SEPTEMBER 1983 90p

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# Practical Wireless

THE RADIO MAGAZINE

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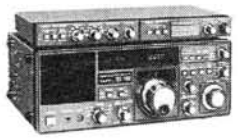
## YAESU FRG7700 Gen Cov Receiver



**£335** inc VAT & Carriage

### YAESU

| | | £ | c&p |
|---|---|---|---|
| FT1 | H.F. Transceiver – Gen. Cov. Receive | 1450.00 | (—) |
| FT102 | Amateur Band H.F. Transceiver | 839.00 | (—) |
| SP102 | Matching speaker | 49.00 | (2.00) |
| FC102 | Matching A.T.U. 1.2kW.PEP/AV | 225.00 | (2.00) |
| FC902 | All Band A.T.U. | 135.00 | (1.50) |
| SP901 | External Speaker | 31.00 | (1.50) |
| FT77 | HF mobile transciever 9 band | 515.00 | (—) |
| FP700 | Power supply/speaker | 110.00 | (—) |
| FC700 | A.T.U. | 99.00 | (1.00) |
| FT757GX | H.F. Amateur Bnd Tx Gen. Cov. Rx | POA | |
| FC757AT | Automatic A.T.U. | POA | |
| FP757GX | Power Supply | POA | |
| FT726R(2) | Multimode multiband base station C/W 2M | 699.00 | (—) |
| FT230R | Transceiver 2M 25W F.M. mobile | 255.00 | (—) |
| FT290R | Transceiver 2M 2.5W Multimode portable | 285.00 | (—) |
| FT790R | Transceiver 70cm 1W Multimode portable | 349.00 | (—) |
| NC11C | Trickle Charger (240V ac) | 9.20 | (0.75) |
| MMB11 | Mobile mount | 24.90 | (1.00) |
| CSC1A | Soft carrying case | 3.85 | (0.75) |
| FL2010 | Linear Amp. 2M 10W | 59.00 | (1.20) |
| FT480R | 2M Multimode mobile transceiver | POA | (—) |
| FT780R | 70cm Multimode mobile transceiver | POA | (—) |
| FT208R | Handheld 2M F.M. transceiver | 199.00 | (—) |
| FT708R | Handheld 70cm F.M. transceiver | 229.00 | (—) |
| NC9C | Trickle charger (240V ac) | 8.00 | (0.75) |
| NC8C | Base Fast charger | 50.00 | (1.50) |
| PA3 | Battery eliminator and charger (12V dc) | 14.20 | (1.00) |
| FRG7700 | H.F. Receiver 0.15–30MHz all mode | 335.00 | (—) |
| FRG7700M | FRG7700 c/w 12 channel memory | 399.00 | (—) |
| MEMG7700 | Memory Unit | 98.00 | (1.00) |
| FRT7700 | Antenna tuner/switch | 42.50 | (1.00) |
| FRA7700 | Active Antenna | 38.70 | (1.00) |
| YM34 | Stand mic 500/50K 8 pin | 23.40 | (1.50) |
| YM38 | Stand mic 500/50K 8 pin + SCAN | 27.20 | (1.50) |
| YD148A | Stand mic 600/50K 4 pin | 22.60 | (1.50) |
| MD1B8 | Stand mic 600/50K 8 pin + SCAN | 49.80 | (1.50) |
| FF501DX | Low pass filter | 25.70 | (1.00) |
| FSP-1 | Mobile speaker 8 ohm 6W | 9.95 | (0.75) |
| YH-55 | Headphones 8 ohm | 9.95 | (0.75) |
| YH-77 | Lightweight headphones | 9.95 | (0.75) |
| QTR24D | World time clock (quartz) | 31.40 | (1.00) |

### ICOM

| | | | |
|---|---|---|---|
| IC-751 | New H.F. Transceiver | POA | (—) |
| IC 740 | H.F. 9 Band Transceiver | 769.00 | (—) |
| IC 720A | H.F. Tx + Gen. Cov. Rx | 949.00 | (—) |
| IC PS20 | P.S.U. for above with Speaker | 155.00 | (—) |
| IC PS15 | P.S.U. | 119.00 | (—) |
| IC 2KL | H.F. Linear 500 Watts O/P | 915.00 | (—) |
| IC 2KLPS | P.S.U. for above | 256.00 | (—) |
| IC AT500 | 1.8-30MHz Auto A.T.U. | 349.00 | (—) |
| IC AT100 | 3.5-30MHz Auto A.T.U. | 249.00 | (—) |
| IC 271E NEW | 2M Multimode Base Station | POA | (—) |
| IC 290E | 2M Multimode Mobile | 379.00 | (—) |
| IC 25E | 2M FM Mobile 25W | 269.00 | (—) |
| IC 2E | 2M Handheld | 179.00 | (—) |
| IC 4E | 70cm Handheld | 199.00 | (—) |
| IC BC30 | Base Charger | 45.00 | (1.50) |
| IC HM9 | Speaker + Microphone | 12.00 | (1.00) |
| IC ML1 | 10 Watt 2M Booster IC2E | 59.00 | (1.00) |
| IC SM5 | Desk Mic (8 pin for Icom only) | 29.00 | (1.00) |
| IC R70 | General Cov. Receiver | 499.00 | (—) |

### F D K

| | | | |
|---|---|---|---|
| Multi 700AX | 2M FM Mobile 25W | 215.00 | (—) |
| Multi 750X | 2M Multimode | 315.00 | (—) |

### WELZ

| | | £ | c&p |
|---|---|---|---|
| SP15M | SWR PWR Meter HF/ 200W | 35.00 | (1.00) |
| SP45M | SWR PWR Meter 2M/70cm 100W | 51.00 | (1.00) |
| SP200 | SWR PWR Meter H.F./2M 1KW | 69.95 | (1.50) |
| SP300 | SWR PWR Meter H.F./2M/70cm | 97.00 | (1.50) |
| SP400 | SWR PWR Meter 2M/70cm 150W | 69.95 | (1.50 |
| SP600 | SWR PWR Meter H.F./2M/20KW | 97.00 | (2.00) |
| SP10X | SWR PWR Meter H.F./2M | 24.45 | (0.75) |
| SP350 | SWR PWR Meter H.F./2M/70 200W | 59.95 | (1.50) |
| SP380 | SWR PWR Meter H.F./2M/70cm | 49.00 | (1.00) |
| AC38 | A.T.U. 3.5 to 30MHz 400W PEP | 65.00 | (1.00) |
| CT15A | 15/50W Dummy Load (PL259) | 7.95 | (0.75) |
| CT15N | 15/50W Dummy Load (N type plug) | 13.95 | (0.75) |
| CT300 | 300/1kW Dummy Load 250MHz (SO239) | 49.50 | (2.00) |

### COAXIAL SWITCHES

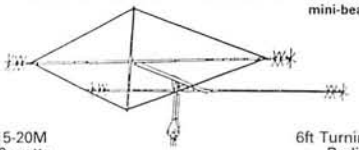
| | | | |
|---|---|---|---|
| – | 2 Way Toggle Switch (H.F./2M) | 6.00 | (0.50) |
| SA450 | 2 Way Diecast - SO239 (500MHz) | 10.00 | (0.75) |
| SA450n | 2 Way Diecast - N plugs (500MHz) | 12.95 | (0.75) |
| CH20A | 2 Way WELZ - SO239 (900MHz) | 17.95 | (1.00) |
| CH20N | 2 Way WELZ - N plugs (900MHz) | 31.95 | (1.00) |
| — | 5 Way Western Rotary (H.F.) | 15.40 | (1.00) |
| — | 3 Way LAR Rotary (H.F.) | 19.95 | (1.25) |

### TRIO

| | | | |
|---|---|---|---|
| TS930S | 9 Band TX General Cov Rx | 1216.00 | (—) |
| TS830S | 160-10m Transceiver 9 Bands | 697.00 | (—) |
| VFO230 | Digital V.F.O. with Memories | 243.00 | (2.00) |
| AT230 | All Band ATU/Power Meter | 135.00 | (2.00) |
| SP230 | External Speaker Unit | 41.00 | (1.50) |
| TS430S | 160-10m Transceiver | 736.00 | (—) |
| PS430 | Matching Power Supply | 112.00 | (3.00) |
| SP430 | Matching Speaker | 29.44 | (1.50) |
| MB430 | Mobile Mounting Bracket | 11.27 | (1.50) |
| FM430 | FM Board for TS430 | 34.50 | (1.00) |
| TS130S | 8 Band 200W Pep Transceiver | 559.00 | (—) |
| TS130V | 8 Band 20W Pep Transceiver | 456.00 | (—) |
| VFO120 | External V.F.O. | 98.00 | (1.50) |
| TL120 | 200W Pep Linear for TS120V | 167.00 | (1.50) |
| MB100 | Mobile Mounts for TS130/120 | 18.60 | (1.50) |
| SP120 | Base Station External Speaker | 26.40 | (1.50) |
| AT130 | 100W Antenna Tuner | 93.00 | (1.50) |
| PS20 | AC Power Supply – TS130V | 57.96 | (2.50) |
| MC50 | Dual Impedance Desk Microphone | 30.80 | (1.50) |
| MC35S | Fist Microphone 50K ohm IMP | 14.70 | (0.75) |
| MC30S | Fist Microphone 500 ohm IMP | 14.70 | (0.75) |
| LF30A | HF Low Pass Filter 1kW | 21.00 | (1.00) |
| TR9130 | 2M Multimode | 433.00 | (—) |
| TS9500 | 70cm Multimode | 450.00 | (—) |
| BO9A | Bass Plinth for TR9130 | 39.30 | (0.50) |
| TR7730 | 2M FM Compact Mobile 25W | 199.00 | (—) |
| TR2300 | FM Portable | 152.00 | (—) |
| VB2300 | 10W Amplifier for TR2300 | 65.70 | (1.50) |
| MB2 | Mobile Mount for TR2300 | 21.00 | (1.50) |
| TR3500 | 70cm Handheld | 250.00 | (—) |
| TR2500 | 2M FM Synthesised Handheld | 232.00 | (—) |
| ST2 | Base Stand | 51.90 | (1.50) |
| SC4 | Soft Case | 13.80 | (0.50) |
| SMC25 | Speaker Mike | 16.10 | (1.00) |
| PB25 | Spare Battery Pack | 25.00 | (1.00) |
| MS1 | Mobile Stand | 31.90 | (1.00) |
| R600 | Gen. Cov. Receiver | 257.00 | (—) |
| R2000 | Synthesiser 200KHz-30MHz Receiver | 398.00 | (—) |
| HC10 | Digital Station World Time Clock | 67.70 | (1.50) |
| HS5 | Deluxe Headphones | 23.00 | (1.00) |
| HS4 | Economy Headphones | 11.27 | (1.00) |
| SP40 | Mobile External Speaker | 14.26 | (1.00) |

## MINI- PRODUCTS HQ-1

mini-beam



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### MOBILE SAFETY MICROPHONES

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| ADONIS AM 202H Head Band+Up/Down Buttons | | 34.50 | (—) |
| ADONIS AM 202F Swan Neck+Up/Down Buttons | | 37.00 | (—) |

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### DATONG PRODUCTS

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| PC1 | Gen. Coverage Converter HF to 2M | 137.42 | (—) |
| VLF | Very Low Frequency Converter | 29.90 | (—) |
| FL1 | Frequency Agile Audio Filter | 79.35 | (—) |
| FL2 | Multi-mode Audio Filter | 89.70 | (—) |
| FL3 | FL2 + Auto Notch | 129.37 | (—) |
| ASP | Auto RF Speech Clipper (4pin plugs) | 82.80 | (—) |
| D75 | Manually controlled RF Speech Clipper | 56.35 | (—) |
| RFC/M | RF Speech Clipper Module | 29.90 | (—) |
| D70 | Morse Tutor | 56.35 | (—) |
| AD370 | Outdoor Active Antenna | 64.40 | (—) |
| AD270 | Indoor Active Antenna | 47.15 | (—) |
| MK | Keyboard Morse Sender | 137.42 | (—) |
| Codecall | Selective Calling Device | 33.92 | (—) |
| RFA | Wideband Preamplifier | 33.92 | (—) |
| DC144/28 | 2M to 28MHz converter | 39.67 | (—) |
| MPU | Mains Power Unit | 6.90 | (—) |
| ANF | Auto notch filler (Audio) | 67.85 | (—) |

### MICROWAVE MODULES

| | | | |
|---|---|---|---|
| MMT144/28 | 2M Transverter for HF Rig | 109.95 | (—) |
| MMT432/28S | 70cm Transverter for HF Rig | 159.95 | (—) |
| MMT432/144R | 70cm Transverter for 2M Rig | 184.00 | (—) |
| MMT70/28 | 4M Transverter for HF Rig | 119.95 | (—) |
| MMT70/144 | 4M Transverter for 2M Rig | 119.95 | (—) |
| MMT1296/144 | 23cm Transverter for 2M Rig | 184.00 | (—) |
| MML144/30 | 2M 30W Linear Amp | 69.95 | (—) |
| MML144/100S | 2M 100W Linear Amp (10W I/P) | 139.00 | (—) |
| MML144/100LS | 2M 100W Linear Amp (3W I/P) | 159.00 | (—) |
| MML432/30 | 70cm 30W Linear Amp (3W I/P) | 99.00 | (—) |
| MML432/50 | 70cm/50W Linear Amp | 109.95 | (—) |
| MML432/100 | 70cm 10/100W Linear Amp | 228.64 | (—) |
| MM2001 | RTTY to TV Converter | 189.00 | (—) |
| MM4000 | RTTY Transceiver | 269.00 | (—) |
| MMC50/28 | 6M Converter to HF Rig | 29.90 | (—) |
| MMC70/28 | 4M Converter to HF Rig | 29.90 | (—) |
| MMC144/28 | 2M Converter to HF Rig | 29.90 | (—) |
| MMC432/28S | 70cm Converter to HF Rig | 37.90 | (—) |
| MMC432/144S | 70cm Converter to 2M Rig | 37.90 | (—) |
| MMC435/600 | 70cm ATV Converter | 27.90 | (—) |
| MMK1296/144 | 23cm Converter to 2M Rig | 69.95 | (—) |
| MMD050/500 | 500MHz Dig. Frequency Meter | 75.00 | (—) |
| MMD600P | 600MHz Prescaler | 29.90 | (—) |
| MMDP1 | Frequency Counter Probe | 14.90 | (—) |
| MMA28 | 10M Preamp | 16.95 | (—) |
| MMA144V | 2M RF Switched Preamp | 34.90 | (—) |
| MMF144 | 2M Band Pass Filter | 11.90 | (—) |
| MMF432 | 70cm Band Pass Filter | 11.90 | (—) |
| MMS1 | The Morse Talker | 115.00 | (—) |

### TELEREADERS (CW & RTTY)

| | |
|---|---|
| TASCO CWR 610 | 189.00 (—) |
| TONO 550 | 299.00 (—) |
| TONO 9000 | 669.00 (—) |

### DRAE PRODUCTS

| | | | | | |
|---|---|---|---|---|---|
| 4 AMP | 30.75 | (1.50) | 12 AMP | 74.00 | (2.00) |
| 6 AMP | 49.00 | (2.00) | 24 AMP | 105.00 | (3.00) |
| VHF Wavemeter 130-450MHz | | | | 27.50 | (—) |

### ROTATORS

| | | | |
|---|---|---|---|
| Hirschman | RO250 VHF Rotor | 45.00 | (2.00) |
| 9502B | Colorotor (Med. VHF) | 56.95 | (2.00) |
| EMR400 | Alinco | 89.95 | (2.50) |
| KR400RC | Kenpro – inc lower clamps | 125.00 | (2.50) |
| KR600RC | Kenpro – inc lower clamps | 175.00 | (3.00) |

### DESK MICROPHONES

| | | |
|---|---|---|
| SHURE 444D Dual Impedance | 45.95 | (1.50) |
| SHURE 526T Mk II Power Microphone | 56.00 | (1.50) |
| ADONIS AM 303 Preamp Mic. Wide Imp. | 29.00 | (—) |
| ADONIS AM 503 Compression Mic 1 | 39.00 | (—) |

### TEST EQUIPMENT

| | | |
|---|---|---|
| Drae VHF Wavemeter 130-450MHz | 27.50 | (—) |
| DM81 Trio Dip Meter | 71.00 | (0.75) |
| MMD50/500 Dig. Frequency meter (500MHz) | 75.00 | (—) |

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# Practical Wireless

SEPTEMBER 1983 VOL. 59 NO. 9 ISSUE 918

## Contents



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Lowe Electronics in Matlock, located on the Chesterfield road out of Matlock, that is the A632 and open Tuesday to Friday from 9am to 5.30pm (closed for lunch 12.30 to 1.30) and Saturday, open all day from 9am to 5pm. A visit to Matlock can be an outing for the family, the local scenery, the Heights of Abraham, Lovers Walk etc. Ample free parking in our car park and when you have browsed then lunch in one of the towns pleasant restaurants. Amateur Radio with the family in mind.

## in glasgow,

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## in darlington,

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Lowe Electronics in the North East of England, set in the delightful market town of Darlington, the shop displays the full range of amateur products sold by the company. Our address in the town is 56 North Road, that is the A167 Durham road out of Darlington. Open Tuesday to Friday from 9am till 5.30pm, Saturday from 9am till 5pm (closed for lunch 12.30 to 1.30). A huge free car park across the road, a large supermarket, bistro restaurant and banking facilities combine to make a visit to this delightful market town a pleasure for the whole family.

## in london,

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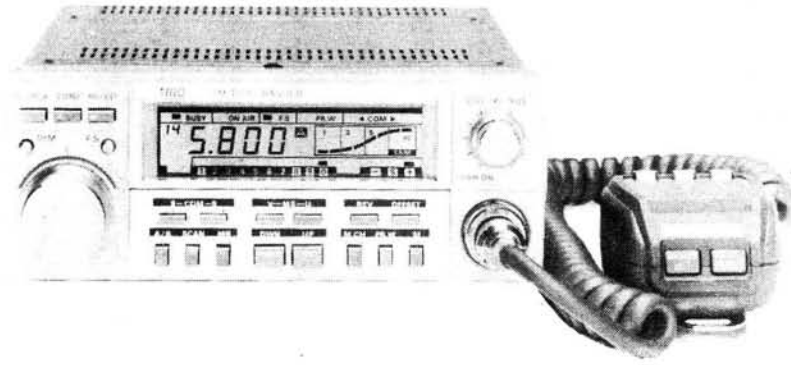
Lowe Electronics in London, our shop in the Capital City, easily found on the lower sales floor of the Hepworths' shop on Pentonville Road, within 3 minutes walk of Kings Cross railway station. Open all day Monday to Saturday, six days a week, from 9.30am to 5.30pm during the week and from 9.30am to 5pm on Saturday, a warm and courteous welcome, together with sound advice awaits those who enter. The entire range of amateur products is on display, backed by a considerable amount of stock. When in the City, visit Lowe Electronics.

The TW4000A is the latest step forward in Trio's programme of providing today's radio amateur with the very best in equipment. Following the success story of the Trio TS780 dual band base station transceiver, the TW4000A gives the mobile operator a superb FM transceiver for both 70 centimetres and the 2 metre band. Not only for mobile operation is the TW4000A perfect but also for shack use where the rig with its scanning and dual band facilities enable the enthusiastic amateur to keep in touch with the local scene.

- The TW4000A covers in one compact transceiver both the 2 metre band (144.000 to 146.000 MHz) and also the full 10 MHz of the 70 centimetre band (430.000 to 440.000 MHz). Measuring 60mm high, 161mm wide, 217mm deep and weighing only slightly more than 2.0 kg, the TW4000A is smaller than most current 2 metre transceivers.
- Added to the exceptional receive performance, now a Trio standard by which others are judged, is the TW4000A's 25 watt capability on both 2 metres and 70 centimetres. Using the TW4000A not only can hear weak signals on either band but they can hear you too. A HI/LO switch reduces the output power to 5 watts when required.
- A green backlit liquid crystal display gives frequency, memory channel, repeater offset, VFO A or B, scan function, channel occupied and "ON AIR" information. Brightly illuminated, the display can easily be ready under unfavourable conditions. All important controls are illuminated for easy operation during darkness.
- Ten memory channels are provided which store frequency, band and repeater offset (on 2 metres minus 600 KHz shift, on 70 centimetres plus 1.6 MHz shift). Memory 1 is used for priority watch, memories 8 and 9 for instant recall and memory 0 for split channel use (cross band operation). An internally fitted lithium battery gives memory backup.
- Frequency scan is extremely versatile in that the rig can be programmed to scan either all memory channels or those holding either 2 metre or 70 centimetre frequencies. The rig can also be programmed to skip those channels which the operator does not wish to monitor. The scan direction can also be changed by using the UP/DOWN switch on the microphone. In order that an important contact is not missed, when in priority watch mode, the rig switches back from the frequency in use to memory channel 1 for one second out of ten. The two most used frequencies can be placed in memories 8 and 9 respectively, common channel scan checking each alternatively for approximately 5 seconds.
- Two VFO's are provided tuning in either 5 or 25 KHz steps, the UP/DOWN shift switch on the microphone providing control.
- Full repeater facilities are included giving the correct frequency shift, 1750 Hz access tone, and of course the essential repeater shift.

**OPTIONAL ACCESSORIES**

**PS430 matching power supply.**
**VS1 voice synthesizer unit.**
**SP40 compact mobile speaker.**
**MA4000 dual band antenna with duplexer.**
**SW100B mobile SWR and power meter.**
**SW200B base station SWR and power meter.**
**PG3 noise filter for mobile use.**



# 70centimetres & 2metres, 2 bands, 1 rig, **TW4000A**

Now, an opportunity for you to buy at a greatly reduced price the **LOWE TX40** c.b. transceiver. Now priced at £29.50 carriage £3.00, the **LOWE TX40** is a reliable, well built and popular rig. A de-luxe version of the transceiver fitted wth an additional filter is available for an additional £8.50. Take this opportunity to buy at this fantastic price a **LOWE TX40** c.b. transceiver.

# LOWE ELECTRONICS

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# the **POCKE TRA**, a new dimension, the belcom **LS 20 XE**. £128.00 inc VAT carriage £2.50

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- The rig you will forget you are carrying . . .
With overall dimensions of 140mm high, 69mm wide, 26mm deep and weighing only 260 grams (including aerial and batteries), the LS-20XE fits easily into your pocket giving perfect portable communication.
- Long range communication . . .
A newly developed dual gate MOS FET is used in the RF stage of the transceiver which considerably improves receiver performance. The internal 50mm diameter speaker ensures clear audio under difficult portable conditions.
- Full coverage of 2 metre amateur band . . .
The transceiver covers 144 to 146 MHz in 5 kHz steps and has repeater shift and automatic tone burst.
- Switchable output power for extended operation . . .
In order to extend portable operation, transmission power level is switchable, 1 W, 500 mW and 100 mW, so depending on the terrain and conditions, the most economical level can be selected.
- Simple to operate . . .
Simplicity of operation is a special feature of this rig and many optional accessories are available. Of major interest is the matching headset SH-2 having built-in vox, this convenient accessory provides simple and safe operation whilst cycling, walking etc.

**OPTIONAL ACCESSORIES**

**SH2** .....**Headset (VOX built-in).**
**CA610** ....**AC charger.**
**CS612** .....**Mobile charger.**
**SH1** .....**Speaker mike.**
**SFT20** .....**Soft case.**
**AAA** .....**Ni-Cd battery (4 batteries required).**
**CP615** .....**Battery carrying pack.**

# the JRC **JST100** transceiver

The Japan Radio Company has, in the manufacture of the JST100, produced an amateur band transceiver, the quality of which most amateurs have only been able to dream about. Whilst other manufacturers have concentrated on producing transceivers which along with the amateur bands include a general coverage receiver, JRC has devoted time and effort to produce the finest performance possible on purely the amateur bands. Their considerable efforts have been justified, the JST100 is the finest amateur band transceiver that we have seen for many years. To produce perfection is not easy, neither is it cheap, there are amateur band transceivers which cost less than the JST100, but, and it is a large but, we are certain that none of them in any way approaches the quality found in the JST100. However there is one thing that is certain. As with other rigs in the Japan Radio Company's range, and I am referring to the NRD505 and the NRD515 general coverage receivers, they become the property of the discerning few. Indeed it is true that one can savour the enjoyment of owning a JST100 transceiver without ever switching it on.

Taking a trip across the front panel one finds a comprehensive display of operating information; a digital frequency readout down to 10 Hz which in shift mode indicates the frequency difference between VFO's F1 and F2. Above the readout are a string of LED's showing that the transceiver is reading the frequency shift, transmitting, that the mike gain is set to high (at the optimum setting the LED "twinkles"), that the attenuator is on, a memory channel is either in use or has been accessed and which of the four modes is being used. A fully backlit meter enables Vc, Ic, transmitter output power, compression level and reflected power to be closely and accurately monitored, whilst on receive it functions as an [illegible]er. Front panel controls adjust the intensity of the readout, set the mike gain and compression levels, adjust the thre[illegible] of the noise blanker and provide VOX control. Transmitted power is adjustable, a front panel knob reducing outp[illegible]tts PEP to approximately 10 watts. All the usual modes of communication are available on the transceiver, [illegible]nd CW wide, narrow (600 Hz) and narrower (300 Hz). The transceiver has 11 memory channels, each c[illegible] the frequency and band but also the operating mode. Two digital VFO's are incorporated in the tr[illegible]s the band in 10 Hz steps. Use of the two VFO's together permits split frequency or cross-mo[illegible] Taking into account the high levels of activity to be found on the HF bands today, JRC hav[illegible] pass band tuning so that the desired signal may be "lifted" from the QRM. It is in the r[illegible] that the Japan Radio Company's careful attention to circuit design, components and co[illegible] however, is the most difficult aspect of the transceiver to describe. One way to [illegible] transceiver is to visit a Lowe Electronics shop, either here in Matlock, London, [illegible] amateur band rig for the discerning, a JST100.

| | |
|---|---|
| **JST100AMATEUR BAND TRANSCEIVER** | **£998.00** |
| **NDB500G POWER SUPPLY** | **£149.50** |
| **NFG97 ANTENNA TUNING UNIT** | **£150.00** |
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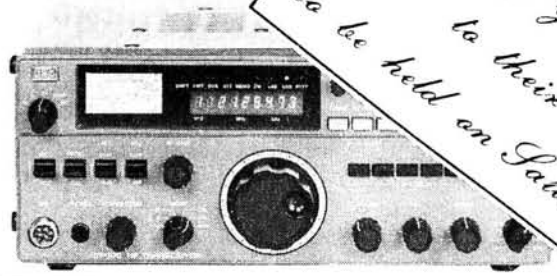

*The Directors and Staff of Lowe Electronics have pleasure in inviting you, your wife and family to their 1983 open day to be held on Saturday 20th August.*

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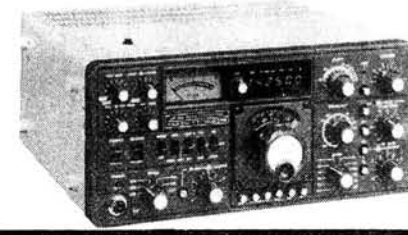

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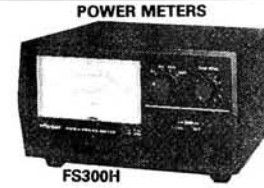


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| FS300H | 1.8-80MHz 20/200/1000 | **£46.40**FOC |
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| FS301MH | 2-30MHz 200/2000W | **£36.65**FOC |
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| FS5S | 1.8-150MHz 20/200/1000W HF | **£37.95**FOC |
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### The IC-751 HF Transceiver

Think about the IC-740,
One of the most popular amateur bands transceivers, make a few improvements such as adding 36 memory channels, doing away with mechanical bandswitching and then add full HF receive capabillity (0.1-30 MHz) which is even an improvement on the famous R70 and you get a pretty good idea of what the IC-751 is like. It is fully compatible with Icom Auto units such as the AT-500 and IC-2KL and a further option for computer control can be added. There is also a digital speech synthesizer option which will be ideal for blind operators For power supplies you have the option of the IC-PS740 (which fits inside) or the PS-15/PS20 range for external use.

As you would expect there is a built in speech processor, a switchable choice of a J-FET pre-amp, straight through or a 20dB pin diode attenuator and two VFOs allowing split frequency operation.

Other standard features include:- 36 memory channels with scan facility and start stop timers, a marker, 4 variable tuning rates, Pass Band Tuning, notch, variable noise blanker, monitor switch, DFM (direct feed mixer) in the front end, full break-in on CW and AMTOR compatibility. The first IF is 70.045 MHz. Any XIT and RIT adjustment is shown on the display. The transmitter features high reliability 2SC2904 transistors in a low IMD (-32dB@ 100W) full 100% duty cycle. Power is restricted to 40W on AM and adjustable from 10W on all modes. FM and the IC-FL44A crystal SSB filter are both fitted as standard. As you can see from this brief description the IC-751 is certainly a transceiver worth considering – Why not call us for details?

## NEW! IC-271, VHF Multimode Base station

Icom have made improvements to the popular IC-251 and brought it up to date.

Power can be adjusted up to 25W on all modes SSB, CW and FM. Squelch works on all modes and a listen-input facility has been added for Repeater work. There is a switchable front end pre-amp. RIT shift is shown on the display. Why not call us for further details? Options include:
Speech synthesizer announcing displayed frequency.
22 Channel memory extension - with scan facilities.
10 Hz tuning facility. SM5 desk mic Internal chopper PSU (IC-740S)

## IC-R70, HF Receiver

The R-70 covers all modes (when the FM option is included), and uses 2 CPU-driven VFO's for split frequency working, and has 3 IF frequencies: 70MHz, 9MHz and 455KHz, and a dynamic range of 100dB. It has a built-in mains supply.

Other R-70 features include: input switchability through a pre-amplifier, direct or via an attenuator, selectable tuning steps of 1KHz, 100Hz or 10Hz, adjustable IF bandwidth in 3 steps (455KHz). Noise limiter, switchable AGC, tunable notch filter, squelch on all modes, RIT, tone control. Tuning LED for FM (discriminator centre indicator) Recorder output, dimmer control.

The R-70 also has separate antenna sockets for LW-MW with automatic switching, and a large, front mounted loudspeaker with 5.8W output. The frequency stability for the 1st hour is ± 50Hz, sensitivity- SSB/CW/RTTY better than 0.32 $\mu$v for 12dB (S+N)÷N, Am-0.5$\mu$v, FM better than 0.32 for 12dB Sinad. DC is optional

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# NEW! IC-120, 1296 MHz FM

**Thinking of 1296? Then Icom IC-120 could be the answer.**

Now you can have the sophistication of today's technology on this up and coming band-all built into a unit the same size as the IC-25E, very compact...

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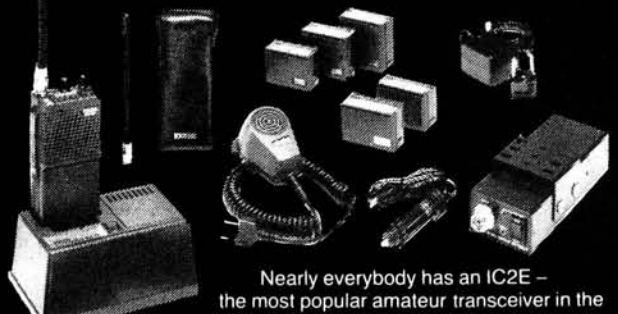
|---|---|
| Features include: | Output Power = 1 W or more |
| Frequency coverage 1260 - 1300 | Mode:- FM |
| Adjustable Repeater Shift | 2 VFO's |
| 6 Memories - with scanning facility | Deviation + 5 KHz |
| Spurious Emissions - 40dB or better | RIT |

8 W and 16W (Puma) Linear Amps available shortly.

# IC-290H, VHF Multimode Mobile

The recently introduced IC-290H has proved so popular that we have decided to concentrate on this (25W) model 2m multimode. With its bright green display, 5 memories, scan facilities on either memories or the whole band, tone-call button on the microphone and instant listen input for repeaters, this little box really is a beauty. The 70cm version, the IC-490E has similar features (although the output is only 10W in this case).

# IC-2E, VHF/FM IC-4E UHF Portables



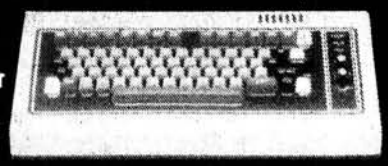
Nearly everybody has an IC2E – the most popular amateur transceiver in the world – there is also the 70 cm version which is every bit as good and takes the same accessories.

# RTTY, Morse & ASCII

Shortwave listeners and amateurs are able to take more interest in other modes of transmission than speech with the latest range of decoders and senders available. As well as amateur transmissions, there is an abundance of news and other interesting broadcasts which can be read using these space-age devices.

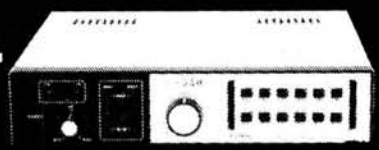
Some models in our range are the Tono 550, 9000E and the Telereader CWR-670, CWR-685E and CWR-610E. There is now available a professional version of the Tono 9000E, the PRO-1, which has a built-in scrambler. The Telereader CWR-670 is also available with a built-in VDU which can include a 40 column printer.

**TONO 9000E Sender/Decoder**




**CWR-610E, Decoder**

**TONO 550, Decoder**



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# Do you know what time it is!

When the globe of this digital clock is revolved, a red lamp indicating a major city in the world will blink, and the current time of that city will be displayed in place of the date. At a glance know the current times of 24 different time zones throughout the world.

This mini-globe clock stands 195mm. high and also has an alarm fitted. This useful device should stop you getting your Amateur friends, on the other side of the world, out of bed in the middle of the night.

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## YAESU-Latest...

Latest news from YAESU - Expected in August is the new **FT-757GX** all-mode HF transceiver - 160 thru ten of course plus general coverage RX. FM and all options fitted including dual VFO's, eight memories, programmable memory scan, full break-in on CW, 100 watts PEP/DC output at 100% duty cycle and all this in a package measuring 238W x 93H x 238Dmm!

## KEEP AHEAD WITH THE YAESU FT-102!

● Better Dynamic Range ● Total IF Flexibility ● New Noise Blanker ● Commercial Quality Transmitter ● Transmitter Audio Tailoring ● New VFO Design ● IF Transmit Monitor ● New TX Purity Standard


### ANCILLARY EQUIPMENT

SP-102 EXTERNAL SPEAKER/AUDIO FILTER
FC-102 1.2 KW ANTENNA COUPLER
FV-102DM SYNTHESIZED, SCANNING EXTERNAL VFO

### FRG-7700 HIGH PERFORMANCE COMMUNICATIONS RECEIVER

YAESU's top of the range receiver. All-mode capability, USB, LSB, CW, AM *and* FM 12 memory channels with back-up. Digital quartz clock feature with timer. Pictured here with matching FRT-7700 Antenna tuner and FRV-7700 VHF converter.

### FT-290R/790R 2m & 70cm PORTABLES

10 memories, 2 VFO's, LCD display, C size battery, easy car mounting tray, FT-290R 0.5 low/2.5 high watts out FT-790R 0.2 low/1.0 high watts out (incorporates speech compressor).

### FT-230R/730R 2m & 70cm FM MOBILES

● Two independent VFO's ● 10 memories ● Priority function ● Memory and band scan ● 12.5/25KHz steps (25/100KHz FT-730R) ● Large LCD readout.

### FT-708R/208R SYNTHESIZED UHF/VHF TRANSCEIVERS

NC-7 - Standard charger
NC-8 - Standard/quick charger/DC Power supply
NC-9C - Compact charger (220-234V)
PA-3 - Car adapter
YM-24A - Speaker/microphone
FL-2010 - 10 watt power amplifier for FT-208R
FL-7010 - 10 watt power amplifier for FT-708R

### FT-480R/780R 2m & 70cm MOBILES

The most advanced 2 metre and 70 cm mobiles available today — USB, LSB, FM, CW full scanning with priority channel, 4 memory channel, dual synthesized VFO system.

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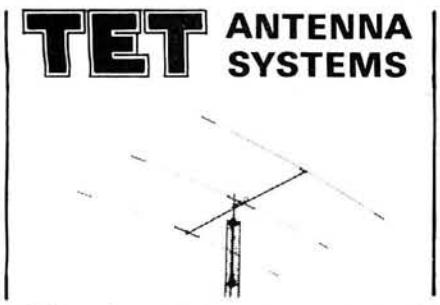
## TET ANTENNA SYSTEMS



| | | | |
|---|---|---|---|
| AX210N | 10 ele. yagi for 2m crossed | 74.95 | (n/c) |
| HB10F2T | 2 ele. 10m mono band beam | 51.50 | (n/c) |
| HB10F3T | 3 ele. 10m mono band beam | 74.95 | (n/c) |
| HB15F2T | 2 ele. 15m mono band beam | 60.66 | (n/c) |
| HB15F3T | 3 ele. 15m mono band beam | 93.46 | (n/c) |
| HB15M25P | VP mini size 15m 2 ele. | 69.50 | (n/c) |
| HB15M35P | VP mini size 15m 3 ele. | 102.30 | (n/c) |
| HB34D | 4 ele. tri band beam 10/15/20m | 222.90 | (n/c) |
| HB33SP | 3 ele. tri band beam 10/15/20m | 192.50 | (n/c) |
| HB35C | Tri band array 10/15/20m | 283.95 | (n/c) |
| HB35T | 5 ele. 10/15/20m | 278.50 | (n/c) |
| MV3BH | Vertical for 10/15/20m | 37.99 | (n/c) |
| MV4BH | Vertical for 10/15/20/40m | 48.90 | (n/c) |
| MV5BH | Vertical for 10/15/20/40/80m | 63.95 | (n/c) |
| MLA4 | Loop antenna 10/15/40/80 | 105.60 | (n/c) |
| SQ22 | Phased 2 ele. swiss quad 2m | 58.95 | (n/c) |
| SQY06 | 6 ele. quagi 2m | 45.75 | (n/c) |
| SQY08 | 8 ele. quagi 2m | 52.75 | (n/c) |
| HB210S | 10 ele. dual driven yagi 2m | 47.99 | (n/c) |
| TE214 | 14 ele. long yagi 2m | 74.40 | (n/c) |
| SSL720 | 9 x 2 ele. (18) slot fed 70cm | 77.20 | (n/c) |
| HB23SP | 2 ele. tri band beam 10/15/20m | 135.60 | (n/c) |
| SSL218 | 9 x 2 ele. (18) slot fed 2m | 144.79 | (n/c) |
| TPH2 | Phasing harness 2m | 17.25 | (n/c) |
| QYU10 | 10 ele. quagi 70cm | 67.90 | (n/c) |
| SQ007 | 70cm 2 ele. phased swiss quad | 66.99 | (n/c) |
| SQ10 | Swiss quad 10m | 97.50 | (n/c) |
| SQ15 | Swiss quad 15m | 106.90 | (n/c) |
| **YAESU ANTENNAS** | | | |
| **Base** | | | |
| RSL145GP | ½ wave base ant. 2m | 21.20 | (1.50) |
| RSL435GP | ½ wave co-linear 70cm | 31.60 | (1.50) |
| **HF Mobile** | | | |
| RSL3.5 | 3.5MHz resonator & whip | 12.21 | (0.50) |
| RSL7.0 | 7.0MHz resonator & whip | 11.80 | (0.50) |
| RSL14.0 | 14.0MHz resonator & whip | 11.45 | (0.50) |
| RSL21.0 | 21.0MHz resonator & whip | 11.20 | (0.50) |
| RSL28.0 | 28.0MHz resonator & whip | 11.00 | (0.50) |
| RSL2A | Mast to suit above | 5.00 | (0.50) |
| RSM2 | Gutter mount/Feeder/PL259 suit above | 10.94 | (0.75) |
| **VHF Mobile** | | | |
| RSL145 | 2m ¼ wave fibreglass whip | 12.10 | (0.50) |
| RSL145S | 2m ¼ wave steel whip foldover | 9.25 | (0.50) |
| RSL150SS | 2m ¼ wave PL259 shock spring | 3.90 | (0.50) |
| RSM2 | Gutter mount/Feeder/PL259 (RSL145) | 10.94 | (0.75) |
| RSM4M | Heavy duty mag/Feeder/PL259 | 13.25 | (1.00) |
| **UHF Mobile** | | | |
| RSL453S | ½ wave antenna | 15.50 | (0.50) |
| **ANTIFERENCE ANTENNAS** | | | |
| **VHF Mobile** | | | |
| TAP3009 | ½ wave 3db snap-in hinged whip | 13.00 | (3.00) |
| TAP3677 | ½ wave 3db snap-in shock coil | 14.56 | (3.00) |
| TAP3002 | ¼ wave unity gain snap-in hinged whip | 9.96 | (3.00) |
| **UHF Mobile** | | | |
| TAP3462 | ½ over ½ wave 3db | 16.86 | (3.00) |
| TAP3697 | ½ over ½ wave 5db | 20.00 | (3.00) |
| K220 | Mag mount/Feeder to suit above | 11.96 | (2.00) |

# Simply phone or write and leave the rest to us

| | | | |
|---|---|---|---|
| **Antennas Various/Accessories** | | | |
| HQ1 | Mini beam 10/15/20m 2 ele. 1kW | 139.00 | (4.00) |
| C4 | Vertical 10/15/20m | 48.50 | (3.00) |
| G4MH | Mini beam 10/15/20 | 88.00 | (4.00) |
| KTLM-4 | Gutter mount/Cable assy. SO239 | 6.90 | (0.50) |
| **DATONG PRODUCTS** | | | |
| PC1 | 50KHz to 30MHz receive converter | 137.42 | (0.50) |
| VLF | Very low freq. converter | 29.90 | (0.50) |
| FL1 | Frequency agile audio filter | 79.35 | (0.50) |
| FL2 | Multimode audio filter | 89.70 | (0.50) |
| ASP/A | Auto RF speech clipper (YAESU) | 82.80 | (0.50) |
| ASP/B | Auto RF speech clipper (TRIO) | 89.70 | (0.50) |
| D75 | Manual RF speech clipper | 56.35 | (0.50) |
| RFC/M | RF speech clipper module | 29.90 | (0.50) |
| D70 | Morse tutor | 56.35 | (0.50) |
| AD270 | Active dipole RX ant. (indoor) | 47.15 | (0.50) |
| AD370 | Active dipole RX ant. (outdoor) | 64.40 | (0.50) |
| MK | Morse keyboard | 137.42 | (0.50) |
| DC144/28 | 2m converter | 39.67 | (0.50) |
| RFA | Broadband preamplifier | 33.92 | (0.50) |
| MPU | Mains power unit | 6.90 | (0.50) |
| **MICROWAVE MODULES** | | | |
| **Transverters** | | | |
| MMT28/144 | 10m transverter | 109.95 | (2.50) |
| MMT70/144 | 4m transverter | 119.95 | (2.50) |
| MMT432/144R | 70cm transverter | 184.00 | (2.50) |
| MMT1296/144 | 23cm transverter | 184.00 | (3.00) |
| MMT70/28 | 4m transverter | 119.95 | (2.50) |
| MMT144/28 | 2m transverter | 109.95 | (2.50) |
| MMT432/28S | 70cm transverter | 159.95 | (2.50) |
| **Linear Amplifiers** | | | |
| MML28/100S | 10m 100W linear amp. | 129.95 | (3.00) |
| MML70/50S | 4m 50W linear amp. | 85.00 | (2.50) |
| MML70/100S | 4m 100W linear amp. | 139.95 | (3.00) |
| MML144/30LS | 2m 30W linear amp. 1-3W in | 69.95 | (2.50) |
| MML144/50S | 2m 50W linear amp. | 85.00 | (2.50) |
| MML144/100LS | 2m 100W linear 1-3W in | 159.95 | (3.00) |
| MML144/100S | 2m 100W linear 10W in | 139.95 | (3.00) |
| MML432/50 | 70cm 50W linear amp. | 109.95 | (3.00) |
| MML432/100 | 70cm 100W linear amp. | 228.65 | (4.00) |
| MML1296/10 | 23cm 10W linear amp. | 199.00 | (2.50) |
| MML432/30 | 70cm 30W linear amp. 1-3W in | 99.00 | (3.00) |
| **Converters** | | | |
| MM1000KB | ASC11 morse converter with keyboard | 99.95 | (3.00) |
| MM4001 | RTTY to TV converter | 189.00 | (2.50) |
| MM4001KB | RTTY transceiver | 269.00 | (2.50) |
| MM4000KB | RTTY transceiver with keyboard | 299.00 | (4.00) |
| MMC28/144 | 10m to 2m converter | 29.90 | (1.00) |
| MMC50/28 | 6m to 10m converter | 29.90 | (1.00) |
| MMC70/28 | 4m to 10m converter | 29.90 | (1.00) |
| MMC70/28LO | 4m to 10m with LO | 32.90 | (1.00) |
| MMC432/28S | 70cm to 10m converter | 37.90 | (1.00) |
| MMC432/144S | 70cm to 2m converter | 37.90 | (1.00) |
| MMC435/600 | UHF ATV converter | 27.90 | (1.00) |
| MMC1296/28 | 23cm to 10m converter | 34.90 | (1.00) |
| MMC1296/144 | 1296MHz low noise converter | 69.95 | (1.00) |
| MMK1691/137.5 | 1691MHz meteosat converter | 129.95 | (2.50) |
| **Morse Talkers** | | | |
| MMS1 | Morse tutor 2-20WPM Side tone | 115.00 | (2.50) |
| MMS2 | Morse tutor (advanced) 6-32WPM + speak back | 169.00 | (2.50) |
| **Amateur TV** | | | |
| MTV435 | 70cm 20W (PSP) transmitter | 149.00 | (2.50) |
| MMC435/600 | Converter ATV UHF output | 27.90 | (1.00) |
| **Preamplifiers** | | | |
| MMA144V | 2m preamp RF switched | 34.90 | (1.00) |
| MMA28 | 10m preamp | 16.95 | (1.00) |
| MMA1296 | 23cm preamp | 34.90 | (1.00) |
| **Frequency Counters** | | | |
| MMD650/500 | 500MHz digital meter | 75.00 | (1.00) |
| MMD600P | 600MHz pre scaler | 29.90 | (1.00) |
| MMDP-1 | Probe | 14.90 | (0.50) |
| **Filters** | | | |
| MMF144 | 2m band pass 40W max. | 11.90 | (1.00) |
| MMF452 | 70cm band pass 40W max. | 11.90 | (1.00) |
| **Various** | | | |
| MMS384 | 384MHz signal source | 29.90 | (1.00) |
| MMR15/10 | 15db 10W attenuator | 11.90 | (1.00) |
| **HI-MOUND MORSE KEYS** | | | |
| HK702 | Up down keyer marble base | 24.50 | (0.50) |
| HK704 | Up down keyer | 16.68 | (0.50) |
| HK705 | Up down keyer | 12.50 | (0.50) |
| HK706 | Up down keyer | 13.75 | (0.50) |
| HK708 | Up down keyer | 11.96 | (0.50) |
| HK808 | Up down keyer marble base | 39.57 | (0.50) |
| MK704 | Twin paddle keyer | 10.95 | (0.50) |
| MK705 | Twin paddle keyer marble base | 22.00 | (0.50) |
| **MOULDINGS** | | | |
| IK | Iambic keyer | 19.95 | (0.50) |

| | | | |
|---|---|---|---|
| **TOKYO HY POWER** | | | |
| HC150 | HF ATU SWR/Power meter 200W PEP | 62.50 | (n/c) |
| HC2000 | HF 2kW ATU SWR/Power meter 6 POS ant. switch. 6 to 1 vernier high Q coils 2kW peak 1kW continuous | 276.55 | (n/c) |
| **Antenna Rotators & Accessories** | | | |
| 9502 | Channel master med duty up to 8 ele. | 57.00 | (3.50) |
| 9523 | Alignment bearing for 9502 | 15.81 | (1.25) |
| KR400 | Med/Heavy duty 180° meter | 90.85 | (3.50) |
| KR400RC | Med/Heavy duty 360° meter Load 200Kg 1½"-2" masts | 114.94 | (3.50) |
| CASTING | Lower casting set | 15.00 | (1.25) |
| KR600RC | Heavy duty 360° meter Load 200Kg Rot600Kg/cm Brake 4000Kg/cm 1½"-2"masts | 163.30 | (3.50) |
| **Antenna Switches** | | | |
| SA450 | SO239 connectors 1 in 2 out | 9.75 | (0.50) |
| SA450N | "N" type connectors 1 in 2 out | 12.75 | (0.50) |
| **Baluns** | | | |
| BL50A | RAK 50 ohm ferrite BALUN 1:1 1.8-38MHz 1kW | 12.88 | (1.50) |
| BL-40X | Balun 2K PEP 1.1 | 11.52 | (1.50) |
| **Dummy Loads** | | | |
| T30 | 30W DC 500MHz PL259 | 6.61 | (0.50) |
| T100 | 100W DC 500MHz SO239 | 20.12 | (1.00) |
| T200 | 200W DC 500MHz SO239 | 31.36 | (1.50) |
| T210 | Wide band 10W 1.2G-2.4G | 24.50 | (0.75) |
| AW05 | Pocket RF wattmeter 5W up to 500MHz BNC | 19.75 | (1.00) |
| **DRAE PRODUCTS** | | | |
| DRAE4 | 4 amp PSU | 30.75 | (2.00) |
| DRAE6 | 6 amp PSU | 48.00 | (2.50) |
| DRAE12 | 12 amp PSU | 74.00 | (3.00) |
| DRAE24 | 24 amp PSU | 105.00 | (4.00) |
| DRAE WM | 135-450MHz wavemeter | 27.50 | (1.00) |
| **"N" Connectors (Silver Plated)** | | | |
| N58 | "N" Male connector RG58 | 2.25 | (0.25) |
| N8 | "N" Male connector RG8 | 2.40 | (0.25) |
| N308 | "N" T adaptor (three female) | 2.40 | (0.25) |
| N307 | "N" L adaptor (1 male 1 female) | 2.40 | (0.25) |
| N306 | "N" Double female adaptor | 1.90 | (0.25) |
| N310 | "N" Double male adaptor | 2.50 | (0.25) |
| NB304 | "N" Female to BNC male adaptor | 2.10 | (0.25) |
| N402 | "N" Plug to SO239 | 2.05 | (0.25) |
| N403 | "N" Socket to PL259 | 2.00 | (0.25) |
| N404 | "N" Socket to SO239 | 1.80 | (0.25) |
| **TOKYO HY POWER** | | | |
| HL32V | VHF 30W linear 1-5W drive HI-LOW output | 53.50 | (n/c) |
| HL82V | VHF linear preamp output meter 2-12W in 35-85+ out | 144.50 | (n/c) |
| HL160V | VHF linear preamp output meter 1-10W in 160W+ out | 242.40 | (n/c) |
| HL45U | UHF linear preamp 2-15W in 10-45W out | 119.75 | (n/c) |
| **YAESU** | | | |
| YH55 | Headphones Low Z | 10.00 | (0.50) |
| YH77 | Lightweight headphones Low Z | 10.00 | (0.50) |

| | | | |
|---|---|---|---|
| **SWR/Power Meters** | | | |
| **YAESU** | | | |
| YS200 | | 52.90 | (n/c) |
| YS2000 | | 69.79 | (n/c) |
| **Other Makes** | | | |
| RF2000 | Twin meter 3.5-150MHz F/Scale 200/2000W | 18.25 | (1.00) |
| YM1X | Twin meter 3.5-150MHz F/Scale 12 or 120W | 14.99 | (1.00) |

# COMPUTERS

| | | |
|---|---|---|
| Commodore 64. 64K, sprites, sound chip etc. | 343.85 | (n/c) |
| Vic 20 + C2N datasett + intro to base part 1 + 4 games. Special price | 139.99 | (3.00) |
| Commodore 1541 174K disk drive | 299.00 | (n/c) |
| Vic 3K ram pack | 29.95 | (0.25) |
| Vic 8K ram pack | 44.95 | (0.25) |
| Vic 16K ram pack | 74.95 | (0.25) |
| Vic 20 reference guide | 9.95 | (0.25) |
| Commodore 64 reference guide | 14.95 | (0.50) |
| C2N datasett | 44.95 | (1.75) |
| Spectrum 48K | 129.95 | (1.75) |
| Spectrum 16K | 99.95 | (1.75) |
| ZX Printer | 39.95 | (0.50) |

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### TS830S

A superb radio from Trio that offers all band coverage, true frequency readout on all modes, variable bandwidth and passband tuning, rugged and reliable 6146B valves in the P.A., top quality construction and design coupled with the Trio reputation for giving you the best equipment at a reasonable price.
This set has far too many features to list in such a small space so send a s.a.e. for full details.

