An enquiry at the Town Hall, or at the local Technical College will perhaps bring you into contact with a local enthusiast or licensed amateur station.

Useful Introduction

CB Radio, often sneered at, and derided by many, can prove a most useful introduction to Amateur Radio. Now that it has lost most of the media promoted "cowboy image" and the anarchists it attracted have gone on to other things . . . it can be used with great effect.

Many amateurs, including GM3XFD use CB, and you may meet one on 27MHz. If not, you will undoubtedly be told where you can contact an amateur. Whatever happens, you can be certain that you will make friends who share the same interests. This, coupled with the fact that CB radio prices have fallen so much now, that a rig can be bought extremely cheaply indeed, makes CB a real bargain. Unfortunately this is unlikely to happen with amateur radio prices, but this series is aimed at avoiding those costs . . . wherever possible!

So, start collecting, hunt your local amateur out, even if he cannot spare the time to get involved, many delight in passing on "junk", the often unfair name for the valuable "bits" that are the foundation of our hobby. Surely, it's the practical way to get started!

Next month . . . Your library, getting a test-meter, antennas and first projects and methods.

Stop Press News . . . Stop Press News . . . Stop Press News . . .

Morse for Class B Licensees

A DTI Press Notice states that . . . "Following the successful completion of the experiment allowing Class B Amateur Radio licensees to practice the use of Morse code, the DTI has confirmed, following consultations with the RSGB, that the concession is now a permanent feature of the licence. The experiment restricted Morse operation to the station address but this condition no longer applies . . ."

The DTI has revised the definition of the amateur licences and has removed Footnote A (which restricts the use of Morse).

Remember, the use of Morse must be restricted to the bands for which you are licensed.

The Sooper Loop

David Mayhew's simple but effective m.w. DX Loop

This medium wave "Sooper Loop" is a highly sensitive loop antenna with a powerful output stage. It will enable your radio to receive medium wave stations which are normally unattainable by any other means. Because the loop is highly directional it will be possible to separate stations using the same frequency or to "null" out an unwanted signal close to a wanted one. This loop has been in use for several years and is by far the best design yet evolved by the author for receiving m.w. DX stations. Some idea of its potential can be obtained by referring to *PW* "On the Air" September 1985. Naturally, good conditions and patience play an important part in obtaining such results, too!

Circuit Description

The heart of the "Sooper Loop" is a high Q loop tuned by a small variable capacitor (see Fig. 1). To maintain this high Q , both of these components are totally insulated from all other parts of the circuit to avoid unnecessary loading. A single turn of wire around the loop provides sufficient coupling into a single transistor amplifier to ensure adequate signal output. The amplifier gain may be varied to allow for different signal levels by means of a simple variable resistor in series with the PP3 9 volt battery supply to the transistor (battery life is approximately 150 hours).

The amplifier output may either be

Fig. 1: Circuit diagram

connected directly to the antenna/earth terminals of the receiver or coupled via a specially designed ferrite injector to an internal ferrite antenna in the set.

Construction

Making the powerful "Sooper Loop" is a simple job and is easily undertaken by a beginner. A kit is available for £20 including post from the author at 29 Downview Close, Yapton, W. Sussex.

1. The former for the loop winding is a 45mm wide slice of 315mm diameter plastic pipe—about 3mm thick.

2. Drill four holes (AB) (CD) in the pipe to accept 8BA bolts. Fit four 8BA bolts, solder tags, washers and nuts as wire anchors and tighten them.

3. Close-wind on the former 16 turns of 24 s.w.g. enamel-covered wire to form the main loop. Clean the wire ends and solder to the external solder tags at bolts (AB). Fix the turns in place with polystyrene cement or use three bands of plastic insulating tape around the coil. Note: the winding direction is unimportant.

4. Wind on one turn of the same wire

over the centre of the loop turns. Clean the wire ends and solder them to the external solder tags at bolts (CD). Do not twist the wires together at the end of the turn but bend the ends out to the solder tags. Cement this single turn in place.

5. Cut three panels, 173 × 78mm (rear), 173 × 58mm (front) and 173 × 45mm (bottom) respectively, from 18mm blockboard. See Fig. 2.

Drill three holes in the front panel to clear the shanks of No. 8 woodscrews, and countersink the holes on the outside of the panel.

Drill two further clearance holes near the bottom of the back panel, again countersinking them on the outside face. Drill a small pilot hole partway through the rear panel from the inside face, in line with the upper hole in the front panel, to accept the tip of the 3 inch wood screw which will clamp the loop former. Screw the rear panel to the bottom panel as shown in Fig. 2.

6. Take the plastics electric double socket surface box (MK List No. 2025) which forms the control box.

Knock out the wood screw fixing

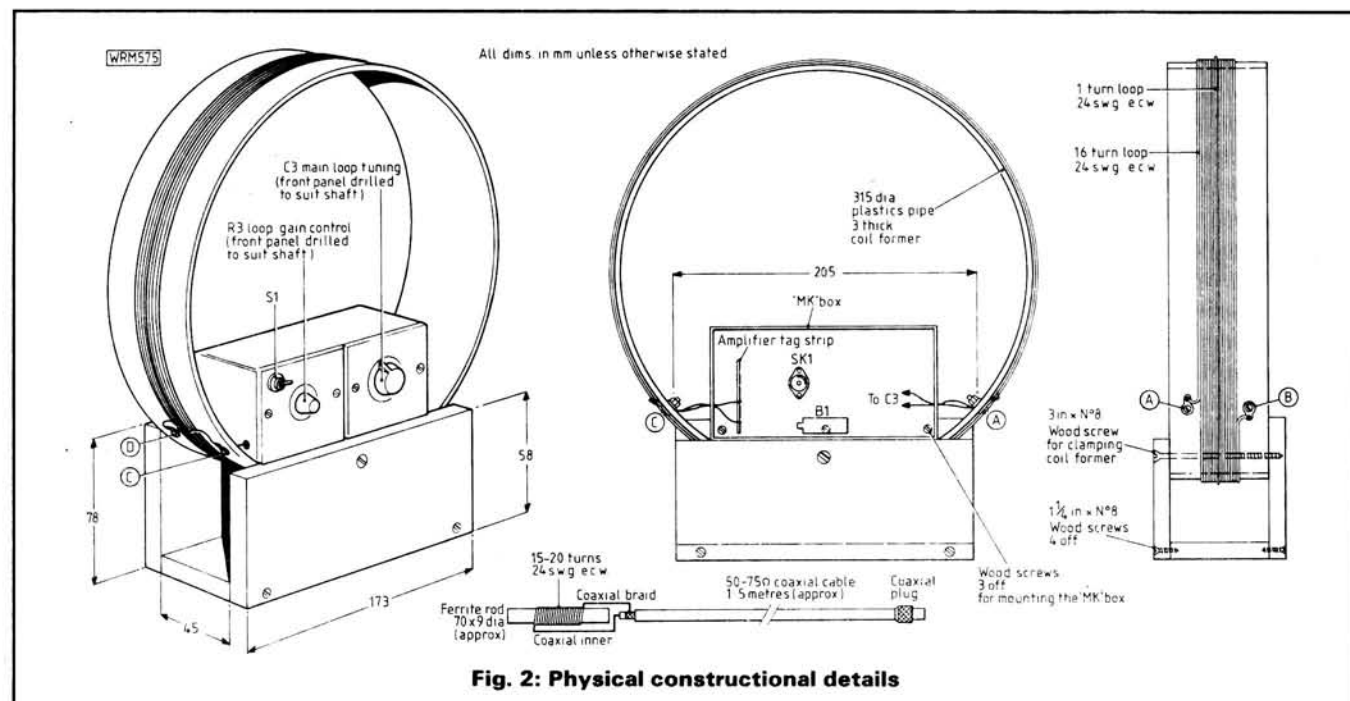


Fig. 2: Physical constructional details

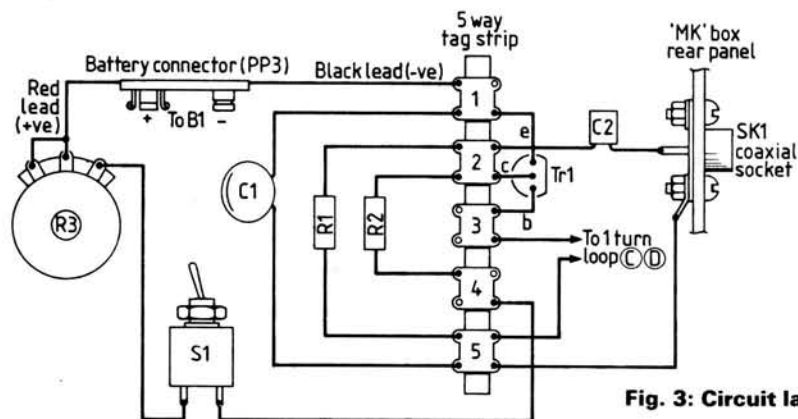


Fig. 3: Circuit layout

hole blanks at the bottom left, bottom centre and bottom right of the box rear wall, and attach the box to the rear wooden panel using three $\frac{3}{4}$ in No. 6 woodscrews, so that the bottom of the box is 20mm below the top edge of the rear wooden panel.

7. Knock out the blanking plug in the centre hole in one of the plastics blanking plates (MK List No. 3827), and enlarge the hole with a file to accept a small 500pF variable capacitor, C3. This is the main loop tuning capacitor, which should now be attached to the plate using one nut each side of the panel. Note: this capacitor fits inside the right-hand half of the box and must not foul the box at any setting.

8. Connect two lengths of thin single-conductor plastics covered wire, each about 120mm long, to the variable capacitor connections.

9. Drill four 3mm holes in the plastics box, two through the lower right-hand side and two through the lower left-hand side, to take the wires to the loop windings. See Fig. 2.

10. Using a file, knock out and enlarge the centre hole in the second

blanking plate to accept a small 10k Ω wire wound variable resistor (R3). Drill a hole for a miniature toggle switch (S1) 25mm down and 10mm in from the top left-hand corner of the panel. Mount these parts on the panel and fit a small knob to the shaft of the variable resistor.

11. Join together one outer tag and the centre tag of the variable resistor R3, and connect them to one of the toggle switch connections using a short length of plastics covered, red coloured, wire.

12. Attach the red flexible lead from a PP3 battery connector to the unused outer connection on R3.

13. Construct the amplifier on a 5-tag strip, see Fig. 3. Attach thin plastics covered wires 100mm long to tags 3 and 5 of the amplifier.

Attach the black flexible lead from the PP3 battery connector to tag 1 and a red plastics covered flexible lead, 130mm long, to tag 4 of the amplifier.

14. Using a file, enlarge the slot-shaped woodscrew hole just to the left of the centre pillar in the box, so that a Belling Lee chassis-mounting coaxial socket may be bolted in position from

the inside, with the socket facing out through the back of the box. Drill two 6BA holes to fix it to the rear wall of the box. Use 6BA bolts, washers and nuts, and fit a solder tag to the lower bolt when fixing it.

15. Drill a 6BA hole through the rear wall of the box, 55mm down from the top rear edge and 15mm in from the side (on the right-hand side when viewed from the back). This hole is used to mount the amplifier tag strip.

16. Pass the wires from tags 3 and 5 of the amplifier out through the holes in the left-hand end of the box (see Step 9) and bolt the amplifier into position, inside the box and parallel to the left-hand side, using a 6BA bolt, washer, spring-washer and nut.

17. Offer up the completed variable capacitor panel to the right-hand side of the box, passing the attached wires out through the adjacent holes. Fix the panel to the box. Fit a large knob to the capacitor shaft.

18. Join a short flexible lead from tag 5 of the amplifier to the earthing solder tag on the Belling Lee socket (SK1). Connect a 560pF capacitor (C2) between the centre connector on this socket and tag 2 of the amplifier (transistor Tr1 collector).

19. Connect the red lead from tag 4 of the amplifier (step 13) to the unused connection on S1 and check that the switch is off.

20. Temporarily attach the panel containing the toggle switch, etc., to the left-hand half of the box.

21. Place the loop in position immediately below the control box. Fix the front wooden panel to the bottom panel using two $1\frac{1}{4}$ in No. 8 woodscrews. Insert the 3in No. 8 woodscrew through the hole just below the control box, feeding it into the pilot hole in the

SHOPPING LIST

Resistors

$\frac{1}{4}$ W 5% Carbon film

| | | |
|---------------|---|----|
| 6-8k Ω | 1 | R2 |
| 1M Ω | 1 | R1 |

Potentiometers

Miniature wire wound

| | | |
|--------------|---|----|
| 10k Ω | 1 | R3 |
|--------------|---|----|

Capacitors

Ceramic

| | | |
|-------|---|----|
| 560pF | 1 | C2 |
| 47nF | 1 | C1 |

Variable Capacitors

Jackson miniature

| | | |
|-------|---|----|
| 500pF | 1 | C3 |
|-------|---|----|

Semiconductors

Transistors

| | | |
|--------|---|-----|
| 2N2926 | 1 | Tr1 |
|--------|---|-----|

Miscellaneous

Plastics pipe 315 x 45 x 3mm wall, 1 off; blockboard panels, see text; plastics electric double socket surface box (MK 2025), 1 off; plastics blanking plates (MK 3827), 2 off; 3in x No. 8 countersunk woodscrews, 1 off; $1\frac{1}{4}$ in x No. 8 countersunk woodscrews, 4 off; $\frac{3}{4}$ in x No. 6 countersunk woodscrews, 3 off; Belling Lee chassis mounted coaxial socket, 1 off; Belling Lee coaxial plug, 1 off; 45mm dia front panel knob, 1 off; 22mm dia front panel knob with scale, 1 off; s.p.s.t. miniature toggle switch, 1 off; 5-way tag strip, 1 off; red and black plastics covered wire, 1m of each; PP3 battery connector with leads, 1 off; PP3 bat-

tery, 1 off; 10mm 8BA bolts, 4 off; 8BA nuts, 8 off; 8BA solder tags, 4 off; 8BA spring washers, 4 off; 8BA plain washers, 8 off; 10mm 6BA bolts, 3 off; 6BA nuts, 3 off; 6BA solder tag, 1 off; 6BA spring washer, 1 off; 6BA plain washers, 3 off; 50 or 75 Ω coaxial cable, 1.5m; 24 s.w.g. enamelled covered wire, 20m; 70 x 9mm ferrite rod, 1 off*; plastics insulating tape, 1 m; polystyrene cement.

* Required for ferrite signal injector only.



The Sooper Loop (cont)

rear panel, and tighten it gently, so as to grip the loop between the panels.

22. Connect the wires projecting through the holes in the right-hand end of the control box to the anchor bolts (AB) on the inside on the loop, using solder tags, washers and nuts, cutting off the excess wire.

23. Connect the wires projecting through the holes in the left-hand end of the control box to the anchor bolts (CD) in similar fashion.

24. Remove the left-hand panel and fit a PP3 battery by sliding it in on its

back (after connecting the press stud fastener/connector to it) on the floor of the box between the two panels. Replace the panel.

25. Prepare a 50Ω or 75Ω coaxial cable lead, about 1.5 metres long, with a Belling Lee plug on one end and a suitable coaxial connector to mate up with the receiver input at the other end.

If the receiver has A and E sockets, connect the inner of the coaxial cable to (A) and the outer braiding to (E).

If the set has an internal ferrite antenna, construct the special ferrite injector and lead shown in Fig. 2.

Congratulations! You are now ready to test your "Sooper Loop".

Operating Notes

Place the loop about 1 metre from the receiver and connect them together using the coaxial cable prepared in step 25. Note: if the special ferrite injector is being used, place this close to the receiver's internal antenna.

Set the loop gain control to its mid-position and switch on the loop amplifier. Tune the receiver to the desired station/frequency. Adjust the loop tuning (this is very sharp) and rotate the loop for maximum signal.

Adjust the loop gain control for best reception without overload. "Null" out any unwanted signals by rotating the loop.

PW

NEWS

EXTRA

Band III

The licence applications for Band III have been announced. Mr G. Pattie, Minister of State for Industry and Information Technology, named the successful applicants who want to operate p.m.r. systems. He said there would now be discussions with the DTI to further define technical aspects of their systems before licences will be granted.

Band III (174–225MHz) became available when 405-line TV finished on the band. Licences will only be granted if the Department is satisfied that the licence conditions will be properly observed.

National p.m.r.:

- (a) A consortium of Pye Telecommunications; Digital Paging Systems (UK); Investors in Industry; Racal Telecommunications Group & Securicor Communications.
(b) GEC Telecommunications.

London p.m.r.:

- (a) London Car Telephones
(b) Air Call
(c) Relcom Communications
(d) Sinclair Communications
(e) National Radiofone

Provincial p.m.r.

- Birmingham–National Radiofone
Manchester/Merseyside–National Radiofone
Nottingham–Zycomm Electronics
Leeds/Bradford–RT Radiophones
Glasgow/Edinburgh/Aberdeen–Tactico/

Project Omega

Mr M. Jarvis has written to us regarding all Project Omega constructors. He would like to hear from others with a view to creating a pool of ideas and information regarding any problems which may have been encountered—with solutions arrived at, or not—as the case might be.

All correspondence will be treated as confidential, so if you would like to write, the address is: **Mr M. Jarvis, 11 Bushey House, Charles Field, Grove Park, London SE9.**

National Radiofone (joint venture).

The DTI notice announced that licences will not be awarded at this stage in four of the other areas outside London for which applications were invited, as insufficient suitable applications were received.

As regard National Wide-Area Radiopaging for the 153MHz band, three groups were announced.

- (a) A consortium of Air Call, Digital Paging Systems (UK), Inter-City Paging and Pageboy Services (UK).
(b) A consortium of Mercury Communications and Motorola
(c) Racal

For 454MHz there were two companies,

- (a) Infowave
(b) Millicom (UK).

As there may be the need to make allowances for future expansion, some operators may be allocated frequencies in the 138–141MHz band rather than 153MHz.



AMSAT-UK

For those amongst you who find satellites a growing part of amateur radio, there is an organisation you should know about. AMSAT-UK (The Radio Amateur Satellite Organisation of the UK) can provide you with a vast amount of information.

Each year it costs £8.50

to provide each member with all the information, so a suitable donation is required from members and prospective members.

Anyone interested should send a 9 x 4½ in s.a.e. to: **Ron Broadbent G3AAJ, 94 Herongate Road, Wanstead Park, London E12 5EQ.**

SWL Pen Pals?

We have a reader in the USA who would like pen pals. Kenn Wilson says that he is interested in reading magazines on auto racing, soaring and radio controlled airplanes. Any s.w.l. interested in writing to him should address their letters: **Kenn Wilson W9JLA/5, 14902 Preston Road, Suite 212-218, Dallas, TX 75240, USA.**

Can You Help?

Has anyone a circuit or handbook on the Cossor double beam oscilloscope type 3398? If so, **Kirk Wilson, 35 Connaught Road, Margate, Kent CT9 5TW**, would like to hear from you.

Another "Can You Help" here, from Mr D. Jenks. He would like to find a circuit diagram for a Safgan Oscilloscope DT420. If you can help, please write to **Mr D. Jenks, 36 West Dene, Gaddesden Row, Hemel Hempstead, Herts HP2 6HU.**

TV Plans on DBS

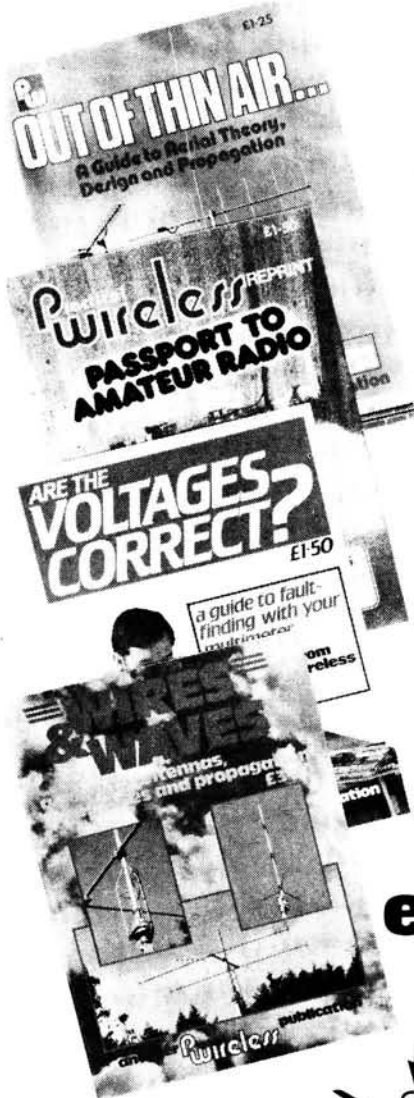
The IBA is proceeding with plans to advertise for contractors to provide up to three British television services by Direct Broadcasting by Satellite—following the announcement by the Home Secretary that sections 37–41 of the Cable and Broadcasting Act are being brought into operation.

If suitable contractors are found, the DBS services—receivable throughout the UK with the necessary equipment, of course—could be on the air before 1990.

The nature of these additional services—which could be funded either by advertising or subscription or by a combination of both—will be discussed with the applicants. The IBA will be looking for a variety of programming supplementary to the comprehensive output of ITV and Channel 4.

IBA's Director General, John Whitney, says, "We shall be proceeding with all speed while aiming to ensure that the firmest possible basis is laid."

PRACTICAL WIRELESS SPECIALIST REPRINTS



- **On Operating Techniques:**
Introducing RTTY_ £1.00
Introducing Morse_ £1.25
Introducing QRP_ £1.50
- **On Circuit Techniques:**
Practical Power Supplies_ £1.25
- **On Antennas and Propagation:**
Out of Thin Air_ £1.25
Wires and Waves_ £3.00
- **On Passing the RAE:**
Passport to Amateur Radio_ £1.50
- **On Fault-Finding:**
Are the Voltages Correct?_ £1.50



**Available from
PW rally and
exhibition stands
or see mail
order details ↓**



ORDER FORM

0202 678558

| Title, Price and Number Required | | Cost | |
|--|-----|------|---|
| | No. | £ | p |
| Out of Thin Air £1.25 | | | |
| Passport to Amateur Radio £1.50 | | | |
| Wires and Waves £3.00 | | | |
| Are the Voltages Correct? £1.50 | | | |
| Introducing RTTY £1.00 | | | |
| Introducing Morse £1.25 | | | |
| Introducing QRP £1.50 | | | |
| Practical Power Supplies £1.25 | | | |
| TOTAL COST | | | |
| Add Post & Packing (60p for one title; £1.00 for two or more) | | | |
| TOTAL MONEY TO SEND £ | | | |

Please send your order and remittance to:
**Practical Wireless, Post Sales Department,
Enefco House, The Quay, Poole,
Dorset, BH15 1PP.**

NAME.....
(BLOCK LETTERS)

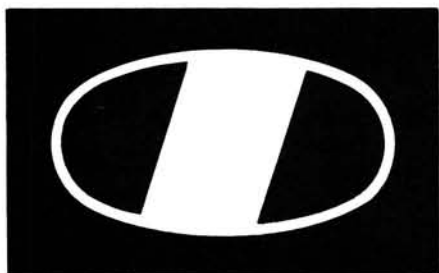
ADDRESS.....
(BLOCK LETTERS)

.....
.....

..... Post Code

I enclose P.O./Cheque No Value

UK remittances must be by crossed postal order or cheque (name and address on back please) and made payable to PRACTICAL WIRELESS or by Access. Remittances with overseas orders must be sufficient to cover despatch by sea or air mail as required. Payable by International Money Order only.



ICOM

25-2000MHz, Commercial Above and beyond



ICOM introduces the IC-R7000, advanced technology, continuous coverage communications receiver. It covers Aircraft, Marine, F.M., Broadcast, Amateur Radio, Television and Weather Satellite bands. The IC-R7000 incorporates FM wide/FM narrow, A.M., upper and lower SSB modes of operation with six tuning speeds: - 0.1, 1.0, 5, 10, 12.5, 25KHz. Frequency coverage 25-1000MHz and 1025-2000MHz (25-1000MHz and 1260-1300MHz guaranteed specification).

With the IC-R7000 you have normal tuning capability with the front panel tuning knob or for quick tuning of a desired frequency by using the front panel key-pad. A total of 99 memory channels are available for storage of received frequencies and operating mode.

Memory channels can be called up by pressing the memory switch then rotating the memory channel knob or by direct keyboard entry.

A sophisticated scanning system provides instant access to specific frequency ranges. By depressing the Auto M switch, the IC-R7000 automatically memorises frequencies that are in use, whilst in the scan mode and can be recalled later. The scanning speed is adjustable and the scanning system includes memory selected frequency ranges or priority channels. All functions including memory channel readout are clearly shown on a dual-colour fluorescent display with dimmer switch. Other features include dial-lock, noise blanker, S-meter and attenuator.



Thanet ICOM **Thanet ICOM** **Thanet ICOM** **Thanet ICOM** **Thanet ICOM** **Thanet ICOM** **Thanet ICOM** **Thanet ICOM** **Thanet ICOM** **Thanet ICOM**

IC-R7000

Commercial quality receiver and all competition



Actual Size

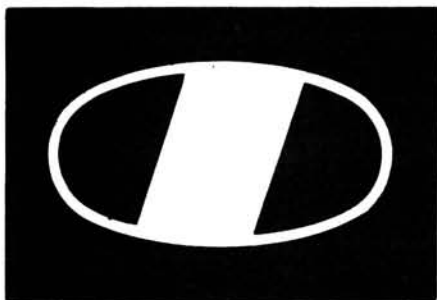
Options include: RC12 infra red remote controller, voice synthesizer, external loudspeaker, HP1 headphones and the ICOM AH-7000 super wideband omnidirectional discone antenna.

There are two ways of using this advertisement, one is to cut out the life-size photograph of the R7000 and paste it to the side of an old shoe box, who knows if your shack is dimly lit visiting Amateurs will be impressed by your excellent choice. The alternative (and one we strongly recommend) is if you are an Amateur or SWL call us on free HELPLINE 0800-521145 for the location of your local ICOM dealer where you can see and actually buy the competitively priced R7000, you have the choice.

Computer Control The IC-R7000 can be easily connected to a computer terminal via a very simple interface. Receiver control is performed serially in the IC-R7000 by ICOM's C1-V communication interface system. Operation is possible with a personal computer that has an RS-232c serial port.

| | | | |
|----|-------------------|-----|--------------------|
| H | HELP | ↔ | Frequency Steps |
| F0 | Frequency | ↑ ↓ | Up/Down (arrows) |
| F1 | Select Mode | M | Memory Channel |
| F2 | Freq/Memory Scan | ↕ | Memory Up/Down |
| F3 | Mode Scan | / | VFO/Memory |
| F4 | VFO → Memory | B | Bargraph Select |
| F5 | Memory Write | (a) | Occupancy On/Off |
| F6 | Memory Clear | : | Scan Stop Off/On |
| F7 | Set 'SIG' Level | S | Change Set |
| F8 | Memory File Read | DEL | Speech (If fitted) |
| F9 | Memory File Write | Q | Quit |

Tha-net ICOM Tha-net ICOM Tha-net ICOM Tha-net ICOM Tha-net ICOM Tha-net ICOM Tha-net ICOM Tha-net ICOM Tha-net ICOM



ICOM

**What's this? _IC-28E,
the very latest 2m. FM mobile
transceiver from ICOM.**



Contact us for the facts, NOW!

IC-271 & 471 Multimode Base stations

ICOM can introduce you to a whole new world via the world-communication satellite OSCAR. Did you know that you can Tx to OSCAR on the 430-440 MHz IC-471 and Rx on the 2m IC-271.

By making simple modifications, you can track the VFO's of the Rx and Tx either normally or reverse. This is unique to these ICOM rigs and therefore very useful for OSCAR 10 communications. Digital A.F.C. can also be provided for UOSAT etc. This

will give automatic tracking of the receiver with digital

readout of the doppler shift. The easy modifications needed to give you this

unique communications opportunity are published in the December '84 issue of OSCAR

NEWS. Back issues of OSCAR NEWS can be obtained from AMSAT (UK), LONDON E12 5EQ.

This range includes the IC-271E-10W, IC-271E-25W, 271H-100W and the 70cm versions IC-471E-25W and 471H-75W r.f. output. The 271E has an optional switchable front-end pre-amp. The 271H can use the pre-amp AG-25, with the 471E and 471H using the AG35 mast-head pre-amp. Other options include internal switch-mode PSU's: the 271E and 471E use the PS25 and the 271H and 471H use the PS35.



Thanet ICOM **Thanet ICOM** **Thanet ICOM** **Thanet ICOM** **Thanet ICOM** **Thanet ICOM** **Thanet ICOM** **Thanet ICOM** **Thanet ICOM** **Thanet ICOM**



ICOM

IC-02E/04E Handportables

These direct entry micro-processor controlled handhelds, one for 2 metres, the other for 70 centimetres. Scanning, 10 memories, duplex offset storage in memory and odd offsets also stored in memory. Keyboard entry is made through the 16 button pad allowing easy access to frequencies, duplex, memories, memory scan and priority. They have a LCD readout indicating frequency, memory channel, signal strength, transmitter/output and scanning functions. A range of accessories include the HS10 Headset and boom microphone, HS10SB PTT switch box with pre-amp, HS10SA voice operated (VOX) switch box. The IC-2E and IC-4E still continue to be available.



HS10



WANT TO LEARN MORE?

Telephone us free-of-charge on:

HELPLINE 0800-521145.

— Mon-Fri 09.00-13.00 and 1400-17.30 —

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.

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.

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.
Eastern Communications, Norwich, 0603 667189.

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.
South Midlands Comms. & branches, 0703 867333.
Tyrone Amateur Electronics, Co. Tyrone, N. Ireland, 0662-42043.
Reg Ward & Co. Ltd., S.W. England, 0297-34918.
Waters & Stanton Electronics, Hockley, Essex, 0702-206835.

Thanet Electronics
Sea Street, Herne Bay, Kent CT6 8LD
Tel: (0227) 363889
Dept. FW

There are a great many meteorological stations broadcasting weather maps using facsimile transmission in the h.f. bands. I have copied traffic from Moscow, Madrid, New York, Copenhagen, Halifax (Canada) and Rome Meteo stations as well as Bracknell. Before looking at the schedules and transmission frequencies for meteo facsimile.

The characteristics that determine between transmitter and receiver are

Meteo facsimile transmission schedules always list the appropriate drum speed/IOC combination in the form 120/576. Some stations change the combination during their daily schedule. Receiving and transmitting equipment can be set to different speeds or IOCs and some communication achieved, but the resulting picture will be distorted although recognisable. For example, with the IOC set for 288 when receiving a transmission based on an IOC of 576, the received picture will be expanded in scale.

Meteo facsimile broadcasts use similar transmission characteristics to commercial facsimile machines designed for use over the public switched telephone network (PSTN). Such machines using the meteo-style analogue decoding are rapidly being replaced by digital machines. It is likely, therefore, that surplus equipment may be avail-



able if you can but find it. The likes of Infotec, Interscan, Plessey or Xerox may be sitting on warehouses full of old FAX machines!

FAX Broadcasts

The main source of facsimile traffic in the UK, and the place to become familiar with the rhythmic sound of FAX, is Bracknell. There are two main groups of transmitters as shown in the Table. Each station of a group transmits the same information. All transmissions use F3C modulation as described previously and are from 10kW transmitters.

Group 1 stations transmit about fifty different maps every 24 hours and Group 2 stations originate about a hundred. A transmission schedule, available to licence-holders from the Meteorological Office, lists the full set and shows for each transmission the time, drum speed and IOC, chart identification, observation time, map area, and a description of the map contents.

For example, at 0952UTC, Group 1 transmitters are scheduled to transmit at 120/288, chart FXNT EGRR (report identification and originating station) observed at 0000UTC for map area G and showing the North Atlantic wave prognosis for the following 48 hours. The schedule lists also the relevant map areas used for these transmissions.

The print-out in Fig. 3.1 shows a facsimile transmission received from the Italian Air Force meteo station in Rome on 8.146MHz of data received from the National Meteorological Centre, New York (KWBC). The chart Fig. 3.2 is a transmission from Bracknell (identified as station EGRR) of a sea-ice chart (data identifier AXNT) received on 4.782MHz at a drum speed of 120 r.p.m. and an IOC of 576.

The latter map was received fully automatically since the tones preceding the transmission (and indicating drum speed and IOC) will start the Muirhead FAX receiver in use at the author's shack. This does require that all the equipment is very stable, since the filters on the Muirhead are quite narrow. The slightest drift as equipment warms up will take signals out of the filter passbands and the tones will not be recognised. It is usually necessary to have both receiver and FAX machine switched on for at least an hour before automatic operation can be relied upon. Receiver drift during reception of a chart will show up as reduced definition or clarity.

| | Callsign | Frequency | Hours (UTC) |
|---------|----------|-----------|-------------|
| GROUP 1 | GFA21 | 3.289MHz | 0000-2400 |
| | GFA22 | 4.610MHz | 1800-1600 |
| | GFA23 | 8.040MHz | 0000-2400 |
| | GFA24 | 11.086MHz | 0000-2400 |
| | GFA25 | 14.582MHz | 0600-1800 |
| GROUP 2 | GFE25 | 2.618MHz | 1800-1600 |
| | GFE21 | 4.782MHz | 0000-2400 |
| | GFE22 | 9.203MHz | 0000-2400 |
| | GFE23 | 14.436MHz | 0000-2400 |
| | GFE24 | 28.261MHz | 0600-1800 |

Table 1

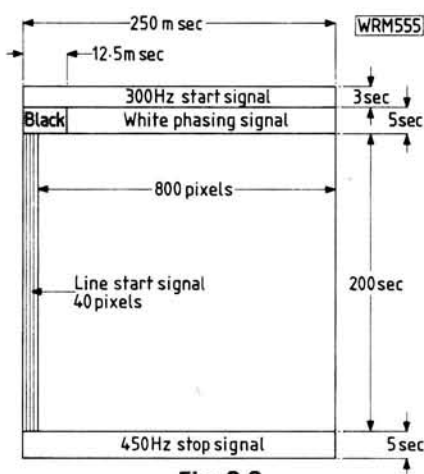


Fig. 3.3

Weather Satellites

The preceding may seem rather prosaic next to the possibility of receiving weather data from satellites. However, the experience gained as a short wave meteo listener is never wasted and the facsimile receiving equipment can be used as the basis for receiving pictures from satellites.

The NOAA (US) and Meteor (USSR) groups of weather satellites broadcast APT (automatic picture transmission) signals compatible with equipment previously used for h.f. picture reception. Note, however, that the APT pictures use 16 levels of grey scale for higher resolution of sub-orbital land masses.

The modulation mode is F3C, as on h.f., but using a 2.4kHz sub-carrier on NOAA and a 2.5kHz sub-carrier on Meteor. The resolution obtainable on a NOAA picture is 4km. The transmission is on 137.5MHz (NOAA 8) using right-hand circular polarisation and a transmission power of 5 watts. Drum speed is 120 and IOC is 576.

The reader should note that the carrier deviation of these signals is ± 17 kHz, and this requires a receiver of correspondingly high bandwidth. The current state of scanning receivers covering the satellite sub-band at v.h.f. (136-138MHz) are not therefore suitable for APT reception purposes. Suitable receivers are available but tend to be expensive.

NOAA 8 has also a high-resolution picture transmitter (HRPT) transmitting 5W on 1698MHz right-hand circular. The data on this channel gives sub-orbital ground pictures with a resolution of 1.1km. The APT data is derived from the HRPT data by way of an averaging algorithm.

A beacon is also transmitting from NOAA 8 on 136.77MHz. The digital beacon data contains multiplexed satellite housekeeping and low-rate instrument data transmitted at 8320 bits per second in a series of frames repeated every 32 seconds. Detailed information for the beacon data together with a wealth of information describing the collection and subsequent transmission of HRPT and APT data is contained in the Annex to World Meteorological Publication No. 411.

Meteosat

A system for receiving NOAA and Meteor APT pictures is a major step towards receiving whole-Earth pictures from Meteosat. This is because a converter can be obtained to translate the Meteosat frequency of 1694MHz to the v.h.f. satellite sub-band. Thus a v.h.f. system can receive Meteosat with the addition only of an antenna and converter. Meteosat is in geostationary orbit some 35 000km above the Earth's surface and signals from its 18dBW transmitter are therefore quite weak for terrestrial reception. Hence the use of a dish antenna with the conversion to v.h.f. at the antenna feed, to obviate the need for high-grade, low-loss s.h.f. feeder cable.

Meteosat data is transmitted in digital form to primary data user stations (PDUS) where extensive computing facilities are required for data evaluation. The Meteosat Ground Computer System in the European Space Operations Centre at Darmstadt in West Germany receives PDUS data and processes it to a form compatible with APT systems. The data is sent back to Meteosat for retransmission to suitable equipped APT stations.

In addition to sending back reprocessed APT-compatible Meteosat pictures, Darmstadt also sends APT-compatible pictures received via the US weather satellite GEOS. Thus Meteosat users can receive pictures for areas not directly visible from that satellite.

The print-out Fig. 3.3 shows the Meteosat APT picture format complete with 300Hz start signal, phasing signal, data and 450Hz stop signal. This format is the same as NOAA APT pictures. The start phasing and stop signals are the same as those used on h.f. transmissions. These allow the use of unattended receiving stations—a particularly useful facility for the polar orbiting satellites (NOAA and Meteor series) which overfly any fixed ground station for only about 14 minutes of each 100-minute orbit.

