The SHORT WAVE Magazine

60p

VOL. XLI APRIL 1983 NUMBER 2

# remember the KX2 now available the KX3

The KX3 is a wide range general coverage tuning unit specially developed for the short wave listener. Using high Q coils, and air spaced variable capacitors, the KX3 is designed to give additional front end selectivity as well as wide range impedance matching.

As a further feature, the range from 10 KHz to 500 KHz is provided with a low pass filter so as to allow listening below 500 KHz whilst rejecting strong medium wave stations in the 500 KHz to 1.5 MHz band.

Provision is made for using the tuning capacitors in the KX3 to resonate an external loop type aerial for medium wave directional reception.

| | |
|---|---|
| Frequency range | 10 KHz-30 MHz |
| Functions | 10 KHz-500 KHz L.P.F.<br>500 KHz-30 MHz Pi match |
| Number of bands | 8 |
| Input and output impedance | 50-600 ohms |
| Size | 220 x 66 x 154 mm |

Both coaxial and wire aerials can be connected to the KX3.

**KX3 RECEIVER ANTENNA TUNING UNIT £42.50** inc. VAT.


## AF606K

**AUDIO FILTER £63.25** carr. £2.00

From Diawa yet another aid to operating. In addition to the notch, SSB and CW filters, the AF606K is equipped with a PLL tone decoder; when the tone frequency of the CW signal and the free running frequency of the PLL tone decoder are the same a locked signal is generated. This locked signal keys an audio oscillator which then reproduces the received CW signal. However, there is a tremendous difference between the produced signal and the received one — no noise and, of course, no fading. **ANOTHER PIECE OF EQUIPMENT TO ENHANCE YOUR LISTENING.**

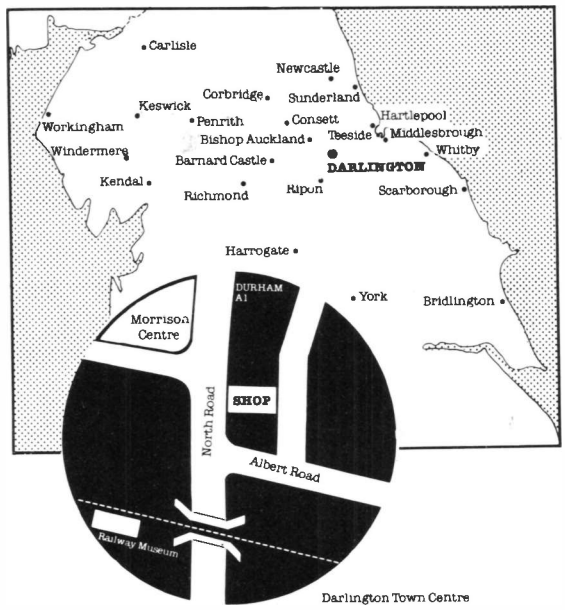

## DK 210

**ELECTRONIC KEYER**
**£47.00** inc. VAT carr. £2.25

With so many electronic keys and keyers on the market, it's hard to describe one that is better than the rest. Inevitably it is a matter of "feel", and the feel of the New Daiwa DK210 is superb. Being Daiwa, the quality of design and construction has to be of the best, but it's in use that the DK210 is so impressive. Designed to be used with an external paddle, to give greater personal choice, the DK210 is otherwise self contained, even to being battery powered (PP3). It offers a speed range of 10 to 50 w.p.m., built in sidetone, facilities for semi auto, or fully auto keying, and a tune position for adjusting your transmitter, but the outstanding feature is the adjustable "weight" control. This control gives an amazing improvement in the character of the sending, and completely removes that mechanical sounding "electronic morse" characteristic. Those experienced CW users who have tried out the DK210 have all said how good it sounds — and have usually purchased one. So will you if you try it out.

DK210 from DAIWA — A truly nice keyer.

# LOWE ELECTRONICS IN THE NORTH EAST




A huge free car park, a shopping complex which has within it a large supermarket, a wine and spirits shop, a bistro restaurant and convenient banking facilities has nothing at all to do with amateur radio.

However, as all these facilities are to be found across the road from our new amateur radio shop in the North East of England, then you will appreciate that we take great care in positioning the Lowe Electronic shops to help both you and other members of your family. The shop is in Darlington, 56 North Road, that is on the A167 road to Durham, only a few minutes from the town centre. Darlington is a delightful market town with extremely good links to the A1 north or south and to the west and east. Indeed, Darlington is easy to get to from towns such as Scarborough, Bridlington, York, Harrogate, Penrith and Carlisle. To the fortunate Radio Amateurs of the North East, then you have Lowe Electronics in your own backyard.