### TS530S

Designed as a little brother to the TS830S, the TS530 uses the same PLL system, the same RF boards, the same readout system and many other features of the 830, but not the variable bandwidth facility. You stilll have the famous Trio I.F. shift system for dodging the QRM.
Again, too many features to mention, including:– 160 to 10 metres (including the new bands), passband tuning on all modes, 6146B PA valves for low intermod, low power tune up, digital readout shows true frequency at all times, VOX built in, CW sidetone, speech processor, noise blanker, etc etc.

### TS430S

The Trio TS430S is a compact high performance solid-state transceiver that covers all the WARC bands from 160 to 10 metres – with SSB, CW, AM and the option of an FM add-on unit.
As an added bonus the 430 incorporates a 150kHz to 30MHz general coverage receiver for world wide reception.
Some of its features are 8 memory channels with memory scan, notch filter, IF shift and dual digital VFO's. This is certainly one of the most exciting pieces of equipment that we have come across for a long time. Come in and try it for yourself.

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- **Bandwidth:** 144-146MHz ± 1dB, more than 45dB rejection at 130 and 160MHz. Compare this with the older generation!
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  - single line ground to transmit control for hard switched applications eliminates annoying relay noise experienced with other amplifiers!
  - rf over-ride of hard-switching function to prevent expensive accidents!
  - straight-through operation with power off. Failsafe!
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# Scan new horizons.

The Bearcat© 20/20 automatic scanning radio monitors 40 frequencies from 7 bands, including aircraft. A two-position switch, located on the front panel, allows monitoring of 20 channels at a time.

Besides coverage of the four public service bands (Low, High, UHF and UHF "T"), the *Bearcat* 20/20 receives frequencies in the 2-Meter and 70 cm Amateur bands and the AM Aircraft band. In addition, the *Bearcat* 20/20 searches the aircraft or marine bands at the press of a button. Other features include automatic search, patented selective scan delay, priority, automatic lockout, patented track tuning, decimal display, direct channel access, switch for choosing AM or FM reception and AC/DC operation for home or mobile use.

Totally programmable, the *Bearcat* 20/20 scans new horizons.

## Features:

**40 Channels/2 Positions.** Monitor 20 channels at a time by use of a two-position switch for a total of 40 channels.

**7 Bands.** Your coverage includes Low, High, UHF and UHF-T public service bands, the 2-Meter and 70 cm Amateur bands, plus the Aircraft communications band.

**AC/DC.** Operates at home or in authorized vehicle.

**Direct Channel Access.** Advance directly to a desired channel.

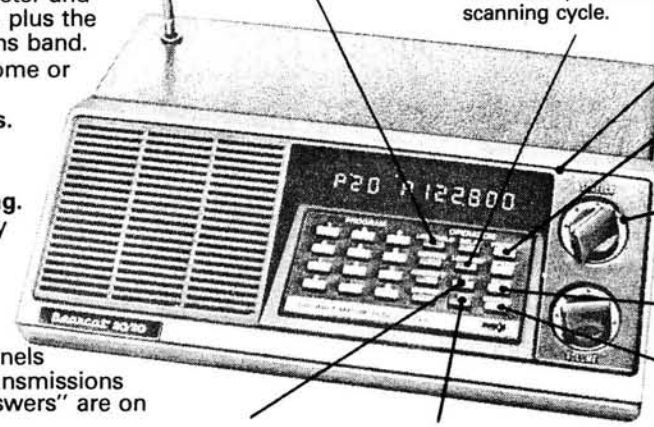
**Patented Track Tuning.** Provides full sensitivity even to band edges.

**Patented Selective Scan Delay.** Adds a two-second delay on desired channels to prevent missing transmissions when "calls" and "answers" are on the same frequency.

**Bearcat 20/20FB**

**£258.75**

Securicor Delivery £6.90




**Limit.** You choose the upper and lower limits of the search range.

**Automatic Lockout.** Skips the channels you're not currently interested in, for a faster scanning cycle.

**Decimal Display.** The large decimal display shows channels and frequencies, as well as features selected.

**Crystalless.** No channel crystals to buy. Ever.

**Priority.** Lets you sample a designated frequency – on Channel 1 – every two seconds.

**Automatic Squelch.** Factory set automatic squelch for easier operation, or manual squelch for close adjustment.

**Dual Scan Speed.** Scan either 5 or 15 channels each second.

**Manual.** Allows direct channel access. Advance directly to a desired channel or step one channel at a time.

**Aircraft Search.** Push a single button to search the Aircraft band for any activity.

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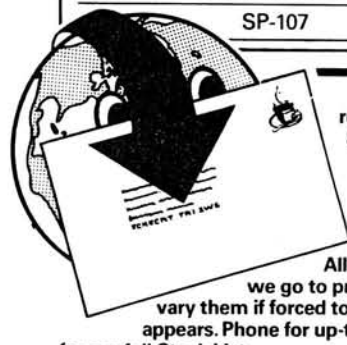

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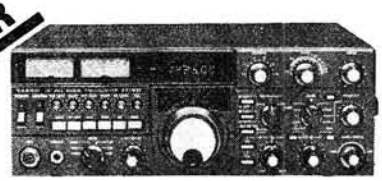

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| FT ONE | Gen. Coverage Transceiver | NEW 1345.00 |
| FT290R | 70cm all-mode portable | NEW 309.00 |
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| FT101ZDFM | 160-10m 9-Band Transceiver | 599.00 |
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| SP901 | External speaker | 31.00 |
| FL2100Z | 9-Band 1200W linear | 475.00 |
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| FC707 | Aerial tuner (unbalanced only) | 85.00 |
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| MMB2 | Mobile mounting bracket | 16.00 |
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| FRV7700B | 50-60MHz & 118-150MHz | 84.70 |
| FRV7700C | 140-170MHz | 74.75 |
| FRV7700D | 70-80MHz & 118-150MHz | 80.90 |

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| FRT7700 | Receiver aerial tuner | 42.00 |
| FF5 | LF filter for above | 9.95 |
| FT480R | 2m all-mode transceiver | *365.00 |
| FP80A | 230V AC power supply | 63.00 |
| FT780R | 70cm all mode transceiver | *399.00 |
| FT290RD | SPECIAL 1983 version with ARE mods | 249.00 |
| NC11C | AC charger | 9.00 |
| CSC 1 | Carrying case | 3.45 |
| MMB 11 | Mobile mounting bracket | 22.25 |
| FT208R | 2m synthesized portable FM | 199.00 |
| NC9C | AC charger | 8.00 |
| FT708R | 70cm hand held | 209.00 |
| YH55 | Headphones, low Z | 10.00 |
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| IC730 | HF mobile transceiver 8 band | 599.00 |
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| TC271 | 2m mutimode base station | NEW 569.00 |
| IC25E | 2m synth compact 25W mobile | 259.00 |
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| ICHM9 | Speaker/microphone | 15.00 |
| ICCP1 | Car charging lead | 3.75 |
| ICBP2 | 6V Nicad pack for IC 2E | 33.00 |
| ICBP3 | 9V Nicad pack for IC 2E | 23.00 |
| ICBP4 | Empty case for 6 × AA Nicads | 6.95 |
| ICBP5 | 11.5V Nicad pack for IC 2E | 44.00 |
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| TS930 | Gen. coverage transceiver | NEW 1100.00 |
| TS130S | 8-Band 200W pep | 425.00 |
| AT130 | 100W antenna tuner | 79.00 |
| TR2500 | 2m FM synthesised handheld | 217.00 |
| HC10 | Digital desk World Clock | 58.75 |
| DM801 | Dip meter | 69.00 |
| R600 | Gen. coverage receiver | 235.00 |
| R2000 | Gen. coverage receiver | 395.00 |
| TW400 | Unique dual-band 2m/70cm mobile/base station | P.O.A. |

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| AR3000 | 720 channel synthesised air band receiver | 99.00 |
| | **Fairmate** | |
| AS32320 | VHF/UHF scanning receiver, air band/military/police | 149.00 |
| | **FDK Air Band** | |
| ATC720 | 720 channel air band handheld | 129.00 |
| ATC720SP | Professional version of above | 189.00 |
| | **JIL** | |
| SX200N | 16 channel memory, synthesised AM/FM | 259.00 |
| | **Maximal-Mickey** | |
| MK4000 | 8 channel memory, 70-80MHz, 140-176MHz, synthesised | 99.00 |
| | **Bearcat** | |
| BC100FB | 16 channel memory, synthesised, handheld | 345.00 |
| BC150FB | 10 channel memory, synthesised | 144.90 |
| BC2020 | 20 channel memory, AM/FM, synthesised | 269.00 |
| BC250FB | 50 channel memory, synthesised | 289.00 |

## TONO

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| THETA 550 | RX only | 299.00 |
| | **AMPLIFIERS** | |
| UC70 | 430MHz 55W + preamp | 159.00 |
| 2M 50W | 144MHz 30 50W | 69.00 |
| 2M 100W | 144MHz 100W + preamp | 129.00 |
| MR 150W | 144MHz 130 150W + preamp | 169.00 |
| MR 250W | 144MHz 250W + preamp | 325.00 |

## TASCO

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|---|---|---|
| TeleReader CWR685 | RTTY/CW/ASCII | 769.00 |
| TeleReader CWR670E | As above Rx only | 345.00 |
| TeleReader CWR610E | Basic unit | 189.00 |

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| HL82V | VHF linear preamp output meter 2·12W in 35·85 + out | 144.50 |
| HL160V | VHF linear preamp output meter 1·10W in 160W + out | 242.40 |
| HL45U | UHF linear preamp 2·15W in 10·45W out | 119.75 |
| HC150 | HF ATU SWR/Power meter 200W PEP | 62.50 |
| HC2000 | HF 2kW ATU SWR/Power meter 6 POS ant. switch. 6 to 1 vernier high Q coils 2kW peak 1kW continuous | 276.55 |

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| HK704 | Up down keyer | 16.68 |
| HK705 | Up down keyer | 12.50 |
| HK706 | Up down keyer | 13.75 |
| HK708 | Up down keyer | 11.96 |
| HK808 | Up down keyer marble base | 39.57 |
| MK704 | Twin paddle keyer | 10.95 |
| MK705 | Twin paddle keyer marble base | 22.00 |

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| VHF Wavemeter 130/450MHz | 27.50 |
| Morse Tutor | 49.00 |

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| ELH 230 | 2M RF amp 3W in/30W out | 39.00 |
| ELH 720 | 70cm RF amp 1W in/10W out | 59.00 |
| EMR 400 | Rotator – heavy duty | 89.00 |

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|---|---|---|
| AX210N | 10 ele. yagi for 2m crossed | 74.95 |
| HB10F2T | 2 ele. 10m mono band beam | 51.50 |
| HB10F3T | 3 ele. 10m mono band beam | 74.95 |
| HB15F2T | 2 ele. 15m mono band beam | 60.66 |
| HB15FT | 3 ele. 15m mono band beam | 93.46 |
| HB15M25P | VP mini size 15m 2 ele | 69.50 |
| HB15M35P | VP mini size 15m 3 ele | 102.30 |
| HB34D | 4 ele. tri band beam 10/15/20m | 222.90 |
| HB33SP | 3 ele. tri band beam 10/15/20m | 192.50 |
| HB35C | Tri band array 10/15/20m | 283.95 |
| HB35T | 5 ele. 10/15/20m | 278.50 |
| MV3BH | Vertical for 10/15/20m | 37.99 |
| MV4BH | Vertical for 10/15/40m | 48.90 |
| MV5BH | Vertical for 10/15/20/40/80m | 63.95 |
| MLA4 | Loop antenna 10/15/40/80 | 105.60 |
| SQ22 | Phased 2 ele. swiss quad 2m | 58.95 |
| SQY06 | 6 ele. quagi 2m | 45.75 |
| SQY08 | 8 ele. quagi 2m | 52.75 |
| HB210S | 10 ele. dual driven yagi 2m | 47.99 |
| TE214 | 14 ele. long yagi 2m | 74.40 |
| SSL720 | 9 × 2 ele. (18) slot fed 70cm | 77.20 |
| HB23SP | 2 ele. tri band beam 10/15/20m | 135.60 |
| SSL218 | 9 × 2 ele. (18) slot fed 2m | 144.79 |
| TPH2 | Phasing harness 2m | 17.25 |
| QYU10 | 10 ele. quagi 70cm | 67.90 |
| SQ007 | 70cm 2 ele. phased swiss quad | 66.99 |
| SQ10 | Swiss quad 10m | 97.50 |
| SQ15 | Swiss quad 15m | 106.90 |

## ANTENNA SWITCHES

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| SA450 | SO239 connectors, 1 in, 2 out | 9.75 |
| SA450N | N type connectors, 1 in, 2 out | 12.75 |

## ROTATORS

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|---|---|---|
| KR250 | Kenpro Lightweight 1 1½" mast | 48.00 |
| 9502B | Colorotor (Med. VHF) | 56.60 |
| KR 400RC | Kenpro – inc. lower clamps | P.O.A. |
| KR 600RC | Kenpro – inc. lower clamps | P.O.A. |

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| BY1 | Keyer Paddle (black base) | 35.84 |
| BY2 | Keyer Paddle (chrome base) | 43.72 |
| BY3 | Keyer Paddle (gold plated) | 92.00 |
| ZA 1A | Balun 3·5 30MHz for dipoles | 15.00 |
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| MS10 | Mobile speaker and message pad, visor mount | 16.25 |

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| SP300 | 1·8 150MHz 20 200W 1kW PWR/SWR Meter | 97.00 |
| SP400 | 130 500MHz 5 20 150W PWR/SWR Meter | 69.95 |
| SP600 | 1·8 500MHz 20 100 2kW PWR/SWR Meter | 97.00 |
| SP15M | 1·8 160MHz 5 20 200WW PWR/SWR Meter | 35.00 |
| SP45M | 130MHz 470MHz POWER/SWR Meter | 51.00 |
| SP 10X | Compact version of SP15M | 24.45 |
| SP250 | 1·8 60MHz 20 200 2kW | 49.50 |
| SP350 | 1·8 500MHz 5 20 2kW | 59.95 |
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| CH20A | 2 way coax switch 1kW 900MHz (SO239) | 17.95 |
| CH20N | 2 way coax switch 1kW 1.3GHz ('N' socket) | 31.95 |
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| TP25A | 50 500MHz 25W power meter with load | 17.50 |
| TP20G | 30 1500MHz power meter with load | 139.00 |
| CA35A | Static discharge protector. DC 500MHz 300w SO239 | 10.75 |
| CA23N | Static discharge protector. DC 1500MHz 300w 'N' | 12.60 |

## MICROWAVE MODULES

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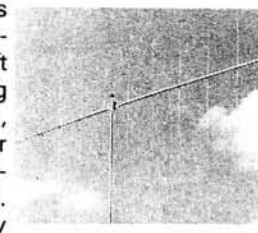

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# For HO Read DTI...

ON JUNE 27, the Radio Regulatory Department, administrator of the UK Amateur Licence, was transferred from the Home Office to the Department of Trade and Industry.

Quite what effect this will have on the future development of radio communications in this country is difficult to assess. Of course, the RRD deals with much more than just the Amateur Licence. Its responsibilities include: band planning and general policy on the use of the radio spectrum in the UK; representing the UK in international frequency negotiations and liaison with foreign administrations; frequency co-ordination with neighbouring administrations; civil radio licensing; enforcement of the Wireless Telegraphy Acts; and control of interference.

In this last task, the RRD is assisted by the Radio Interference Branch of British Telecom, which despite being currently in the middle of a massive re-equipment programme, is scheduled to be axed later this year. The reason for this was disagreement between two ministries on the funding of the RI service. Now that the RRD has joined British Telecom under the aegis of the DTI, perhaps the argument can be resolved, and the future of the RI service (surely essential to our continued use of radio communications) assured.

Ministerial responsibilty for radio frequency regulations at the DTI lies with Mr. Alex Fletcher MP, Parliamentary Under Secretary of State for Corporate and Consumer Affairs, under the overall responsibility of Mr. Cecil Parkinson MP, Secretary of State for Trade and Industry.

Although the Directorate of Radio Technology has been transferred along with the RRD, the Home Office does retain responsibility for two other departments concerned with radio communications. These are the Directorate of Telecommunications, dealing with radio spectrum management for the police and fire services, and the Broadcasting Department, responsible for many aspects of broadcasting by radio (including satellites) and by cable, plus BBC and IBA finance and TV licensing. Strangely though, teletext and viewdata come under the DTI as part of "information technology".

Those of us who were wondering what changes a new Home Secretary might bring have got more changes than we bargained for! I hope that we may see continued discussion on licensing questions, with liberalisation of regulations where this is warranted. Reintroduction of the Telecommunications Bill, lost when the General Election was called, should be a priority to give improved powers to deal with abuses of the radio spectrum.

★ ★ ★ ★ ★ ★

From this issue the price of your *Practical Wireless* goes up to 90p. I'm sorry this has to be so, but we shall carry on putting our best efforts into making *PW* value for money each month.

Geoff Arnold



### QUERIES

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

Components for our projects are usually available from advertisers. For more difficult items, a source will be suggested in the "Buying Guide" box included in each constructional article.

### PROJECT COST

The approximate cost quoted in each constructional article includes the box or case used for the prototype. For some projects the type of case may be critical; if so this will be mentioned in the Buying Guide.

### INSURANCE

Turn to the following page for details of the PW Radio Users Insurance Scheme, exclusive to our readers.

### CONSTRUCTION RATING

Each constructional project will in future be 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. Generally this category will be used for simple projects, but sometimes for more complicated ones of wide appeal. In this case, construction and wiring will be dealt with in some detail.

**Intermediate**

A project likely to appeal to a wide range of constructors, and requiring only basic test equipment to complete any tests and adjustments. A fair degree of experience in building electronic or radio projects is assumed.

**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. Constructional information will generally be limited to the more critical aspects of the project. Definitely not recommended for a beginner to tackle on his own.

### SUBSCRIPTIONS

Subscriptions are available to home addresses at £13 per annum, from **"Practical Wireless" Subscription Department, Room 2816, King's Reach Tower, Stamford Street, London SE1 9LS.** Airmail rates for overseas subscriptions can be quoted on request.

### BACK NUMBERS AND BINDERS

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

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

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

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

# PW RADIO USERS INSURANCE SCHEME

Practical Wireless Radio Users Insurance Scheme was devised by Registered Insurance Brokers B. A. LAYMOND & PARTNERS LIMITED following consultation with PRACTICAL WIRELESS to formulate an exclusive scheme designed to meet the needs and requirements of: Amateur Radio Enthusiasts ● CB Radio Users ● Taxi Companies and Fleet Users with Radio Telephones. A copy of the Policy can be inspected at the offices of B. A. Laymond & Partners Ltd., or of Practical Wireless in Poole.

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†Write directly to B. A. LAYMOND & PARTNERS LTD, for a special application form and full details enclosing the coupon below.

B. A. Laymond & Partners Ltd., Practical Wireless and the Underwriters wish to make it clear that it is an offence to instal or use a radio transmitter in the UK except under the authority of a licence granted by the Secretary of State and it is not their intention to provide cover for or to encourage or condone the illegal use of CB and/or other communications equipment.

Cover for property contained in vehicles is subject to a Limit of Liability of £250, increased to £750 where the vehicle is protected by a reputable audible alarm, correctly set and operational.

When the vehicle is unattended, mobile equipment secured so that tools or a key are required to remove it must be disguised or concealed from view. Portable and mobile equipment not so secured must be removed and placed in a locked boot or otherwise concealed from view, or removed from the vehicle entirely. Equipment not in a secure building or vehicle must not be left unattended.

## How Much Will It Cost?

| Sum to Insure | £1000 | £3000 | £5000 |
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| All others: | Sums insured up to £3000 | £25 |
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## How To Insure

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Name in full (State Mr, Mrs, Miss or Title)

Address

Post Code

Occupation Age Phone No. (Home) (Work)

I/We hereby apply to insure the equipment detailed below

BLOCK LETTERS

| | Manufacturer's Name | Model | Serial No. | Description of equipment to be insured e.g. Base station; Mobile; CB; etc. | VALUE £ |
|---|---|---|---|---|---|
| 1 | | | | | |
| 2 | | | | | |
| 3 | Antennas (Aerials), s.w.r. meters, etc. | | | | |

Please continue list of equipment on a separate sheet if necessary

**TOTAL SUM TO INSURE £**

**DECLARATION:** I/We hereby declare that: 1. The sums insured represent the full replacement value of the equipment. 2. I/We have not* had insurance cancelled, declined, restricted, or other terms imposed in any way other than the normal Policy terms. 3. This proposal shall be the basis of the contract and that the contract will be on the Underwriters normal terms and conditions for All Risks and Legal Costs/Expenses cover unless otherwise agreed. 4. I/We have not* sustained any loss or damage to any radio communications equipment or been involved in litigation relating to use of radio equipment during the past three years, whether insured or not. 5. All the above statements made in connection with this proposal *are true and no material information* has been withheld. 6. I/We understand no liability shall attach until this proposal shall have been accepted by Laymond's and the premium paid in full and a Certificate issued.

* If you have, please give details on a separate sheet.

Date Signed

Rush us details of PW Club Insurance ☐
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## RAE Courses

Courses to prepare students for the Radio Amateurs Examination (City and Guilds 765) will be available at the following locations:

**Bradford**—*Bradford & Ilkley Community College, Great Horton Road, Bradford, West Yorkshire BD7 1AY, tel: (0274) 734844.* Enrolment commences on 6 September. This is a two year course, the first year to prepare for the RAE and the second year for the Post Office Morse test. The second year is optional and is also available for Class B holders who wish to obtain an A licence. The Course Tutor will be P. Nurse.

**Brixton**—*Brixton College for Further Education, Ferndale Road, London SW4 7SB,* tel: 01-737 2323. Starting in September on one evening a week between 6.30 and 9.00pm, enrolment in the evening only from Monday to Thursday of the week commencing 5 September between 6.30 and 8.30pm. The Course Tutor will be R. McEwan Reid G4GTO and further details are obtainable from the college.

**Derby**—*Spondon Adult Evening Centre and also at Allestree Adult Evening Centre.* Further details can be obtained from the Course Tutor, A. T. Pearson G6CZF, tel: (0332) 556682.

**Farnborough**—*Oak Farm Centre, Chaucer Road, Farnborough, Hampshire,* commencing Thursday 22 September. Further details from the Centre, tel: (0252) 540084.

**Hemel Hempstead**—*Dacorum College, Marlowes, Hemel Hempstead, Hertfordshire HP1 1HD,* commencing Wednesday 21 September between 6.30 and 9.30pm, enrolment 5 September (if a sufficient number of students enrol a further course will be run on Mondays). The Course Tutor will be C. B. Burke G3VOZ and further details are available from the college, tel: (0442) 63771.

**North London**—*De Beauvoir Evening Institute, Tottenham Road, Dalston, London N1,* commencing Wednesday 28 September between 6.30 and 9.30pm, enrolment 19 September between 6.00 and 9.00pm. The Course Tutor will be T. C. Clark G4BZW, tel: 01-249 1843.

**Loughborough** — *Loughborough Technical College, Dept. of Electrical Engineering, Radmoor, Loughborough, Leicestershire LE11 3BT, tel: (0509) 215831,* commencing Tuesday 13 September between 6.00 and 7.00pm Morse, and between 7.00 and 9.00pm RAE. The Course Tutor will be Doug Doughty G3FLS and the course fee £16.50. Further details from the college.

**Gwent**—at Abergavenny and Blaenavon, Gwent, South Wales, commencing 12 September. The Abergavenny and Neville Hall ARS are registered as a City and Guilds Examination Centre where students may take the RAE after the course or may register at the end of September for the December examination. All enquiries to *D. F. Jones GW3SSY, tel: (0873) 2566 daytime, and (0495) 791617 evenings.*

**Manchester**—*North Trafford College of Further Education, Talbot Road, Stretford, tel: 061-872 3731.* Course ERA1. RAE Theory on Monday or Thursday evenings between 6.00 and 9.00pm, enrolment 5, 6 and 7 September. The college callsign is G4FXP and the Lecturer will be J. T. Beaumont, T.Eng(CEI), MIElecIE.

**Manchester**—*Pendlebury High School, Cromwell Road, Swinton,* on Mondays at 7.30pm, commencing 26 September, enrolment early September. The Course Instructor will be P. Whatmough G4HYE with Morse Class Instructor W. Stevenson G4KKI. Further details from G4HYE, tel: 061-794 3706 or from Swinton Adult Education Centre, tel: 061-794 5798.

**North London**—*Grafton R.S./Islington Institute, Risinghill Street, London N1,* on Monday evenings between 6.00 and 10.00pm to prepare students for the May/June RAE only. Enrolment 19 September. The Course Tutor will be B. C. Bond and for further details, tel: 01-485 7065.

**Nottingham**—*Hucknall CFE, Portland Road, Hucknall, Notts.* on Mondays between 6.30 and 9.00pm, Course Tutor Alan Lake G4DVW.

*Basford Hall, Stockhill Lane, Nottingham,* on Thursdays between 6.30 and 9.00pm, Course Tutor Geoff Tomlinson G6DJQ.

*Arnold and Carlton CFE, Digby Avenue, Mapperley, Nottingham NG3 6DR,* on Wednesdays between 7.00 and 9.00pm commencing 21 September, Course Tutors G4DVW and G4NZU.

Enrolment at the respective colleges on 12, 13 and 14 September, phone for times. Arnold and Carlton CFE also run crash courses for students with some knowledge of the subject, plus three separate courses of interest to the radio and electronics enthusiast.

Further information on all the courses can be obtained from Alan Lake G4DVW, tel: (0602) 382509 or from the respective colleges: Arnold and Carlton, (0602) 876503 and Hucknall/Basford Hall, (0602) 637316.

**Northumberland**—*Further Education and Youth Centre, Astley High School, Seaton Delaval,* on Wednesdays between 7.00 and 8.45pm (should there be sufficient applications a Friday class will also be run). The Course Tutor will be S. Wisher G8CYW and further details are available from K. B. Fawcett, tel: Seaton Delaval (0632) 371784.

**Nr Stamford, Lincs.**—*Great Casterton Community Centre, Ryhall Road, Great Casterton, Nr Stamford,* commencing on Thursday 22 September at 7.00pm. Enrolment can be by post to the principal at the Community Centre or in person on Monday 5 September at 7.30pm. The Course Tutor will be J. M. Tripp G3YWO.

**Slough**—*Langley College of Further Education, Station Road, Langley, Slough SL3 8BY, tel: (0753) 49222,* College callsign G3XPL. Classes are held on Wednesday and Thursday divided into three modules, students may choose modules to make an individual programme. Enrolment will be at the college on 6 and 7 September between 12.30 and 8.00pm. For further information contact the Senior Lecturer, E. C. Palmer G3FVC at the college.

**Gosforth** — *Gosforth Adult Association, Gosforth High School, Knightsbridge, Gosforth, Newcastle upon Tyne,* on Tuesdays between 7.00 and 9.00pm. Enquiries should be addressed to the Principal of the Association or by telephone from the Course Tutor D. R. Loveday on (0632) 668439.

## Gemini Communications

Unfortunately an error crept into the Gemini Communications advertisement on page 81 of the August issue. It concerned the price of Gemini's Gemscan 70 scanning receiver, and should have read **£258** not £279.

We apologise for the error to both Gemini Communications and any readers who may have been misled.

## VHF/UHF DX News

Neil Montanana G8RWG is intending to produce a small quarterly journal dealing specifically with DX working on all amateur bands above 144MHz utilising any propagation mode.

Interested parties who would like to contribute information or would like further details, contact (sae please): *Neil Montanana G8RWG, 324 Yorktown Road, College Town, Camberley, Surrey GU15 4PZ.*

## AMSAT News

**OSCAR 10:** At 1159.03 on 16.6.83 the European Space Agency's Ariane 6 was launched from Kourou, French Guiana and subsequently placed the latest AMSAT vehicle together with the ECS-1 satellite into earth orbit—exactly to schedule. Control stations for OSCAR 10, located in Japan, Germany and the US, obtained good contact with the satellite from its first pass. Karl Meinzer DJ4ZC, at the European command station at Marburg, determined that the spacecraft's attitude with respect to the sun was far from the ideal, resulting in the antenna system, and not the solar array, being pointed at the sun.

In practical terms this large reduction in energy production resulted in a curtailment of beacon transmissions to eke out the available power. As of this time the sun angle problem is gradually being self-corrected at the rate of 1·8 degrees per day due to atmospheric drag effects as the satellite passes the earth at perigee. All other systems are functioning exactly to plan.

The satellite is to be kept in its present orbit until at least orbit 50 before the kick motor is deployed to ease the craft into its final elliptical path. The 2W general beacon on 145·810MHz is operational for transmitting housekeeping data back to the command centres. When deployed, the engineering beacon (15W) is an exceptionally strong signal.

**OSCAR 9:** Attempts to solve the problem with the jammed/bent stabilisation boom resulted in a success on 21 June. The boom was retracted and the first h.f. band beacon, operating on 21·002MHz, activated. Signals are c.w./steady tone and reception reports would be welcomed by the University of Surrey.

## The 1983 Girl Technician Engineer of the Year

The search is now on to find the 1983 Girl Technician Engineer of the Year. Sponsored by The Caroline Haslett Memorial Trust and The Institution of Electrical and Electronics Incorporated Engineers, The Girl Technician Engineer of the Year Award has already established itself as a worthwhile and successful competition, increasingly well supported by the electrical and electronics industries.

The aim of the Award—in the realisation that the engineering industry needs to attract more young people of the highest calibre—is to focus attention on electrical and electronic engineering as a worthwhile professional career for women. By selecting the most outstanding girl Technician Engineer—who will have successfully undertaken the necessary education and training, and have proved herself capable of holding a responsible job—it is the Award sponsors' express hope that she will, by her example, encourage more girls to enter the electrical and electronic engineering profession. Past winners include an Assistant Test Manager in telecommunications, an Electrical Contracts Engineer, an Instrumentation Development Project Leader, an Electricity Board Third Engineer (Contracting), and a Control Technologist. All were in their twenties. Nominations for this electrical and electronic engineering Award, with its £250 prize, are required no later than 1st October, 1983.

For further details and copies of the 1983 Award nomination form, please apply to: *The Secretary, IEEIE, 2 Savoy Hill, London WC2R 0BS. Tel: 01-836 3357.*

## Radio Rally and Exhibition

Telford Radio Rally and Exhibition has been organised for Sunday, 11 September, 1983, at Telford New Town Centre Malls, Telford, Shropshire.

There will be all the usual attractions at this huge venue, including free entrance and parking plus catering and licensed premises on site.

For those who have not attended this major event before, the easiest way there is to take exit 12 off the M6 onto the M5 then the A442 from North or South, A464 from Wolverhampton then follow the signs to the Town Centre.

Readers may be interested to know that on the *PW* stand at this event we will have for sale: Parabolic dishes (£10 each), *PW Radio Programs—1 and 2* cassette tapes, plus copies of *Out of Thin Air, Passport to Amateur Radio* and recent issues of *Practical Wireless.*

## Stolen Equipment

The following radio equipment has been stolen in the King's Langley area: a TS-830S, serial No. 1110438 and a TR-2500, serial No. 2051908.

If you have any information concerning these rigs please contact: *PC Dowse, Hemel Hempstead Police Station, Tel: (0442) 64881.*

## Is Anyone Calling Us?

A space scientist from the University of California in Berkeley has recently reported that an inexpensive search for signals from intelligent beings in outer space enabled some ten million radio signals to be examined. The automated search monitoring the signals detected by a large radio telescope caused those containing tell-tale signs, which indicate they be from extra-terrestrial intelligence, to be recorded.

Ten signals were picked out as possible candidates, but before any of them can be considered as potential messages from space, they must be re-observed coming from the same direction as in the preliminary search. However, the odds against the detection of a signal beamed at us from space are literally astronomical, since the telescope must be tuned to the correct frequency band when it is pointing in the correct direction at the right time to pick up the signal.

At a meeting of the American Astronomical Society in Boston, Project Director Stuart Bowyer described how the initial search had sorted through the signals received by the 26m diameter radio telescope at Hat Creek Radio Observatory near Mt. Lassen (about 270 miles north of San Francisco) during a 35 day trial run of the system.

In order to minimise costs, the search employed the radio telescope which was also being used for other space research. All other searches for extra-terrestrial intelligence have had the sole use of a radio telescope. The remote facility used in the work described is managed by the University of California's Berkeley Radio Astronomy Laboratory.

*BD*

## New CQ Centre Branch

The CQ Centre of Merton, South London, have just opened a new branch in the Midlands. Bob G6DSS and Paul G4HXZ have now been joined by Ray G4KZH, who will be running the new shop. As well as stocking the same range of items as the London shop, the Birmingham branch will also have facilities for p.m.r. sales and servicing. They will also be offering 28MHz (10m) rigs with crystal filters for £49.50, a 24 hour crystal service for £5.50 plus p&p and there will be provisions for customers to bring in their own CB rigs for conversion to 28MHz.

Opening hours are 9.30am to 6.00pm Tuesday to Saturday, and the new shop is at: *584 Hagley Road, Oldbury, Birmingham B68 0BS. Tel: 021-421 8201.*

## Boys Brigade Centenary

One hundred years ago in Glasgow the first Boys Brigade Company was founded by William Smith. In this the centenary year, many special events have been arranged to celebrate the birth of the movement. One such event will involve amateur radio in an exercise to link up boys and officers of the Brigade throughout the UK and indeed worldwide.

"Anchor Chain" will take place on Sunday 21 August with prearranged h.f. and v.h.f. stations around the country. Starting from the HQ of the Glasgow Battalion, radio contact will be made with the second station in the chain, giving the usual information plus a "Stedfast Number", that is, the number of boys who have already taken part in the local radio event. With the next QSO the number of boys taking part will be added to the "Stedfast Number", and so on around the UK, including Northern Ireland, Ireland, Orkney, Shetland etc., to eventually arrive back in Glasgow some hours later with an aggregate "Stedfast Number".

Boys Brigade personnel are encouraged to be involved with licensed radio amateurs, and to ensure complete coverage, many operators are needed just to ensure that the chain will not be broken. Lots of radio amateurs have offered their help already but others are required in various parts of the country.

If you can help or would like further information, please contact: *George Allan GM4HYF, Chairman Communications Committee, Glasgow Battalion Boys Brigade, 22 Tynwald Avenue, High Burnside, Rutherglen, Glasgow G73 4RN.*

## Frequency Changes for 934MHz CB Service

United Kingdom channels for 934MHz CB Service are to be adjusted in line with a recent international agreement on a channel plan for Europe.

The agreement, which was reached by the Conference of European Posts and Telecommunications Administrations (CEPT), means that United Kingdom channels will be moved downwards by 12½kHz. All other technical requirements will be unchanged.

This follows consultation with the two suppliers known to be actively involved in 934MHz CB: Reftec, who manufacture the only sets currently available; and Grandstand, who are about to enter production, already incorporating the changes. (Reftec will shortly announce arrangements for the modification of their sets.)

Users will be able to use equipment on the old frequencies for the time being, but a date will be fixed by which all sets must be modified. Manufacturers will also be given a date by which all production must be for the new channels, but in practice they have indicated they will change almost immediately.

## On the Move

South West Aerial Systems, the DXTV antenna and accessory specialists, have recently moved from their premises in Shaftesbury, Dorset.

The new, larger premises are located at: *11 Kent Road, Parkstone, Poole, Dorset BH12 2EH. Tel: (0202) 738232.*

## Ham in Space

The US space shuttle mission this autumn, designated the STS-9/Spacelab flight, will provide considerable interest for the world's radio amateur population. NASA have granted the permission allowing astronaut Owen Garriott W5LFL to operate a 144MHz station from earth orbit.

Final details of this event are awaited, but the basic scheme is to adopt an existing p.c.b. antenna on the aft flight deck of the shuttle for the appropriate frequency and to operate a 5W f.m. handheld transceiver. NASA have agreed to the operation on the basis of zero cost and proof of non-interference to other on-board instrumentation/communication systems. Early reports did suggest the extensive use of v.h.f. repeaters to act as "gateways"—looking at our latest datacard would seem to suggest that this may cause Owen some problems of access identification when overflying the UK!

## Equatorial Aurora

An item in the "Space Scene" page of the June 1983 *AMSAT-OSCAR News* compiled by John Branegan GM4IHJ provides interesting news for those interested in propagation techniques.

Transequatorial (TE) propagation has for some years yielded contacts of up to 6000km between stations disposed about the equator—by far the best terrestrial DX on 144MHz and above. Results of a study started by Russian Cosmonauts Georgi Gretchko and Valery Ryumin on an early Salyut mission and continued by the Soviet/French Salyut 7 team have produced strong evidence of auroral type activity over the equator. Colour photographs have been obtained which show the characteristic red glow of excited oxygen at 400km altitudes with clear evidence of a regular band of enhanced ionisation over the subtropical regions.

Following serious propagation disruptions of satellite radar and communications links over the equator, satellite experimental studies have revealed that the equatorial ionosphere was often far more disturbed than at the polar regions, resulting in a dramatic reappraisal of propagation theory in professional circles. Given the additional evidence provided by amateur sources and now the Russian visual observations the TE propagation jigsaw is apparently beginning to fall into place.

## Space Mirror

A remarkable space mirror is being developed at the Stanford Research Centre at Menlo Park, California. It is planned to place the mirror in a geosynchronous orbit where it will reflect transmissions from the earth over the wide frequency range of 500kHz to 10GHz.

It is reported that this large passive satellite will be a parabolic dish structure, formed of a mesh of very fine wires, the diameter of each wire being less than 1μm so that the whole reflector will weigh about a tenth of a gram.

*BD*

## Lowe Electronics Open Day

Saturday 20 August sees the 1983 Lowe Electronics open day at the HQ at *Bentley Bridge, Chesterfield Road, Matlock, Derbyshire.*

Apart from our intrepid Technical Editor, John Fell G8MCP, manning the *PW* stand, this highly popular event will include displays by Strumech Engineering, the RSGB and the highly acclaimed Matlock Brass Band.

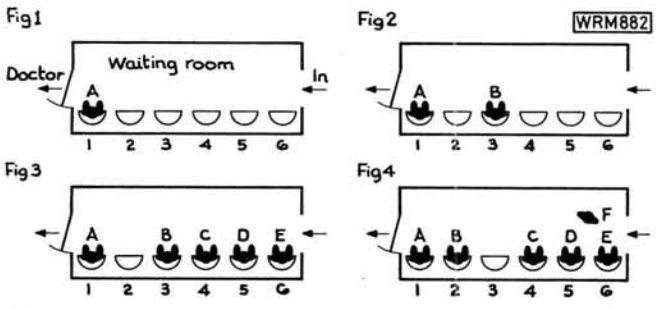
In addition to the complete range of Trio equipment being on display the open day will provide the opportunity to assess first-hand Lowe's extensive servicing facilities with guided tours around the workshops throughout the day. For the ladies, in conjunction with Hepworths, there will be a fashion display by "Next Shops". Finally, rumour has it that Lowe card holders (Club 21) will be able to avail themselves of a members' enclosure on the forecourt, personally supervised by David Monkhouse, author of the renowned *"Emporium News"—FBOM*

## CURRENTS—2

Last month I talked about conventional current and electron flow, and also mentioned briefly that currents in liquids, jellies and pastes (all termed electrolytes) are conveyed partly by ions, that is, ionised molecules of the substances making up the electrolyte. An ionised molecule is produced by chemical action, which causes the substances to split up and recombine into different substances each having a net positive or negative charge. School physics text-books for O-level and A-level students will explain this for those of you who want to learn more.

Moving on to semiconductor materials (commonly silicon or germanium), we find that currents are conveyed in two ways—by electrons having a negative charge, and by holes which we can think of as having a positive charge. In fact a hole is, as its name implies, a place where something has gone missing, and that something is an electron. If you have an atom which is electrically balanced or neutral (in other words it has no net electric charge), then taking away an electron means that the atom will become short of negative charge. Anything that's short of negative charge has a positive charge.

What makes the hole happen? Well, in a pure semiconductor material, which is electrically neutral, applying heat or light can cause some atoms to lose electrons, leaving behind holes into which other free electrons can go. This movement is what causes "leakage" current in transistors and diodes, and the heat I spoke of only has to be room temperature. In general, it's an unwanted current, happening under conditions when you want the transistor or diode to be cut off (non-conducting), and it gets larger as the temperature rises.




But if a hole is simply a place where an electron isn't, so to speak, how can you have a current made up of holes? Picture a doctor's waiting room, with a row of six chairs along one wall. The surgery has just opened, but the doctor hasn't started seeing patients yet. The first person to arrive, we'll call him "A", sits in chair number 1, nearest the door to the doctor's room (Fig. 1). "A" doesn't look at all well. He's got a rash all over his face and hands, and when patient "B" arrives, she thinks "I'm not going to get too close to him, it might be catching", and sits in chair number 3.

Three more people arrive ("C", "D" and "E") and sit in chairs 4, 5 and 6 (Fig. 2), waiting patiently, until a sixth comes in the door. He's a stroppy type and, seeing the empty chair, says "Move up you lot, so's I can sit down." Patient "B" isn't keen on getting a rash, but thinks patient "F" might try jumping the queue so she moves into chair 2, leaving chair 3 empty (Fig. 4). Then "C" moves to chair 3, leaving chair 4 empty, and so on down the row until "F" sits down in chair 6.

The doctor's door opens. "First patient please!" Mr. "A" gets up and disappears, leaving chair 1 empty. Miss "B" breathes a sigh of relief and moves to chair 1, leaving chair 2 empty, and so on down the row again until chair 6 is empty, awaiting the arrival of the next patient. This process will be repeated over and over again, with a stream of patients moving from right to left through the waiting room. But each time a patient goes in to see the doctor, an empty chair appears at 1 and effectively moves from left to right until it reaches 6. If another patient arrives, the "empty" chair could be imagined to have disappeared out the entrance. So, we have a stream of empty chairs moving from left to right, caused by the patients moving from right to left. If you call the patients "electrons" and the empty chairs "holes", that's just what happens in a semiconductor material with a voltage applied across it. I'm not too sure about that electron with a rash, though!

Silicon and germanium both have what are known as tetravalent atoms. This means that each atom has four (tetra = 4) electrons in its outer shell, where they can be fairly easily detached. In a chunk of silicon or germanium, these outer electrons link up with those of the atoms next door and bond together to produce a crystal lattice structure.

Semiconductor material used in transistors and diodes is usually "doped" with a very small amount of an impurity which has either five electrons (pentavalent) or three electrons (trivalent) in the outer shell of each atom. At each point where these impurity atoms fit into the crystal structure of the semiconductor material, there will be a surplus electron or hole, because the numbers of electrons on neighbouring atoms no longer match. The material with surplus electrons is called *n*-type (*n* for negative), and the material with surplus holes is called *p*-type (*p* for positive). There will still be some of the thermally-generated hole and electron pairs I talked of just now, but there will be far fewer of these than the electrons or holes due to the impurity, which are therefore called the **majority carriers** (of current).

Obviously I can't begin to explain transistor theory in the space I have here—it takes whole text-books to do that. Perhaps though, I've done something to help the many beginners who find it very difficult to visualise a current made up of holes, when reading about transistors.

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| Input Requirements | 5-500 mW (Continuously Variable) | | |
| Output Power | 10 Watts | 10 Watts | 10 Watts |
| Conversion Principle | SINGLE | SINGLE | SINGLE |
| Receive Gain | 30 dB | | |
| Receive N.F. | 2.0 dB max. | 2.5 dB max. | 3.0 dB max. |
| Input & Output Impedance | 50 ohm | | |
| RF Connectors | SO239 | SO239 | SO239/BNC/N |
| Power Requirements | 13.8V at 2.1A | 13.8V at 2.1A | 13.8V at 2.1A |

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Price details: **£29.95** in kit, **£40.25** as an assembled module.

**6RX2 6M CONVERTER** – You may not be one of the priveleged 40 but you can at least listen on this compact high performance converter for 6M. It allows reception on the 2M band. The board has options for local oscillator output and r.f. gain adjustment.
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Price details: **£6.95** in kit form, **£10.15** as an assembled module.

**Impressive new products but the best is yet to come . . .**

In May a new design for a 50W h.f. transceiver will appear in Radio Communications. While it is a departure from our normal policy of marketing only our own designs we were so impressed by George Fare's (G30GQ) write up that we have offered to back the project with component kits. This will include PCB's and all components per our normal policy. Full price details are not yet available but a full kit should market for approximately £250 inc. VAT. Some provisional technical details are available, please ask.

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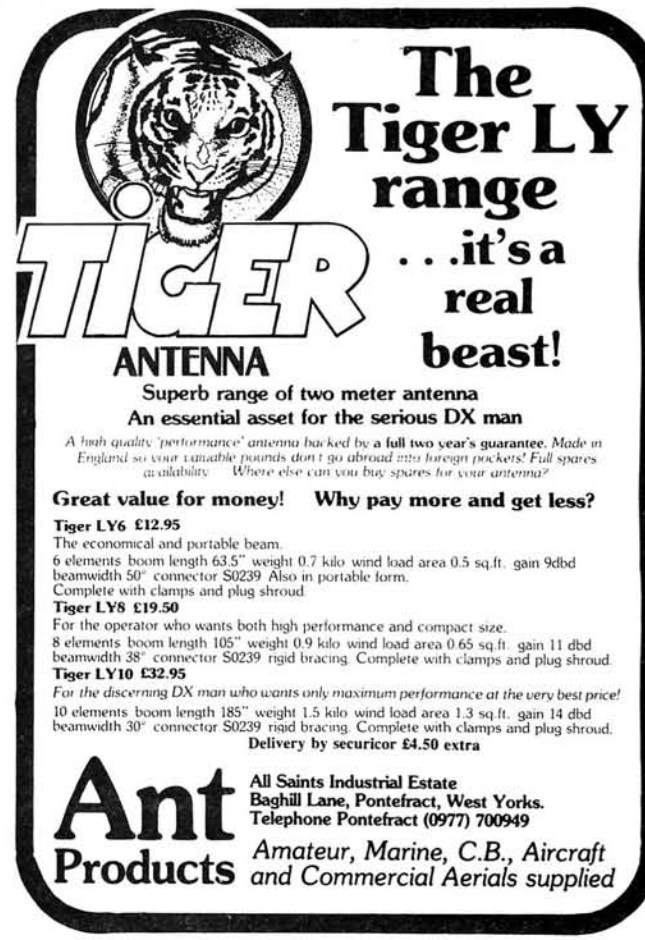



# Mods

# No.25 Roger Hall G4TNT(Sam)

**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 also 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.**

My apologies to those of you who do not own a Yaesu FT-290 because this month's column is once again devoted to this model. I had intended to feature a different set this month but just as I was about to start writing I received another letter from Tom G8HUH. One of Tom's mods was featured in a previous article on the FT-290 and he has now come up with another mod that is so interesting that I felt that it should be published immediately. He calls it an auto one-shot toneburst. It is a small circuit that fits inside the rig and which makes the toneburst "intelligent" in that it can identify whether it is required or not. Most repeaters in Britain are initially accessed by a toneburst but they usually only need a carrier for re-access. This means that a tone should only be transmitted to activate the repeater from cold. Tom's suggestion is to modify the set so that both the condition of the squelch and the setting of the simplex/repeater shift switch determine whether or not a tone will be sent. When the set has been modified, a toneburst will only be transmitted if:

a) the repeater shift switch is in the + or − 600 position **and**

b) the squelch is closed prior to transmitting.

The circuit to be built is fairly simple as only eight components are used. The circuit is shown in Fig. 1 and no board layout has been given so readers can either use a small piece of Veroboard or design their own p.c.b. Alternatively, the components can be soldered directly onto the main board using the earth pillars as anchor points. The physical layout of the board is shown in Fig. 2 and all of the new components should fit into the clear area indicated in the diagram. Access to points A, FMT 6·8V and to earth is not difficult as these connections are nearby, but two long wires will be needed to connect the new circuit to the mode switch and to T.CALL at connection 11 on the reg. unit.

Start by building the circuit and by fitting it in the space shown, or by installing the components directly inside the rig. Then connect D1 to point A. Now run a lead to earth and then run another wire from point X on the new board to FMT 6·8V on the main board. Then run a longer wire from point Y on the new board to the simplex/repeater shift switch. The relevant connections on the switch are shown in Fig. 3. Finally run a wire from point Z on the new board to T.CALL (11) on the reg. unit, see Fig. 4. The mod is now complete and the set can be re-assembled. To explain how this mod works, we should first assume that repeater shift has been selected and the squelch is closed, i.e. no signal is heard from the repeater.