PW

More Information

In addition to the Meteorological Office, intending weather forecasters will find the following sources useful:

Decoding details:

News sheet: M. W. Stubbs, Meteorological Broadcasts, Royal Meteorological Society, James Glaisher House, Grenville Place, Bracknell RG12 1BX.

Weather (monthly): Royal Meteorological Society, address as above.

Various: World Meteorological Organisation, Geneva, Switzerland.

NOAA orbital data: Bracknell RTTY broadcast daily about 2000UTC (data—TBUS KWBC).

Meteosat data: ESA Operations Centre, MDMD/OPS, Robert Bosch Str 5, 6100 Darmstadt, West Germany.

50MHz from Day 1

Following an initial experimental period of amateur activity on the 50MHz band by 100 UK special permit holders the DTI opened the band to UK Class A licensees on 1 February 1986. This report, compiled by John M. Fell G0API provides an initial insight into activity during the first week of 24 hour operation.

It's not too often that an all new amateur band allocation is made available and so the long awaited *London Gazette* announcement of 20 December 1985, regarding UK amateur access to spectrum at 50MHz, was received with more than average enthusiasm.

With Day 1 set at Saturday, February 1 it appeared that there would be plenty of time to prepare all the necessary equipment—January seemed to pass very quickly and was notable only for the lack of any real DX on most of the v.h.f. bands. Even the stalwart activities of the 50MHz special permit holders dwindled away—not surprising really when you consider the many hours of effort put in chasing contacts after TV hours and before 0830. Having managed to log 56 of their number during the last 6 months of the experiment, I for one would like to publicly thank them all for all their efforts which have now resulted in the present allocation.

At five minutes to midnight the

headphones went on and a check was made on the band to make sure everyone was holding back. How wrong can you be? Far from the deserted wastes, the band was jumping with signals, yes the permit holders were having a last fling! Having added several new call-signs to the list, the time arrived and 30 seconds into Day 1 G3RJL in Weymouth, some 40km distant, was called and 5/9 reports passed both ways.

Equipment

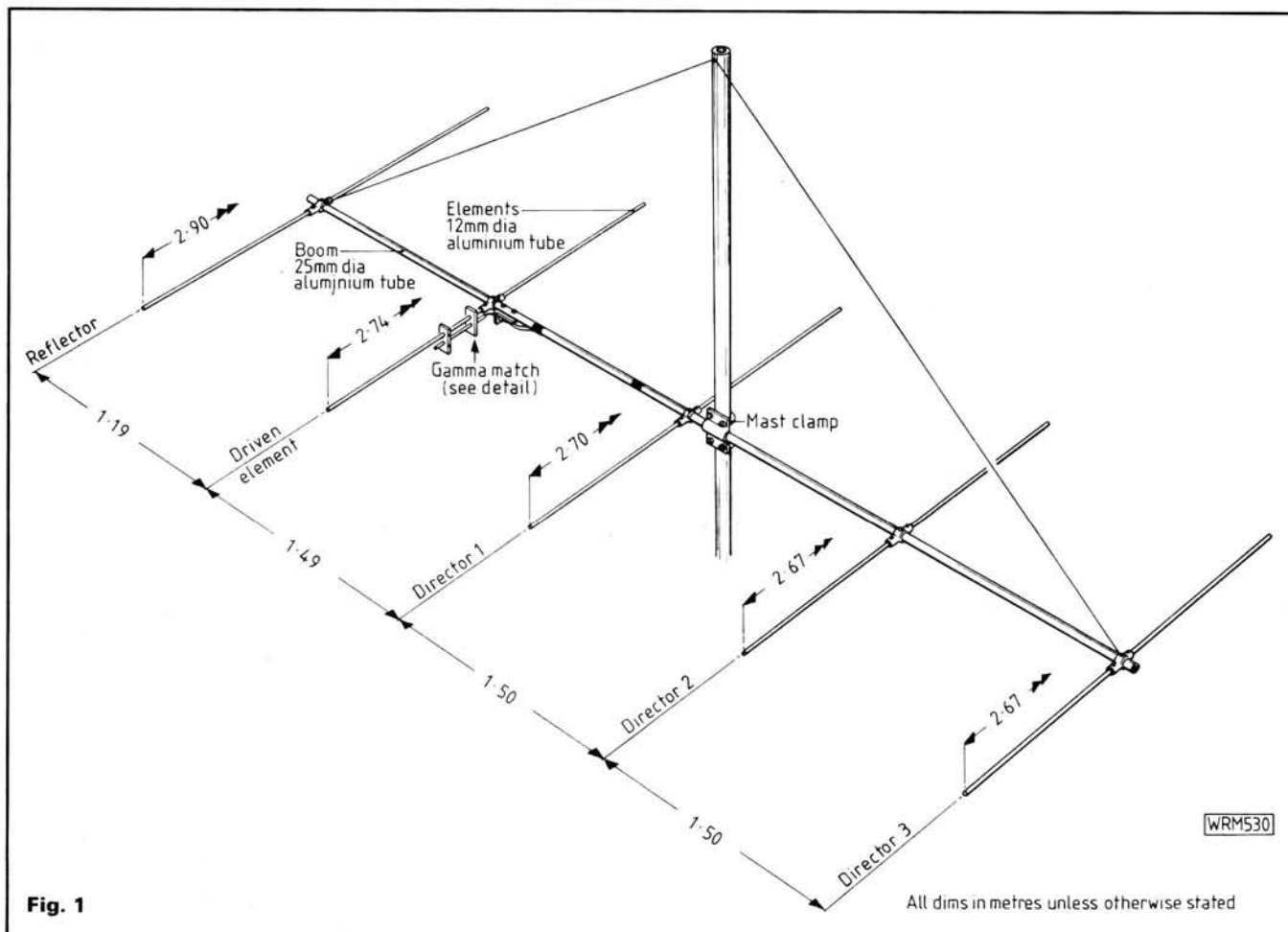
Several more local contacts ensued before a rather bemused but less enthusiastic XYL demanded QRT. Reports received afterwards suggested that the band was well and truly christened with activity going on well into the early hours and contacts over ranges of up to 250km being available. The RSGB HQ staff were active from Potters Bar—GB3NHQ (for a few hours) was not!

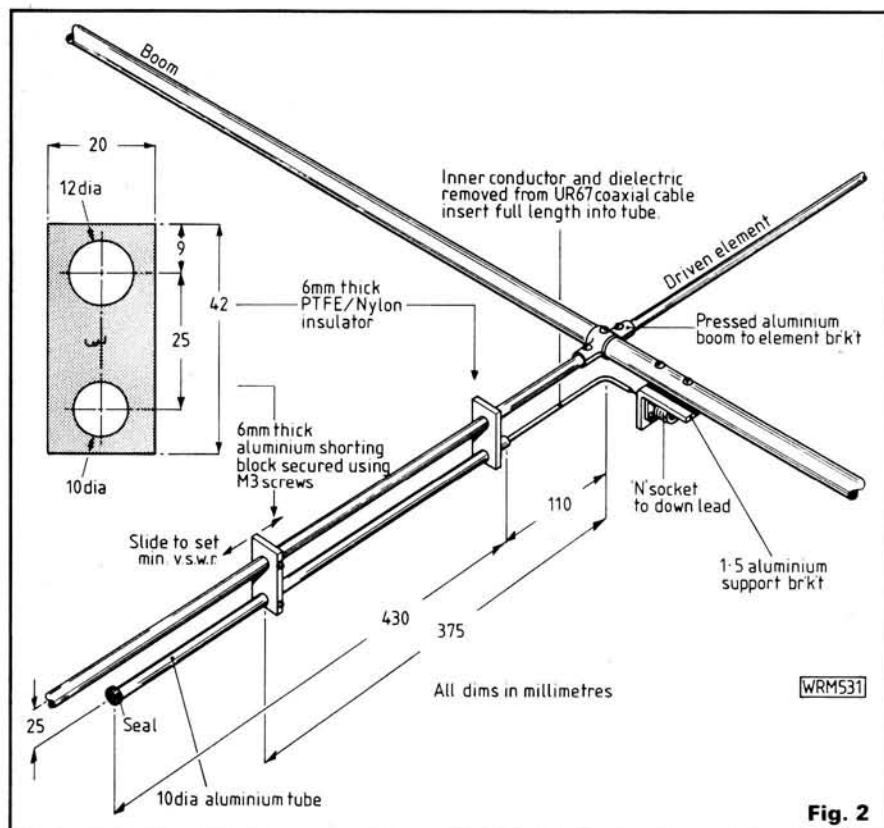
So much for the start: what sort of equipment is being used, and to what

effect? Well here at G0API the 50MHz set-up comprises a Shimizu SS-105S transceiver driving, at 28MHz, a PW Meon Transverter (what else!). A Spectrum Communications p.a. provides further gain and has been set for 10W p.e.p. thus ensuring that when used in conjunction with a 5-element NBS Yagi and 35m of UR-67 feeder the system stays within the 20dBW e.r.p. limits.

Transverters seem to be popular, with home-brew and commercial designs all providing good results—28MHz i.f.s predominate. As with all bands populated with multiple high level signals the use of high dynamic range, selective receivers becomes more of a necessity—50MHz is no exception in terms of signal levels.

From observations and contacts made during the subsequent days of the first week it became obvious that antenna installations varied between the h.f. operator "running here a link-coupled G5RV", to the v.h.f. orientated station with his 3, 4, 5 or even 7-





element Yagi beam. The largest system yet encountered consisted of two phased 5-element Tonna Yagis—no mean feat when you consider that for optimum aperture the stacking distance should be near to 1.5λ .

I personally would advocate the use of a rotatable beam, with its antenna directional selectivity advantages and passive system gain. For those who just cannot find the extra space, the single and double size G5RV does work well but, as theory dictates, with predominant fixed lobes favouring its main axis. My half-sized version of this antenna, which is only some 6m a.g.l. at its highest point and fed via 75 Ω coaxial cable, provides an absolutely flat load and can be directly connected to the p.a. output.

Operating

Turning next to operating practice the RSGB band plan has been largely adopted, but with *de facto* calling frequencies established at 50-100MHz for c.w. and 50-200MHz for s.s.b. during "normal" conditions. Some n.b.f.m. activity has been observed above 50-400MHz and this follows the narrow deviation format established on 28MHz. For those monitoring in conjunction with a 144MHz i.f. the recovered audio will be perfectly readable but noticeably low level.

From my QTH here in Dorset (IO80) the GB3NHQ beacon at Potters Bar normally averages a 5/3 signal but is often subject to slow QSB which is a characteristic of 50MHz. Tropospherically related enhancement has been noted but appears less pronounced than at 144MHz. If meteor scatter propagation has never appealed to you

before, the far greater incidence of this phenomenon at 50MHz (caused by signal reflection from briefly ionised patches of the upper atmosphere) may well be an eye/ear opener. Setting your receiver to a known beacon frequency will produce many different effects, ranging from the brief "ping" or rapidly cut-off metallic sounding "clunk" to occasional bursts of high level signal, sometimes for up to 30 seconds or more. All UK beacons are receivable by this mechanism and the likely intensity can be predicted by reference to known meteor showers.

The coming Summer months from May onwards should see other propagation effects becoming more obvious, and amongst these sporadic-E will no doubt provide the potential for long range contacts. With the Sunspot minima yet to be reached, International F2 layer propagation is still a long way off. The limitation will be on the availability of suitably equipped stations outside the UK. It is believed that Portugal will soon have some 50MHz activity. Certainly during previous years both the Gibraltar beacon ZB2VHF, 50-035MHz, and the Cyprus beacon 5B4CY, 50-499MHz, have provided many hours of S9+ signals throughout the UK. Within Europe it is probable that other in-band contacts will occur with stations in EI, LA and PA—albeit subject to TV hours operation restrictions.

Returning from the probable, Day 7 of 50MHz operations will probably go down in history as marking the onset of an extremely large auroral event. At 1630 on February 7, I once again tuned across the full 0-5MHz bandwidth and was amazed to find steady signals from the GB3RMK beacon, 50-060MHz, in Northern GM. Whilst steady however,

the c.w. was far from pure and had the characteristic rasp of auroral propagation. Continuing to tune the band further c.w. activity was evident from Scotland with at least four separate GM stations calling CQ. The adrenaline started to flow from then on as the first s.s.b. signals arrived. At 1701 I called Dave GM3WIL at Prestwick (IO75QL) who exchanged 5/9 aurora reports. My beam heading for peak signals at this time was some 40° to the east of north. Even more surprising was the description of the equipment used by GM3WIL—a home-brew 3-element beam, at modest height, fed by a 6W p.a. stage driven from... yes, you've guessed it, a *PW* Meon!

Activity on 50MHz picked up very rapidly from then on and in Southern England the event lasted until at least 1830. The Anglesey beacon GB3SIX was heard but, unlike the more northerly GM stations, had to be beamed at directly for peak signals. This device on 50-020MHz has an e.r.p. of 100W and beams due west. Before the band lapsed into a more normal mode, contacts were made with GM4YPZ at Montrose (approximately 60km south of Aberdeen) and GM3WOJ, 10km north of Inverness (IO77WO).

There was a strong temptation to QSY upwards when GM4YPZ mentioned having contacted stations in DL that afternoon on 430MHz! Subsequent information has revealed that 144MHz s.s.b. and c.w. contacts were made between Northern G and Russia, Poland, Yugoslavia and Scandinavia—clear evidence of a very extensive opening.

Best DX

It is known that auroral events often exhibit several distinct active periods or phases, in this case the second phase, certainly in the Southern part of the UK, started during the following afternoon at approximately 1330. Once again the appearance of strong auroral note c.w. heralded the start of the fun, which continued throughout the afternoon until at least 1900. Even after this time GB3SIX continued to be audible, with regular QSB, but unlike the previous day's emergence, signal peaks occurred at beam headings of up to 300°—some 60° west of true. Conversely, the northern stations were peaked more closely to true heading. Many stations throughout the UK took part in this second phase with many working squares never before contacted on v.h.f.

When conditions are so good it is only human nature to go for the best available DX and inevitably this produced some enormous pile-ups for all the GM, GI and EI stations. However, the "true" best DX probably occurred when Southern G stations exchanged full auroral reports. Dave G3PBV at Hennock near Exeter worked Brian G4WEY in Wimborne with 5/7A reports—both stations being nearly at the same latitude along the South

Coast and a very long way from the auroral curtain. Even GJ stations were heavily into the event—did it reach CT?

During such conditions the use of a directional antenna allows the best reflection point to be tracked but it was equally obvious that very modest power levels, some in the milliwatt range, and even indoor dipoles produced mouthwatering DX. Tony G3PFM (IO80) exchanged 5/9A reports with GM3JII at Stornoway (WS69C) on the Outer Hebrides, remarkable to think that the GM station was using a barefoot FT-690 and a 4-element beam that was actually sat flat on his garage roof. Some London stations apparently worked 140 contacts during this event, taking full advantage of the much reduced auroral "scrambling" at 50MHz to use s.s.b. with "contest style" report exchanges. Towards the close of the auroral opening in the early hours of February 9 several contacts occurred by a mechanism labelled as auroral-E which can produce equivalent DX but without the tell-tale auroral rasp. Certainly the month of February had produced similar auroral events in years past so perhaps the start up date was indeed well planned.

Clearly the first few days on 50MHz produced far more than most ever

expected, and has left many wondering about future propagation effects.

Les G4XMX in Manchester was one who anticipated the aurora. He had been warned by the Rutherford-Appleton Laboratory that a large X-ray flare had occurred on the visible disc on the sun at 0400 on February 4, following a progressive build up of solar noise during the previous two days. This noise is still clearly evident up to 144MHz as I write this on February 10, together with the attendant suppression of h.f. band propagation below 28MHz.

Those who took part or monitored this event are urged to send reports to Charlie Newton G2FKZ, the IARU co-ordinator, and also our own v.h.f. correspondent, Ron Ham.

50MHz NBS Yagi

As mentioned previously, the Yagi beam antenna used at G0API is based on NBS data. Constructional details are shown in Fig. 1 and should be easy to duplicate. The use of ready-made pressed aluminium boom-to-element clamps allows rigid construction and economy of materials as the element tubes are split at the clamp points.

The use of a 25mm diameter boom may be considered to be tempting fate but if formed from seamless tube of the

type used for TV antenna masts and supported by guy ropes the structure is quite durable. The prototype has survived without mishap for nearly six months and remains straight.

Gamma matching techniques have proved to be a ready means of feeding from 50Ω unbalanced (coaxial) sources and the arrangement shown is simple, but effective. To avoid drilling and tapping the long lengths of ptfе which normally form the dielectric of the tubular matching section capacitor, this arrangement uses the centre conductor and dielectric from normal UR-67 coaxial cable. If you have an old Jaybeam 144MHz antenna element it will be found that the tube bore is a reasonably close fit on the cable. With the antenna elements clear of the ground, v.s.w.r. adjustments are made by sliding the aluminium shorting block along the capacitor tube/driven element. It should be possible to obtain a v.s.w.r. of below 1.3:1 over the bandwidth. Forward gain will be approximately 7dBd, with reasonable front to back ratio and a 3dB beamwidth of some 40°.

The boom-to-element clamps and suitable plastics element plugs, essential to prevent "organ pipe" resonance, can be obtained from Aerial Techniques, 11 Kent Road, Parkstone, Poole, Dorset. Tel: (0202) 738232. **PW**

ERRORS & UPDATES

PW Radio Programs—7 BBC-B "SATRACK"

Some users of this program have experienced problems concerning the year input routine, caused by the year being input as 1986 instead of 86 in the DATA part of the "S1" program.

The author, Norman Dille G8YBT, has sent us the following modifications to the program to overcome the problem and also to extend the *Sidereal Time Table* to 1990. Follow the instructions exactly.

LOAD "S1" (Do not RUN)

Substitute LINE 540 with the following:

```
540 IF N=8 REPEAT PRINTAB
(0,10); STRING$(38," "); PRINTAB
(3,10); CHR$134; X$; CHR$131;
TAB(17); INPUT Y3: PROCyrchk:
UNTIL Y3>80 AND Y3<91
```

LOAD "S2" (Do not RUN)

Add the following LINES:

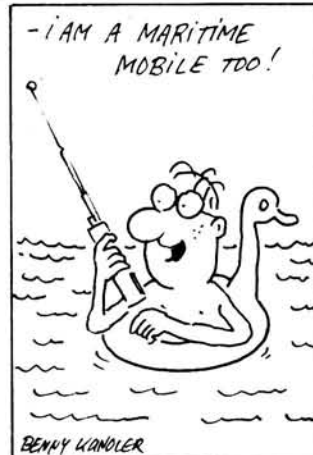
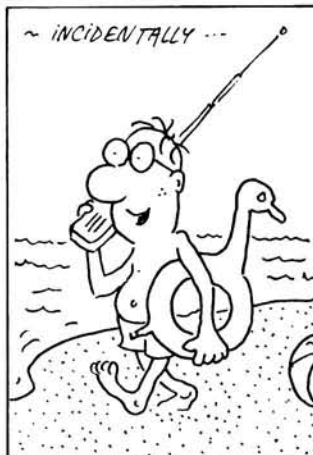
```
1161 DATA 86,0-27601916
1162 DATA 87,0-27535606
1163 DATA 88,0-27469296
```

```
1164 DATA 89,0-27676777
1165 DATA 90,0-27610467
```

SAVE "S2"

"SATRACK" is recorded on the cassette in three parts, each part CHAINED to the next. To make a new copy of the program it is necessary to LOAD "SATRACK" and then SAVE "SATRACK" onto a clean tape. Next LOAD "S1" from the original tape, carry out the amendments and SAVE "S1" onto the new tape immediately following "SATRACK". Repeat this process for "S2". Note that you must LOAD, not CHAIN and that you must not RUN any of the programs after loading. If desired you can LIST any of the programs after LOADING them.

BENNY



Michael Faraday

Sometimes referred to as the "father of electricity", Faraday's career as a scientist did not begin until he was 21. Born in 1791, he came from a poor family, and had very little formal education. At 14, he was apprenticed as a bookbinder, stationer and bookseller, and in this trade developed the manual dexterity and practical approach which distinguished his research in later years.

He read scientific books passing through his hands, and undertook such simple experiments as he could afford with a limited income. He attended four lectures by Sir Humphry Davy at the Royal Institution, using tickets given to him by a customer. He took careful notes which, using the skills of his trade, he bound and sent to Davy, asking his advice and assistance in commencing a scientific career.

In 1813, with Davy's support, he was appointed as a laboratory assistant at the Royal Institution. He accompanied Davy on a tour of Europe during the next two years, meeting some of the most famous scientists of the time, including Ampere and Volta. Returning home, he enthusiastically took up chemistry and by 1820 had acquired a reputation as an expert analyst.

That year, he was persuaded to review the electrical experiments and theories of others, following Oersted's recent discovery of electromagnetism. He was reluctant to turn from chemistry, but changed his attitude when he discovered that a magnetic pole would rotate around a wire, so long as a current flowed in the wire—in effect, the first primitive electric motor.

Director of the RI Lab

In 1825, he was appointed Director of the RI laboratory. He instituted the Friday evening discourses which helped popularise science amongst influential Victorians, and, in 1833, was made the Institution's first Fullerian professor of chemistry.

In 1831, both he and Joseph Henry (in the USA), working independently of each other, discovered the effects of electrical induction. Faraday wound an electromagnet on a thick iron ring, with two separate windings, one on each side of the ring. When a current was switched through the primary winding, a galvanometer, wired to the secondary coil, moved. Faraday published his findings first. The discovery of mutual inductance was credited to him, and that of self-inductance to Henry.

Faraday subsequently invented the *Practical Wireless*, July 1986

NAMES from the PAST

by Tony Smith G4FAI



Photo courtesy of the Science Museum

dynamo, and this led to another field of research. There was much confusion at the time about the production of electricity from different sources, e.g. electrical machines (static electricity), voltaic cells, thermocouples, electric fishes, and now, the dynamo. It was generally believed that each had its own characteristics, resulting in different types of electricity. Faraday thought otherwise, and his work to prove this led to his laws of electrolysis, and the foundations of electrochemistry.

In 1839, after eight years of intense experimentation and intellectual effort, in which he had probed and expanded the known frontiers of electrical science, he suffered a nervous breakdown. For the next five years he concentrated on the affairs of the RI, and on less demanding scientific work. In 1845, he discovered the effect of a magnetic field on polarised light, known as the Faraday effect, and in 1846 published an early approach to the electromagnetic theory of light, later developed by Maxwell.

Illustrated Lectures

After 1850, he concentrated on teaching, and his lectures, illustrated by experiments, became famous. He resigned from the RI in 1862, and retired to a "grace and favour" house at Hampton Court, provided by Queen Victoria at the suggestion of Prince

Albert, and there he died in August 1867.

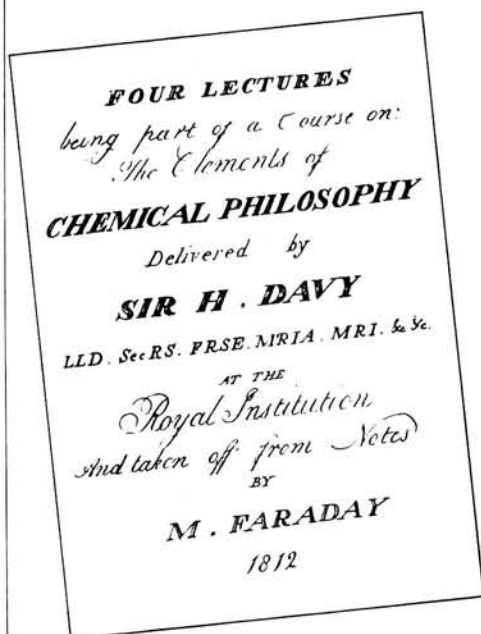
Noted above all else for his work on electromagnetism, his other scientific work was incredibly varied, and included the discovery of benzene, the experimental production of superior steel alloys, on which the later work of Bessemer and others was based, experiments on optical glass, and the condensation of gases.

With Sir Charles Lyell, a geologist, he investigated the cause of an explosion in a Durham coal-mine. He served on a committee set up to consider the preservation of paintings in the National Gallery, and studied the varnishes used to cover them.

He was consulted about preserving the Elgin Marbles in the British Museum and for many years lectured on chemistry at the Royal Military Academy, Woolwich. He was scientific adviser to Trinity House, and suggested new visual and aural warning systems for their lighthouses. He was one of the first Senators of London University, and declined the Presidency of the RI in 1864.

He was a deeply religious man, a member of a sect known as the Sandemanians, but he kept his work and his religion apart all his life. He is remembered today through the unit of electrical capacitance, named "farad" in his honour; by the Faraday medal, the highest award of the IEE; and by the various scientific laws named after him. He was one of the truly great pioneers of modern science.

From Michael Faraday of the Royal Institution by Ronald King. Courtesy of The Royal Institution of GB, London.



MODS No. 36 Roger Hall G4TNT (Sam)

What can the FT-2700RH do? Roger takes a look at some ideas.

FT-2700RH

The Yaesu FT-2700RH is a very versatile radio that has obviously been designed for worldwide use. Kris G8AUU, has been playing with one that was loaned to him by Bernie at A.R.E. Communications. He has discovered that it is possible to programme it to cover virtually every band that is available to amateurs anywhere. If you are anticipating taking yours abroad, Kris's mods will show you how to set the appropriate band edges and channel spacing.

To take the rig apart follow the instructions in the operating manual for fitting the optional FVS-1 voice synthesiser unit except for the front panel. This should be pivoted upwards on the upper pair of countersunk side mounting screws. This will hinge the front panel away from the wiring harness.

Unscrew and lay back the small switch panel and this will reveal the control unit p.c.b. on which the two v.l.s.i.c.s (Q4001 and Q4002) are located.

UHF Options

Just below the lefthand chip (Q4002—HD44750FM) there are three diode positions—D4013, D4014 and D4015. These are marked BJU0, BJU1 and BJU2 on the circuit diagram but only the two diodes, D4013 and D4014, are fitted. By using all three positions, eight options are available—see Table 1.

MODE 0

This is the u.h.f. inhibit mode.

MODE 1

This is for standard North American 440MHz operation.

MODE 2

This 430–450MHz version of Mode 1 is needed in the metropolitan areas of North America where 440MHz is overcrowded.

| Mode | BSV | Call 2 (MHz) | Rpt. (kHz) | Step | Band (MHz) |
|------|-------------------------|----------------------------------|----------------------|--------------------------|-------------------------------|
| | D4015 D4014 D4013 | 433-0 433-4 435-0 435-0 | +1-6 +5-0 +7-6 | 10/5 20/10 25/12.5 | 430-440 430-450 440-450 |
| 0 | 0 0 0 | 0 0 0 0 | 0 0 0 | 0 0 0 | 0 0 0 |
| 1 | 0 0 1 | 0 0 0 1 | 0 1 0 | 0 0 1 | 0 0 1 |
| 2 | 0 1 0 | 0 0 0 1 | 0 1 0 | 0 0 1 | 0 1 0 |
| 3 | 0 1 1 | 0 1 0 0 | 1 0 0 | 0 0 1 | 1 0 0 |
| 4 | 1 0 0 | 0 1 0 0 | 0 0 1 | 0 0 1 | 1 0 0 |
| 5 | 1 0 1 | 0 0 1 0 | 0 1 0 | 0 0 1 | 1 0 0 |
| 6 | 1 1 0 | 1 0 0 0 | 0 1 0 | 0 1 0 | 1 0 0 |
| 7 | 1 1 1 | 1 0 0 0 | 0 1 0 | 1 0 0 | 0 1 0 |

MODE 3

This is the standard IARU Region 1 version as supplied to the UK.

MODE 4

This is the same as Mode 3 apart from the repeater shift which is changed to ± 7.6 MHz, making it suitable for use on the extensive West German, Austrian and Swiss repeater network.

MODE 5

This is the version that is supplied to Australia and New Zealand.

MODE 6

This is the Japanese domestic version.

MODE 7

Mode 7 is the same as Mode 6 except for the channel spacing which is 5/10kHz instead of 10/20kHz.

VHF Options

Immediately below and just underneath the two i.c.s. (Q4001 and Q4002) are the fitting holes for diodes D4009, D4010, D4011 and D4012 and again only two (D4009 and D4012) are fitted. These diodes are marked BSV0, BSV1, BSV2 and BSV3 on the circuit diagram and Table 2 shows the sixteen options that are available by inserting the appropriate diodes.

MODE 0

In this mode v.h.f. is inhibited.

MODES 1, 2, 3 and 4

In these modes the frequency is locked to 151-600MHz and none of the v.h.f. controls are active.

MODE 5

This is probably for the Asian (India, Singapore and PR of China) market where the 144MHz band is only 2MHz wide instead of the usual 4MHz.

MODE 6

144–154MHz coverage as in Mode 7.

MODE 7

This is for both the North and South American markets. The only difference between type A and type E is the frequency of the tone burst (A = 1800Hz and B = 1750Hz).

MODE 8

140–150MHz coverage otherwise as Mode 7.

MODE 9

This version is the one that is supplied to the UK for standard Region 1 operation.

MODE 10

This mode gives standard New Zealand and Australian operation.

MODE 11

140–150MHz coverage otherwise as Mode 10.

MODE 12

144–154MHz coverage otherwise as Mode 10.

MODE 13

144–154MHz coverage otherwise as Mode 14.

MODE 14

This is the standard Japanese home market version but as there are no 144MHz band repeaters in Japan, the offset switch would be inhibited giving

Table 2 ▶

| Mode | BSV | Call 1 | Rpt. (kHz) | Step (kHz) | Band (MHz) |
|------|----------------------------------|-------------------------|------------|--------------------------|--|
| | D4012 D4011 D4010 D4009 | 145-0 147-0 151-6 | +600 | 10/5 20/10 25/12.5 | 144-146 144-148 140-150 144-154 |
| 0 | 0 0 0 0 | 0 0 0 | 0 | 0 0 0 | 0 0 0 0 |
| 1 | 0 0 0 1 | 0 0 1 | 0 | 0 0 0 | 0 0 0 0 |
| 2 | 0 0 1 0 | 0 0 1 | 0 | 0 0 0 | 0 0 0 0 |
| 3 | 0 0 1 1 | 0 0 1 | 0 | 0 0 0 | 0 0 0 0 |
| 4 | 0 1 0 0 | 0 0 1 | 0 | 0 0 0 | 0 0 0 0 |
| 5 | 0 1 0 1 | 1 0 0 | 1 | 1 0 0 | 1 0 0 0 |
| 6 | 0 1 1 0 | 0 1 0 | 1 | 1 0 0 | 0 0 0 1 |
| 7 | 0 1 1 1 | 0 1 0 | 1 | 1 0 0 | 0 1 0 0 |
| 8 | 1 0 0 0 | 0 1 0 | 1 | 1 0 0 | 0 0 1 0 |
| 9 | 1 0 0 1 | 1 0 0 | 1 | 0 0 1 | 1 0 0 0 |
| 10 | 1 0 1 0 | 0 1 0 | 1 | 0 0 1 | 0 1 0 0 |
| 11 | 1 0 1 1 | 0 1 0 | 1 | 0 0 1 | 0 0 1 0 |
| 12 | 1 1 0 0 | 0 1 0 | 1 | 0 0 1 | 0 0 0 1 |
| 13 | 1 1 0 1 | 1 0 0 | 1 | 0 1 0 | 0 0 0 1 |
| 14 | 1 1 1 0 | 1 0 0 | 1 | 0 1 0 | 1 0 0 0 |
| 15 | 1 1 1 1 | 1 0 0 | 1 | 0 1 0 | 0 0 0 1 |

Table 1 ▼

ARE COMMUNICATIONS LTD

FOR THE PROFESSIONAL

WE STOCK AND DEMONSTRATE THE LATEST IN COMMUNICATION RECEIVERS

NRD 525 - ICR71 - FRG8800 - KENWOOD TR2000 - AIRBAND - MARINE.
RECEIVERS + TRANSCEIVERS - VHF + UHF SCANNERS - HF TRANSCEIVERS

ARE COMMUNICATIONS, 6 ROYAL PARADE, HANGER LANE, EALING, LONDON W5A 1ET, ENGLAND
TELEPHONE: 01-997 4476

PRACTICAL WIRELESS KITS

| | | |
|---|------------------|--------------------|
| P.W. ARUN PARAMETRIC FILTER - inc. specified case | May '86 | £53.00 + £2 p&p |
| P.W. ARUN PARAMETRIC FILTER - excluding case | May '86 | £40.00 + £1 p&p |
| MEON 2.50 MHz TRANSVERTER - 144MHz I.F. | April '86 | £48.50 + £1.50 p&p |
| SIMPLE AUDIO OSCILLATOR | Mar. '86 | £27.25 |
| R.F. SPEECH PROCESSOR | Mar. '86 | £53.00 + £1.50 p&p |
| RTTY/MORSE MODEM - no case | Jan. '86 | £35.85 |
| CRYSTAL CALIBRATOR | Jan. '86 | £19.95 |
| TWO TONE OSCILLATOR - exc. mic. plug | Dec. '85 | £22.40 |
| MEON 50MHz TRANSVERTER - 28MHz I.F. | Oct. '85 | £48.50 + £1.50 p&p |
| CAPACITANCE METER | Oct. '85 | £23.90 |
| DIP OSCILLATOR | Oct. '85 | £19.90 |
| U.H.F. PRESCALER | Sept. '85 | £24.95 |
| ADD ON B.F.O. - inc. C804 and optional components | Aug. '85 | £14.40 |
| TRIUMPHIC KEYS | Feb. '85 | £18.00 |
| BUG KEY WITH 528 BIT MEMORY - inc. specified case | Oct. '84 | £51.00 + £1.50 p&p |
| MODULAR RECEIVER (HAM RADIO TODAY) | Apr. May Jn. '86 | £142.00 + £2 p&p |

| COMPONENTS | 85p | 22p | 741C | 22p | 4 x SPST Dill Switch | 90p |
|------------|--------|------|-----------------|-------|----------------------|------|
| BF961 | SD42P | 2.55 | 4077B | 18p | Relay (Meon) | 2.65 |
| J309 | SBL1 | 7.45 | 4093B | 28p | C804 100pF | 5.70 |
| VN10LM | SL1640 | 5.85 | CFS455J | 14.10 | C804 15pF | 4.70 |
| 2N3819 | TL072 | 64p | CFS455I | 10.00 | PCB Meon (199) | 5.00 |
| 2N3866 | TL084 | 1.04 | 22pF Trimmer | 27p | PCB Arun (210) | 8.50 |
| LF351 | XR2206 | 5.45 | 85pF Trimmer | 33p | PCB RTTY (205) | 6.50 |
| LM566 | XR2211 | 2.30 | Pots Lin or Log | 48p | PCB RTTY (206) | 3.65 |

DO NOT ADD V.A.T. ADD 70p P&P UNLESS SPECIFIED. ARTICLE REPRINTS 60p
(If required). All kits complete (less batteries). Unless otherwise specified, including PCB (or stripboard), case, all components and hardware.
Cheque or Postal Order to: C.P.L. ELECTRONICS, 8 Southdean Close, Hemlington, Middlesbrough, Cleveland TS8 9HE. Tel. 0642 581157.
Other kits available plus components, hardware, tools, test equipment etc.
Goods normally dispatched within 14 days. Free price list available on request

CRICKLEWOOD ELECTRONICS LTD

It's no secret!

that there is a real difference at Cricklewood Electronics. That's why you should never be without the **FREE** CRICKLEWOOD ELECTRONICS COMPONENTS CATALOGUE, for sheer variety, competitive prices and service from the U.K.'s number one 100% component shop. No gimmicks, no gadgets or computers, just components, millions of them, all easily available by mail order, calling or credit card telephone orders. Just pick up the phone (or a pen) to get your **FREE** copy now (no SAE required). You have nothing to lose.

CRICKLEWOOD ELECTRONICS LTD.
40 Cricklewood Broadway NW2 3ET.
01-450 0995 & 01-452 0161
ALL MAJOR CREDIT CARDS ACCEPTED
Telex 914977 Phone or write today

USED AMATEUR EQUIPMENT?

I Buy, Sell & Exchange!

SELLING? Is your Used Equipment in First Class Condition? Want the **VERY BEST CASH PRICE**, with the least hassle and no waiting months for your ads to appear??

BUYING?? Whether looking for the largest or smallest item in Amateur Radio, you can save money by buying from our stock of **TOP QUALITY USED AMATEUR EQUIPMENT!!**

For the Deal You've been Looking for, Phone Dave, G4TNY
ON HORNCHURCH (04024) 57722 or Send SAE for List.

(Personal callers by appointment only please) MONDAY TO SATURDAY, 9 am to 7 pm

G4TNY AMATEUR RADIO

MAIL ORDER

132, Albany Road, Hornchurch, Essex RM12 4AQ

PART EXCHANGE

only single frequency operation.

MODE 15

144-154MHz coverage otherwise as Mode 14.

As you can see, putting the right diodes into the FT-2700RH will make it work almost anywhere! Thanks for passing on the information Kris.

Wanted

I have had several enquiries from readers who want to know more about interfacing their radios—usually scanners, with their computers. With modern scanners such as the AOR AR2002 or the Icom R7000 this is very easy to do because the manufacturers have not only provided sockets on the back of these sets, they have also recently

Practical Wireless, July 1986

IMPORTANT—The ideas presented here are suggestions only, and as they are untried by this magazine, we cannot accept responsibility for any resultant damage, however caused. Before alterations are attempted, care should be taken to ensure that any guarantee is not invalidated, and it should be borne in mind that modifications usually have an adverse effect on resale prices. In cases where specialist skills or equipment are needed, most dealers will undertake the work for a reasonable fee.