A Lowe Electronics' shop means the opportunity to browse, to try out, without sales pressure, a new or second hand piece of equipment before you buy it. And not only that, the shop will stock all the usual accessories, aerials, swr meters, cables, rotators, tuning units, plugs, sockets, etc. All equipment bought from the Darlington shop will carry the now well-known Lowe after sales service. It is a fact that today's equipment, although very reliable, is extremely complex and although not beyond the amateur, the expensive test equipment required for the repair leave most of us in the hands of the person who sold us the rig.

With Lowe Electronics not only are the hands helpful but technically able.

RING FOR OPENING DETAILS

**LOWE IN LONDON,** Open monday to saturday, six days a week
lower sales floor, Hepworths, Pentonville Rd, London. telephone 01.837.6702
**LOWE IN GLASGOW,** Open tuesday to saturday
4,5 Queen Margarets Rd, Glasgow. telephone 041.945.2626


**TR3500**

**COMPACT SIZE AND LIGHT WEIGHT**
Measures only 66W x 168H x 40D mm with a weight of 540grams including Ni-Cd battery pack.

**LCD DIGITAL FREQUENCY READOUT**
Easy to read in direct sunlight, or in the dark. Vitually no current drain (much less than LED's). Displays transmit and receive frequencies and memory channels. Display includes four "Arrow" indicators: "F. LOCK" (Frequency Lock), "REV" (Repeater Reverse), "PROG. S" (Programmed Scan), "MS" (Memory Scan).

**TEN CHANNEL MEMORY**
Nine memories may be operated in simplex mode, or with transmit frequency offset permitting access to repeaters.

**LITHIUM BATTERY MEMORY BACK-UP**
No loss of memory in case of complete discharge (or removal of the Ni-Cd batteries). Current (approximately 1 microampere) to maintain memory supplied by built-in separate lithium battery, with estimated life of more than 5 years.

**MEMORY SCAN**
Scans only those channels (maximum 10) in which frequency data is stored. Stops on "Busy" channel, resumes scan automatically approximately 2 seconds after signal goes off, or when "MS" key is pressed. The "STOP" key or the PTT switch may be used to cancel the scan function. LCD displays memory channel number and "MS" arrow while memory scan in use.

**PROGRAMMABLE BAND SCAN**
Scan bandwidth (lower and upper frequency limits) and scan steps of 5kHz and larger (5, 10, 15, 20, 25 kHz, etc.) may be programmed. Scan automatically locks up on busy channel and resumes approximately 2 seconds after signal goes off or when "PROG. S" key is pressed. "STOP" key or PTT switch cancels scan function.

**UP/DOWN MANUAL SCAN**
UP/DOWN manual scan in 5 kHz steps.

**FREQUENCY COVERAGE**
Covers 430.00 – 439.995 MHz in 5 kHz steps.

**TONE BURST SWITCH**
The TONE BURST switch activates the 1,750 Hz repeater access tone oscillator.

**TX OFFSET SWITCH**
Selects simplex or repeater operation (operator pre-programmes repeater OFFSET MAX ±9.995 MHz).

**HI/LOW POWER SELECTION**
HI/LOW power output switch allows operation at 1.5W or, for extended battery life, 300 mW.

**REVERSE OPERATION**
"REV" switch shifts the receiver to the transmit frequency, and the tranmitter to the receive frequency. Useful for checking signals on the input of a repeater, to determine if you are within simplex range.

**AUTO/MANUAL SQUELCH**
Selector switch on threshold control allows selection of automatic or manual squelch operation.

**BATTERY INDICATOR**
LED battery condition indicator flashes when battery charge level approaches nominal discharged battery potential.

**TWO "LOCK" SWITCHES**
"F. LOCK" switch prevents accidental loss of chosen frequency when in "LOCK" position. "TX. STOP" switch prevents accidental transmission if PTT switch is accidentally pressed in handling.

**BNC ANTENNA TERMINAL**
Allows antenna changeover to be quick and easy.

**ACCESSORIES INCLUDED**
- Flexible rubberised antenna with BNC connector.
- 400 mAH Ni-Cd battery pack.
- AC charger.
- Plug for external microphone and speaker.
- Hand strap.