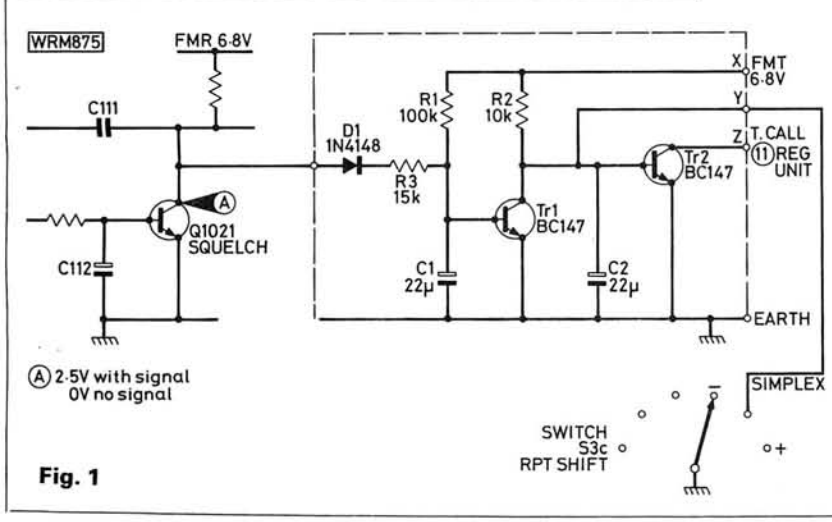



Fig. 1

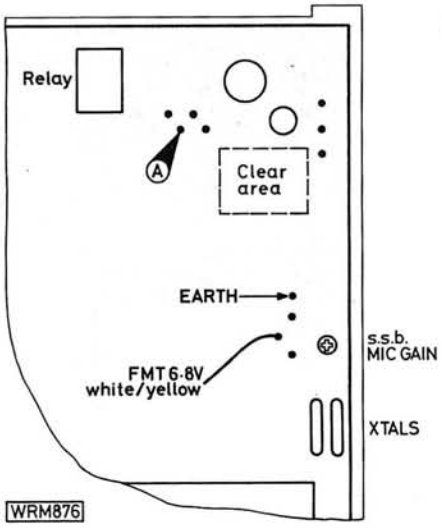



Fig. 2

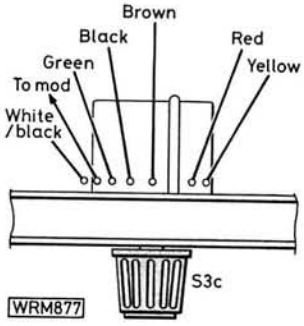



Fig. 3

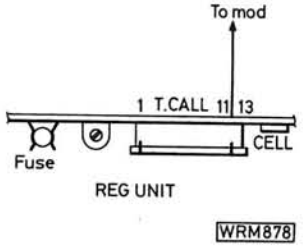



Fig. 4

*continued on page 31*▶▶▶

# Ring Beam Antenna For 144MHz

by F.C. Judd G2BCX

The ring or circular loop beam antenna described in this article is **not** a development of the well-known quad system of square loops, even though the basic function is similar.

The evolution of the quad antenna, first used in practical form in 1942, is well known and the most generally accepted explanation, concerned with the derivation of the square loop itself, is its formation from a pair of vertically stacked horizontal dipoles spaced $\lambda/4$ apart and fed in phase as in Fig. 1(a). A phased horizontal pair in this configuration has a bi-directional radiation pattern, is horizontally polarised and the gain (in each direction) is approximately 2·5dB over a single dipole.

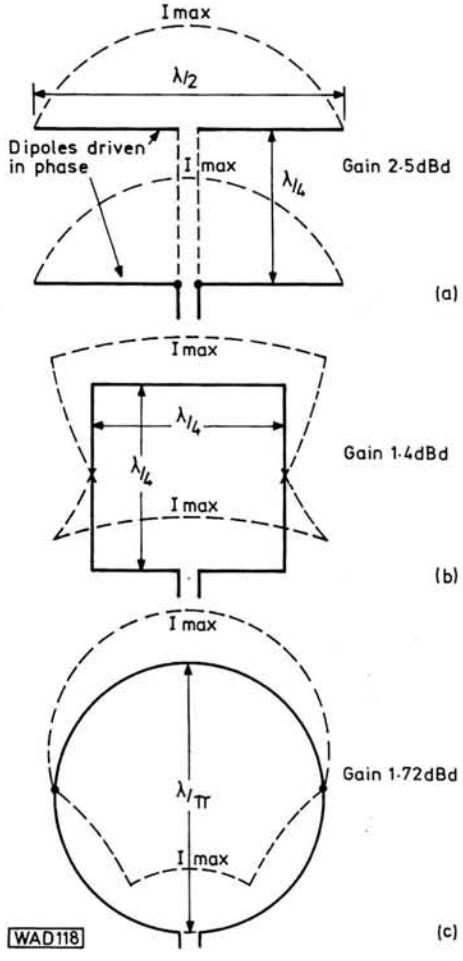


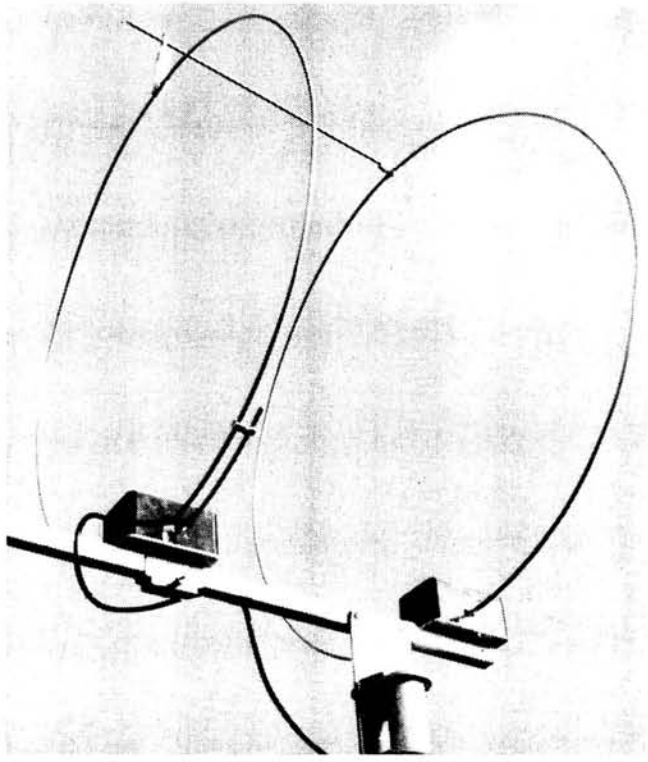

**Fig. 1(a): Configuration of a two-element array from which the square loop is derived (b) Square loop format showing current distribution; gain factor 1·4dB per single loop over dipole (c) Circular loop with diameter $\lambda/\pi$ has a more uniform distribution of current; gain factor 1·72dB per single loop over dipole**

If each element in this arrangement is folded, one up and one down, at a point $\lambda/8$ inward from each end and joined as shown in Fig. 1(b) at the points marked X, then we have the familiar square loop used in the quad system, but which now has a dimension of $\lambda/4$ per side. By doing this however, the original gain factor is reduced to about 1·4dBd, although radiation is still bi-directional. The reason for the reduced gain is due to the folding, because one half of the loop (the two sides) are vertical and the other half (top and bottom) are horizontal. This is also the reason why a square loop can be used for either mode of polarisation[1].

## The Circular Loop

Reference here to a "loop" antenna, either square or circular, implies that the loop has a perimeter of one wavelength ($\lambda$) and is considered as a single radiating element. What is important however, is that a single loop of this dimension, circular or square, still provides gain over a dipole and that the mode of polarisation can be changed either by rotating the loop itself through ninety degrees, or moving the position of the feed point by ninety degrees.

The circular loop does however, have some advantages that are worth considering. The current distribution in a loop one wavelength in circumference is more uniform along a greater portion of each half of the loop as in



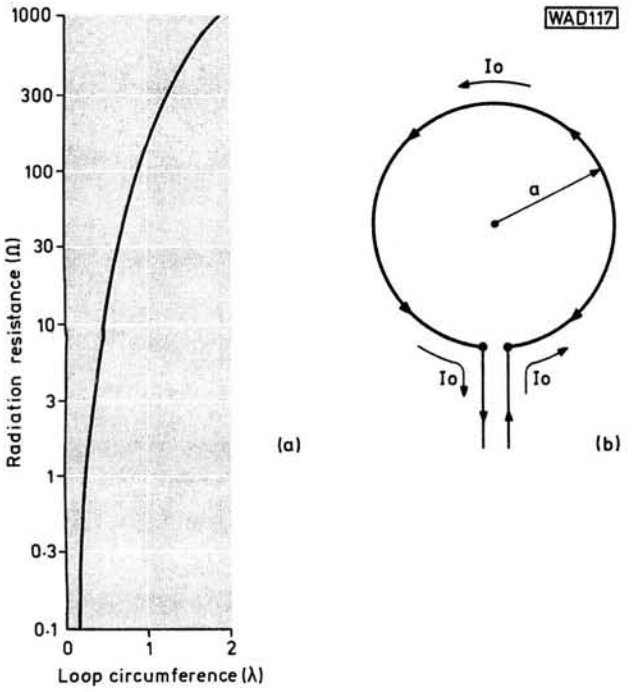



**Fig. 2(a): The radiation resistance of circular loops up to 2λ diameter. The Rr of a λ/π diameter loop is approximately 150Ω (b) Direction of current (in-phase) around a circular loop λ/π diameter. Points of maximum current are designated as Io**

Fig. 1(c) and this results in a gain of 1·76dBd as compared with the 1·4dBd obtained with a square loop. The physical area of a circular loop of this dimension is larger than that of a square loop of λ/4 per side which means that the effective aperture of a circular loop is also larger. It is not generally known that high efficiency antennas such as colinear arrays, Yagi and other similar parasitic structures, as well as multiple element quad antennas, have an effective aperture considerably larger than the physical size of the antenna. The larger the effective aperture of any antenna, the more signal it will extract from a passing radio wave[2].

The radiation resistance (Rr) of a circular loop is high which means greater efficiency as the power radiated in any antenna is due to $I^2Rr$. The graph Fig. 2(a) shows the radiation resistance of a circular loop of circumference λ to be in the region of 150 ohms[3]. Note that the radiation resistance obtained is the value which would appear at the loop terminals when connected to a transmission line as in Fig. 2(b). This situation only occurs in small loops e.g., where the current is uniform and in-phase for a given radius (a) which in this case is half λ/π. Larger loops would necessitate the insertion of phase shifters to maintain uniform in-phase current around the loop.

It should be noted that although the radiation resistance of a driven loop is reduced when a parasitic element such as the reflector is used, the value is still sufficient to maintain a high degree of efficiency.

## Gain and Radiation Patterns

The radiation pattern of a single loop radiator is bi-directional, as in Fig. 5, which means that a reflector may be used to make the system uni-directional and thus obtain greater gain by directivity. A typical two-element quad consisting of a driven element and reflector, as shown in Fig. 3(a), has a forward gain of 6·5dBd and minimal side or rear radiation when the spacing between the elements is 0·2λ. Any increase in spacing produces no increase in this gain factor but decreasing the spacing to a little under 0·15λ produces a narrower forward main lobe and an increase in gain to about 7dBd. However, in this configuration the side lobes, which are normally quite small, increase to a somewhat larger amplitude and could be unacceptable for some applications.

A two-element ring beam with a spacing between the driven element and the reflector of 0·17λ as in Fig. 3(b) provides a forward gain of 8·2dBd, a wide forward main lobe and virtually no rear or side lobes, and is similar to the radiation pattern of Fig. 6.

The radiation pattern shown photographically in Fig. 5 is from a scale model operating at a frequency of 941·9MHz, one of the numerous frequencies covered by the author's special HO licence under the callsign G9BTN. The radiation pattern from the prototype 144MHz ring beam antenna to be described is shown in Fig. 6. The pattern is the same whether the antenna is used in horizontal or vertical mode.

## Two-Element Ring Beam Construction

A working prototype of the two-element ring beam is shown in the photograph on page 26. A study of this will help clarify the diagram given for construction in Fig. 4. The mounting boom was made from 20mm square aluminium tube and needs to be approximately 610mm long. Surplus can be cut off as required.

The general assembly and the ring diameters etc. are shown in Fig. 4. The inner ends of each loop are flattened so that holes can be drilled for fixing to the base blocks. The rings can easily be formed by hand if done slowly and carefully because 5mm diameter aluminium rod is quite soft.

## The Gamma Match

The front, or driven ring, employs a gamma match to obtain a direct feed from 50 ohm coaxial cable. It will be seen that the terminations of the rings are on blocks which ideally should be of Delrin or similar insulating material. Perspex or Tufnol could also be used but if neither are available then hard wood, thoroughly varnished, will suffice. The length of the gamma match rod and details of the shorting bar are also given in Fig. 4. The protecting boxes are pvc types large enough to accommodate the ring base connections etc. and are in fact used upside down so that the lid becomes the base and is secured to the boom as the diagram shows.

It should be noted that the 27pF silver mica capacitor that bridges the inner ends of the reflector loop is to tune it and also to compensate for velocity factor. **It is very important that both rings are isolated from the boom.** The

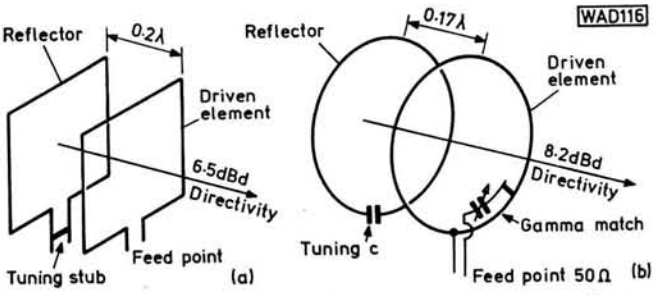



**Fig. 3(a): Configuration of a two-element quad antenna for optimum gain/smallest amplitude rear and side lobes (b) Configuration of two-element circular loop antenna for optimum gain and no significant rear/side lobe amplitudes**

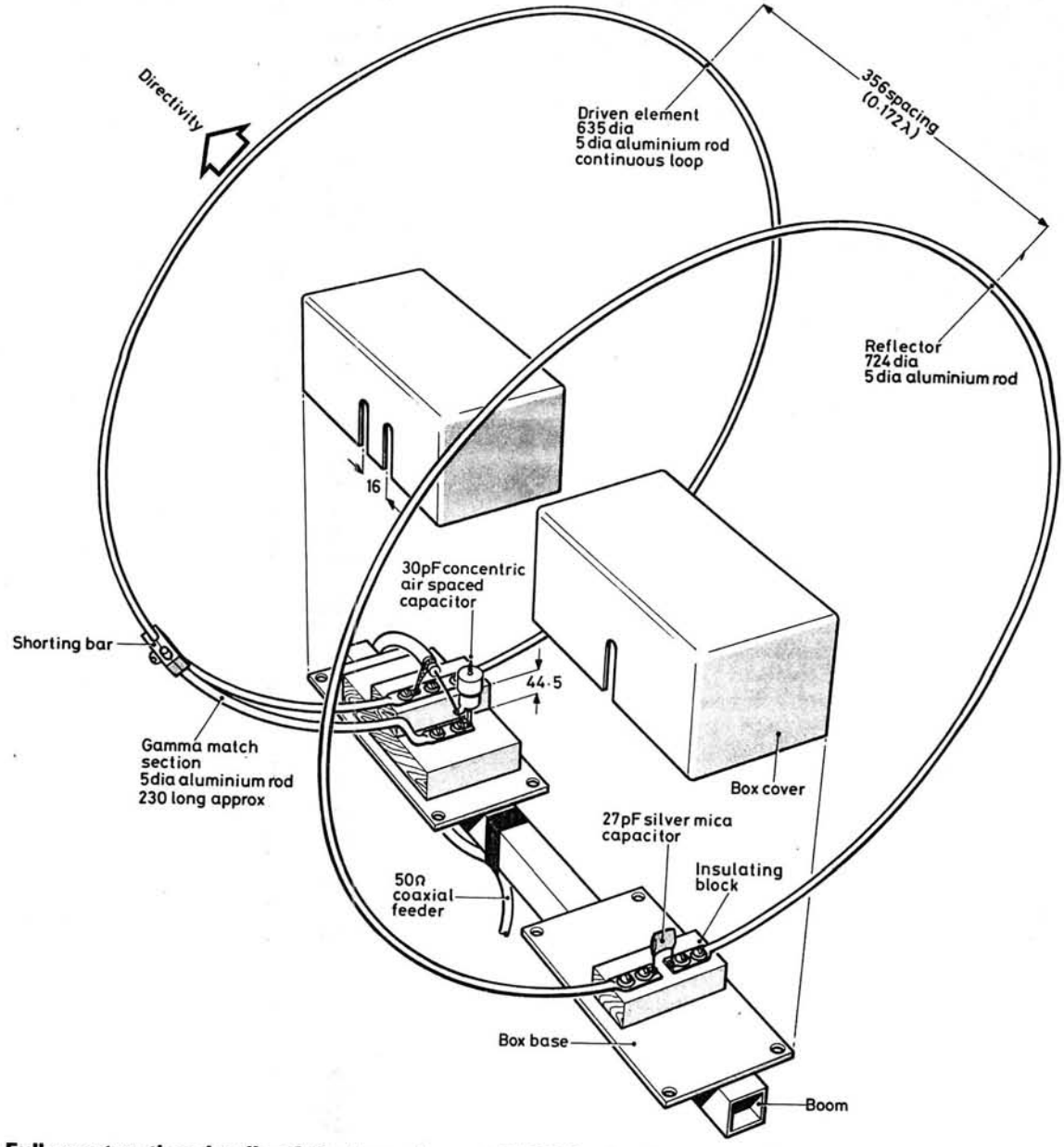



**Fig. 4: Full construction details of the two-element 144MHz ring beam antenna. The boom may be connected to the supporting mast by means of a bracket located between the elements as shown in the photograph on page 26. As drawn, the antenna is horizontally polarised; rotating the boom and element assembly through 90 degrees will provide vertical polarisation**

only "earthed" point of the driven element is where its two inner ends are joined and connected to the screening braid of the 50 ohm coaxial cable as in Fig. 4. The reflector ring is also isolated from the boom.

## Tuning the System

Ideally the length of cable to be used should be connected and the antenna set up in a clear space a few metres above ground. Set the transmitter frequency to mid-band (145MHz) and with a v.s.w.r. meter in series with the feed cable, tune the gamma match capacitor in conjunction with movement of the shorting bar at the end of the gamma line to obtain the lowest possible v.s.w.r. reading.

If a Philips air spaced concentric capacitor (beehive) as shown in the diagrams is not available any small air spaced capacitor with a value variable between 0 to 30pF may be used. Once the v.s.w.r. has been verified the plastic covers can be fitted and every possible point of entry blocked with a sealant to prevent water getting in. There are a number of hard setting sealants available which have good insulating properties and will not affect the performance of the antenna. Scotchkote is very good if available although Evostik applied thickly will set to a waterproof state.

## Performance

The v.s.w.r. readout obtained from the prototype ring beam is very flat across the complete 144MHz band owing to the wide bandwidth of this antenna. The polar pattern shown in Fig. 6 was obtained with the antenna in situ at 7·5m above ground and fed via 10m of UR43 coaxial cable.

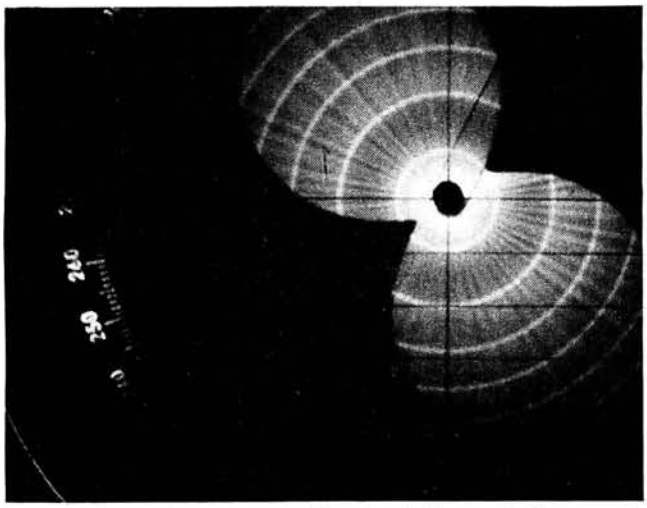


**Fig. 5: Radiation pattern of a single loop of diameter λ taken from a 941·9MHz model**

Daily checks have revealed consistent reception at the author's QTH in south central Norfolk from the 144MHz beacon located at Wrotham in Kent at a distance of 168km and without "lift" conditions. During medium "lift" conditions signal strengths from the Wrotham beacon have been at S9 and over. The signals from this beacon are horizontally polarised and the beam was set up accordingly as shown in the photograph. For vertical polarisation, it is only necessary to turn the beam through 90 degrees, which simply means transferring the mounting plate to the next side round on the boom, so that the antenna lies sideways.

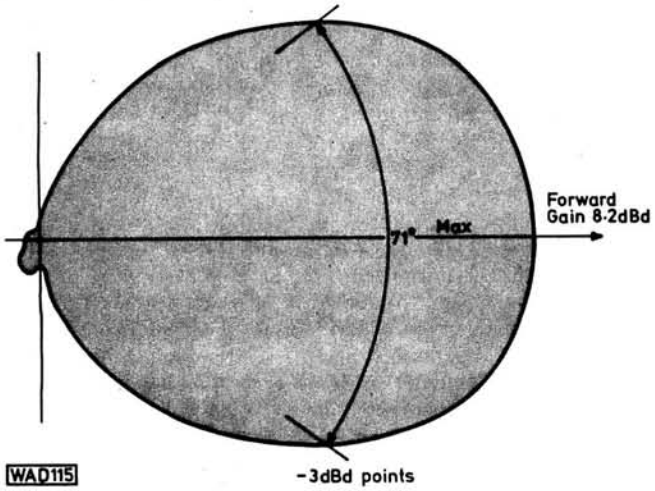



**Fig. 6: Horizontal mode radiation pattern of the prototype 144MHz antenna. Measured gain is 8·2dBd**

It has been advocated that owing to its useful amount of gain and wide beamwidth the ring beam antenna would be ideal for satellite working. ●

## References


(1) *Cubical Quad Antennas* by W. Orr W6SAI. Radio Publications Inc. U.S.A.

(2) *Antennas (Chapter 3—The Antenna as an aperture).* J. D. Kraus. McGraw Hill Book Co. Inc. U.S.A.

(3) *The ARRL Antenna Handbook (Chapter 2—Antenna Fundamentals).* Published by the American Radio Relay League.

(4) *Antennas (Chapter 6—The Loop Antenna).* J. D. Kraus. McGraw Hill Book Co. Inc. U.S.A.


## Kindly Note

***PW* "Marchwood"—1/2 June/July 1983**

As a result of an unfortunate misunderstanding between the author and transformer manufacturer the price quoted in Part 2 of this project was incorrect. There are three possible solutions to the problem and these are outlined below.

The first solution is to approach a local transformer maker—consult *Yellow Pages* under **"Transformer mfrs"**—and ask him to quote for making a 16V 42A open style transformer primary 240V 50Hz. The ball-park figure for this is around £31 inc. VAT but not delivery. If you can find some fellow constructors who are also building the *PW* Marchwood then getting together and placing a joint order should improve the price slightly.

The second solution is to order the mains transformer by post. The original source, **Hilton Transformers, North Causeway, Wareham, Dorset, Tel.: Wareham 51646,** can supply the correct specification transformer at a price of £37.09 inc. carriage and VAT. The type number is **248/05.**

The third solution is to use a toroidal mains transformer and we have arranged with **ILP Electronics Ltd., Graham Bell House, Roper Close, Canterbury, Kent CT2 7EP, Tel: 0227 54778,** to supply a 16V 672VA (42A) toroidal mains transformer for the *PW* Marchwood. The price quoted is £27.05 inc. post and packing and VAT. The part number for this transformer is **9T845.** The change to a toroidal transformer will mean that the four fixing bolt holes in the front panel will no longer be used and should be blanked off with suitable screws. A single hole will have to be drilled in the floor of the case to accept the fixing bolt for the transformer.

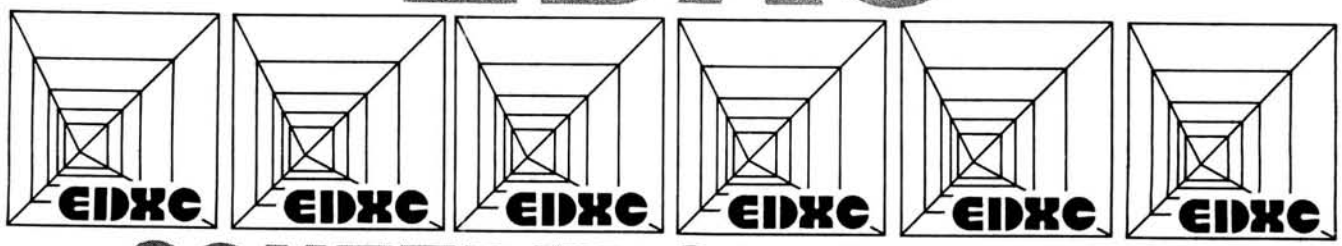
Readers should note that all orders must be placed directly with the transformer manufacturer chosen and **not** with *Practical Wireless.* It is also a good idea to check with the supplier before ordering that the price has not altered.

## Did You Know...

**That the first wireless transmission of music took place accidentally in 1877?**

In that year, a Mr Rathbone who lived near New York amused himself by connecting his telephone receiver to a telegraph line, and was astounded to hear music in it. Upon investigation, he found that Edison had been experimenting with a "singing telephone" in which several musicians playing in New York could be listened to in Saratoga Springs. Edison's telephone line ran for some way alongside Rathbone's telegraph line, and the variable currents in the former induced similar currents in the latter, and they were translated into music in Rathbone's telephone receiver. Although caused by induction, it is the first known instance of the wireless transmission of music.

# EDXC




# CONFERENCE REPORT

## BY GEOFF ARNOLD

The 17th Annual Conference of the European DX Council took place in London from 20-23 May. It was attended by some 140 delegates from 24 countries, one third of them (Australia, Barbados, Canada, Ecuador, Egypt, Ghana, South Korea and the USA) being outside Europe.

The conference was generously sponsored by Marconi Communications Systems Ltd., hosted by BBC External Services, and most efficiently organised by the DX Association of Great Britain. It brought together broadcasters and listeners for what proved to be a most enjoyable and instructive weekend.

The first afternoon gave delegates an opportunity to visit Bush House in the Strand, the headquarters of BBC External Services (BBCES), where we were given a guided tour including the news rooms and news and continuity studios, and had the pleasure of meeting face-to-face some of the announcers, usually known to us only as voices over the air. In the evening, BBCES gave a reception at the Langham (opposite Broadcasting House), soon to be redeveloped as the main London headquarters of the BBC. Douglas Muggeridge, Managing Director of BBC External Broadcasting, gave an address of welcome in which he talked about the aims and achievements of the BBCES and of the problems affecting all short-wave broadcasters, particularly the congestion caused by deliberate jamming transmissions. He said that it has been estimated that at certain times of day, more than 80 per cent of frequencies that can be heard in Europe are affected by this nuisance. He looked forward to the 1984 and 1986 World Administrative Radio Conferences on HF Broadcasting, and also to the impact of direct broadcasting by satellite.

On Saturday morning, after an address by Bill Cooke, Managing Director of Eddystone Radio Limited, Michael Murray, Secretary-General of EDXC, reported on the Council's work for the past year and plans for the immediate future: updating and expanding their Receiver Files and preparing a new edition of the QSL Survey.

Then followed a series of lectures on a variety of topics concerned with short-wave broadcasting. Keith Edwards, Assistant Chief Engineer, BBCES, spoke on WARC '84: the technical characteristics to be used in planning schedules, the use of frequencies and directional antenna design; the effect of jamming and the changing sunspot cycle, which reduces the effective amount of spectrum space available; the pressure growing on the lower frequency h.f. broadcast bands due to the increased requirements of developing nations for national coverage with least capital expenditure. He also spoke of the BBC's introduction of satellite links to carry programmes to overseas relay stations. Already in operation to Cyprus and Masira, these use special coding and decoding equipment to give a 6kHz bandwidth, 1% distortion, 50dB signal-to-noise ratio link, using two standard 300-3000Hz telephone channels each with a 64 kilobit pulse-coded modulation system. An interesting consequence of the extra 72 423km which the signals have to travel via the satellite, is that programmes including of course the Greenwich time signal are delayed by approximately a quarter of a second.

Next, Douglas Bowers of Marconi Communications Systems Ltd. spoke on developments in the design of high-power h.f. broadcasting transmitters, with particular emphasis on the need to develop circuits with very high efficiency, to combat soaring energy costs. When you're using transmitters with output powers of several hundred kilowatts upwards, this is obviously an essential aspect, both in the a.f. and r.f. amplifier stages.

George Wilcox, Editor of *Dial Search,* gave a most amusing and enlightening talk on the anatomy and life of the average kitchen radio set—what it covered, what it did, what it could do if better instructions and information were available, even what it might do if all of v.h.f. Band II were released to broadcasters. Much food for thought there.

A survey of the history and present work of the BBC Monitoring Service was presented by Richard Measham, Chief Monitor of its World Schedules Section. The BBCMS, as it is often known, really deserves an article devoted to it alone, for it is a complex organisation. From its headquarters at Caversham Park and the nearby Crowsley Park Receiving Station, on the outskirts of Reading, it listens to broadcast stations in many parts of the world, gathering news for the BBC itself and for a number of outside subscribers. A recent addition to its work is to keep a regular watch on transmissions from the Russian Gorizont satellite.

The final lecture was by John Cantrell of Eddystone Radio Limited, who traced the development of Eddystone and the receivers produced for amateurs, broadcast listeners and professional users.

On Saturday afternoon, many of the organisations represented at the conference displayed their wares at the EDXC Forum. In the evening, Radio Luxembourg personality Benny Brown talked about that station and its philosophy in broadcasting simultaneously on medium wave, short wave (6·090MHz in the 49m band) and v.h.f. Band II, and frequently mentioning the short-wave outlet in an effort to encourage listeners to take an interest in that part of the spectrum as a source of entertainment.

Sunday morning saw (most of) the delegates up bright and early to join one of the working groups for discussions on a number of topics related to short-wave broadcasting.

**"The Future of the DX Hobby":** The use of higher power and multi-channel transmissions was considered to have been to the detriment of the hobby, but relay stations did give the opportunity of logging a station in a country unlikely to install its own short-wave transmitters.

The trend among many stations to restrict QSLs was regretted though largely understood. This trend was partly for economic reasons but also because of poor quality reception reports. It was felt that new technologies would not have much effect on DXing in the near future, other than in the increased availability of short-wave receivers.

**"The Broadcaster-Listener Dialogue":** The listeners present indicated that their main interest was in the programme-listening aspects of international broadcasting. They felt that there was insufficient advanced programme information available, whilst appreciating that for many limited-budget stations, it was impossible to plan more than about eight days ahead. It was felt that more information should be made available on the short-wave receivers available to DXers.

**"The Future of Telecommunications":** This group looked at many aspects, but felt that the impact of cable and satellite distribution systems for programmes was the most important. They touched on the question of censorship by governments, which could be made very effective on cable systems. The very high cost of running high-power short-wave broadcasting services meant that many administrations would find that direct satellite broadcasting could become a cheaper way of covering their target area, possibly leading to the situation where most short-wave broadcasts are directed to third-world countries.

**"Jamming (Deliberate Interference)":** This group dealt with the history of jamming, the types of jamming transmission currently in use and their relative effectiveness, the impact of jamming, not only on the target broadcast, but also on other stations on the same or adjacent channels, both for communications-grade receivers and cheaper, less sophisticated receivers with lower selectivity used by ordinary listeners. It was noted that jamming had generally been a taboo subject with international broadcasters, presumably because of the political overtones, but that the BBC and others now seemed ready to bring it into the open.

On Sunday afternoon, delegates were taken by coach to see either the BBC Daventry transmitting station, or the BBC Monitoring Service establishments at Caversham and Crowsley Park. BBC Daventry is now devoted exclusively to short-wave broadcasting. It has a total of 14 transmitters with powers up to 250kW, feeding into an antenna farm comprising some 47 antennas covering all the broadcast bands from 4 to 26MHz, supported from 44 masts and towers, and covering a total area of approximately 250 acres. A number of the transmitters are more than 40 years old, the most modern are two s.s.b. transmitters used to feed programmes to overseas relay stations.

The work of the Monitoring Service has already been described briefly. We hope to publish a more in-depth article in *Practical Wireless* in the near future.

The Conference came to a close at midday on the Monday, after the Working Groups had presented their reports, as described, and a proposal by the World DX Club had been carried by an overwhelming majority. This proposal said: "The European DX Council, speaking on behalf of short-wave listeners represented in its member clubs, condemns the practice of deliberate interference to radio broadcasts. It points out that this practice affects broadcasts other than the intended target. The European DX Council will monitor the situation and present information on the extent of such interference in its News Letter and will communicate its concern to whichever authorities it considers appropriate."

The Final Address to the Conference was presented by an unexpected but most welcome visitor, Herr Werner Wolter, representing Richard Butler, Secretary General of the International Telecommunications Union in Geneva, and responsible for the co-ordination of World Communications Year. Herr Wolter spoke particularly of the indirect benefits of telecommunications in developing countries, where a very large proportion of the population live in rural areas. In Africa, for example, this stands at around 80 per cent. He cited how telecommunications can break the feeling of isolation for the populations of these rural areas, giving them a sense of security, allowing law and order to be more effectively maintained, warnings of natural disasters to be more speedily conveyed, and social and cultural contacts more easily made.

Some of the statistics given by Herr Wolter were particularly interesting. In December 1982, it is estimated that there were 558 million telephones, 575 million TV receivers and about 1·5 billion radio receivers in the world.

The 1984 EDXC Conference is to be held in Stockholm, from June 8-11, and looking further ahead, the 1985 Conference is to be in Madrid.

Further details of organisations mentioned in this report can be obtained from the following addresses:

**European DX Council,** PO Box 4, St. Ives, Huntingdon, Cambridgeshire, England PE17 4FE.

**DX Association of Great Britain,** Five Acres, Whiteditch Lane, Newport, Saffron Walden, Essex, England CB11 3UD.

Since both are voluntary, non-profit making organisations, no doubt a stamped addressed envelope or at least return postage would be appreciated. ●

## MODS No. 25

▶▶▶*continued from page 25*

When the p.t.t. is closed, FMT 6·8V is powered up but FMR 6·8V is not. Tr1 collector is high because it has no bias on its base until C1 can charge up through R1. As the squelch was closed during the previous receive period, Q1021 collector was at earth potential, thus preventing C1 charging through D1. The high on the collector of Tr1 biases Tr2 on and as its collector falls towards earth potential, the tone is initiated; either BC147 or BC182 can be used for the transistors. When Tr1 is on, because C1 has acquired enough charge to provide bias, its collector falls and this removes the bias from the base of Tr2. This allows Tr2's collector to rise and the tone ceases. The duration of the tone is governed by the time constant of C1 and R1. Capacitor C2 is included to prevent false triggering. Both C1 and C2 are tantalum capacitors. If the repeater has already been accessed, the tone will not be present because the squelch will have been open prior to transmitting and this will have allowed C1 to have been charged through D1 during the receive period. Therefore Tr1 will conduct immediately FMT 6·8V is applied as its collector is virtually at earth potential, thus removing the bias from the base of Tr2 and inhibiting the tone.

In the simplex mode, the toneburst is disabled because the bias on Tr2 is fed to earth by S3C, the simplex/-repeater shift switch, and on s.s.b. FMT 6·8V is not present.

The CALL button will still operate normally as it is not affected by this modification.

Thanks for an excellent mod Tom.

# Swap Spot

Have Yaesu FRT-7700 a.t.u., brand new and never used. Would exchange for any scanner, radio w.h.y. Mr E. Gildea. Tel: 051 260 9116 (Liverpool). *S590*

Have two good receivers Yaesu FR50B and Eddystone 740, ideal for s.w.l. or learner, also Morse tutor (Datong). Would exchange any of these for good g.d.o./wavemeter or w.h.y. Martyn Bolt G4SUI. PO Box 8 Mirfield, West Yorks. *S591*

Have golf clubs 3, 5, 7, 9, putter, PW 2, 3 and 4 woods, bag, umbrella. Also have C-Scope 800 metal locator. Would exchange for 144MHz rig, monitor 'scope, frequency counter, w.h.y. Colin G4LXN. Tel: Chipping Sodbury 318528. *S602*

Have radio test gear; Marconi sig. gen. 10–310MHz with manual, Leyland b.f.o. 50Hz–20kHz, Solartron power pack variable 0–500V, 'scope (general purpose and servicing), many other items. Would exchange any or all for optical instruments. Tel: 0636 73265 (Newark, Notts). *S603*

Have Realistic DX200 (150kHz-30MHz) receiver with frequency readout, plus Tamiya Superchamp radio controlled racing buggy with fleet supercontrol, Acoms 2-channel radio, NiCad rapid charger. Would exchange for R-1000 or FRG-7700 receivers in good condition. A. Southby, 25 Park Hill, Church Crookham, Hants. Tel: Fleet 3965. *S604*

Have Yashica FX3 s.l.r. camera F2 lens e.r.c., mint condition. Would exchange for mains powered scanner/receiver. Also have Lafayette model HE30 in fair condition (working). Would exchange for Air band receiver/scanner. Bishton, 2 Edgar Street, Ramsbottom, Bury, Lancs BL0 9JT. Tel: Ramsbottom 4598. *S631*

Have ex-RAF Mk 9 Bubble Sextant, in excellent condition, in box with extension leads. Would exchange for best all band transceiver or very good receiver. Gillespie, 58 Thrush Rd, Redcar, Cleveland. *S632*

Have Atari video computer system plus 8 cartridges. Would exchange for Sinclair Spectrum (48K) or w.h.y. (amateur radio gear). Also have Sony ICF 6700W general coverage receiver. Would exchange both for h.f. transceiver or w.h.y. T. Maund GM6UNJ. 6 Winfield Close, Benbecula, Scotland PA88 5LQ. *S641*

Have 35MHz radio control plane flightbox. Would exchange for IC-215 or similar or Sinclair or w.h.y. Tel: 02572 62250 (Chorley). *S642*

Have MML144/30LS linear amp, suitable for FT-290R etc., excellent condition, boxed and never used mobile. Would exchange for RTTY terminal unit; Scarab MPTU1 or similar for use with their interface board. Mike c/o 2 Penrose Villas, Mannamead, Plymouth PL4 7BD. Tel: 0752 669536 after 6pm. *S643*

Have AR77 general coverage reciever, working with bandspread 3·5MHz, 7MHz, 14MHz and 28MHz bands, with manual. Would exchange for Datong FL1, HW32A or Tatty SB101. G4MNB. Tel: 0793 826325 (Swindon). *S644*

Have Eddystone 840A communications receiver in good working order. Would exchange for any 144MHz accessory of a similar value. Delivery may be possible. Tel: 0704 73435 (Southport). *S663*

Have Amstrad CB 901 with base and mobile antenna, K40 speech processor, 13·8V 3 amp power supply. Would exchange for s.w. receiver or 144MHz hand held. Ray. Tel: 0383 736401 (Dunfermline). *S696*

Have ZX81 and 16K RAM plus extras. Would exchange for DX receiver or CB home base or 35mm s.l.r. camera. Matthew. Tel: Milton Keynes 312035. *S697*

Have Trio 7010 144MHz s.s.b. 144·260–144·450MHz, very good condition, Partridge Supermatch a.t.u. and v.f.a. (TX version). Would exchange for 29·3–29·6MHz s.s.b. RX or 432MHz, 1296MHz or satellite equipment. G6HHV. Tel: 051 327 5804 (Eastham). *S698*

Have 78mm Astronomical telescope complete with tripod and accessories, mint condition. Insured value £350. Would exchange for solid state communications receiver a.m./f.m. Ex-service acceptable providing handbook and circuit available. Tel: 0795 875973 (Sheppey). *S699*

Have Britex Student microscope with case, 144MHz Sea Star hand held, remote mic, case, rubber duck, home brew linear 3 in 20 out, pre-amp. Would exchange all for h.f. receiver. J. Harris, 30 Springfield Road, New Elgin, Moray. Tel: 0342 7299. *S713*

Have Feinwerkbau s.u. match air rifle, in very good condition. Would exchange for h.f. general coverage receiver or transceiver. Peter. Tel: 0685 875006 (Aberdare). *S716*

Have Belcom Liner 2 working on 144MHz and 28MHz. Would exchange for h.f. linear amplifier or good quality a.t.u. SEM or similar. T. R. Slack. Tel: 0983 866687. *S717*

Have mechanical engineering skills and facilities. Would exchange time and effort on your behalf. Would exchange for Yaesu FL-100B transmitter. R. Colvin, 46 Beechwood Ave., Woodley, Berks RG5 3DG. *S718*

Have Sommerkamp TS7888DX in good/fair condition. Would exchange for v.h.f./u.h.f. equipment, test equipment or communications receiver. Also have Heathkit HW101/P523/HS1661 for exchange. Ron Kumetz Jr. 88 Lee Street, Elmwood Park, New Jersey 07407, USA. *S719*

Have Olympus OM1 50mm zoom lens motorwind 2X converter, extension tubes, National flash with adjustable head and aluminium case. (to be collected). Would exchange for 7700M or Icom R70. Allan Wood, 8 Crampton Court, Top Valley, Nottingham NG5 9EJ. *S730*

Have photocopier, OCE model, (cost £800 seven years ago). Would exchange for general coverage transceiver. Also have B♭ tenor saxophone and B♭ clarinet (cost around £400). Would exchange for general coverage receiver. W. Lambert, Glaglig, Broadway, Co. Wexford, Ireland. *S734*

Have good quality combination hi-fi system, Rotel logic control tape deck, Rotel 25W—p.c. amplifier, 60W speakers, belt drive record deck. Would exchange for h.f. rig, must be digital readout, non-working considered if clean. Details please to Jim. PO Box 22, Hereford. *S747*

Have Zenith 35mm s.l.r. camera, Ferguson portable television, roll-up film projector screen with tripod—all good working order. Would part exchange for v.h.f./u.h.f. receiver. Thomas Blamey, 83 High Street, Tonyrefail, Mid Glam. CF39 8PH. *S757*

Have Sanyo RD5600 stereo cassette deck and Sony TA1055 stereo amp, both excellent condition. Would exchange for Spectrum 48K or 16K with details of RTTY conversion. Would consider ZX81 with printer and ancillary items. Tel: Ash Green 874480 (evenings). *S758*

Have Sharp GF575 tape recorder/receiver, double tapes. Would exchange for Grundig Satellit or similar. Tel: 01-660 0177 (9am-5pm). *S784*

Have JVC stereo cassette radio player, plus 40 channel f.m. CB transceiver. Would exchange for any h.f. communications receiver. C. Roberts, 20 Bridge Street, Shotton, Deeside, Clwyd, N. Wales. Tel: Deeside 811687. *S799*

# Swap Spot

Have B40 0·65-30MHz s.w. s.s.b. receiver in good condition. Would exchange for good f.m. 27MHz CB plus car antenna. Tel: 0946 820032 (Egremont). *S782*

Have 88 copies Practical Television 1957-1967 and T1333. Would exchange for Government surplus wireless equipment with handbook or w.h.y. S. V. Hunter, 30 Adelaide Street, Barrow-in-Furness, Cumbria LA14 5TX. *S783*

Have Zeiss Jenoptem 10 x 50 binoculars in mint condition. Would exchange for any amateur receiver. S. Speirs, 9 Woodland View, Wyesham, Monmouth. Tel: 0600 4902. *S806*

Have Acorn Atom 12 + 12K computer complete with p.s.u., v.i.a. and toolbox including programs. Would exchange for Yaesu FT-708R or 432MHz handheld in excellent condition. W. F. Clarkson. Tel: 0274 723101 during office hours. *S807*

Have Avo 8 Mk 5 multimeter (latest model) unused, mint condition, in original box complete with leads, probes, clips and batteries plus warranty from Avo Ltd. Would exchange for KW2000B h.f. transceiver in similar condition. M. Wlach, 33 Coleridge Road, Old Trafford, Manchester M16 9QU. *S808*

Have C-Scope v.l.f. 1200 ADC, as new, value £200. Would exchange for Yaesu FT-208 or 708. Tel: Elland 75901 (evenings). *S819*

Have RGD all-wave radiogram model No. 746G, working order. Would exchange for ZX81 related products or w.h.y. amateur radio. Tel: 040 481 3390 (Ottery St. Mary). *S822*

Have Nikon F camera with 35mm and 24mm lenses. Would exchange for SX200N or Bearcat scanner, 144MHz handheld or good computer. Tel: Brian 051 264 8682 (Liverpool). *S823*

Have 144MHz mobile (12V) receiver. Would exchange for your mono or stereo "disco" amplifier. Tel: 0904 765296 (York). *S828*

Have mobile CB radio, power pack, mobile antenna. Would exchange for 4W CB handheld set or other radio equipment. Ray. Tel: 0922 54631 (Hertford, Herts.). *S829*

Have 40 transistor radios, working. Would exchange the lot for decent communications receiver (valved type acceptable). Also have B. 29 (ex-Navy) long wave communications receiver. Would exchange for any standard communications receiver with cash adjustment. Tel: 0273 737076 (Brighton). *S830*

Have Sharp MZ80K microcomputer, 48K RAM with about £200 of software, including FORTRAN, FORTH, BASIC Toolkit, PASCAL—14 months old. Would exchange for FT-101Z or similar h.f. transceiver or w.h.y. M. Dodds, 38 Watson Place, Dunfermline, Fife. *S831*

Have Trio-Kenwood TR2300, charger, case, helical, spare whips and power leads, NO NiCads. Would exchange for w.h.y. Tel: Ian on 05095 502989 (Shepshed). *S849*

Have Heathkit SB-310 RX, ex-BBC receiver, covering 9 amateur and s.w. broadcast bands and Global AT-1000 a.t.u. Both in very good condition. Would exchange for electronic organ components. J. Barton. Tel: Witney (0993) 75220. *S850*

Have metal detector, auto discriminator C-Scope v.l.f. and TR-1200 20 months guarantee with deluxe case in brand new condition, cost £225. Would exchange for Microwave Modules 144/100LS, 144/30LS + balance or w.h.y. Tel: Tony 047482 3369 after 8pm (Shorne). *S853*

Have RAF 1392 v.h.f. receiver with p.s.u. Would exchange for ATV convertor, Microwave Modules type, or Pye Pocketphone receiver PF1. A. J. Humphriss, 21 Gould Road, Hampton Magna, Warwick, CV35 8TU. *S857*

Have collection of Science-Fiction books, original cost over £110. List of books sent if required. Would exchange for any type of radio or ATV equipment. Could deliver along routes Dover/London/Oxford or M1/M6 to Lancashire or Felixstowe/Cambridge/Northampton/M1/M6. Mr S. Hurst, 14 Boars Head Avenue, Standish, Wigan WN6 0BH. *S858*

Have Hitachi 3-band stereo radio recorder, Philips 640 pocket memo plus charger, motion electronics television sound monitor, Sony TPS-L2 stereo cassette player with a.c. adapter. All as new. Would exchange for FRG-7 or Eddystone 770R. Tel: 0258 53933 (Blandford, Dorset). *S879*

Have complete mobile/base CB station including Transcom GBX-4000 and many extras—almost everything you would ever need for a complete station. Would exchange for Sinclair ZX Spectrum 48K RAM or similar. Tel: Romford 46538 after 5pm. *S896*

Have hi-fi cabinet, solid teak, "record housing lowflex" 1·5m long 0·6m high 532mm deep. Three compartments, pneumatic lid. Would exchange for multimeter with a.c. current or w.h.y. Bennett, "Ashley", Lambs Lane, Lawshall, W. Suffolk. Tel: Hartest 411. *S898*

Have Shimizu SS105S 10W h.f. rig plus completed homebrew 2 x 813 linear, including 2kV softstart p.s.u. Would exchange for any solid state/hybrid 100W h.f. rig, e.g. FT101, consider equipment requiring attention, but not junk. Gee Goodrich G4NLA, Tel: Brighton 739841. *S899*

Have Maplin 5600 stereo synthesiser in perfect condition, fully built, adjusted and tested, cost £750 to build. Would exchange for good h.f. transceiver, FRG-7700 receiver plus Microwave Modules 28/144MHz transverter or would consider other items of radio equipment to comparable value. Tel: 0945 63095 (Wisbech, Cambs.). *S918*

Have 16K ZX81 and extras. Would exchange for CB home base or DX receiver or w.h.y. Tel: Matthew, Milton Keynes 312035 evenings or weekend. *S919*

Have Acorn Atom 8K ROM + 3K RAM in excellent condition, supplied with all leads, transformer and instruction manual. Would exchange for IC2E or other synthesised 144MHz handheld/portable (f.m.) in working order. R. C. Stirman GI6WLL, 14 Church Crescent, Glengormley, Newtownabbey, Co. Antrim, BT36 6ES. *S931*

Have SX200 scanner also AKAI reel tape recorder. Would exchange for Panasonic DR49 or Trio R2000. W. J. Bannister, 3 Eastbourne Walk, Liverpool 6. Tel: 051-263 6724. *S932*

## *PW* "SWAP SPOT"

Got a camera, want a receiver? Got a v.h.f. rig, want some h.f. gear to go with your new G4? In fact, have you got anything to trade radio-wise?

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

A FEW SIMPLE RULES: Your ad. should follow the format of those appearing above; 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.

# DOTS DASHES

## by Ron Ham

The late Margaret "Meg" Mills, G3ACC, author of the book *The Morse Code For Radio Amateurs* in the late 1950s said, "A sound knowledge of the Morse Code is a great advantage, for none can say when that knowledge will be required. A feeble SOS from an aircraft wrecked in the desert or a ship marooned at sea could pass by unheeded in a world where few knew the Morse Code."

## In The Beginning

In the late 18th century, a French engineer, Claude Chappe, built an optical telegraph system using a long pointer, controlled by ropes, in the centre of a large lettered dial mounted on a giant backboard and installed on high ground. Briefly, the letters of the message, selected by the pointer at a predetermined time, were read some distance away, providing the visibility was good, by someone with a telescope. Chappe's telegraph soon extended through France and a similar system, using holes and shutters, was developed by Lord George Murray and used in southern-England. They closed around 1850 in favour of the Electric Telegraph, pioneered by Cooke, Edison and Wheatstone, which rapidly developed until miles of telegraph wires were visible in many countries.

The basic telegraph used a key and battery at the transmitting end and a bell, buzzer, or electromechanical sounder at the receiving end, Fig. 1 and by pressing the transmitting key, the receiving device would sound. No doubt this was a fine alarm, but it could not convey messages until a code, using short and long operations of the key, dots and dashes, was invented by Samuel B. Morse in the 1860s. The Morse code, adopted internationally, is a rhythm of dots and dashes and each letter and number has a sound of its own, for example, A ·– or rhythmically di-dah and B–··· becomes dah-di-di-dit and so on through the alphabet. Once this rhythm was learnt by the early telegraph operators, messages of any length could be transmitted between telegraph offices many miles apart.

## Telegraph Without Wires

At the turn of the century and the coming of "Wireless" the key was used to interrupt the output of the early wireless transmitters and so, by using the same short/long signals, messages in Morse code could be sent over great distances without wires, as Marconi proved in December 1901 when he repeatedly heard three dots, the letter "S", di-di-dit, coming from his receiver on Signal Hill, Newfoundland, having been sent from his wireless station in Poldhu, Cornwall.

As wireless communications developed, many enthusiasts learnt to use the Morse code and prior to World War I, wireless operators in the Royal Navy and the Merchant Service used the code for ship to ship and ship to shore messages as well as for distress when they sent the letters CQD and later SOS. Many early amateurs and wireless enthusiasts learnt the Morse code by listening to the news bulletins from the Eiffel Tower (15 w.p.m.), the German station Nauen (18 w.p.m.) and weather reports from Cleethorpes (20-25 w.p.m.) The G.P.O. also used the Morse code for internal transmissions of their telegrams and employed and trained a large number of telegraphists.