If you have a mod that you would like to pass on or if you have a request for a mod that you would like to carry out, please write to me at this address: R. S. Hall, Practical Wireless, Enefc House, The Quay, Poole, Dorset BH15 1PP.

brought out interfaces that will allow almost any computer that has RS232 to be used to control the radio. This seems to be the way that amateur radio is going to go and nearly all of the new h.f. radios will have facilities for interfacing, as have some of the new 2m base stations that I have seen. We will be telling you more about the AOR and Icom interface units and the ingenious software that is already available as

soon as possible—hopefully in the next issue, but in the meantime I would be interested in hearing from anyone who has managed to link up one of the older style scanners (Bearcat, SX-200, Saiko and so on) to any form of external controller. I will then gladly pass on the information through these pages to those of you who have expressed an interest.

Till next time—73's de G4TNT.

Practical Wireless BOOK SERVICE

The books listed have been selected as being of special interest to our readers.
They are supplied from our editorial address direct to your door.

DATA & REFERENCE

DIGITAL IC EQUIVALENTS AND PIN CONNECTIONS

A. Michaels

Shows equivalents and pin connections of a popular selection of European, American and Japanese digital i.c.s. Also includes details of packaging, families, functions, manufacturer and country of origin.

256 pages Order code BP140 £4.95

LINEAR IC EQUIVALENTS AND PIN CONNECTIONS

A. Michaels

Shows equivalents and pin connections of a popular selection of European, American and Japanese linear i.c.s. Also includes details of functions, manufacturer and country of origin.

320 pages Order code BP141 £4.95

INTERNATIONAL TRANSISTOR EQUIVALENTS GUIDE

A. Michaels

Helps the reader to find possible substitutes for a popular selection of European, American and Japanese transistors. Also shows material type, polarity, manufacturer and use.

320 pages Order code BP85 £2.95

INTERNATIONAL DIODE EQUIVALENTS GUIDE

A. Michaels

Designed to help the user in finding possible substitutes for a large selection of the many different types of semiconductor diodes that are available. Besides simple rectifier diodes, also included are Zener diodes, i.e.d.s, diacs, triacs, thyristors, o.c.i.s, photo and display diodes

144 pages Order code BP108 £2.25

PROJECT CONSTRUCTION

HOW TO DESIGN AND MAKE YOUR OWN P.C.B.s

R. A. Penfold

Chapter 1 deals with the simple methods of copying printed circuit board designs from magazines and books and covers all aspects of simple p.c.b. construction as comprehensively as possible.

Chapter 2 covers photographic methods of producing p.c.b.s and Chapter 3 deals with most aspects of designing your own printed circuit board layouts.

80 pages Order code BP121 £1.95

RADIO

COMMUNICATION (Elements of Electronics—Book 5)

F. A. Wilson

Looking at electronics fundamentals over the whole of the communication scene, this book aims to teach the important elements of each branch of the subject in an interesting and practical style. Line, microwave, submarine, satellite, digital multiplex, radio and telegraphy systems are covered, without getting involved in the more complicated theory or mathematics.

This is not an expert's book, neither is it for those looking for the easy way—it aims to leave the reader knowledgeable and with a good technical understanding of this extensive subject.

256 pages Order code BP89 £2.95

AN INTRODUCTION TO RADIO DXING

R. A. Penfold

Anyone can switch on a short-wave receiver and play with the controls until they pick up something, but to find a particular station, country or type of broadcast and to receive it as clearly as possible requires a little more skill and knowledge. The object of this book is to help the reader do just that, which in essence is the fascinating hobby of radio DXing.

112 pages Order code BP91 £1.95

INTERNATIONAL RADIO STATIONS GUIDE

Completely revised and updated in 1985, this book is an invaluable aid in helping all those who have a radio receiver to obtain the maximum entertainment value and enjoyment from their sets.

Clearly shown are the station site, country, frequency and/or wavelength, and the effective radiated power of the transmitter. The book covers Europe, the Near East and N. Africa, the USA, Canada, Latin America and the Caribbean, plus short-wave stations worldwide. There is also a list of English language broadcasts.

128 pages Order code BP155 £2.95

ANTENNAS (AERIALS)

AERIAL PROJECTS

R. A. Penfold

The performance of any receiver will ultimately depend on the aerial to which it is connected. This book considers practical designs including active, loop and ferrite aerials which give good performance and are relatively simple and inexpensive to build. The complex theory and mathematics of the subject have been avoided.

Also included are constructional details of accessories including a preselector, attenuator, filters and a tuning unit.

96 pages Order code BP105 £1.95

SIMPLE AMATEUR BAND AERIALS

E. M. Noll

This concise book describes how to build 25 simple and inexpensive aerials, ranging from a simple dipole through beam and triangle designs to a mini-rhombic made from four TV masts and about 120 metres of wire.

Tables of dimensions are given to design aerials for specific spot frequencies, including the WARC bands.

80 pages Order code BP125 £1.95

25 SIMPLE SHORT WAVE BROADCAST BAND AERIALS

E. M. Noll

Fortunately good aerials can be erected at low cost, and for a small fraction of the cost of your receiving equipment. This book describes 25 different aerials, ranging from a simple dipole through helical designs to a multi-band umbrella.

80 pages Order code BP132 £1.95

25 SIMPLE INDOOR AND WINDOW AERIALS

E. M. Noll

Written for people who live in flats or have no gardens, or who have other space-limiting restrictions which prevent them from constructing a conventional aerial system. The 25 aerials included in this book give surprisingly good results considering their limited dimensions.

64 pages Order code BP138 £1.75

25 SIMPLE TROPICAL AND MW BAND AERIALS

E. M. Noll

Shows you how to build 25 simple and inexpensive aerials for operation on the medium wave broadcast band and on the 60, 75, 90 and 120 metre Tropical bands. Designs for the 49 metre band are included as well.

64 pages Order code BP145 £1.75

AUDIO FREQUENCIES

AUDIO

(Elements of Electronics—Book 6)

F. A. Wilson

This book studies sound and hearing, and examines the operation of microphones, loudspeakers, amplifiers, oscillators, and both disc and magnetic recording. Intended to give the reader a good understanding of the subject without getting involved in the more complicated theory and mathematics.

320 pages Order code BP111 £3.50

THEORY & CALCULATIONS

PRACTICAL ELECTRONICS CALCULATIONS AND FORMULAE

F. A. Wilson

A book for the workbench, covering units and constants, d.c. and a.c. theory, passive components, networks, theorems and measurements. Its aim is to bridge the gap between complicated theory and the "cut-and-try" methods which may bring success in design but leave the experimenter unfulfilled.

Tedious higher mathematics have been avoided where possible. Instead there is a strong practical bias with many tables included to save calculation whilst giving greater intimacy with the design process.

256 pages Order code BP53 £2.95

THE SIMPLE ELECTRONIC CIRCUIT AND COMPONENTS

(Elements of Electronics—Book 1)

F. A. Wilson

The first book to appear in this excellent series which aims to fill the divide between the simpler basic textbook and the more advanced treatise steeped in higher mathematics.

This volume contains all the fundamental theory necessary to lead to a full understanding of the simple electronic circuit and its main components.

224 pages Order code BP62 £2.95

COMPUTING

MICROPROCESSING SYSTEMS AND CIRCUITS

(Elements of Electronics—Book 4)

F. A. Wilson

A truly comprehensive guide to the elements of micro-processing systems which really starts at the beginning. Teaches the reader the essential fundamentals that are so important for a sound understanding of a subject which is becoming ever more involved in radio systems and equipment.

256 pages Order code BP77 £2.95

AN INTRODUCTION TO COMPUTER PERIPHERALS

J. W. Penfold

Covers such items as monitors, printers, disk drives, cassette recorders, modems, etc., explaining what they are, how to use them and the various types and standards. Helps you to make sure that the peripherals you buy will work with your computer and with each other.

80 pages Order code BP170 £2.50

AN INTRODUCTION TO COMPUTER COMMUNICATIONS

R. A. Penfold

Provides details of the various types of modem and their suitability for specific applications, plus details of connecting various computers to modems, and modems to the telephone system. Also information on common networking systems and RTTY.

96 pages Order code BP177 £2.95

FAULT-FINDING

TRANSISTOR RADIO FAULT-FINDING CHART

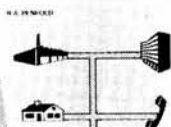
C. E. Miller

Used properly, should enable most common faults to be traced reasonably quickly. Selecting the appropriate fault description at the head of the chart, the reader is led through a sequence of suggested checks until the fault is cleared.

635 x 455mm approx. Order code BP70 £0.95

International
Radio Stations
Guide

An Introduction to
Computer
Communications



Audio

Digital IC
Equivalents
and Pin
Connections

ADRIAN MICHAELS

TO ORDER

Add 50p per order postage (overseas readers add £1 for surface mail postage) and send a postal order, cheque or international money order payable to PW Publishing Ltd (quoting order code and quantities) to **Practical Wireless, Enefco House, The Quay, Poole, Dorset BH15 1PP**. Payment by Access or Mastercard also accepted on telephone orders to Poole (0202) 678558.

PLEASE ALLOW 28 DAYS FOR DELIVERY

Avon

South Bristol ARC: Len Baker G4RZY (Whitchurch 834282). Meets Wednesdays, 7.30pm in Whitchurch Folkhouse, East Dundry Road, Whitchurch.

Bedfordshire

Bedford & District ARC: Chris Lenn G4VHF (Bedford 751763). Meets 1st and 3rd Thursdays, 8pm in Allen's Club, Hurst Grove, Queens Park, Bedford. June 19—Propagation and the weather by Jim Bacon.

Dunstable Down RC: Philip Morris G6EES (Dunstable 607623). Meets Fridays, 8pm in Room 3, Chews House, 77 High Street South, Dunstable. June 6—Wire Antennas by G3WLM; 20th—"The Scene of the Crime".

Berkshire

Maidenhead & District ARC: Bob Fowler G3IQF (Marlow 6421). Meets 1st and 3rd Tuesdays, 7.30pm in the Red Cross Hall, The Crescent, Maidenhead.

Newbury & District RS: M. J. Fereday G3VOW (Newbury 43048). Meets 2nd Tuesdays in Newbury Technical College. June 10—Intermodulation, Phase Noise and Dynamic Range by G3RZP.

Buckinghamshire

Milton Keynes & District ARS: Dave White G3ZPA (Milton Keynes 501310). Meets 2nd Mondays, 7.30pm in the Meeting Place, Hodge Lea, North Milton Keynes. June 9—Long Range Aircraft by USAF.

Cambridgeshire

Greater Peterborough ARC: Frank Brisley G4NRJ (Peterborough 231848). Meets 4th Thursdays, 7.30pm in the Southfields Junior School, Stanground, Peterborough.

Cheshire

Chester & District ARS: Dave Hicks G6IFA (Chester 336639). Meets 2nd, 3rd, 4th and 5th Tuesdays, 8pm in the Chester RUFC, Hare Lane, Vicars Cross, Chester. June 10—Surplus Equipment Sale; 17th—Barbecue, bring your own steaks; 24th—Cellular Radio by GW1ATZ.

Clywd

Conwy Valley ARC: Nigel Vicars-Harris (Conwy 636376). Meets 2nd and 4th Thursdays, 8pm in the Green Lawns Hotel, Bay View Road, Colwyn Bay. June 12—AGM.

Rhyl & District ARC: Melfyn Allington GW1AKT (Nantglyn 469). Meets 1st and 3rd Mondays, 7.30pm in the Mona Hotel, Market Street, Rhyl. June 8—DF Hunt.

Cumbria

Solway RC: D. G. Rayner G0AFP (Cockermouth 826461). Meets Wednesdays in the Maryport Educational Settlement, High Street, Maryport.

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

Westmorland RS: Gordon Chapman G1IIE, 61 Rusland Park, Kendal. Meets 2nd Tuesdays, 8pm in the Strickland Arms, Sizergh, nr Kendal.

Devon

Axe Vale ARC: Bob Newland G3VW (Lyme Regis



Compiled by Eric Dowdeswell G4AR

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

5282). Meets 1st Fridays, 7.30pm in the Cavalier Inn, West Street, Axminster. August 1st—Family Picnic.

Plymouth Polytechnic ARS: Darren Salter G1ERM, 92 Alma Road, Pennycomequick, Plymouth. Meets Wednesday afternoons in the Science Block, top floor.

Tiverton (SW) RC: G. Draper G4ZNV (Credon 235). Meets Tuesdays, 7.30pm in the Half Moon Inn, Fore Street, Tiverton.

Torbay ARS: Brian Wall G1EUA (Teignmouth 78554). Meets Fridays and last Saturdays, 7.30pm in the ECCSC, Ringslade Road, Highweek, Newton Abbot. June 27—Wine-making by G0BAJ; 28th—Special Event Station GB4PP.

Dorset

Flight Refuelling ARS: Ashley Hulme (Bournemouth 872503). Meets Sundays, 7.30pm at the FR S&SC, Merley, Wimborne. June 22—Lecture by G4WHO; July 6—RSGB Video; 20th—ATUs by G3RZP.

Poole RAS: Phil Dykes G4XYX, 68 Egmont Road, Poole. Meets last Fridays, 7.30pm in Commander House, Constitution Hill Road, Poole. June 27—Antenna Rigging Time for G4PRS.

County Down

Mid-Ulster ARC: Sam White (Craigavon 22855). Meets 2nd Sundays, 3pm in the Guide Hall, Castle Hill, Gilford.

Dumfries & Galloway

Wigtownshire ARC: Gerry Maxwell GM4BAE (Stranraer 2876). Meets Thursdays, 7.30pm in the Stranraer CC, Lewis Street, Stranraer.

Dyfed

Aberporth RAC: Frank Thomas GW6RDR (Cardi-

gan 87274). Meets Thursdays, 7pm in Building 17, Royal Aircraft Establishment, Aberporth.

Pembrokeshire RS: Paul Delaney (Letterston 840249). Meets alternate Thursdays in the FE Centre, Tower Hill, Haverfordwest.

Essex

Havering & District RC: D. S. J. Gray G0B0I (Hornchurch 41532). Meets Wednesdays, 8pm in Fairkytes, Billet Lane, Hornchurch. June 11—Best Crystal Set Competition; 18th—Talk by G5RV; 25th—Meteor Scatter Operation by G8VR.

Southend & District RS: Brian Wood G4RDS (South Benfleet 50494). Meets Fridays, 7.30pm in The Rocheway Centre, Rocheway, Rochford.

Fife

Dunfermline RS: Donald Ingram GM10IN (Inverkeithing 414283). Meets Thursdays, 8pm in the Outh Wireless Station. Transport from Dunfermline arranged if required.

Glenrothes & District ARC: Anne Edmondson GM4TCW (Glenrothes 744449). Meets Wednesdays and 3rd Sundays, 7.30pm in Provosts Land, Leslie. Mondays—GM3YBQ gives theory lessons; Tuesdays—GM3AFQ gives code classes.

Glamorgan

Rhondda ARS: John Howells GW4BUZ (Tonypandy 432542). Meets Thursdays, 7.30pm in the NUM Club, Tonypandy. June 26—Tape Slide Lecture.

Gloucestershire

Cirencester & District ARC: G. R. Hayter G0AZD (Cirencester 5015). Meets alternate Thursdays, 8pm in the Phoenix Centre, Cirencester.

Grampian

Aberdeen RS: Don Travis GM4GXD (Pitcapple 251). Meets Fridays, 7.30pm at 35 Thistle Lane, Aberdeen. June 13—Super Sale of Good Equipment; 20th—Talks by Winners of Home-brew Competition; July 4—Junk Sale.

Greater Manchester

West Manchester RC: Dave Comac G1100 (Bolton 24104). Meets Wednesdays, 8pm in the Astley and Tyldesley MW, Meanley Road, Gin Pit Village, Astley.

Stockport RS: Mel Betts G4FFW (061-224 7880). Meets 2nd and 4th Wednesdays, 8pm in the Magnet Inn, Wellington Road, Stockport. Informal gathering on 3rd Wednesdays.

Trafford ARC: Graham Oldfield G11JK (Urmston 9804). Meets Thursdays, 7.30pm in the TS de Trafford, Sea Cadet Corp, Bradshaw Lane, Stretford.

Gwent

Abergavenny & Nevill Hall ARC: J. B. Davies GW4XQH (Abergavenny 4655). Meets Thursdays, 7.30pm in Pen-Y-Fal Hospital above Male Ward 2. 1st Thursdays—Video Matters. Club is a registered RAE centre.

Pontypool ARS: Ivor Wilkinson GW4RJA (Cwmbran 72110). Meets Tuesdays, 7pm in The Settlement, Rockhill Road, Pontypool.

Gwynedd

Merion ARS: Ken Judge GW4KEV, Tyddyn Mawr, Arthog. Meets 1st Thursdays, 7.30pm in the Dolserau Hall Hotel, Dolgellau.

Hampshire

Andover RAC: Mike Adams G0AMO (Andover 51593). Meets 1st and 3rd Wednesdays, 8pm in the Wolversdene Club, Love Lane, Andover.

Binstead ARS: A. F. Knight G4RTT (IOW 295951). Meets Wednesdays, 7.30pm in the 1st Ryde/1st Binstead Scout HQ, Binstead.

Fareham & District ARC: Alan Chester (Fareham 288139). Meets Wednesdays, 7.30pm in the Porchester CC, Westlands Grove, Porchester. June 18—Basic Digital Techniques by G4ITF; July 2—Weather Satellites by G8VOI.

Farnborough & District RS: Peter Taylor G4MBZ, 12 Dunbar Road, Paddock Hill, Frimley, Camberley. Meets 2nd and 4th Wednesdays, 7.30pm in the Railway Enthusiasts Club, Access Road, Hawley Lane, Farnborough.

Horndean & District ARC: Dan Barnard G4RLE, 36 Guildford Road, Fratton, Portsmouth. Meets 1st Thursdays, 8pm in Marchiston Hall, London Road, Horndean. July 3—Special talk by G6NZ.

Three Counties ARC: Keith Tupman G0BTU (Petersfield 66489). Meets alternate Wednesdays, 8pm in The Railway Hotel, Liphook. June 7—Lurgashall Fete Station; 11th—Cellular Radio by G0TDW; 25th—Computer Time; 28th—Summer Barbecue.

Hereford & Worcester

Droitwich ARC: Gordon Taylor G4HFP (Stourport-on-Severn 3818). Meets 2nd and 4th Mondays, 8pm in the Scout HQ, Union Lane, Droitwich.

Hereford ARS: F. E. G. Cox, 35 Thompson Place, Hereford. Meets 1st and 3rd Fridays, 8pm in the County Council CD HQ, Gaol Street, Hereford.

Kidderminster & District ARS: Tony Hartland G8WQX (Kidderminster 751584). Meets 1st and 3rd Tuesdays, 8pm in the Harrier FC, Hoo Road, Kidderminster.

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

Hertfordshire

Verulam ARC: Gerry Wimpenny G40BH (St Albans 52003). Meets 2nd and 4th Tuesdays, 7.30pm in The RAFA HQ, New Kent Road, off Marlborough Road, St Albans.

Humberside

Grimsby ARS: George Smith G4EBK (Grimsby 887720). Meets Thursdays, 7pm in the Cromwell SC, Cromwell Road, Grimsby. June 12—RTTY Demo; 19th—Treasure Hunt; July 3—DF Hunt.

Hornsea ARC: Richard Gutteridge G4YTV (Skirraugh 62498). Meets Wednesdays, 7.30pm in The Mill, Mill House, Atwick Road, Hornsea.

Scunthorpe ARC: G. Parkin-Coates G60SA (Doncaster 873827). Meets Tuesdays, 8pm in the Hobbies Centre, Grange Farm, Franklin Crescent, Scunthorpe.

Kent

Biggin Hill ARC: Bob Senft G0AMP (Farnborough 57848). Meets 3rd Tuesdays, 8.30pm in Downe Village Hall, High Street, Downe. June 17—Moonbounce Operation.

Bredhurst R&TS: J. Scott G4ZTF (Medway 374670). Meets Thursdays, 8.15pm in Parkwood CC, Parkwood Green, Rainham.

Dartford Heath DF Club: Peter B. Sharman G8DYF (Greenhithe 844467). Meets at the Horse & Groom, Leyton Cross, Nr Dartford Heath prior to the hunt, next pre-hunt meeting

July 1. June 8—Club Hunt; 15th and 29th—RSGB Hunts.

Hilderstone RS: Annette Penfold G0BEX (Canterbury 812723). Meets Fridays, 7.30pm in the Hilderstone AEC, St Peters, Broadstairs.

East Kent ARS: A. G. Stone G4UPJ, 86a Joy Lane, Whitstable. Meets 1st and 3rd Thursdays, 7.30pm in Herne Bay YC, The Cabin, King's Road, Herne Bay.

SE Kent YMCA ARC: John Dobson (Dover 211638). Meets Wednesdays, 7.45pm in the Dover YMCA, Godwynehurst, Leyburne Road, Dover. June 11—Top Band Fox Hunt starting at 1930; 18th—Natter Nite; 25th—Setting up Portable Equipment for Outdoors Operations; July 2—Natter Nite.

West Kent ARS: Nigel Peacock G4KIU (Tunbridge Wells 33586). Meets Fridays, 8pm in the AEC Annex, Quarry Road, Tunbridge Wells.

Lancashire

Morecambe Bay ARS: W.E. Delamere G3PER (Heysham 52659). Meets Mondays, 7.30pm in the canteen, Luneside Eng. Co., Mill Lane, Halton. June 9—SSTV by G0AUF; 23rd—RAYNET.

Preston ARS: George Earnshaw G3ZXC (Preston 718175). Meets 2nd and 4th Thursdays, 7.45pm in the Lonsdale Club, Fulwood. June 19—Analysis by G3ZXC.

Rolls Royce ARC: L. Logan G4ILG (Barnoldswick 812288). Meets 1st Wednesdays, 8pm in the RR S&SC, Barnoldswick.

Rossendale Valley RC: Bernard Murray G4VVK (Rossendale 229026). Meets Thursdays 8pm in the Bishops Blaize Hotel, Rawtenstall, on the A56.

Skelmersdale & District ARC: Gordon Crowhurst G4ZPY (Ormskirk 894299). Meets Thursdays, 7.45pm in the Beacon Park Centre, Dalton Lane, Skelmersdale.

Thornton Cleveleys ARS: Liz Milne G4WIC (Thornton Cleveleys 821827). Meets Mondays, 7.45pm in the 1st Norbreck Scout HQ, Carr Road, Bispham.

Lincolnshire

Bourne ARS: A. T. Johnson G4RQK (078-087 326). Meets 1st and 3rd Tuesdays in Edenham Village Hall, Edenham, Bourne.

London

Acton, Brentford & Chiswick ARC: W. G. Dyer G3GEN, 188 Gunnersbury Avenue, Acton, London. Meets 3rd Tuesdays, 7.30pm in the Chiswick Town Hall, High Road, Chiswick, London W4. June 17—Receiver Design.

Ealing & District ARS: Anton Berg G4SCR (01-997 1416). Meets Tuesdays, 7.30pm in Northfields CC, 71a Northcroft Road, London W13.

Grafton RS: John Kaine G4RPK, 74 Camden Mews, London NW1. Meets 2nd and 4th Fridays, 8pm in the Haringey Sea Cadet Corp, Training Ship Wizard, White Hart Lane, Wood Lane, London N22.

Wimbledon & District ARS: George Cripps G3DWW (01-540 2180). Meets 2nd and last Fridays, 7.30pm in the St John Ambulance HQ, 124 Kingston Road, London SW19. June 13—Judging the Construction Contest; 27th—Space Exploration of the Solar System by Dr Gary Hunt.

Lothian

Lothian RS: Robin Thompson GM4YPL (Winchburgh 890177). Meets 2nd and 4th Wednesdays, 7.30pm in the Harwell House Hotel, Ettrick Drive, Edinburgh. June 11—AGM.

Merseyside

Wirral & District ARC: Peter Morton G6CGJ (051-

677 7376). Meets 2nd and 4th Wednesdays, 8pm in Irby Cricket Club, Mill Hill Road, Irby. June 11—Practice DF Hunt; Troposcatter Comms in the Oil Industry and in Amateur Operations Film.

Northamptonshire

Nene Valley RC: M. P. Bayles G6UWS (Wellingborough 71189). Meets Wednesdays, 8pm in the Prince of Wales, Well Street, Finedon.

Nottinghamshire

Mansfield ARS: Angela Fisher G1DZH (Mansfield 652812). Meets 1st Fridays and 3rd Tuesdays in the Victoria Social Club, Princess Street, Mansfield.

ARC of Nottingham: Ian Miller G4JAE (Nottingham 232604). Meets Thursdays, 7.30pm in the Sherwood CC, Woodthorpe House, Mansfield Road, Nottingham. June 12—QRP Construction and Operation by G4JAE and G4DVW; 19th—430MHz DF Hunt; 26th—Summer Junk Sale.

Workshop ARS: Carole Gee G4ZUN (Workshop 486614). Meets 2nd and 4th Tuesdays, 7.30pm in the Sub-Aqua Club, The Maltkins, Gateford Road, Workshop. June 17—Mystery Lecture Night; July 3—Visit to Newark RC.

Shropshire

Salop ARS: Simon Price G0E1Y (Shrewsbury 67799). Meets Thursdays, 8pm in the Olde Bucks Head, Frankwell, Shrewsbury. June 12—Receiver Techniques by G3EWZ; 26th—Operation via Satellites by G3MWQ.

Somerset

Yeovil ARC: Eric Godfrey G3GC (Yeovil 75533). Meets Thursdays, 7.30pm in the Recreation Centre, Chilton Grove, Yeovil. June 12—Phase by G3MYM; 19th—Anomalous HF Propagation; July 3—Daytime Propagation on 80m.

Staffordshire

Cannock Chase ARS: B. Robinson G1FEC (Cannock 74521). Meets Thursdays, 8pm in the Bridgetown War Memorial Club, Union Street, Bridgetown.

Suffolk

Felixstowe & District ARS: Paul Whiting G4YQC (Ipswich 642595). Meets 2nd and 4th Mondays, 8pm in the Feathers, Walton High Street, Felixstowe. June 16—Social Evening; 30th—Talk.

Ipswich RC: Jack Toothill G4IFF (Ipswich 44047). Meets 2nd and last Wednesdays, 8pm in the Rose & Crown Club Room, 77 Norwich Road, Ipswich.

Surrey

Coulsdon ATS: Alan Bartle (01-684 0610). Meets 2nd Mondays and last Thursdays, 7.45pm in St Swithuns Church Hall, Grovelands Road, Purley, Surrey. June 9—Open Evening with v.h.f., h.f., RTTY and ATV.

Sutton & Cheam RS: Alan Keech G4BOX, 26 St Albans Road, Cheam, Sutton. Meets 3rd Fridays, 7.30pm in the Downs LT Club, Holland Avenue, Cheam. June 20—Quiz with Coulsdon ATS; 29th—Visit to Longleat Rally.

Sussex

Chichester & District ARC: C. Bryan G4EHG (Chichester 789587). Meets 1st Tuesdays, 7.30pm in the North Lodge Bar, County

Practical Wireless, July 1986

Hall, Chichester. Next meetings—June 5 and 19th. No meetings in July and August. **Crawley ARC: David Hill G4IQM (Crawley 882641).** Meets 2nd and 4th Wednesdays, 8pm in the United Reform Church, Ifield Drive, Ifield. June 25—Weather satellites by G4TVG.

Hastings E&RC: Dave Shirley G4NVQ (Hastings 420608). Meets 3rd Wednesdays, 7.45pm in the West Hill CC, Croft Road, Hastings and on Fridays, 8pm in the Club House, Downey Close, St Leonards-on-Sea. June 18—Medical Electronics.

Horsham ARC: Paul Drawmer G4YFY, Treforest, Dragon Green, Shipley. Meets 1st Thursdays, 8pm in the Girl Guides HQ, Denne Road, Horsham. July 3—HF Antennas and Feed Systems.

Southdown ARS: R. Evans G4VOS (Heathfield 3168). Meets 1st Monday, 7.30pm in Chaiseley Home, Southcliff, Eastbourne and Tuesdays and Fridays in the Wealdon Council Offices, Vicarage Field, Hailsham.

Tyneside

South Tyneside ARS: P. W. Grainger (South Shields 543955). Meets Mondays, 7.30pm in the Martec Club, South Tyneside College, Grosvenor Road, Tyneside.

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" Entrance, Hillmorton, Rugby.

Stratford-upon-Avon & District ARC: David Boock G8OVC (S-u-A 750584). Meets 2nd and 4th Mondays, 7.30pm in the Baptist Church, Payton Street, S-u-A. June

9—Talk on Royal Signals & Radar Establishment; 23rd—CAD PCBs by GOCHO.

Mid-Warwickshire ARS: Stan Hobbs G6XRI (Kenilworth 53099). Meets 2nd and 4th Tuesdays, 8pm at 61 Emscote Road. June 10—DF Hunt and Barbeque; 24th—Chassis Bashing.

West Midlands

Dudley ARC: John Tisdale G4NRA (Kingswinford 278300). Meets 1st, 2nd and 4th Mondays, 7.45pm in the Allied Centre, Greenman Alley, off Tower Street, Dudley. June 23—Halley's Comet by Dave Harris.

Mirfield RC: C. Marks G4ZPJ, 63 Alvis Walk, Chelmsley Wood, Birmingham. Meets Mondays, Tuesdays, Wednesdays and Thursdays, 7pm in the Mirfield CC, Yockleton Road, Lea Village, Birmingham.

Sandwell ARC: Malcolm Strong G4UMY (021-422 1554). Meets Mondays and Thursdays, 7.30pm in the Club Rooms, Broadway, Oldbury, Warley. June 30—Amateur Radio on the Burma Railway by G3BA.

Willenhall & District ARS: John Phillips G4UPF (Wombourne 782076). Meets Wednesdays, 8pm in the Cross Keys, Prouds Lane, Willenhall.

Wolverhampton ARS: Keith Jenkinson G10IA (Wolverhampton 24870). Meets Tuesdays, 8pm in the Wolverhampton Electricity S&SC, St Marks Road, Chapel Ash, Wolverhampton. June 7/8—Demo Station at 21st Tipton Carnival & Show; 17th—Lightning Protection; 22nd—DF

| Cover Date | Deadline | For events from early |
|------------------|----------------|-----------------------|
| August September | May 15 June 15 | July August |

Hunt from Tettenhall Rock at 11am; 24th Problems Solved Time.

Wiltshire

Devizes & District ARS: Peter Greed G3MQD, 18 Nursted Park, Devizes. Meets Fridays, 8pm in the Devizes Football SC, Devizes.

Salisbury R&ES: Neil Underwood G4LDR (Salisbury 22809). Meets Tuesdays, 7.30pm in Grosvenor House, Churchfield Road, Salisbury.

Trowbridge & District ARS: Gerry Callaghan G4SPE (Westbury 4532). Meets 4th Tuesdays, 8pm in Southwick Village Hall, Nr Trowbridge.

Yorkshire

Halifax & District ARS: D. L. Moss G0DLM (Halifax 202306). Meets 3rd Tuesdays, 7.30pm in The Running Man, Pellon Lane, Halifax. June 17—RTTY Working Demo by G4KGS & G4MLW.

Pontefract & District ARS: Colin Mills G0AAO (Pontefract 43101). Meets Thursdays, 8pm in the Carleton CC, Pontefract.

Sheffield ARS: Peter Day G3PHO (Sheffield 681216). Meets 1st and 2nd Mondays, Firth Park Pavilion.

Spen Valley ARS: Tim Clough G4PHR (Mirfield 499397). Meets Thursdays, 8pm in the Old Bank WMC, Mirfield. June 19—DF Hunt against N. Wakefield ARS.

Wakefield & District RS: Walter Parkin G8PBE (Wakefield 378727). Meets alternate Tuesdays, 8pm in the Ossett CC, Prospect Road, Ossett. June 10—DF Hunt.

North Wakefield RC: S. Thompson G4RCH (Morley 536633). Meets Thursdays, 8pm in the Carr Gate WMC, Lawns Lane, Wakefield. June 19—DF Hunt and Barbeque.

Practical Wireless

0202 678 558

PCB SERVICE

Printed circuit boards for recent *PW* constructional projects are now available from the *PW* PCB SERVICE. The boards are fabricated in 1.5mm glass-fibre, and are fully drilled and roller tinned. All prices include VAT and postage and packing for UK orders. Add £2.00 per order for despatch to overseas addresses.

Orders and remittances should be sent to: **PCB Service, Practical Wireless, Enefco House, The Quay, Poole, Dorset BH15 1PP.** Cheques should be crossed and made payable to Practical Wireless.

When ordering, please state the Project Title and Issue Month as well as the Order Code. Please print your name and address clearly in block capitals, and do not send any other correspondence with your order. You may phone your order using Access.

Please allow 28 days for delivery. Always check the latest issue of *PW* for the current details of price and availability. Note that we can only supply the p.c.b.s listed in the most recent issue.

| PROJECT TITLE (Issue) | ORDER CODE | PRICE |
|-------------------------------|-------------|--------|
| PW Marchwood (Jul. 83) | WR161 | £3.32 |
| Bug Key with Memory (Oct. 84) | WR189/WR192 | £10.35 |
| PW Teme—TX (Nov. 84) | WR196 | £4.83 |
| PW Teme—VFO/Doubler (Dec. 84) | WA001 | £3.76 |
| PW Teme—RX (Jan. 85) | WA002 | £5.46 |
| PW Triambic Keyer (Feb. 85) | WAD280* | £4.26 |
| FRG-7 BFO Mod (Feb. 85) | WAD249 | £4.00 |

| PROJECT TITLE (Issue) | ORDER CODE | PRICE |
|-------------------------------------|------------|-------|
| PW Colne (Apr. 85) | A004 | £4.14 |
| | A005 | £4.08 |
| PW Colne (May 85) | WR198 | £5.01 |
| PW Colne (Jun 85) | WR197 | £4.97 |
| Battery Charge Control (Jun. 85) | WAD302 | £3.94 |
| Crystal Tester (Jul. 85) | WR200 | £3.43 |
| Add-on BFO (Aug. 85) | WR201 | £3.42 |
| UHF Prescaler (Sep. 85) | WR202 | £4.76 |
| PW Meon 50MHz Transverter (Oct. 85) | WR199 | £8.28 |
| Capacitance Meter (Oct. 85) | WR203 | £3.74 |
| WQ MW Loop (Nov. 85) | WR204 | £3.45 |
| RTTY/Morse Modem (Jan. 86) | WR205 | £6.73 |
| | WR206 | £3.78 |
| Crystal Calibrator (Jan. 86) | WR207 | £2.90 |
| Simple Audio Oscillator (Mar. 86) | WR209 | £5.50 |
| RF Speech Processor (Mar. 86) | WR208 | £5.21 |
| PW Meon Filter (Apr. 86) | WR211 | £4.04 |
| PW Arun Parametric Filter (May 86) | WR210 | £9.87 |
| FRG-7 CIO Mod (Jun. 86) | WR213 | £3.61 |

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 can hardly have failed to notice the recent hullabaloo over the introduction of the new amateur band allocation at 50MHz. Some may wonder why so much fuss is being made over the maximum power that may be transmitted and the seemingly complicated way in which it has to be calculated.

In the earlier days of amateur radio the d.c. power input to the valve delivering power to the antenna was a very simple means of stating transmitter power. Knowing the p.a. anode current and the anode voltage enabled the power to be calculated. For example, an 813 p.a. valve with 1000V on the anode and passing an anode current of 150mA had an input of 150W, the maximum allowed on the h.f. bands then, with a limit of 10W on the 1-8MHz band.

Now, the requirement is based on r.f. power output described in decibels, relative to a watt or dBW. On the new 50MHz band not only must the transmitter power output be known but also the loss in the feeder between the p.a. and the antenna, and the gain of the antenna system. The reason for this is that UK 50MHz stations must not be allowed to interfere with certain Continental TV broadcast stations in the same band. If interference does occur with any regularity our 50MHz allocation might well be withdrawn.

Reference to dB tables will show for example, that 9dBW, the maximum carrier output on the 1-8MHz (160m) band, corresponds to 8W. On the h.f. bands (except the WARC bands) it is 20dBW or 100W output. The corresponding maximum output power on s.s.b. would be 400W (26dBW) peak envelope power or p.e.p. as it is commonly called.

Reverting to the requirements on 50MHz the transmitter output can be measured with a power meter suitable for use at that frequency, while coaxial feeder loss may be calculated by reference to tables to be found in AR handbooks or obtained from the cable retailer. This loss is usually expressed in dB per 100m and must be deducted from the transmitter output power to obtain the power at the feedpoint of the antenna.

The antenna for 50MHz will almost certainly be a Yagi beam, the gain in dB being found in the manufacturer's literature and added to the power at the antenna feedpoint. Note that the antenna gain must be expressed in dBd meaning decibels relative to a half-wave dipole. The resulting power is known as the effective radiated power (e.r.p.) in a given direction.

On the 50MHz band the maximum e.r.p. is 14dBW carrier power, or 20dBW p.e.p., corresponding to 25W carrier or 100W p.e.p. The antenna must be horizontally polarised, and not exceed a height of 20 metres above ground level. All rather complicated but if the conditions are adhered to it will ensure that we keep our new 50MHz allocation.