# "compatible"

## the two metre & seventy centimetre handhelds from Trio.

TR2500 £232.53 inc. VAT, carr. £5.00
TR3500 £250.70 inc. VAT, carr. £5.00

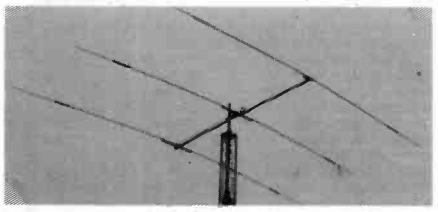
PRICES AND SPECIFICATION SUBJECT TO CHANGE WITHOUT NOTICE.

**LOWE ELECTRONICS**
Chesterfield Road, Matlock, Derbyshire. DE4 5LE.
Telephone 0629 2817, 2430, 4057, 4995. Telex 377482.

# FAST MAIL ORDER!!!

**BY CREDIT CARD OR CHEQUE**

# 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. (10) 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 | ¼ wave 3db snap-in hinged whip | 11.42 | (3.00) |
| TAP3677 | ¼ wave 3db snap-in shock coil | 15.64 | (3.00) |
| TAP3002 | ¼ wave unity gain snap-in hinged whip | 8.81 | (3.00) |
| **UHF Mobile** | | | |
| TAP3462 | ½ over ½ wave 3db | 9.89 | (3.00) |
| TAP3697 | ½ over ½ wave 5db | 18.40 | (3.00) |
| K220 | Mag mount/Feeder to suit above | 10.73 | (2.00) |

# Simply phone or write and leave the rest to us

| | | | |
|---|---|---|---|
| **Antennas Various/Accessories** | | | |
| HQ1 | Mini beam 10/15/20m 2 ele. 1kW | TBA | (4.00) |
| C4 | Vertical 10/15/20m | 48.50 | (3.00) |
| G4MH | Mini beam 10/15/20 | 85.00 | (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 (inc. lower casting) | 90.85 | (3.50) |
| KR400RC | Med/Heavy duty 360° meter Load 200Kg 1½"-2" masts | 114.94 | (3.50) |
| CASTING | Lower casting set (400RC) | 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) |
| **Filters** | | | |
| AKD | Hi-pass blocks 0-200MHz RF interference to UHF above 400MHz | 5.50 | (0.50) |
| **Linear Amplifiers** | | | |
| **YAESU** | | | |
| FL110 | HF 160/80/40/20/15/10m 100W (10W drive) | 155.25 | (n/c) |
| FL2100Z | HF warc 1200w PEP, SSB 1kW CW, 400W AM/FM/FSK | 449.00 | (n/c) |
| FL2010 | 2m VHF 10W linear | 54.00 | (n/c) |
| FL2050 | 2m VHF 50W linear 10W drive | 115.00 | (n/c) |
| FL7010 | 70cm UHF 10W linear | 91.00 | (n/c) |
| **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) |
| **ADONIS MICROPHONES Mobile/Base** | | | |
| MM202S | Mobile safety mic. (non scanning) | 23.00 | (1.00) |
| MM202HD | Mobile safety mic. (scanning) | 30.00 | (1.00) |
| AM502 | Desk mic. (compressor selectable) | 45.94 | (1.00) |
| **Miscellaneous** | | | |
| **Mutec** | | | |
| SNL144S | 2m preamp RF switched | 33.90 | (1.00) |
| RPCB | 144U8 FT221/225 front end board | 64.50 | (1.25) |
| **Ni-cads** | | | |
| AA | AA size Ni-cad | 1.00 | (0.20) |
| C | C size Ni-cad | 2.40 | (0.30) |
| NC1850 | Ni-cad charger (4 x C or 4 x AA) | 9.50 | (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) |
| **Speakers/Headphones** | | | |
| **Various** | | | |
| RT650 | 4 ohm, 8 ohm 3W nom 6W max | 6.50 | (0.50) |
| MS60 | 3W nom 5W max | 7.50 | (0.50) |
| S2 | Headphones (cobalt magnets) | 5.75 | (0.50) |
| **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) |
| Sensor 500 | 1.8-160MHz 5/50/500W | 37.08 | (1.00) |
| T430 | Twin meter 144-430MHz | 34.85 | (1.00) |
| T435 | Twin meter 144-435MHz | 39.10 | (1.00) |

**Please send your order direct to Dept. CF at our main address below, including carriage charges where applicable and your full delivery address.**

**Amateur Electronics UK**
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or attractive H.P. terms readily available for on-the-spot transactions. Full demonstration facilities. Free Securicor delivery.