## Call Up For War

With the outbreak of WW-I in 1914, all branches of the services needed wireless operators so hundreds of pre-war amateurs and Post Office telegraphists volunteered or were later drafted into the forces for this purpose. One such man was Edward Emlyn Davies from Farnham, aptly nick-named "double dot" (EE), whose pre-war knowledge of the Morse code enabled him to join the Royal Signals and work as a "wireless spy" at Armentieres. The late Bill Longmire, G3TKL joined the signals section of the 26th Canadian Battalion in 1914 and had to pass in Morse code at 12 w.p.m. with buzzer, lamp and heliograph. Like many others, Bill was one of the signallers who used the key on the Marconi 50 watt Trench set.

Mark Deny, G6DN, a RNAS operator said that sending Morse messages with a spark transmitter below an airship gas-bag was one of the hazards of life in those days. Although Mark was a licensed amateur in 1914 and no stranger to the key, the Navy required him to pass a Morse test at 25 w.p.m. for 5 minutes without a mistake.

As time went on recognised abbreviations within the Morse code were used to save wireless operators time — a good example is the international 'Q' code, QRM, QSL, QSB, QTH etc. It is much quicker to send ––·– ·– ···· (QTH), than a lengthy address. The armed forces developed

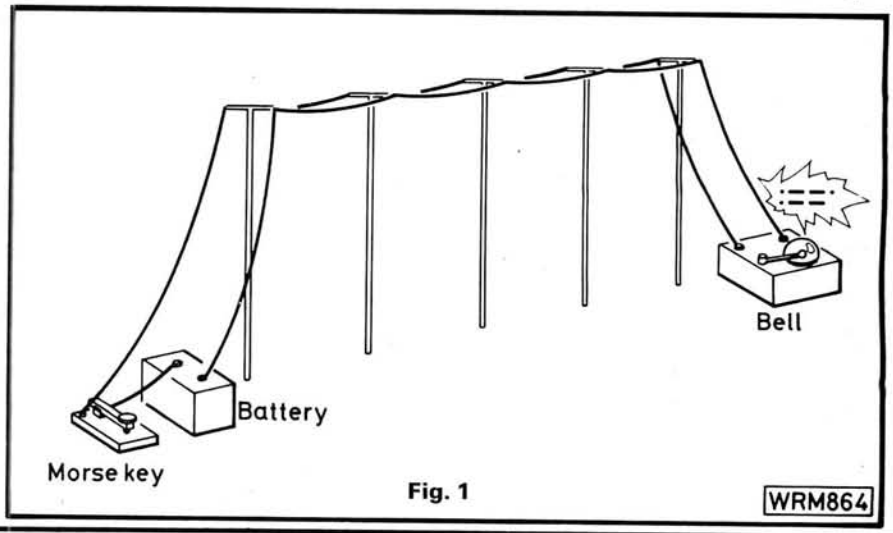



Fig. 1 WRM864

their own code letters for weather reports, stations identification, a variety of battle conditions and to classify enemy aircraft, airships, gun positions and warships.

## The Inter-War Years

Between 1918 and 1939, great strides were made in the development and design of radio communications equipment. Gone were the days of the spark transmitter, now it was the turn of thermionic valves and quartz crystals. Much thought was given to the reception of c.w. (continuous wave) signals by the introduction of an adjustable beat frequency oscillator (b.f.o.) to add tone to the incoming signal, switchable i.f. selectivity and special audio filters to sharpen c.w. reception. Receiver improvement was essential because as flying developed, radio beacons for navigation were installed at strategic international locations and each one transmitted a continuous wave, periodically interrupted by a Morse coded signal for identification purposes.

During the 1930s, the Radio Society of Great Britain organised several national and international contests, as well as their annual National Field Day, for c.w. operators. The society also had a Radio Experimental Section where members, who studied propagation, learnt that the tone of a c.w. signal could tell them a lot about atmospheric conditions, for example the letter "C" dah-di-dah-dit, would sound like ror-ri-ror-rit if the signal was reflected from an auroral display. It was also proved that a c.w. signal was more reliable than phone for communication when band conditions were poor.

In brief, the radio amateurs of the 1930s, through their continual experimenting, had most of the know

**Fig. 3: A selection of WW-I sets, the Marconi 50W trench set is bottom left**

how about radio communications both with the Morse key and the microphone.

## The Reserves

Throughout WW-I, the armed forces realised the value of having ready trained telegraphists and were so determined that there would be no future shortage that in 1932, the Admiralty set up the Royal Navy Wireless Auxiliary Reserve (RNWAR). Later, in 1938, the Air Ministry established the Royal Air Force Civilian Wireless Reserve (RAFCWR). These organisations, which came into being with the help of the RSGB, were so successful that the following references were made to them in the official phamphlet, *National Service,* published by HMSO in 1939:

page 30 . . . RN Volunteer (Wireless) Reserve

"The Royal Navy Volunteer (Wireless) Reserve is formed for the purpose of training and providing telegraphists for service in the Royal Navy in emergency"

Qualifications.

"The age limits are 18 to 45 and candidates should be amateur operators or should be interested in wireless telegraphy transmission work in Morse Code".

page 42 . . . RAF Civilian Wireless Reserve

Qualifications.

"Men who are proficient amateur wireless operators, preferably holders of General Post Office Transmitting and/or Experimental licences, are eligible for the Civilian Wireless Reserve. The age limits are 18 to 55".

## At War Again

Note the emphasis in that official document on amateur radio. How right they were! When war started again in September 1939, hundreds of radio amateurs were ready to serve their country and during WW-II they operated such famous sets as WS-18, 19, 46, 52, T1154, B2 and others, all fitted with Morse keys. Throughout the war, c.w. was used on land, at sea and in the air and posterity will never know just how great a contribution was made by the brass pounders and their Morse coded messages.

## Silent Keys

The Morse keys of two famous amateurs, the late Barbara Dunn, G6YL, (licensed in 1927) and the late Nell Corry, G2YL, (1932) now occupy a proud position in the author's collection.

Barbara made some 17 000 c.w. contacts in her 50 years on the air and Nell, whose key was made in 1915, established a record in 1935 when she made c.w. contact with stations in all 6 continents in 6h 20m, earning her the praise of the national press of the day.

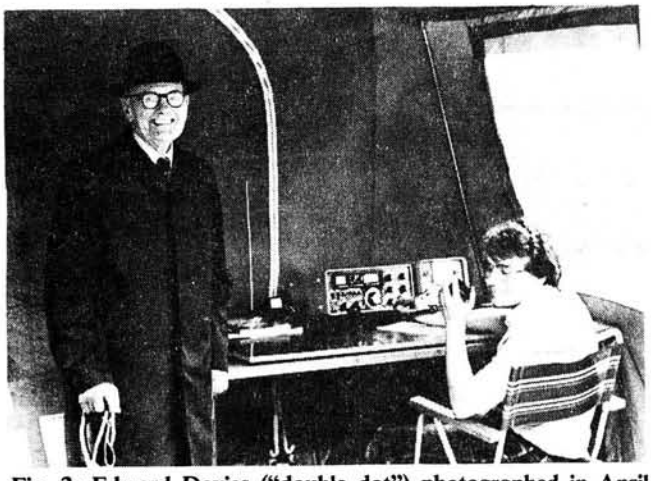


**Fig. 2: Edward Davies ("double dot") photographed in April 1981**

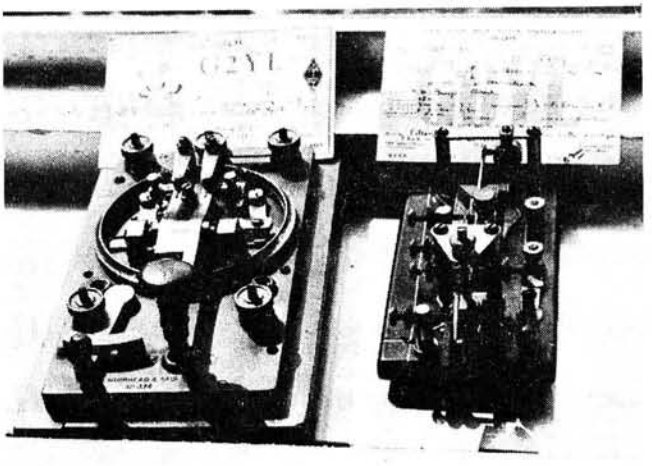
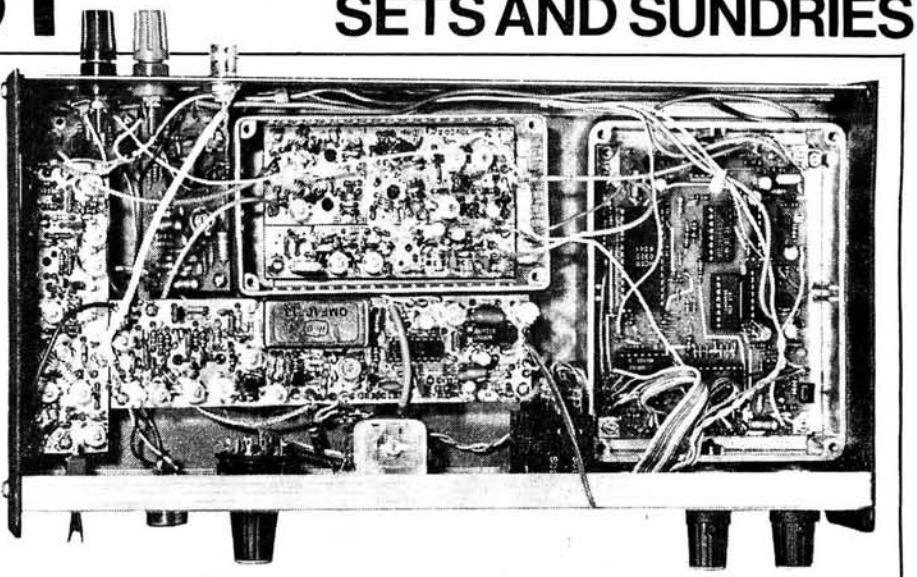


**Fig. 4: The Morse keys of G2YL and G6YL**

# AIR TEST

## USER REPORTS ON SETS AND SUNDRIES

## WOOD & DOUGLAS 430MHz Synthesiser Kit



**The completed 430MHz synthesiser rig**

I approached the idea of this review with a mixture of uncertainty—not understanding the "nitty-gritty" of synthesiser design—and enthusiasm. It seemed an interesting way to expand my u.h.f. horizons. I was pleased to note that the kit was collected from the "normal" pile of kits, not from a special drawer marked "review kits only", so clearly Wood & Douglas had faith in their packing efficiency.

The construction notes warn that it is quite an advanced project, not to be undertaken lightly, and if the constructor is in doubt, to send it back and buy a ready-built module. It is good to see a warning like this, and it made me read the instructions thoroughly before proceeding. This proved essential as there were one or two modifications that needed to be noted sooner rather than later.

The kit contains the synthesiser, v.c.o., receiver, shortened transmitter strip, modulator, and solid-state relay for the supply switching. I decided to build the synthesiser first. There were two packs of components, one containing most of the components, the other the i.c.s and sockets. These should always be used in projects of this nature, and it is nice to see them provided. Indeed W & D warn that they will only service units fitted with i.c. sockets. The printed circuit boards were of excellent quality, drilled, with no omissions. The main i.c. used is the 0320 by Hughes Microelectronics and featured in the Don Lancaster *CMOS Cookbook*. This is a versatile device and well exploited by Wood & Douglas in this kit.

It is worthwhile sorting out the components, rather than picking them out at random, it being very easy to confuse say 100Ω with 1kΩ when in a hurry. The instructions give clear directions on the order of construction and if followed no problems should be encountered. A useful component check list was included which noted any changes, but my kit had ended up with four 10µF electrolytic capacitors and one tantalum capacitor, rather than the other way round. A quick look at the circuit diagram showed that the tantalum was best suited to the filter, and the others weren't critical, so that was how they were used. I didn't bother to check the transistor pin-outs, being content to trust the overlay diagram, which didn't let me down.

I feel that perhaps a rather obvious general warning ought to be included about ensuring components don't touch tracks on the component side of the double-sided p.c.b. I found C5 and C11 a bit close and bent them away. There are four through-board links to be made, as well as one link wire by IC7, and this could have been a bit more clear on the diagram as there are two holes available. It is the hole nearest to IC7 that is used.

The construction section is followed by seven paragraphs of setting-up procedure, the first three of which were accomplished easily. The fourth however proved a problem as it needed the v.c.o. which I had not built yet!

No problems were experienced—or so I thought—in building the v.c.o. My only minor gripe was that L9 had been changed so the drawing was incorrect, but still easily understood. The setting up went superbly until I tried to peak up the 5MHz (approx.) output. Nothing was appearing and after many frustrating hours a phone call to Wood & Douglas revealed that I had put the BF981 in upside down. Take care with this four-legged device; it worked when I put it in the right way round so it must be quite robust, but check its orientation—twice—not like me. Tuning up then proceeded very smoothly, and no problems were encountered linking it to the synthesiser board, and the system locked up nicely.

The receiver was reviewed in *PW* (Oct '80) so it won't be repeated here. Suffice it to say that the circuit has to be slightly modified for external oscillator drive, and this proved to be very easy. It tuned up with no problem at all, and was extremely sensitive. Though the transmitter was also reviewed in *PW* at the same time it was not in fact used with this kit, because Wood & Douglas provide a "shortened transmitter strip", taking the 20nW, 144MHz signal from the v.c.o., tripling it and amplifying up to 500mW. The only omission in the kit occurred here, one resistor, so almost full marks to the packing department—certainly many times better than some kits I have built.

At the risk of being repetitive, this, along with the solid-state relay and the modulator, worked first time. The p.a. is tuned up with the output coaxial lead in one position, followed by the output filter, with the coaxial lead in its final resting place. The other end of the lead then connects to the receiver where there is an effective diode switch to avoid the use of relays. When all was connected the TX was delivering approximately 800mW.

The unit was built into a Centurion DX4 case, and with the v.c.o. and synthesiser in individual die-cast boxes it was a tight fit, but looked extremely smart. Wood & Douglas recommend the use of a case with as few separate sections as possible to avoid problems with parts of the case not making a good earth connection. There were a few microphonic hiccups but these were soon ironed out, and the casing was, indeed, the cause.

Feeding into a dipole I was amazed to find six repeaters suddenly available to me. The spectrum analyser revealed a nice clean signal, and audio reports were extremely favourable. The 70 PAC2 kit costs £128 inc. VAT plus 75p post from **Wood & Douglas, Unit 13, Youngs Industrial Estate, Paices Hill, Aldermaston, Reading RG7 4PQ. Tel: 07356 5324.** *G4LBW*

# WOOD & DOUGLAS

## 70PA2/S 432MHz RF Switched Pre-amplifier

The effectiveness of r.f. pre-amplifiers has been discussed several times in *PW* and the main conclusion reached is that for optimum overall system sensitivity/lowest noise figure the place to locate a pre-amplifier is as close to the antenna as possible. On 432MHz the result of placing the pre-amplifier at the shack end of 15m of UR67 coaxial cable, assuming a noise figure of 1.9dB for the pre-amplifier and a 6dB receiver noise figure, would result in an overall noise figure of 6.1dB. The **overall** system noise figure for a mast-head mounted pre-amplifier would be 2·63dB—a **very** significant improvement.

Wood and Douglas developed the 70PA2/S for this purpose and the unit can be purchased ready built or as a kit. As with all W & D products yet seen by this reviewer the level of preparation is exceedingly good and sets the standard for kit suppliers.

As the double-sided p.c.b. is laid out with a device density similar to that found on industrial assemblies reasonable proficiency in forming and soldering the 57 components is called for. The kit version on review took approximately $2\frac{1}{2}$ hours to assemble following the concise instructions provided, which include circuit diagrams, p.c.b. overlays and all relevent device identification information.

Circuit wise the 70PA2/S uses an NE 21936 low noise bi-polar transistor in a common emitter configuration with tuned input and output. Protection from excessive r.f. to both input and output is provided by back-to-back 1N4148 clamping diodes.

Electro-mechanical relays are dispensed with in favour of *pin* diodes for r.f. switching, which has the advantages of reduced price, size and long term stability. The only disadvantage is that this arrangement does limit the power handling to a safe level of 30W, but for most commercial transceivers, ATV transmitters etc., this is still well within safe limits.

The r.f. switching arrangements are designed to provide maximum versatility and incorporate both r.f. sense VOX and "hardline" control options as standard. With no d.c. supply (12V) applied to the pre-amplifier the unit is effectively "transparent" to r.f. in both directions (typical insertion loss 0.8dB). Connecting either the "—T" terminal to ground or the "+T" to the supply positive rail switches the unit into the "straight through" mode, useful if running QRP below the level needed to actuate the r.f. VOX (30mW). For s.s.b. use a hang time of 100ms is also built in.

On test the gain of the pre-amplifier was measured at 13.5dB with a supply of 12V d.c. and a standing current on receive of 60mA. All parameters quoted by the manufacturer were met by the constructed kit sample.

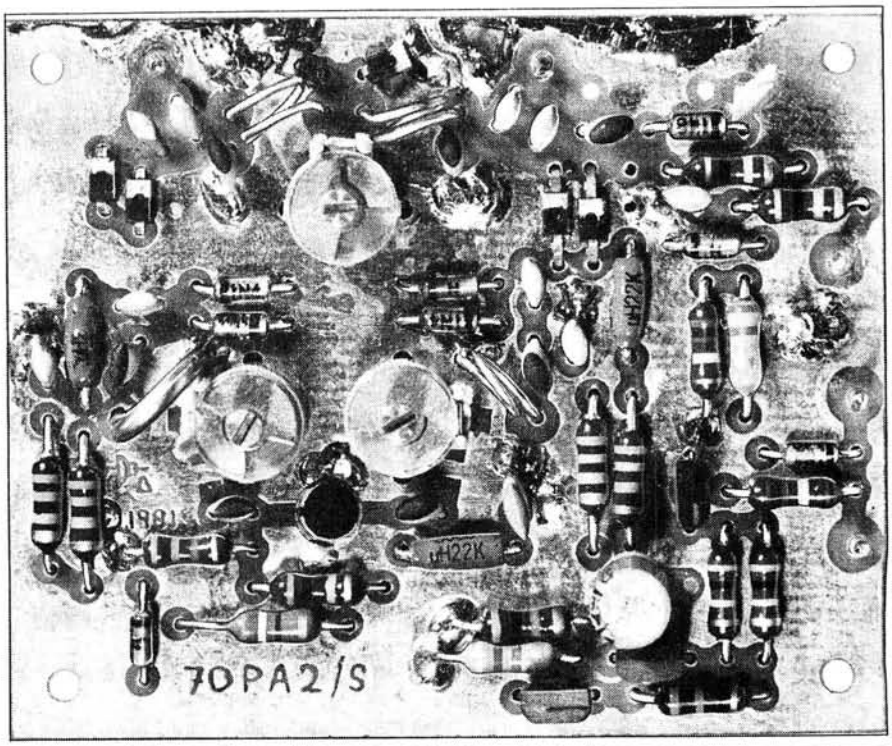
Alignment of the kit pre-amplifier consists of adjusting three film trimmers—one to set the through-switching line up for minimum insertion loss and the other two to peak the tuned input/output sections. The method adopted for the review sample was to mount the terminated pre-amplifier onto the antenna system (with mast winched over) and to audibly peak-up on a known constant weak signal source. (In this case a mysterious non-identified carrier apparently vertically polarised and first heard during early 83—any guesses?)

In use the pre-amplifier has been mounted at the mast-head approximately 1.5m from the antenna driven element (Quad Loop/Silver 70 Yagi). As the pre-amplifier is not supplied in a case a suitable r.f. and water tight enclosure was constructed by using a skimmed milk powder tin. N type r.f. connectors and d.c. input feedthroughs were mounted on the lid with the pre-amplifier sat on a copper strip bracket soldered on the rear of the lid. A wrap around with self-amalgamating tape and a generous coat of Finigans Wax Oil complete the weatherproofing which after six months of rain/snow etc., shows no signs of deterioration.

Switching in the pre-amplifier during ATV contacts always results in a typical weak picture improvement of at least two grades and on s.s.b./f.m. certainly "lifts" stations out of the noise. These results must be qualified by the fact that the MCP shack feeder is currently "only" 35m of military grade UR67 with a measured through loss of close to 6dB. Notwithstanding this drawback ATV signals have been exchanged under flat conditions over 120km and PA0 worked on s.s.b.

Thanks go to **Wood & Douglas Limited, Unit 13, Youngs Development, Aldermaston, Reading, RG7 4PQ, Telephone (07356) 5324** for the review kit which is currently available at £14.75 + p. & p., or alternatively as a built and tested unit at £21.10.

*John M. Fell.*



## Latest Icom Products

With the vast increase in usage of 144MHz and 432MHz amateur bands, Icom have introduced the IC-120, the first dedicated 1·2GHz transceiver to come onto the UK amateur market. With repeaters now operational within this band and the promise of more to come this would seem to be an ideal time to launch this product, which will allow more amateurs to explore the capabilities of this lowest microwave band.

The IC-120 covers 1260–1300MHz (1·2GHz–1·3GHz) in a channelised format with three separate tuning rates in increments of 25kHz, 75kHz and 1MHz. The rig is provided with a duplex facilitity allowing any programmed in-band offset to be obtained in conjunction with the six memory channels or the dual v.f.o.s, and the receive frequency can be varied over ±5kHz using the RIT control. When initiated from "cold" a 20MHz offset is obtained.

Comprehensive scanning of the memories, the complete 40MHz or any segment of the band is available with selection of pause on either an occupied or vacant frequency—the former will probably be the most used for some time!

Frequency readout is via a 4-digit green l.e.d. display and signal strength is indicated on the now familiar horizontal l.e.d. bargraph. With r.f. power output of 1W and receive sensitivity quoted at −8dB(0·4)μV for 20dB quieting, this transceiver offers a very attractive means of access to this exciting band for a price in the region of £329.

Second, the IC-751 which incorporates and even improves on the performance of the respected R70 receiver and the IC-740 transceiver, making it Icom's most advanced, high-performance h.f. bands transceiver with full general coverage receiver capability between 100kHz and 30MHz. It is fully compatible with Icom auto units and further options include computer control and a digital speech synthesiser.

Built-in features include a speech processor, a switchable choice of j.f.e.t. pre-amp, straight through or a 20dB *pin* diode attenuator and two v.f.o.s allowing split frequency operation. Other standard features are: 32 memory channels with scan facility and start/stop timers, a marker, four variable tuning rates, pass band tuning, notch, variable noise blanker, monitor switch, d.f.m. (direct feed mixer) in the front-end, full break-in on c.w. and AM-TOR compatibility. A 70MHz first i.f. virtually eliminates spurious responses and is followed by a high gain 9MHz second i.f.

The transmitter features high reliability 2SC2904 r.f. power transistors with a low i.m.d. (−32dB @ 100W) full 100% duty cycle. Power is restricted to 40W on a.m. and adjustable from 10W on all other modes. The IC-751 is expected to cost in the region of £950.

**The IC-751**

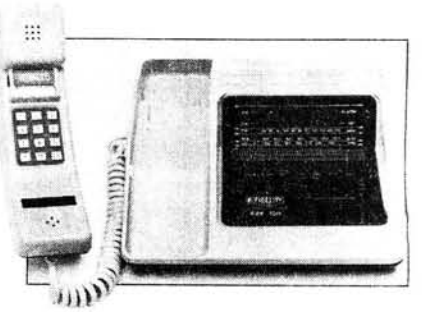
## Clock Radio Phone

Hard on the heels of its launch of the UK's first legal cordless telephone, the Wanderer (see Products July issue), Fidelity unveils a second new telephone. Called the CRP 100, it's a compact modern unit incorporating the three facilities of radio, alarm clock and telephone.

The radio operates on l.w., m.w. and f.m., has rotary tuning and slider volume control. Selector switches are provided for radio, alarm radio, alarm buzz and off. Push buttons enable selection of alarm off, sleep, alarm set and time set, also a snooze touch sensor is provided. The twelve hour clock has an am/pm indicator and readout is via a red digital l.e.d. display, which also carries a warning flag in case of failure.

The modern corded telephone handset incorporates a push button dialling system with last number redial. It is independently powered and its use automatically cuts out the radio.

Available from W. H. Smith and similar retail outlets during September, the CRP 100 will cost in the region of £70.



**The IC-120**

## Antenna Extender

Owners of hand-held or portable rigs with similar antenna connections to the FT-290 or AR-240/245, may now improve the performance of their transceiver by extending or converting the standard λ/4 telescopic antenna into a 5λ/8 whip.

The CQ Centre can supply an antenna extender that is connected directly between the existing antenna and the transceiver. The unit measures approximately 610mm long, and should assist in removing body coupling effects, resulting in a more efficient radiation of the available energy. Also, it should provide a well worthwhile increase in gain over the standard λ/4 element.

Priced at £10.50, which includes VAT and carriage, the antenna extender is obtainable from either branch of the CQ Centre at: *10 Merton Park Parade, Kingston Road, London SW19. Tel: 01-543 4214/5150 or 584 Hagley Road, Oldbury, Birmingham B68 0BS. Tel: 021-431 8201.*

## Moscow Muffler

Ever since the Russian "Woodpecker" started up, noise blankers have been incorporated into transceivers to try and combat the problem. None have really succeeded.

Now a simple and really effective blanker is available which fits into the antenna lead from the transceiver. Placed ahead of any stages of amplification and any filters, the WB1-C incorporates carrier operated antenna switching and is adjusted by two simply operated controls.

For the serious h.f. operator, this latest technology breakthrough is a must. It makes QSOs possible when they would otherwise be impossible.

The WB1-C is available from: *I.C.S. Electronics Ltd., PO Box 2, Arundel, W Sussex. Tel: (021 365) 590.*

We will be reviewing the Moscow Muffler very soon in a future issue of *PW.*


## The TS-530S Returns

We have just received intriguing news from Lowe Electronics, Trio's main importer, that due to literally world-wide demand from radio amateurs the previously phased-out TS530S h.f. bands transceiver is to be re-introduced.

As far as we are aware, this is the first time a Japanese manufacturer has acquiesced to customer demand, and must surely indicate the quality and performance of this particular rig.

Priced at the VAT inclusive price of £595 plus carriage, stocks are now available at: *Lowe Electronics, Bentley Bridge, Chesterfield Road, Matlock, Derbyshire DE4 5LE. Tel: (0629) 2430 or 2817.*

## Economy DXer's TV

A product that should prove of particular interest to the TV/DX enthusiast or the European traveller, where the B/G (5·5MHz sound) system is the standard, is available from South West Aerial Systems.

Entitled the Vega 402DE, it is a v.h.f./u.h.f. 6in screen monochrome TV, that is manufactured in the USSR, is of rugged construction within a metal case and is powered via a removable heavy-duty mains-adjustable p.s.u. or from an external 12V d.c. source (all plugs etc. are supplied).

The 402DE features very good sensitivity and sharp selectivity with its four individually tuned i.f. stages (five stages at u.h.f.). Antenna input is via separate v.h.f. and u.h.f. 75 ohm coaxial sockets, in addition a strong integral whip antenna (1·16m extended) is fitted at the rear of the set. The v.h.f. tuner is an 11 position "click stop" turret covering all Band I/III "E" channels—SWAS adjust the Ch. E2 coil to include Ch. 1A allowing all band I TV/DX channels to be received—the fine tuning range in Band III is sufficient to cover virtually all European channels without adjustment. For u.h.f. a small rotary tuner control is provided (with varicap fine tune) covering the Ch. 21-68 range.

SWAS are the sole UK distributor for the Vega 402DE, which costs, inclusive of VAT and delivery, only £58.95. Orders should be sent to their new address: *South West Aerial Systems, 11 Kent Road, Parkstone, Poole, Dorset BH12 2EH. Tel: (0202) 738232.*

I understand that Roger Bunney, probably the UK's leading authority on DX-TV, is working on some simple modifications to extend both the flexibility and versatility of this receiver.

## Signal Injector

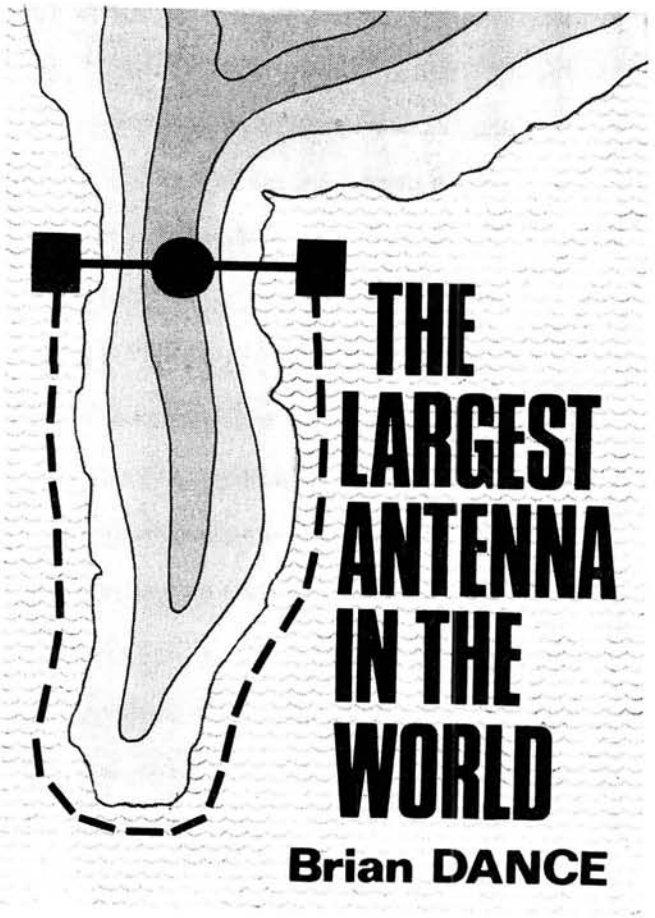
Alcon Instruments announce the availability of the Chinaglia Usijet universal signal generator. The device is a small pocket-sized, pen-shaped probe capable of providing a test signal wherever it might be needed.

Intended initially for use in fault-finding and alignment checking in the radio and TV areas, the unit has application over a wide field including the audio and communication markets.

The main signal generator is a blocking oscillator providing a basic 500kHz signal which is modulated at 1kHz for identification and demodulation check purposes. The waveform generated produces harmonics detectable right up to 500MHz, very useful in many servicing applications, and power consumption is 25mA from an internal 1·5V cell to give a 20V p-p output at the probe tip.

In use the case of the unit is connected via a fly-lead to the earth line of the equipment under test and the probe tip touched to whatever point the signal is required. The Usijet can be used in "live" test conditions and can cope with circuit voltages of up to 500V d.c.

The price, complete with earthing lead and instructions, is £11.55 including VAT, and is available from: *Alcon Instruments Ltd. 19 Mulberry Walk, London SW3. Tel: 01-352 1897.*



# THE LARGEST ANTENNA IN THE WORLD

**Brian DANCE**

The length of an antenna required for efficient transmission or reception is proportional to the wavelength of the signal concerned. Thus if one wishes to transmit very low frequencies (v.l.f.), one must use an antenna system of extremely large dimensions to obtain reasonable efficiency.

Why should one wish to use such very low frequencies anyway, since information can be transmitted so much more rapidly using signals of a higher frequency and can be transmitted and received by far smaller antenna systems?

At the present time there are two main reasons for using v.l.f., one being of great military importance and the other a useful research technique. These frequencies, which can be used to communicate with submerged submaries, are likely to bring us a new understanding of certain radio signals which are reaching us from space. Huge antenna systems are needed to transmit v.l.f. signals to submerged submarines, whilst similarly large antenna systems are required to receive extremely low frequencies from space.

## Signals from Space

A group of research workers under Anthony Fraser-Smith of the Stanford Electronics Laboratory, Stanford, California, is interested in the study of radio waves reaching the earth at frequencies ranging from a few hertz down to perhaps 0·001Hz. The corresponding wavelengths are enormous—as large as the distance from the earth to the moon. Clearly it is not possible, at least for the imaginable future, to construct an antenna of such dimensions, but nevertheless the largest possible antenna is required in order to receive the signals at a strength which, it is hoped, will be adequate for the purpose.

As the construction of an antenna system with dimensions of several km is out of the question on the grounds of cost, Fraser-Smith and his colleagues came up with the idea of using a "peninsula antenna". Sea water conducts electricity fairly well, owing to the salt and other substances in it which form current-carrying ions. Thus if one finds a suitable peninsula and puts electrodes into the water on each side, fed with v.l.f. radio signals, the electricity will flow in the shortest possible conducting path between the electrodes—namely, right around the peninsula from one electrode to the other.

In other words, the signals flow around the shore line of the peninsula in a path which can be very roughly circular if one chooses a suitable peninsula and injects the signals into the water at a point where there is a fairly narrow neck across the land.

## Practical Experiments

It is well-known that any antenna which transmits well at a certain frequency is also a good receiving antenna at that same frequency. In order to test their peninsula idea, Professor Oswald G. Villard Jr. and Fraser-Smith set up an experiment in the summer of 1975 on a small peninsula on the north shore of Chappaquiddick Island off Cape Cod, Massachusetts. This peninsula, called North Neck, juts out into the Nantucket Sound.

North Neck is some hundreds of metres across and these workers stretched a wire 300m in length across the neck and attached 0·45m square copper sheets at each end under the water. A receiver system was placed at the centre of the wire.

The antenna picked up some peculiar "wailing" sounds from space which Fraser-Smith wishes to study. Although they sound artificial, scientists are certain that these signals are a natural phenomenon. They are believed to be produced in the upper limits of the earth's radiation belt.

The following year the same workers decided a more active experiment was justified. They stretched an aluminium wire across the North Neck and attached the ends to two large pieces of galvanised iron pipe which acted as the electrodes which made contact with the sea water. The two electrodes were about 180m apart.

Their alternating signal was produced using four automobile relays connected to two 12V car batteries. A measurement of the magnetic field around the peninsula was made to determine how well the peninsula was performing as an antenna. They found that an aeroplane flying at altitudes from between 160m to 320m above the island could pick up their transmissions.

Calculations showed that the peninsula technique, using the sea water as a conductor, produced results some 49 times better than would have been obtained if they had built a conventional antenna system around the shore of North Neck.

The US Navy helped to provide funds for this work, together with the US National Science Foundation, since it is interested in its applications for direct communication with submarines. However, Fraser-Smith is far more interested in using the technique for studying natural phenomena.

He said that there is now a well-developed theory as to how these pulsations are generated, but it has never been tested practically, and he wants to be one of the first to test it.

The complex mathematical theory is that the energetic particles in the radiation belts above the earth react with other forms of radiation to produce the v.l.f. transmissions that, when speeded up by replaying recordings at higher speeds, produce sounds like the songs of humpbacked whales or like a sound track from a bad science fiction film. Fraser-Smith is not interested in the "whistlers", but in the little "warbling" currents.

## Transmissions to Space

Now Fraser-Smith wants to use a powerful enough peninsula antenna to be able to transmit signals to the radiation belts on nights when the warbling noises are absent to see if the particles interact with his signals in the way which is predicted by the theory.

Fraser-Smith wants to carry out these further experiments himself as soon as possible. He feels it will not be too expensive and that it will be fairly harmless to the environment. He needs a peninsula larger than Chappiquiddick and, whilst Cape Cod might be satisfactory, it is considered to be too densely populated for the purpose. Villard has swum through a comparable current to that which would be produced in the sea water and, while he felt a tingling sensation, was not harmed in any way.

As the current travels through a large body of sea water, it has practically no effect on any living thing as far as is known. Nevertheless, it might produce some electric shocks, especially near to the points where it is injected into the water.

Fraser-Smith is therefore considering more remote peninsulas where no people are around and has considered places in Canada, Alaska, Antarctica and Greenland. He considers the best place for the experiments will be in the polar regions, where Stanford is already operating an antenna at much higher frequencies. He does not yet have suitable equipment, but commented that the Soviets have been doing research with portable magnetohydrodynamic generators which can provide huge currents, but do not have the variable frequency characteristics he is seeking.

## Submarine Communications

During World War II it became quite clear that a submarine was cut off from conventional communications as soon as it submerged and its antenna was at a depth of more than a few metres. This is due to the conducting properties of sea water. However, the attenuation of radio waves by sea water can be shown to be proportional to the square root of their frequency. Thus a signal at 40Hz is attenuated by a factor of 30 less than a signal at 36kHz. Both the US and other Navies want extremely low frequency communications so that they can give orders to a nuclear submarine whilst it remains at an undetectable depth. It has been reported that approximately half of the US nuclear strike capability is carried by nuclear submarines, so it is highly desirable that they maintain communications.

Proposals have been made by which it seems that a transmitter radiating a mere 2W of power from Wisconsin could send messages to submarines deep in the ocean. The proposed frequency is 76Hz; although data rates at such a frequency can only be very low, they would be adequate for issuing command instructions to a nuclear strike force.

The extremely low frequency signals would be propagated around the earth with a vertical polarisation, being reflected between the earth's surface and the ionosphere (80 to 400km in altitude). At the surface of the oceans, the waves would be tilted downwards so that they become horizontally polarised under water.

Strangely enough, it seems that pure water does not exert the same attenuation on radio waves as sea water. Submarines deeply submerged in fresh water lakes can receive radio signals at much higher frequencies, although there is naturally still considerable attenuation.

The US proposed a "Seafarer" extremely low frequency communication system in Michigan's upper peninsula involving the burying of some 3860km of cable in an area of nearly 120km square. The difference between the effective electrical length of the antenna and the wavelength of the transmitted 76Hz signal implies a transmission efficiency in the order of 0·01 per cent. For example, it has been suggested that a power of more than 10MW would be needed to generate a radiated signal of 500W.

These high power levels and the need to bury some 3860km of antenna cable have given rise to much local controversy and many objections to the Seafarer project. Proposed alternative sites in the south-west regions of the US are reported as being too costly and also less efficient, whilst the testing site in Wisconsin is reported to be unsuitable for a full-size antenna.

Many experts believe the USSR to be well ahead in extremely low frequency communication techniques. It has been reported that they have carried out experiments in the Arctic at the Rybachiy Peninsula and that measurements of the magnetic field produced by their equipment have been made as far as 750km from their site.

## Conclusions

It is interesting to note that many years ago radio transmitting stations used very large antenna systems, whereas currently much higher frequencies are commonly used where TV and f.m. stations employ an antenna at the top of a mast. For the future, small antennas at the centre of microwave dishes may be much more the norm.

However, for extremely low frequencies one must still use very large antennas or make a great sacrifice in the transmission efficiency. One can only wonder whether some enterprising scientist of the future will construct a dipole using the earth and the moon, or possibly even the earth and another planet, to form the largest possible antenna for some purpose which now seems to us rather obscure!

## Background Notes

Early in 1982 a team of researchers carrying out experiments in Antarctica found a previously unknown source of ultra low frequency waves in the upper atmosphere of the earth. This work has a number of important connections ranging from the forecasting of magnetic storms to studies in the field of plasma physics. Indeed, the researchers believe that this new source of ultra low frequency waves will aid scientists in the understanding of the structure and of the processes occurring in the magnetosphere of the earth and of the ionosphere and of the interaction between these two regions.

The researchers found that the ultra low frequency waves are generated in the ionosphere when the conductivity of that region increased significantly owing to the increased ionisation caused by ultra-violet radiation and X-radiation from solar flares. Previously, workers in the field of atmospheric physics had considered that the only naturally occurring ultra low frequency waves were generated when streams of charged particles (electrons and protons) from the sun interacted with the magnetic field of the earth or during magnetic storms when discharges into the magnetosphere produced bright auroral displays. ●

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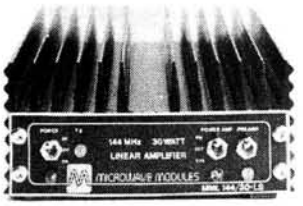

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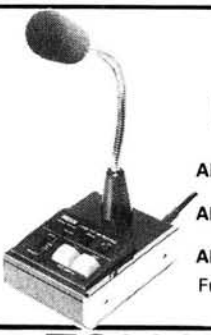

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# New Books

**HF ANTENNAS FOR ALL LOCATIONS**
**by L. A. Moxon BSc C Eng MIEE G6XN**
**Published by RSGB**
**260 pages, 193 × 252mm. Price £6.67**

This latest addition to the range of RSGB publications features an indepth review of all types of "traditional" h.f. antenna systems, from the long wire to the switchable quad. The book is divided into two parts dealing with the theory behind and the practical realisation of h.f. antennas with information of use to all users of the spectrum below 30MHz. Based on the author's personal investigations many "standard" designs are subjected to close examination to determine how and why they work—this approach often provides surprising results.

**VIDEO USER'S HANDBOOK—2ND EDITION**
**by Dr. Peter Utz**
**Published by Prentice-Hall International**
**500 pages, 174 × 231mm. Price £11.95**

Written in non-technical language this book has step-by-step instructions for setting-up, operating, maintaining and trouble shooting video equipment. It also has illustrations, TV screen, photographs and shortcuts to help you with equipment if other technical help is not available.

The twenty chapters cover such wide subjects as the TV receiver in Chapter 1; More about TV Antennas in Chapter 3; The TV camera in Chapter 6; Lighting in Chapter 10; Video Tape Editing in Chapter 13; Portable VTRs in Chapter 14; Video maintenance in Chapter 16 and Advanced Planning and Production Techniques in Chapter 19.

**PRACTICAL DESIGN OF DIGITAL CIRCUITS**
**by Ian Kampel**
**Published by Newnes Technical Books**
**301 pages, 137 × 214mm. Price £9.95**

The aim of the book is to show the reader the most direct route to "thinking" about digital design, like an experienced designer. It should also appeal to engineers and enthusiasts wishing to expand their knowledge in practical rather than theoretical directions.

The book is divided into three parts: Basic Logic; Design Practice; Microprocessors with five Appendices. So whilst there are many books on digital electronics this will be a useful source of information to anyone wanting to cover practical digital design principles.

**TOMORROW'S TELEVISION TODAY**
**by Michael J. Stone**
**Published by M. J. Stone**
**137 pages, 206 × 145mm. Price £10.50 including p & p.**

True Direct Satellite Broadcasting (DBS) has yet to occur in earnest in the UK but interest in its reception is already stimulating a demand for related information.

This book has been produced to catalogue the requirements for successful satellite reception and is written in a way that can be readily understood. The technical description of the isolated components forming the Television Receive Only Terminal (TVRO) is confined to an outline "blackbox" discussion but nevertheless achieves its objectives. Erstwhile esoteric r.f. hardware such as the multiple-stage GaAsfet low-noise head pre-amplifier takes its place amongst the multitude of parabolic dishes and associated feed systems with only a casual acknowledgement that without its development none of the systems would be possible—such is the pace of technology!

Inevitably much of the information in this book relates to satellites currently operational on 4GHz, many of which are not DBS devices and reception of which is non-licensable in the UK. However, the overall techniques should readily relate to the impending 12GHz European DBS systems and as such is worth reading.

**TELEVISION ENGINEERS' POCKET BOOK—7TH EDITION**
**by Malcolm Burrell**
**Published by Newnes Technical Books**
**314 pages, 122 × 189mm. Price £7.95**

This book should be useful to those involved in television principles and servicing, whether the reader is an enthusiast, student or technician.

It covers an introduction to television standards and circuits, timebases, power supplies, the principles of colour TV, testing, installing and servicing TV sets, antennas and interference.

Teletext, video cassette recorders and cameras are also covered in new sections. In this latest edition the emphasis is on solid state technology, bringing the book up to date.

**MODERN OP-AMP PROJECTS**
**by R. A. Penfold**
**Published by Bernard Babani (publishing) Ltd.**
**112 pages, 111 × 177mm. Price £1.95**

All the projects are fairly easy to construct, and layouts are given for most so even beginners can build the simplest of circuits.

The book covers the basic operation of the different types of op amps. The sixteen projects that follow are broken into sections such as construction, calibration, components, adjustment, operating principle and the circuit—thereby giving the necessary background to help beginners.

**INTERNATIONAL DIODE EQUIVALENTS GUIDE**
**by Adrian Michaels**
**Published by Bernard Babani (publishing) Ltd.**
**144 pages, 111 × 179mm. Price £2.25**

This book is designed to help find substitutes for a large selection of semiconductor diodes that are available today. Included in the tables are rectifier diodes, Zener diodes, l.e.d.s, diacs, triacs, thyristors, optically coupled isolators, photo diodes and display diodes.

Where possible such details as the material type, function and country of origin are shown, and equivalents are subdivided.

**BEGINNER'S GUIDE TO AMATEUR RADIO**
**by F. G. Rayer G3OGR**
**Published by Newnes Technical Books**
**169 pages, 123 × 185mm. Price £3.95**

Principally written for those interested in learning about radio communications this book explains simply many of the topics that can confuse the newcomer. The information included will help the reader prepare for the Radio Amateurs' Examination.

The book provides a broad picture of amateur radio and such specialised interests as slow-scan television and microwave operating are mentioned but not in detail. This enables the book to be readily understood by a non-technical beginner—as an introductory book should be.

**More New Books on page 61**

# Over-the-Horizon Radar Systems-
# BEYOND THE BLUE HORIZON
## by F.C. Judd - Part 2

Before dealing with the nature of the Russian OTHR transmissions ("Woodpecker") some further notes on OTHR generally may be of interest. Firstly these systems make use of wide aperture antennas to produce beam widths of a few degrees and which have a performance comparable with that of microwave radar antennas even though the wavelength is some 200 times longer. Consequently such antennas have very high forward gain and are capable of exceptionally high effective radiated power. It is estimated that if similar antennas are used, then the e.r.p. from Russian OTHR stations is in the region 200 to 400 Megawatts[1]. Because detection distances are so great the total area from which back scattered energy is received at any given time is little more than 583km$^2$ (225 square miles). This is one reason of course for the high transmitting power used.

## Interference to OTHR

Most forms of interference either on, or adjacent to, the frequency in use by an OTHR station, are accepted by the system as a form of noise. In fact OTHR is designed to operate through a given level of interference regardless of its origin. Special circuitry is used to convert interfering carriers such as those used for teletype, or normal telephony and telegraphy transmissions, into what the OTHR receiver accepts as relatively unharmful broadband noise.

## OTHR Interference to Other Services

Providing the performance of American OTHRs is satisfactory the policy with regard to interference to other services is to cause as little as possible, and when propagation conditions are good the transmitting power can even be reduced. Full power is only needed when propagation loss is high, or when there are high levels of static (QRN).

Whilst interference from Russian OTHR pulse transmissions is instantly recognisable the American OTHR signals, if heard in the UK or other parts of the world, sound rather like a mains hum because many of the several modulation frequencies used are between 20 and 60Hz. Consequently they are less potent than the Russian on-off pulse transmissions which lead us now to a few facts about these signals.

## The "Woodpecker"

There are probably very few h.f. band operators anywhere in the world who have not experienced QRM from the appropriately named "Woodpecker" transmissions particularly on 14 and 21MHz. Even CB radio enthusiasts have been getting the "knock" despite the use of f.m. reception. The distinctive "tock-tock" sound produced by these transmissions is because they are r.f. pulses with an "on" time of about 4ms and a repetition rate of 10 per second, that is with an interval of 100ms, or one tenth of a second, between each pulse, **although this is not always the case.**

However, with a dual beam oscilloscope connected directly to the usual 465kHz i.f. output and the detector stage of a conventional superhet receiver ('scope to be locked to the pulse signals) the pulse itself appeared as in either of the two traces in the oscillogram, Fig. 2.1. The upper trace (a) shows that the unrectified r.f. pulse carries some form of modulation but which is not visible in the rectified signal (lower trace—b). The rectified signal was taken directly from the output of the 465kHz i.f. stage of a conventional superhet receiver. It was thought that better resolution might be obtained by using a wide band receiver which later proved to be the case. At about this time a report was published which stated that spectrum analysis of "Woodpecker" pulses had revealed modulation that was thought to be a form of encoded information possibly used for identification of the transmitter in operation.

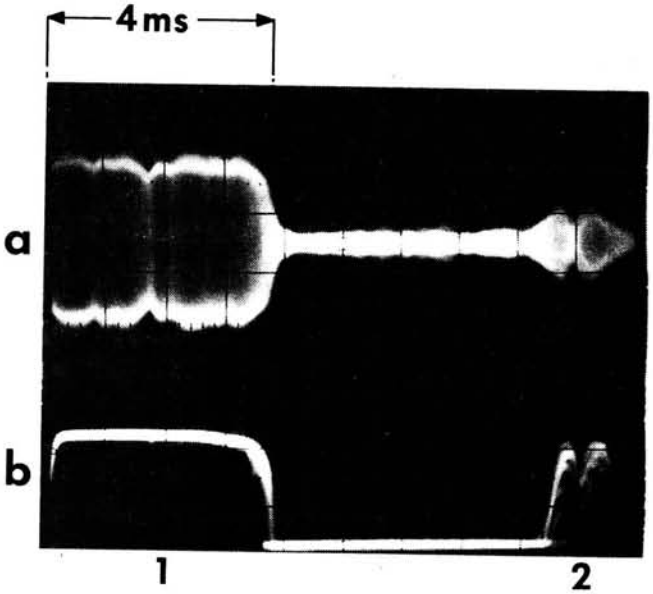


**Fig. 2.1: Oscillogram showing the expanded "Woodpecker" pulse (a) unrectified (b) rectified**

The author decided that further investigation might be worthwhile and accordingly built a special t.r.f. receiver with three r.f. stages and a detector followed by an amplifier with bandwidth of 2MHz. Normal low frequency amplifiers were added so that signals could be made audi-

ble as well. The dual beam oscilloscope with 10MHz bandwidth "Y" amplifiers was used for displaying both unrectified and rectified pulses simultaneously. The receiver covered the frequency range 7 to 28MHz.

## Preliminary Investigation

Russian OTHR signals **are not always the same** although the pulse repetition (p.r.) time of 100ms seems to be constantly maintained. Prior to most transmissions of **modulated** pulses there are often a few seconds of **unmodulated multiple pulse** transmission, shown in Fig. 2.2. These may appear on any frequency and could simply be ionospheric sounding transmissions which are generally followed by single or multiple modulated pulse transmissions often with various "echoes" appearing along the trace. In Fig. 2.3 (a) both unrectified and rectified/amplified single pulse signals are displayed. The upper trace (unrectified) begins with the **master** pulse (P1) followed by what may be local ionospheric scatter signals (Is) and then by what looks like a large echo (Ec) at approximately 40ms. A very small echo appears at 90ms with the trace ending at the next master pulse (P2). Now the large pulse at 40ms may in fact be another transmitted pulse occurring later in time i.e., after the master pulse (P1) and which, from continuous observation, is not unusual.