General

During the Greenwich Festival on Sat/Sun, June 14/15, the Cray Valley Radio Society will be running the special event station GB2GF on behalf of the Festival. Operation is being arranged for both the h.f. and v.h.f. bands and special QSL cards will be available for all contacts and reports. Further details from Owen Cross G4DFI, 28 Garden Avenue, Bexleyheath, Kent.

An interesting letter from J. T. Joyce G4JTI, chairman of the Bedford & District Radio Club on how to run a club properly. He comments that over the last few years his club "sank into the doldrums of a beer-swilling club, mainly as a result of not offering a programme". The club supports three repeater stations which tended to act as a meeting spot instead of the club. Now the club is on its feet again with the target set to provide a more formal atmosphere and to ensure that there is always a talk or demonstration organised for meeting nights.

He goes on to say that this policy is proving successful so far. His final point is that in order to sustain a variety of talks and demos the club has co-ordinated its programme with other clubs with a view to providing a "library" of events which can be drawn upon as necessary. Club committees, read, learn and inwardly digest!

During Fri/Sat/Sun, June 20/22, the 200-year anniversary of the Methodist Missionary Society will be celebrated at Trentham Gardens, Trentham, North Staffs, by the World Association of Christian Radio Amateurs and Listeners with special event station GB8MM on the h.f. and v.h.f. bands plus a special commemorative QSL for all contacts. Full details of the event and of WACRAL activities from Brian Hancock G4NPM on 0795 873147 or drop a line to him at "Leahurst", Augustine Road, Minster, Sheerness, Kent.

DX Bands

Phil Dykes G4XYX of Poole, Dorset, comments on some good openings heard on the 28MHz band of late, mainly to South America and Africa and wonders if this is a sign of things looking up. Personally speaking I don't think it is, as north/south propagation tends to come good on the band from time to time during sunspot minimum. The sunspot count is still hovering around the zero mark and the 1-8 and 3-5MHz bands are still producing excellent DX. Phil has been away from home a lot recently so his log consists of c.w. QRP contacts on 7MHz, like EI4DZ, KB1DA, LX1DA, UC2SLX, WA1GAG and W4XJ, all with 3W input and a vertical antenna.

"Oh! the pain!" comments Marcus Walden of Harrogate, on his efforts to copy c.w. on the amateur bands, where call signs are often repeated several times which is most helpful for the beginner. However, back to s.s.b. where Marcus caught VO1FG around 3-8MHz, with EA9FU on 7MHz. The 14MHz band produced just HH7PV for a good one, and on to 21MHz and NP4CC, TROA, TU2PX and ZS6CAN, all on a DX302 and 20m-long antenna in the attic.

Arthur Greenwood BRS86966 of Rochdale has been busy on most of the h.f. bands with his R600 receiver and 20m-long wire, finding 9L3MW, a Reformed Church missionary, on 21MHz. On 14MHz the log starts with TA1I, TY5EG, T52KEZ and V3VEL, and on to 7MHz and TI2WW and TK5BF. More on and around 3-8MHz with J6LMY, KH6F, OJ4CK, TI2CCC, V3GJ, VE3MV, ZL2AGV and ZL4AP all about 0630Z. Arthur will have had a go at the RAE by now so let's hope he has made it. He is very active learning the code at his local club.

Andy Durrant (Aldershot, Hants) has now added a Jaybeam VR3 for 7/14/21MHz on the receiving side with his FRG-8800/FRT-7700 combination and did well around 3-8MHz with EA8BLO, I2JSB/EA5, OE5JTL/YK, OY5NS, VK2ABN, 6W1CK, VK2AVN, VK7AE, 3A2AH and 4X4JO mostly between 2100Z and midnight. Up to 7MHz and NP4A with cards to W3HNK, OD5AS and YV5DPO. The popular 14MHz band produced AI2C/4, EA8BBP, KP2AH, OD5AO, TA1D, VE8RKS of the Polar radio club at Alert, NWT with cards to MPO 310, Belleville KOK 350, VP2EZ, VP2MCG and 5Z4MR all evening catches. CT3AF and EA8BED were all of any note on the 21MHz band.

For those readers interested in low-power operation the G-QRP Club is running a "Summer Ramble" activity event on June 14 to 22 this year, hopefully to become an annual event, so watch all the QRP spot frequencies.

Snippets of news say DL2YAG/SV5 is on 14MHz around 2300Z and that BY0AA is on c.w. on 14-029MHz around 1130Z with a YL operator.

Using a Panasonic DR49 and an AD370 antenna in Bolton, Lancs, Michael Sargeant did well to capture CR8CDC, N6MCD/OX, VE7RVT, V44KAC, ZL3MF, 3D6VU and 5H3HM all on 14MHz s.s.b. The 21MHz area produced A22BK, A4XZF, CP6NU, EL3AA, HZ1HZ, J28DN, TA2G, VU2ZAP, ZS6NK, 8R1RPN and finally 9J2BO.

Robert Watters of St Austell, Cornwall, runs a Yaesu FRG-7700 and FRT-7700 a.t.u. fed from a 20m-long L-shaped antenna and feels that the 21MHz band has improved of late with entries such as LU8DWR, SV5TS, YCOBW, YV5AGM and 4X6KJ. Bob looks forward to the time when he can hear all the activity promised on the 21 and 28MHz bands when the solar cycle starts rising again. Don't we all! On 14MHz Bob logged VK6WC, VK5MS, JA1CIA and JH1IED and PY1BJ.

With 94 countries now confirmed M. Dunn BRS86500 of Grimsby is busy

sending off for various awards, helped by the arrival of cards from SV5TS, A22BW, A4XJZ, 9H1ED and 9U5JB. Melvyn has an FRG-7700 and 40m of antenna wire to capture such as T77C on Top Band, plus PY0FG (QSL POB 10, Fernando da Noronha), 4X6TT, and TA1E with QSLs to POB 294 Istanbul on 3.8MHz. The noisy 7MHz band came good with HC5EA (QSL K8LJG), YV3AA, VP2EC (QSL N5AU), and D44BC QSLs to POB 36, Mindelo, Cape Verde Islands. Good catches on 14MHz included such as PJ7ARI (QSL POB 142, Saint Maarten), HV3SJ, (QSL IODUD), VP9KK, and 5N0HFW with cards to WB2LCH. Finally, on 21MHz, YB3CDL, TR0A, 5N8AFE (QSL POB 12635, Kano) and HZ1HZ with reports to N7RO.

George Hitchins BRS88435 (Frimley, Surrey) comments on the VK/G Net on 10-128MHz s.s.b., mentioning VK7AK in particular. George has a Panasonic RF3100LBE receiver and a loft wire 20m long. Outstanding on 7MHz were DU6UA and NP4A while CMOCQV, KL7X, TU2JU (QSL POB 120, Abidjan), V85GI, 6T2BA (Sudan), 9L1IS, 5V7QL very strong indeed (and wondering if he is legitimate), all on 14MHz. Outstanding on 21MHz were LU1DDS, PT7CB, YC8GH, YV2CCT, ZS1AAJ, 5N4RTF and 5X5GK.

Fred Tagg up in Nottingham bought a trapped dipole, twin feeder and a dipole/Marconi switched balun from the G2DYM organisation and was delighted to note that as a dipole it greatly reduced electrical QRM and improved signal strengths. The principle expounded by G2DYM of keeping everything symmetrical has certainly proved effective in many similar situations. Fred has an Icom R71 receiver and logged KW0A, VO1PK, XT2BR and ZB2HG (QSLs POB 292, Gibraltar) on the 3.8MHz spot. On 7MHz c.w. it was CO7HC, PU7IAL and WT4K/MM in position 31°N, 41°W. Stuff found on 14MHz s.s.b. included HH7PV, JH1LPF, KA9TWZ/AG, PY2BD, VP2MJ (QSL to VE3XZO), VU2BEJ, 5T5SL (QSL DL8DF), 5Z4EO (QSL DJ5JRT) and KP2AH (QSL WA2YMX) who said he hopes to be active on 1.8MHz with a 15 metre-tall vertical antenna. On 14MHz c.w. it was ZD8KM who wants cards via G3IFB. Catches on 21MHz s.s.b. were FM5BX (QSL POB 152, Fort de France), YC3DSJ (QSL POB 490, Surubaya), YC1FR (QSL POB 54, Jakarta) and 4X4HT.

Mention was made a while ago of an idea to form an association of people for the exchange of information and ideas between s.w.l.s, and as a result the International Listeners' Association has been

formed with a membership of over 60 at the start. A register of members will be built up and, at present, there are no membership fees. It is intended to issue a quarterly newsletter with updates of members' equipment, etc.

Intending members should send full name and address and details of equipment to Trevor Morgan GW4OXB, 1 Jersey Street, Hafod, Swansea, SA1 2HF, and it is pointed out that addresses will not be published or released outside the club. All inter-member mail will be sent via the above address.

Trevor has originated a number of awards for s.w.l.s including the Amateur Radio Prefix awards with certificates for logging 250 and 500 prefixes and engraved plaques for 1000 and 2000 prefixes. There are also the Lifeboat Award, the QRP Awards, and the Jamboree Awards in connection with the annual JOTA event. Full details of these awards from the above address of GW4OXB.

Readers are invited to send in regular logs of DX stations heard on the h.f. bands and they should reach me direct by the 15th of the month. A sample log sheet is available from me for an s.a.s.e. Good listening!

the Society for Experimental Radio Research in the Netherlands." RTTY signals on 14MHz pounded into my QTH from JA4CMW, Fukuyama City, working a 4X4, at 0932 on March 21 and less strong, but very clear, came VK2BQS at 1436 on April 3.

"I have not heard the band in such good condition for a long time," commented HP1XAW to an IT9 on 14MHz, at 1947 on March 30, and he was absolutely correct because at 0839 on the 31st I logged, for the first time, ZK2JB on Niue Is. I saw his RTTY signal again at 1015 on April 5, saying "Good evening to you" to a station on Sardinia. I glanced at my world clock and realised that, as far as the ZK was concerned, the time was around 2200 on the 4th. Shortly after I noted that OH6MW

RTTY

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

"Although there is no sign yet of a general upturn in solar activity, the h.f. bands have been lively enough to bring in a rich harvest of data mode loggings this month," writes **Len Fennelaw G4ODH** in Wisbech. During the month prior to April 8 Len had a record haul of stations from over 60 countries on RTTY. He heard 27 stations on AMTOR including 12 new ones for him, Botswana, Cayman Is, Central African Republic, Ecuador, Equatorial Guinea, Kenya, Moldavia, Montserrat, Panama, Peru, St. Pierre and Uruguay. However, although the majority of these countries were logged around 14-090MHz, I am pleased to see that signals from Brazil, Canada, Canary Is, Chile, Equatorial Guinea, France, Italy and Spain were copied on 21MHz. "This lot, at a time of depressed solar conditions augurs well for future months when an increasing sun angle, with its attendant enhancement of F layer ionisation, should bring many an evening's pleasure to this fascinating hobby of Data DXing," said Len.

Between March 10 and April 7, **Bob Borzych G4WWD**, Liphook, exchanged AMTOR signals with KA9EDX, KOEPK, WB2TTC and VE3RX on 14MHz and A4XFW on 21MHz. At 1121 on April 5, he was the second QSO for SP9VU who was enjoying his first day using AMTOR. Bob also heard AMTOR signals from 11 other countries, ranging from Alaska to Australia on 14MHz and at midday on the 5th, he copied HB9BDM and both sides of a QSO between G4ZKJ and ZS6AAK on 21MHz.

I too had a good RTTY haul during the period, including signals from the Pacific area and several new prefixes. At 0849 on March 16, on 3.5 and 7MHz I copied, "This is the voice of the German Amateur Radio Teleprinter Group Inc.", announcing that their station was active on 3.585, 7.035 and 14.085MHz using 75 baud Baudot at 0900, 110 baud ASCII at 0930



by Ron Ham BRS15744

and 45 baud Baudot at 1000. A few minutes later, on 14MHz, SP9HWN told an EA, "I am a member of the SPDX Club and Scouts Group of Tarnow."

During the evening of the 28th, I read, "End of RTTY Bulletin of PI4AA, Dutch National Amateur Radio Station PA0AA of

| Country (Prefix) | Band (MHz) | | | |
|--------------------------|------------|---|----|----|
| | 3-5 | 7 | 14 | 21 |
| Alaska (KL7) | | | X | |
| Argentina (LU) | | | X | |
| Australia (VK) | | | X | |
| Austria (OE) | | X | X | |
| Balearic Is (EA6) | | | X | |
| Belgium (ON) | | | X | |
| Botswana (A2) | | | X | |
| Brazil (PP,PT,PU,PY) | | | X | X |
| Bulgaria (LZ) | | | X | |
| Canada (VE) | | | X | X |
| Canary Is (EA8) | | | X | X |
| Cayman Is (ZF) | | | X | |
| Central African Rep (TL) | | | X | |
| Ceuta & Melilla (EA9) | | | X | |
| Chile (CE) | | | | X |
| Comoros (D6) | | | X | |
| Cuba (CO) | | | X | |
| Czechoslovakia (OK) | | X | X | |
| Denmark (OZ) | | X | X | |
| East Germany (DM, Y2-9) | | X | X | |
| Ecuador (HC) | | | X | |
| Eire (EI) | | | X | |
| England (G) | X | | X | |
| Equatorial Guinea (3C) | | | | X |
| Estonia (UR2) | | | X | |
| Finland (OH) | | X | X | |
| France (F) | X | X | X | X |
| Germany (DF,DJ,DK,DL) | X | X | X | |
| Gozo & Comino (9H4) | | | X | |
| Greece (SV) | | | X | |
| Greenland (HH) | | | X | |
| Haiti (HH) | | | X | |
| Israel (4X, 4Z) | | | X | |
| Italy (I) | | X | X | X |

| Country (Prefix) | Band (MHz) | | | |
|----------------------|------------|---|----|----|
| | 3-5 | 7 | 14 | 21 |
| Japan (JA,JF,JR) | | | X | |
| Kenya (5Z) | | | X | |
| Lebanon (OD) | | | X | |
| Malta (9H) | | | X | X |
| Martinique (FM) | | | X | |
| Moldavia (UO5) | | | X | |
| Montserrat (VP2M) | | | X | |
| Netherlands (PA) | X | | X | |
| Nigeria (5N) | | | X | |
| Norway (LA) | | X | X | |
| Oman (A4) | | | X | |
| Panama (HP) | | | X | |
| Peru (OA) | | | X | |
| Poland (SP) | | | X | |
| Portugal (CT) | | | X | |
| Rhodes (SV) | | | X | |
| Rumania (YO) | | | X | |
| Sardinia (IS) | | | X | |
| Scotland (GM) | | | X | |
| Sicily (IT9) | | | X | |
| South Africa (ZS4-6) | | | X | |
| Spain (EA) | X | X | X | X |
| St Pierre (FP) | | | X | |
| Sweden (SM) | | X | X | X |
| Switzerland (HB) | | X | X | X |
| Turkey (TA) | | | X | |
| Ukraine (UT) | | | X | |
| Uruguay (CX) | | | X | |
| USA (N,K,W) | | | X | |
| USSR (UA,UB,UZ,RA) | | | X | |
| Venezuela (YV5) | | | X | |
| Wales (GW) | | | X | |
| Yugoslavia (YU) | | | X | |

Fig. 1

was printing "CQ DX PACIFIC" and at 1029, I read both sides of a real northern QSO between stations in Greenland OX3CO and Sweden SMOKCR.

During the evening there was an opening to South America, because around 2000, I copied CO2BB in Cuba working into EI, DF and HB9 and heard several stations calling him. Within a few minutes I had logged signals from Brazil, Haiti, Suriname and Venezuela and a W4 saying he was, "From the Blugrass station of Kentucky". These reports should be good news for people like Andrew Salt G1SAC, in Sheffield, who is planning to use a BBC B computer for data communications.

I made a few sample checks on 14MHz during the BARTG RTTY contest in March and soon after 1113 on the 22nd, I had 5 countries, Austria, Finland, Italy, Japan and the USSR in the log. If one has the time, these events are fascinating and well worth entering. BARTG events usually cater for single or multi-operators and s.w.l.s. On several days during this period I copied signals from the EA8WP-Radio Bulletin Board Service and VK5BB, in Whyalla, working G at 0759 on April 6.

My thanks to Bob and Len for their detailed logs, which, coupled with my own RTTY efforts, enabled me to compile our monthly charts. Reference to Fig. 1, RTTY, shows that 8 countries were logged on 3-5MHz, 11 on 7MHz, 64 on 14MHz and 9 on 21MHz and, Fig. 2, AMTOR, indicates 3, 2, 27 and 6 countries respectively.

| Country (Prefix) | Band (MHz) | | | |
|-----------------------|------------|---|----|----|
| | 3-5 | 7 | 14 | 21 |
| Alaska (KL7) | | | X | |
| Australia (VK) | | | X | |
| Austria (OE) | | | X | |
| Brazil (PP,PT,PU,PY) | | | X | |
| Canada (VE) | | | X | |
| Canary Is (EA8) | | | X | X |
| Crete (SV9) | | | X | |
| Eire (EI) | X | | | |
| England (G) | X | | X | X |
| Finland (OH) | | | X | |
| Germany (DF,DJ,DK,DL) | X | X | | |
| Greenland (OX) | | | X | |
| Italy (I) | | X | X | X |
| Japan (JA,JF,JR) | | | X | |
| Kuwait (9K) | | | X | |
| Mauritius (3B8) | | | X | |
| Netherlands (PA) | | | X | |
| Norway (LA) | | | X | |
| Poland (SP) | | | X | |
| Portugal (CT) | | | X | |
| Sicily (IT9) | | | X | |
| Singapore (9V) | | | X | |
| South Africa (ZS4-6) | | | X | X |
| Spain (EA) | | | X | X |
| Sudan (ST) | | | X | |
| Sweden (SM) | | | X | |
| Switzerland (HB) | | | X | X |
| USA (K,N,W) | | | X | |
| West Malaysia (9M2) | | | X | |

Fig. 2

Reports by the 15th, please

controlled for frequency adjustments, Doppler shift, QRM, etc. The resultant audio from the downlink is fed to the Q16 and monitored by the operator, who also controls the TX switching, aligns the RX and TX frequencies, steers the antennas, announces the Gateway open, and explains the procedure to stations using the system.

This is the basis for the functional station, which by our licence requirements could be said to need licensed operator presence while in use, although technically could be fully computer controlled. By the use of even a small micro and suitable modems, frequency selection, uplink and downlink matching with Doppler correction adjustment, amplitude levels to match a given downlink strength, az-el auto antenna tracking, call sign indication, and a host of control commands could all be executed and put into effect by a group effort.

If any groups are interested in experimenting with their own local system, it is strongly recommended that they liaise with G4CUO, G4ZHG, and the RSGB Repeater Management Group who could in turn consult with the DTI with a view to establishing such facilities on a permanent basis.

As future satellites emigrate through u.h.f. toward s.h.f., and the cost and technical requirements of a single station escalate, the Gateway concept could be the means of large numbers of users sharing a common facility and installation costs to provide worldwide communications to small mobile and hand-held f.m. users.

Shuttle Scene

NASA has tentatively arranged a schedule of STS flights commencing on 5 February 1987, on the proviso that these are permitted following adequate correction of the problem that brought about the tragic *Challenger* disaster. May 1 is to be a highly secret military mission for which no details are obviously available, but June 25 is set for *Atlantis* to carry either a solar probe and/or the Galileo mission to Jupiter and its moons. July 23 is planned for the first launch of *Discovery* from the Vandenberg Air-Force base (from whence came the early OSCAR series) giving us high inclination, very visible passes in Northern Europe. *Atlantis* is planned to fly again on 17 September to carry the Hubble space telescope into space, and around 18 November to take up the "G-STAR" and the Indonesian "Palapa B-3" satellite. Finally, on 17 December, *Atlantis* flies again to take up the long awaited "TDRS", the Tracking Data and Relay Satellite that is used by the shuttles themselves for communications.

Sadly, but rather as expected, NASA listed no "ham-in-space" or "SAREX" (Shuttle Amateur-Radio Experiment) missions, as they seem to prefer to call them. Given time, it is to be hoped that these will resume, as the public relations aspect of these do much to make the enormous budget costs of the STS missions acceptable to many of the taxpayers who also happen to be radio amateurs. As even the major missions listed can be said to be no more than that which it is hoped to accomplish if all goes according to plan, it would be premature to assume any further ham activity within a year.

Spacelab D-1 and DPOS1

The tape recording made onboard the STS-61-A D-1 European Spacelab during

Practical Wireless, July 1986

SPACE & SATELLITES

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

Gateway to Space

Readers may recall having read about the "Gateway" stations operating in the USA in the February 1985 PW (page 64) and of the experiments conducted in the UK by G4CUO and G4ZHG on page 55 of the March 1986 issue.

Although mobile to mobile operation through OSCAR-10 has been successfully demonstrated by the first QSO between G3PXT/M and G4CUO/M, it is normally only really feasible when the satellite is close to perigee, and when the modest powers and antennas of a mobile installation are not competing with the demands of fixed stations with high e.i.r.p. levels. Local ignition QRN can critically affect the readability, and it is no mean feat to finely tune Doppler shifting s.s.b. and match ones uplinks and downlinks whilst driving a car on our busy roads of today.

This is where the "Gateway" comes in, as a repeater with a difference, which can use a remote station to get the mobiles signal as an uplink to the satellite, and also retrieve the satellite downlink and pass it to the mobile as a good strong noise-free transmission requiring minimum driver adjustment. The problems that might evolve by closely linked harmonically related signals, and powerful adjacent transmitted signals in the same band as the weak satellite downlink have been overcome in an experimental station at Newark, by Dave G4CUO and John G4ZHG, who have demonstrated a feasible basic project that may lead to a number of permanent stations allowing worldwide inter-mobile v.h.f./u.h.f. contacts independent of propagation variables.

The Gateway station consists of three interdependent sections, as (1) The input

from the local f.m. stations and the interface unit, (2) The uplink, and (3) The downlink.

(1) **The Local Input:** The input from local f.m. amateurs requires a fully quieting input on 144-575MHz, this choice of frequency showing no de-sensitisation by proximate mobiles of the satellite downlink 1-375MHz higher in the band. An FDK Q16 crystal controlled transceiver was used with a ground plane at 9m, giving coverage to Lincoln, Grantham and Doncaster all around 48km distant. (It was calculated that if the input was changed to the Lincoln repeater or "R5" (145-125 RX/145-725MHz TX) and a separation of 825kHz established, then coverage of some 96km would be possible. This has yet to be discussed with the Lincoln Repeater Group).

(2) **The Uplink:** The incoming f.m. signal from mobiles on the Q16 is audio coupled to the IC-451E set to 435-050MHz i.s.b. VOX controlled, and a 430MHz linear amplifier added to give the e.i.r.p. needed to produce a good downlink from the satellite. The signal was fed to a 430MHz 12-element XY RHCP array, with manual control of antenna position and r.f. level determined by a Spectrum computer using the OSCAR-10 program of GM4IHJ to give pointing, distance, DX in range, satellite position, Doppler, and all needed parameters.

(3) **The Downlink:** The signals from the satellite are received on an 8-element 144MHz XY RHCP array and fed via a MM144 pre-amplifier to an IC-211E. Both RX and TX have microprocessor frequency controls which can be remote



by Pat Gowen G3IOR



**NORMAN
G4THJ**



STANDARD C111 2 WATT HAND HELD

**ONLY £189.00 inc. VAT
(P+P £2.50)**

Spec:

Frequency Range RX/TX 144-148MHz
Current Drain: Transmit Hi 700mA
Low: 250mA

Transmitter:

RF Output Hi: 2 Watt
Low: 400mW
2.5W plus available with
Nicad Battery CNB111

Receiver:

System: Double Superheterodyne
(10.695MHz/455MHz)
Sensitivity 12dB Sinad -10dB
-16dBμ

S/N at Input Voltage 1uV...more than 30dB
Audio Output: 400mW
(8 OHMS 10% Distortion)

* 1750Hz Tone Burst comes in with Repeater
Switch
* "S" Meter Socket

ACCESSORY RANGE

| | | |
|---------|------------------------------------|-------------------|
| CMP111 | Speaker/Microphone | £23.50 inc VAT |
| CHP111 | Headset/Boom Mic with PTT | £22.50 inc VAT |
| CMA111 | DC Charger/Adaptor (Switchable) | £32.50 inc VAT |
| CAD111 | DC Charger Unit | £8.50 inc VAT |
| CSA111 | Base Charger | £45.00 inc VAT |
| CNB111 | Nicad Pack (For 2.5 Watt + Output) | £35.00 inc VAT |
| C10/120 | Wall Charger | £8.50 inc VAT |
| CMB111 | Mobile Mount Clip | £7.00 inc VAT |
| CNT111 | CTCSS Tone Squelch Unit | £30.00 inc VAT |
| CLC111 | Carrying Case | £6.00 inc VAT |
| | Spare Helical | £7.95 inc VAT |

211 WEST HENDON BROADWAY, LONDON NW9 7DE

TEL. 01-202 3638

TELEX 298765 UNIQUE G

and

(FORMERLY LEE ELECTRONICS)

400 EDGWARE ROAD, LONDON W2

TEL. 01-723 5521

TELEX 298765 UNIQUE G



Normally 24hr
despatch but please allow
7 days for delivery

Mail Order + Retail
All prices are inclusive of VAT and are
correct at time of going to press

Northern Agents: Joe Bell G4PMY
Unit 3, Thomas St., Crewe
Tel. 0270 582849



RADIO DATABASE INTERNATIONAL WORLDWIDE SHORTWAVE BROADCASTING ... AT A GLANCE

Which stations broadcast on what frequencies? At what time? To what parts of the world? In which language? With what transmitter powers?

RADIO DATABASE INTERNATIONAL answers all these questions and more. You'll find page after page of accurate, up-to-date information about all categories of shortwave broadcasting including independent networks such as the BBC, official government stations, commercial and religious broadcasts, secret clandestine operations, hidden "pirates", broadcasting feeders... even illegal jamming transmissions.

This valuable information - most of it gathered firsthand by a worldwide network of expert monitors - is presented in a visually oriented format that's completely different from traditional reference publications. Thanks to a unique combination of innovative computer graphics plus the world's most comprehensive private shortwave database you'll find everything you need to know to scan the worldwide shortwave bands... all in one place... all at a glance.

RADIO DATABASE INTERNATIONAL

Part 1 - International Broadcasting Edition (5.73-26.10 MHz) £10.95 + £1.20 p&p

Part 2 - Tropical Bands Edition (2.5-7.3 MHz) £5.50 + 60p p&p

Save £5.75 by buying both parts together

Part 1 and 2 only £13.70 incl post & packing.

OTHER NEW BOOKS

SCANNERS. A VHF/UHF Listener's Guide £7.95 p&p FREE.

UK TABLE OF RADIO FREQUENCY ALLOCATIONS. Frequency allocations 20kHz-400GHz. £12.00 p&p FREE

GUIDE TO UTILITY STATIONS 1986. Now lists 15,083 SW frequencies Aero, CW, Fixed, Commercial, RTTY, FAX, etc. stations, plus call signs and much more. The most comprehensive frequency book available. £16.00 + £1.45 p&p

US MILITARY RADIO COMMUNICATIONS. Full details of operations and frequencies used on HF bands. Part 1 £10.80 + 65p p&p
Parts 2 and 3 £8.65 + 65p p&p
Parts 1, 2 and 3 together £26.50 p&p FREE

RADIO BEACON HANDBOOK. Worldwide listing of 8,500 Long and MW Beacons by call sign, frequency, station and more. £8.85 + 35p p&p

AERAD - Europe & Middle East. Lists all airports and the VHF frequencies used. £5.85 + 65p p&p

HANDBOOK FOR RADIO OPERATORS. Maritime bands manual. £9.95 p&p FREE

RADIOTELETYPE PRESS BROADCASTS. Full details, frequencies & times of Press Agencies. £11.85 + 65p p&p

CLANDESTINE CONFIDENTIAL. £5.25 + 60p p&p

Two or more books Post & Packing FREE. (UK and Eire only).

Ask for our free catalogue of all books.

Delivery normally from stock within 14 days.



INTERBOOKS, PWD12, Stanley, Perth PH1 4QQ. Tel: (0738) 828575

COMMUNICATION CENTRE OF THE NORTH

The largest range of communications equipment available in the North. Full range of receivers, transceivers, antennas, power supplies, meters. Ali tubing - wall brackets - rotators - insulators.

We are the original amateur radio suppliers in the North West with 20 years experience in all types of equipment.

We are the only official TRIO stockists in the North West. Full range of equipment on display. Guaranteed after sales service.

Stockists also for Tonna, Welz, TET, G.Whips, Jaybeam, RSGB Publications, Diawa, Microwave Modules.

RECEIVERS

TRIO R600 Solid State Receiver £323.78

TRIO R2000 Solid State Receiver £518.73

Wide Band Scanning Receiver AR2002,

25-550 MHz AM-FM + 800 to 1300 MHz £435.00

R532 Airband Receiver £209.76

RS37S Hand Held Airband Receiver £64.89

Yaesu FRG8800 Receiver £575.00

AT1000 SWL Antenna Tuning Unit £53.00

YAESU FRG9600 Scanning Receiver £465.00

Please send SAE for full information and up-to-date prices as these fluctuate to change in sterling rates.

For the caller a wide range of Aluminium Tubing, Clamps, etc. at competitive prices, i.e. 12' x 2" Ali Tubing £9.00.

Full range of RSGB and ARRL publications in stock.

Part Exchanges welcome. Second hand lists daily.

Send S.A.E. for details of any equipment.

HP terms. Access/Barclaycard facilities.

Open 6 days a week. 24 Hour Mail Order Service.

Goods normally despatched by return of post.

Phone 0942-676790.

STEPHENS JAMES LTD.

47 WARRINGTON ROAD,
LEIGH, LANCs. WN7 3EA.

the late October/early November DPOSL mission operated by DD6CF, DG2KM and PE1LFO has had its first audience. Stations uplinking on 437MHz f.m. to DPOSL were numerous on the tape, and resulted in a list containing mainly stations from the USA and Germany, plus some quite exotic call areas.

From the British Isles, the following stations were identified on the first playing of the tape recording:

EI6AS, G3AHX, G3IOR, G3RUH, G4FCD, G4RKV/A, G4VRC, G6HMS, G8SBF, GM6FPX, GM6JVC and GU4YMW.

The tape will be gone through very carefully in time, with good filters and sharp ears, at which time a further group of stations in the area will be identified and listed. These will be placed in a later issue, and if copy space permits, a complete listing will be given.

OSCAR-10

A number of our readers have asked why we have not been keeping them informed of the operating schedule times of A-O-10. The lack of information, we openly admit, is quite intentional, as with the rapid change of schedule mode "on" times every week or so, by the time the information is published it would be well outdated, and thus no longer true when seen. Until we come to a long zero-eclipse period, coupled with good behaviour of all of those stations currently louder than the beacon that has meant an additional "off" period close to apogee to conserve battery charge, there is no way in which a long advance plan can be given. Watch the 145-810MHz beacon and the numerous AMSAT nets, try the UoS bulletin telephone number given later in this issue, and these will give you the schedule changes on a topical basis.

Gradually the spacecraft is getting above our Northern European roof levels, and also coming into more sociable hours, at which times signals have been found to be quite good. New stations continued to be heard using the transponder, with VS5JA, TR8JLD, 7P8CM/3D8 and 7P8CF/3D8 adding to the one hundred and twenty DXCC countries now known to be active via OSCAR-10.

QSL's for 7P8DM and DF/3D6 go to Martin and John either via the 7P8 QSL Bureau or direct to Martin Broadway, P.O. Box 949, Maseru 100, Lesotho. CX2GB's QTH is Paul Rivero, Grito de Asencio 1581, Dolores, Soriano, Uruguay. CE8ABF, Alex, is operating from Tierra del Fuego, and can be QSL'd via LU8DPM, P.O. Box 7150, Ayacucho, Argentina. TZ6FE has DL4BC as a QSL Manager.

Orbital Elements

In this issue we shall additionally publish the Keplerian data for most of the Weather Satellites, as this seems to be becoming popular with many correspondents. These have been kindly supplied by keen satellite s.w.l. Birger Lindholm of Dalsbruk, Finland, from his NASA source. We shall attempt updates regularly enough to literally keep you in track.

Comments have arisen that the data supplied for MIR and Salyut-7 have resulted in those satellites being up to thirty minutes out from that predicted, although the other spacecraft elements gave passes which were found to be "spot-on". Rather as expected, and probably to avoid an unscheduled coupling, just before the Kep-

lerian data was published in our last issue, MIR was jettied first up, and then later down by some 7km, and Salyut-7 was lifted by some 3km. This change meant an incremental additive that gave earlier and later pass times respectively. As these satellites are constantly being adjusted in their orbits, the parameter changes cannot be normally kept true for more than a week or so at the best, and if no topical update is to hand, then it is best to listen for the crew of MIR on 143-625MHz f.m. (no h.f. frequency yet) and to Salyut-7 when crewed on 142-420MHz. One can easily copy the strong 19-955MHz telemetry of Cosmos 1686 currently attached to Salyut-7, but beware sub-horizon and antipodal reception, particularly during the hours of daylight and high m.u.f. if you intend to use these passes to modify the elements to match.

As mentioned before, it is best to ignore the decay or drag factor as being useful for long term predictions, as if sustained the large manned orbiters would soon get into an even lower orbit, and merely provide short lived but excellent meteor-scatter communication.

The latest data, including the drag, will be published with this column, but please remember that by the time you read and apply it, quite a few changes could have occurred to the orbit height and hence the period, and considerable leeway of up to forty minutes either side of the evolved pass times should be allowed for.

MIR, SALYUT and SOYUZ

It is now known that the new USSR space station MIR has, in addition to the facilities listed last month, a sports hall, a recreation room, a restaurant, and a normal earth atmosphere. It also has a large extending arm, undoubtedly to be used for the manipulation, launch and recovery of satellites.

John Branegan GM4IHJ, who watched the TV broadcast by Cosmonauts Commander Leonid Kizim and Engineer Vladimir Solov'yov who went aloft on the first Soyuz T-15 mission to prepare the station for the later full time crewing, said that MIR was "... out of this world ..."

Nevertheless, even this success does not come without its problems, the prime one being concerns over experiments that require a stable platform for success. ROENTGEN/HEXE is a high energy X-ray experiment designed by teams from Utrecht, Birmingham, Tübingen and ESA, and made by the German Max Planck Institute. It has to have extremely good stability to permit accurate pointing as it looks at old super-novae and galactic nuclei, and this state is unlikely to be achieved with lots of cosmonauts moving about in a station at 315km altitude causing movement of the ultra-stable platform needed for all work of this nature.

HEXE was originally designed to fly in Salyut-7 when it was unmanned, so some very special and careful scheduling will now be necessary if it is to fly in MIR, as the Russians have stated that MIR is to be manned continuously.

Ideally, MIR could be taken up to 500km altitude, where it could be gravity stabilised, and there is nothing to prevent MIR from achieving such an orbit but the same is not true for the Salyut-T transport craft that ferry the crews back and forth from earth. Even Salyut-7 had to be lowered in altitude whenever a three-man crew went up via Soyuz, which was then pushed up another 50km or so to avoid the drag and

| Satellite | NOAA-6 | NOAA-9 | METEOR 2/13 | METEOR 2/8 | METEOR 2/9 | METEOR 2/10 | METEOR 2/11 | METEOR 2/12 | METEOR 3/1 | SALYUT-7 | MIR |
|--------------------------------|-------------------------|--------------------------|-------------------|-------------------|-------------------|-------------------|-------------------|----------------------|----------------------|------------------------|--------------------------|
| Int designation | | | | | | | | | | | |
| Object Number | 79-57A | 84-123A | 85-119A | 85-25A | 82-116A | 83-109A | 84-72A | 85-13A | 85-100A | 82-033A | 86-17A |
| Epoch Year | 11416 | 15427 | 16408 | 13113 | 13718 | 14452 | 15099 | 15516 | 16191 | 13138 | 16609 |
| Epoch Year | 86 | 86 | 86 | 86 | 86 | 86 | 86 | 86 | 86 | 86 | 86 |
| Epoch Day | 067.69900681 | 074.38336797 | 068.09289574 | 068.62056161 | 068.85475081 | 068.90052181 | 068.86193294 | 069.89479899 | 069.79603860 | 077.75326929 | 078.93895735 |
| Inclination | 98.5106° | 98.9873° | 82.5322° | 82.5402° | 81.2487° | 81.1613° | 82.5272° | 82.5393° | 82.5555° | 51.6270° | 51.6256° |
| RAAN | 86.2151° | 32.8489° | 90.8336° | 288.7530° | 10.4042° | 50.6203° | 236.7717° | 174.4257° | 0.1630° | 341.7852° | 335.4476° |
| Eccentricity | 0.0012364 | 0.0016606 | 0.0017589 | 0.0015042 | 0.0056695 | 0.0094516 | 0.0013169 | 0.0015841 | 0.0019378 | 0.0003458 | 0.0005297 |
| Arg of Perigee | 174.7031° | 58.9149° | 62.1550° | 171.0172° | 156.8791° | 298.5326° | 353.9839° | 221.7209° | 58.7122° | 299.5628° | 184.7287° |
| Mean Anomaly | 345.4505° | 301.3643° | 189.1373° | 189.1259° | 203.4977° | 60.6366° | 6.1203° | 138.2732° | 301.5118° | 60.5187° | 175.3822° |
| Mean Motion (r.p.d.) | 14.24901938 | 14.11412799 | 13.83795559 | 13.83806026 | 14.12883687 | 14.21641385 | 13.83472109 | 13.83909631 | 13.15903974 | 15.75656110 | 15.78307655 |
| Decay Rate (r/d ²) | 7.7e ⁻⁷ | -8.5e ⁻⁰⁷ | 6e ⁻⁰⁸ | 6e ⁻⁰⁸ | 6e ⁻⁰⁸ | 6e ⁻⁰⁸ | 6e ⁻⁰⁸ | 1.47e ⁻⁰⁶ | 1.39e ⁻⁰⁶ | 2.5786e ⁻⁰⁴ | 1.531e ⁻⁰⁴ |
| Orbit Number | 34945 | 6460 | 1010 | 19988 | 16675 | 12269 | 8483 | 5586 | 1807 | 22549 | 444 |
| SMA (km) | 7229.861 | 7229.861 | | | | | | | | | |
| Period (min) | 102.025432 | 102.025432 | | | | | | | | | 6713.889 |
| Apogee (km) | 879.024 | 879.024 | | | | | | | | | 91.236965 |
| Perigee (km) | 855.012 | 855.012 | | | | | | | | | 339.390 |
| Frequencies (MHz) | APT 137.5 DSB 136.77 | APT 137.62 DSB 137.77 | WEFAX 137.3 | APT 137.85 | APT 137.3 | | | | WEFAX 137.4 | COSMOS 1686 19.955 | 332.277 SOYUZ 143.625 |

other problems after Soyuz had docked with the station.