★ 80-10 metres including WARC allocations.
★ Multimode LSB-USB-CW (W)-CW (N)* *and* FM*.
★ 100W PEP output. (IOW "S" version).
★ No tune design — inbuilt SWR meter.
★ Only 3¾" x 9½" — Less than a foot deep!
★ Dual selectable pulse width noise blanker.

| | | |
|---|---|---|
| FT77 | Transciever 100W output | £475.00 |
| FT77S | Transceiver 10W output | £399.00 |
| MARK7 | Crystal Marker board | £7.65 |
| FMU77 | FM Unit | £23.75 |
| XF8.9HC(N) | 600Hz or 300Hz (N) | £24.90 |
| FV707DM | Digital Memory VFO | £203.15 |
| FC700 | Antenna Tuner | £92.60 |
| FP700 | Mains P.S.U. | £125.00 |
| FTV707 | Transvertor, frame only | £90.00 |
| Modules: | 432...£185, 144...£100, 70...£80.00 | |

## FT77 £475 inc. VAT @ 15% & SECURICOR

★NEW★

ALL BAND MULTIMODE

## FT707 £509 inc. VAT @ 15% & SECURICOR

THE SMC FM VERSION AVAILABLE

★ 80-10 metres (including 10, 18 and 24MHz bands).
★ USB-LSB-CWN-AM (Tx and Rx operation).
★ 100W PEP. 50% power output at 3:1 VSWR.
★ Full "broad band" no tune output stage.
★ Excellent Rx dynamic range, power transistor buffers.
★ Rx Schottky diode ring mixer module.
★ Local oscillator with ultra-low noise floor.
★ Variable IF bandwidth — 16 crystal poles.
★ Bandwidths 6kHz*, 2.4kHz-300Hz. (600-350) Hz*
★ AGC; slow-fast switchable VOX built-in.
★ Semi-break in with side tone for excellent CW.
★ Digital (100Hz) plus analogue frequency display.
★ LED Level meter reads: S, PO and ALC.
★ Indicators for: calibrator, fix, int/ext VFO.
★ Receiver offset tuning (RIT-clarifier) control.
★ Advanced noise blanker with local loop AGC. *Option

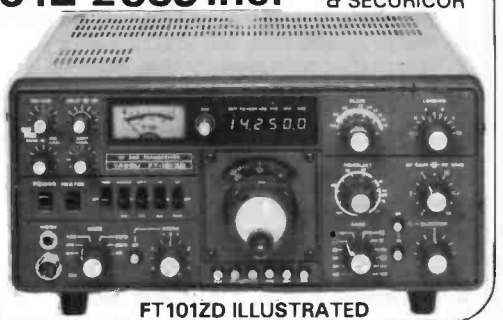
★ 160-10 metres including new allocations.
★ Variable IF bandwidth 2.4kHz down to 300Hz.
★ Selectable CW fixed bandwidth CW-W and CW-N*
★ Semi-break in with sidetone for excellent CW.
★ Digital* plus analogue frequency displays.
★ 180W PIP and — 31dB 3rd order intermod.
★ RF speech processor fitted — adjustable level.
★ VOX built-in and is adjustable from the front panel.
★ Wide dynamic range for big signal handling.
★ High usable sensitivity, for those weak ones.
★ Superb noise blanker — adjustable threshold.
★ Attenuator: 0-10-20dB, AGC; slow-fast-off.
★ Clarifier (RIT) switchable on Tx, Rx or both.
★ Low level transvertor drive output facility.
★ Universal power supply 110-234V AC and 12V DC*.
★ Incredible range of matching accessories.
★ N.B. — 6 models: Digital/Analogue — AM/FM options. — N.B.

SPECIAL OFFER

*Buy any FT101 and get a free FV101Z worth £112.00.

*Limited Offer

## FT101Z £559 inc. VAT @ 15% & SECURICOR



*Option

FT101ZD ILLUSTRATED

## FT102 £785 inc. VAT @ 15% & SECURICOR

"INSTANT" H.P.

★ 1.8-3.5-7-10-14-18-21-24.5-28MHz.
★ All modes: — LSB, USB, CW, AM±, FM±, (‡Option board).
★ Front end: extra high level, operates on 24V DC.
★ RF stage bypassable, boosts dynamic range over 100 dB!
★ Variable bandwidth 2.7KHz→500Hz *and* IF Shift.
★ Fixed bandwidth filters, parallel or cascade configurations.
★ IF notch (455KHz) *and* independent audio peak.
★ Noise blanker adjustable for pulse *width*.
★ External Rx and separate Rx antenna provisions.
★ *Three* 6146B in special configuration — 40 dB IMD!
★ Extra product detector for checking Tx IF signal.
★ Dual meter, peak hold ALC system.
★ Mic amp with tunable audio network.