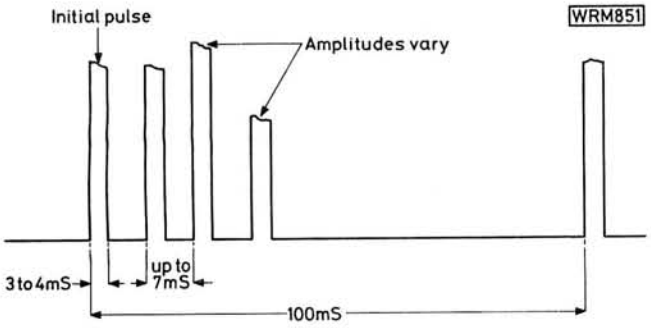


**Fig. 2.2: Unmodulated four pulse "Woodpecker" signal which often precedes usual modulated pulse transmissions**

The second oscillogram, Fig. 2.3 (b), shows a single master pulse (P1) followed by what again may be local ionospheric scatter signals and then two "echoes" (Ec), the trace ending with the next master pulse (P2). The two echoes (Ec) are at approximately 85 and 95ms. However, since the signals shown in the oscillograms have been intercepted at a considerable distance from the original point of transmission and, therefore at some time later, it is not possible to estimate the true distance of "echoes" seen on the traces even though time intervals are indicated. Also if the Russian system is a back scatter type OTHR the total distance travelled by a pulse and its return as a reflected signal, or echo, will include **the whole path distance.** That is, out to the ionosphere and down to the target, then back via the ionosphere to the point of reception at ground level which one assumes will be near the location from which the original transmission was made. It is the height of the ionosphere that determines the path **angle** to and from earth of both transmitted and received signals and therefore the total distance the signals have to travel. This too is an unknown factor except to those operating an OTHR at the time of transmission.

As a point of interest pulse signals transmitted vertically to the ionosphere are returned straight down again. This practice is frequently used for pulse sounding the height of the ionosphere and is known as "straight up and straight down". It therefore covers only the direct distance from earth to an ionosphereic layer and back. No slant angles are involved so with a layer at a height of say 322km the total distance covered by the pulse, up and back, would be 644km, the time taken being

644 × 3·337 = 2149μs (speed of radio wave 1km in 3·337μs)

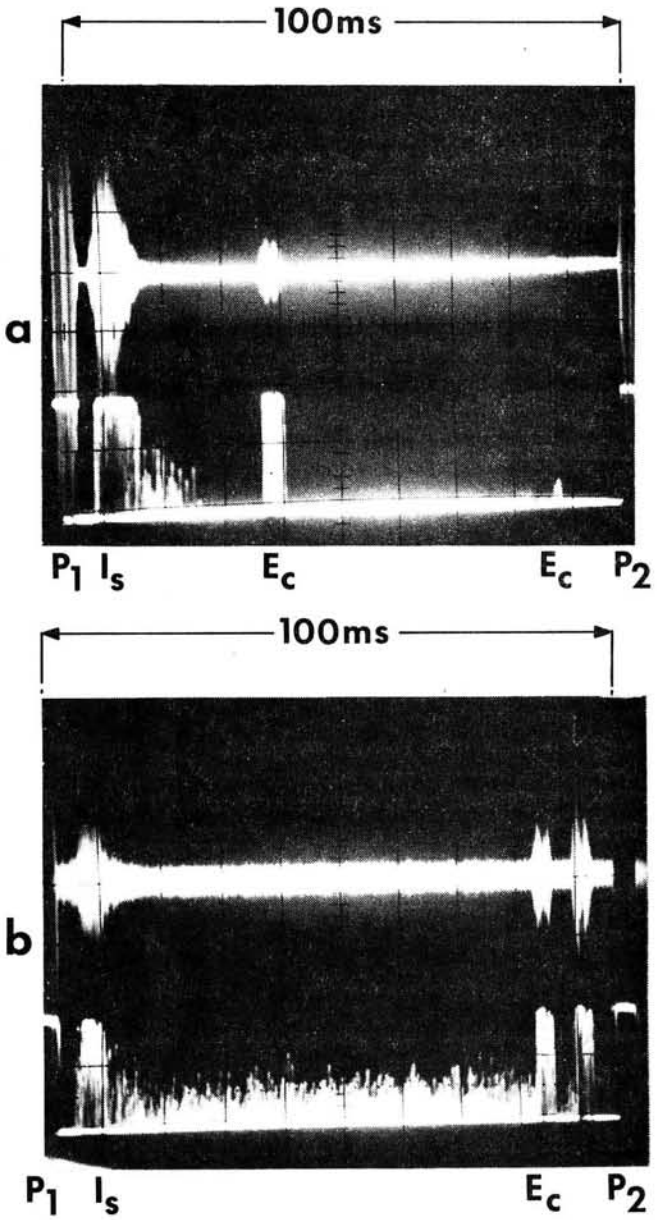


**Fig. 2.3: Single pulse signals (a) unrectified (b) rectified/amplified**

On some occasions what are believed to be round-the-world returns of Russian OTHR pulses in both directions, long and short path, have been recorded. This indicates a distance to the transmitter from the UK of about 2900–3200km which, based on a bearing of 40–45 degrees from the UK, suggests a location for at least one Russian OTHR transmitter between 40 and 50 degrees longitude and at approximately 54 degrees latitude. If an azimuth of only 60 degrees, similar to that of the American CONUS-B OTHR were used, then a maximum target detection range would be in the region of 2900km, covering a direct approach from the UK and a number of European countries (Fig. 2.4).

## A Closer Examination of "Woodpecker" Signals

Continuous observation over a considerable period of time has revealed the tendency for Russian OTHRs to operate more or less at random on any frequency between about 7MHz and 30MHz. Frequencies in the light shaded section of the chart (Fig. 2.5) are often used but the dark shaded sections indicate frequency bands where activity is greatest. As can be seen the 7, 14, 21 and 28MHz amateur bands suffer considerably although lately there has been only intermittent appearance in the 27MHz CB band and the 28–29MHz amateur band, probably because of the now relatively poor propagation conditions prevailing for those frequencies.

After the initial "sounding" as suggested by the transmission of four unmodulated pulses (Fig. 2.2) the "Woodpecker" signals change to a four-pulse format, each pulse being modulated as shown in Fig. 2.6 (a). These pulses (1–4) vary in amplitude even during quite short periods of transmission which suggests a "search mode" for best signal return from a target. Also the whole transmission may suddenly shift in frequency either because of static (QRN) or to obtain better propagation. The modulation on each pulse is quite different but as shown by the expanded oscillogram Fig. 2.6 (b) it varies continuously. This variation has been made apparent by increasing the film exposure time slightly. Both the frequency content and the amplitude of the modulated signals change quite rapidly. It has been noticed that when a "target" has been located (echo received) the pulse transmission usually reverts to a single pulse of about 4ms duration but still with the p.r. time of 100ms as described earlier.

## "Woodpecker" QRM

As far as QRM to amateur radio contacts is concerned the noise blanker circuits on some sets can be re-adjusted to greatly reduce and even eliminate single pulse "Woodpecker" signals. These circuits do not have much effect on multiple pulse transmissions, particularly if the signals are very strong (in the "S"9 plus region). By the way, it is a waste of time putting out a transmission on the frequency being used by the "Woodpecker" in the hope that it will cause them QRM. It won't, and it is entirely coincidental if they do happen to move, or stop transmitting, when you call CQ or whatever on their frequency. OTHRs invariably change frequency very quickly to maintain contact with a target but rarely do so for reasons of QRM from other forms of transmission.

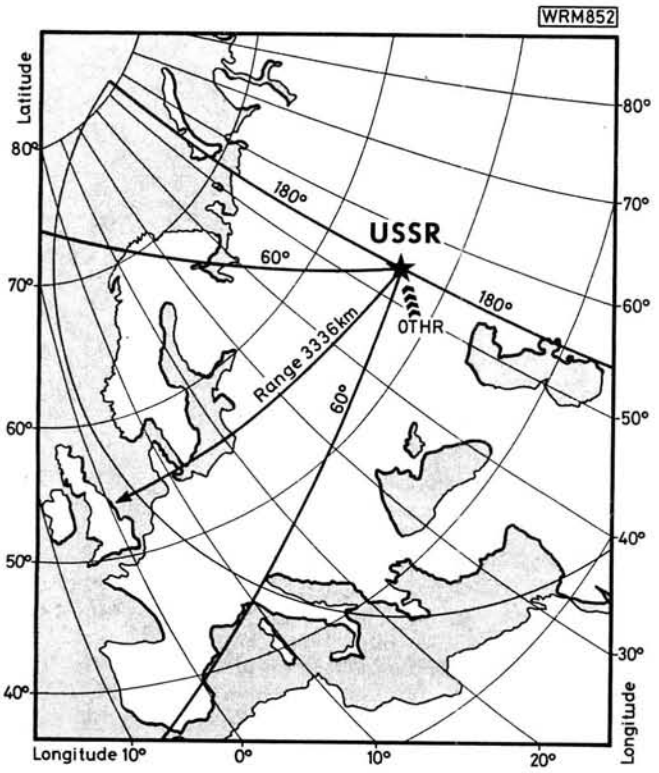


**Fig. 2.4: Possible location of one Russian OTHR**

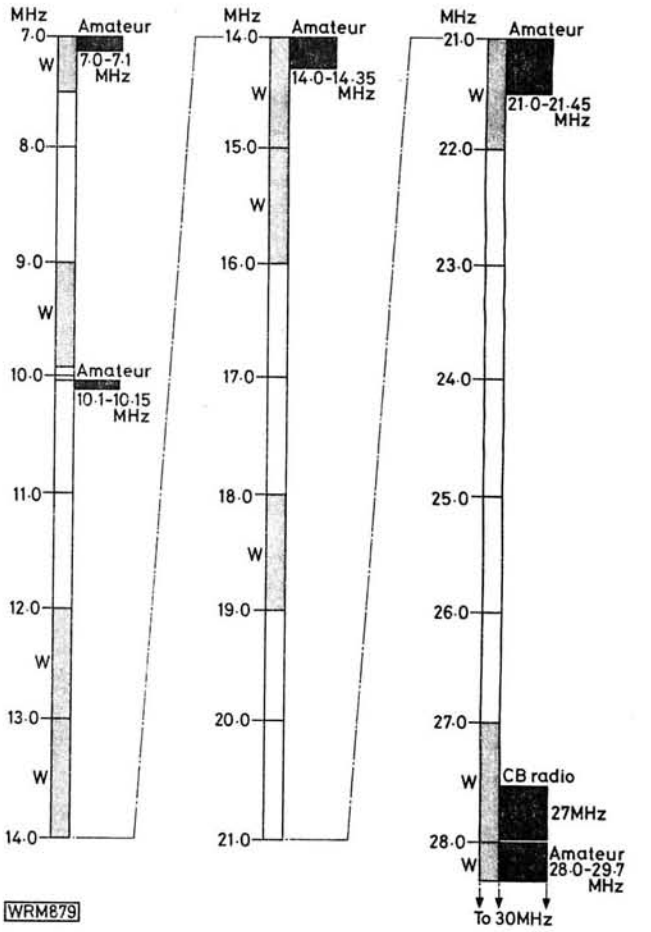


**Fig. 2.5: Usage of the frequency band 7–30MHz by the Russian OTHR**

## Conclusion

Whilst every effort has been made to verify information given in this article regarding the Russian "Woodpecker" OTHR transmissions some facts may be in error. Most of the data given has been derived from personal observation and analysis mainly because authentic information from Russian sources is very scarce indeed. One possible question does arise however. Is there an excuse for setting-up an OTH radar system in the UK particularly in view of the American nuclear arms bases in this and other near European countries and the extended radar detection range that OTHR would provide in an easterly direction?

Finally the author wishes to thank the Marconi Company Ltd. and the Rutherford Appleton Laboratory for supplying relevant information in connection with the preparation of this article.

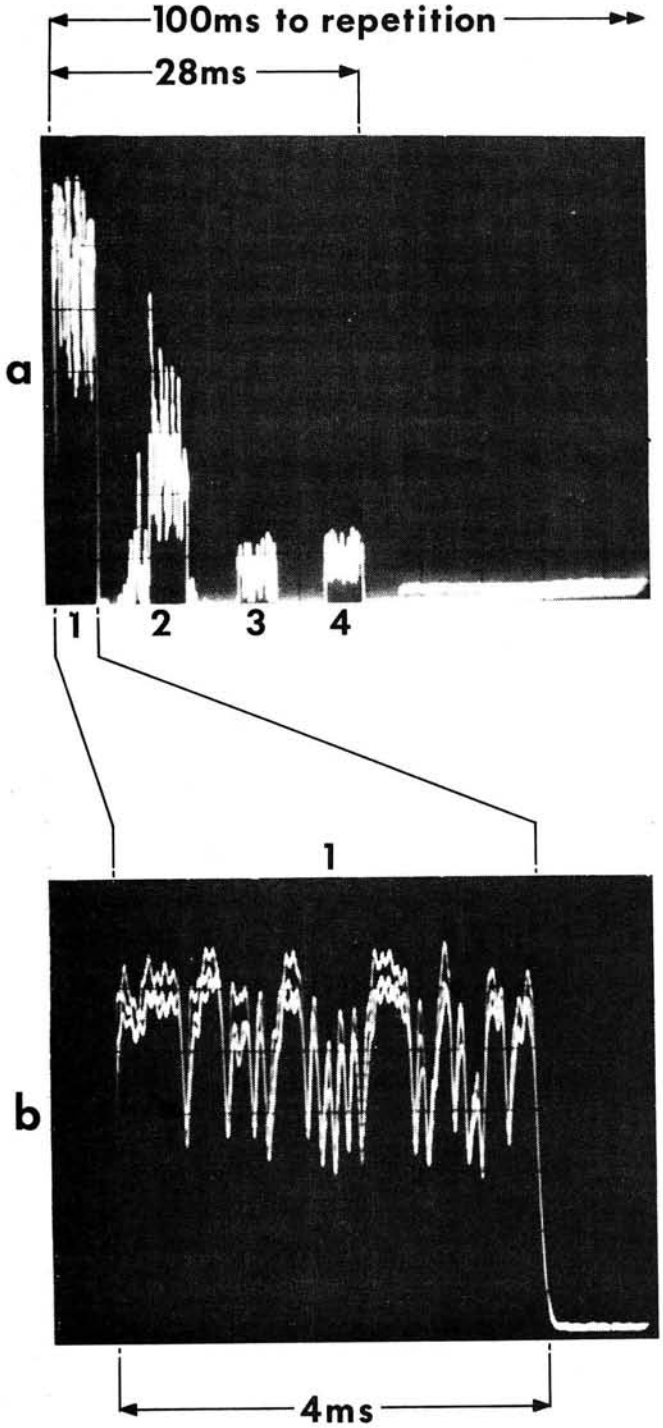


**Fig. 2.6: Four pulse modulated "Woodpecker" signals**

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*Ionospheric Reflections and Weather Forecasting for Eastern China.* E. Gherzi, Bulletin American Meteorological Society Vol. 27 March 1946.

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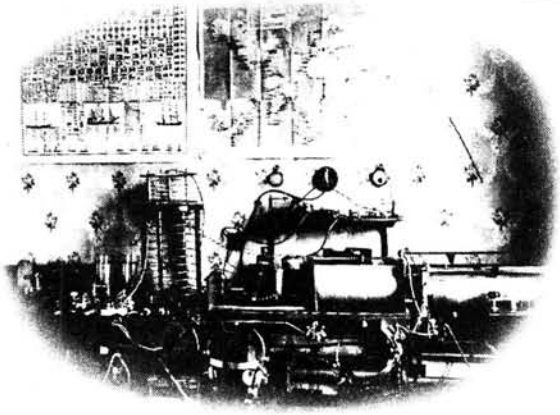


# Amateur Wireless Before 1914

## by G.R. Jessop G6JP Part 1

Although a few experimenters had started to explore some of the mysteries of wireless earlier, generally it was not until about 1910 that there were any quantity of experimenters. It was also about this time that clubs and societies began to be formed.

Press reports of the latest advances made by Marconi appeared regularly, items also appeared in the *English Mechanic* and the *Marconigraph* (later to become *Wireless World).* Even the Boy Scouts took a very early interest in wireless.

Among the early amateur wireless experimenters quite active in this new science were such people as the well known authors William Le Queux and Rudyard Kipling.

At this period (1910) any person interested in wireless had of necessity to make almost every item, there being few or no suppliers. There were in fact few suppliers of ordinary electrical fittings, for the use of electricity in the home was not yet normal. Most household illumination was by town gas or oil lamp and electric supplies, where they existed, were in no way standardised. Much of the supply was direct current (d.c.) of almost any voltage between 100 and 220 volts, alternating supplies varied similarly in voltage and had different frequencies as well.

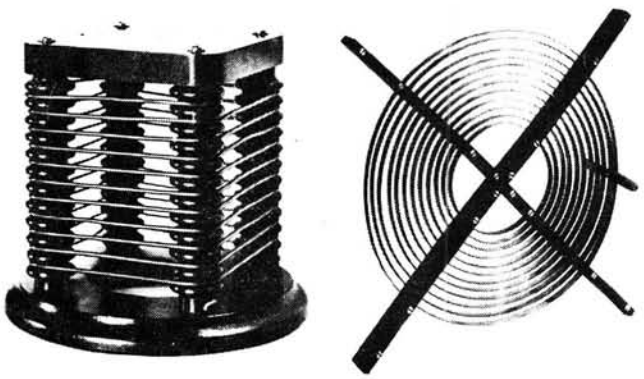


**Fig. 1: Early forms of transmitting tuning coils**

Travelling in those days was very largely restricted to such public transport that existed. Although most of the railways were operating, motor cars, cycles and buses were yet to arrive in any quantity—the horse drawn bus was still in service in London for example and steam trains were still operating on the Metropolitan and District Railways.

An average experimenter's wireless was a rather primitive affair, the transmitter was one form or other of a simple spark gap or a rotary multipoint gap, connected to a tuned circuit usually loose coupled to the antenna (aerial) tuning circuit. Quite often a single inductor was used with taps connecting to the spark gap and the antenna.

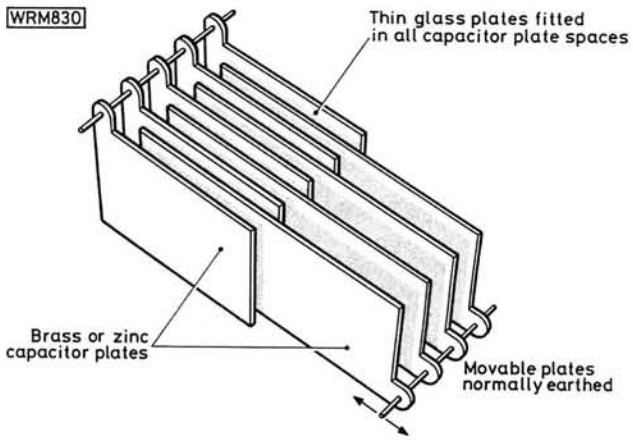



**Fig. 2: An early form of adjustable capacitor**

The inductance of the tuned circuit took the form of either a large diameter helix or a spiral or pancake (spiders web), wound with heavy gauge wire or ribbon (Fig. 1). The tuning capacitor (condenser) usually consisted of a number of Leyden jars that could be connected in circuit enabling some degree of variability. Ordinary rotary tuning capacitors, if used, had to be fabricated from sheet metal. An alternative consisted of two sets of rectangular plates which could be moved relative to one another. In this type it was usual for sheets of thin glass, such as cleaned photographic plates, to be inserted between intermeshed plates, the capacitor plates being smaller than the glass insulating plates.

The generator was a spark either from a simple pair of electrodes or some form of rotary gap where there were effectively two smaller spark gaps in series set opposite a series of electrodes attached to a rotating disc, the disc being rotated either by a belt or gearing. Some examples of a rotary spark gap are shown in Fig. 3.

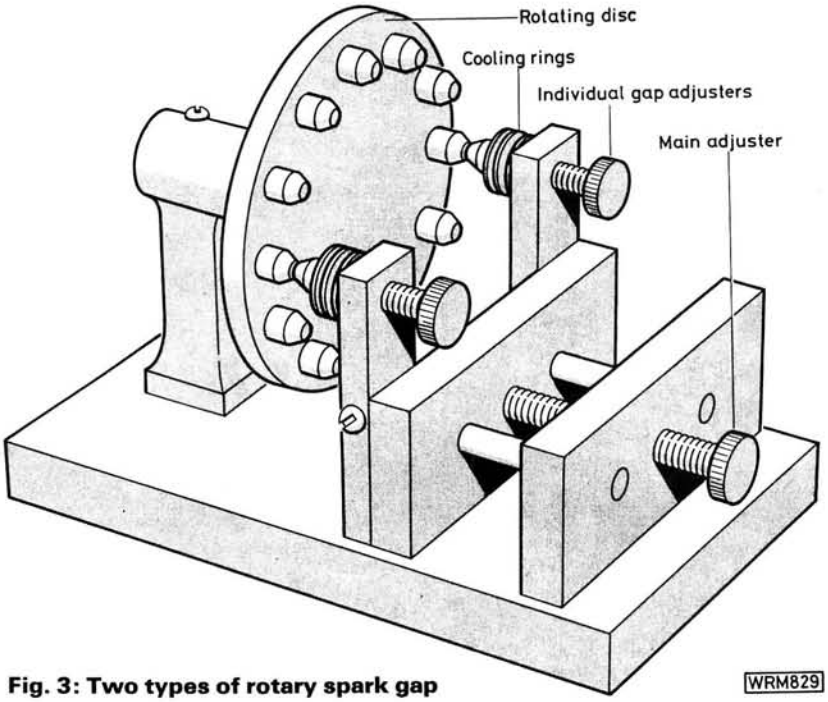
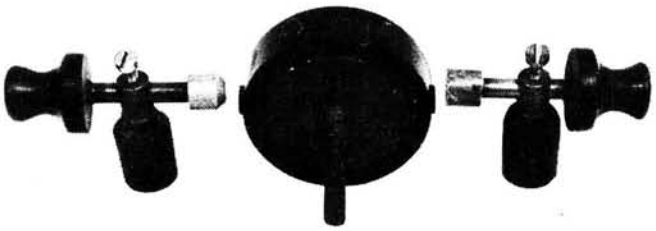



**Fig. 3: Two types of rotary spark gap**



The voltage supply for the spark gap was normally provided by an induction coil with a make and break set of contacts fed from a suitable battery (the same principle as now used for coil ignition in petrol engines). Almost any form of regular switching of the d.c. supply was applied to the induction coil primary.

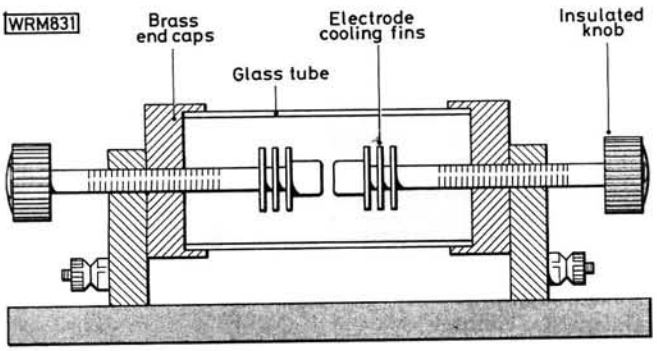



**Fig. 4: A simple enclosed spark gap**

The rotary spark gap was most often used when the induction coil was supplied from a mains supply, it being a convenient method of driving the gap by small motor.

Any spark gap is very noisy and it was often enclosed in some form of silencing box. A simple spark gap would have been enclosed in some sort of muffler which would have usually consisted of a thick wall tube with close fitting end caps (Fig. 4).

Control of power was always of an elementary nature, in the case of mains supplied induction coils, some form of adjustable (tapped) iron cored inductance was used. Keying the transmitter was of necessity in the primary of the coil as the voltage was lower.

The transmitting frequencies (wavelengths) were quoted to be from about 500kHz–3MHz (600–100m), with power ranging from a few watts up to a quarter of a kilowatt, with working ranges up to approximately 65km.

Antennas were generally large and as high as possible, usually taking the form of an inverted "L" having several wires in parallel held in position by bamboo spreaders. Alternatively a cage formation was preferred by some experimenters. The whole installation was well insulated despite only simple insulators being readily available. In most stations the voltage on the antenna was considerable and so the lead-in had to be well out of reach in case of accident.

On the receiving side the tuning range of the receiver was usually quite extensive, the majority were able to reach 50kHz (6000m) or so, but a few had provision for coverage to 2kHz (15000m) with quoted receiving ranges up to 4000km.

The receiver was essentially a simple crystal detector type, the coherer and magnetic detectors had been replaced by crystal detectors about the time that the majority of experimenters interest was aroused (Fig. 5).

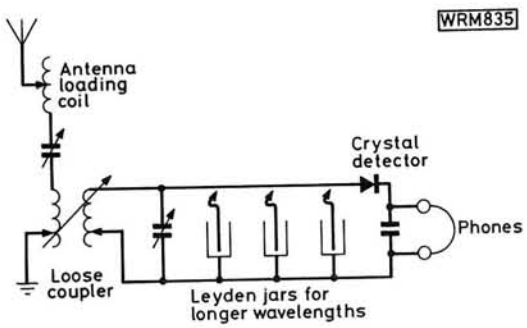



**Fig. 5: The circuit of a typical crystal receiver**

The antenna loading coil was usually in the form of a large solenoid with a slider for selecting the required inductance for any particular wavelength, these coils were often between 0·6 and 0·9m in length and 88 to 127mm diameter close wound with 18 to 22 s.w.g. enamelled wire, the insulation being scraped off for contact with the slider.

The coupling coils, were either pancake type or more usually a "loose coupler", that is a pair of coils that could slide inside one another, variation of the inductance in circuit being selected by tap switches. Examples of these coils are shown in Fig. 6.

The crystal detector was subject to a great deal of experimentation and ingenuity. In the first place when a transmitter was operated the detector became desensitised and needed re-adjustment after each transmission. Therefore to overcome this particular problem the detector crystals were arranged to be separated either mechanically or magnetically, so that the detector was effectively disconnected during transmission. Crystal detectors arranged for automatic and mechanical disconnection are shown in Fig. 7.

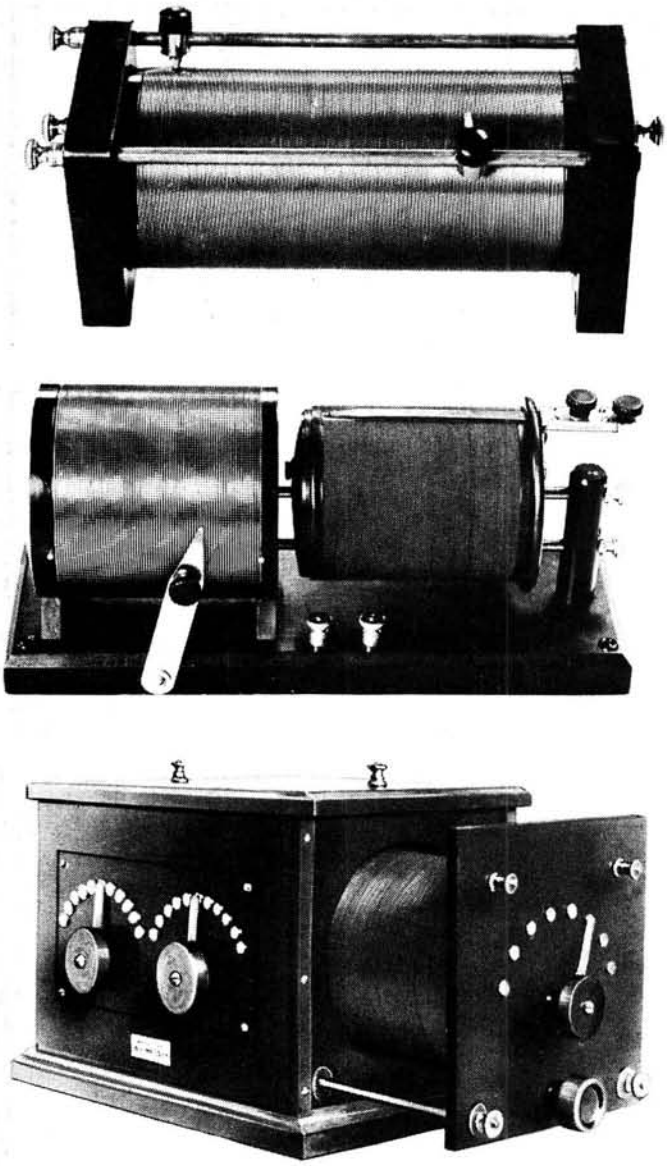


**Fig. 6: Three types of receiver tuning coils (a) two-slider inductor (b) loose coupler with slider adjustments (c) loose coupler with tap switches for adjustments**

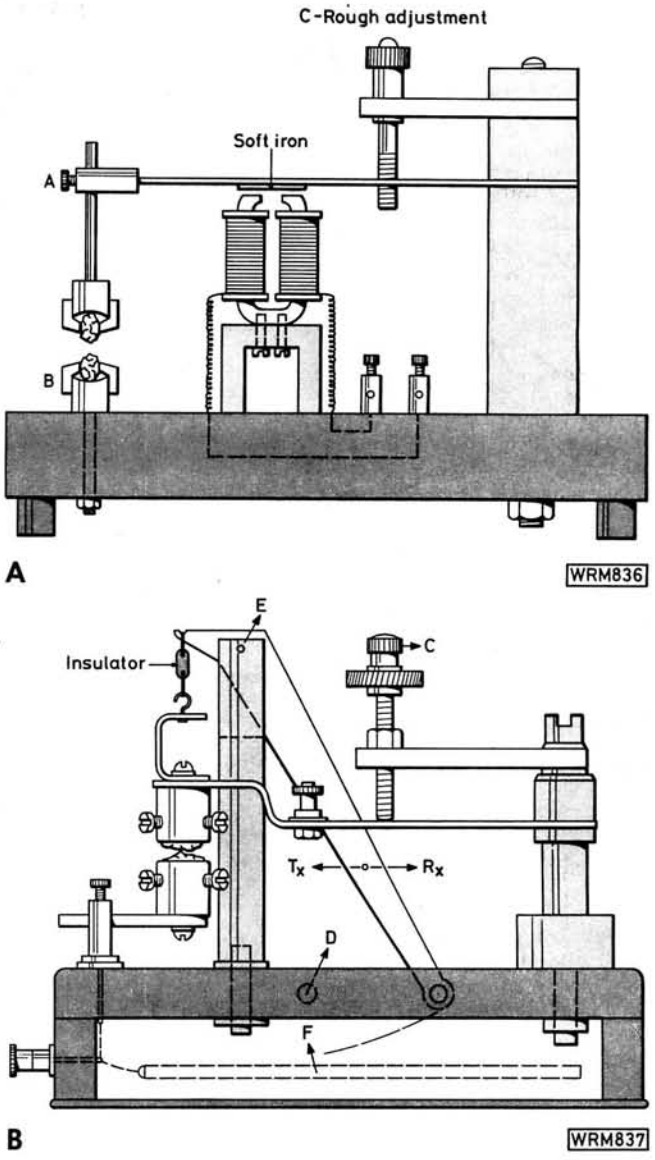



**Fig. 7: The Perikon crystal detector arranged for automatic disconnection (a) magnetically operated type (b) mechanically operated type**

The Perikon type of crystal detector using two different crystal seems to have been generally preferred, though some used oil immersed point contact (catswhisker) with success and found that such design was largely free from transmitter damage, similarly others favoured the electrolytic detector. In passing it is interesting to note that the experimenters of the period were quite prepared to tackle simple "glass blowing" to seal wires into glass tubes. Platinum wire was usually available from jewellers (platinum being a good match in respect of its thermal expansion to the glass normally available—leadglass).

A wide variety of materials were tried for crystal detectors, among these the following were used fairly widely.

| | | |
|---|---|---|
| Bornite | Galena | Nicolite |
| Carbon Silicide | Graphite | Silicon |
| Carborundum | Iron Pyrites | Tellurium |
| Copper Pyrites | Molybdenite | Zincite |

For double crystal Perikon detectors the following combinations were normally used.

Zincite & Tellurium
Zincite & Copper Pyrites
Zincite & Bornite
Galena & Tellurium
Galena & Graphite

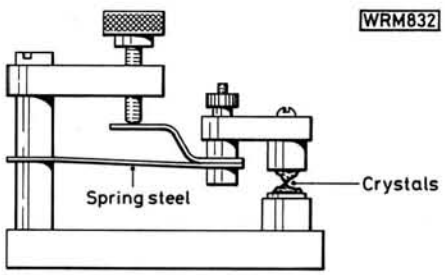



**Fig. 8: A Perikon two-crystal detector**

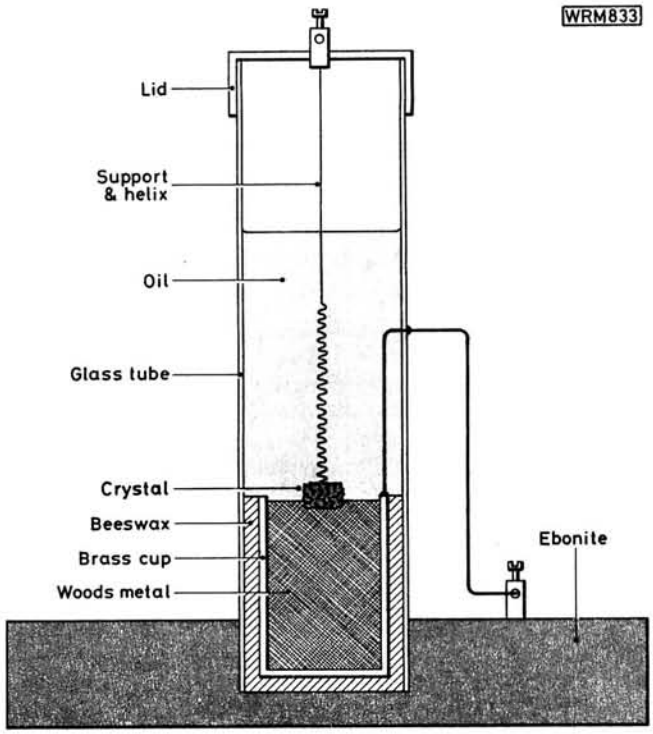



**Fig. 9: An example of an oil-immersed point contact detector**

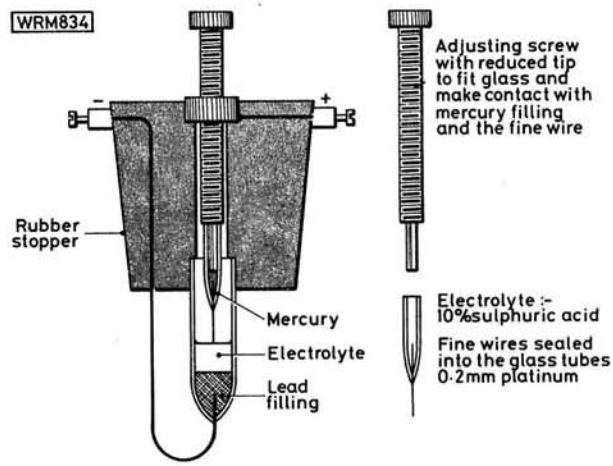



**Fig. 10: One design of an electrolytic detector**

The most suitable contact metals for single crystal detectors were:

Carborundum & Steel
Galena & Brass
Galena & Copper
Galena & Gold
Galena & Silver
Silicon & Gold
Silicon & Steel
Iron Pyrites & Gold
Molybdenite & Silver

Unlike any other crystal material the carborundum/steel benefitted from the application of a small voltage across the junction, this was usually about 0·8 volts.

**Next month we will look at the kind of stations some of the early wireless operators used.**

# BATC CONVE

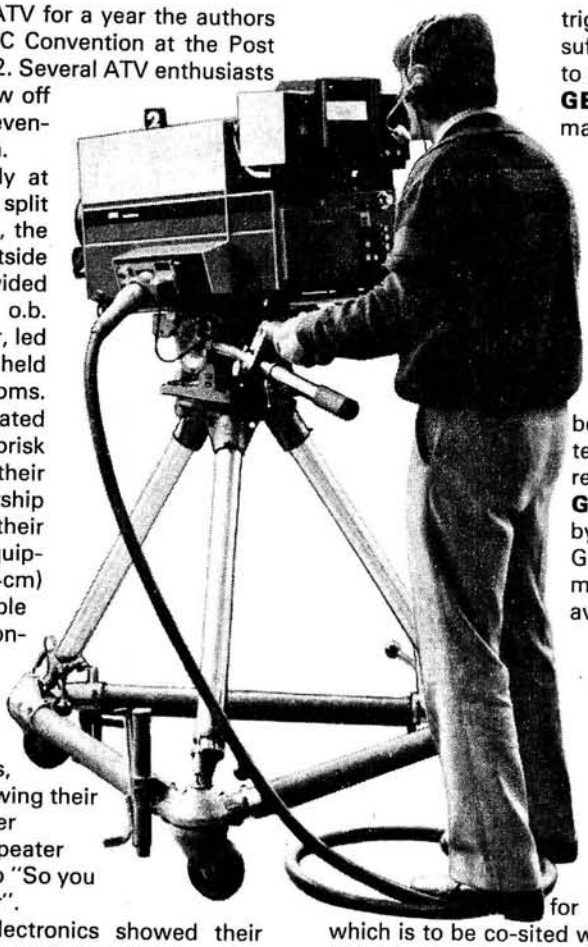
## by J.Richardson G6JGR and M.Staton G4BGT

Having been active on 432MHz ATV for a year the authors decided to attend the 1983 BATC Convention at the Post House Motel, Leicester, on May 22. Several ATV enthusiasts stayed overnight and got the show off to a good start on the Saturday evening, talking in the bar until 1.30a.m.

The exhibition opened promptly at 10.00a.m. on Sunday and was split into two rooms, one for fast-scan, the other for SSTV. The BATC outside broadcast van, in the car park, provided a continuous display from its o.b. cameras. An ATV repeater seminar, led by Graham Shirville (G3VZV), was held in one of the smaller conference rooms.

The fast-scan room was dominated by the BATC stand, which did a brisk trade in p.c.b.s, back issues of their club magazine *CQ-TV* and membership subscriptions. ForTop showed their existing range of 432MHz ATV equipment and their new 1·3GHz (24cm) f.m. system, which will be available soon. Wood and Douglas demonstrated their 1·3, 2·3 and 10GHz ATV systems, which should be ready shortly, as well as their current range of kits.

Exhibitors included ANT Products, PLM Components and PPM all showing their current ranges. The GB3 GV repeater group brought their 1·3GHz ATV repeater and A Studio ran a continuous video "So you want to be a Glamour Photographer".



In the SSTV room AMTEC Electronics showed their Sinclair Spectrum SSTV system and the NBTV group demonstrated their "Baird" type mechanical cameras. Grant Dixon G3CGK displayed his slow scan system, including a programme to reproduce the pictures on a dot-matrix printer. G4EQP and G3CCH showed their home constructed colour SSTV equipment.

**Repeater Seminar**

The ATV repeater seminar drew about 40 participants, though more might have attended if they could have found the room. The chairman pointed out that the five proposed 1·3GHz ATV repeaters fall into two groups:

1) Input a.m. or f.m., output a.m. GB3GV (Leicester) and GB3UT (Bath) are of this type.
2) Input f.m., output f.m., GB3TV (Luton), GB3UD (Stoke) and GB3VR (Worthing) use this format.

Representatives of each of the groups presented the current state of their respective machines.

**GB3GV**—This is nearly complete, the transmitter still needs some work, but the machine could go with 15W of r.f. now. The antenna will be based on the Alford slot. Logic control was changed to use a BBC micro. The main problems so far have been polling the two receivers (the f.m. receiver triggers under weak a.m. signal conditions, and the a.m. triggers from strong f.m.) and achieving sufficient isolation between TX and RX to prevent desense.

**GB3TV**—The specification for this machine was changed from a.m. to f.m. Consequently not much has been finished. The TX has been built and used for f.m. video and is sufficiently stable. A fully tunable RX has been built which follows the BATC design, which works well, but the bandwidth needs to be widened for colour picture reception. Alford slots will be used for the antennas. The logic control will be based on a 6800 micro. Coverage tests from the proposed site show reception of pictures over 64km.

**GB3UT**—This repeater is being built by part of the Mendip Repeater Group. Due to their work on current machines not much effort has been available for the ATV repeater. The a.m. RX is complete and working. On the TX side the oscillator is built and stable, the first p.a. is working with 1W of r.f. out. The final p.a. devices should give 8W out. The logic will be a modified GB3WR type. This repeater, unlike the others, will use a "gen-lock" system to synchronise the video sources. The sync pulse generator for this has been built. The repeater, which is to be co-sited with GB3UB, will use clover leaf antennas.

**GB3VR**—The transmitter is basically complete, using a crystal locked free running oscillator based on the RSGB microwave committee source board. This appears to be ok for f.m. ATV, producing 20W at 432MHz. This level is fed to a varactor tripler to give the output frequency. G4JEI developed the receiver, which turned out to be virtually identical to the BATC design. The logic will be run by a 6800 micro. Repeater coverage will *not* be omnidirectional, since the site is bounded to the North by the South Downs, and to the South by the sea. Therefore the antenna system will consist of two 6 × $\lambda/2$ phased dipoles, one pointing East, the other West.

**GB3UD**—This repeater is based on the new ForTop 1·3GHz TX and RX units. Control logic is under construction. The repeater will be sited at 366m a.s.l., using Alford slot antennas which should give coverage as far as Birmingham.

The chairman summarised the proceedings by stating that GB3GV could be on the air within 14 days of receiving the licence, whilst the others are 3-4 months from completion. A discussion followed on the major problems. These were:

1) Getting sufficient isolation between TX and RX to prevent receiver desense. An 8 pole interdigital filter is barely sufficient and adding extra stages is impractical

# REPORT


as even at 1·3GHz this is quite large. The GB3GV group is experimenting with a waveguide based filter which is theoretically adequate. It was thought that it will be necessary to pre-emphasise the video signal to compensate for its irregular characteristics.

2) Frequency stability could be a problem for the f.m. transmitters, though both the Stoke and Worthing groups are happy with the stability of their oscillators.
3) The criteria for deciding on the presence/absence of video on an incoming signal appear to be tricky. The Leicester machine looks for greater than 225 line pulses per frame. The Worthing machine uses the GI teletext chip to decide if it is good video, whilst the Bath machine gen-lock circuitry decides when video is present.

The seminar closed with the various groups indicating their desire to keep in touch over solving these technical problems.

The exhibition, which finally closed at 4p.m., was well worth attending to see new developments, buying items from the BATC stand (some of the p.c.b.s purchased had only been etched the previous day) and meeting lots of fellow enthusiasts. We hope to go again next year. ●

# SHORT-WAVE LOW-PASS FILTER

R.A. PENFOLD


While the fact that a superhet receiver has spurious responses is well known, no doubt many radio enthusiasts are only aware of the image response and i.f. breakthrough, and do not realise that there are other unwanted responses. These other responses may well be of only academic importance in many cases, but they can sometimes coincide with strong signals and consequently give problems with breakthrough of these unwanted signals.

One way in which this breakthrough can manifest itself is in the form of v.h.f. signals being received on a set tuned to one of the h.f. (short wave) bands, and v.h.f. Band II broadcast stations are the most common source of this type of interference. If the receiver is tuned to roughly the centre of the interfering transmission the audio output will be a severely distorted version of the proper demodulated audio signal due to the narrow bandwidth of the receiver, plus the fact that it is unlikely to be using the right form of demodulation anyway. If the receiver is tuned to one edge of the offending transmission then the audio output will probably just be in the form of 'crashing' sounds as the carrier wave will only come within the receiver's passband during modulation peaks.

## Oscillator Harmonics

These v.h.f. spurious responses are normally caused by the harmonics on the oscillator signal mixing with the incoming signals to produce an output at the i.f. For example, a receiver having an oscillator frequency of 30MHz and an i.f. of 2MHz would have a reception frequency of 28MHz and an image response at 32MHz (or vice versa). The second harmonic of the oscillator would be at 60MHz, giving spurious responses at 62MHz and 58MHz. The third harmonic of the oscillator signal would be at 90MHz, giving spurious responses at 92 and 88MHz, both of which are within the v.h.f. Band II.

Of course, the oscillator harmonics would be weaker than the fundamental and the input filtering of the receiver would help considerably to attenuate these responses. However, the strength of interfering v.h.f. signals can often be such that these signals still breakthrough quite strongly, and problems with v.h.f. breakthrough when using a short-wave set on the h.f. bands are not uncommon.

In most cases it would be impractical to modify the receiver to obtain reduced oscillator harmonic strength, and the only viable method of reducing the spurious responses is to add a low pass filter between the antenna and the receiver. This must be designed to give very little attenuation over the short-wave bands, with a degree of attenuation that rapidly increases at frequencies above the short wave spectrum.

Using a simple passive filter it is possible to obtain losses of only a few dB at the upper end of the short wave spectrum, but an attenuation level of over 40dB at frequencies of around 100MHz.

The circuit diagram shown in Fig. 1 is for a practical filter of this type. This is a two stage *LC* filter which has a nominal attenuation rate of 24dB per octave (i.e. doubling the input frequency produces a sixteenfold reduction in the output level) above the cutoff frequency, but this is reduced somewhat in practice due to a degree of interaction between the two filter sections and due to the input impedance of the receiver which shunts C3.

The operation of a filter of this type simply relies on the fact that the impedance of an inductor increases with applied frequency, whereas the impedance of a capacitor reduces with increasing signal frequency. Thus at frequencies of 30MHz or less L1 and L2 have very low impedances and do not greatly hinder the passage of signals through the filter. C1 to C3 have very high impedances at these frequencies, and do not have any significant effect.

At higher frequencies the impedances of L1 and L2 become progressively higher, while those of C1 to C3 become steadily lower. The potential divider action across

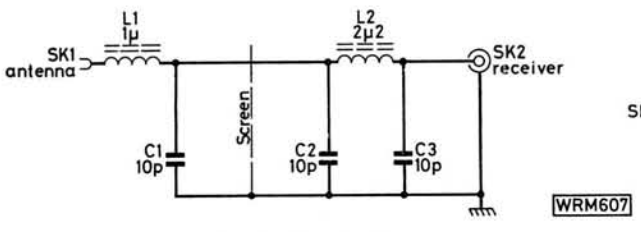



**Fig. 1: Circuit diagram**

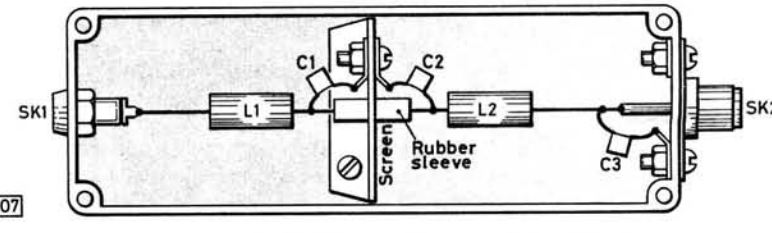
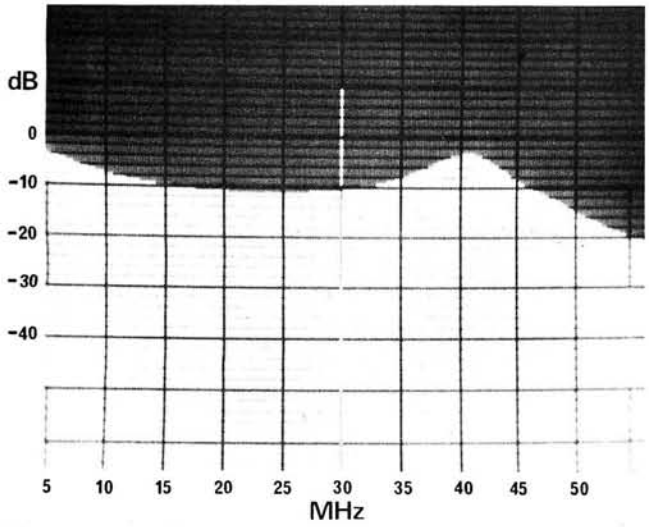
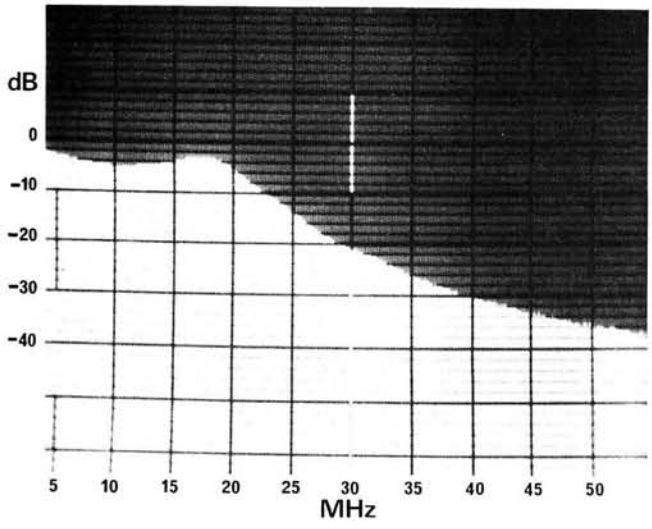



**Fig. 2: General layout of the filter**




**Spectrum analyser plots of the filter. Above C1 = C2 = C3 = 10pF. Below C1 = C2 = 40pF, C3 = 10pF. By varying C1 and C2 it is possible to alter the characteristics**




## ★ components

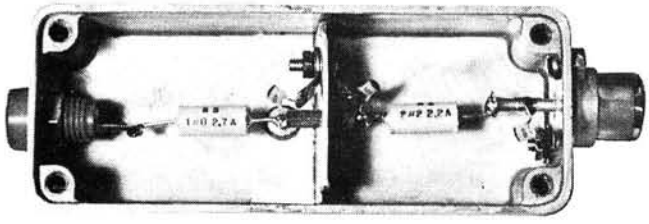
**Capacitors**
*Ceramic*

| | | |
|---|---|---|
| 10pF | 3 | C1,2,3 |

**Inductors**
*Miniature wire-ended*

| | | |
|---|---|---|
| 1µH | 1 | L1 |
| 2·2µH | 1 | L2 |

**Miscellaneous**
Wander socket; Coaxial socket; Aluminium diecast box 90 × 35 × 30mm; 18 s.w.g. aluminium for screen; Rubber sleeve; Solder tags, 6 BA screws.



**CONSTRUCTION RATING** Beginner

## BUYING GUIDE

The components used for this simple project can be obtained from many of the advertisers in this magazine.

**APPROXIMATE COST** £2.50

L1 together with the combined capacitance of C1 and C2, and a similar action across L2 and C3, produces rapidly increasing losses.

As is normal with a filter of this general type, a screen is used to isolate the two filter sections and minimise stray coupling around the filter. This precaution is necessary due to the very high frequencies of the signals that the filter must block, and the ease with which these signals could be coupled from the input to the output of the unit by stray capacitive or inductive coupling. Stray coupling is further reduced to a small degree by using two capacitors in the first filter section, one each side of the screen.

## Construction

An aluminium diecast box measuring about 90 × 35 × 30mm was used to house the prototype filter, and was chosen simply because it happened to be to hand. The components could easily be fitted into a different metal box if desired.

The screen is made from 18 s.w.g. aluminium bent into an L shape so that it can be bolted to the base of the case. It should be accurately dimensioned so that it isolates the two halves of the case as effectively as possible.

A hole is drilled at the centre of the screen to enable a lead to pass through from one section of the case to the other, and this lead should be fitted with a sleeve to prevent it from short circuiting to the case. Another hole is drilled just to one side of this so that solder tags can be fitted to the screen to provide earthing points, one tag being fitted each side of the screen.