John points out that if MIR is to be used at maximum potential, then clearly an advanced Soyuz taxi needs to be evolved, so our readers are alerted to the probability that they may soon be hearing signals from a new Soyuz type of craft on test at orbits greater than the present 92 minute period. Listeners should watch 922-750 and 926-060MHz as well as the more familiar 121-750MHz on f.m., and for the beacon on 20-008MHz.

Space Launches

Now that the Soviet launch agencies are giving advance notice of their space launches, *Practical Wireless* space watchers will have a far better chance of being able to monitor the communications used on these one or two day trips. Since the early advice on the launch of MIR and of the Soyuz launch to take the first crew, John Branegan has been carefully listening, and has given us some informative and interesting details made from his observations.

Manned Soyuz "T" flights use 121-75MHz f.m. voice transmissions, which can easily be at first confused with the a.m. aircraft ground control signals present in many places, e.g. Edinburgh, etc. Even when the listener is close to an air-control station, mutual interference rarely affects the f.m. reception of Soyuz, and the Russian language can clearly be identified. At times Soyuz cosmonauts switch on a beacon on 20-008MHz which often can be heard sub horizon. The beacon sends a succession of two tone dots and ripples, but it is not always switched on whilst the spacecraft is over Europe. Manned Soyuz flights usually take 25 hours from launch to docking, and after docking they still have tests to perform that can take up to a further three hours before they finally enter the space station itself. Thus, a 28 hour period of productive listening results following a launch when signals from Soyuz can be heard.

If a Soyuz flight is extended beyond one day, then this is a sure sign that the slower, safer, more economical, two day approach is being employed. This occurred during the Salyut-7 rescue mission in 1985 and again when the first cosmonauts went up to man the new MIR station. In the MIR case the safe orbit was dictated not because of equipment failure but because it had then yet to be switched on.

When returning to earth the procedure is often much faster, with the landing occurring only six or seven hours after undocking. Landings are usually timed to occur a little before local sunset, corresponding to

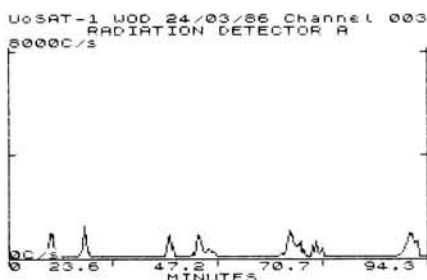


Fig. 7

about 1300UTC in summer, and an hour or so earlier in the winter. Before landing, final orbit checks are sometimes made with communications ships off the North-West coast of Africa, and near the Straits of Gibraltar, so communications may be heard some time before the spacecraft is within range of the USSR.

The unmanned automatic supply craft of the Progress type invariably use the more economical two day approach from launch to docking, averaging some forty-nine hours of overall flight time in the majority of cases. Progress control channels use 166-000MHz and 922-750MHz. Unlike Soyuz, Progress craft are frequently undocked, but are not commanded to destructive re-entry for several days, when they normally re-enter and burn out over the Pacific Ocean.

MIR Communications

The frequency of 143-625MHz f.m. voice now appears to be the regular v.h.f. downlink for MIR. This channel is regularly left on mark when not in use, and it rebroadcasts not only uplink traffic picked up from loudspeakers inside MIR, including music, but also broadcasts station running noise such as air conditioning, pen recorders, pipe noise, and that generally resulting from the cosmonauts at work. Recently some MIR transmissions over UK have ended with a burst of two tone RTTY, but it is not clear whether this is an actual transmission on the downlink, if it is aural pick up, or even produced by cross modulation. It was very noticeable that in November 1985, when the CHEGETS team were closing down Salyut-7, much of the machinery noise was absent from transmissions made on the last two days of occupation of the station, so this is a clue to be watched for in the future.

The following frequencies reported by WA2LQQ have been found to carry Soyuz/MIR communications around the world: 121-750, 142-400, 142-417, 142-600, 143-144, 143-625, 143-825, 166-000 and 192-040MHz. These are

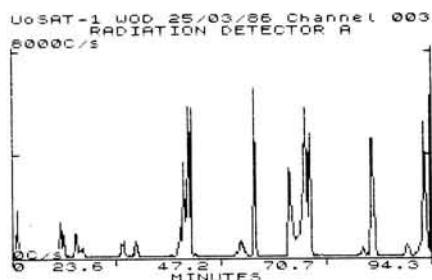


Fig. 8

thought to be specific channels for various ships, and the main one for the USSR base heard in Europe is 143-625MHz.

The USSR has now launched a satellite called "LUCH" which is very similar to the USA "TDRS" satellite that handles the tracking data and communications relay for MIR. It is thus now unlikely that we shall hear much in the way of h.f. communications from the new space station, unless another Cosmos like 1686 is attached later in the programme.

ARIANE Launches

A keen observer reports signals on 136-610MHz emanating from the ARIANE rocket as it takes the satellites up from the ESA launch site in French Guiana. Our space watchers might wish to observe this frequency when the next launch is scheduled.

Satellite List Additions

Graham Smith G1JVZ, adds to our frequency lists with the information that 166-000MHz is occupied by the following group of satellites: Cosmos-1167, ELINT; Cosmos-1220, Ocean RADAR; Cosmos-1249, RADAR; Cosmos-1260, Ocean Recon; Cosmos-1299, RADAR; Cosmos-1337, RADAR; Cosmos-1461, ELINT Ocean Recon.

DIY "WOD"

Readers who have expressed interest in the Whole Orbit Data graphs made by Harold Meerza in past issues will be happy to know that they now have the means of doing their own. As an add-on to the G4IDE/G4INP Spectrum "SHORT1" and "SHORT2" UoSAT decoder programs that comes with the "UO1-EAR" and "UO2-EAR" programs detailed in the March PW, they have now, with the aid of G4JJ and G3ENY, put together a program called "WOD".

| Satellite | OSCAR-9 | OSCAR-10 | OSCAR-11 | RS-1 | RS-5 | RS-7 |
|----------------------|--------------|--------------|--------------|--------------|--------------|--------------|
| Int designation | 81-100B | 83-58B | 84-21B | 78-100A | 81-120C | 81-120E |
| Object Number | 12888 | 14129 | 14781 | 11084 | 12999 | 13001 |
| Epoch Year | 86 | 86 | 86 | 86 | 86 | 86 |
| Epoch Day | 071-47672713 | 069-68155227 | 066-75676743 | 062-01122382 | 069-26460025 | 059-66057011 |
| Element Set | 856 | 233 | 124 | | 306 | 242 |
| Inclination | 97-6514° | 26-3847° | 98-1610° | 82-5423° | 82-9531° | 82-9628° |
| RAAN | 70-7946° | 90-8961° | 135-0944° | 87-4729° | 160-3712° | 159-6531° |
| Eccentricity | 0-0003900 | 0-6004856 | 0-0014126 | 0-0011456 | 0-0008339 | 0-0022375 |
| Arg of Perigee | 61-5034° | 92-8224° | 115-9196° | 223-3938° | 245-0573° | 183-8165° |
| Mean Anomaly | 298-6523° | 333-2649° | 244-3470° | 136-6212° | 114-9604° | 176-2727° |
| Mean Motion (r.p.d.) | 15-28185141 | 2-05856192 | 14-62032819 | 11-96696866 | 12-05051219 | 12-08695650 |
| Decay Rate (r/d²) | 2-735e-05 | -8e-08 | 9e-07 | 8e-08 | 4e-08 | 4e-08 |
| Orbit Number | 24619 | 2063 | 10754 | 32113 | 18595 | 18535 |
| SMA (km) | 6856-340 | 26105-467 | 7061-831 | | 8033-850 | 8017-682 |
| Period (min) | 94-229420 | 699-517457 | 98-493001 | | 119-496995 | 119-136691 |
| Apogee (km) | 497-093 | 35407-492 | 710-612 | | 1679-722 | 1657-570 |
| Perigee (km) | 491-746 | 4055-578 | 690-661 | | 1666-323 | 1621-691 |
| Frequencies (MHz) | 145-826 | 145-810 | 145-826 | 29-401 | 29-330 | 29-340 |
| | 21-002 | 436-048 | 435-025 | | 29-452 | 29-501 |
| | 435-025 | | 2401-5 | | | |
| | 2401-0 | | | | | |

This program takes the data stored in the UoSAT computer over the course of an orbit saved in the original program, and draws graphs of the data dumps in amazingly fast time. It takes the raw data, checksums, etc. for any channel, irrespective of length, decimal or converted figures, uses selected max/min figures for the "Y" axis, and did 700 lines in only 2 seconds!

Graphs of channel 3, the radiation detector, made on two consecutive days, using the "WOD" program, are shown in Figs. 7 and 8. The difference in the level is very marked and, as Harold Meerza points out, it is vital to know just where the radiation detector is pointing in order to deduce any really meaningful conclusions from the evidence. For details on the new program send a s.a.s.e. to SARUG, the Sinclair Amateur Radio Group, c/o G4INP QTHR.

"SUDD"

The Spectrum UoSAT Data demodulator program of G4HLX covered in the last issue has been used to give the copy in Fig. 9 to show its word-perfect capabilities and give some of the latest information that is available on reading the UoSAT-OSCAR-9 weekly bulletin transmitted each Saturday and Sunday. This copy was obtained directly by feeding the audio output of a hand-held TR-2400 on the office window-ledge to the Spectrum ear socket, having carefully oriented the handy-talkie to avoid the chorus of two metre noise that the computer generates.

Useful Numbers

Graham Smith G1JVZ, sends us the Mansfield Amateur-Radio Society list of some handy telephone numbers by which to keep in real-time contact with the many space happenings. Most of these have a short tape recording giving the latest details of any particular on-going mission, and are a valuable source of topical data.

Guildford (0483) 61707 gives the UoSAT-1 alias OSCAR-9 bulletin, and includes most of the latest Keplerian satellite elements.

Guildford (0483) 61202 is the UoSAT-2 (OSCAR-11) counterpart.

01-246 8055 is the British Telecom

Fig. 9

**** UoSAT-OSCAR-9 Bulletin 171b 26 March 1986 ****

UoSAT Spacecraft Control Centre, University of Surrey, England

**** SIGHTING AND MONITORING MIR ****

Those who have fed Keplerian elements for MIR into their tracking programs and then turned their scanners or their eyes to the sky have been well rewarded. There are now many reports of amateur radio operators and satellite spotters catching a glimpse of the giant Soviet space station. Harold Price (NK6K) reports that "at 60 degrees elevation, MIR was the brightest object aside from the Moon, and was visible from ground level in Los Angeles, on a major street, under a street light. The moon was 89% full. When MIR disappeared at 21 degrees, it was still as bright as the stars in Orion's belt." From this and other reports, Ron Dunbar (W0PN) concludes that MIR is around first magnitude. The best viewing times are on orbits about an hour before sunrise or after sunset. Narrowband FM VHF radio transmissions from MIR have been monitored on several channels between 142 and 144 MHz.

**** AMSAT-USA REQUEST FOR PAPERS ****

You may recall that in the spring of 1985 AMSAT-USA announced that it would publish a collection of technical papers as the first issue of the AMSAT Technical Journal. Though the Journal has not been published, it is being revived by Robert Diersing, N5AHD. It will be dedicated to TECHNICAL articles, not to the kind of "how to" and construction articles that are already familiar and frequently published. There is no upper limit on the technical content. Judging from some of the reports that we get from stations monitoring the UoSATs, many of you have made detailed, long-term observations of amateur satellites and may have something to add to this technical publication. If you think that you have the makings of an article for the AMSAT Technical Journal, quickly contact R.J. Diersing, Computer Science Department, Corpus Christi State University, 6300 Ocean Drive, Corpus Christi, TX 78411.

**** PHASE 3-C PROGRESS REPORT ****

The Helium bottle bracket problem is solved. Last week, a weldment, or additional support, was added to the bottom ring of the assembly, and it now fits perfectly. Other work centered on the Liquid Ignition Unit, with the prototype board wired and custom transformers wound. Once the circuit has been tested, it is expected to take a week to finish the flight model. Steady work on the delayed Mode-S transponder continues. The oscillator, multiplier and mixer chain prototype has been completed, and the IF board and the RF amplifier board are under test. Enclosures for the module are being built for AMSAT by a member of the L-5 Society. (de W0R0LY)

"Spaceline", and whilst little is given on amateur-radio satellites, is a valuable source of general space information updated regularly.

025 683 448 is the Lasham Ground Station, with a tape recorded bulletin giving the latest news and data on the NOAA and Meteosat weather satellites.

010 1 900 410 6272 will produce the American "Dial a shuttle" service which is kept going during missions with update.

010 1 202 653 0258 is the Washington US Naval Observatory Hotline carrying useful input for your needs.

Finally, the RSGB Newsletter on Potters Bar (0707) 593 12 always carries the latest information available when any amateur

radio related space activity is imminent or current, as well as the other amateur radio news.

Russian Satellites

Little new news is to hand on ISKRA-4 which in early April was not ready for transport to either MIR or Salyut-7 for launch. RS-9 has been having a few problems under test, but RS-10 is all ready for the lift-off still set for late May this year.

Both RS-5 and RS-7 survived the long March eclipse, and despite the ailing batteries, could be with us for some time to come with careful handling from RS3A and modest use by amateurs.

VHF BANDS

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



by Ron Ham BRS15744

By connecting a straightforward v.h.f. converter, fed with a suitable antenna, to the front end of an h.f. communications receiver you can transform the receiving section of your station into a useful scientific observatory. I am often asked by newcomers, how this conversion business works and is it really worth while. Of course I am biased, but in my view, the addition of equipment for the 144MHz band gives the operator another challenge on the DX front and a chance to learn more about the behaviour of radio signals. You can tell when they are influenced by such natural phenomena as aurora, decaying meteor trails, sporadic-E and tropospheric ducting.

First the 144MHz converter has 3 basic sections, a radio frequency amplifier tuned to cover the range 144 to 146MHz, a crystal oscillator chain giving a steady signal at 116MHz and a mixer stage which

combines the incoming v.h.f. signal, say 145MHz, with the oscillator at 116MHz and produces an output at the difference frequency, in this case 29MHz. Therefore, if this difference, or intermediate frequency (i.f.) is fed to the antenna socket of a good communications receiver, already tuned to 29MHz, the wanted signal at 145MHz will be heard through the receiver's loudspeaker. By the same token, 28, 29 and 30MHz are converted to 144, 145 and 146MHz, respectively, with all the advantages, such as slow motion tuning, variable stage gains, independent selection of a.m., c.w., f.m., and s.s.b. modes, a signal strength meter and in some cases,

a bank of memories, usually built in to an h.f. receiver.

A good tuning test is one of the v.h.f. beacons, for example, the Wrotham beacon GB3VHF on 144-925MHz should appear at 28-925MHz on the h.f. receiver's dial. A good rotatable Yagi is an ideal antenna for the 144MHz band and there is a good selection to choose from among PW advertisers. When aurora is present the antenna should be beamed toward the north, so that signals reflected by the display can be received. Maximum signal strength beam headings should be carefully noted, because they are important in your report, especially if it is going to the RSGB's auroral co-ordinator. Remember that the tone of auroral c.w. is very rough, thus a typical report would be 55A and s.s.b. signals sound like a ghostly whisper.

During the mid-summer months sudden outbreaks of sporadic-E, which normally affects signals between 28 and 80MHz, can extend rapidly up to 150MHz and while such conditions last the beam should be directed toward eastern European and the Mediterranean countries for some super DX. It will soon become obvious what



Thanet Electronics/Retail.

Everything you need for your shack is available from Thanet Electronics' retail shop. Andy G6MRI is on hand with new and secondhand stock from ICOM plus Yaesu, Trio, MET, Tono, Jaybeam, Welz, Drae, BNOS and many more. RSGB publications also available, if Andy can't help, you've got a problem. Why not call in, we are on the corner of Stanley Road and Kings Road, Herne Bay, Kent and open 9 - 5.30 mon-sat, lunch is 1-2.15, 1/2-day closing thursday afternoons open 9-1.00. BCNU.

Credit facilities available, plus VISA & ACCESS accepted.



Thanet Electronics Ltd. The World System
2 Stanley Road, Herne Bay, Kent CT6 6SH. Tel: 0227 369464.



SSTV - RTTY AMTOR - CW

THE RX-4 MULTIMODE RECEIVE PROGRAM NOW FEATURES

SSTV 8, 16, 32 sec. frames. Keyboard grey scale adjustment.
RTTY 4 baud rates, any shift.
RTTY and AMTOR selectable unshift-on-space. Tones directly displayed on a tuning scale for really easy and accurate tuning.
CW selectable software filters and controllable autotrack to 250wpm.
All text and pictures can be stored, recalled, saved and printed.
Spectrum needs no hardware. BBC-B, CBM64, VIC20 use the same interface as our RTTY and CW transceive program, see below.
Tape £25, Disc £27 (BBC: state 40/80 track)

RTTY and CW TRANSCEIVE

Split screen, type ahead, 26 large saveable memories, auto CR/LF, CW to 250 wpm, QSO review and more.
For BBC-B, CBM64, VIC20. Tape £20, Disc £22. Interface kit £5, ready-made with all connections £20 (state rig if transceive).
Both these programs can use a T.U. on CW and RTTY instead.
Great Morse Tutor, Logbook, Locator, RAE Maths programs, too.
More details about everything in previous adverts.

technical software (PW)

Fron, Upper Llandwrog, Caernarfon, Gwynedd LL54 7RF.
Tel. 0286 881886

SPECIAL NOTICE TO READERS

Although the proprietors and staff of *PRACTICAL WIRELESS* take reasonable precautions to protect the interests of readers by ensuring as far as practicable that advertisements in *PRACTICAL WIRELESS* are bona fide, the magazine and its Publishers cannot give any undertakings in respect of statements or claims made by advertisers, whether these advertisements are printed as part of the magazine, or are in the form of inserts.

The Publishers regret that under no circumstances will the magazine accept liability for non-receipt of goods ordered, or for late delivery, or for faults in manufacture. Legal remedies are available in respect of some of these circumstances, and readers who have complaints should address them to the advertiser or should consult a local trading standard office, or a Citizens' Advice Bureau, or their own solicitor.

SPECTRUM COMMUNICATIONS

MANUFACTURERS OF RADIO EQUIPMENT AND KITS

CB TO 10 METRE CONVERSION BOARD, fits nearly all rigs to give 29.31 to 29.70MHz. Size only 63x40x13mm. Suits MC145106, LC71367, TC9119P PLL's. Built & aligned board type SC29 £15.00. Or we'll supply & fit to your rig, £28.00 inc. P&P.

LEGALISATION OF 11 METRE MULTIMODES. Gives 28.01 to 29.7MHz and pay duty if required. 120 Channel rigs with chassis types PTBM-059COX/121D4X/125A4X, PC010AB, PC879, £52.50 inc. P&P.

NEW TRANSMIT CONVERTER, 2, 4, or 6 Metre 2 1/2W output, 25mW to 1W, 2 or 10 metre drive, includes harmonic filtering and AE switching. Types TC2-10H, TC4-10H or TC4-2H, TC6-10H or TC6-2H. PCB kit £27.50, Boxed kit £36.50, Boxed built £50.

RECEIVE CONVERTERS 2, 4, 6 Metre AE input, 2 or 10 metre IF. 26dB gain, low noise with OSC output. Types RC2-10, RC4-2, RC4-10, RC6-2, RC6-10. PCB kit £17.25, PCB built £24.50, Boxed kit £25.00, Boxed built £32.25.

TRANSMIT & RECEIVE CONVERTERS combined in one box, types TRX2-10H, TRX4-2H/10H, TRX6-2H/10H, Kit £56.75, Built £77.25.

VAT & P&P INC PRICES

Delivery within 14 days subject to availability. 24 hr answering.

UNIT B6, MARABOUT INDUSTRIAL ESTATE, DORCHESTER, DORSET. TEL: 0305 62250



AMATEUR ELECTRONICS UK

G6XBH
G1RAS
G8UUS

R.A.S. (Nottingham)
Radio Amateur Supplies
Tel: 0602 280267



Visit your Local Emporium

Large selection of New/Used Equipment on Show

AGENTS FOR:

F.D.K.
AZDEN
ICOM
YAESU
CELLNET
VODAFONE

ACCESSORIES:

Welz Range
Microwave Modules
Adonis Mics
Mutek Pre-Amps
Barenco Mast Supports
DRAE Products
BNOS Linears & P.S.U.'s

AERIALS, Tonna, Halbar, New Diamond Range of Mobile Whips
JAYBEAM TIGER ANTENNAS

JUST GIVE US A RING

Monday: CLOSED Tuesday-Saturday: 10.00am to 5.00pm

3 Farndon Green, Wollaton Park, Nottingham
Off Ring Rd., between A52 (Derby Road) & A609 (Ilkeston Road)

CHOICE OF PROFESSIONALS

COMPACT LATTICE TOWERS and SLIMLINE TUBULAR MASTS

TELESCOPIC-TILTOWER, FIXED-MOBILE FROM 6m UP TO 36m

Suitable for a wide range of civil and military applications such as:

- RADIO COMMUNICATION
- SURVEILLANCE & CCTV
- METEOROLOGICAL MONITORING
- AMATEUR RADIO
- AERO & MARINE NAV AIDS
- FLOODLIGHTING, ETC.

Purpose designed using 4.5m and 3m section modules for low retracted heights and cost effective shipment. Engineered to B.S.I. Standards and hot dip galvanized to BS729 for protection. Wind loads are based on B.S.C.P.3. Chap V, PT2, 1972 for wind speeds up to 100 mph/160 kph.

RELIABILITY QUALITY KNOW HOW

WE DESIGN, WE MAKE, WE SELL DIRECT

PRICES RANGE FROM £253.00 incl. VAT. SAE FOR MORE DETAILS, PLEASE

Allweld Engineering
Factory 6, 232 Selsdon Road,
South Croydon, Surrey, CR2 6PL, G.B.
Tel: 01-680 2995 (24 hr) 01-681 6734.

Normally despatched within 7 days

stations are about and do keep in mind that each event is different and a new experience, so I can only provide a few guidelines from my own observations.

When the atmospheric pressure is high and beginning to fall it is likely that a tropospheric opening will take place, in which case, point the antenna at Scandinavia, then at the Dutch/German border and see what is about before making further alterations to the antenna direction. Very often 144MHz signals are so strong during an opening that it is possible to leave the antenna in one direction. However, don't forget to look around the UK when tropo conditions are good because EI, G, GI, GJ, GM, GU and GW all count as countries and, depending on your own location, a signal from any one of them can be good.

VHF DX

Lists of Continental and Scandinavian 144MHz beacons are available from the RSGB. However, if you are new to DXing, when conditions are right look for the beacons in Angus GB3ANG, Cornwall GB3CTC, Lerwick GB3LER and Northern Ireland GB3EGI on 144.975MHz, 144.915MHz, 144.965MHz and 144.945MHz respectively.

During the earth's orbit around the sun it encounters millions of tiny particles, known as meteors, which on a clear dark night become visible as streaks of bright light as they burn up in the Earth's atmosphere. Each burn represents a decaying trail of ionised gas which, during its brief life, can reflect radio and television signals. A radio signal, bouncing off a meteor trail, sounds like and is referred to as a "ping" of the intelligence being transmitted at the time. Very little station information can be identified from these random meteors. However, try pointing your antenna toward a really distant beacon, tune your receiver to its precise frequency and listen for "pings" of the beacon's transmissions jumping above your receiver's background noise. Periodically every year the earth passes through great swarms of these particles, called meteor showers, which produce enough temporary ionisation for amateurs to attempt long distance communications using the meteor scatter technique. Normally both sides of a pre-arranged QSO transmit their station information, on the key, at 5 minute intervals until the contact is confirmed.

When sunspots are present, direct your beam (unless you can tilt it) at the rising or setting sun, then find a clear spot in the 144MHz band and select the a.m. mode and listen for the "whooshing" of solar activity above your receiver noise. Take this a step further and connect a d.c. amplifier and a pen recorder to your receiver's detector circuit and you have a simple solar radio telescope. However, be warned, recording chart is expensive. Finally, make sure that the feeder between your 144MHz antenna and converter is of good quality and use a screened cable between the output of the converter and the antenna socket of your receiver, to prevent unwanted signals breaking through at the intermediate frequency.

Meteor Scatter

To encourage more interest in random meteor work, special activity periods have been arranged. The dates and times are in Table 1.

A reminder to all enthusiasts, amateurs, s.w.l.s, broadcast bands and TVDXers, to

| | | |
|-----------|-----------|-----------|
| Month | 2200-2400 | 0600-0800 |
| June | 7th | 22nd |
| July | 12th | 27th |
| August | 9th | 24th |
| September | 6th | 21st |
| October | 11th | 26th |
| November | 8th | 23rd |
| December | 6th | 21st |

Table 1

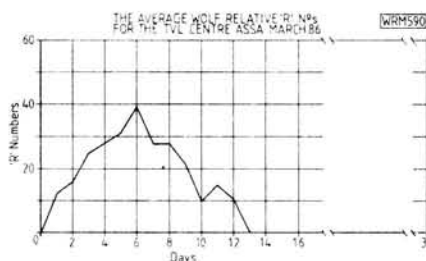


Fig. 1

exercise their skills and equipment during the predicted peaks of the Perseids, August 12, Orionids, October 21, Leonids, November 17, Geminids, December 14 and the Ursids on December 23. All of these annual meteor showers are named after the constellation of stars from which the radiant of the meteors appears to come.

Solar

Apart from a single group of 3 sunspots, observed by **Bob Anderson's** team in Johannesburg at 0745 on March 28, the sun was generally quiet throughout this reporting period, March 15 to April 14.

"I have made careful magnetic measurements in April, but so far there has been no apparent recurrence of the February/March activity as I have not detected any magnetic disturbances neither have I received any reports of aurorae and other events," writes **Ron Livezey**, Glasgow. Ron is the auroral co-ordinator for the British Astronomical Association and like Bob, has sent more information about the solar happenings during the first half of March. Bob's team observed 3 sunspots on March 1 and watched the number grow to 29 on the 6th and decline to one on the 12th. This can be seen by following the graph in Fig. 1, which is a copy of the relative report they prepared for the solar section of the Astronomical Society of South Africa. The sunspots which they located on the 1st appeared exactly 14 days after the last February group disappeared and Bob thinks that this could be a reappearance, due to the rotation of the sun, which grew into a sizeable group.

"The aurora of March 6/7 was well seen in Edinburgh, late at night, when the display was referred to as brilliant, and photographed," said Ron. He also received reports of "quiet glows" and "quiet ray structures", from the weather ship *Cumulus*, at station Lima, for the nights of 5/6 and 6/7 respectively. Rays, rayed arcs and bands were among the descriptions received from observers in Edinburgh, The Wirral, St. Andrews and Ulster about the 6/7 aurora, and active bands, homogeneous arcs, patches, quiet arcs and ray bundles were seen from the same areas, plus Kirkwall, on the night of March 7/8. The Boulder, Colorado, Space Environmental Centre, reported a minor magnetic storm from 6th to 8th and Ron's own magnetometer registered a small magnetic storm during the 7/8 event. Boulder also reported, "a major storm in high latitudes.

Source unknown," on the 13th. On the same day, **Len Fennelaw G4ODH**, Wisbech, entered in his log, "Conditions very bad on 14MHz, blacked out at 21MHz." As you will see every snippet of information about unusual conditions, however insignificant it may seem at the time, may well become very important in a collective report.

My thanks to Bob Anderson for the April issue of *Canopus*, the newsletter of the Transvaal branch of the ASSA, in which he says, "The violence of a magnetic storm is in no way related to the sunspot number but to the magnitude and location of the solar flare which causes it. Hence our interest in observing all those factors which lead to a better understanding of solar-terrestrial influence on our daily existence and in maintaining this interest."

The 50MHz (6m) Band

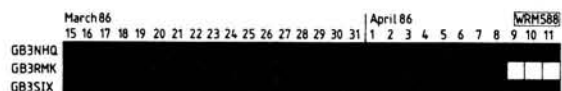
On March 22, **Norman Hyde G2AIH**, Epsom Downs, worked GW3XJQ in South Wales and gave him a report of RS55, fine, but, "what was remarkable," said Norman, "he was only running 0.5W! Admittedly, he was using a 5-element Yagi, but, if my sums are right, his e.r.p. was only 2.5W and I think conditions were about average at the time."

Newcomers may wonder why broadcast stations often appear within the 28MHz band during the summer months. This annoying factor is mainly due to sporadic-E and these, sometimes very strong, signals are harmonics of lower frequency transmissions. It is a useful exercise to tune around the lower broadcast bands, find the original signals and add this information to your reports. 28MHz is a fascinating band, especially when conditions are changing between sporadic-E and F layer propagation and at sunrise and sunset, so it is worth keeping a special watch on all sections of this band during the coming months and let me know your findings.

"Nothing to report on 28MHz, this time," writes Norman Hyde, however, he kept an ear on the 50MHz beacons and between March 15 and April 11, he received signals from GB3NHQ, in Potters Bar and GB3SIX, in Anglesey, every day and GB3RMK in Scotland, daily until April 8 (Fig. 2).

Propagation Beacons

"Herewith the worst ever beacon report, only GB3RAL heard," writes **Ted Owen**, Maldon, for the month prior to April 10. Apart from logging the Rutherford Appleton Laboratory beacon (RAL) around 0800 every day during this period, my 28MHz log is also blank. In Belfast, **Bill Kelly**, heard the Marconi beacon IY4M, on March 15 and 17 but nothing else. Len Fennelaw and **Fred Pallant G3RNM**, Storrington, logged the Mauritius beacon 3B8MS early in this period, but in Walsall, **Gordon Pheasant G4BPY**, did much better; he copied signals from the German and South African beacons on several days and his prize was the appearance of VK6RWA, peaking 429, between 0759 and 0808 on April 2. "Propagation to South America is beginning to creep in again and as usual, when the band opens up that way, there is some backscatter on DLOIGI. Backscatter seems to result from reflections from the sea, which makes a better reflector than land and must produce a lot of scatter in odd directions,



◀Fig. 2

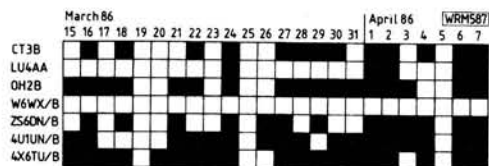
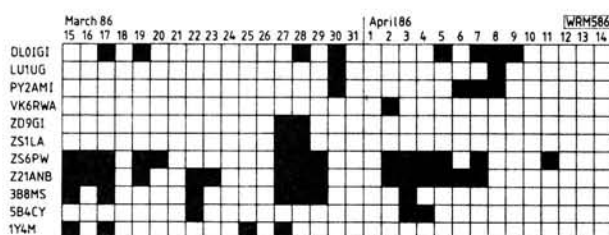


Fig. 4▶

◀Fig. 3



▼Fig. 5

especially if the sea is rough!" said Gordon. An interesting thought, I said earlier that 28MHz is a fascinating band.

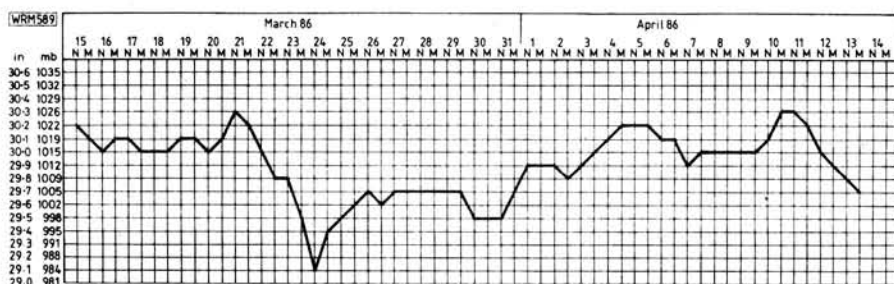
"The 14MHz beacons were regularly received here during the past month, showing a fairly consistent level of propagation, although their strength varied widely during the evenings," writes Len Fennelaw. Both he and I received signals daily from the RSGB v.h.f. beacons at their Headquarters in Potters Bar GB3NHQ, on 50-050MHz and Wrotham GB3VHF. My thanks to Len for his 14MHz beacon log, Fig. 3, and to Bill, Fred, Gordon, Len, Norman and Ted for their detailed reports which enabled me to compile our monthly chart (Fig. 4) of beacon signals received on 28MHz.

During a brief sporadic-E opening during the afternoon of March 14, Norman Hyde exchanged signals from GM4ELV, Glasgow and GM4UQO, nr. Edinburgh on 29MHz fm. "The Glasgow station was only running 5W," said Norman.

In The Hague, Chris van den Berg logged signals from the South African beacons, ZS6PW and Z21ANB on March 15, 16 and 19, and then a force 10 gale, gusting to 12, severely damaged his h.f. antenna system. Tough luck Chris, this is something we all dread happening during high winds and heavy, driving rain when the wet can creep into insulators and joints previously cracked by dry hot weather. However, Chris also received signals from the Wrotham v.h.f. beacon while the pressure was falling on March 15 and 16, rising on 18 and 19, falling on 22, 23 and 24 and then on several days, when it hovered around 30.0 in (1015mb), between April 2 and 10.

Tropospheric

Although v.h.f. conditions were generally below par for the period, there was a



small lift between March 17 and 23 and a few very minor ones which ebbed and flowed with the changes in atmospheric pressure. I noted this by comparing the daily signal strength of the Wrotham beacon, received on a vertical dipole, with the reading on my barometer and the general weather situation. Early on March 22, Bill Kelly heard traffic working through the 144MHz repeaters in Buxton GB3HH on R4, Caernarfon GB3AR R4, Moel-Y-Parc GB3MP R6 and Waterford EI2WRC R2. The atmospheric pressure remained at 30.0in (1015mb), or above from March 15 to 22, kept mainly between 29.5 (996) and 30.0 from the 22nd to April 3 and then back above 30.0 until the 12th, when a fall set in for the end of this period. 29.4 (995) on March 24 was the lowest pressure that I recorded this time and 30.3 (1026), on April 10, was the highest. The slightly rounded figures on our monthly pressure chart, Fig. 4, were taken daily, at noon and midnight, from the Short and Mason Barograph installed at my QTH.

Band II

Although Band II DX is a big problem for Bill Kelly because of strong BBC and RTE signals, he did hear ILR stations from Clyde

and Sheffield, Red Rose in Preston, Radio City, Liverpool, and BBC Cymru, Lancashire and Merseyside, during the lift, early on March 22. Bill identified the stations by their adverts, news bulletins and or announcements.

"For most of the month there was only the bare minimum of French stations about," writes Harold Brodribb, from St. Leonards-on-Sea. However, he did hear signals, occasionally, from the stations in Abbeville, Boulogne, Lille and Neufchatel, transmitting programmes from Cultur, Frequence Nord, Inter and Musique. On March 13, he added Caen and Rouen to the list, noted extra good reception from Dieppe, Lille and Neufchatel on the 17th and similar on the 18th, except that Caen, Paris and Rouen were inaudible. "Daily variations were obviously directional," said Harold, who also reported that Abbeville was "unusually strong" on the 20th.

Reports by the 15th, please

TELEVISION

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

"I have a high quality scanning v.h.f./u.h.f. receiver and if I put the television sound frequencies into the receiver's memory and set it for limited scan, it could possibly surface as an early warning indicator for sporadic-E," writes Ian Mason, from Ayrshire. Quite true, Ian, and as we are now in the sporadic-E season, you have raised a point that affects us all and needs further discussion. Most TVDXers are well aware of the fact that a sporadic-E disturbance can manifest suddenly, at anytime during daylight hours, during the mid-summer months and obviously, it is not possible to watch a screen all day just waiting for an opening to occur. However, with this in mind, a more practical way must be found of knowing when an event is beginning, or



by Ron Ham BRS15744

is, in fact, in progress, if every opportunity is to be taken to witness that extraordinary style of DX which is peculiar to sporadic-E.