The input and output sockets are fitted at opposite ends of the box, and a wander socket is used at the input of the prototype as the filter is only used with a longwire antenna, but a coaxial or similar type can of course be used here if necessary. The output socket must be coaxial, or other two way r.f. type, because the lead which connects the filter to the receiver must be coaxial. This is necessary to prevent pick-up in the connecting lead from reducing the effectiveness of the filter, and also because the chassis of the filter must connect to the chassis or earth socket of the receiver. The outer braiding of the coaxial cable makes this connection of course.

Point-to-point wiring is used, and Fig. 2 illustrates this and also shows the general layout of the unit. ●

# IC of the month

Brian DANCE M Sc

## Plessey Semiconductors SL6440

A new double-balanced high-level mixer device for use in radio systems operating at frequencies of up to 150MHz was introduced by Plessey Semiconductors in 1982. The SL6440 device has a facility for setting the supply current by means of an external programming resistor and is suitable for use in the mixer of radio transceivers, in phase comparator circuits and modulators.

When biased for a supply current of 50mA, the SL6440 provides a third order intermodulation intercept point of typically +30dBm—a value which is unobtainable from previously available integrated circuits. This figure renders the device suitable for many applications where diode ring mixers have previously been employed. The new device offers the advantages of providing voltage gain, requiring low drive from the local oscillator, and providing superior isolation.

## Basic Requirements

Mixers for h.f. radio receivers should provide low noise, high input-output isolation, high intermodulation intercept points and have a low power consumption. Simple mixer circuits employing a single diode, transistor or f.e.t. are economical to manufacture, but offer a very poor performance for high level signal work, with no isolation and very poor intermodulation characteristics.

High performance modulators and frequency converter circuits have employed diode ring circuits which involve at least a 6dB insertion loss. They also require high local oscillator drive power and provide limited isolation with intermodulation characteristics which are critically dependent on the value of the terminating load. Alternatively the more expensive quad f.e.t. circuits could be used which provide conversion gain, but it it not always easy to optimise their inter-modulation characteristics which are load dependent. In spite of their inherent disadvantages, diode or f.e.t. commutative mixers have therefore been used in radio receivers where third order intermodulation intercept points of +25 to +30dBm have been required. The relative advantages and disadvantages of the various types of mixer circuit are discussed in the Plessey Semiconductors Application Note AN1007 by P. E. Chadwick.

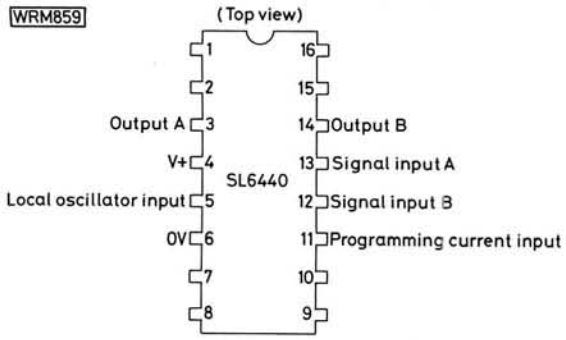



**Fig. 1: Connections of the SL6440**

Most current designs for high performance h.f. and v.h.f. receivers employ a form of balanced mixer circuit which can provide good isolation and minimise stray radiation. The SL6440 can provide a third order intermodulation distortion performance far better than that of any earlier integrated circuit. Its intermodulation distortion performance is set by the programmed supply current, since intermodulation in the internal "transistor-tree" mixer is produced by non-linearity of the voltage-to-current conversion in the signal input transistors (unless the circuit is operating above the point at which gain compression occurs).

The SL6440 provides good isolation, can be used with single-ended or with differential drive and has an intermodulation distortion performance which is independent of the load impedance. The device has a high input impedance. However, the bandwidth of the SL6440 is limited to around 200MHz and the noise figure to some 12dB for optimum intermodulation distortion performance.

## Encapsulation

The SL6440 device is encapsulated in a 16 pin dual-in-line package, although only the 8 pins indicated in Fig. 1

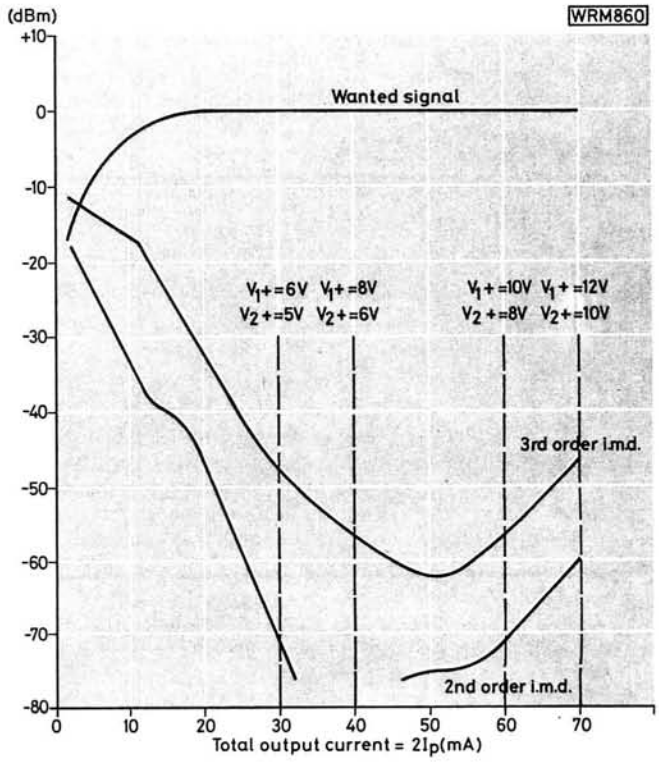



**Fig. 2: Variation of 2nd and 3rd order intermodulation levels with the total output current (Signal frequency 30MHz)**

are connected internally to the circuit. The SL6440 is supplied in a ceramic package for operation over the full military temperature range of −55°C to +125°C, whereas the SL6440C is supplied in a plastic package with the same connections for the −30°C to +85°C temperature range.

Absolute maximum permissible power dissipation in the package is 1200mW, with the junction-to-ambient thermal resistance being 125°C/W; however, a suitable heat sink may be used to reduce this to about 65°C/W.

The absolute maximum voltage rating for the positive supply and for the output pins is 15V.

## Programming

The supply current of the SL6440 is determined by the value of the programming resistor connected between pin 11 and a positive line. The absolute maximum permissible value of the programming current to pin 11 is 50mA. The total current flowing into the output pins 3 and 14 is twice the current programmed into pin 11. The required programming resistor in the pin 11 circuit for a desired supply current can be calculated by assuming that the potential at pin 11 is 2·1 V (that is, about $3V_{be}$).

Intermodulation distortion performance depends on the programming current, $I_p$, as shown in Fig. 2 in the case of the second and third order intermodulation distortion. It can be seen that in general the performance increases with the values of $I_p$ up to about 50mA. For large input signals the current switched by the transistors at the bottom of the tree should be quite high and is modulated by the input signal current. However, improvement in linearity tends to be achieved only at the expense of the noise figure of the device, so the programming facility allows the user to select the best compromise.

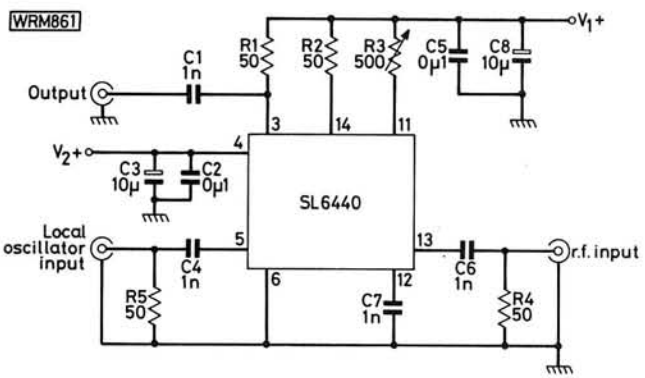



**Fig. 3: A simple single-ended mixer circuit**

## Base Circuit

A simple circuit for the use or testing of the SL6440 is shown in Fig. 3. The outputs at pins 3 and 14 are open collectors, so the output load resistors can be chosen for a given application and their value naturally affects the conversion gain. The positive supply line potential, $V_{1+}$, should be chosen so that the voltage at pins 3 and 14 is not low enough for the output transistors to saturate and thus unnecessarily limit the signal output swing; such saturation will not occur if the potentials at pins 3 and 14 are always greater than the positive supply $V_{2+}$ to pin 4. Normally $V_{1+}$ is about 2 to 3V greater than $V_{2+}$. The output frequency response will fall as the output transistors approach saturation.

The minimum value of $V_{1+}$ may be taken as $(I_pR_1) + V_S + V_{2+}$ where $I_p$ is the programmed current, $R_1$ is the load resistor and $V_S$ is the maximum signal swing at the output.

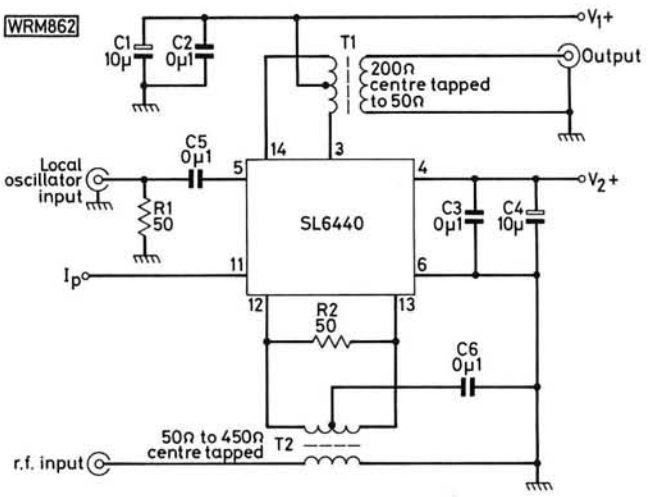



**Fig. 4: A high performance balanced circuit**

If the signal swing is not known, the minimum value of $V_{1+}$ may be taken as $2(I_pR_1) + V_{2+}$, since in this case the signal will be limiting at the input before the output saturates.

Local oscillator signal requirement at pin 5 is about 200 mV r.m.s., the impedance at this pin being some 1·5kΩ. The power supply to pin 4 is for the oscillator buffer circuit.

A single-ended input is shown in the simple circuit of Fig. 3, but the SL6440 can also be used in differential input circuits for improved carrier leak. A high performance circuit with such a balanced input and a balanced output for increased conversion gain (both transformer coupled) is shown in Fig. 4. A lower value of $V_{2+}$ can be used in this circuit with consequent lower thermal dissipation.

It should be noted that the input pins 12 and 13 may be kept at the same steady potential, but should not be coupled to any external source of voltage. The use of transformer coupling in Fig. 4 enables the high input impedance of the SL6440 device to be utilised.

The circuit gain for the single ended circuit of Fig. 3 is given by:

$$\text{Gain (dB)} = 20 \log_{10} \left( \frac{R_L I_p}{56{\cdot}6\, I_p + 0{\cdot}0785} \right)$$

However, the differential output circuit provides an extra 6dB of gain.

The circuit of Fig. 4 provides an input to output isolation of some 30dB and local oscillator radiation from the input to less than −65dBm. Circuit gain is 10dB and the noise factor 11dB. An important advantage of the SL6440

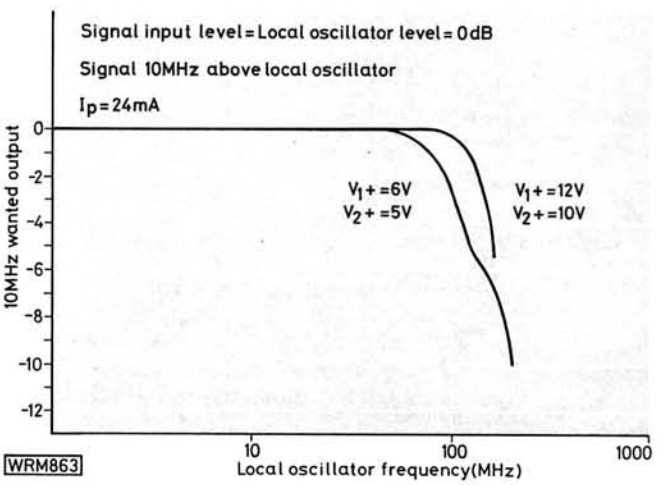



**Fig. 5: Frequency performance of the SL6440**

circuits is the low local oscillator drive requirement of some 30μW (which may be compared with the 200 to 500mW requirement of diode ring mixers with comparable intercept points). This naturally results in less local oscillator radiation from the antenna.

The number of spurious output frequencies from the SL6440 is relatively very low. This can be of vital importance in double superheterodyne receivers where harmonics of the first local oscillator can mix with high order harmonics of the second local oscillator to produce unwanted signals within the second intermediate frequency pass band.

The SL6440 offers a very convenient way of converting the signal in a transmitter to the final output frequency, but it is not possible to obtain the final output power from the balanced modulator owing to the intermodulation distortion properties of the side band filter which usually require the input signal to be at a level of −10dBm or less. The use of a circuit such as that of Fig. 3 enables an increase in output to be obtained for a given intermodulation distortion performance so that less amplification is required at the final transmitted frequency; this assists stability.

The availability of the SL6440 enables high performance, economical, simple mixer circuits to be constructed which require low local oscillator power and which provide a useful gain. Circuit performance is effectively limited by that of the crystal or mechanical filters with which the device is used for moderate operating frequencies.

In the v.h.f. region the device performance fall off as shown in Fig. 5 as the gain of the internal transistors falls with increasing frequency. The noise performance also limits the usefulness of the device as one approaches frequencies of about 150MHz. ●



# Letters

## Free Valves

**Sir:** I have a full set of valves for an Alba radiogram 1940 vintage. I would like to offer them to any of your readers who could use them. I don't want to throw them away and would be pleased to hear from anyone who could find a use for them.

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| | |
|---|---|
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*Bob Evans*
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*Tel: 051-922 8267*

## Can You Help?

We regularly receive letters from readers seeking information, circuit diagrams, sources of spares etc. for a variety of electronic equipment, and where possible we reply direct to them. However, in some instances our search will prove fruitless, so we would like to ask fellow enthusiasts if they can help. Brief details of some of the requests are listed below:

**Serviscope Oscilloscope (Serial No. 3892),** require circuit diagram. *E. S. Bridgeland, 2 Shepley Road, Stocksmoor, Huddersfield HD4 6XW.*

**Etronic—RA640 Radio,** require circuit diagram or service manual. *P. S. Fisher, 4 Vennwood Close, Wenvoe, Cardiff.*

**Hallicrafters Model HT 37 Transmitter,** require handbook or circuit diagram. *G. V. Carter, 43 Stoke Road, Bletchley, Milton Keynes.*

**Hallicrafters Model S/38E Receiver,** require circuit diagram or any other information. *J. Atkinson, 156 Hareydene, Westerhope, Newcastle-upon-Tyne 5.*

**Sontronics Band Scanner,** am interested in obtaining one of these units in good working order. *J. Mason, 37 West Terrace, Middlesbrough, Cleveland TS3 6HQ. Tel: (0642) 210609.*

**Power Supply Unit for Radio Receiver Type CKP-45159-A,** a unit of Model TCS-6 Radio Equipment, manufacted for the Navy Dept.—Bureau of Ships by Air King Products Co. Inc., New York. require circuit diagram or service manual. *W. Cullen, 35 St. Manntans Road, Wicklow Town, Co. Wicklow. Eire.*

## Can I Help?

Sir: I noted with interest the comments made recently by Charles Molloy in *On the Air,* on the subject of the repair and maintenance of elderly recievers. I am sure that many readers, like myself, are firmly attached to some "old faithful" even though they may possess a modern "black-box".

What started as a hobby has now become an absorbing activity and I am happy to offer advice and assistance to anyone who is experiencing difficulty with an old piece of equipment. The "strong smell of burning" is fortunately, in the case of valved equipment, rarely a death sentence, nor does sudden silence indicate a terminal "heart attack", as is all to often the case with modern equipment.

I would be glad therefore, through the medium of your excellent magazine, to offer my help in rehabilitating failed equipment of the World War II and immediate post war vintage.

*L. N. Wells,*
*44 Dormer Avenue, Wing, Leighton Buzzard,*
*Beds. LU7 OTF. Tel: (0296 68) 403.*

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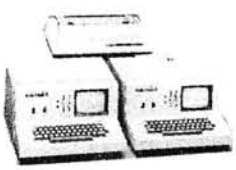

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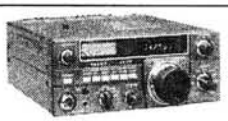

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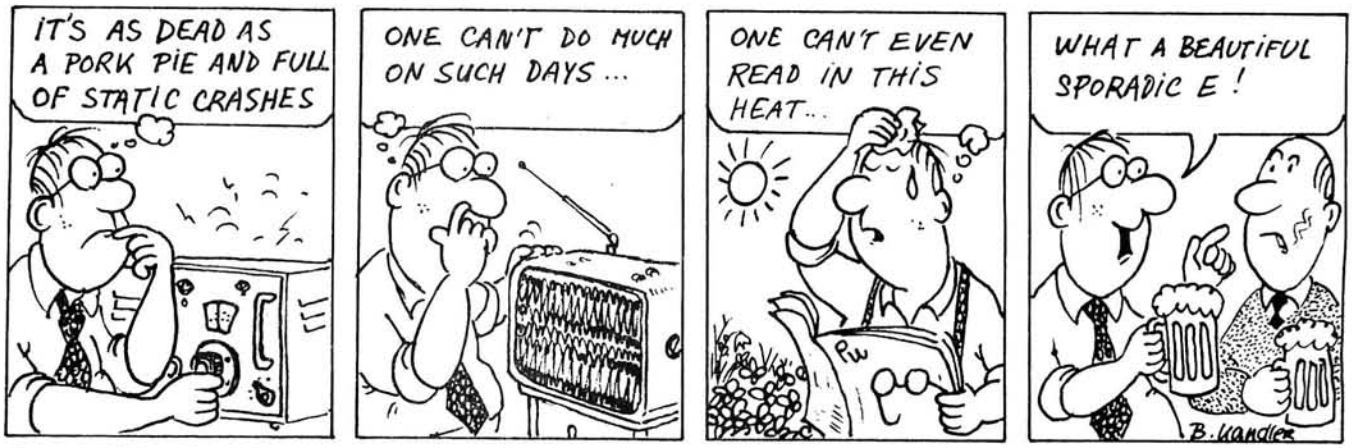
# Benny



# ANTENNAS

## PART 8

F.C. JUDD G2BCX

**Part 7 of this series dealt with ground reflection and its effect on normal full length antennas and in particular vertical antennas, the ideal heights of which would not be very amenable for amateur radio applications except for the higher h.f. bands.**

For many amateurs an h.f. band antenna system is always a problem because of lack of space or, even if space is available, height restrictions are imposed by local planning authorities. Therefore an antenna that would be regarded as being visually less objectionable may have to be considered.

## The Multi-band Trap Vertical

This type of antenna has the advantage of being omni-directional and does not require rotation as would a horizontal beam or dipole, for optimum horizontal directivity. It is reasonably compact and therefore less unsightly, at least to those concerned with this aspect, both facts which have made these antennas fairly popular. Trapped vertical antennas are available for three or four, or even five band operation and can usually be operated either with a direct earth connection, or with a system of resonant radials. The use of inductive/capacitive r.f. trap circuits allow specific portions of the antenna to function as a $\lambda/4$ vertical radiator for the chosen band of operation.

The basic idea is shown in Fig. 8.1, the arrangement shown being for four bands 7, 14, 21 and 28MHz. If the trap circuit marked (A) is tuned to 28MHz the section of antenna *beneath* it together with its tuned horizontal "radial" provides half-wave resonance for that frequency. This method would though appear to have the disadvantage of horizontally polarised radiation from the radial as well as vertically polarised radiation from the vertical section. When operating on the next band, 21MHz, the *whole* section of the antenna below the 21MHz trap, including the 28MHz portion and the appropriate radials, now functions as a resonant *half-wave* at 21MHz. The process is repeated for the other bands on which the antenna is designed to work. *Under the foregoing conditions the whole antenna is elevated above ground* although no critical height seems to be specified.

This type of antenna can also be operated with the *base at ground level* in which case it becomes a fully grounded $\lambda/4$ for each band of operation. As illustrated by Fig. 8.2(A) the antenna now has a direct earth connection via a conducting spike connected to the outer of the coaxial feed cable. Continuity of current distribution is by way of ground reflected *image*. In the case of Fig. 8.2(B) where the antenna is elevated above ground, continuity of current distribution is via the resonant radial system. It should be noted that the radials are usually in the region of $\lambda/4$ long at operational frequency and consequently have high r.f. voltage at the ends. Good insulation between *the ends of* the radials and their anchorage is essential.

## Radiation at Vertical Angles

With either of the arrangements previously described it is difficult to predict exactly what the vertical angle radiation will be. With the antenna at actual ground level and providing a large area ground radial system is used, or alternatively the earth beneath has exceptionally good conductivity, fairly low angle radiation is likely. However, since the highest frequency (28MHz) section is lowest and

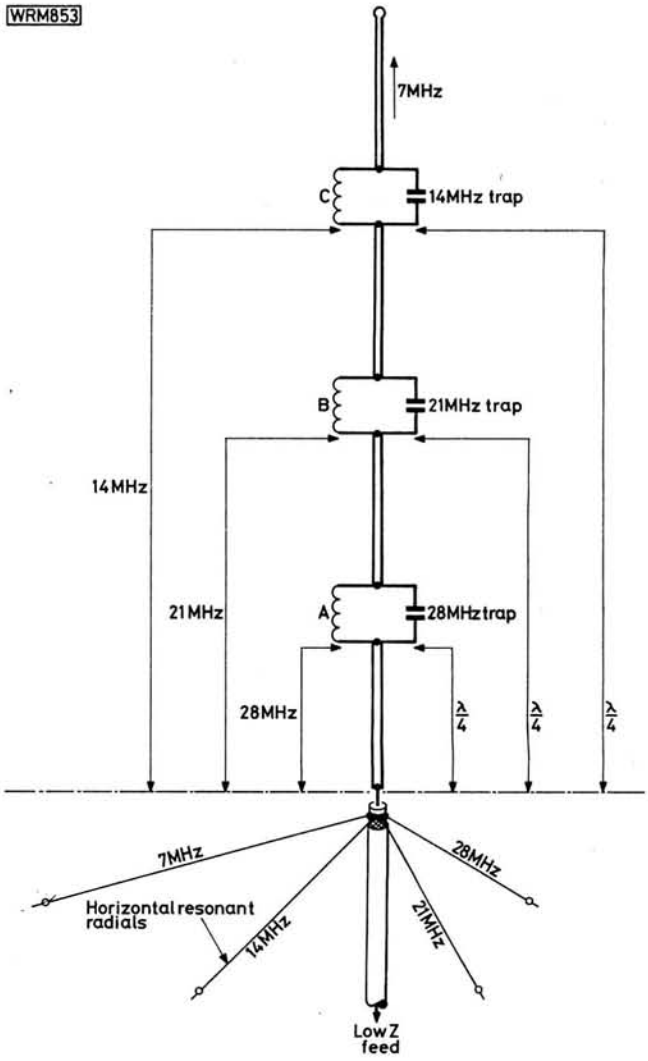



**Fig. 8.1: Multi-band trap vertical antenna operating with a resonant radial system**

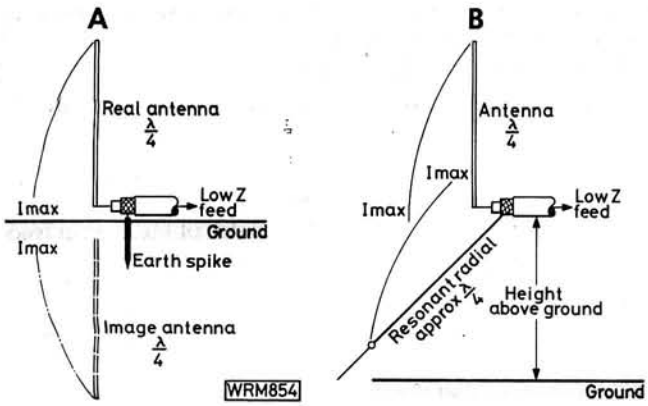



**Fig. 8.2(A): Current distribution of a λ/4 vertical with base at ground level and (B) in conjunction with resonant horizontal radial**

therefore very near to the ground, radiation may be considerably attenuated by surrounding buildings and trees etc. It would therefore, seem prudent to employ the resonant "radial" system with the height of the antenna raised to something like λ/2 above ground using the wavelength of the *highest* frequency for this dimension e.g. for a trap vertical operating on 28, 21 and 14MHz etc. the base of the antenna should be at least 5 metres above ground.

The vertical angle radiation patterns for vertical λ/2 antennas at different heights *to the centre point of the antenna* are shown in Fig. 8.3. Whilst these should not be accepted as being a true indication of vertical angle radiation from trap vertical antennas raised above ground, they do show that little is to be gained by increasing the height by more than λ/2 which has the effect of producing secondary lobes at high angles. In any case the ground level lobes become attenuated, whatever the height, unless the ground has perfect conductivity or a very large area ground radial system is employed.

Examples of the effect of ground conductivity are illustrated in Fig. 8.4 by the different polar patterns for vertical angles obtained from a vertical λ/2 antenna operating on a frequency of 17·5MHz and with the centre at a height of λ/3 above ground.

## Lack of Information

Some of the manufacturers written to by the author for information on their trap vertical antennas were unable to provide details of vertical angle radiation for each band of operation for which the antennas were intended. All that was to be found in literature sent (apart from physical dimensions etc.) were comments such as *"The (type No. antenna) for 10, 15, 20 and 40 metres delivers exceptionally low angle radiation with a 1·5 to 1 v.s.w.r. or less on all bands"*—which doesn't say much.

It is worth bearing in mind that, because of the highly inductive nature of these antennas, and in fact most trap multi-band or other inductively loaded antennas, the bandwidth is usually pretty narrow and some will only cover about half of a particular band with a v.s.w.r. of less than approximately 1·5 to 1. Also the overall efficiency of such antennas is much lower than a full length resonant antenna and under certain conditions of environment and ground conductivity etc. may be not more than 50 per cent. With earth of poor conductivity, or even a ground radial system consisting of only four radials on, or under the ground, the efficiency could fall to as low as 25 per cent.

## VHF Antenna Ground-planes

These are too well known to warrant an illustration but usually consist of the vertical radiator and four horizontal radials each about λ/4 (with reference to frequency of operation).

Whilst reasonable matching etc. can be obtained with the now almost universally used 50 ohm coaxial feed

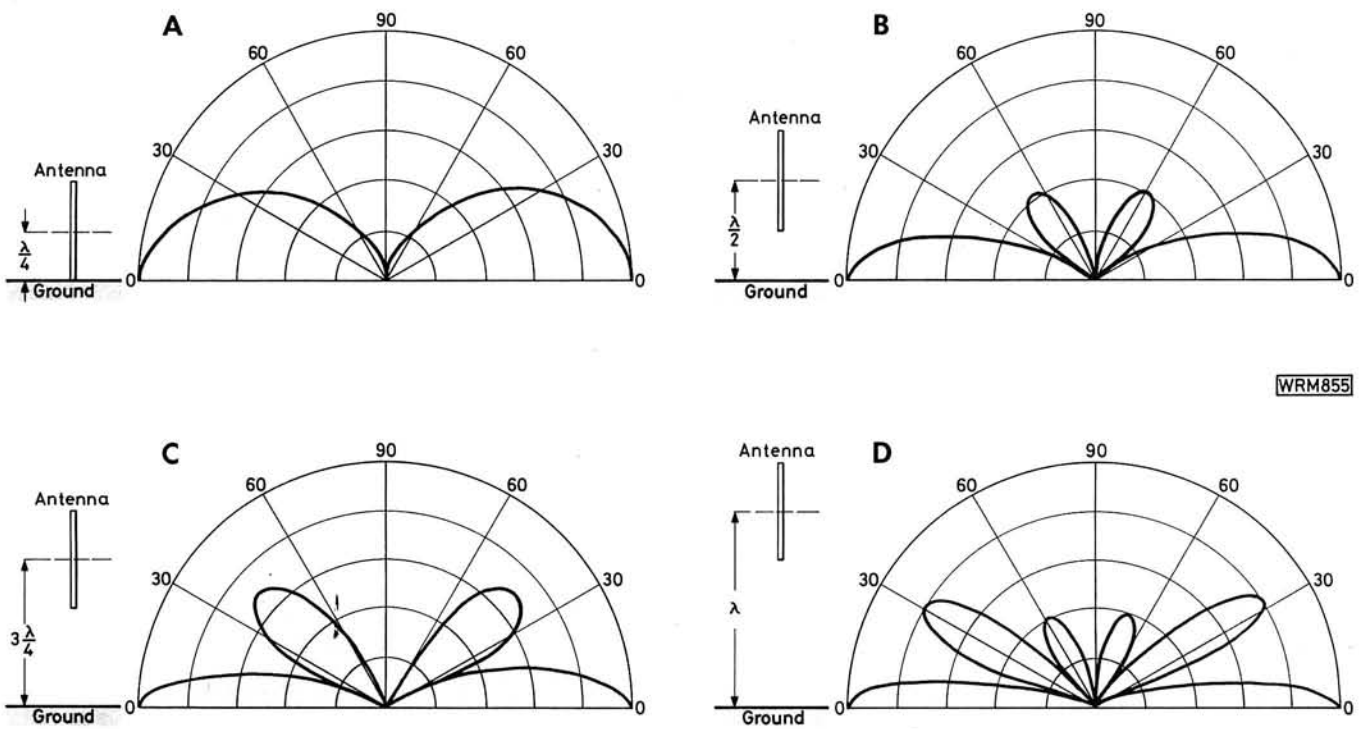



**Fig. 8.3: Vertical angle radiation patterns for λ/2 vertical antennas at heights to centre point of (A) λ/4, (B) λ/2, (C) 3λ/4, (D) λ**

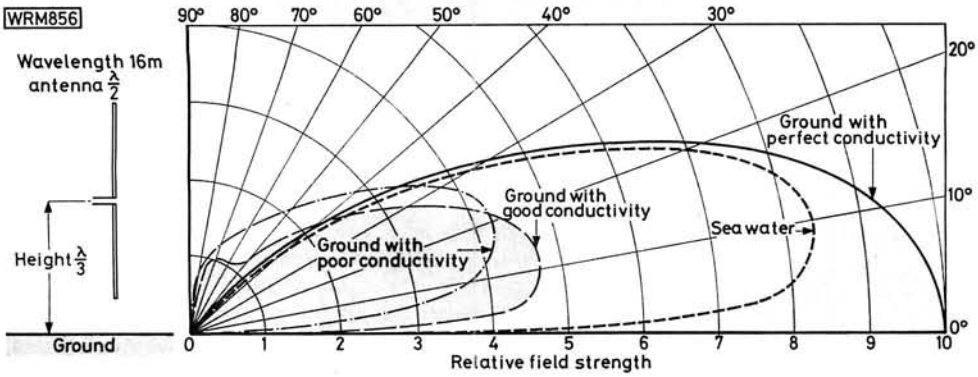



**Fig. 8.4: Vertical angle radiation from vertical λ/2 with centre point λ/3 above ground showing effects of ground conductivity**

cable, there is little actual radiated power loss with such antennas except at an angle where it is most needed—parallel to ground. With all ground-plane antennas having small and too few radial elements the angle of maximum radiation is always too high. A typical example is shown in Fig. 8.5 which might be beneficial if v.h.f. and u.h.f. waves were reflected from the ionosphere but in this area of the radio wave spectrum we are dealing with more or less line-of-sight propagation. The only real advantage of vertical ground-plane antennas is that they are omni-directional.

There are however, other antennas that are omni-directional and have a maximum radiation angle of usually less than 10 degrees. These are the half-wave "J" match, the stub fed vertical folded dipole (Slim Jim) and more recently the resonant Ring Base λ/2 vertical (recently featured in *PW*), all of which are virtually "free-space" antennas requiring no ground-plane. Discone antennas offer scope for dual band operation (144 and 432MHz), are omni-directional and have low angle radiation and unity gain (gain equal to a λ/2 dipole). In addition there are some reasonably effective vertical colinear v.h.f. and u.h.f. antennas available which, if well designed, offer a small but acceptable amount of gain.

## Conical Ground-planes

Attempts to lower the vertical angle radiation of ground-plane antennas have by and large proved ineffective. Setting the radials at some angle towards ground has very little effect unless eventually formed into a "sleeve" which then transforms the antenna into what is called a "sleeve dipole". Although serious investigation has shown that the radiation angle can be lowered with the use of conical ground-planes it requires a cone radius of about 4λ to get the main lobe angle down to even 10 degrees using a λ/4 radiator.

The graph (upper curve) of Fig. 8.6(A) shows the angles at which maximum radiation is obtained with a λ/4 antenna and *flat disc ground-planes* of various radii in wavelengths. As can be seen a radius of 8λ would be required to obtain an angle of maximum radiation of even a little less than 20 degrees. The lower curve Fig. 8.6(A) gives the angles of maximum radiation *for cone ground-planes* of different sizes but still calls for a very large and somewhat impractical construction to achieve an angle approaching zero. Incidentally this method assumes cones of sheet metal and not a series of radials angled downward to provide the conical shape.

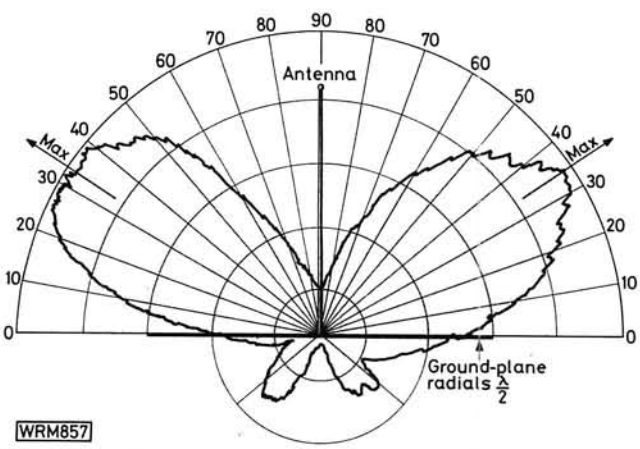



**Fig. 8.5: Typical vertical angle radiation from 5λ/8 v.h.f. vertical above a ground-plane of four λ/2 radials**

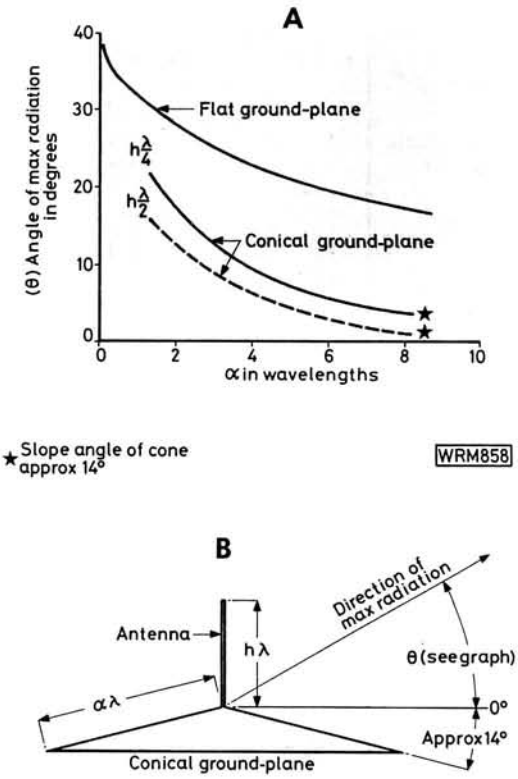



**Fig. 8.6(A): Angle of maximum radiation obtainable using flat disc ground-planes of various radii and (B) angle of maximum radiation using conical ground-planes**

The trap vertical antenna system described in this article is fairly common but other methods involving the use of stub decoupling and linear resonators are employed to achieve the same objective.

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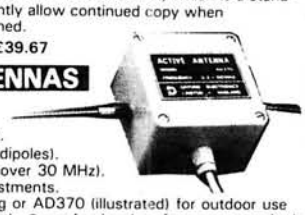


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# BASIC QSOs in Spanish

## PART 1

G.W. Roberts GW4JXN and Ildefonso Sevilla EA7BWX

The reader will probably now be familiar with the aim and general purpose of this short series of articles, namely to give the radio amateur the linguistic tools for a basic QSO in different common world languages. The language considered this time is Spanish which many amateurs have come into contact with during their holidays, but our aim is not to tell you how to order coffee on the Costa del Sol, just to give you enough Spanish to catch the DX from the Spanish speaking stations.

Spanish is a very important world language since it is not only spoken in Spain (EA) but has been taken from there into the New World, a table of these countries is shown below. Many of these countries are "catches" in terms of DX. Spanish is not the official language of Brazil, whose language is Portuguese.

## QTH Locations

Consultation of the excellent RSGB *Amateur Radio Operating Manual* shows that many countries have a system of location within their callsign. Mainland Spain is divided into nine areas, EA1–9. EA9, for example, is Southern Spain, where the co-author of this article comes from. Generally the lower the number the nearer the area is to us in Great Britain; EA1 for example is the North West and Basque area of Spain, with whom contacts on 144MHz (2m) are possible from the author's QTH in North Wales under lift conditions. Locations in North and Central Spain are usually worked on 14MHz (20m) and Southern Spain on 21 and 28MHz (15 and 10m)—depending on conditions.

Most of the Southern and Central American countries have a basically similar system with up to nine different call areas. Maps of these are in the *Amateur Radio Operating Manual*. Most countries use numbers, though in Uruguay the first letter denotes the province.

Four of the countries—Guatemala, Honduras, Nicaragua and Venezuela permit third party traffic but the licensed amateur in the UK is reminded that our licensing conditions permit only contact with other licensed operators, not third parties. Your contact in these countries would be committing no breach of his licence conditions, but your speaking to third parties might bring you into conflict with our authorities.

| | | |
|---|---|---|
| CE Chile | HK Colombia | TI Costa Rica |
| CM, CO Cuba | HP Panama | XE, XF Mexico |
| CP Bolivia | HR Honduras | YN Nicaragua |
| CX Uruguay | KP4 Puerto Rico | YS El Salvador |
| HC Equador | LU Argentina | YV, 4M Venezuela |
| HI Dominican Republic | OA Peru | ZP Paraguay |
| | TG Guatemala | |

**Table 1**

To identify towns in Spain the author again recommends a detailed atlas with its full index of place names.

## Spanish and English

As has been seen, Spanish is a truly international language and this has implications for the Spanish radio operator. Armed only with Spanish on the h.f. bands, the Spanish operator, provided he has suitable equipment, is almost assured of getting good contacts, some of them in rare locations, in his own language—and there are about 50 000 radio amateurs in Spanish America. The Spanish operator does not, therefore, feel the same pressure to learn English as other nations have found. It is thus possible to find stations from mainland Spain coming back to you with no English at all or with only one or two words especially on v.h.f. There are many Spaniards, of course, who speak good English and many others who have enough English for a


**My rig is home brew**

QSO—but in fact many Spanish operators are in a very similar position to many readers reading this, practically no knowledge of the other person's language. This means that even a few words of Spanish from you will help.

## South and Central America

A knowledge of Spanish here can lead to some good DX though you might find that you have to fight off stiff American opposition for contacts. One Spanish American, Fred Green LU5WS, who has Welsh connections, and was in regular contact with GW4CFC, dared not call that station for fear of being swamped by US callholders. Thus Dr. Llyr Gruffydd (GW4CFC) usually called him and the ensuing conversation was in Welsh! The Spanish of America differs from that of mainland Spain, just as American English differs from British English and there are differences in pronunciation. The Castillian ll (Li) becomes almost an English "y" and in the River Plate countries and part of Southern Spain it becomes the "si" in English "invasion".

## The Spanish used in this Article

Although we have used the word Spanish until now loosely, it would be more accurate to use the word Castillian, as the Spaniards do to describe the approved Spanish used for speaking with foreigners and the standard Spanish used as the basis of the written language. Other areas of Spain differ in dialect and South American English is more akin to these dialects in their pronunciation. The letter "c" before "e" and "i" is pronounced as "th" in "thank" in Castillian but as "s" in other dialects.

Spanish is more like French and Latin than German and this means that many of the technical words look very similar to English technical words, and are thus easy to remember—and to try out! Also once more there is a great resemblance between the pronunciation of Spanish and the written form.

## How to use the Guide

We suggest that you once more start your own little notebook or sheet with a very basic QSO, e.g. signal report, name, QTH and weather. Even five short phrases can be sufficient to help the Spaniard on the other end. If the QRM is bad then you can try the bi-lingual speaking method suggested in the previous articles—namely you speak Spanish, which is easier for your contact, and he uses English which is easier for you.

## Spanish Pronunciation

As has been suggested pronunciation of Spanish is fairly straightforward, the five vowels a e i o u (w) are sharp vowels with no tendency to being drawled as in English. The diphthongs are pronounced like the two vowels together. Spanish consonants that need attention are "r" which is rolled, "ch" which is pronounced as "tsh" in church, "ll" as "li", "y" or "zi" according to dialect, "c + e" as "th" or "s" according to dialect, "b" and "v" are pronounced with the lips touching, "g + e" and "g + i" are pronounced as "ch" in Scots "loch" and "j" is "ch".

As noted in the previous articles individuals speaking Spanish will differ as to the number of anglicisms which they will readily use or accept in their language. They will also vary as to the use of "hamisms" and Q codes.

As there are differences in language usage the authors will be pleased to receive any comments or alternatives offered by readers though every care has been taken by the British and Spanish co-authors. Please contact GW4JXN QTHR. We wish you all the best and good DX.

| | |
|---|---|
| **Making a Call** | |
| CQ CQ general call. This is (own callsign) calling on 10, 15, 20 metres and standing by. | CQ CQ Llamada general. Aqui (own callsign) que llama en 10, 15, 20 metros y queda atento. |
| **Replying to a Call** | |
| (EA7 . . . ) This is (G4XYZ) replying/this is (G4XYZ) calling you.<br>This is the British/English/Welsh/Scottish/Irish/Australian/American/Canadian/New Zealand/South African station.<br><br>The Spanish speaking station this is . . . | (EA7 . . . ) Aqui (G4XYZ) retornando/aqui (G4XYZ) que le llama.<br>Aqui la estacion britanica/inglesa/galesa/escocesa/irlandesa/autraliana/americana/canadiense/Neozelandesa/sudafricana.<br><br>La estacion de habla española aqui . . . |
| **After Someone has Replied to Your Call** | |
| I heard more than one station replying. Go ahead (XYZ). Try again (XYZ). Please wait. This is (own callsign). Good morning/afternoon/evening old man. Thank you for returning my call.<br><br>I think this is the first time we have worked each other.<br>I think we have worked before.<br>The name is . . .<br>I'll spell it for you phonetically.<br>I repeat. | Hay mas de una estacion que me llama. Adelante (XYZ). Por favor llame otra vez (XYZ). Por favor espere. Aquí (own callsign). Buenos dias/buenas tardes/buenas noches estimado Colega. Gracias por responder a mi llamada.<br><br>Creo que es el primer contacto que tenemos.<br>Creo que hemos tenido contacto anteriormente.<br>El nombre del operador es . . .<br>Se lo voy a codificar.<br>Se lo repito. |
| | Saycoo saycoo liamadha cheneral. Akee (own callsign) kay lliama en dee-ehz, keensay, vehinteh metros ee kuaydha atento. |
| | (EA7 . . . ) Akee (G4XYZ) raytornando/akee (G4XYZ) kay lay liama.<br>Akee la estathion britanika/inglaysa/galaysa/escothesa/irlandaysa / australeeana / amerikana / canadeeaynsay / nayozaylandaysa/swdafreekana.<br>La estathion day abla espaniola akee . . . |
| | Hay mas day oona estathion kay mee liama. Adaylante (XYZ). Por favor liamay otra veth (XYZ). Por favor ayspayray. Akee (own callsign). Booenos deeas/booenas tradays/booenas notshes estimadho colayga. Grathias por responder amee liamadha.<br>Crayo kay es el primer contacto kay tenaymos.<br>Crayo kay haymos tenidho contacto anteriormente.<br>El nombray del operadhor es . . .<br>Say lo voy a kodifikar.<br>Say lo raypieto. |

## Location

| | | |
|---|---|---|
| The location is . . . I'll spell it for you, in the county/state of . . . in North/South/West/East England/Wales/Scotland/Ireland/Canada/USA etc. | Mi ubicacion es . . . se lo codifico, en el Condado de/Estado de . . . en el Norte/Sur/Oeste/Este de Inglaterra/Pais de Gales/Escocia/Irlanda/Canada/USA etc. | Mee oobeecathion es . . . say lo kodiefiko, en el kontadho day/estadho day . . . en el Nortay/Soor/Oeste/Este day Inglatayrra/Pays day Gales/Escothia/Irlanda/Canada/OOES AAh etc. |
| The location is in the centre of . . . on the island of . . . | Mi ubicacion es en el centro do . . . de la Isla de . . . | Mee oobicathion es en el thentro do . . ./de la Isla day . . . |
| In the small/big town/city of . . . | En la pequeña/grande ciudad/Capital de . . . | En la pekwaynia/granday kweewdhadh/Capital day . . . |
| In the seaside town of . . . | En la cuidad Costera de . . . | En la kweewdhadh costayra day . . . |
| About . . . kilometres from . . . | Cerca de . . . kilometros de . . . | Therca day . . . kilometros day . . . |
| The longitude and the latitude is . . . degrees — minutes North/South, degrees — minutes East/West. | La longitud y la latitud es . . . grados — minutos Norte/Sur, grados — minutos Este/Oeste. | La longitidh ee la latitudh es . . . gradhos — minwtos Norte/Swr, gradhos — minwtos Estay/Oestay. |
| The QTH locator is . . . | Mi localizador QTH es . . . | Mi lokalithadhor CuuTay He es . . . |

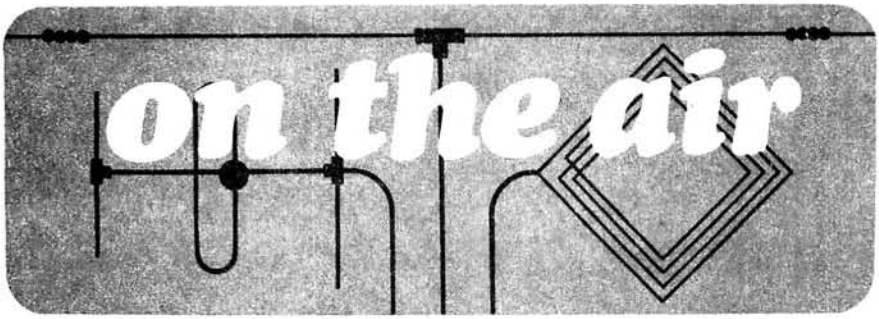
## Signal Report

| | | |
|---|---|---|
| You are five and nine in . . . | Su señal cinco-nueve en . . . | Soo senial thinko nwayvay en . . . |
| Your signal is variable, very weak, weak, strong, very strong, excellent. | Su señal es variable, muy floja, floja, fuerte, muy fuerte, excelente. | Soo senial es variablay, mooee flocha, flocha, fooertay, mooee fooertay, ecthelente. |
| There is no interference. There is a lot of local interference. | No tiene interferencia. Hay mucha interferencia local. | No tee-enay interferenthia. Hay mootsha interferenthia lokal. |
| Your signals are fading. | Sus señales se pierden. | Soos seniales se pee-erden. |
| Your modulation is good/bad. | Su modulacion es buena/mala. | Soos modoolathion es booena/mala. |
| I can understand you very easily. | Puedo comprenderle facilmente. | Pooaydho comprenderlay fathilmente. |
| I can understand you only with great difficulty. | Solo puedo entenderle con gran dificultad. | Solo pooaydho entenderlay con gran difikwltadh. |

## Asking for Information and Commands

| | | |
|---|---|---|
| Please state your name/your location/your callsign. | Por favor digame su nombre/su ubicacion/su indicativo de llamada. | Por favor deegame soo nombre/soo oovikathion/soo indicativo day liamahda. |
| What is your country? | Cual es su pais? | Kwal es soo pies? |
| Please spell your name/location/callsign phonetically. | Por favor codifique su nombre/ubicacion/distintivo de llamada. | Por favor kodeefeekway soo nombre/oovikathion/distintivo day liamahda. |
| Please can you give me a report? | Por favor digame mis señales? | Por favor deegame mes seniales? |
| Please repeat. | Por favor repita. | Por favor raypeata. |
| Please speak more slowly. | Por favor hable mas despacio. | Por favor ablay mas despathio. |
| Do you have a lot of interference? | Tiene mucha interferencia? | Teanay mootsha interferenthia? |
| Are my signals fading? | Se pierden mis señales? | Say piayrden mis seniales? |
| Have we worked each other before — on this band/on another band? | Hemos hecho contacto anteriormente — en esta banda/u otras bandas? | Aymos etsho contacto anteriormente — en esta banda/ oootras bandas? |
| I'm sorry, I do not understand you. | Lo siento, no le comprendo. | Lo siento no lay comprendo. |
| I do not understand/speak Spanish very well. | No comprendo/hablo Español muy bien. | No comprendo/ablo espaniol mooee be-en. |
| Please stand by. | Por favor esté atento. | Por favor este atento. |
| Please go again. | Por favor adelante de nuevo. | Por favor adaylantay day nwayvo. |
| Do you copy? | Me copia? | Me copia? |
| How do you copy? | Como me copia? | Como me copia? |
| Is this frequency free/occupied? | Esta la frecuencia libre/ocupada? | Esta la frekwenthia libre/okwpahdo? |
| This frequency is in use old man, I'm sorry. | Esta frecuencia está ocupada, lo siento. | Esta frekwenthia esta okopahdo, lo see-ent. |
| I have a sked. | He preguntado — tengo cita. | Ay pregwntahdo — tengo theeta. |
| Can we change frequency? How about 10kHz up/down, if the frequency is free? | Podemos cambiar de frecuencia? Que le parece 10kHz arriba/abajo, si está libre? | Pohdaymos kambiar day frekwenthia? Kay lay paraythe dee ehth kiloherts arreeva/abacho, see esta leebro? |
| How about S19? | Que le parece S19? | Kay lay parethay S dee ehthi nooehve? |
| Can we go simplex? | Podemos hacerlo en simplex? | Pohdemos atherlo en simplex? |
| I shall see you on the . . . repeater. | Le verè en el . . . repetidor. | Lay veray en el . . . raypetihdor. |
| Shall we try sideband? | Probamos en banda lateral? | Provamos en la banda lateral? |
| How about Morse? | Que le parece en Morse? | Kay lay paraythe en Morse? |
| I'll give a report on the next over. | Le dare su reportaje al proximo cambio. | Lay daray soo reportache al proximo cambio. |

CONTINUED NEXT MONTH



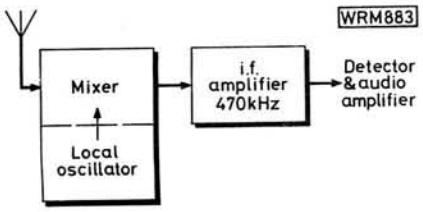

# Amateur Bands

by Eric Dowdeswell G4AR

Reports to: Eric Dowdeswell G4AR
Silver Firs, Leatherhead Road,
Ashtead, Surrey KT21 2TW.
Logs by bands in alphabetical order.