It is already well known that signals around 50MHz are most vulnerable, even to the mildest E-layer disturbance, therefore, if the vision frequencies of Ch.E2, 48-25MHz and Ch.R1, 49-75MHz, are put in a scanner's memory and left with the receiver's squelch control active, a strong buzzing sound will be emitted from the loudspeaker when vision signals are present on these channels. Although the

sound frequencies for Chs. E2 and R1, 53.75 and 56.25MHz respectively, are above the critical frequency they, too, warrant memory space in the scanner, because when there is a hint of a signal on either of these channels, sound or vision, the time is right to switch on the television receiver and carefully tune through Band I. A simple horizontally mounted dipole, cut for 50MHz, is ideal for the scanner or both sets can be fed from a wide-band distribution amplifier installed at the receiver end of an outdoor antenna specifically designed for Band I. I have found the latter a most satisfactory arrangement.

By the time you read this, new DXers may well have seen their first major sporadic-E opening and realised that pictures from some countries are predominant for a while and others appear for short periods only, or sometimes just briefly. Conditions like this and the source of the signals being received, at any given time, depends entirely upon the movements and fluctuations of the sporadic reflecting

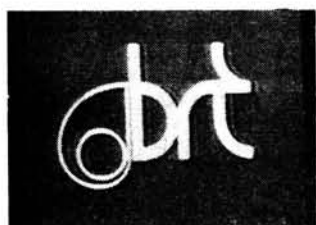


Fig. 1

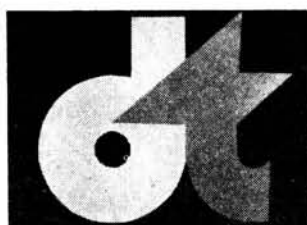


Fig. 2



Fig. 3

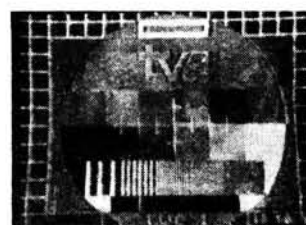


Fig. 4

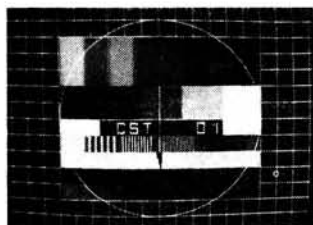


Fig. 5



Fig. 6



Fig. 7



Fig. 8



Fig. 9

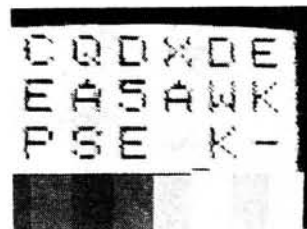


Fig. 10



Fig. 11



Fig. 12

regions within the E-layer of the earth's ionosphere. We have all experienced the problem of identifying a signal from a glimpse at the peak of a QSB, so I suggest that you keep a look-out for insignias, like those from Belgium BRT, Fig. 1, and Poland's news, dt, Fig. 2, sent in by **Keith Hamer** and **Garry Smith**, both TVDXers and authors of the book, *Guide to World-Wide Television Test Cards*. In my opinion, this book, available from HS Publications, 7 Epping Close, Derby DE3 4HR, and the *World Radio TV Handbook*, distributed in the UK by Pitman Publishing Ltd, 129 Long Acre, London WC2E 9AN, are a must for the enthusiast's bookshelf. Signals from Spain with station captions, Fig. 3 and test-cards, Fig. 4, received by **Steve Green**, Malvern, and **Len Eastman** G8UUE, Bristol, respectively, often appear on Chs. E2, 3 and 4 during a disturbance and the letters TVE or RTVE are the idents to look for. At times signals on Ch. E2 will mix with and overpower, pictures from the USSR on Ch. R1, so in this case, watch for clocks with the inscription CCCP, the news captions BPEMR and HOBCTN and TACC COObWAET (Tass Report) under a presenter's name and such titles as CNOPT and NPORPAMMA. The time on a clock is another important clue to the origin of the signal; try counting the time zones on a map by the number of hours that the clock is ahead of GMT and when there is a rapidly changing mixture of pictures, keep an eye open for regional names, frequently seen on test cards, from Norway and Spain on Ch. E2 and Yugoslavia on Ch. R1. Finally, do watch for CST, RS-KH and PRAHA from Czechoslovakia, MTV Hungary, TVP Poland, TVR Rumania and JRT Yugoslavia on Ch. R1 and ORF-FS1 from Austria, NORGE, NRK and TELEVERKET Norway, RTP, Portugal and TV1 SVERIGE, Sweden, on Ch E2 and please include any captions, etc. that you see

with your reports because these can be of great assistance to other readers.

Band I

Husband and wife team, **Tony and Edwina Mancini**, Belper, kept a routine watch on Band I between March 8 and April 6 and received test cards, for short periods or sometimes just bursts, with something on most days, from Czechoslovakia, scribed RS-KH and CST.01 and Poland TVP on Ch. R1, Austria ORF-FS1, Spain RTVEI and II, Sweden TV1 and Switzerland +PTT SRG1 on Ch. E2, Belgium BRT1, Portugal RTP1 and Spain, on Ch. E3 and East and West Germany DDR F1 and Ard, Holland PTT NED 1, Italy RAI (IB) and Norway NRK on Ch. E4. The Italian Ch. B and Ch. E4 have the same vision and sound frequencies, 62.25 and 67.75MHz respectively, which adds to the fun during an intense sporadic-E disturbance. Among the programmes received at the Mancini QTH were skiing from Spain on March 23, the Pope from Italy on the 28th, a clock showing 1200 from RAI PROGRAMME 1 at 1100 our time on the 29th, a geometry lesson from Portugal at midday on April 4 and cartoons from Spain during the afternoon of the 5th. This is an impressive log by any standards for this time of year, which proves once more, that there are rewards for tuning through Band I as often as possible. Last September, Tony received pictures from Czechoslovakian Television and sent them a report and among the items of information in their reply package, was a coloured photograph of their CST.01 test card, Fig. 5.

I received a weak test card from Holland on Ch. E4, at 0805 on March 15 and 0857 on April 7 and, around 0800 on April 1 and 5, I heard many bursts of television sync, on Ch. R1, appearing on the ex-Army R216 communications receiver which I use

with a dipole antenna to monitor 49-75MHz and for general tuning through Band I.

Tropospheric

At 2235 on January 22, **Major Rana Roy**, India, received pictures from Pakistan Television and writes, "We saw an interview and then, at 2255, a commercial, followed by a programme of classical Indian music. Signals improved considerably at 2325 and we watched clear coloured pictures from Rawalpindi on Ch. 8, Fig. 6 and Bahawalpur on Ch. 10. The programmes finished at 2340 and then Radio Pakistan's Lahore programmes were announced, followed at 2342 by the next day's television schedule, Figs. 7, 8 and 9."

While on a trip some 200km north of Bikaner, between January 27 and February 15, Rana regularly received pictures from Lahore on Ch. 5, in good colour, using a friend's ITT German colour receiver and his own 24-element Band III antenna and pre-amplifier. "We usually have a few very good tropo openings in March, but none this year," says Rana and explains, "The weather became very warm here at the end of February and beginning of March and suddenly on March 12, we had heavy rain all over north and eastern India and heavy snowfalls in the Himalayas. The plains of Punjab and Haryana had hail storms which destroyed the wheat crop. This brought the temperatures down and we have taken to our sweaters again." Sounds like Easter in the UK Rana, hi. Rana has added a Hitachi VT330E video recorder to his station so that he can keep his DX records on cassette.

Weather conditions in the UK during March and early April did little to enhance v.h.f. signals. However, Tony and Edwina Mancini, received spasmodic bursts of

TV-FM DXing

The one stop shop for aerials, amplifiers, filters, rotators, mounting kits, cable and VHF/UHF dual & multi-standard TV-DXing receivers. We have our own unique range of seven Band 1 Wideband TV aerials for DXing, all makes of deep fringe, high gain UHF aerials supplied. Our prices are competitive. Start DXing today, the right way, consult **Aerial Techniques** the experts.

Examples from our range:

FERNSEH-ANTENNA DR 1712 Combined Band 1/3 wideband aerial for TV-DXing, covers 47-68MHz and 175-230MHz; 2 elements Band 1; 9 elements Band 3, requires single download **£48.70**
ANTIFERRE UP1300 VHF masthead amplifier (40-230MHz) for Bands 1, 2 & 3 **£16.90**
 Gain 18dB, low noise figure of only 2.5dB **£12.33**
 Matching power supply unit (12V) for use with above amplifier **£39.33**
PLANET TFC-1 Upconverter with gain control (ideal TV-DXing) mains powered, no tuning required **£45.98**
'NEW' AR250 'offset' Aerial Rotator, complete with latest type of Control Console, features continuous indication of beam/aerial heading, uses 3 core cable **£16.25**
SB100 Alignment/support Bearing for above Rotator, allows greater aerial head loads to be used **£18.25**
FRINGE Electronics FM Radio set-back amplifier, High 20dB Gain, very Low Noise figure of only 1.9dB, mains powered (SAE leaflet) **£18.25**

WHETHER YOUR NEED IS FOR LOCAL OR FRINGE RECEPTION, ALTERNATIVE CHANNELS, TV/FM DXING, OR FOR A DISTRIBUTION SYSTEM, AERIAL TECHNIQUES IS THE 'ONE STOP' ADDRESS FOR ALL EQUIPMENT.

AERIAL TECHNIQUES IS UNIQUE - TRY OUR COMPREHENSIVE 1986 CATALOGUE AT 65p.

SAE with all enquiries please. ACCESS & VISA welcome.

All prices inclusive of VAT and Carriage

Delivery 7-10 days.



AERIAL TECHNIQUES (PW)

11, Kent Road, Parkstone,
Poole, Dorset, BH12 2EH. Tel: 0202 738232.



J. BIRKETT

RADIO COMPONENT SUPPLIERS



25 The Strait
Lincoln, Tel. 20767
(LN2 1JF)
Partners (J.H.Birkett,
J.L.Birkett).

TOKO MECHANICAL FILTERS Type MFH71T 455KHz BW 7KHz @ 95p.
AVX MULTILAYER CERAMIC AXIAL CAPACITORS Sub-Min 1000p.f. 100Vw. 25p. Doz.
TELEPHONE CARBON MIKE INSERTS @ 25p. 5 for £1.
TAG ENDED ELECTROLYTICS 16+16u.f. 350Vw. @ 35p. 16+16u.f. 450Vw. @ 45p. 32+32u.f. 350Vw. @ 45p. 32u.f. 50+50u.f. 450Vw. @ 75p.
WIRE END CAPACITORS 0.1u.f. 400Vw. @ 10p each.
50 ASSORTED TRANSISTOR I.F. Transformers @ 50p. 50 Assorted Springs for 50p.
144MHz WAVEMETER KIT With Instructions @ £4.60.
14 PIN DIL OP-AMPS 710, 741, 747 All @ 20p each.
TRANSMITTING VARIABLES Similar To One Fitted In FT101 300p.f. @ £6.30.
SOLDER-IN FEED THRU'S 5p.f. 27p.f. 300p.f. 1000p.f. All 20p Doz.
TOYOCOM CRYSTAL FILTERS 10.7MHz BW± 7.5KHz @ £2.50 each.
2GHz STRIPLINE NPN TRANSISTORS Similar To BFY90 3 for £1.15.
250 VOLT RED NEON INDICATOR LAMPS @ 30p each.
X BAND GUNN DIODES With Data @ £1.65 each.
X BAND SCHOTTKY DIODES Like IN23 @ 45p each.
DISC CERAMICS 500Vw. 2.2p.f. 6.8p.f. 100p.f. 220p.f. 560p.f. 680p.f. 1500p.f. All @ 5p each.
FETS J304 @ 6 for £1, J230 5 for 60p, 2N3819 @ 20p, BF256 @ 20p.
GENERAL PURPOSE UNIJUNCTION TRANSISTORS Like TS43 @ 20p.
LARGE GLASS 100KHz Crystals @ £1 each.
30 ASSORTED SILVER MICA CAPACITORS @ 50p. JUMBO ORP12 @ 95p.
AIR SPACED VARIABLE CAPACITORS 400+330p.f. 3mm Spindle @ £1.30, 500+500p.f. SM Drive @ £1.60, 10+10+20p.f. @ £1.30.
 WOOD AND DOUGLAS KITS AVAILABLE BY POST AND FOR CALLERS.
 ACCESS AND BARCLAY CARDS ACCEPTED. P.P. 60p UNDER £5, OVER FREE.

LOSING DX?

ANTENNA TUNER, only **£28.20**, for outside or INDOOR antennas, end-fed LONG WIRES or dipoles, BOOST DX and reduce interference 100KHz-30MHz in 6 overlapping ranges, IDEAL for FRG7700 etc or 10W tx, BANDPASS design (not just usual low pass) with high Q coils and expensive air dielectric capacitor, also adapts to **WAVEMETER**, field strength meter etc, get MORE STATIONS.

ANTENNA FAULT? not getting out? Check FAST with an **Antenna Noise Bridge**, MEASURE resonance 1-160MHz and radiation resistance 2-1000 ohms, no 10 second limit nor confusion with harmonics, ALSO use for phasing lines or RF resistance, and hence Q, of loading coils, **£22.40**, get answers, MORE DX.

V.L.F.? EXPLORE 10-150KHz, Receiver £25.20.

RARE DX UNDER QRM? DIG it OUT with a **Tunable Audio Notch Filter**, between your receiver and extension speaker, BOOST your DX/QRM ratio, 40dB notch, bypassed when off, **£18.80**, hear WEAK DX.

Each **fun-to-build kit** (ready-made to order) includes ALL parts, case, instructions, postage etc (Giro 21-923-4000), list of other kits, pcbs are fibre glass, coils are pre-wound, SEND away NOW.

CAMBRIDGE KITS

45 (PG) Old School Lane, Milton, Cambridge.

S.E.M.

UNION MILLS, ISLE OF MAN
Tel: MAROWN (0624) 851277

YOU CAN NOW HAVE LF, MF, HF, VHF, UHF WITH ONE RECEIVER

S.E.M. H.F. CONVERTER. This already very popular unit converts 100KHz to 60MHz. UP to 100.1MHz to 160MHz to extend the range of your scanner receiver. It has 3 50239 sockets. One to your receiver aerial socket, one for an H.F. aerial, one to your existing VHF/UHF aerial. Switch your converter ON and you have LF, MF, HF. Switch OFF and you are on VHF/UHF. 12v 5mA. **£45.** Ex-Stock.

NEW S.E.M. WIDEBAND PRE-AMPS. Following a lot of development work and evaluation of the devices available, we have produced 2 new WIDE BAND PRE-AMPS with unbeatable performance. Covering 3-40MHz or 20-400MHz. Measurements: GAIN 9dB, N.F. 1.5dB. 3rd order IP(OUTPUT) +30dBm. Each pre-amp in 3 types. Basic pre-amp **£30**, straight thru. when off **£35**, R.F. switched **£40**. All Ex-Stock.

S.E.M. TRANZMATCH. The most VERSATILE Aerial Matching (Tuning) Unit available. Matches 15-5,000 ohms BALANCED or UNBALANCED feeders up to 1 KW. Air coupled BALUN (no toroids) means no connection to equipment, which can cure TVI both ways. An SO239 and screw terminals for CO-AX, END FED or TWIN FEEDERS. Size 8 3/4" x 4" x 7 1/4". 3.5-30MHz **£95**. 1.8-30MHz **£105**. The highly acclaimed EZITUNE built in (see below) **£35** extra. 90% we sell have the EZITUNE option. All Ex-stock.

S.E.M. EZITUNE. Because no similar unit is made, it's usefulness is not appreciated until you have used one. Eliminates need for S.W.R. bridge. Clean up the bands, increase your P.A. life by many times, by tuning up without transmitting, the easy way.

Connects in aerial lead, produces S9 + noise in receiver. Adjust A.T.U. or aerial for minimum noise. You have now put an exact 50 Ohms into your transceiver. Fully protected, you can transmit through it, save your P.A. and stop QRM. 3" x 1 1/2" x 2". **£39.50 Ex stock.** P.c.b. + fixing + instructions to fit in TRANZMATCH or any ATU **£35 Ex Stock.**

S.E.M. WAVEMETER. Have you read your licence? Have you got a wavemeter? Produced following so many requests. 1.5-30MHz in 3 switched bands with a meter. Only **£34.50 Ex stock.**

S.E.M. IMABONE KEYS. No better fully auto keys. Uses Curtis chip. R.F. proof. Sidetone etc. **£45.** A first class twin paddle key **£17.50 Ex stock.**

BRAID BREAKER/HI PASS FILTER. Stop TVI at TV. **£6.95 Ex stock.**

RF NOISE BRIDGE. Adjustable 0-infinity ohms. 3" x 1 1/2" x 2" only. SO239s, 1-170MHz. Neat, accurate & economical. **£39.50 Ex Stock.**

3 WAY ANT. SWITCH + 4th position to EARTH. 1kW. SO239s. Good to 2 metres. **£19.80.** Ex-Stock.

S.E.M. 2 METRE TRANZMATCH. 5 1/2" x 2", 3". SO239s. **£29.50.**



SENTINEL 2M LINEAR POWER/PRE-AMPLIFIERS

Feature either POWER AMP alone or PRE-AMP alone or both POWER AND PRE-AMP or STRAIGHT THRU when OFF. Plus a gain control on the PRE-AMP from 0 to 20dB. N.F. around 1dB with a neutralised strip line BF981. Top performance on transmit and receive. Ultra LINEAR for all modes and R.F. or P.T.T. switched. 13.8V. SO239s. Three Models: Ex. Stock
3/36. 12 times power gain, e.g. 3W in, 36W out. **£70**
10/50. 10W in, 50W out. **£86.**
10/100. 10 to 100W. **£135.**

SENTINEL AUTO 2 METRE PRE-AMPLIFIER (R.F. Switched)

1dB N.F. and 20dB gain, (gain control adjusts down to unity) 400W P.E.P. power rating. Use on any mode. 12V 25mA. Sizes: 1 1/2" x 2 1/4" x 4". **£34 Ex stock.**

PA5 Same specification as the Auto including 240V P.S.U. **£39 Ex stock.**

SENTINEL 2 METRE PRE-AMPLIFIER. No R.F. switch. **£21.90 Ex stock.**

S.E.M. AUDIO MULTIFILTER (Users say it's the best filter you can buy). The most versatile filter available. Gives "passband" tuning, "variable selectivity" and one or two notches. Switched Hi-pass, Lo-pass, peak or notch. Selectivity from 2.5KHz to 20Hz. Tunable from 2.5KHz to 250Hz. PLUS another notch available in any of the four switch positions which covers 10KHz to 100Hz. 12V supply. **£69.50 Ex stock.**

12 MONTHS COMPLETE GUARANTEE INCLUDING ALL TRANSISTORS.

Prices include VAT and delivery, C.W.O. or phone your credit card number for same day service. Ring or write for more information. Place orders or request information on our Ansaphone at cheap rate times.

Goods normally by return.

pictures from Radio Telefis Eireann (RTE 1), on Ch. H, 207.25MHz, in Band III, daily, from March 10 to 16 and good pictures and sound on the 17th. They also logged bursts of test card from Belgium RTBF on Ch. E8 on the 12th and similar from France, CANAL PLUS, mainly on Ch. F9, on days 8, 11, 12, 16 and poor to excellent pictures from the 17th to 22nd, and poor to good from the 23rd to 29th.

In St. Leonards-on-Sea, **Harold Brodribb** received a test card from Belgium, scribed RTBF1, on Ch. E8 from Wavre, on March 14, and strong negative pictures from France on Chs. F5, 7 and 9 in Band III and from Lille, at 1715 on the 20th, on u.h.f. Ch. 21. I noticed co-channel interference on some stations on the u.h.f. band during the evening of March 22.

In Bombay, **J. A. Kharas** often receives intermittent pictures from Gulf stations between 1030 and 1830 u.t.c. and from distant Indian stations, re-broadcasting Delhi programmes which they receive via satellite. "I am interested in satellite television, I can watch two satellites from here, Intelsat V, with programmes like Premiere, The Children's Channel and Screen Sport and ECS-1, which includes such programmes as RAI 1, Olympus, New World Channel, Music Box and the Sky Channel," writes **Carlos Gonzalez**,

from Gijon. I must confess that I know very little about these television systems and would be pleased to hear more on the subject from my readers.

SSTV

"There seems to be a lot more activity on SSTV this year with many stations coming up and the Sinclair Spectrum computer appears to be very popular among operators," writes **Lester Curno** from Bude, adding, "March was a very interesting month for me on SSTV," after receiving pictures, mainly on 14MHz, from 25 stations in Czechoslovakia, Eire, Finland, Germany, Hungary, Italy, Switzerland, USA and Yugoslavia. During a 3.5MHz SSTV net on the 29th, Lester copied pictures from EI3CZ, G4GOZ, GD4HOX and GJ4YCR and among the captions he logged, within the period, were "I0UMV for GB4DBZ", "QRX OTHER STATION", "QTH LATINA", "CQ SP7FUZ PSE K", "GM3WIL DE W4FAX 36 SEC", "GJ4YCR DE DL3NAE", "NAME IS WALT QTH KENMORE NEW JERSEY", "CQ DE F3RT", "QRZ YU4E2C", "G4RVC DE I3XQW", "DF3PU DE YU4E2C", "CQ DE HB9BIN", "HOW COPY DE OH4BB", "MIKE ENDICOTT

NEW YORK" and "CQ CQ DE W2UOX". By adding Cyprus, 5B4MD, to his log on April 1, he increased his score to 192 different stations logged in 31 countries and told me that he is really looking forward to the improved band conditions as time goes on. Reports like this should really encourage readers like **David Spry** who is planning to use his Spectrum computer to add the SSTV mode to his station in Thurso.

Around 14.230MHz I logged the SSTV captions, "CQ SSTV DE IC8POF", at 1651 on March 16, "MY NAME IS PETER", at 0939 on the 22nd, I think "G4TZI DE HA8EI", at 1530 on the 24th, and "HOW COPY PSE K", possibly from the USA, at 2025 on April 9. Last year, **Peter Lincoln**, Aldershot, an experienced SSTVer, received CQ captions from Spain, EA5AWK, Fig. 10, Switzerland, HB9AXG, Fig. 11, and an interesting picture from KP4YD in Puerto Rico, Fig. 12.

During the month prior to April 11, **Richard Thurlow G3WW**, March, added HA0DG, HG6VV, LZ1OW, OZ1DOZ, YU5FU and ZS6BOU on 14MHz to his new station list on SSTV and tells me that G0BNR, Ramsey St. Mary, G4WJB, Stan-ground and G6SCD, Chatteris, have joined the Fenland 144.5MHz f.m. Net, which operates at 1930 on Monday evenings.

MW BROADCAST BAND DX

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

Back in March, keen s.w.l. **Al Dupres**, of Cardiff, informed me that he was considering the possibility of introducing a DX programme into the *Al Dupres Show* which he presents on Red Dragon Radio, from Monday to Friday between 2100 and 0100UTC, also on Saturdays between 1300 and 1700UTC. Naturally, I gave him every encouragement to make this idea a reality, for this series, I felt, would bring the exciting world of s.w. radio to the ears of the m.w. listener and do much for this truly great hobby of ours.

I am delighted to be able to tell you that Al has now introduced this feature, called *Red Dragon DX* into his Show on the first and third Friday of the month at 0015UTC—so Local Radio DXers should turn their loops to Cardiff at this time!

Red Dragon Radio took over CBC and GB Radio and can be heard on 1305kHz & 1359kHz m.w.—also on v.h.f.—and serves the Cardiff and Newport area of S. Wales, but as every DXer knows it can be heard over a wide area! If you would like a QSL or have a report for Al, see QSL Addresses later.

DX Report

(Note: All frequencies in kHz: Times in UTC = GMT).

Transatlantic DX: A very impressive list of transatlantic m.w. DX has been sent along by **Andy Kennedy**, who listens at all hours of the night! Between 0230 and 0515, he received from the USA WTOP of Washington 1500; WINS 1010 and WHN 1050—both from New York—and from Boston he heard WMRE 1510. Newfoundland, Canada, came in well, too—CJYQ of St. John's 930, was the first to be heard, followed by CHYQ of Musgravetown 670, VOXM of St. John's 590 and CKYQ from Grand Bank 610.

Andy reports that several Caribbean and



by Brian Oddy G3FEX

S. American stations have been well received at his location between 0115 and 0500, namely Radio Rebelde from Cuba 600 and Caribbean Beacon, Anguilla 1610; also Radio Globo from Rio, Brazil 1220 and from Venezuela, Radio Vibracion of Carupano 1470 and Radio Vision from Caracas 950.

Another listener who enjoys m.w. DXing, is **Calum MacLeod** of the Isle of Lewis, Scotland. His log includes WBAL of Baltimore 1090 and WMRE 1510 heard at 0100. Much later, at 0655, he listened to WNEW of New York 1130. During most nights, CJYQ 930 has been received, although CJCH of Halifax 920 was only audible around 0330. Radio Paradise of St. Kitts 825 and the VOA Antigua relay 1580, have been good signals around 0130 from the Caribbean area.

Paul Logan of Co. Fermanagh, N. Ireland, also logged many of the stations detailed above and says, "As a matter of interest to *PW* readers using simple gear, I have heard about twenty N. American stations on a receiver which has a ferrite rod antenna!" Another listener in N. Ireland, **Bill Kelly** of Belfast, has been hearing WQXR in New York on 1560 at 0245 and the "Memory" station in Boston, WMRE 1510.

At his listening post in Randburg, S. Africa, **Leo Gieske** has been busy checking the band on his Drake SPR4 receiver and heard CJRS in Sherbrooke, Quebec 1510 for the first time. Also in Quebec, CKLM of Laval 1570 was a good signal, but CBJ of Chicoutimi 1580 was much weaker—all were received around 0350. Other stations logged were WTOP; WMRE; WQXR; WKBW from Buffalo, NY

1520; WCKY of Cincinnati, Ohio 1530 and WPTR of Albany, NY 1540.

Using a Trio R2000 receiver, **Graham Powell** of Pontypridd, S. Wales, logged several stations from Newfoundland, including CJYQ; VOXM; CJFX of Antigonish 580 and CKVO of Clarendville 710. WMAQ of Chicago, 670 has now sent along a QSL to Graham—it seems that this station has not been heard in the UK for some years. Another Trio R2000 owner, **George Morley** of Redhill, Surrey, noted WCAU of Philadelphia 1210, WHN; WINS; WNEW and WBZ of Boston 1030, in his log.

In an interesting letter, **Maurice Andries** of Dendermonde, Belgium, described how the signals from CJYQ "improved by the minute" when his local 300kW station BRT 1 closed down at 0405—local stations are creating an increasing problem for DXers, with more and more of them now operating 24 hours a day.

Other DX: Once again, Leo Gieske has been hearing ILR Capital Radio on 1548kHz, in Randburg, S. Africa. Other m.w. European stations received include DLF Mainflingen, W. Germany, with 700kW on 1539kHz and WDR Langenberg, W. Germany, which runs 800kW on 1593kHz. Leo uses a Box Loop antenna in conjunction with his Drake SPR4 receiver to hear these signals around 0400UTC.

Alan Jarvis of Cardiff, Wales, has been monitoring the band using a very unusual receiver—a Tandy MW/FM Headphone Radio, which has the complete receiver built into the headphones, including a very effective ferrite rod antenna! During one night, he received AFN Stuttgart, Germany 1143 at 0230! Alan says that good "nulls" of unwanted signals can be obtained with them, so they may well be of interest to m.w. Local Radio DXers.

Manx Radio 1368, was received by **Alan Merrit** of Abingdon, Oxon, for the first time on his Pye music centre, which has a built-in antenna. **Steven Woods** of Bramcote Moor, Nottingham, has also been listening to this station at night. RTE Radio 2 from Athlone 612 was also noted in his log. Belgium's Beltem transmitter, which

Practical Wireless, July 1986



NEW FROM SONY AIR-7 MONITOR

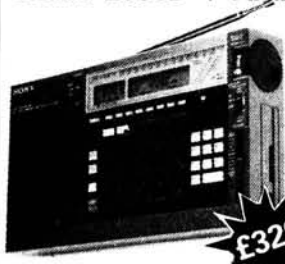
AM 150KHz-2194KHz AM 108-136MHz
WFM 76-108MHz NFM 144-174MHz

The new Sony Air-7 is a superb new monitor having features so far unmatched in a single hand-held monitor by any other manufacturer. Its frequency coverage makes it ideal for airband, public service or marine band monitoring, plus normal domestic use. Highly sensitive, this receiver does everything you could ever desire in one package. The LCD digital display means clear frequency display even under bright illumination and the PLL circuitry ensures drift free reception. Frequency is selected by keypad entry or electronic tuning and there is provision for disabling the keyboard. 10 memories are provided for each of the 4 main ranges (40 in total) and comprehensive scanning is provided in the bands 106-174MHz. Either full band or memory scanning is possible at a rapid rate. Additionally, delays may be programmed into each memory channel, certain channels only may be scanned and any channel can be designated the "priority" channel. Accessories include BNC helical, battery cartridge shoulder strap etc. Options available: rechargeable battery cartridge £15.95; Mains PSU/charger £13.

£249

PLEASE NOTE, unlike some versions on the market, these are not "grey imports" and therefore have both the full frequency coverage and the backing of SONY UK. No other amateur radio dealer in the UK can offer you this guarantee. Be warned!

SONY 2001D + AIRBAND OPTION & AC PSU!



Angus McKenzie in Amateur Radio Magazine says "probably represents the best portable radio that one can get" and "far superior to anything that I have tried". We can only agree with his comments. It is a truly superb communications receiver that is completely portable covering 0.15-30MHz, 76-108MHz (WFM) plus 115-136MHz AM airband. We can only touch on the features here such as Synchronous detector on AM for reduced interference; Switchable USB/LSB with separate filter; 55mHz first IF for good image response; both electronic and manual tuning the latter with dual speed; signal metering; RF gain control; 32 programmable memories with scanning; search facility; 4 event timer; 24/12 hour clock; LCD readouts; mains power supply included; etc. etc. We have used this radio extensively on the office desk and it is a delight to be able to listen to the DX on 14MHz; the natters on 3.5mHz and the latest news from Radio Australia. For home use an external aerial socket is provided and under these conditions it compares well with even the most exotic receivers. In stock now!

£329

ALSO IN STOCK A.N-1 ACTIVE AERIAL KIT £49.00
CARRIAGE ON ALL ABOVE £2.50

WATERS & STANTON

RETAIL & MAIL ORDER:- 18-20, Main Road, Hockley, Essex SS5 4QS.

Tel: (0702) 206835, 204965

RETAIL ONLY:- 12, North Street, Hornchurch, Essex RM11 1QX.

Tel: (04024) 204965

Visa and Access by telephone. 24 hour securicor £6.50 extra.

UK LISTENERS CONFIDENTIAL FREQUENCY LIST NEW 3RD EDITION

Not just an update but a complete rewrite of this popular publication with a smart new presentation style. Over 50% more information plus updates of the previous entries. No other publication at anywhere near this price offers you so much information. Other overseas publications cost three times as much! Specially prepared for the UK listener it covers every imaginable type of service both civil and military with comprehensive details of frequency, mode location, and where known, times. Now widely regarded as the "Bible" of the shortwave listener, you really should not be without a copy. Send today for your copy or call into one of our shops. Also available at most good amateur radio shops.

- ★ Covers 2 to 30MHz
- ★ Lists hundreds of frequencies
- ★ Marine & Aviation
- ★ Military & Civil
- ★ Comprehensive RTTY listings
- ★ Press and weather channels
- ★ Main broadcast schedules

£5.95
+75p p&p



— OTHER TITLES —

VHF/UHF AIRBAND FREQUENCY LIST - A comprehensive list of both civil and military frequencies many of which you won't find in any other publication! **£3.95 p&p 50p**

OCEANIC HF AIRBAND SUPPLEMENT (New 2nd edition) - Gives comprehensive list of all civil and military aviation frequencies between 2 and 23 MHz including air-sea rescue etc. **£2.95 p&p 50p**

SCANNER OPERATORS GUIDE TO THE VHF/UHF SPECTRUM - Specially written for the owners of scanner receivers to give them comprehensive listings of the stations and frequencies between 27 and 1300MHz **£3.95 p&p 50p**

WORLD RADIO TELETYPE HF FREQUENCY LIST - Written for us by an RTTY enthusiast, it lists all the marine, press, weather etc services in the shortwave spectrum together with time schedules and where and when to listen. **£3.95 p&p 50p**

AIR TRAFFIC CONTROL - 170 pages packed with information about ATC in the UK with a heavy bias towards the radio side. Many illustrations and charts etc. Published by Patrick Stephens. **£6.99 p&p 75p**

AIR BAND RADIO HANDBOOK - Written by a professional air traffic controller it makes an ideal companion to our frequency list and its 150 pages are packed with useful information. Published PSL. **£4.99 p&p 75p**

WORLD RADIO AND TV HANDBOOK - The bible for broadcast enthusiast, it lists frequencies and time schedules of the World's broadcasting stations on MW/SW and VHF 600 pages of info. **£17.95 p&p £1.75**

SHORTWAVE BROADCASTING GUIDE - Coming shortly this will be a special guide for UK listeners to the Shortwave broadcasts of the World with frequencies and time schedules. Phone for price. **£T.B.A.**

PLEASE MENTION

PRACTICAL WIRELESS WHEN REPLYING TO ADVERTISEMENTS

SPECIAL PRICES ON SURPLUS EQUIPMENT

Eddystone 770R 19-165MHz in 6 bands **£145.00**
Racal RA17L Receiver 500KHz/30MHz in 30 effective bands **£200.00**. Racal RA98 SSB Adaptor for RA17/117 **£69.00**. Racal LF adaptor 20KHz to 1MHz **£65.00**
All above Receivers p&p £15.00 adaptors £5.00. Ask for manual prices
PCR Receiver LW/MW/SW built in P.S.U. **£45.00** p&p **£5.00** Pye Pocket phone PF1 RX **£6.50** p&p 50p Tx batts new **£1.50** Rx batts **£1.00** each p&p 50p any no.
AVO valve tester with databook **£40.00** p&p **£5.00** AVO Transistor tester CT537 with instructions **£40.00** p&p **£5.00**. AVO multimeters from **£28.00**. Creed Model 75 Teleprinters **£22.00** p&p **£5.00**. Marconi TF995/A/3s Sig Gen 1.5-220MHz AM/FM **£95.00** p&p **£15.00**. Marconi TF 144H/4S 10KHz-72MHz **£110.00** p&p **£15.00**. Wayne Kerr S121 AF Sig Gen 10Hz-120KHz. As new **£55.00** 10ft whip aerial **£4.00** p&p **£1.50**. 100W mains inverter 12v in 240v output **£20.00** p&p **£4**.
All above Tested and Guaranteed for 6 Months.
New 19 range 2A/1KV AC/DC digital Multimeter DM105 **£29.95**. New 28 range 10A 1KV AC/DC DMM DM6010 **£39.95**. New Meteor 600 Frequency counter 600MHz **£126.00** Meteor 1500 covers 23cm **£199.00** now in stock. Also 100MHz **£99.00** 1GHz **£175.00** p&p **£2.00**. H100 Co-Ax 80p metre p&p 5p metre min 50p.
Various scopes/sig gens/counters/meters/always in stock. SAE for test equip list or **£1.00** for Radio/Equip catalogue includes **£1.00** off voucher.
ADD VAT at 15% to ALL PRICES

Our Leicestershire Warehouse now open Saturdays only - phone Watford for information.

WEIRMEAD LTD, 218 St Albans Rd, Watford, Herts. 0923 49456
Access/Visa Welcome

Universal Semiconductor Devices Ltd.

17 GRANVILLE COURT, GRANVILLE ROAD,
HORNSEY, LONDON N4 4EP, ENGLAND.
TEL. 01-348 9420/9425 * TLX. 25157 usdco g



WE OFFER ONE OF THE LARGEST RANGES OF SEMICONDUCTORS AT HIGHLY ECONOMICAL PRICES. THE FOLLOWING SEMICONDUCTOR TYPES ARE AVAILABLE FROM STOCK. IF WE DON'T STOCK WHAT YOU NEED THEN WE CAN GET IT FAST FROM OUR FACILITIES IN WEST GERMANY AND USA UPON REQUEST.

TRANSISTORS - BIPOLARS - GERMANIUM AND SILICON

SMALL SIGNAL
POWER
DARLINGTONS - ALL SHAPES AND SIZES
VHF/UHF DEVICES - ALL SHAPES AND SIZES

FETS - POWER MOSFETS
UNIUNIONS

DIODES - GERMANIUM AND SILICON
RECTIFIERS AND BRIDGES
OPTO-ELECTRONIC DEVICES
LEDS OF ALL SHAPES AND SIZES

THYRISTORS AND TRIACS - ALL

SHAPES
SIZES
RATINGS

INTEGRATED CIRCUITS:
CONSUMER - DIGITAL/ANALOGUE
MICROPROCESSORS AND PERIPHERALS
IC SOCKETS

JAPANESE COMPONENTS - VAST RANGE OF DISCRETES AND CONSUMER IC's.

MAIL ORDER CUSTOMERS: PLEASE SEND FOR OUR COMPREHENSIVE PRICE LIST, ENCLOSING £1.00 IN STAMPS, CHEQUE OR POSTAL ORDER.