The complexities of the modern communication receiver seem to frighten off some users from investigating its circuitry in the hope of understanding how it functions, always good practice with any equipment if one is to get the best from it. However, should this knowledge be acquired it does not mean that one can start fiddling about inside the set! A short review of the way in which the superheterodyne receiver has developed would seem to be in order.

Considering the pre-synthesiser age of superhets, the basic stages required are shown in Fig. 1 with a mixer, local oscillator, intermediate frequency stage/s and detector, although in this discussion we are not concerned with anything after the i.f. stages. The local oscillator (l.o.) signal mixes with the input signal to produce, basically, sum and difference frequencies, with the difference frequency generally being selected to form the intermediate frequency (i.f.) being amplified in the i.f. stage/s. Normal practice is for the l.o. to be higher in frequency than the input signal for reasons that need not be explained here. The i.f. signal goes to a detector or demodulator converting the signal to a low-level audio signal.




**Signal freq. 14–14·5MHz**

**Local osc. 14·470–14·970MHz**

**Fig. 1: Simplest superhet circuit with combined mixer/local oscillator feeding into a fixed frequency amplifier where most of the gain of the receiver takes place**

With this simple set the frequency stability depends upon the stability of the l.o., consisting of networks of coils, capacitors and a section of a ganged tuning capacitor, all switched to provide a wide range of frequency coverage, typically 500kHz to 30MHz in a general coverage receiver. In earlier days receivers covering only the h.f. amateur bands were not uncommon. With the multiplicity of contacts on the band switch it is surprising that the l.o.s were as stable as they were. The l.o. would be fed from a 150V line stabilised with a neon-type stabiliser from the main 250V line. With the heat generated in the l.o. stage, frequency drift was always a problem, often solved by the right combination of temperature-conscious capacitors in the l.o. tuned circuit.

The advent of transistors and integrated circuits and their much lower operating voltages meant big reductions in all the factors that militated against good frequency stability in valved oscillators. But back to the valved sets and the first improvements that came along. The first was to use a crystal controlled converter feeding a tunable i.f. stage, Fig. 2, which often was one range of a communications receiver, say 3·5 to 4MHz. Hence the l.o. in the tunable i.f. was working at quite a low frequency and stability was improved. One crystal was used in the converter for each amateur band with two or three required for the 28MHz band (10m). Taking the example shown in Fig. 2, with a crystal of 18MHz and an input frequency of 14MHz, the i.f. would be 4MHz, but at 14·5MHz it would be 3·5MHz so, in effect, the tunable i.f. is tuning backwards! When the signal frequency is above the crystal frequency the opposite obtains.

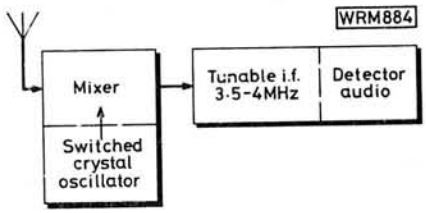



**Fig. 2: Here the mixer is associated with an oscillator having several fixed frequency crystals, one for each band, feeding into an i.f. amplifier which can be tuned over a range of 500kHz, usually one range of a conventional superhet. Hence there is double frequency conversion**

In practice, the crystal was often an overtone type operating at much lower frequencies, the harmonics being selected for injection into the mixer stage. In fact, one converter that proved very popular used a single 3·5MHz crystal, or just below, with the appropriate harmonic used for the 7, 14, 21 and 28MHz bands. If the crystal had been on 3·5MHz precisely the harmonics would have been a nuisance at the end of all the higher frequency bands! One big advantage of the tunable i.f. idea is that the coverage, say 500kHz or whatever, is the same on every band, as is the calibration. More next month.

## Round and About

From Edinburgh, **Keith Nockels** writes for the first time and reports receiving a VK on his new receiver with a whip antenna and asks if he can fit an outside antenna for better results. Unfortunately, although widely advertised, I would not consider the set to be in the communication class and if he adds any wire he will get severe cross-modulation on most bands on the stronger signals.

Lack of the necessary has not stopped **Mike Davis** (London E18) from getting on to the amateur bands. He built a single f.e.t. regenerative receiver using plug-in Denco coils to cover 1·8MHz to 14MHz bands fed via an a.t.u. from a 20m-long dipole. His best DX on 14MHz so far is VK3. As he says, he hasn't logged anything really spectacular yet, but he does get a lot of enjoyment from this simple rig having built it himself. This, of course, is where so many newly licensed amateurs lose out, going straight on the air with commercial equipment and not having the pleasure and satisfaction that goes with constructing one's own gear.

At the other end of the scale, as it were, is retired **Doug Middleton** in Broadstone, Dorset, who was into radio in the early days but got hooked by motor bikes to the exclusion of radio. However, he is back in the fold again, having visited the Flight Refuelling club at Wimborne and started to study for the RAE. A "grand bunch of helpful lads and lassies" he comments.

**Andy Durrant** of Colchester, Essex, has had trouble with his AR88 with a complete lack of signals. Fault-finding on such occasions is yet another way of improving one's knowledge of the equipment in use. With a bit of logic, the old-fashioned stuff, he found an open smoothing circuit choke which was soon rectified (Ugh!). Whether the gear is valved or solid-state, first check the voltage of the supply and work backwards from the output stage until the faulty stage is found, after which a little deduction will often prove effective. Expensive test equipment is useful but by no means essential in fault-finding.

I was delighted to meet **Anne Edmondson** GM4TCW of Edinburgh on her way south to the RNARS rally at HMS Mercury where she acquired a DX40 and v.f.o. All she needs now is a handbook on this rig. If anyone can help, please contact Anne at 52 Elm Row, Edinburgh EH7 4AH.

In East Ham, London, **C. P. Stagg** has a Realistic DX200 and the 10m of wire supplied with it as an antenna, and he wonders what the Lo-Z and Hi-Z terminals mean on the back terminal panel. Well, OM, they mean low and high impedance inputs, for different types of antenna. In the case of the wire supplied this would be a half wave on the 14MHz band and thus high impedance and should be connected to the Hi-Z terminal. However, on 7MHz (40m), where it is a quarter wave long, it becomes low impedance and must be connected to the Lo-Z terminal. Obviously, one cannot be forever chopping and changing like this so you could fit a changeover switch to make it more convenient.

However, the simplest solution is to construct an antenna tuning unit that will transform the impedance presented to the receiver to low impedance whatever the frequency concerned, with a low impedance coaxial lead between the a.t.u. and the receiver. Thus you will get the best results on any band with a common antenna.

A further appeal for the loan of a manual for the old Codar CR70A receiver, wanted by one of our handicapped readers. Please send it to me and I'll copy and return immediately. Thank you, in advance.

## DX Notes

Most of you have already reported the special callsigns now in use from Liberia, A81–82–85–87–88 and 89LC, with postage money sent for QSL cards being donated to the Ganta leper colony. An award for working all six stations is available. All QSLs to B. Johansson SM4CWY, Box 134, S-67101 Arvika, Sweden. A good cause if ever there was one. I once visited a leper colony in the southern Sudan and, contrary to most people's views on such places, it was very clean and very much a communal enterprise, but, as always, very much in need of support from the outside world.

For those wanting a 9V1 station in their log there is 9V1VS in Singapore, looking for G QSOs on 14 or 21MHz between 1200 and 1600Z weekdays, and continuing on to 2000Z on Fridays and Saturdays.

By now **Brian Patchett** BRS51845 will have taken his code test and with the RAE out of the way he could be on the air before long. Living in Sheffield, Brian is passing the time pondering on the rig he hopes to have soon. On his Grundig Satellit 1400 he caught VP9CP on 14MHz, and VU2GI, ZD7BW, 5H3DM, 5N2LED and 5Z4DA on 21MHz. On the 7MHz band he complains of much noise and "very poor selectivity", typical of front end overloading by strong signals. Need I say more?

**David Price** (Wellington, Somerset) covered three bands with his FRG-7 and multi-band dipole with VP8ANT, VP8APU, S83H in the Transkei, Z22JV, VP2VA, EA8BS with 8W to a tri-bander, 9V1VP, 8P6MV, PY1EFM/P/PY0T on Trinidade Island, 7Q7LW (POB 24, Mtakataka), all on 28MHz band, and HC1SK and 7P8CL in Lesotho. He also comments on ZD8JT frequently heard round 1900Z on 21·190MHz with ZD7BW, also available around 21·3MHz.

In Hillhouse, Hamilton, **Donald Stewart** stuck to 14MHz with his Ferguson TR61 using an Eagle RAD30 as the b.f.o. to log 9M2HB, VP8ML, 5B4HG (POB 375, Larnaca or via OE3REB), JR6FC on Okinawa (remarkable!), DU1CK, CT3DK, HH3MC, 7Z2AP in Riyadh (Box 2537), and finally Z21GC (POB 294 Harare) for an excellent effort with a minimum of suitable equipment.

Don't forget that Owen W5LFL will be active on 144MHz from the STS9 space shuttle in September, so you are excused if you emigrate to 144MHz for this great event. Since it is a purely optical path there should be no propagation problems, but just how he will cope with the chaos is not yet known. I've heard it suggested on 144MHz that it may have to be handled through repeaters where this is possible. Now, what's the best handheld on the market?!

The annual Cray Valley RS SWL contest will be held for 24 hours starting at 1800Z on Saturday Sept 10, with up to 18 hours' logging allowed. There are c.w. and telephony plus single and multi-op categories on 1·8, 3·5, 7, 14, 21 and 28MHz (have they not heard of the new bands? An ideal opportunity to check activity there). Log sheets and details from Owen Cross G4DFI, 28 Garden Avenue, Bexleyheath, Kent DA7 4LF on receipt of a LARGE SAE. Certificates of merit will be awarded, so there is a chance to show what you can do and I hope some of our readers will top out the results list in due course. Remember it is invaluable practice for the time when you will want to enter a contest, having got your ticket. Believe me, there is far more to contest operation than meets the eye, warranting quite a lot of preparation beforehand, if it is to be taken seriously.

For the s.w.l. and licensed lads and lasses there are the Cray Valley weekend activity contests, No. 1 1·8 and 3·5MHz 1900 to 2200Z on Saturday September 17, No. 2 144MHz 1400 to 1700Z on Sunday September 18, and No. 3 on 432MHz 0700 to 1200Z also on the Sunday. Full rules etc from Graeme Caselton G6CSY, 19 Cowden Road, Orpington, Kent BR6 0TP. Ditto re large SAE.

**Viv Doidge** has been hard at it in Callington, Cornwall, with his FRG-7700, a.t.u. and 40m-long antenna with such as DU7RLC, FY0ESE (Ariane launch site), XT2BM, ZD8RS, VP5RAC, 9J2BO, 9L1DR, 9M2FZ and 9X5SL (QSL via DL8DF) all on 21MHz band. On to 14MHz band for A89LC (see previous note), FG7CI, HL9RC, KG6RN on Guam, 7Z2AP, 9Q5MA and 9Y4VV. The 7MHz band produced just FG0HUL/FS (QSL N3CQM, on holiday no doubt) and 5T5RR for a couple of good ones. A92NH, Z21EV, ZL2BT, ZS3GB, ZS4PB and 5Z4DR turned up amazingly on the 3·5MHz sector, very good for what is supposed to be midsummer! I heard the ZS3 myself recently with a good 57 signal, but unfortunately I had just taken down my 3·5MHz delta loop and I wasn't going to add to the QRM with my trapped dipole! Viv queried VE0MJH, which I suspect is the equivalent of a maritime mobile suffix. Incidentally, that ZS 3·5MHz DX was heard around 2200Z and the ZL at 0500Z.

Don't worry if you find that you are hearing American stations a bit lower down on 14MHz these days as some new allocations have been made. Extra Class tickets can use 14150 to 14175kHz, Advanced and Extra Class 14175 to 14225kHz and General, Advanced and Extra Class 14225 to 14350kHz.

**David Wilkinson** writes for the first time from Ventnor, IOW, where he runs an Eddystone 840A with a 30m-long wire, with an a.t.u. in the pipeline. He usually manages to get an hour's listening in morning and evening, like CT2DG, VP2MBG on 21MHz plus PJ9EE, 6Y5IC, 9H4B and 5N2LED on 14.

In Prestwich, Manchester, **Dave Shapiro** has also been monitoring most of the h.f. bands and has been playing about with a loop antenna on 1·8MHz. Details pse! He also joined a fairly local radio club, but is a bit put out because too many of them smoke too much, to quote his own words. Answer—find another club! Oh, yes, Dave is also BRS53844. On to his log and C6ANU, J28BG, J37AH, TR8DX, VS5GA, V2AO, ZD7BW, 9Q5MA representing 14MHz, 6Y5MJ, HZ1AB, VP2VD on 7MHz, and A89LC, FY0ESE, HC1BP, PY1EFM/PY0T on Trinidade Island, 9V1VP, J37AB, 7Q7LW, TR8WR, ZD7CW and 9X5MB for 21MHz. The gear is a DX200 with a 10m-long wire antenna.

An open circuit smoothing choke was the reason for the dead AR88 of Andy Durrant (Colchester), mentioned previously, so he's active once again. He has augmented his equipment with a famous old set, the Hammarlund HQ100A, bought for a song, as they say. But on the '88 it was OL6NAP/ZS6, 5Z4TV, 8P6HX, VS5GA and 5N8ARY, all on 14MHz. On 21MHz he logged 5B4BD and 9X5LR. With the RAF at Honington, Suffolk, **Terry Jenner** has a Trio R2000 and a.t.u. and a 40m-long antenna which caught a nice one on 3·8MHz, namely VK6HD. A couple of South Americans on 7MHz were followed by HL1EJ and 7Z2AP on 14MHz. POB 146, Cambridge, is the QSL address for VP8ANT in Antarctica, says Terry. That was on 21MHz where he also got VS6DK and 5N8WCY (POB 7355, Kano). Terry says he is now BRS84462, but I think he'd better check that with the RSGB as they can't have gone that far ahead so soon. Should be 54462 I suspect. A late note says Terry is now at RAF Manston, Kent.

**Steve Stephenson G3CLJ retired recently from the chairman's job with the Chesham & District ARS after many years' service. Peter Cabbon, right, G4OST, hands over a small token of thanks from club members**

The FRG-7700 and FRT-7700 a.t.u. and a random length wire were the means of **Jim Willett** up in Grimsby finding FO8JJ on Tahiti on 14MHz, with J2ADN in Djibuti, YB6MF (POB 232 Medan), 9M2FZ, 9V1VP and 5Z4DE on 21MHz. At long last someone else has turned up on Pitcairn! VR6KY was logged by **Dave Coggins** in Knutsford, Cheshire, on 14MHz, with cards to LA7JO. Also found were DU9RG and XE1OE. Up to 21MHz and TU2JL, ZD7BW and a nice one in ZK2JS on Niue. Getting rather patchy these days 28MHz produced FH8CB on Mayotte Island for a rare catch, PJ9EE, VS5RB and YC2DNT with QSLs to POB 161, Solo, Indonesia.

An FRG-7700 fed from an active antenna FRA-7700 enabled **John Griffiths** BRS54142 to locate a real goodie on 7MHz, FB8ZQ on Amsterdam Island. On 14MHz he got J39BS on Grenada, VP2MKM, 5N8YPN and 6Y5HN. Only two, VP2MF and OA4II, were worth logging on 21MHz. John, in Holyhead, Gwynedd, has parental problems with wires over the vegetable patch so is thinking about a less conspicuous vertical! Although s.w.l.ing for a couple of years, **Alex Fraser** in Dublin has at last got around to writing to the column, so welcome OM. Not sure it should be "OM" as Alex is only 14. However, he will have sat for their RAE in July and can only hope he makes it. The rig is a Sony ICF2001 which, apart from lots of Euros, found 5T5AP, VP9OS, ZB2AP and some W's.

**Dave Gregory** (Leeds) expresses his sorrow for those who buy commercial gear and thus miss the great thrill of constructing one's own gear. He has a bought receiver but it sits gathering dust, it seems! His recent effort was a direct conversion rig on which he has copied C53DF, TR8JD, 5Z4DE, PJ3AT, HC2HE/P/8 on the Galapagos Islands, YI1BGD and 9N1MM and many others, all on a 20m-long antenna.

**Terry Maton G4GHU, left, was contest manager for the NFD effort by the Harlow & District ARS station G6UT this year. Continuing to the right we find son Keith Maton G6NHU, Dave Wilkins G6DMF and Les Adams G4KUI, and the station rig. Unfortunately all was lost when the hired generator threw in its hand**

## Club Time

**Acton, Brentford & Chiswick ARC G3IIU** It's the Chiswick Town Hall, High Road, Chiswick, London W4, on Tuesday August 16 at 7.30 when those lucky enough to get along will be regaled with a talk on a variable h.f. frame antenna. How about an article for *PW*? Demonstrator will be G3OJX, says hon sec W. G. Dyer G3GEH, 188 Gunnersbury Avenue, Acton, London W3.

**Atherstone ARC G4LCQ G6ARC** The Tudor Centre, Coleshill Road, Atherstone, second and third Thursdays at 7.30 where, on August 11, it will be an evening on the air, the 18th being RSGB film night. In case it is too late for the next issue, note September 8 when G8SYE will hold forth on Top Band DF. Try Mike Wooding G6IQM, 16 Hill Top, New Arley, near Coventry, for the latest gen.

**Aylesbury Vale RS** Meets at the Stone Village Hall, Stone, at 8pm every four weeks, which, from the club's newsletter, seems to be Tuesday August 9 for the next meeting when Stan Cook G5XB will deal with his work on the Intruder Watch. Tuesday September 6 finds G4KNZ introducing members to microwaves. Cathy Clark, 9 Conigre, Chinnor, Oxon, will be glad to bring you up-to-date on club happenings. Cathy and her OM Brian are busy with an RAE course at present, taking the exam in December.

**Barry College of FE RS GW4BRS GW3VKL** The shack has been re-designed and the quad and mast serviced, according to publicity officer Dennis Egan GW6HAW, 4 Hazel Grove, Longmeadow, Dinas Powis, S. Glam. Meetings every Thursday at the College Annexe at 7.30. This is on the outskirts of Barry, near to the old Barry Zoo, seemingly.

**Braintree ARS G4JXG G6BRH** First and third Mondays at 7.45, the Braintree Community Centre in Victoria Street. Not quite sure how he made it, the new Publicity Sec is Jeff Roberts G6OIX of 27 Medley Road, Rayne, Braintree, Essex, who is anxious to assist possible new members and visitors. Must have nodded when he shouldn't have done! New chairman Cyril Weller G4ONH threatens all sorts of new activities for the club according to club's monthly communication *BARSCOM* well-produced by editor Dave Penny G3PEN. On August 15 Len Crane G3PED tells the history of teleprinting, and advance notice of a quiz evening on September 5.

**Brighton & District ARS G4GQR G8OMR** Next meetings scheduled are on August 10 and 24 but subjects so far unknown at this end. But they will take place at the Marmion Road YMCA at 7.30. Those are Wednesdays, but on Mondays there is a Morse code class, but for further info try Wendy Firmager, 26 Brownleaf Road, Brighton. Visitors to the club on September 21 will be the Worthing & District TV repeater group to talk about the video side of amateur radio.

**Bury ARS** A foxhunt! Not the real thing I'm glad to assure you, but from the club's QTH at the Mosses Centre, Cecil Street, Bury, at 7.30pm on Tuesday August 9 it says. I'd check with PRO Malcolm Pritchard G3VNQ, 56 Shelfield Lane, Norden, Rochdale, Lancs, if I were you for latest details. The fox will be last year's winner G6FUQ. Otherwise Tuesdays at 8 at the Centre with the second Tuesday deemed to be main meeting time. Unusual subject for September 13 is Japanese Morse by G3CSG, if one can rightfully call it "Morse"!

**Carlisle & District ARS** Much activity at the Scout Hut, Trinity School, Carlisle, starting with half an hour's code practice before the main meeting at 7.30. RAE results are awaited for several students on the club's course. More from Paul Boyd G8RJA, 13 Stackbraes Road, Longtown, Cumbria.

**Civil Service ARS** Re-formed a couple of years ago, the club now meets lunch times on first and third Mondays at the CS Recreation Centre, Monck Street, London SW1, off the Horseferry Road, with lectures and discussions. Nets run are on 144·575MHz at 7.30 on Tuesdays, with a 3760kHz group half an hour later. So says hon sec G. H. Costin G4GFU who can be found on 01-632 6444. Civil servants in particular are most welcome to join the nationwide membership. A club station is expected to be established before long with contest operation envisaged.

**Dartford Heath DF Club** For the DF specialist, with meets starting at the Horse & Groom, near Dartford Heath, NGR 520 726 says hunt organiser Peter Sharman G8DYF, 3 Elizabeth Street, Stone, near Dartford, Kent, or Greenhithe 844467.

**East London RSGB Group** Rendezvous is Wanstead House, Wanstead, London E11, every third Sunday in the month, from September to July, at 3pm. Very unusual, but I'm sure it's best for all concerned! It is expected that the club station will be re-activated very shortly. Lectures and social events are regular features in what is a revival of the club. More from the Publicity Officer Julian Greenberg G6DXW . . . well, you could if I knew his QTH or even his phone number, which I don't. So as an interim measure I suggest you contact Sheila Gabriel G3HCQ, 71 Albert Road, Ilford, Essex, who just happens to be the chairman.

G4JDT
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**Farnborough & District RS** Chris French G8ZAJ, 26 Wood Street, Ash Vale, near Aldershot, Hants, is PRO for the club and tells me that they meet at 7.30 on the second and fourth Wednesdays at the Railway Enthusiasts Club, Access Road, off Hawley Lane, Farnborough, with August 10 finding G6HIT declaiming on basic computers. G3LTP will deal with v.h.f. propagation on the 24th. A note not to forget the constructional contest on September 28.

**Flight Refuelling ARS G4RFR G6SFR** HAMFEST '83 rally is the event of the year for the club, to be held on Sunday August 21 at the club's site at Merley, near to Wimborne, Dorset, from 11am to 5pm in conjunction with the Bournemouth & District group of the RAIBC. National and local traders, XYL Bonanza-displays and demos for the ladies, demo station in the club house operating on all bands with all modes including SSTV, RAIBC stand with AGM during the day. RAYNET will be giving a display and a jumbo junk sale is envisaged with unwanted gear solicited for the RAIBC cause. Bring and buy, model railway exhibition, squash demo and lots more. Talk-in on 144MHz and 432MHz from GB2FRH and GB3SC. Whew! Full club QTH is the Flight Refuelling Social Club, Merley, Wimborne, with regular meetings on Sundays at 7.30. Don G8YCA speaks on Colour TV decoders on August 7, with Nick G8MCQ dealing with technical matters a week later. Nothing on the 21st needless to say, except the rally! But on the 28th Don G8YCA, again, deals with video recording matters. Club sec is Mike Owen G8VFY on Wimborne 882271.

**Gosport (Rowner & District) ARS** First and third Mondays at 7.30, Hardway & District Community Association, Fieldmore Road, Gosport, with code classes and RAE course flourishing. More from PRO Chris Jackson G4NAB, on (0329) 662144.

**Greater Peterborough ARC** Fourth Thursday of the month, but no meetings in August, so next is September 22. Activities include special event stations, rallies, computers, constructing a transceiver, video evenings, plus the usual quizzes and raffles, with a promised talk on satellite working. Club net on 21·200MHz at 8pm on Mondays. Sec is Frank Brisley G4NRJ, 27 Lady Lodge Drive, Orton Longueville, Peterborough, or (0733) 231848.

**Halifax & District ARS** After much dissatisfaction with the old place a new venue has been acquired at the Running Man, Pellon Lane, Halifax, and the beer's better, apparently! Phil G4JHS is the lad to contact for event info, at 79 Windermere Road, Bradford, W. Yorks, also B'ford 576504.

**Leighton Linslade RC** Gathers at the Vandyke Community College, Room A64, Vandyke Road, Leighton Buzzard from 7 to 10pm first and third Mondays although the big event for August is the last of the season's DF hunts on Sunday the 28th. The AGM is scheduled for September 5. Pete Brazier G6JFN, Kingsway Farm, Miletree Road, Leighton Buzzard, Beds, will fill in the details for you or ring Heath & Reach 270.

**Mid-Warwickshire ARS** First of all, the family day out and picnic at Ragley Hall on Sunday August 21 complete with h.f. station G3UDN on the air. An exhibit will be mounted at the Town & Country Festival at the National Agriculture Centre, Stoneleigh, on Sat/Sun/Mon August 27/28/29th. Normal meetings on the first and third Tuesdays at 61 Emscote Road, Warwick with additional info gladly supplied by Carol Finnis G4TIL (congratulations, Carol!) at 37 Stowe Drive, Southam, Warwks, that is also (092681) 4765. NB:— junk sale on September 6 and a 144MHz foxhunt on the 20th.

**Nene Valley RC G4NWZ G6GWZ** It's the Dolben Arms, Finedon, on Weds at 8pm for most meetings with transmitting activity from the nearby St Mary's Scout Hall. Natter nite and on-the-air on the h.f. bands occupies Aug 10, with Sunday the 14 seeing the club off to the Derby Rally. On the 17th G3NVK holds forth on "Resonating Antennas" the most important aspect of this fascinating field of amateur radio, while on Aug 24 Dr. J. Graham of the CEGB delivers a lecture on "Alternative Power", not to be missed. More nattering and TX operation on the last day of the month. Lionel Parker G4PLJ, 128 Northampton Road, Wellingborough, Northants is around to answer your queries. Ah, don't forget the lecture on satellite working by G4HME on September 7.

**Newark & District ARS** The Palace Theatre, Newark, on the first Thursday at 7.30 with a station on the air and fast and/or slow Morse classes in addition to regular talks, quizzes and all the usual events. On Aug 4, if you get this in time, it's new antenna testing time at the club, both v.h.f. and h.f., and note the social evening on Sept 1, with a get-together for all and sundry in the Punch & Judy Room with bar and refreshments and the likelihood of some entertainment. Club net is on 144·525MHz Mondays at 8pm. Details from Roger Hiscock G4MDV on East Stoke 539.

**Norfolk ARC G4ARN** Peter Forster G3VWQ, 12 Thor Road, Thorpe-St-Andrew, Norwich, says the club foregathers at Crome Centre, Telegraph Lane East, Norwich at 7.45 Wednesdays, like on August 10 when G2FLC recalls his early days in radio, or the 17th when G6LUN has computers on display, with a reminder of the foxhunt on Sunday Sept 4. Big event to come is the visit to the BBC in London on Sunday October 9, so contact Peter on this one, first come, first served, as they say.

**North Bristol ARC G4GCT** The club has sponsored and operated several special event stations of late. AMTOR, computer controlled RTTY, was demonstrated by a couple of members and the c.w. and RAE classes are going well. Every Friday at the Self-Help Enterprise, 7 Braemar Crescent, Northville, Bristol with visitors most welcome, says Ted Bidmead G4EUV, 4 Pine Grove, Northville, Bristol BS7.

**Perth & District AR Group** These lucky people have their own club room at the Perth City Sports & Social Club, Leonards Street, Perth, meeting there every Tuesday from 8.30pm with various constructional projects in hand and code classes every Wednesday. Activity is also available in the local RAYNET group. Computers have moved into the club with much mutual help on the problems that arise. I think I'm right in saying that the sec is R. H. Barnes GM6ESY, Pittendynie Cottages, Moneydie, near Luncarty, Perth.

**Ripon & District ARS** RAE and Morse code classes lead off the meetings every Thursday starting at 7 with the main attraction around 8, after coffee. All at St John Ambulance Hall in Ripon. Peter Fautley G6CUG at Parkside, Thornton-Le-Street, Thirsk is also on Thirsk 24945, and is the secretary of the club.

**South Essex ARS** Not yet a year old the club already has an excellent mag *South Essex EARS* every month. Contents of recent issue included a DF receiver for Top Band, the diary of G1BF (be careful, that could be somebody's call very soon!), Computer Date, the VK2ABQ tri-band beam and much more. Gatherings every Wednesday at Paddocks Community Centre on Canvey Island, at 7. Forthcoming Events speaks of a foxhunt on August 10, a station-on-the-air evening on h.f. and v.h.f., with the 31st aimed at finalising preparations for the s.s.b. FD. Contact is Dave Pritchard G4GVO, 55 Walker Drive, Leigh-on-Sea, Essex.

**Stevenage & District ARS** It's 8pm on the first and third Tuesdays at TS Andromeda, Fairlands Valley Park, Shephall View, Stevenage, Herts, says Publicity Sec Trevor Tugwell G8KMV, 11 The Dell, Stevenage. August 9 is DF hunt time while a week later constructors' evening gets under way in what it is hoped will be a monthly feature at the club. Ah! Something for all the family, a club picnic at Hampton Park on Sunday August 21. Two more events to advise you on, September 6 when G4MEO describes how aluminium can be utilised in making antennas, and a Beginners' Evening to be held at the Fairlands Community Centre on Thursday September 8.

**Stourbridge & District ARS G6OI G6SRS** The *STARS* newsletter tells me that the club has informal meetings on the first Mondays and main events on the third Mons, all at the Garibaldi, Cross Street, Stourbridge, at 8. No meetings in August but on Sept 5 the informal meeting will deal with the Stourbridge Carnival, and JOTA groups; the carnival plus special event station active on Sept 10, a Saturday. Future club programme details from Bob Taylor G4DST, 122 Birmingham Road, Great Barr, B'ham otherwise 021-357 5171.

**Torbay ARS G3NJA G8NJA** New PRO is Tony Rider G6GLP at 7 Kingston Close, Kingskerswell, S. Devon, taking over from Les G2CWR. Telephone is (08047) 5130, and the club sec is GLP's XYL. All nice and cosy! No club meetings during August but strong possibility of putting on an exhibition station at the Marldon Apple Pie Fair on Saturday Aug 27. More on events from Tony.

**Vale of the White Horse ARS** On the move, the club goes to the Canteen and Social Club, Milton Trading Estate, Milton, actually a pub with restaurant and bar facilities for those so inclined. First Tuesdays are devoted to visiting speakers and the third to club events, all at 7.30, ending around 10. A computer group within the club is growing rapidly, so if your interest lies in any aspect of amateur radio contact sec Ian White G3SEK, 52 Abingdon Road, Drayton, Abingdon, Oxon (0235) 31559.

**Wigston ARC** Every Friday at the United Reformed Church, Long Street, Wigston, Leicester at 7.30. Constructional projects

enable the members to build up their stock of gear whether the interest is on the h.f. or v.h.f. bands. More from Alan Faint G6GWH on (0858) 62827.

**Wimbledon & District RS** It's ragchews and general club activities on Fridays August 12 and 26th with the big events being held over 'til the autumn, says sec Geoff Mellett G4MVS, 26 Paget Avenue, Sutton, Surrey. Club gathers at the St John Ambulance HQ, 124 Kingston Road, London SW19.

**Wirral ARS G3NWR** As from Wed Sept 7 it's a new QTH for the club, at the Guides HQ Building, behind the Public Hall, Westbourne Road, West Kirby, on first and third Weds at 7.45. November dates include the Chairman's night on the 2nd and G3KTJ talking about coaxial cables on the 16th. We wish you all well in your new quarters. It's sec Cedric Cawthorne G4KPY, 40 Westbourne Road, West Kirby, Wirral, also known as 051 625 7311. Not far to go for a meeting eh!

Club secs will probably realise that if their club doesn't happen to be mentioned, although they have sent in the info, that there are just too many reports received every month to be able to cover them all in any one issue. So, chairmen and club members, don't shoot your sec if he seems to be slacking. It is probably my fault! See you next month.

# Medium Wave Broadcast Band DX

by Charles Molloy G8BUS

Reports to: Charles Molloy G8BUS
132 Segars Lane, Southport PR8 3JG.

"I am puzzled by the medium wave loop. Please could you tell me about it; what are its advantages against a long (or short) wire antenna. Please also say whether it is best to be mounted in or out of doors" writes **Philip Hodgson** from Uffington in Lincolnshire. Although this has been explained before, the following may be of use to newcomers to the hobby.

The DXers m.w. loop is a tuneable directional antenna. The standard version consists of seven turns of wire wound in the shape of a square that is of one metre side. Connected across this winding is a variable capacitor which is the tuning control. A second, single turn winding, not connected to the main winding, is used to pick off the signal and lead it to the receiver. This type of antenna is directional, having two nulls, which are directions of little or no pickup that lie in opposite directions to one another and at right angles to the plane of the windings. Constructional details of loops suitable for use on the medium and longwaves are to be found in my article in *Out of Thin Air*.

When using a loop you first of all tune the receiver to the station you want to hear. Then adjust the loop tuning control until the signal peaks up. Finally rotate the loop for the best reception. If two stations are on the same frequency but lie in different directions from the receiver, then it is possible, by rotating the loop, to null-out each in turn. You can obtain this effect with an ordinary portable whose internal ferrite rod antenna acts like a mini-loop. Turn the receiver to null out the offending interference.

A loop can also be used to reduce "splash" from adjacent stations. Again, tune the receiver to the wanted station, peak it up with the loop tuner, rotate the loop for optimum reception. Alternatively, tune the receiver to the station, peak the loop on it, rotate the loop to null out this unwanted station. Now re-tune the receiver to the wanted station when hopefully it will still be heard, this time without the splash. Static can often be reduced by a loop. If it is coming from all directions then less will be picked up by the loop since noise from the directions of the two nulls will be suppressed. An improved signal-to-noise ratio will be obtained. Noise coming from a single direction either static or electrical noise indoors, can often be suppressed, but so of course will radio signals from the same direction. Summer static from tropical areas to the south can be eliminated, leaving DX from North America in the clear. Finally, the correct place for the loop is beside the receiver under the control of the DXer. There is little to be gained by having it elsewhere, either indoors or outside and to do so would bring problems with remote control of tuning and rotation.

## Disadvantages

There are two disadvantages. The pick up from a loop is less than one would get from a good outdoor antenna. It is often claimed that a loop has the same pickup as a 10m random wire 3m above the ground. This may not be based on actual measurement but it is of the right order. The other disadvantage is that the loop cannot be used with a receiver that already has an antenna of its own, a portable for example. This problem was covered in the July issue along with a suggestion how to get around it.


**AFN in Munich West Germany**
*Philip Hodgson*

## Abbreviations

In the early days of radio when communication was mainly by Morse code, it was normal practice to shorten commonly used words. Many of these abbreviations are now part of the language of amateur radio, a few of them being used by DXers. For the benefit of the newcomer to DXing who may be puzzled by some of this jargon, we will have a look at a few of the new "words" he may encounter.

The term DX is the obvious example. It is a shortened form of Distance, the letter X representing the last seven letters of the word. At one time it was quite an achievement to pull in a distant station. Not so today, so DX is now a word in its own right meaning Difficulty. A DXer is a listener interested in picking up broadcasts not intended for reception in his own area. The letters s.w.l. of course stand for short wave (programme) listener.

In a similar vein TX means transmitter while the RX is your receiver. Morse is referred to as c.w. (continuous waves), YL is Young Lady or girl friend and XYL is wife. Radio enthusiasts are a friendly lot who always call each other by their first name and will end a letter with 73 (best wishes) in place of the more formal Yours sincerely. There is also 88 which means love and kisses, a term to be used with some discretion! Next time we will have a look at the Q Code and some technical abbreviations.

**Europe No. 1 is on 185kHz with 2000kW**
*Philip Hodgson*

## HCJB on 1280kHz

Old timer **J Gordon** of Sunderland, who has been DXing for 50 years, writes to tell me of his reception of HCJB, the Voice of the Andes in Ecuador, on 1280kHz at 0630 on Tuesday 19 April. The receiver was an Elite 37 a.m./f.m. radio cassette recorder. Our reader asks if I can explain the phenomenon.

Well, HCJB does not transmit on 1280kHz and even if it did, it would not come in at programme strength in the UK. Ecuador is one of the more difficult South American countries to log on the medium waves in the UK. At the time quoted, HCJB's North American service

was on 6·095, 9·745 and 11·910MHz according to the ILG, so it must have been one of these three frequencies that was picked up.

Oscillator harmonics are one possibility. With the set tuned to 1280kHz and an i.f. of 455kHz, the receiver local oscillator would be at 1280 + 455 = 1735kHz. If a harmonic of 1735kHz was 455kHz above or below any of the three frequencies then pick up would be possible. The nearest I can get is 9·745MHz with the receiver tuned to 1245kHz or 11·910 when tuned to 1311kHz. Has anyone any ideas?

## Medium Wave Plan

Responding to a recent mention over Sweden Calling DXers I ordered a copy of the m.w. and l.w. station list from the DX Team in Berlin. They claim it lists all stations in West and East Germany, Spain, UK, Ireland together with several hundred others that might be heard (in West Germany). The list, which is a 40 page A5 size booklet, includes two maps showing m.w. radio in the UK. One is of local radio and the other is of the BBC national outlets. There is a useful list of ITU country prefixes, a map showing countries in the ITU Region 1 and a Great Circle map based on West Germany which is not noticeably different from one centred on the UK. The remainder of the booklet—about nine pages, is in German and covers m.w. propagation and receivers. *The Plan,* which is obtainable for four IRCs from the DX Team Berlin, Postfach 61 04 26, 1000 Berlin 61, West Germany, could be an inexpensive list for the local radio DXer who is interested in Spain as well as the UK.

## Spain

Local radio in Spain has been established for many years with well over 100 outlets on the medium waves and probably as many again on v.h.f. This is a good time of year for DXing Spain, before the arrival of winter. Listen from sunset until midnight or even later on 1026, 1080, 1224, 1314, 1395, 1413, 1476, 1584 and 1602kHz. Each channel has several occupants that sign off for the night at different times. Sign off time is obviously a good time to pick up the rare ones.

Many of the stations heard will reply to a report in English and there is no need to worry too much about the correct address. The name of the station followed by the town e.g. La Voz de Granada, Granada, Spain, should be adequate to reach most of them. Remember to enclose an international reply coupon (IRC) with the report.

## Readers' Letters

From New Radnor in Powys, **Simon Hamer** reports about local radio DXing. The highlights from his log being West Sound Ayr on 1035kHz and Radio Tees on 1170. Simon's set-up is interesting. He has constructed an a.t.u. which uses a ferrite rod instead of the more usual tapped inductor. The unit, which is connected to a 22m longwire, is placed on top of his Grundig S1400 so that there is coupling between the a.t.u. and the receiver's internal antenna. The signal is peaked up with the a.t.u. controls. A good way of avoiding the overloading that might occur if the 22m longwire were connected to the receiver.

# Short Wave Broadcast Bands

by Charles Molloy G8BUS

Reports: as for medium wave DX, but please keep separate.

In order to improve reception reader **R Lawrence** of London connected a 10m random wire antenna to his Panasonic 3100 receiver. "Once connected all I get is gross interference . . . it is strange how I can get a distant station reasonably clearly with just the telescopic antenna connected to the set and yet lose it almost completely with interference once the longwire is connected."

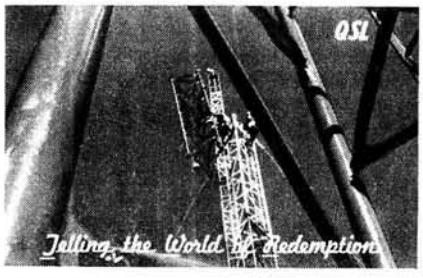
## Overloading

Our reader's receiver is too sensitive for use with a 10m antenna and consequently it is being overloaded. The result is interference from stations that are not even close in frequency to the desired one. When a portable has an antenna socket it is really intended for use with an antenna of comparable length to the whip. It would be an advantage to use such an antenna when the receiver is in a screened location such as inside a motor vehicle or a caravan. An antenna tuning unit (a.t.u.) will not help. If it is effective it may make the overloading worse. It is always worth trying a longer antenna as you may get away with it at times especially on a quiet band. If the result is an increase in interference and the generation of spurios and whistles, then you are overloading the set.

It is natural to assume that when a set has a socket for an additional antenna you can connect a longwire plus a.t.u. and obtain improved reception but I'm afraid this is seldom the case with portables. Overloading can also occur with communications receivers. It is often beneficial, when listening to strong signals, to back off the r.f. gain control or to switch in the attenuator (sometimes marked ATT). You can also reduce "real" QRM this way when the unwanted signal is weaker than the wanted one.

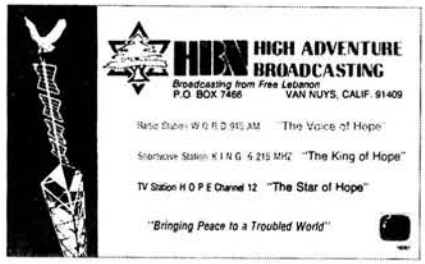
## Tropical Bands in the Evening

The Tropical Bands are a source of DX at any time of the year. Like the medium waves, propagation is only possible when the path between TX and RX is in darkness, which might lead one to think that the only DX to be heard during the summer would be in the middle of the night from Latin America. Not so. At this time of year, as sunset approaches the UK, most of Africa, a large part of Asia excluding the Far East and all of Australia will already be in darkness, though some of the more easterly parts of this area may not be too far away from sunrise.




**TWR Netherlands Antilles**

*Philip Hodgson*




**The Voice of Hope in Israel**

*Philip Hodgson*

The main band from the DX point of view is 5MHz (60m), which covers 4·750MHz to 5·060MHz. This is the place for the newcomer to start. The main requirement is a good antenna plus a receiver capable of handling signals from it without overloading. The RX should be both sensitive and selective which really means a communications receiver. This puts the DXer with portable and whip at a disadvantage but it is always worth a try. You never know what may be heard during the period around sunset.

From Africa listen for ELWA in Liberia on 4·765MHz, for Kaduna Nigeria on 4·770, Libreville Gabon on 4·810, Yaounde in Cameroon in English at 2100 on 4850, Cotonou Benin on 4·870, Lagos Nigeria 4·990. From Asia

there is Baku in Azerbaijan on 4·785, Ashkhabad in Turkmenia 4·825, Radio Sana in Yemen on 4·853, China on 4·865, Sri Lanka 4·870, Bangladesh 4·890, Azad Kashmir 4·980, Tbilisi Georgia 5·040.

Few of the above will be at programme value and many will suffer interference from commercial stations but in spite of this it is possible to use the tropical bands to eavesdrop into domestic broadcasting in distant lands.

## International Listening Guide

The summer edition of the ILG contains a new section called World Frequency Survey which lists approx 3000 transmitters operating in the nine international bands which lie between 4MHz (75m) and 26MHz (11m). An indication is given to show whether the programme carried is from the home or external service. Relay stations are marked and so are transmissions that are normally jammed. This new section makes the ILG into a complete directory of programmes in English for the short wave programme listener and is one that I personally would find it hard to be without.

The English edition of the ILG, which was reviewed in the January 1983 edition of this column, is obtainable from the DX Listeners Service, c/o Bernd Friedewald (DK9FI), Merianstr 2, D-3588 Homberg West Germany, the annual subscription for four issues being £4 or 12 IRCs.

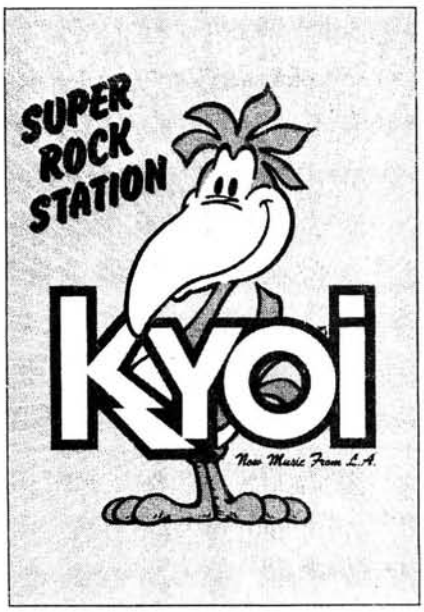
## ORF

These letters stand for "Osterreichischer Rundfunk" or Austrian Radio, which is a public corporation that produces the radio and television service in that country. The short wave service of ORF broadcasts in English for half an hour daily at 0830UTC on 6·155MHz, 7·170MHz and 9·770MHz with repeats at 1230 on 6·155 and 9·770, at 1830 on 6·155 and 2130 on 5·943. On Sunday there are extensions from 0900 to 0915 and from 1805 to 1830.

Programmes cover a wide variety of topics such as *Sports Review,* which includes the ski slopes, *Pop Corner* on Thursday, *Focus* (an item of music, literary, historical or artistic interest) on Friday, the *Tourist Scene* on Saturday, *Profile of Austria* and *Austrian SW Panorama* on Sunday. The latter "discusses all sorts of subject concerning shortwave listening in a way that appeals to the non-technically minded" to quote their programme schedule. At the time of writing they are completing a fortnightly series called Is there Anyone out There?, which examines the probability of extra-terrestrial life and the possibility of communicating with it. Austrian Shortwave Panorama is on the air on Sunday at 0900, 1235 and 1805.

The ORF transmitters, which are located at Moosbrun, range in power from 100kW to 500kW. A number of antennas are available, the most interesting being an omni-directional quadrant antenna for Europe and a rotatable multi-band curtain antenna for overseas. The latter is suspended between two towers which can be moved round a circular 80m diameter track in 8 minutes.

The address for a programme schedule and for reception reports is ORF, Auslandsdienst, A-1136 Wien, Austria.




**KYOI in Saipan**

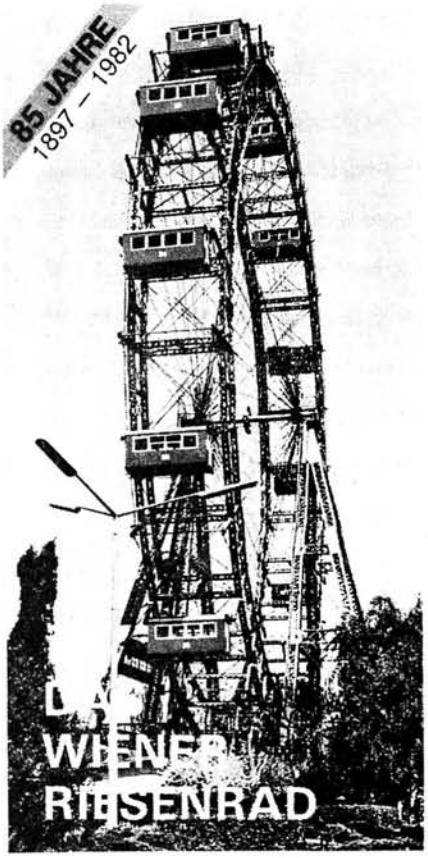
*Philip Hodgson*

## DX Clubs in the UK

Following on from the list of clubs mentioned in the June issue, there is the International Short Wave League founded in 1946. This club, which caters for the Radio Amateur as well as the DXer, publishes a monthly magazine called *Monitor.* As well as general features, *Monitor* has sections devoted to the Amateur Bands, v.h.f., Broadcast, Technical, Transmitting. The club, which has members in 30 countries, runs its own QSL bureau, sending out cards free of charge to all parts of the world.

The above information is from Edward Baker who is General Editor, Jim May who is Broadcast Bands Editor, and Mike G4ICG. Many thanks for writing. Interested applicants can write to the General Secretary who is Hayden Drinkwater, 88 The Barley Lea, Coventry CV3 1DY.

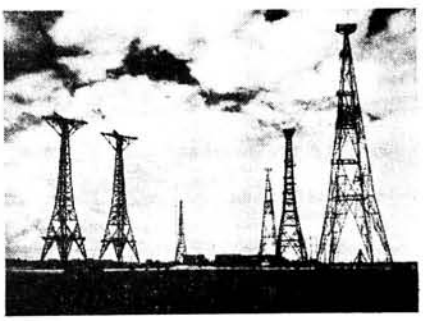
According to Sweden Calling DXers the North England Radio Club International has changed its address to c/o Bill Shaw, 1 Alt Avenue, Liverpool L31 7BJ. My list of clubs in the UK likely to be of interest to the Broadcast Bands DXer now includes The British DXX-Club, NERCI, The World DX Club, and the ISWL. Are there any more? The intention is to print the list from time to time for the benefit of newcomers to the hobby.




**The Vienna giant wheel**

## Readers' Letters

A London reader **R Vamben,** who is interested in the Indian Ocean area, wonders if Reunion, Seychelles and Mauritius have been logged in the UK and when are the best times to listen for them. Local broadcasting in Reunion and Seychelles is on the medium waves and neither has been heard in the UK so far as I know. The Far East Broadcasting Association (FEBA) uses the Seychelles as a base for its missionary programmes. These are not too difficult to pick up on the international bands during the day. The best



**Huizen antenna park with the wooden towers on the left**

# B.N.O.S. ELECTRONICS

## HIGH QUALITY R.F. CONNECTORS AT CHEAP CONNECTOR PRICES

CONNECTORS SUFFIXED 'S' DENOTES SILVER PLATED ALL OTHERS ARE NICKEL PLATED WITH DELRIN INSULATOR

### UHF CONNECTORS

| | Plugs | Price |
|---|---|---|
| BU01 | PL259 for 0·4in cable (UR67) | 0.50 |
| BU01A | Reducer for 0·2in cable (UR43) | 0.11 |
| BU01B | Reducer for 0·25in cable (UR90) | 0.11 |
| BU02 | PL259 as BU01 with metric thread | 0.75 |
| BU03 | PL259 for 0·2in cable (UR43) | 0.62 |
| BU04 | PL259 push on connector for UR67 | 0.73 |
| BU05 | PL259 elbow connector for UR43 | 0.79 |
| BU06 | PL259 solderless connector for UR67 | 0.55 |
| BU07 | PL259 solderless connector for UR43 | 0.55 |
| BU08 | As BU07 but push on type | 0.99 |
| | Sockets | |
| BU11 | SO259, 4 fixing hole type | 0.42 |
| BU12 | SO259 single hole, inside nut type | 0.55 |
| BU13 | SO259 single hole, outside nut type | 0.55 |
| BU14 | SO259, 2 hole fixing type | 0.42 |
| BU15 | SO259 inline socket for UR43 | 0.65 |
| BU16 | Chassis mount elbow socket for UR43 | 0.85 |
| | Couplers | |
| BU21 | SO259 back to back female | 0.85 |
| BU22 | SO259 back to back male | 1.32 |
| BU23 | SO259 elbow male to female | 0.98 |
| BU24 | Double female single male 'T' coupler | 1.35 |
| BU25 | Triple female 'T' coupler | 1.55 |
| BU26 | Female to female lightning arrestor | 1.12 |
| BU27 | Female to male lightning arrestor | 1.30 |
| BU28 | Triple female single male 'X' coupler | 2.05 |
| BU29 | Chassis mount back to back female | 0.98 |
| | Adaptors | |
| BU35 | UHF male to N male | N/A |
| BU36 | UHF male to N female | 2.93 |
| BU37 | UHF female to N male | 2.93 |
| BU38 | UHF female to N female | 2.65 |
| BU39 | UHF female to phono/car aerial male | 0.65 |
| BU40 | UHF male to phono female | 0.65 |
| BU41 | UHF female to 3·5mm jack plug | 0.68 |
| BU42 | SO259 to push on PL259 adaptor | 0.85 |

★★ Also see BNC adaptors ★★

### BNC CONNECTORS

| | Plugs | Price |
|---|---|---|
| BB01S | For 0·2" cable (UR43) | 0.98 |
| BB02S | For 0·25" cable (UR90) | 1.05 |
| BB03S | Elbow for 0·2" cable (UR43) | N/A |
| | Sockets | |
| BB11S | Chassis mount 4 fixing hole type | 0.98 |
| BB12S | Single hole long thread type | 0.96 |
| BB13S | Single hole short thread type | 0.90 |
| BB14S | Inline socket for 0·2" cable (UR43) | 0.99 |
| | Couplers | |
| BB21S | Back to back female | 1.24 |
| BB22S | Back to back male | 1.90 |
| BB23S | Elbow male to female | 2.17 |
| BB24S | Double female single male 'T' coupler | 2.61 |
| BB25S | Triple female 'T' coupler | 2.34 |
| BB26 | Back to back female chassis mount | 1.36 |
| | Adaptors | |
| BB31 | BNC male to UHF male | 1.63 |
| BB32 | BNC male to UHF female | 1.29 |
| BB33 | BNC female to UHF male | 1.45 |
| BB34 | BNC female to UHF female | 1.15 |
| BU35 | BNC male to phono female | 0.95 |
| BU36 | BNC female to phono male | 0.95 |
| BU37 | BNC female to 3·5mm jack plug | 1.15 |

★★ Also see 'N' type adaptors ★★

| | | |
|---|---|---|
| BL01 | 30 Watt dummy load PL259 connector | 6.80 |
| BL02 | 5 Watt lighted dummy load (PL259) | 2.15 |
| BL03 | 2 Watt dummy load PL259 connector | 1.25 |

### N TYPE CONNECTORS

| | Plugs | Price |
|---|---|---|
| BN01S | For 0·2" cable (UR43) | 2.45 |
| BN02S | For 0·33" cable (RG-5,6,21/U) | 2.45 |
| BN03S | For 0·4" cable (UR67) | 2.45 |
| BN04S | For 0·55" cable (UR83 & RG14/U) | 2.93 |
| | Sockets | |
| BN11S | Chassis mount 4 fixing hole type | 1.58 |
| BN12S | Chassis mount 2 fixing hole type | 1.58 |
| BN13S | Single hole fixing type | 1.25 |
| BN14S | Inline socket for UR67 cable | 2.05 |
| BN15S | Inline socket for UR43 cable | 1.86 |
| | Couplers | |
| BN21S | Back to back female | 1.85 |
| BN22S | Back to back male | 2.73 |
| BN23S | Elbow male to female | 2.54 |
| BN24S | Double female single male 'T' coupler | 3.75 |
| BN25S | Three female 'T' coupler | 3.05 |
| | Adaptors | |
| BN31S | N male to BNC male | N/A |
| BN32S | N male to BNC female | 2.05 |
| BN33S | N female to BNC male | 1.95 |
| BN34S | N female to BNC female | 1.63 |

★★ Also see UHF adaptors ★★

| | | |
|---|---|---|
| BC01 | Solderless inline splicer for UR43 | 0.45 |
| BC02 | Solderless inline splicer for UR90 | 0.52 |
| BC03 | Solderless inline splicer for UR67 | 0.58 |

### HIGH QUALITY NiCAD BATTERIES

| Format | Capacity | Prices 1-9 | 10-24 | 25-99 |
|---|---|---|---|---|
| AA | 0·50Ah | 0.90 | 0.85 | 0.82 |
| *AA | 0·50Ah | 0.96 | 0.91 | 0.88 |
| *½AA | 0·25Ah | 1.20 | 1.14 | 1.08 |
| *½A | 0·45Ah | 1.53 | 1.45 | 1.38 |
| *RR (sub C) | 1·20Ah | 1.70 | 1.61 | 1.52 |
| C | 2·20Ah | 2.40 | 2.30 | 2.20 |
| D (sub D) | 1·20Ah | 2.40 | 2.30 | 2.20 |
| D | 4·00Ah | 3.50 | 3.32 | 3.15 |
| *D | 4·00Ah | 3.59 | 3.41 | 3.24 |
| *F | 7·00Ah | 6.85 | 6.50 | 6.20 |
| *SF | 10·00Ah | 10.50 | 9.50 | 8.90 |
| PP3 | 0·11Ah | 4.35 | 4.10 | 3.85 |

*Denotes solder tags fitted*

### NiCAD CHARGERS

| | | |
|---|---|---|
| AC1 | Saft Mazda AA charger, charges 1 to 4 AA cells | £5.90 |
| MC2 | Altai Multicharger, charges 1 to 4 AA, C, D cells plus 1 PP3 cell. | 8.50 |
| PC3 | Saft Mazda PP3 charger, charges 1 or 2 PP3 cells. | 6.90 |
| MC4 | Jeckson Multicharger, charges 1 or 2 AA, C & D cells. | 7.25 |
| MC5 | Jeckson Multicharger, charges 2 or 4 AA, C & D cells or 1 or 2 PP3 cells. | 8.50 |

### FERRITES

Ferrite rings for TVI suppression (data supplied).

| | |
|---|---|
| Small type, 1½" dia ×½" (FX1588 material) | 0.42 |
| Large type, 1½" dia ×½" (FX1588 material) | 0.80 |
| Ferrite Beads. | |
| Single hole type 4mm dia (FX1115) | 0.05 |
| Six hole type 6mm dia (FX1898) | 0.15 |

### PREAMP TRANSISTORS

| | | |
|---|---|---|
| 3SK88 | 145MHz, 26dB gain, 1·1dB NF | 0.95 |
| BF981 | 145MHz, 18dB gain, 0·7dB NF | 1.20 |
| BFR91 | 432MHz, 18dB gain, 1·9dB NF | 1.35 |

### R.F. POWER TRANSISTORS

| | | |
|---|---|---|
| MRF260 | 145MHz, 10dB gain, 5W output | 6.56 |
| MRF261 | 145MHz, 6dB gain, 10W output | 8.74 |
| MRF262 | 145MHz, 6·3dB gain, 15W output | 14.40 |
| MRF264 | 145MHz, 5·2dB gain, 30W output | 15.26 |
| MRF221 | 145MHz, 6·3dB gain, 15W output | 17.60 |
| MRF247 | 145MHz, 7dB gain, 75W output | 40.74 |
| MRF245 | 145MHz, 6·4dB gain, 80W output | 44.25 |
| MRF475 | 1·5-30MHz, 10dB gain, 12W PEP | 4.95 |

All figures for gain & output power are minimum values, full data supplied with all orders. Send SAE for free data sheet on any of the above transistors.

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**12/25A** £125.45
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- ★ 30A maximum output current
- ★ Large 30A current meter
- ★ 30A output terminals
- ★ LED shut down indicator
- ★ Fully protected

**12/40A** £225.40
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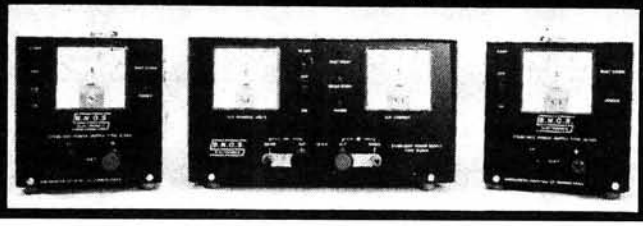
- ★ 50A maximum output current
- ★ Large 50A current meter
- ★ Large output voltmeter
- ★ LED shut down indicator
- ★ LED out of regulation indicator
- ★ Output sensing terminals
- ★ Fully protected



### UK AGENTS

Amateur Radio Exchange
373 Uxbridge Road
Acton, London.
01-992 5765

Bredhurst Electronics
High Street
Handcross, West Sussex
0444-400786

Dewsbury Electronics
176 Lower High Street
Stourbridge, West Midlands
0384-390063

Radio & Electronic Services
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Rohais, St Peter Port
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Edinburgh
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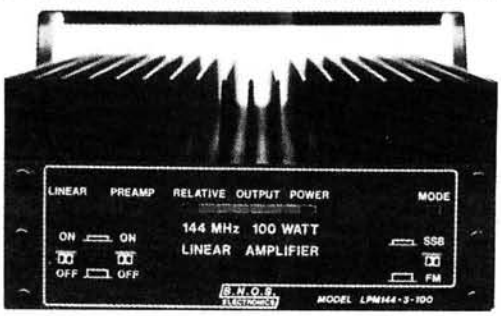


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| LPM144-3-100 3 Watt input linear/preamp | 172.50 |
| LPM144-10-100 10 Watt input linear/preamp | 149.50 |
| L144-25-160 25 Watt input linear | 155.00 |
| LPM144-25-160 25 Watt input linear/preamp | 189.50 |
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Access

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bet is Mauritius on the 4·7–5MHz band (nominally on 4·850MHz). It should be audible in the early evening in winter in the UK. Has anyone heard it?

Radio Netherlands have sent me a copy of their *Programme Information Release* which mentions a new European frequency of 6·020MHz. It is on the air at 1830UTC and comes in well at my QTH. *Satellite for the Short Wave Listener* is the title of a new 12 page publication that can be had free of charge. Write to Media Network, Radio Netherlands, PO Box 222, 1200JG Hilversum, Holland. A number of photographs were also received, the most interesting to me being one of the Huizen antenna park taken around 1937. The two famous wooden rotating towers which appeared on their pre-war QSL card are shown. Mine went astray during the war but if any reader would like to lend me one I will be delighted to reproduce it in this column.

# VHF Bands

by Ron Ham BRS15744

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

The successful launch of *Ariane 6* with a new amateur satellite aboard, stations in Italy, Malta and Sicily worked from the UK on 144MHz, interesting short skip on 28MHz and signals from Tunisia in Band II are just some of the goodies this month to show, once again, that the v.h.f. bands are far from dull.

## Solar

Although the sun was generally quiet between May 19 and June 20, mild radio noise storms were recorded at 136 and 143MHz on May 23 and 24 and June 8, 9 and 10. A few small, short duration, bursts of solar noise were also recorded on the 13th (Fig. 1) and 17th. While checking the bands at 0815 on May 28, I heard a massive burst of noise, lasting several minutes, covering the 28 and 50MHz bands and **Ted Waring,** Bristol, identified active areas on the sun on May 23 and June 11. "A complex spot group was just past central meridian on the 12th and 28MHz was quiet on the 13th" writes Ted, who counted 28 sunspots on May 16, 35 on the 22nd, 30 on the 24th, 15 on June 2 and 33 on the 12th.

## The 50MHz Band

At 1900 on May 31, **Barry Ainsworth** G4GPW, Lancing, received 599 plus signals from the 50MHz beacon in Gibraltar, ZB2VHF, on 50·035MHz and to further prove its strength, Barry removed his antenna plug and could just hear the beacon's signal with a screwdriver in the antenna socket. Around 0630 on the 21st, **David Newman** G4GLT, Leicester, made a crossband, 50MHz to 3·5MHz, QSO with EI9Q at Waterford, Southern Ireland. Each day between May 24 and 27 David carried out test transmissions beamed toward Holland which resulted in a comprehensive report being sent to him by a Dutch s.w.l., **Carlo Vervaet** NL 5736-R47, who copied David's signals on tropo and meteor scatter each day between 0600 and 0630, a distance of some 386km. On June 7, David waited for GW3LDH to complete a crossband contact, 50MHz to 144MHz, with PA0XMA before trying it himself. The Dutch signals were received by David on 144MHz at 559 and his signals were copied in Holland on 50MHz via meteor scatter at 26. At various times on June 6, David logged signals from the 50MHz beacons FY7THF, ZB2VHF and 5B4CY, via sporadic-E.

In Knutsford, **Dave Coggins,** heard G4GLT on c.w. at 0650 on May 11, a carrier only on 50·275MHz at 0624, G3OHH working G6XM at 0640 and G3RXC at 0659 on the 21st and ZB2BL working G stations at 2100 on the 25th. Dave also logged ZB2VHF on the 25th, 27th and 28th.

## Meteor Scatter

During the Arietids meteor shower in June, **Kevin Piper** G8TGM, Bognor Regis, completed skeds on 144MHz with OE1APS and YU3TWO and heard a few pings of signals from SM5CBN and **John Cooper** G8NGO, Cowfold, worked IW5ACZ.

## The 28MHz Band

Although many of my letters this month referred to the predominant short skip conditions caused by the frequent sporadic-E disturbances, Dave Coggins logged signals from JY9CL, ZX6XI and Z21GN around 1600 on May 27. He reports an excellent opening to South America on June 2 and writes, "It pays to get up around 0630 and have a listen on 28MHz" proved by the fact that at this time on June 5 he heard VK1HF Canberra, VK6AEK Perth and at noon he received a colossal signal from JY9CL. The most memorable short skip for me came during the evening of June 17 when signals from GMs were pounding into the

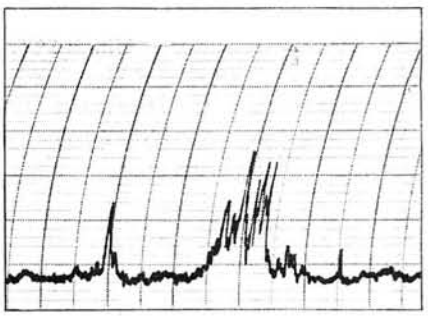


**Fig. 1: One of the small bursts of solar noise recorded by the author**

south of England and as well as hearing a local QSO between 2 GMs, I heard one say that he had been on solid since 1330 and that one of his colleagues, in Fife, was running just 2·5 watts of s.s.b.

"Conditions on 28MHz have been quite good during the last month with a peak around the first week in June", writes **Norman Hyde** G2AIH, Epsom Downs, having heard or worked stations in Europe, Scandinavia, South Africa and South America. **Fred Pallant** G3RNM, Storrington, logged ZS1 and ZS6 and PY1 and PY2 on May 21, LU4 and ZP5 on the 22nd, VP8 on the 29th and LA and SM on June 10.

"There have been some very short skip conditions on some days in early June, with DLs coming in very strong", writes **Peter Lincoln** BRS 42979, Aldershot, who also heard PR8MG and ZP5JCY on May 21, UI8CAJ, and 9J2BH on the 29th and 3V8PS on the 30th.

## 28MHz Beacons

"While tuning through the 28MHz beacon band (28·2 to 28·3MHz) I came across an Australian beacon" writes

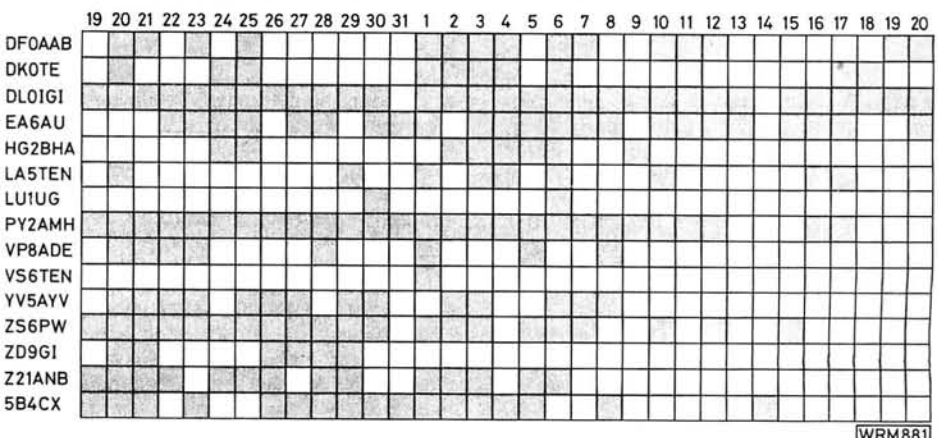



**Fig. 2: Distribution of beacons heard**

Dave Coggins. At 0830 on June 5 he heard VK2RSY on 28·262MHz (VK2WI's frequency) and adds, "I wonder if anyone else heard it?". Like many of us, Dave noticed the often and very strong signals from the 28MHz beacons in Germany DF0AAB, DK0TE and DL0IGI, Hungary HG2BHA, Norway LA5TEN and Spain EA6AU, due to the large amount of sporadic-E between May 19 and June 20. Ted Waring reported hearing the Canadian beacons VE2TEN and VE3TEN at 1530 on May 17 and, along with the logs from Dave Coggins, **John Coulter,** Winchester, Norman Hyde, **Bill Kelly,** Belfast, **Cmdr Henry Hatfield,** Sevenoaks and I, made up the list of beacons heard during the period of this report, Fig. 2. Bill Kelly also heard the South African beacon ZS5VHF at 1440 on May 26.

## Amateur Satellites

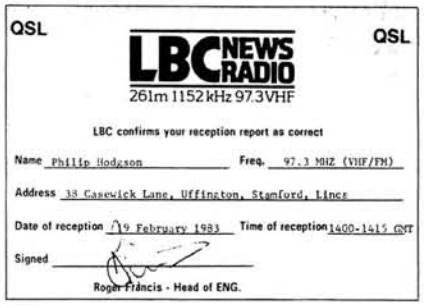
At 1545 on May 18, John Coulter, heard the following via the Russian RS3A satellite on 29·350MHz, "V de DF4XW s.w.l. raport pse s.w.l. raport fer signal via RS, QTH Hamburg name Werner QSL via club." Also "QTH Hamburg, name Werner, QTH lokator EN50e de DF4XW".

Before the freak hail and thunder storms hit the Chalk Pits Museum Wireless Day around 1400 on June 5, members of the Chichester and District Amateur Radio Club, using the museum's call sign GB2CPM, worked from their portable exhibition site, DF8XV, DK1WCY and GI4GVS, via RS8 and CT4KQ and DE1FP through RS6. The Club's exhibition station comprised a 15m mast and rotator for their 11-element 144MHz Yagi for the uplink and a 3-element Tri-bander array for the 28MHz downlink, coupled inside their spacious tent to an FT221R and FT101ZD. Among the satellite enthusiasts in the Chichester club are Eric Clark G6CSX, Eric and Brian Dubbins, father and son, G8OCM and G8OCN respectively and Robin George G6AII who are often heard working through RS6 and RS8. G6CSX has worked stations in France, Italy and Spain, using an FDK transmitter, Microwave Modules linear and 9-element Tonna for 144MHz and a dipole and Racal RA17 receiver for 28MHz.

The two G8s use an IC211E, 16-element Tonna and a dipole and communications receiver, and in early May, G6AII worked stations in the Faroe Islands and the USA, with an 8-element Yagi on 144MHz and a dipole for 28MHz. "Satellite down link on 29MHz band very active on some days, many European amateurs working through RS5 and RS7, on c.w." writes Bill Kelly.

## Sporadic-E

During extensive sporadic-E disturbances I counted 22 very strong signals from eastern European f.m. broadcast


QSL

LBC NEWS RADIO

261m 1152kHz 97.3VHF

LBC confirms your reception report as correct

Name Philip Hodgson Freq. 97.3 MHZ (VHF/FM)

Address 38 Casewick Lane, Uffington, Stamford, Lincs

Date of reception 19 February 1983 Time of reception 1400-1415 GMT

Signed

Roger Francis - Head of ENG.

QSL

**Fig. 3: QSL card received by Philip Hodgson**

stations, operating between 66 and 73MHz, at 1907 on May 25, 15 at 1830 on June 2, 27 at 0750 on the 3rd, 29 at 0830 on the 11th, 22 at 1850 on the 12th, 50 at 1815 on the 15th, 17 at 1730 on the 16th and an average count of 20 when I checked the bands at 1050 and 1925 on the 17th, 1525 on the 18th, 1855 on the 19th and 1944 on the 20th. **Harold Brodribb,** St. Leonards-on-Sea, logged these stations on June 11 and 12 and commented on the typical sporadic-E fading and fluttering often heard on these signals. Unfortunately, not many receivers tune through this range; Harold uses an ex-government RL85 communications receiver and I use an ex-army R216. Both these sets and the Eddystone 770R and Hallicrafters S27 and S36 receivers, which also tune between 40 and 100MHz, a.m./f.m., are now more than 30 years old and replacement valves will become a problem as the years go by.

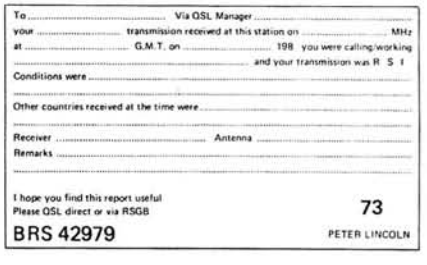
Very often, when these broadcast signals are exceptionally strong and obliterating the 70MHz band, the prevailing sporadic-E disturbance seems to reach a peak and is likely to extend its influence into the 144MHz band suddenly for a short period and offer us some first class DX. "The ES opening into 144MHz on June 7 was unexpected as Band I seemed quite dead into Europe and the test card from Iceland was very strong on Ch. E4 62·25MHz and suddenly 144MHz was alive with signals from IT9 and 9H1" writes Kevin Piper G8TCM. Between 1410 and 1505 he worked 6 IT9s and 2 9H1s and a neighbour of his, **Mike Chace** G6DHU, experienced his first sporadic-E by working 9H1BT with just 1 watt of s.s.b. into a 9-element F9FT Yagi. John Cooper, using an FT221R, muTek pre-amp, home-brew linear and 14-element Parabeam took advantage of the same opening and gave contest points to 9H1BT, 9H1CG, 9H1FBS and 9H4P and heard a contest QSO between an IT9 and a 9H1. At 1641 on the 10th John and Kevin heard CN8BA working a G station and between 1600 and 1715 on the 15th, John worked I8OMA, I8REK, I8TUS, I0EIO, IR9ADN, IT9VHS, IW8PCW, IW0BQ and 9H4P. During a similar event on the 16th, **Eric Dubbins** worked into Spain. Another interesting point is that both John and Kevin had heard that Greece was worked from the UK during one of these disturbances. John told me that he had trouble in getting a QSO with I8TUS because there was a pile up of SMs waiting to work him, which shows the geographical extent of that 144MHz sporadic-E.

## Tropospheric

The atmospheric pressure, measured at my QTH, began this period at 29·8in (1009mb) on May 19 and remained below 30·0 (1015) until 0200 on the 24th when it rose to 30·1 (1019) and stayed there for about 3 days. At 2200 on the 27th, the pressure fell to 29·9 (1012) and hovered around this figure until midnight on June 2 when it rose again and fluctuated between 30·0 and 30·15 (1020) for 11 days. During the morning of the 14th it shot up to 30·4 (1029) and kept high until 0800 on the 19th when a steady fall set in. Periodically during the high pressure, v.h.f. conditions were good and a variety of short lived tropospheric openings were reported. ON1BCG is on 144MHz s.s.b. almost daily from Wielsbeke and is always looking for contacts with G stations. Up to May 20 he had made 400 contacts with 250 different stations in the UK and is equipped with a TR9130, Tono 9/100 linear and an 8-element Jaybeam antenna 50m a.s.l.

Keep a lookout for 75-year-old **Lance Bush,** one of our life-long readers who passed the RAE last October and now with an FT-230 is active on 144MHz from his home in Wallington with the callsign G6OCH.

One of my contributors, **Jim Penny** GM4JLY is now in Australia and while there plans to set up equipment for the 50MHz, 144MHz and 432MHz bands using the callsign, VK5AJ. "My QTH is very well sited for ducts across the Spencer gulf to Adelaide and even Tasmania", writes Jim who, through his work, often visits an active club station VK5GAS on a site near the Queensland border.


To ..... Via QSL Manager .....

your ..... transmission received at this station on ..... MHz

at ..... G.M.T. on ..... 198 you were calling/working

..... and your transmission was R S I

Conditions were .....

Other countries received at the time were .....

Receiver ..... Antenna .....

Remarks .....

I hope you find this report useful
Please QSL direct or via RSGB

73

BRS 42979

PETER LINCOLN

**Fig. 4: Report side of Peter Lincoln's QSL card**

## Band II

During the good conditions on May 27 and 30th, **Simon Hamer,** Presteigne, heard strong signals from BBC radios Northamptonshire, Solent and Solway, Belgium BRT II from Egem, France TDF Cultur, Frequence Nord and Musique from Lille and Manx Radio from the Isle-of-Man. Using the Band II section of my TVR5D, with its own telescopic antenna, at a site near Harting, high on the South

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| 1274 | Fan B | Fan for FT-101 | 13.00 |
| 1275 | DC Unit | DC/DC PSU for FT-101 | 40.00 |
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| 1232 | DMS-107 | Memory for FT-107 | 89.00 |
| 1264 | FV-107 | VFO for FT-107 | 95.00 |
| 1265 | SP-107 | Speaker | 28.00 |
| 1266 | FC-107 | ATU | 106.00 |
| 1268 | FT-902DM | SSB/AM/FM TCVR | 850.00 |
| 1244 | SP-901 | Spkr for 101Z/902 | 30.00 |
| 1267 | SP-901P | Phone patch/spkr | 55.20 |
| 1247 | FV-901DM | Remote VFO for 901 | 250.00 |
| 1245 | FC-902 | ATU for 101Z/902 | 130.00 |
| 1269 | FTV-901R | T.VTR plus 2M unit | 270.00 |
| 1270 | 430TV | 70cm Unit for above | 170.00 |
| 1271 | 144TV | 2M Unit for FTV-901R | 95.00 |
| 1272 | YO-901P | Monitor scope/pan ad | 315.00 |
| 1239 | FT-707 | Mobile TCVR | 549.00 |
| 1238 | FP-707 | AC PSU | 119.00 |
| 1237 | FC-707 | ATU for FT-707 | 82.00 |
| 1273 | MR-7 | Rack for FT-707 | 15.00 |
| 1203 | MMB-2 | Mobile mount for '707' | 16.00 |
| 1246 | FL-2100Z | HF 1200W linear | 399.00 |
| 1206 | FRG-7 | Receiver | 189.00 |
| 1248 | FRG-7700 | Receiver | 315.00 |
| 1255 | FRV-7700A | Conv 118/130 130/140 140/150Mhz | 69.75 |
| 1257 | FRV-7700D | Conv 118/130 140/150 70/80Mhz | 72.45 |
| 1254 | FRT-7700 | Antenna tuner | 37.00 |

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| 1210 | MMB-11 | Mounting bracket 290 | 22.00 |
| 1211 | NC-11C | Charger for FT-290R | 8.00 |
| 1595 | C Nicads | Set of 8 for FT-290R | 21.20 |
| 1348 | FL-2010 | 10W linear for FT-290R | 62.00 |
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| 1204 | NC-2 | Charger | 39.00 |
| 1201 | PA-1 | DC Unit | 19.00 |
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| 1258 | NC-7 | Base trickle charger | 26.00 |
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| 1260 | FBA-2 | Battery sleeve for NC-7, NC-8 | 3.00 |
| 1262 | NC-9C | Compact trickle charger | 8.00 |
| 1349 | FNB-2 | Spare battery pack | 17.00 |
| 1350 | FL-2050 | Linear amp FT-480R etc | 120.00 |
| 1351 | YM-24A | Spkr/Mic, FT-208/708 | 18.00 |
| 1241 | FT-720RU | 70cm FM mobile transceiver | 264.00 |
| 1242 | FT-720RV | 2m FM mobile transceiver | 239.00 |
| 1263 | FT-230R | 2m FM mobile transceiver | 229.00 |

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| 1213 | QTR-240 | Quartz 24hr clock | 27.00 |
| 1215 | YM-36 | Noise cancelling mic | 13.00 |
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| 1352 | YM-37 | Hand mic | 6.90 |
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| 1221 | YD-148 | Desk mic | 20.00 |
| 1216 | YH-55 | Headphones | 10.00 |
| 1217 | E72-L | Remote cable for FT-720 | 19.50 |
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| 1303 | SC-3 | Soft vinyl case for TR-2400 | 10.95 |
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| 1307 | PS-20 | DC PSU for TR-9000 | 47.95 |
| 1308 | PB-24k | Spare battery pack for TR-2400 | 16.00 |
| 1309 | MC-30S | Hand microphone; 500 ohm | 12.95 |
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| 1312 | MC-50 | Desk microphone; 500 ohm/50k | 26.45 |
| 1315 | YK-88CN | 270Hz CW filter for TS-130S/830S | 30.00 |
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| 1317 | MB-100 | Mobile mount for TS-130S | 16.50 |
| 1318 | SP-100 | Matching speaker for R-1000 | 25.00 |
| 1319 | SP-120 | Matching speaker for TS-130S etc. | 23.00 |
| 1321 | AT-130 | Antenna tuner to match TS-130S | 79.00 |
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| 1323 | DFC-230 | Dig. rem. frequ. controller | 175.00 |
| 1324 | TS-180S | Solid state TCVR, 160-10m | 669.00 |
| 1325 | AT-230 | Antenna tuner to match TS-830S | 119.00 |
| 1326 | TS-530S | All-band HF TCVR, digital | 529.00 |
| 1327 | SP-230 | Speaker to match TS-530S/830S | 35.00 |
| 1330 | TS-830S | All-band HF TCVR, digital | 879.00 |
| 1332 | R-1000 | Gen. cov. receiver, digital | 295.00 |
| 1333 | DCK-1 | DC operating kit for R-1000 | 8.26 |
| 1334 | TR-2300 | 2m FM portable TCVR, synth. | 164.95 |
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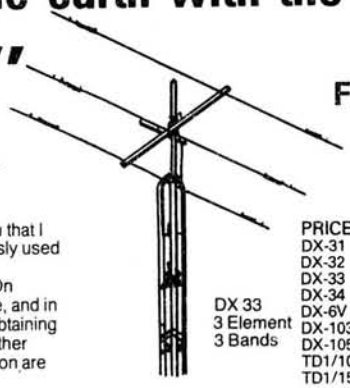

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| DX-34 | 4-element, 2kW, 10-15-20m | £212.75 |
| DX-6V | Vertical 10-80m | £74.75 |
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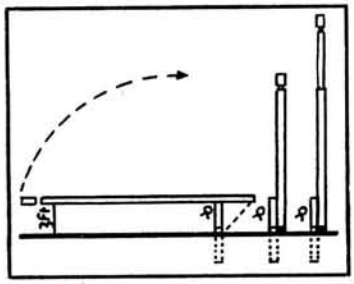

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Downs, I heard a strong French signal around 100MHz on June 1 and 3 French stations between 98 and 104MHz, during a trip to Kent on the 3rd. While using his Sharp GF9090, with its own rod antenna, on Canford Cliffs, Poole, **Gavin Meaden,** logged many French stations between 92 and 102MHz on June 4 and identified France Cultur, Inter and Musique. BBC Radios London and Medway and ILRS Capital, County Sound, Hereward, LBC and Trent were received in Wales by Simon Hamer on the 6th and on the 7th. **Ian Kelly,** Reading, listened to a variety of programmes from French stations at Boulogne, Bourges, Le Mans, Lille and Reims during the same period. Around 0337 on the 10th Ian heard RTBF-2 from Anerlues, BRT-1 from Egem and unidentified French language transmissions on 90·2 and 92·1MHz at 0400. I counted about 15 foreign language broadcast stations between 87 and 100MHz during a short lived tropospheric opening around 0930 on the 19th.

Sporadic-E also hit Band II and on June 7, Ian Kelly heard several Italian stations between 86·9 and 105MHz and at 1633 he heard Radiodiffusion Television Tunisienne. **Kevin Piper** noted strong signals from stations in Italy and Spain and others in Arabic on the 10th, a similar report came from Ian for the mid-morning of the 12th and John Cooper reported signals from Spain and Yugoslavia during the morning of the 15th. **Philip Hodgson,** Stamford, received a QSL card from LBC, Fig. 3, in reply to a reception report he sent after receiving their signals on 97·3MHz in February.

**Richard Hunt,** Tadcaster, has been listening to the test transmissions of BBC Radio York on 90·2 and 97·2MHz, scheduled to begin regular transmissions on July 4. "90·2MHz is the main frequency and the transmitter is located at Acklam Wold and 97·2MHz is the frequency for the Yorkshire coast which will be served by a transmitter at Oliver's Mount" says Richard. He also heard bursts of signals from French, Italian and Spanish stations on June 14 and a tentative ID of Yugoslavia's Zagreb 2 at 1038 on the 18th.

## RTTY

On the subject of QSL cards, Peter Lincoln is a great believer in giving as much information as possible to a station when he sends a report and encloses one of his QSL cards, Fig. 4, which has earned him many replies. Peter copied RTTY signals from 3 new countries during the month preceding June 7, 9M2DW at 1700 on May 14, PJ2MI at 2145 on the 18th and TF3IB at 0015 on June 5. In addition to signals from many European countries, he logged CY1ASJ a special Canadian callsign, HC1HC, HK4CCX, KP4YD, TU2JD, 7Z2AP and 8P6JA.

Between May 21 and June 20, I copied signals from RTTY stations in 13 countries CT, DJ, EA, F, I, HB9, LX, OZ, SP, TO2, UK, Y25 and ZS on 14MHz and 3 Italian stations at 0932 on June 12 during the World Communications Year contest on 28MHz.

Some readers have commented about the high number of Italian operators on RTTY so, **Norman Jennings,** Rye, did a survey and logged 66 different Italian stations, mainly on 14 and 21MHz, between May 10 and June 12. During that period, Norman copied signals from about 24 European countries and added TF3KC on 14MHz, 5R8AL and 9V1VC on 21MHz and VK8HA on 28MHz, to his score. "May 14 was a good day with signals spread over a wide area" said Norman who logged DU7, TU2, ZS6 and 9M2 between 1600 and 1730.

Congratulations to ON4UN, YU7AM, LZ1KDP and OH2AA in taking first and second places respectively in the single operator and multi-operator sections of the BARTG 1983 Spring RTTY contest. The leading s.w.l. stations were ONL-5566 from Belgium and OZDR2135 from Denmark and from the 144 logs submitted for the whole event the BARTG say that 18 new Quarter Century Awards have been earned.

## Museum Wireless Day

Despite the freak thunder and hail storms which hit the Wireless Day at the Chalk Pits Museum, Sussex, on June 5, I was pleased to meet, if only briefly, our readers Tim Anderson, John Coulter, Cyril Fairchild, Lance Gibbs, Gordon Goodyer, George Hook, Fraser Lees, Brian Renforth, Ken Salmon, Alan Taylor and his father. As organiser I would like to thank British Telecoms, Ralph Barret, Aldweld Engineering, Maurice Fagg, Wolsen Electronics, Mike Tatham, Les Sawford, Tony Bailey, I.C.S. Electronics, The Editor of *Practical Wireless,* RAIBC and members of RAYNET, Chichester, Mid-Sussex and Worthing Amateur Radio Clubs for their displays and Stewards David Ford, Loui Holman, Fred Pallant, Ron Weller and the Brownlow family who operated GB2CPM throughout the day.

## Can Anyone Help

"Is there an AFN station in Spain? because in August 1979 I heard a station saying 'This is AFSN American Forces Spanish Network on 103·1MHz from Madrid' ", writes Philip Hodgson. Any information you have I will pass on to Philip.

## Tailpiece

Visitors are welcome on Wednesday evenings at Marine Park Cafe, Bognor Regis, to meetings of the Bognor Technical Communications Association who have been going for about two years and their around 100 members are interested in all aspects of communications including amateur radio and CB.

More than 450 walkers in aid of the Wey and Arun Canal funds were successfully marshalled through an area of the South Downs by G4EHG, G6SKZ, G8JEM and G8ZTD on behalf of the West Sussex (Chichester) RAYNET on May 29.

---

# TV

by Ron Ham BRS15744

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

Pictures in mono and colour often at super strength were seen in the UK during late May and early June from countries ranging from Russia to Scandinavia and France to Italy and are due to the seasonal sporadic-E which greatly increased the viewing time of many of my readers.

## Amateur Television

About 100 people attended the annual barbecue of the Chichester and District Amateur Radio Club on June 16, held near the main grandstand at Goodwood racecourse, some 150m a.s.l. on the Sussex Downs. Among the ATV enthusiasts present were club members **Richard Butterworth** G6FDU, **Eric Clark** G6CSX and **Ted Brodie** G6HTB who, along with a Brighton station, were involved in a series of 2-way colour QSOs on June 14 with G6HMS from Lincoln operating portable on the Isle of Wight. Ted, a BATC member, uses a Sony 2000 colour camera and home brew sets into a Jaybeam MBM 48 antenna and Eric has a Dragon computer to produce the graphics for his Fortop 432MHz transmitter, he also uses an MBM 48 element antenna. "G6HMS was also using a Fortop 432MHz transmitter" said Eric.

**Roger Wallis,** Solihull, has invested in a Microwave Modules up-converter for ATV and between 2000 and 2200 on May 2 he received pictures from G3FDL, G4TCM, G6FPU, Fig. 1, G6IRB, Fig. 2 and G6MVB. He remarked "Superb net with all stations transmitting, including 'broadcast quality' in colour from G6RIB". Roger visited the British Amateur Television Club's stand at Leicester and purchased one of their sync pulse generators so that he can start building his own ATV station ready for when he takes the RAE.

During the BATC Summer Fun Contest, on June 19, members of the Worthing Video Repeater Group worked 24 ATV stations. With pictures mainly in colour they worked most on 432MHz and then G6ACQ on 1296MHz. The group were at Chanctonbury Ring on the Sussex Downs using the callsign G6WOR/P. The equipment for the event was mainly home brew using an 18-element Yagi and to produce the graphics

a Spectrum computer. **Robin Steven** G8XEU wrote the program which gave the QRA locator, maps and general ATV graphics.

The program is available for about £6 in aid of the WVRG funds, call-sign GB3VR, and details are available by sending an sae to Robin, QTHR. One of the group members, **Martin Snow** G6MBL, generates his captions from a Commodore computer. They are mixed with his ATV transmissions from a home brew transmitter, the station is completed with a 48-element multibeam antenna, National camera and special effects mixer.

## Tropospheric

On May 15, **Philip Hodgson** received a QSL card, Fig. 3, from Switzerland SRG for his report on their pictures he received on Ch. 50 at 0913 on January 23. On June 3 I used my Plustron TVR5D, with its own antenna some 170m a.s.l. in Ashdown Forest and received negative going pictures from France on Chs. 22, 27 and 55. Using the same set up at Goodwood on June 16 I watched strong French pictures on Chs. 45, 51 and 55 and despite the wrong line speed, I saw several FR3 captions. At 1837 on the 17th, I was only 30m a.s.l. at Petworth and identified a YL presenter, the caption FR3 and the word Caen around Chs. 22 and 27. During the morning of the 16th, **Eric Dubbins** watched the launch of Ariane, carrying among other items in its payload the AMSAT OSCAR-10 amateur satellite, live on French television from TF1 at Caen.

Around 2230 on June 6, **Simon Hamer** saw Anglia TV's clock and knight from Sandy Heath on Ch. 24 and Sudbury on Ch. 41, TVS Hannington Ch. 42, Tyne Tees Bisdale Ch. 29, Thames Crystal Palace Ch. 23 and transmissions from the IBA's Channel 4 from Belmont Ch. 32, Crystal Palace Ch. 30, Hannington Ch. 66, Oxford Ch. 53, Sudbury Ch. 47 and Tacolweston Ch. 65. I am not surprised Simon, because there was co-channel interference on many u.h.f. channels for most of that evening.

| Country | Caption | Vision Freq. |
|---|---|---|
| Austria | ORF–FS1 | E2—48·25MHz |
| | | E4—62·25MHz |
| Czech. | CST–01 | R1—49·75MHz |
| | RS–KH | R2—59·25MHz |
| | PRAHA | |
| Denmark | DR | E3—55·25MHz |
| | DANMARK | E4—62·25MHz |
| Hungary | MTV–1 | R1—49·75MHz |
| | BUDAPEST | R2—59·25MHz |
| Iceland | RUV | E3—55·25MHz |
| | ISLAND | E4—62·25MHz |
| Italy | RAI | A—53·75MHz |
| | | B—62·25MHz |
| Norway | NORGE | E2—48·25MHz |
| | | E3—55·25MHz |
| | | E4—62·25MHz |
| Poland | TP | R1—49·75MHz |
| | TVP | R2—59·25MHz |
| | dt | |
| Portugal | RTP–1 | E2—48·25MHz |
| | | E3—55·25MHz |
| Romania | TVR | R2—59·25MHz |
| Spain | RTVE | E2—48·25MHz |
| | | E3—55·25MHz |
| | | E4—62·25MHz |
| Sweden | TVI | E2—48·25MHz |
| | SVERIGES | E3—55·25MHz |
| | | E4—62·25MHz |
| Switzerl. | +PTT | E2—48·25MHz |
| | SRG 1 | E3—55·25MHz |
| USSR | | R1—49·75MHz |
| | | R2—59·25MHz |
| Yugoslav. | JRT | E3—55·25MHz |


**Fig. 1: Amateur Television picture** *Roger Wallis*

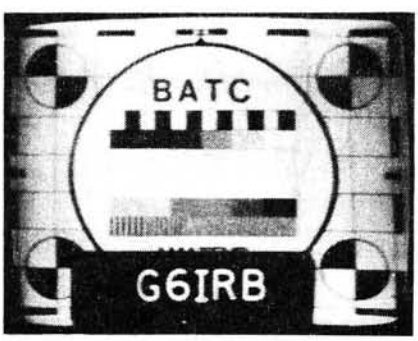


**Fig. 2: Amateur Television picture** *Roger Wallis*

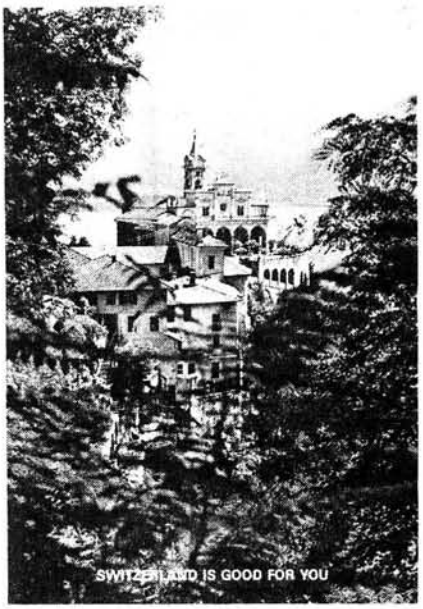


**Fig. 3: Television QSL card** *Peter Hodgson*

## Sporadic-E

During the period May 21 to June 20, there were at least a dozen large sporadic-E events and several small ones, which kept the TVDXers busy tuning up and down Band I. After studying the most interesting and detailed reports from **Harold Brodribb, John Chappell, Simon Hamer, Fraser Lees, David Newman, Raymond O'Connor, Kevin Piper, Brian Renforth, Alan Taylor, John Thompson** and **Roger Wallis** and comparing them with my own log, I decided to analyse them and show where the pictures came from and on what days the main disturbances occurred, Fig. 4.

With television pictures received from at least 14 countries, which must have included many regional transmitters, I was not surprised to learn that among the items seen were the captions, BPEMR, CST, CNOPT, dt, HOBOCTON,

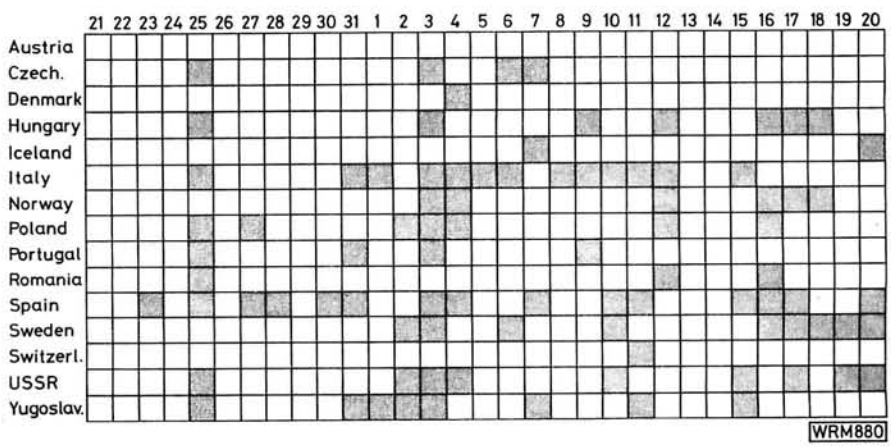


**Fig. 4: Distribution of TV pictures received during Sporadic-E disturbances**

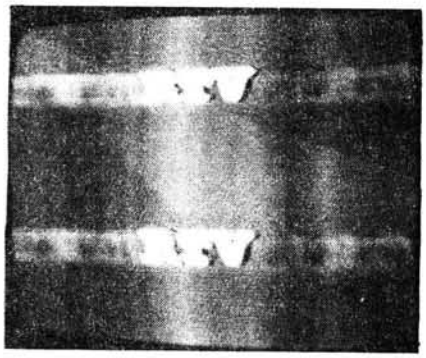

**Fig. 5: TV caption** *David Newman*

**Fig. 6: Ice hockey from USSR** *Roger Wallis*

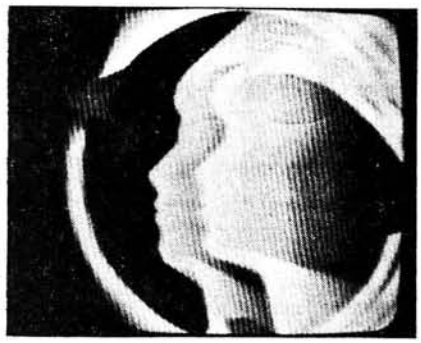

**Fig. 7: Mystery picture** *David Newman*

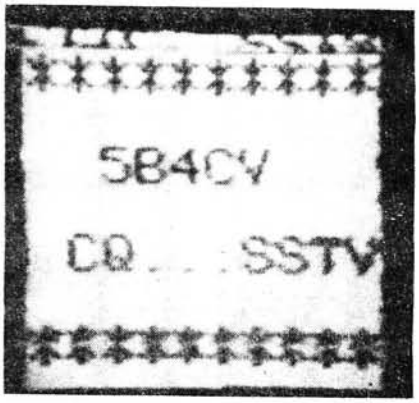


**Fig. 8: Received May 20** *Peter Lincoln*


**Fig. 9: Received May 25** *Peter Lincoln*


**Fig. 10: SSTV picture** *Peter Lincoln*

KRAM, LAS, PREZWA, RS-KH, RTV, Fig. 5, TACC COObWAET, TP, TVR BUCURESTI, NRK, NPORPAMMA, LA TARDE, TB CCP, TV REKLAM and WARSARWA. Clocks, both analogue and digital, from Hungary, Norway and Portugal showing 1 hour ahead of BST and the USSR showing 3 hours ahead of BST, programmes about many varied subjects, films, often with sub-titles and sports programmes were all seen.

A variety of test cards including regional ones from Norway, Gamlemsveten, Gulen, Melhus and Steigen were received. David Newman sent a mystery picture, Fig. 7, which he received between 1110 and 1229 on May 13 and says "The star (top left) suggests a communist country". Any ideas? During the extensive disturbance on June 15, Eric Dubbins, using a Wolsey G36 antenna, Labgear pre-amplifier and a converted Bush 161 receiver, identified pictures form Italy, Spain and Yugoslavia.

## SSTV

"In the Essex and London areas we have a well established Slow Scan Television net each Wednesday at 2230 on 144·5MHz, with horizontal polarization", writes **Dick Hunter** G3LUI, Hockley, who says that call-ins are welcome and stations to look for are G3CDK, G3LUI, G3NOX, G3WCY, G4BCH and G4IMO. "Most stations are equipped for frame sequential colour and successful transmissions have been carried out using '3D' and computer graphics" says Dick.

Throughout the month preceding June 7, **Peter Lincoln,** copied mainly European SSTV stations plus 5B4CV, Fig. 8, on May 20, K20DC, Fig. 9, at 2325 on May 25 and is very pleased with the signal from SP2JPG, Fig. 10, which he received on June 2. To date Peter has received SSTV pictures from 27 countries ranging from Argentina, through Europe to Japan and from Scandinavia to South Africa.

"Volker Wrasse DL2RZ, has fitted my SC422A scan converter (3 memories) with his 24 seconds single frame 3 colour board and I am sending and receiving from European and ZS stations good such single frame colour pictures" writes **Richard Thurlow** G3WW, Wimblington, who adds, "his system sends the colour sequence green, blue and red as against the 'W' system which sends red, green and blue. ZS6PP has devised a one i.c. mod which I am installing in the SC422A". Until this modification was complete, Richard built a "mechanical" switch to flip over the memories to a different set of RGB guns.

## Swap Spot

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Have AKAI M8 stereo tape recorder (valves), working—could do with servicing. One tone control intermittent. Would exchange for mobile or handheld 144MHz TX with f.m. and repeater shift. Barnes, 20 Smithtyne Avenue, Dereham, Norfolk NR19 1HW. Tel: 0362 66993. *S959*

Have Harrier CBX CB, s.w.r. meter, matcher, base antenna, mobile antenna, power mic, coaxial cable etc. Cost £160. Would exchange for 144MHz f.m. transceiver or h.f. beam for 14, 21 or 28MHz. Innes Fairbairn, 1 Callander Place, Cockburnspath, Berwickshire TD13 5XY. *S962*

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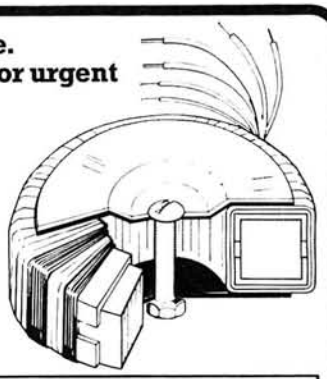

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| | 2x012 | 12+12 | 2.08 | |
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| | 2x016 | 25+25 | 1.00 | TOTAL £8.60 |
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| | 3x016 | 25+25 | 1.60 | |
| | 3x017 | 30+30 | 1.33 | |
| | 3x028 | 110 | 0.72 | |
| | 3x029 | 220 | 0.36 | |
| | 3x030 | 240 | 0.33 | |

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| | 4x012 | 12+12 | 5.00 | **£7.42** |
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| | 4x018 | 35+35 | 1.71 | |
| | 4x028 | 110 | 1.09 | |
| | 4x029 | 220 | 0.54 | |
| | 4x030 | 240 | 0.50 | |
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| | 5x018 | 35+35 | 2.28 | |
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| | 5x028 | 110 | 1.45 | |
| | 5x029 | 220 | 0.72 | |
| | 5x030 | 240 | 0.66 | |
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| | 6x033 | 50+50 | 2.25 | |
| | 6x028 | 110 | 2.04 | |
| | 6x029 | 220 | 1.02 | |
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| | 7x026 | 40+40 | 3.75 | TOTAL £14.87 |
| | 7x025 | 45+45 | 3.33 | |
| | 7x033 | 50+50 | 3.00 | |
| | 7x028 | 110 | 2.72 | |
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| | 8x033 | 50+50 | 5.00 | TOTAL £19.30 |
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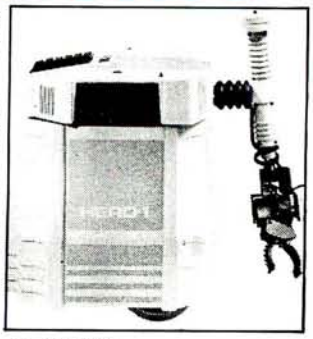


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