CATALOGUE SENT FREE OF CHARGE, WHEN REQUESTED ON OFFICIAL LETTERHEAD (WITHOUT REFUND), TO OEM'S, SCHOOLS, COLLEGES, UNIVERSITIES, GOVERNMENT INSTITUTIONS, COMPUTER FIRMS, ELECTRONIC REPAIR FIRMS AND DISTRIBUTORS.

SPECIAL DISCOUNTS AND PAYMENT TERMS ARE AVAILABLE TO ABOVE INSTITUTIONS.

PLEASE ENQUIRE FOR QUANTITY DISCOUNTS.

WE WELCOME TELEPHONE AND TELEX ENQUIRIES!

| Freq (kHz) Station | | | Simon Hamer, New Radnor | Paul Logan, Co. Fermanagh | Alan Merritt, Abingdon | Stewart Russell, Forfar | Roy Spencer, Nuneaton | Steven Woods, Nottingham | Calum MacLeod, Isle of Lewis | Andy Kennedy, Leicester | Alan Jarvis, Cardiff | Graham Johnson, Nuneaton |
|--------------------|----------------------|-----|-------------------------|---------------------------|------------------------|-------------------------|-----------------------|--------------------------|------------------------------|-------------------------|----------------------|--------------------------|
| 603 | Invicta Sound | ILR | X | | | | | | | | | X |
| 630 | Radio Cornwall | BBC | X | | | | | | | | | |
| 630 | Radio Bedfordshire | BBC | X | | | | | | | | | |
| 657 | Radio Cornwall | BBC | | X | | | | | | | | |
| 666 | Devonair Radio | ILR | X | X | | | | | | X | | |
| 666 | Radio York | BBC | X | X | | | | | | X | | |
| 756 | Radio Cumbria | BBC | X | X | | | | | | | | |
| 756 | Radio Shropshire | BBC | X | | | | | | | X | X | |
| 774 | Radio Kent | BBC | X | | | | | | | X | | |
| 774 | Radio Leeds | BBC | X | | | | X | | | X | | |
| 774 | Severn Sound | ILR | X | X | | | X | | X | X | X | |
| 792 | Chiltern Radio | ILR | X | | | | | | X | | X | |
| 801 | Radio Devon | BBC | X | X | | | | | | X | | |
| 828 | ZCR | ILR | X | | | | | | | | X | |
| 828 | Radio WM | BBC | X | | | | X | | X | | X | |
| 828 | Radio Aire | ILR | X | | | | X | | | | | |
| 828 | Chilton Radio | ILR | X | | | | X | | X | | | |
| 837 | Radio Leicester | BBC | X | X | | | | | X | | X | |
| 855 | Radio Devon | BBC | | X | | | | | | | X | |
| 855 | Radio Norfolk | BBC | X | X | | | | | | X | | |
| 855 | Radio Lancashire | BBC | X | X | | | | | | | | |
| 873 | Radio Norfolk | BBC | X | | | | | | X | | | |
| 963 | GWR | ILR | X | X | | | | | X | | | |
| 954 | Devonair Radio | ILR | X | X | | | | | | X | X | |
| 954 | Radio Wyvern | ILR | X | X | | | | | | | | |
| 990 | Radio Devon | BBC | | X | | | | | | | | |
| 990 | Beacon Radio | ILR | X | | | | X | | X | X | | |
| 990 | Hallam Radio | ILR | X | | | | | | X | | | |
| 999 | Radio Solent | BBC | X | X | | | | | | | | |
| 999 | Red Rose Radio | ILR | X | X | | X | | | | | | |
| 999 | Radio Trent | ILR | X | | | | | | X | | X | |
| 1026 | Radio Cambridgeshire | BBC | X | | | | | | X | | X | |
| 1035 | Radio Sheffield | BBC | X | | | | | | X | | | |
| 1035 | Radio Kent | BBC | X | | | | | | X | | | |
| 1035 | Northsound Radio | ILR | X | | | | | | | | | |
| 1035 | West Sound | ILR | X | X | | | | | | | | |
| 1107 | Moray Firth Radio | ILR | | X | | | | | | | | |
| 1107 | Radio Northampton | BBC | X | | X | | | | X | | X | |
| 1116 | Radio Derby | BBC | X | X | | | | | X | | | |
| 1152 | LBC | ILR | X | | X | | | | | | | |
| 1152 | Radio Clyde | ILR | X | X | | | | | X | | | |
| 1152 | Metro Radio | ILR | X | X | | | | | | | | |
| 1152 | BRMB | ILR | X | | | | | | X | | X | |
| 1152 | Piccadilly Radio | ILR | X | X | | | | | | | | |
| 1152 | Radio Broadland | ILR | X | X | | | | | | | | |
| 1161 | Radio Sussex | BBC | X | | | | | | | | | |
| 1161 | Radio Tay | ILR | | X | | | | | X | | | |
| 1161 | Viking Radio | IBA | X | | | | | | X | | | |
| 1161 | GWR | ILR | X | | | | | | | | | |

Fig. 1

radiates BRT 2 on 1512, was received by **Julian Wood** of Buckie, Scotland, using a Trio R2000 receiver.

During March, Paul Logan monitored 1521 for Radio Beijing. He found that the signal peaked up around 1700 and that a second weaker peak occurred at 2100—he is now anxiously awaiting the arrival of their QSL! An excellent signal at 1822, from UAE RCTV Dubai on 1481, was noted by Graham Powell in his log for March.

In a survey of the l.w. band between 140 and 200kHz, Bill Kelly was unable to confirm that all the l.w. Broadcast Stations had in fact complied with the frequency changes mentioned last month in "On The Air". It seems DLF W. Germany 153 and Radio France Inter 162 are on the new frequencies, but DDR, Europe 1 W. Germany is 183 instead of 180 and there is a station in German on 176, so all has not been fully implemented yet.

Local Radio DX

There has been a considerable amount of activity here, as can be seen from Fig. 1. **Roy Spencer** of Nuneaton, Warwickshire, says "I find the early daylight hours to be the best for Local Radio DX, as there is too much interference from Europe at night".

It was fortunate for Steven Woods that the BBC Engineers had to turn off his local BBC Trowell Moor transmitter on 1521 for an hour recently, for this enabled him to log ILR Beacon Radio on 990 and ILR Radio Mercury on 1521!

Paul Logan says "The prize Local Radio catch for me was BBC Radio Kent (Rusthall) with only 0.25 kilowatts!"

Writing from Forfar in Angus, Scotland, **Stewart Russell** says "I noticed on the IBA teletext that two new stations are due to start operation in late September/October, namely, Radio Trent (Derby) on 945kHz and Ocean Sound (Southampton)

| Freq (kHz) Station | | | Simon Hamer, New Radnor | Paul Logan, Co. Fermanagh | Alan Merritt, Abingdon | Stewart Russell, Forfar | Roy Spencer, Nuneaton | Steven Woods, Nottingham | Calum MacLeod, Isle of Lewis | Andy Kennedy, Leicester | Alan Jarvis, Cardiff | Graham Johnson, Nuneaton |
|--------------------|----------------------|-----|-------------------------|---------------------------|------------------------|-------------------------|-----------------------|--------------------------|------------------------------|-------------------------|----------------------|--------------------------|
| 1161 | Radio Bedfordshire | BBC | | | | | | | X | | | |
| 1170 | Swansea Sound | ILR | X | X | | | | | | | | |
| 1170 | Radio Tees | ILR | X | | | | | | | | | |
| 1170 | Radio Orwell | ILR | X | | | | | | X | | | |
| 1170 | Signal Radio | ILR | X | | | | | | X | | | |
| 1242 | Invicta Sound | ILR | X | | | | | | | X | X | |
| 1251 | Saxon Radio | ILR | X | | | | | | | | | X |
| 1260 | GWR | ILR | X | X | X | | | | | | | |
| 1260 | Marcher Sound | ILR | X | | | | | | | | | |
| 1260 | Leicester Sound | ILR | X | | | | | | | | | X |
| 1278 | Pennine Radio | ILR | X | | | | | | | | | |
| 1305 | Red Dragon | ILR | X | | X | | | | | | | |
| 1305 | Radio Hallam | ILR | X | | | | | | | | | |
| 1323 | Radio Bristol | BBC | X | X | | | | | | | | |
| 1323 | Southern Sound | ILR | X | X | | | | | | | | |
| 1332 | Hereford Radio | ILR | X | | X | X | | | | | | X |
| 1359 | Essex Radio | ILR | X | | | | | | | | | |
| 1359 | Radio Solent | BBC | X | | | | | | | | | |
| 1359 | Red Dragon | ILR | X | X | | | | | | | | |
| 1359 | Mercia Sound | ILR | X | X | X | | | | | | | |
| 1368 | Radio Lincolnshire | BBC | X | | | | | | | | | |
| 1431 | Essex Radio | ILR | X | | | | | | | | | |
| 1431 | Radio 210 | ILR | X | X | | | | | | | | |
| 1449 | Radio Cambridgeshire | BBC | X | X | | | | | | | | |
| 1458 | Radio London | BBC | X | X | | | | | X | | | |
| 1458 | Radio WM | BBC | X | | | | | | | X | X | |
| 1458 | Radio Manchester | BBC | X | X | | | | | X | | | |
| 1458 | Radio Newcastle | BBC | X | | | | | | X | | | |
| 1458 | Radio Devon | BBC | X | | | | | | | | | |
| 1458 | Radio Cumbria | BBC | X | | | | | | | | | |
| 1476 | County Sound | ILR | X | X | X | | | | | | | |
| 1485 | Radio Merseyside | BBC | X | | | | | | | | | |
| 1485 | Radio Humberside | BBC | X | X | | | | | | | | |
| 1485 | Radio Oxford | BBC | X | | | | | | | | | |
| 1503 | Radio Stoke-on-Trent | BBC | X | X | | | | | | | | |
| 1521 | Radio Mercury | ILR | X | X | X | | | X | | X | | |
| 1521 | Radio Nottingham | BBC | X | X | | | | | | X | X | |
| 1530 | Pennine Radio | ILR | X | X | | X | | | | | | |
| 1530 | Radio Wyvern | ILR | X | X | X | | | | | | | X |
| 1548 | Capital Radio | ILR | X | | X | | X | | | X | | |
| 1548 | Radio Bristol | BBC | X | X | | | X | | | | | |
| 1548 | Radio Forth | ILR | X | X | | X | | | | X | | |
| 1548 | Radio City | ILR | X | X | | | | | | | | |
| 1548 | Radio Cleveland | BBC | X | | | | | | | | | |
| 1557 | Hereford Radio | ILR | X | X | | X | X | | | X | X | |
| 1557 | Radio Lancashire | BBC | X | X | | | | X | | | | |
| 1584 | Radio Nottingham | BBC | X | X | | | | | X | | X | |
| 1584 | Radio Shropshire | BBC | X | X | | | | | | | | |
| 1584 | Radio Tay | ILR | X | X | | | | | X | | | |
| 1602 | Radio Kent | BBC | X | | | | | | | | | |

on 1557kHz"—well thanks Stewart, for pointing this out to DXers, let's hope they have plenty of QSLs waiting!

As you can see, **Simon Hamer** of New Radnor, Wales, has been really busy! He says "I had quite a struggle with some of the station identities, because of interference from the Irish pirates. It is interesting to see the BBC is using 'County' names for the new Locals".

"I am still trying my best to hear BBC Radio Stoke-on-Trent on 1503, or even ILR Signal Radio on 1170 but I am beginning to wonder if I am expecting too much" says Alan Merritt—Why not try a different time of day Alan?

Receiver News

Two PW readers, **Frank Gregory** of Walton-on-Thames, Surrey, and **Les Smith** of Witham, Essex, have now built the little reflex receiver, as used by **John**

Practical Wireless, July 1986

Ratcliffe of Southport, Queensland, Australia, and have written to tell me that they are pleased with its performance. New ideas are now being tested out—Les is now making a l.w. version of the set and Frank—who used BC108 transistors in the circuit—is now going to try an antenna Q multiplier. Many other readers are building this set and I hope to include news from them in future issues of *PW*. It is quite an incredible design, since so few components are used!

QSL Addresses

Red Dragon Radio, Radio House, West Canal Wharf, Cardiff CF1 5XJ, S. Wales.
BBC Radio Leeds, Broadcasting House, Woodhouse Lane, Leeds LS2 9PN.
BBC Radio WM, P.O. Box 206, Pebble Mill Road, Birmingham B5 7SD.

Reports by the 15th, please

SW BROADCAST BANDS

Reports: as for Medium Wave DX, but please keep separate

For the Newcomer SWL

Our nearest star, which we call the sun, is at the centre of a complex system consisting of our planet earth and eight other major planets. It is in fact the only star in the universe which we can see clearly, for all the other stars are so remote that they appear as a point of light, even when viewed through the World's most powerful telescopes! Our sun is located 149.5 million km (about 93 million miles) away from us and a ray of light, or "sunshine", takes 500 seconds or 8.3 minutes to reach us.

For at least 4 billion years the sun has been turning hydrogen into helium and releasing a wide range of electromagnetic radiations and charged particles into space. Some of the many forms of radiation released are vital to life on earth, but others have harmful effects. There is an ever changing intensity in the level of these radiations and why this is so and exactly what the sun is going to do at any given time in the future is only known in a general way.

Ultraviolet and X-ray radiation, the ionising agents of solar energy, ionise the oxygen, nitrogen and nitric acid present in the rarified atmosphere above the earth to form the ionosphere. The basic principles of s.w. propagation via the ionosphere have already been discussed in this series (see October 1985 *PW*, page 72) and some aspects of the effects which solar events, sunspots and the solar sunspot cycle have on the ionosphere, were revealed in a later article (see March 1986 *PW*, page 63).

In addition to the relatively regular variations, already discussed in the previous articles, when the sun is said to be "quiet", when the sun is "active", the ionosphere can be subjected to sudden disturbances, which may adversely affect s.w. propagation. When an eruption or solar flare occurs on the surface of the sun, an intense emission of electromagnetic radiation consisting of X-rays, ultraviolet, visible light and radio waves takes place and these reach the earth in 8.3 minutes.

The effect of the bursts of ultra-violet and X-ray radiation on the ionosphere, is to increase the level of ionisation of the D layer to the point where it may absorb all radio waves before they can reach the higher reflecting F layers. This will cause a "Dellinger fade-out"—a complete or partial loss of all signals—which may last for a few minutes or an hour or more! This is usually referred to as a "sudden ionospheric disturbance" or "s.i.d."

Solar flares, which vary in magnitude and effect, occur without warning and are



by Brian Oddy G3FEX

frequently located close to a major sunspot. They usually last for only a very brief period and seldom for as long as an hour. In addition to the intense electromagnetic radiations emitted by a flare, streams of fast moving particles may also be ejected from the solar atmosphere into space and some of these may travel towards the earth. These charged particles arrive here about two days after a s.i.d. has occurred and cause another form of radio fade-out or black-out—the "ionospheric storm"—which can last anything from a few hours to several days! (Note, however, that if the particles miss the earth, then a storm will not occur)

Ionospheric storms may be divided into two main types, "isolated" and "recurrent". The isolated type are usually associated with solar flares and are most

common during the peak years of the sunspot cycle. However, they are much more significant at sunspot minima, since poor propagation conditions may well exist at that time.

Not all storms are caused by solar flares and the recurrent type of storm may be the result of emissions of fast solar particles from other sources on the surface of the sun. Since the rotation period of the sun, as seen from the earth, is about 27 days, recurrent storms reappear with the same frequency and they may regularly recur for a year or more. Initially, a single storm in a recurrent series may last for a few days, but as time goes by, the duration tends to be less. Storms of this type mainly arise a few years after a solar sunspot maximum period.

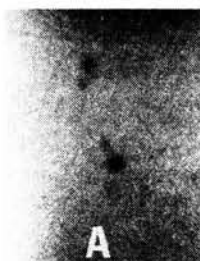
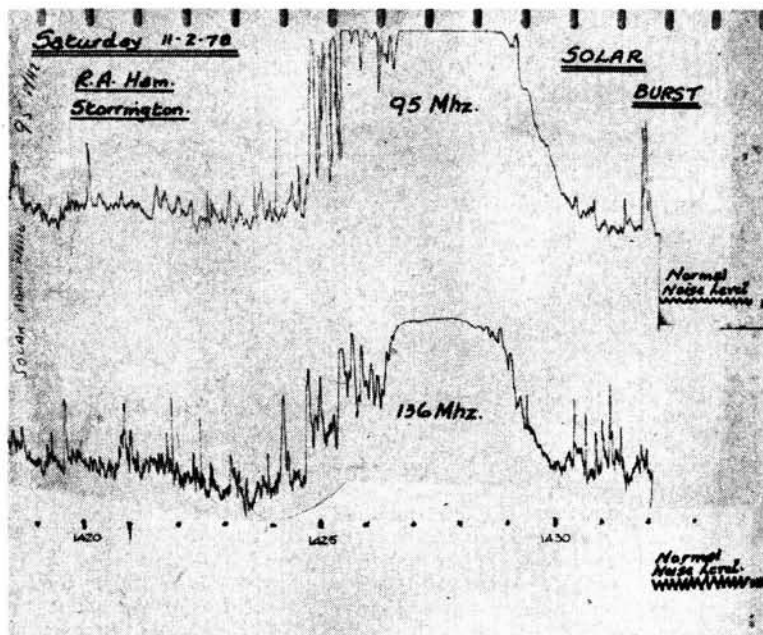
The charged solar particles cause magnetic disturbances as well as ionospheric storms when they arrive and these bring about changes in the strength of the geomagnetic field, which indirectly result in spectacular visible displays of "aurora". A photograph, taken by special techniques, of an actual solar flare occurring on the surface of the sun and a pen recording of the associated radio noise emitted by this flare is shown in Fig. 1. **WARNING: NEVER look at the sun through binoculars or a telescope—you will be permanently blinded.**

Conditions on 25 and 21MHz

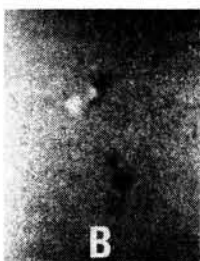
(Note: Frequencies in MHz. Time in UTC = GMT)

The low sunspot numbers are adversely affecting the 25MHz (11m) band and consequently most broadcasters have migrated to lower frequencies. However, VOA still broadcast to Australia from their relay station in Tinang, Philippines, on 26.000MHz between 0000 and 0200, but there has been no mention of this trans-

Fig. 1



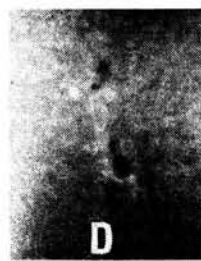
1426 HB



1427 HB



1428 1/2 Hα



1437 Hα

mission in the logs from Australia or Malaysia.

On the 21MHz (13m) band, many signals are audible during the morning and afternoon. **Fred Tagg** of Sherwood, Nottingham, has been busy testing a new G2DYM trap dipole antenna with his Icom R71 receiver and was pleased to hear UAE Radio Dubai 21-605 broadcasting in Arabic and English between 1000 and 1430; RFI France 21-620 with French at 1030; AFRTS 21-670 via their Tinang, Philippines, relay at 1150; Voice of Israel 21-760 in Hebrew at 1120 and WYFR 21-525 from Okeechobee, Florida, at 1635, to mention only a few of the stations in his log.

Alan Merritt of Abingdon, Oxon, has been listening to "Africa Today" from Radio RSA, Johannesburg 21-590 at 1400 and **Philip Rambaut** also logged this transmission in Macclesfield, Cheshire. His extensive log included Radio Nederlands at 1205, via their Madagascar relay on 21-480; Radio Cairo, Egypt 21-465 broadcasting in Thai and Indonesian at 1221; RBI Berlin 21-540 from 1300 and RSI Stockholm beaming to Africa at 1400 on 21-555.

By late afternoon, many of these stations have left 21MHz, but **George Morley** of Redhill, Surrey, has been hearing quite a good signal from Radio Nederlands, via their Bonaire Neth. Antilles relay station, on 21-685 at 1923, when they beam on Africa, with a transmission in English and French.

The 17 and 15MHz Bands

On 17MHz (16m) **Tommy Dougan** of Belfast, N. Ireland, has been hearing the Voice of Greece on 17-565 with News in English at 1049 and 1344. He also listened to All India Radio, New Delhi at 1030, broadcasting in English on 17-387. **Robert Taylor** of Edinburgh says that AIR are very anxious to get reports on their 17-875 transmissions, at 1000—this is beamed to Australia, but no doubt reports from other countries will be welcome, too!

Radio Pakistan beams to Europe at 1005 on 17-660 and **Ben Dias** of Bristol, Avon, enjoyed their live broadcast of a test match between Pakistan and Sri Lanka. In the Isle of Lewis, Scotland, **Calum MacLeod** has been busy with his Yaesu FRG-7700 receiver and his log of 17MHz stations included Radio Afghanistan, relayed by the USSR on 17-720 at 0900 and Radio Nederlands, via their relay in Madagascar on 17-575, at 1225.

UAE Radio Dubai beams to Europe at 1330 on 17-775 and 17-830. **Phil Englehard** of Macclesfield, Cheshire, says "The feature programme following the News is always worth catching for an insight into Arab culture and tradition."

A new venture in s.w. broadcasting will commence this month—stereo from the USA station NDXE! The transmissions to Europe on 17MHz will be from 1400 to 1800—the exact frequency is not known at the time of going to press. To receive these signals, two s.w. receivers will be needed. From the technical point of view, I am not fully convinced that this s.w. stereo system will work too well, because selective fading and phase distortion takes place on s.w. to a varying degree all the time, so it will be interesting to see what does happen to the signals—so please send along your reception reports and comments to me for "On The Air".

RCI Montreal, Canada, can be heard beaming to Africa on 17-820 at 1800 and

there is usually plenty to interest the listener in their programmes. **Ted Tew** of Northallerton, Yorkshire, enjoyed their "Listeners' Corner" programme at 1830. At 1900, Phil Englehard has noticed that the WYFR signals on 17-750 from Okeechobee, Florida, USA, come through well. Later, at 2000, **Peter Mills** of Sherborne, Dorset, heard Radio Algiers, Algeria, for the first time, broadcasting News in English at 2000 on 17-745—apparently, this was a good signal until the band conditions rapidly changed and it faded out at 2017.

Conditions for long distance reception on 15MHz (19m) have been variable and generally unreliable. However, signals from KYOI Saipan, N. Mariana Islands, logged by **Tim Shirley** of Bristol and others on 15-150 from 0900, have been quite good at times. Radio Australia is sometimes a strong signal in the UK on 15MHz—both Tim and Calum MacLeod noted their transmission to Asia on 15-405 at 1050 as good.

A strong signal from Iran can be heard on 15-084 and **David Middlemiss** of Eyemouth, Berwickshire, has been listening to VOIRI, Tehran at 1115 with his Eddystone 7173 Mk2 receiver.

Darren Taplin of Tunbridge Wells, Kent, has been monitoring the band with his DX 150A receiver, during the evenings. His log includes Radio Sophia, Bulgaria, on 15-310 at 1830 and AFRTS via Greenville USA on 15-430 at 2000—this station was also received well by David Park of Bradford, Yorkshire, who uses a Panasonic RF-3100L receiver and a 6m wire antenna. David has been trying to receive some of the USA Religious Broadcasters and heard WYFR on 15-566 at 1600—however, WHRI on 15-310 at 1700 and WINB on 15-150 at 1800 are very much in the background. **Andrew Hill** of Cheslyn Hay, Staffs, who uses a Vega 206 receiver, has been hearing Radio HCJB Quito, Ecuador, on 15-270 very well at 2130—this is certainly one to look out for!

The Voice of Free China broadcast programmes about Chinese cooking at 2100 on 15-440—these seem to be very popular with **Sheila Hughes** of Morden, Surrey; **Anthony Beldon** of Barnsley, Yorkshire; **Alan Curry** and **Michael Hill**, both of Stockton-on-Tees; **Andrew Hill** and **David Middlemiss**!

The Voice of Nigeria on 15-120 is not often mentioned by s.w.l.s in their letters; however, Sheila Hughes says she has been hearing their News broadcast from Lagos at 0700 and **Fred Pallant G3RNM** of Storrington, Sussex, enjoyed their "Hi-Life" music at 1700. Fred has also been monitoring Africa No.1, Gabon, during the day. This station operates on 15-200 between 0800 and 1700 and then moves to 15-475 until 2300.

The 11, 9, 7 and 6MHz Bands

These bands are full of signals from all Continents. Some of the interesting signals heard on 11MHz (25m) by **Keith Hitchman** of Didcot, Oxon, include Radio Beijing on 11-610 at 1140; RHC Habana, Cuba on 11-795 at 1830; AIR New Delhi 11-620 from 1845; VOA on 11-760 via their relay in Tangier, Morocco at 1915 and Radio Kuwait on 11-675 from 1800. His log for 9MHz (31m) mentions Radio Australia on 9-655 at 0930—**Roy Spencer** of Nuneaton, Warwickshire, spent several mornings monitoring this transmission between 0700 and 0800 and found it to be excellent.

Keith Edwards of Oxford has been listening to some of the other transmissions from Radio Australia, for example their ABC relay on 9-680 around 0800 and their service to Papua and New Guinea on 9-760 between 0800 and 0900. Radio Australia also broadcast in the 7MHz (41m) band on 7-205 from 1530. **Peter Edwards** of Abingdon, Oxon, is a regular listener to their 6MHz (49m) transmission, targeted on Europe from 1500 on 6-035.

A relative newcomer to s.w.ling, **Craig Harris** of Laceyby, S. Humberside, uses a Sharp GF-570 twin cassette radio plus 36m long wire antenna. He enjoys the Saturday night "Rock On" music broadcast by Radio Kuwait from 1915 on 11-675 and has received AIR New Delhi 11-740 at 2245; Adventist World Radio on 9-670, with "DX News" at 0800; Radio Kiev 7-230 at 1700; Radio Vilnius, Lithuania 7-165 at 2300 and RBI Berlin, 6-080 at 1630.

Writing from Dendermonde, Belgium, **Maurice Andries** says he has been comparing the signals from UAE Radio Dubai at 1615 on 11-955 and 9-595—although the 11MHz signal is good, he found the 9MHz signal to be very weak.

Because of his hours of work—see MW section—**Al Dupres** of Cardiff hunts for stations late at night with his Yaesu FRG-8800 receiver! In his interesting letter Al mentions News from Athens via the Voice of Greece 9-935 at 0130; Radio Cairo on 9-475 at 0230; TWR Bonaire, Nederlands Antilles 9-535 at 0300 and UAE Radio Dubai 7-310 at 0330.

NDXE plan to broadcast Stereo to Europe from July, in the 11MHz and 9MHz bands—times are 0000 to 0300, but exact frequencies are not known.

Peter Jones of Abertillery, S. Wales, sent along the only reception report of Radio Earth International, USA, which broadcasts via Radio Milano, Italy, on Sundays from 0700, with a transmission for Europe on 7-295. Peter has a Yaesu FRG-7 receiver and a vertical antenna. Another station not often mentioned is the Voice of Vietnam. **Julian Wood** of Buckie, Scotland, has been receiving their broadcast to Europe on 10-040 at 1900.

An interesting log from **Alan Hollingworth** of Southsea, Hampshire, includes RCI Montreal, Canada on 9-760 at 2200. He also mentions good reception of Radio RSA, Johannesburg on 9-585 at 2100 with News; Radio Sophia, Bulgaria on 9-700 at 2300 and News from Radio Polonia, Warsaw on 9-540 at 1730. **John Sadler** of Bishops Cleeve, Hertfordshire, also listens to RCI Montreal, Canada, and tunes to 11-945 at 2030 on Saturdays for their DX programme. His log mentions Radio Peace & Progress Moscow on 9-875 at 1630; Radio Yugoslavia, Belgrade 6-100 at 2000 and Radio Budapest, Hungary on 9-835—this station has a DX programme on Fridays at 1415.

Vatican Radio of Rome, broadcasting on 9-645, was received by **David Wright** of Telford, Staffordshire, at 0620, during an early morning listening session. Using a Sony ICF7600D receiver, some of the other stations heard were RBI Berlin on 5-965 at 0600; Radio Polonia, Warsaw on 9-675 at 0630 and VOA via their Tangier relay on 9-650 at 0700.

The 5, 4, 3 and 2MHz Bands

Although the conditions for long distance reception on the Tropical bands have been good, the identification of some of the DX stations received is never easy!

Practical Wireless, July 1986

Michael Sargeant of Bolton, Lancashire, concentrated on these bands and sent along an extensive log which included ELWA Monrovia, Liberia 4-760; Radio Mundial Venezuela 4-770; Radio Atlantida Peru 4-790; Africa No. 1 Gabon 4-830; Radio Jornal do Brazil 4-875; Radio Yacuy Venezuela 4-885; Radio Rumbos Venezuela 4-970 and Ecos Del Torbes Venezuela 4-980.

Leslie Biss of Knaresborough, Yorkshire, has been exploring these bands with his new Trio R600 receiver and listened to African music from Radio Douala, Cameroon on 4-795 at 2040 and to S. American music from Radio Nacional Porto Velho, Brazil on 4-945 at 2100.

Up in Scotland, **Neil Dove** of Lockerbie, Dumfriesshire, noted BBC Ghana 3-366; AIR Delhi 3-905; BBC Kranji Singapore 3-915; Xinjiang China 4-735; RTM Mali 4-835; ORTB Cotonou Benin 4-870; Senegal 4-890; FRCN Lagos Nigeria 4-990; Equatorial Guinea 5-004 and Radio Sutanzenza Columbia 5-095 in his log!

Using the general coverage receiver of his Yaesu FT-757GX transceiver, **Albert Fisher G4VBH** of Heston, Hounslow, has been hearing FRCN Kaduna, Nigeria 4-770, but says, "I measure it as 4-775." Do you get the same readout on l.s.b./u.s.b. as a.m. Albert? I make it 4-770 here—has anyone heard this station operating off frequency?

John Romano of Glasgow, Scotland, has been experimenting with antennas and enjoys looking for the low power Tropical stations—his latest DX is Radio Mundial Boliva, Venezuela on 4-770, heard at 0145. **Graham Powell** of Pontypridd, S. Wales, has also been hearing some S. American DX, including La Voz Evangelica, Honduras 4-820; Radio Reloj, Costa Rica 4-832; Radio Capital, Venezuela 4-850 and

Radio Timbira, Brazil 4-975. Graham also head 4VEH from Haiti on 4-930—often a good signal at 2300 and RFO Cayenne, Fr Guiana on 5-055 at 2239.

Another keen listener, **Jon Snooks** of Andover, Hampshire, decided to look for tropical DX for the first time and his extensive log included Radio Burkina, Ouagadougou 4-815; ORTM Nouakchott, Mauritania 4-845; Radio Yaounde, Cameroon 4-850; ORTS Dakar, Senegal 4-890 and Radio Togo, Lome 5-047.

Andy Kennedy of Leicester has been searching for more DX and was delighted to hear signals from 4VEH Cap Haitien, Haiti on 4-930 at 2316. He says "I spent much time on 90m this month and most rewarding it was, too. Radio Zaracay, Ecuador on 3-395 in particular, was a solid and regular signal." Others logged were HCJB Quito, Ecuador 3-220 (Home Service in Spanish); Radio/TV Togolaise Kara, Togo 3-222; Radio Occidente, Venezuela 3-225; ELWA Monrovia 3-230; Radio RSA 3-230; Radio Cultural, Guatemala 3-300; CHU Ottawa, Canada 3-330. On 75m, signals from the BBC Kranji, Singapore station on 3-915 were received.

In Selangor, Malaysia **Mat Jusoh** has been listening to the 75m band signals from AIR New Delhi on 3-900 at 1500; BBC Kranji, Singapore on 3-915 at 1545; Nippon BC Japan on 3-925 at 1510 and Radio RRI, Padang on 4-000—relaying News from FR Jakarta at 1600. On 60m, Africa No. 1, Gabon 4-830 at 2300; ORTM Nouakchott, Mauritania 4-845 at 1945; Radio San'a, North Yemen 4-850 at 2000; VLM4 Brisbane, Australia 4-920 at 2010 and FRCN Lagos, Nigeria 4-990 at 2200 were logged.

At his listening post in Belfast, N. Ireland, **Bill Kelly** has been busy checking the Tropical bands during the night, with his



Fig. 1

JRC NRD 515 receiver. On 90m, Bill listened to "Good Morning Africa" via Radio RSA on 3-230—a very good signal at 0345 and on 75m heard the BBC Kranji, Singapore station on 3-915 at 2330 and RFI Allouis 3-965 at 0330. His extensive 60m band log includes Radio Bafoussam, Cameroon 4-000 at 0535; Radio Kabul, Pushto (USSR Relay?) 4-740 and Radio Garoua, Cameroon 5-010 at 0445.

Tim Shirley of Bristol—pictured in Fig. 1—has continued his search for DX on these bands and logged LNBS Lesotho 4-800 at 2140; RTB Cotonou, Benin 4-870 at 1925; Radio Nacional, Porto Velho Brazil 4-945 at 0300; Radio Rebelde, Cuba 5-025 at 0205 and Radio Cultura do Para, Brazil 5-045 at 0100.

Station Addresses

Radiodiffusion TV Gabonaise, Boite Postale 10150, Libreville, Rep. Gabon.

RHC Habana, Emis. de Ondas Cortas, Apartado de Correos 7026, La Habana, Cuba.

WYFR Family Radio, 290, Hegenberger Road, Oakland, CA. 94621, USA.

SWAP SPOT

Have 1966 MGB Tourer, much sought after by enthusiasts, stripped and half way through restoration. Most parts to complete, including original HMV valve radio. Would exchange for h.f. or v.h.f. TX/RX, or even g.c. RX. Try me. Tel: Cardiff 551392. **B225**

Have 6 x Pye Westminster transceivers Ex-council xtals fitted for 77-87MHz, but will work on 50-70MHz. Would exchange for electronic, computer or musical goods. Tom. Tel: North Shields 595852. **B245**

Have Durst 601 2 1/2 35 black and white enlarger with colour head and transformer, Colorneg analyser, 80mm Rodagon lens, total s.h. value about £150. Would exchange for 144MHz synthesised handheld, 200MHz frequency counter, w.h.y? G6VPD. QTHR. **B280**

Have Canon FTBn s.l.r. camera, case, electronic flash, wide angle lens with case, virtually as new. Would exchange for 144MHz handheld (not crystal), or Microwave Modules Advanced Morse Tutor in good condition. Tel: Stratford-on-Avon 204614. **B281**

Have Pye F460 u.h.f. station, TX & RX plus remote control cabinet 450MHz, requires re-tuning to 430MHz band, uses 12MHz xtals. Would exchange for any 35mm camera and flash gun, 200/300mm telephoto lens and doubler, Super 8mm projector. P. G. Robins G8BSK, 290 Priory Road, St Denys, Southampton (or call R5 on 144MHz band). **B291**

Have Realistic DX200, 5-band communications receiver, 150kHz-3MHz in excellent condition. Would exchange for quality s.l.r. and lens. Mr Mahon, 111 Medlar Road, Abbronnill, Cumbernauld, Glasgow G67 3AH. Tel: 023-67 25817. **B292**

Have Yaesu FT-203R hand-portable with batteries, case, rubber antenna and home-brew speaker mic c/w handbook. Would exchange for FT-200 or any similar h.f. TX/RX. Simon G0EHU. Tel: Derby 515908. **B293**

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, Enfield House, The Quay, Poole, Dorset BH15 1PP, for inclusion in the first available issue 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 FR100B amateur bands receiver, in working order with manual. Would exchange for RX audio processor, MFJ or Datong or similar. Sharp. Tel: Swindon 826325 after 7pm. **B294**

Have Canon Auto Zoom cine camera plus two projectors, also have Texas TI/99A computer as new. Would exchange for Yaesu FC-707 a.t.u. or a pair Tandy TRC1001 handheld CBs. Ian. "The Dormouse", 5 Sunset Walk, Bush Estate, Eccles-on-Sea, Norfolk NR12 0SX. **B295**

Have Yaesu head set, boom mic and switch box, as new boxed. Would exchange for Icom equivalent. Garry. tel: 0625 530200 (Wilmslow). **B296**

Have 48K Spectrum computer plus Protek interface and lots of games (joystick if wanted). Would exchange for AT130 or TL130 or p.s.u., other offers considered. Douglas. Tel: Hamilton 426476. **B304**

Have 10m, 3-section, glass fibre tower, new and unused. Would exchange for 144MHz mobile multimode or f.m. Delivery can be arranged. Bill G0CYD. Tel: Bristol 828591. **B312**

Have Tandy 40-channel CB 4 watts, plus extension microphone. Would exchange for Sony ICF-2001 receiver and power supply, or communications receiver of some sort. Cash adjustment either way. Mike. 14 Doverfield Road, Brixton, London. **B326**

Have several round and edge type meters, 200µA upwards, also 270V 250mA, 6V 10A power units. Would exchange for B2 spares, particularly coil socket, meter (MT4) p.u. plugs (cable plug 2A). R. K. Mildren, 13 Queens Crescent, Bodmin, Cornwall. **B338**

USE THIS

SPACE

SMALL ADS

The prepaid rate for classified advertisements is 40 pence per word (minimum 12 words), box number 60p extra. Semi-display setting £13.24 per single column centimetre (minimum 2.5 cm). Please add 15% VAT to total. All cheques, postal orders etc., to be made payable to Practical Wireless. Treasury notes should always be sent registered post. Advertisements, together with remittance should be sent to the Classified Advertisement Dept., Practical Wireless, Enefco House, The Quay, Poole, Dorset BH15 1PP. Telephone (0202) 678558.

Whilst prices of goods shown in advertisements are correct at the time of closing for press, readers are advised to check with the advertiser both prices and availability of goods before ordering from non-current issues of the magazine.

Receivers and Components

RADIO CANADA, Peking, Australia, Voice of America. A Vega 206 (6x SW/MW/LW) pulls these and dozens more. £24.95. "Good buy" Practical Wireless. Year's guarantee. Return despatch. CORRIGAN-RADIOWATCH, Building 109, Prestwick Airport, KA9 2RT.

ATU's ATU's FOR SWL'S AND DX'ERS, S.A.E. details: D. J. STANTON (RADIO), 16 Addison Road, Worcester WR3 8EA.

MAXI - Q

COILS AND CHOKES
PREVIOUSLY MADE BY DENCO
S.A.E. PRICE LIST
8 BRUNEL UNITS, BRUNEL ROAD,
GORSE LANE IND. ESTATE,
CLACTON, ESSEX CO15 4LU.
TEL: (0255) 424152

CRYSTALS Made to order for any purpose and large stocks of standard frequencies for computers, modems, etc. Amateur CW (QRP) freqs £4.00 and CB conversion crystals at £4.50. **PROGRAMMABLE OSCILLATORS (PXO)** for baud rates, MPU, and freq markers £12.50.

FILTERS Crystal, monolithic, mechanical and ceramic for all standard IF's. Special 10.695MHz for big improvement to most CB rigs at £4.50 each.

S.A.E. FOR LISTS. PRICES INCLUDE VAT AND POST

P. R. GOLLEDGE ELECTRONICS
G3EDW, Merriott, Somerset, TA16 5NS
Tel. 0460 73718

JAYCEE ELECTRONICS
JOHN GM30PW
20 Woodside Way, Glenrothes, Fife KY7 5DF
Tel: 0592 756962
Open: Tues-Sat 9-5

Quality secondhand equipment in stock. Full range of TRIO goodies. Jaybeam - Microwave Modules - LAR.

ESR ELECTRONIC COMPONENTS

- FULL RANGE OF COMPONENTS
- MOTORS & SERVOS
- ROBOT ARMS & INTERFACES
- VELLEMAN ELECTRONIC KITS

Send for new catalogue 60p inc. P&P
13a Station Road, Cullercoats,
North Shields, Tyne & Wear NE30 4PQ
091 251 4363

Receivers and Components Cont.

PROFESSIONAL POLICE, Fire & Public Service style pocket-sized monitor receiver. 54-176MHz plus 10m Amateur (11m CB on request) and VHF Aircraft. Excellent sensitivity. VFO. Squelch provision. Whip antenna etc. £27.95 all inc. CWO/COD welcome: D. TAYLOR (Dept GSE8), 8 Emmerson Street, Crook, Co. Durham, U.K.

PARTS FOR YOUR PROJECT, we can supply them! Cash, Cheque or Access number with order to: BUSINESSLAND, Unit 15, Mochdre Industrial Estate, Newtown, Powys SY16 3LE. Tel: (0686) 24846.

Veteran & Vintage

NOW AVAILABLE - Bumper Catalogue - 170 pages - For collectors of Vintage Radio, Audio & T/V Equipment. Price: £2.00 post paid U.K., £3.00 post paid overseas. **VINTAGE WIRELESS CO. LTD.**, Cosham Street, Mangotsfield, Bristol BS17 3EN. Phone 0272 565472.

EARLY WIRELESS SETS FOR SALE. Crystal sets, bakelite radios. S.A.E. plus 50p for list: 312 Carterhatch Lane, Enfield, Middlesex.

Educational

COURSE FOR CITY & GUILDS, Radio Amateurs Examination. Pass this important examination and obtain your licence, with an RRC Home Study Course. For details of this and other courses (GCE, Career and professional examinations, etc.) write or phone: **THE RAPID RESULTS COLLEGE**, Dept. JX16, Tuition House, London, SW19 4DS. Tel: 01-947 7272 (9am-5pm) or use our 24hr Recordacall Service: 01-946 1102 quoting Dept. JX16.

Software

J.E.P. ELECTRONICS

MORSE READER PROGRAMMES Spectrum Dragon VIC 20 Atari 600/800x1 MSX Computers BBC B CBM64 ZX81/16K) Amstrad 464. Sinclair computers require NO interface, others use simple one transistor (BC107) device. Programmes self tracking 8/30 WPM. All connections to existing sockets. Cassette with full instructions and interface circuit (where required) £6 inc. P&P. Interface built and tested £2.50 inc. P&P. **MORSE TRANSCIBE**. For your 48K Spectrum a full CW transcribe Programme. Full type ahead facility, even while receiving. Pre-programmable memories can be called at any time. Lock the sending speed to the received speed or choose your own. Self tracking 8/30 WPM. On HF bands a suitable filter will improve reception. Programme on cassette with instructions and filter circuit £8.50 inc. P&P. Ready built filters, see below. **RTTY TRANSCIBE**. For the 48K Spectrum Menu driven, 10 programmable memories, split screen, morse ident, 4 Baud rates etc. etc. **No Terminal Unit**, just a filter unit. Cassette with instructions and filter circuit £8.50 (See below for ready built filters). **FILTER UNITS: RTTY ONLY** Built, tested and fitted with leads (no plugs) £6. **CW ONLY** Built, tested and fitted with leads (no plugs) £7. **RTTY/CW Switchable**, dual purpose filter, supplied boxed and fitted with plugs to fit your Spectrum. **E11.50**. **RTTY/CW SUPER** Specification as above but with addition of LED circuit for perfect tuning. **E13.50**. **BASE TERMINAL UNIT** CW-RTTY (170 & 850Hz shifts) Outputs: Audio, TTL, reverse TTL, open collector (normal & reverse) requires 12-15V supply. SAE brings full spec. £45. With the exception of the last unit the filters require a nine volt supply. Battery clips are fitted. Battery not supplied. SAE please for full details of any or all of our goods. All goods dispatched same day by first class post (overseas add £1.00 for airmail). **J.E.P. Electronics, New Road Complex, Kidderminster, DY10 1AL. Phone (0562) 753893**

"MICROCOM 16" CW/RTTY (TX and RX) with morse tutor for the Commodore 16. Also available "Microcom +4", "Microcom 64" and "Microcom 128". S.A.E. to: **MORAY MICRO COMPUTING**, Enzie Slackhead, Buckie, Moray AB5 2BR for full details.

Books and Publications

EUROPEAN & BRITISH broadcast stations clearly listed in DIAL-SEARCH: MW, LW and selections SW, VHF; 40pp + 2 maps. "Excellent" (PW); "Good value" (Radio Nederland Booklist). £3.30 including postage (abroad £3.50 or 15 IRCs). - **WILCOX** (PW2), 9 Thurrock Close, Eastbourne BN20 9NF.

For Sale

FOR SALE: Eddystone communication receiver type 680X. Tel. 061 797 5653.

FOR SALE: Wireless valves and service sheets. S.A.E. 5 Holcombe Avenue, Bury BL8 2RN.

JRC NRD515 RECEIVER WITH SPEAKER. V.G.C. £550. **BILLERICAY** (ESSEX) 52485 evenings/weekends.

MANUFACTURERS SURPLUS STOCKS

Electronic Components, Test Gear, Radiotelephones, Computers, Photographic and Video Equipment. All at knockout prices.

Catalogues Available from:

B. BAMBER ELECTRONICS, 5 STATION ROAD, LITTLEPORT, CAMBS. Phone: ELY (0353) 860185.

ORDER FORM PLEASE WRITE IN BLOCK CAPITALS

Please insert the advertisement below in the next available issue of Practical Wireless for
insertions. I enclose Cheque/P.O. for £ CAT. heading
(Cheques and Postal Orders should be made payable to Practical Wireless)

| | | | |
|--|--|--|--|
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |

NAME

ADDRESS

PRACTICAL WIRELESS
Classified Advertisement Department,
Enefco House, The Quay, Poole,
Dorset BH15 1PP. Telephone (0202) 678558
Rate 40p per word, minimum 12 words.
Box No. 60p extra.
PLEASE ADD 15% VAT TO TOTAL

Company registered in England. Registered No. 1980539. Registered Office: Towngate House, 2 Parkstone Road, Poole, Dorset, BH15 2PJ.

7/86

Service Sheets

TECHNICAL INFO SERVICES 76 Church St - Larkhall - Lanarks

FULL SIZE SERVICE SHEETS
Any radio, audio £2.50 + i.s.a.e.
CTVs/MusC £3.50 + i.s.a.e. complete set

World's largest collection
service manuals 30's - date
from £4.50-£35 each.

Comprehensive T.V. Repair Course
Complete Radio Service & Repair Course
ONLY £9.50 EACH

Unique comprehensive repair
data & circuits for almost
every TV & video in stock.

S.a.e. brings any quotation
FREE 50p mag. inc. service sheet!
Pricelists unique elect. publications

FOR FAST QUOTES RING
0698 884585 before 5pm
0698 883334 after 4pm

SERVICE MANUALS, Television, Audio, Video, Vintage,
Test etc. LSAE enquiries: MAURITRON (PW), 8 Cherry-
tree Road, Chinnor, Oxfordshire, OX9 4QY.

BELL'S TELEVISION SERVICES for service sheets on
Radio, TV, etc., £1.50 plus SAE. Service Manuals on Colour
TV and Video Recorders, prices on request. SAE with
enquiries to B.T.S., 190 Kings Road, Harrogate, N. York-
shire. Tel. (0423) 505885.

SERVICE MANUALS for colour television, video recorders,
hi-fi, etc. Send S.A.E. for list: MIDDLESEX VIDEO, 488
Lady Margaret Road, Southall, Middlesex.

Aerials

AERIALS, Traps for Trap Dipoles, Beams, Verticals, Baluns.
Data sheets 24p. S.A.E. Aerial Guide £1. G2DYM, Uplow-
man, Devon EX16 7PH. 03986 215.

Miscellaneous

G2VF D.I.Y. H.F. long and medium wave loop antennas.
SAE for details: F. RYLANDS, 39 Parkside Avenue, Mill-
brook, Southampton.

HEATHKIT U.K. Spares and Service Centre. CEDAR
ELECTRONICS, Unit 12 Station Drive, Bredon, Tewkes-
bury, Glos. Tel. (0684) 73127.

WAVEGUIDE, FLANGES & DISHES. All standard sizes &
alloys (new material only) from stock. Special sizes to order.
Call: EARTH STATION 01-228 7876. 22 Howie Street,
London SW11 4AR.

CASES 19" rack and free standing from £12.00. NEWRAD
Wick Ind. Est., New Milton, Hants. Tel. 621195.

QSL CARDS. Gloss or tinted cards. SAE for samples to:
TWROG PRESS, Dept. PW, Penybont, Gellilydan, Blaenau
Ffestiniog, Gwynedd.

PRACTICAL WIRELESS, 1957 to 1968 and 1973 to 1985,
with few omissions. Offers invited. Write Box No. P.W.14.

WE'RE OFF AGAIN! To the biggest mobile rally in the south
of England on Sunday 13th July 1986 from 10 a.m. to 5 p.m. at
the Brighton Race Ground. Huge "Bring and Buy" stall,
20,000 sq.ft. under cover exhibition area, plus attractions for
the XYL and children and restaurant facilities. The rally which
caters for the whole family. Talk-in on S22 and 3.5MHz.
Admission £1. Children free if accompanied by an adult.
Further details ring:- (0903) 782594.

| THE SCIENTIFIC WIRE COMPANY | | | | | |
|--|-------|------|------|------|--|
| 811 Forest Road, London E17. Telephone 01-531 1568 | | | | | |
| ENAMELLED COPPER WIRE | | | | | |
| SWG | 1lb | 8 oz | 4 oz | 2 oz | |
| 8 to 34 | 3.63 | 2.09 | 1.10 | 0.88 | |
| 35 to 39 | 3.82 | 2.31 | 1.27 | 0.93 | |
| 40 to 43 | 6.00 | 3.20 | 2.25 | 1.61 | |
| 44 to 47 | 8.67 | 5.80 | 3.49 | 2.75 | |
| 48 | 15.96 | 9.58 | 6.38 | 3.69 | |
| SILVER PLATED COPPER WIRE | | | | | |
| 14 to 30 | 9.09 | 5.20 | 2.93 | 1.97 | |
| TINNED COPPER WIRE | | | | | |
| 14 to 30 | 3.97 | 2.41 | 1.39 | 0.94 | |
| Fluxcore | | | | | |
| Solder | 5.90 | 3.25 | 1.82 | 0.94 | |
| Prices include P&P VAT. Orders under £2 add 20p. | | | | | |
| SAE for list of copper and resistance wire. | | | | | |
| Dealer enquiries welcome. | | | | | |

WANTED. REDIFON GR 410. Working units or parts for
spares. PETER ASHBY, 4 Valley Road, London SW16 2XN.
01-769 1182.

WANTED: POP MUSIC RADIO RECORDINGS (1960s) on
reel or cassette. (053673) 483 Brigstock.

★ BAKER ★

GROUP P.A. DISCO

150 watt Output, 4 input Mixer pre-amp. Illustrated £99
150 watt Output, Slave 500 mV. Input 3 Speaker Outputs £80
150 + 150 watt Stereo. 300 watt Mono Slave 500 mV. Inputs £125
150 watt P.A. Vocal, 8 inputs. High/Low Mixer Echo Socket £129
50 watt Mobile 240V AC and 12V DC. 4-8-16 ohm + 100V line £89
Reverb Unit for Microphone or Musical Instruments £35 PP £1
Electronic Echo Machine for mic/line £85. Ditto Deluxe £95 PP £1.
30 Watt COMBI. 12in. Speaker, Treble, Bass etc. £95 PP £5.

| FAMOUS LOUDSPEAKERS | | | FULLY GUARANTEED | | | |
|---------------------|-------------|-----------------|------------------|--------|---------------|------|
| Make | Model | Size | Watts | Ohms | Price | Post |
| AUDAX | WOOFER | 5 1/2in | 25 | 8 | £10.50 | £1 |
| GOODMANS | HIFAX | 7 1/2 x 4 1/4in | 100 | 8 | £34 | £2 |
| GOODMANS | HE WOOFER | 8in | 50 | 8 | £14 | £1 |
| GOODMANS | "402" | 12in | 60 | 15 | £30 | £2 |
| BAKER | WOOFER | 12in | 80 | 8 | £25 | £2 |
| GOODMANS | DISCO GROUP | 12in | 120 | 8/15 | £36 | £2 |
| BAKER | DISCO GROUP | 15in | 100 | 8/16 | £39 | £4 |
| H.I.H. | DISCO GROUP | 15in | 100 | 4/8/16 | £49.50 | £4 |
| GOODMANS | HP/BASS | 15in | 250 | 8 | £74 | £4 |
| GOODMANS | HPD/BASS | 18in | 230 | 8 | £87 | £4 |

COMPACT FULL RANGE SPEAKER SYSTEMS size 24 x 17 x 12in
100 watts £90, 200 watts £100, 400 watts £150 each Carr £12.

DISCO CONSOLE Twin Decks, mixer pre amp £149. Carr £10.
Ditto Powered 120 watt £199; or Complete Disco £295. Carr £30.

MAINS TRANSFORMERS Price Post
250-0-250V 80mA, 6.3V 3.5A, 6.3V 1A.
350-0-350V 250mA, 6.3V 6A CT £7.00 £2
220V 25mA, 6V 1Amp £3.00, 220V 45mA, 6V 2 Amp £4.00 £1

LOW VOLTAGE TAPPED OUTPUTS AVAILABLE
1 amp 6, 8, 10, 12, 16, 18, 20, 24, 30, 36, 40, 48, 60 £6.00 £2
ditto 2 amp £10.50 3 amp £12.50 5 amp £16.00 £2
31.26-0-26.31 volt 6 amp £14.00 £2

LOW VOLTAGE MAINS TRANSFORMERS £5.50 each post paid
9V, 3A, 12V, 3A, 16V, 2A, 20V, 1A, 30V, 1 1/2A, 30V, 5A + 17-0-17V,
2A, 35V, 2A, 20-40-60V, 1A, 12-0-12V, 2A, 20-0-20V, 1A

PANEL METERS 50uA, 100uA, 500uA, 1mA, 5mA, 100mA, 500mA,
1 amp, 2 amp, 5 amp, 25 volt, VU 2 1/4 + 2 x 1 1/4in. £5.50 post 50p

MINI MULTI TESTER Volts AC/DC, ohms, milliamps £8.50
DELUXE RANGE DOUBLER METER SKO O.P.V. £25.00 PP £1

PROJECT CASES. Black Vinyl Covered Steel Top, All Base
4 x 2 1/2 x 2 1/4in £2.50; 6 x 4 x 1 1/2in £3.60; 8 x 5 x 2in £4.00;
11 x 6 x 3in £5.50; 11 1/2 x 6 x 3in £9.00; 15 x 8 x 4in £12.00.

ALUMINIUM PANELS 18 s.w.g. 12 x 12in £1.80; 14 x 9in £1.75;
6 x 4in 55p; 12 x 8in £1.30; 10 x 7in 90p; 14 x 3in.
72p, 12 x 5in 90p; 16 x 10in 90p; 16 x 6in £1.30.

ALUMINIUM BOXES. MANY OTHER SIZES IN STOCK.
4 x 2 1/2 x 2in £1.02; 3 x 2 x 1in £1.6; 4 x 2in £1.90; 8 x 6 x 3
£3.00; 12 x 5 x 3in £3.60; 6 x 4 x 3in £2.20; 10 x 7 x £3.60.

HIGH VOLTAGE ELECTROLYTICS
16/450V 50p 220/400V £2 32 + 32/500V £2
20/500V 75p 8 + 8/450V 85p 32 + 32/350V 85p
32/350V 45p 16 + 16/350V 75p 16 + 32 + 32/500V £2
47/350V 75p 20 + 20/350V 75p 80 + 40 + 20/350V 95p

GEARED TWIN GANCS 365 + 365 + 25 + 25p £2.00.
REVERSE VERNIER cord drive 90p. Spindle Extender £1.50.
VERNIER DIALS, 0-100, 36mm, £2.50, 50mm, £3.00.

RADIO COMPONENT SPECIALISTS

Dept 4, 337, WHITEHORSE ROAD, CROYDON
SURREY, U.K. Tel: 01-684 1665
ACCESS Post 65p Minimum. Callers Welcome VISA
List, Large S.A.E. Delivery 7 days Closed Wednesday

VALVES

*SPECIAL QUALITY

Prices are as at going to press but may
fluctuate. Please phone for firm quotation

| | | | | | | | | | | | |
|-------|-------|---------|-----------|--------|-------|--------|-------|---------|-------|--------|-------------|
| 1A3 | 1.40 | 6AH6 | 1.15 | 6CL6 | 2.75 | 6J56R | 6.40 | 12AT6 | 0.70 | 25A6GT | 1.50 |
| 114 | 0.80 | 6AK5 | 0.80 | 6D4V | 0.80 | 6K7 | 0.95 | 12AT7 | 0.95 | 25Z6 | 0.75 |
| 1R5 | 0.80 | 6AK8 | 0.80 | 6E3CB | 0.40 | 6K16B | 5.50 | 12AU7 | 0.95 | 30W4 | 2.80 |
| 155 | 0.80 | 6AL5 | 0.80 | 6F5 | 0.80 | 6M6 | 0.95 | 12B6 | 0.95 | 85A2 | 1.40/2.50 |
| 114 | 0.80 | 6AL5W | 0.80 | 6G6 | 2.50 | 6L6 | 0.95 | 12C6 | 0.75 | 807 | 1.40/2.50 |
| 114 | 0.65 | 6AM5 | 4.20 | 6H6 | 1.00 | 6L6GT | 5.95 | 12E6A | 1.25 | 812A | 44.80 |
| 114 | 0.80 | 6AM5 | 5.50 | 6H6GB | 1.10 | 6L18 | 0.70 | 12E6E | 1.25 | 812B | 25.50/38.50 |
| 114 | 0.80 | 6AN1A | 2.50 | 6I6 | 1.00 | 6L18 | 0.70 | 12F6 | 0.95 | 812C | 24.00 |
| 2X2A | 2.50 | 6A40 | 0.40 | 6F8G | 0.85 | 6L6E | 5.50 | 12E1 | 1.85 | 822A | 8.50 |
| 30A | 0.70 | 6A40S | 2.20 | 6F12 | 1.10 | 6A75 | 1.30 | 12J56GT | 0.95 | 866A | 5.00 |
| 30A | 0.70 | 6A40SW | 2.20 | 6F12 | 1.10 | 6A75 | 1.30 | 12J56GT | 0.95 | 866A | 5.00 |
| 30B78 | 12.50 | 6A5G | 1.15 | 6F15 | 1.30 | 6E5GT | 1.00 | 12K6GT | 0.95 | 881A | 1.80 |
| 30B | 0.60 | 6A15 | 4.99 | 6F17 | 3.20 | 6E1J | 1.00 | 12M70GT | 0.60 | 95A | 1.20 |
| 3E29 | 19.00 | 6A40 | 0.90 | 6F23 | 0.75 | 6E3K7 | 1.40 | 12C27 | 0.65 | 95S | 1.20 |
| 3E34 | 10.00 | 6A40 | 1.25 | 6F27 | 1.00 | 6E3K7 | 1.40 | 12C27 | 0.65 | 95S | 1.20 |
| 4B32 | 18.25 | 6A4XGT1 | 1.30 | 6F38 | 17.80 | 6E5D | 1.50 | 12J51 | 1.45 | 1000 | 7.50 |
| 5V46 | 1.25 | 6A4XGT2 | 1.30 | 6F38 | 17.80 | 6E5D | 1.50 | 12J51 | 1.45 | 1000 | 7.50 |
| 5V46 | 1.25 | 6B6A | 0.70/1.20 | 6GH8A | 1.95 | 6V6G | 5.00 | 12K4 | 0.70 | 1201 | 1.30 |
| 5V46 | 1.25 | 6B6E | 0.95/1.20 | 6H6 | 1.00 | 6V6GT1 | 1.30 | 1201 | 2.80 | 616B | 13.80 |
| 5V46 | 1.25 | 6E5G | 1.60 | 6J16 | 5.95 | 6A1 | 1.50 | 1203 | 3.00 | 616AB | 10.80 |
| 5Z4G | 2.80 | 6E1J | 1.00 | 6J16GT | 1.60 | 6A15 | 0.95 | 12A05 | 0.80 | 616B | 12.80 |
| 5Z4G | 1.25 | 6E07A | 0.85 | 6J4V4 | 2.00 | 6V6G | 0.90 | 12G1 | 11.50 | 9001 | 0.95 |
| 5Z4G | 1.46 | 6E8T | 2.00 | 6J5 | 2.30 | 6A4 | 0.70 | 9E6 | 10.50 | 9001 | 0.95 |
| 6A2 | 0.90 | 6E8T2 | 6.20 | 6J5GT | 0.95 | 6A4 | 0.95 | 9E6S | 26.50 | 9001 | 0.95 |
| 6A2 | 0.70 | 6E8T7 | 1.80 | 6J6 | 0.95 | 906 | 2.00 | 2001 | 0.80 | | |
| 6A67 | 1.15 | 6E4 | 0.70 | 6J6W | 2.00 | 11E2 | 15.50 | 20E1 | 1.30 | | |

YOUR LOCAL DEALERS

LONDON

AMCOMM

Approved dealer for Yaesu and Icom

194 Northolt Road, South Harrow, Middx HA2 0EN
Tel: 01-422 9585

(Mail order a speciality)

LONDON

Dressler (UK) Ltd.

A large selection always in stock - all makes

191 Francis Road, Leyton, LONDON, E10
Tel: 01-558 0854

(Mon-Sat 9am-5.30pm)

LONDON

Henry's

Test instruments, components and accessories. Catalogue - S.A.E. (A4) + 34p (UK)

404 Edgware Road, London W2 1ED
Tel: 01-724 0323

(Open 6 days a week)

ESSEX

Selectronic

The UK's leading suppliers of 934MHz personal radio equipment

203 High Street, Canvey Island, Essex
Tel: 0268 691481

(Open Mon-Sat 9-5.30)

Amateur radio equipment also in stock

HERNE BAY

Thanet Electronics

The Official Icom importer

2 Stanley Road
Herne Bay, Kent
CT6 5SH

Tel: 0227 369464

(Open Mon-Sat 9-5.30, except Thurs 9-1)

SOUTHAMPTON

South Midlands Communications

Official Yaesu Importer

S.M. House, Rumbridge Street, Totton, Southampton SO4 4DP
Tel: 0703 867333

PORTSMOUTH

Telecomms

Importers of the Nevada range of 934MHz equipment

189, London Road, North End, Portsmouth, Hants, PO2 9AE
Tel: 0705 662145

DEVON

Reg. Ward & Co. Ltd.

The South-West's largest amateur radio stockist. Approved dealer for Trio, Yaesu and Icom

1 Western Parade, West Street, Axminster, Devon, EX13 5NY
Tel: 0297 34918

(Closed 1.00-2.00 and all day Monday)

BUCKINGHAMSHIRE

Photo-Acoustics Ltd.

Approved Trio, Yaesu and Icom dealer (part exchange always welcome)

58 High Street, Newport Pagnell, Buckinghamshire MK16 8AQ
Tel: 0908 610625

(Mon-Fri 9.30-5.30, Sat 9.30-4.30)

WEST MIDLANDS

Dewsbury Electronics

Approved Trio, Yaesu and Icom dealer

176 Lower High Street, Stourbridge, West Midlands
Tel: 0384 390063

(Open Mon-Sat 9.30-5.15)

MERSEYSIDE

A.R.E. Communications

For all your amateur radio needs - most models in stock.

38 Bridge St., Earlestown, Newton-Le-Willows, Merseyside
Tel: 09252 29881

(For commercial enquiries ring Bernie or Brenda on 01-997 4476)

DERBYSHIRE

Lowe Electronics

The official importer of the TRIO range of equipment (See main ad. for the full list of all our shops)

Chesterfield Road, Matlock, Derbyshire, DE4 5LE
Tel: 0629 2817/2430/4057

INDEX TO ADVERTISERS

| | |
|--------------------------|--------|
| A. H. Supplies | 71 |
| A.R.E. Communications | 13, 47 |
| Aerial Techniques | 63 |
| Allweld Engineering | 59 |
| Amateur Radio Promotions | 6 |
| Amcomm-ARE | 15 |
| B.N.O.S. Electronics | 29 |
| Bamber, B., Electronics | 70 |
| Birkett, J. | 63 |
| Bredhurst Electronics | 47 |
| C.P.L. Electronics | 10 |
| Cambridge Kits | 63 |

| | |
|-----------------------------|----|
| Cirkit | 8 |
| Colomor Electronics | 71 |
| Cricklewood Electronics | 47 |
| Datong Electronics | 29 |
| Dewsbury Electronics | 12 |
| Dressler (UK) | 7 |
| Elliott Electronics | 8 |
| ESR Electronic Components | 70 |
| Garex Electronics | 8 |
| Golledge, P.R. | 70 |
| G4TNY Amateur Radio | 47 |
| Henry's | 72 |
| Hewes, C. M. Communications | 23 |
| I.C.S. Intertext | 71 |
| Interbooks | 55 |

| | |
|------------------------------|----------|
| J.E.P. Electronics | 70 |
| Jaycee Electronics | 70 |
| Lowe Electronics | 2, 3, 20 |
| Maplin Electronic Supplies | Cover 4 |
| Maxi-Q | 70 |
| North London Communications | 55 |
| Photo Acoustics | 9 |
| R.A.S. (Nottingham) | 59 |
| Radio Components Specialists | 71 |
| Radio Shack Ltd. | 72 |
| Random Electronics | 8 |
| RST Valve | 10 |
| S.E.M. | 63 |

| | |
|---------------------------------|--------------------|
| Scientific Wire Company | 71 |
| Selectronic | 72 |
| South Midlands Communications | 4, 5, 10 |
| Spectrum Communications | 59 |
| Stephens James Ltd. | 55 |
| Technical Info Services | 71 |
| Technical Software | 59 |
| Telecomms | Cover 3 |
| Thanet Electronics | 36, 37, 38, 39, 59 |
| Universal Semiconductor Devices | 65 |
| Ward, Reg & Co. | Cover 2 |
| Waters & Stanton | 65 |
| Weirhead | 65 |
| Weka Publishing | 14 |
| Withers, R. Communications | 29 |

RADIO SHACK

FOR EVERYTHING IN

AMATEUR RADIO

SCANNERS

A variety in stock including PRO-30 Handheld at £239.95, ADR 2002 Bearcat 150, YAESU FRG-9600.



BC-200FB
16 CHANNEL
£199.95

RECEIVERS AND TRANSCEIVERS

YAESU • TRIO • ICOM • DRAKE •
COLLINS • INCLUDING THE FABULOUS
KWM380 AT £3,438.50

ANTENNAS

JAY BEAM • HY GAIN • HUSTLER
• ANTENNA SPECIALISTS • AVANTI • MET
• G4MH MINI BEAM • CABLES & CONNECTORS

NEW! 200 CHANNEL
HANDHELD SCANNER £239.95
(p&p £3.45) (Delivery expected end of June)

ACCESSORIES

DATONG • TELEX • MICROWAVE MODULES

COMPUTERS & PRINTERS

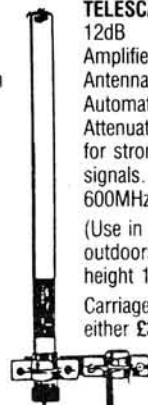
• TANDY •

TELESCAN

Scanner
Antenna.
Normal Version
30-600MHz
£19.95

TELESCAN 2

12dB
Amplified
Antenna.
Automatic
Attenuator
for strong
signals. 60-
600MHz **£49.95**
(Use in or
outdoors
height 1m)
Carriage on
either **£3.45**



RADIO SHACK LTD

(Just around the corner from West Hampstead Station on the Jubilee Line)

Giro Account No. 588 7151 Telephone: 01-624 7174 Telex: 23718

188 BROADHURST GARDENS,
LONDON NW6 3AY

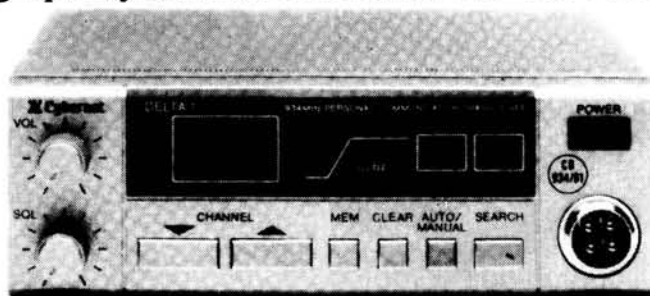


934 MHz PERSONAL RADIO

The Nevada Range

Join the growing number of people
discovering this exciting radio band.

934 MHz offers 2 way high quality communications from 10 - 250 miles
(according to location/weather
conditions).



THE CYBERNET DELTA 1 934 MHz TRANSCEIVER

Has been engineered specifically for the UK market using latest
"state of the art" technology.

- Sensitive RX (0.25 μ V for 12 db SINAD).
- 16 memories available.
- Auto/Manual scan and search facility.
- External 'S' meter socket.

£355

+£5 SPECIAL DELIVERY

7.

POWER SPLITTER

Enables the co-phasing of any two similar 934 MHz
antennas to give an additional 3 DB gain.

£24⁵⁰

HRA 934 L IN-LINE GaAs FET PRE-AMP

A super new ultra-low noise pre-amp which
fits in line on any base or mobile
installation. Guaranteed to give a
staggering increase in received range.
Extremely low noise 0.7 DB NF. 20 DB gain.

£125

HRA 900 MASTHEAD PRE-AMPLIFIER

Super low noise
GaAs FET
pre-amplifier that
mounts at the
masthead. Low
insertion loss and
noise (typically 0.8
dB) coupled with
15dB gain enable
this unit to double
the received range
of many sets.

£139⁹⁵

SWR/POWER METER

This precise and
extremely
accurate meter
features an
illuminated
scale, low loss 'I'
type connectors
and twin meters
for both power
and SWR
measurement.
Power 0-50 watts
in two ranges.



£89⁹⁵

REMOTE ANTENNA SWITCH

High quality
weatherproof
masthead
mounting switch.
For switching 2
antennas with one
cable feed.

£59⁹⁵

HAS-2

Remote DC
switch for mast head antenna switch

£6⁹⁵

WR 900 SWR/POWER METER

A low cost unit measuring power to 100 watts in
three ranges.

£49⁵⁰

ANTENNAS

Manufactured to the highest possible specification.

1. **PA7-E BASE COLNEAR**
Gain 7.14 dBi stacked $\frac{3}{8}$ array. **£66**
2. **P714-RE**
High gain gutter mount, mobile antenna. **£44**
3. **P7-ME**
High gain mobile magnetic mount antenna. **£44**
4. **P7-E**
High gain gutter mount mobile antenna. **£44**
5. **G900A**
Low profile, bolt thru mobile antenna. **£25**
6. **G900R**
Low profile bolt thru mobile antenna in black. **£25**
7. **Tc 12L MKII 12 ELEMENT BEAM**
A new aluminium version of our successful
12 element loop quad. Gain: 18dBi. **£49**

NEVADA 934

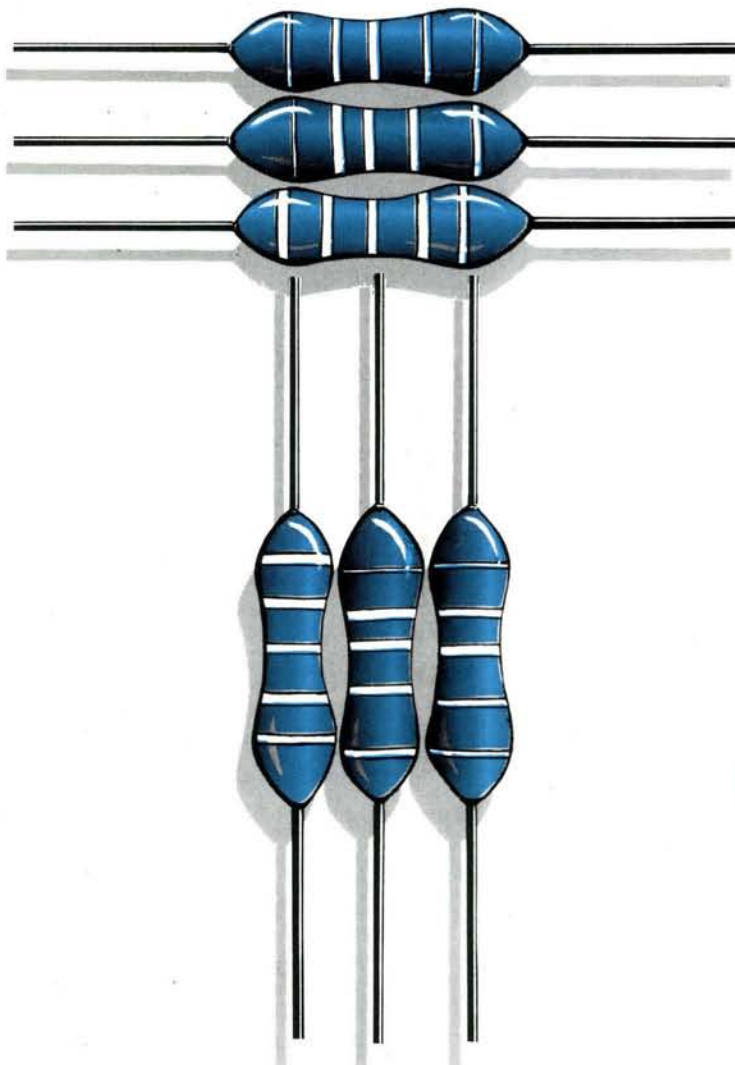
Professional Series

ASK YOUR DEALER FOR MORE INFORMATION
OR CONTACT US DIRECT.

Telecomms, 189 London Road, Portsmouth PO2 9AE. Tel: 0705 662145 Telex: 869107 TELCOM G

Nevada 934 MHz Catalogue with full details and specifications of the complete range is available from Telecomms £1.00.

**Lowest possible prices?
Top quality components?
Fast reliable service?
Large range?**

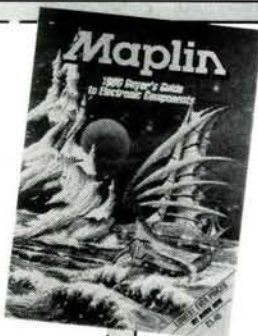


Maplin it's irresistible.

Pick up a copy of our new 1986 catalogue from any branch of W.H. Smith for just £1.45.
Or post this coupon now, to receive your copy by post for just £1.45 + 40p p & p. If you live outside the U.K. send £2.50 or 11 International Reply Coupons. I enclose £1.85.

Name

Address



MAPLIN ELECTRONIC SUPPLIES LTD.

Mail Order: P.O. Box 3, Rayleigh, Essex SS6 8LR.
Telephone: Southend (0702) 552911

SHOPS

- BIRMINGHAM Lynton Square, Perry Barr, Tel: 021-356 7292.
- LONDON 159-161 King Street, Hammersmith, W6.
Telephone: 01-748 0926.
- MANCHESTER 8 Oxford Road, Tel: 061-236 0281.
- SOUTHAMPTON 46-48 Bevois Valley Road, Tel: 0703 225831.
- SOUTHBEND 282-284 London Rd, Westcliff-on-Sea, Essex.
Telephone: 0702-554000

Shops closed all day Monday.