**SP102:** — Speaker, Hi and Lo AF filters, 12 responses!
**FV102:** — VFO, 10Hz steps and readout, scanning, QSY.
**FC102:** — ATU, 1.2KW, 20/200/1200 W FSD PEP, wire.
**FAS-1-4R:** — 4 way remote waterproof antenna selector.

★ 160-10 metres including new allocations.
★ Variable IF bandwidth 2.4kHz down to 300Hz.
★ Audio Peak and independent notch controls.
★ AM, FSK, USB, LSB, CW, FM, (Tx and Rx).
★ Semi-break in, inbuilt Curtis IC Keyer.
★ Digital* plus analogue frequency displays.
★ VOX built-in and adjustable.
★ Instant write in memory channel.
★ Tune up button (10 sec, of full power).
★ Switchable AGC and RF attenuator.
★ 350 or 600 Hz CW, 6kHz, AM filters *included!*
★ Clarifier (RIT) switchable on Tx, Rx or both.
★ Plug in modular, computer style constructor.
★ Fully adjustable RF Speech processor.
★ Ergonomically designed with necessary LEDS.
★ Incredible range of matching accessories.
★ Universal power supply 110-234V AC and 12V DC.

"FREE" SECURICOR

## FT902DM £885 inc. VAT @ 15% & SECURICOR

D & DE MODELS AVAILABLE

## FT230R £239 inc. VAT @ 15% & SECURICOR

- ★ 150(W) x 50(H) x 176(D)mm.!!
- ★ Up/down, memory/band scanning.
- ★ Easy "write-in" memory channels.
- ★ Memory back-up "5 year" lithium cell.
- ★ Ten memories with priority functions.
- ★ Supplied with scanning microphone.
- ★ Illuminated "any angle" LCD display.
- ★ Display to 100's of Hz and functions.
- ★ Two completely independent VFO's.
- ★ Operation between memory and VFO.
- ★ Full reverse repeater function.
- ★ Manual and automatic tone burst.
- ★ Large "full sound" internal speaker.
- ★ Concentric volume and squelch.

2 or 70!

- ★ 144-146 MHz (extensions possible).
- ★ 25W RF output, 3W on low.
- ★ 25 and 12½kHz steps provided.
- ★ ±600kHz repeater split, 1750Hz burst.
- ★ Tx; 5A. Rx 300mA (standby).

- ★ 430-434MHz (440-445MHz possible).
- ★ 10W RF output, 1W on low.
- ★ 25 and 100kHz steps provided.
- ★ ±1.6MHz repeater split, 1750Hz burst.
- ★ Tx 3A, Rx 300mA (standby).

## FT730R £285 inc. VAT @ 15% & SECURICOR

- ★ Multimode USB, LSB, FM, CW
- ★ 100Hz backlit LCD Frequency display
- ★ 10 memory channels '5 year' backup
- ★ Any Tx/Rx split with dual VFOs
- ★ Up/down tuning from microphone
- ★ AF output 1W @ 10% THD
- ★ Bandwidth 2.4kHz and 14kHz @ −6dB
- ★ LED's; 'On Air', 'Busy'. m/c meter; S, PO.
- ★ 58 (H) x 150 (W) x 195 (D) (1.3kg)

| | | |
|---|---|---|
| **SMC2.0C** | Nicad 2.0A/hr "C" ..... | £2.35 |
| **SMC8C** | Slow Charger (220mA) .. | £8.80 |
| **MMB 11** | Mobile Mount ..... | £22.25 |
| **CSC1A** | Soft carrying case ..... | £3.45 |
| **FL2010** | Linear Amplifier 2m 10W. | £59.00 |
| **FL7010** | Linear Amplifier 70cms .. | £91.00 |

6 or 2 or 70!

## FT290R £265 VAT @ 15% & CARRIAGE

- ★ 144-146MHz (144-148) possible
- ★ 2.5W PEP, 2.5W RMS/300mW out
- ★ FM: 25kHz and 12.5kHz steps
- ★ SSB: 1kHz and 100Hz steps
- ★ ±600 kHz repeater split 1750kHz burst
- ★ Integral telescopic antenna
- ★ Rx, 70mA, Tx; 800mA (FM maximum)

## FT790R £325 VAT @ 15% & CARRIAGE

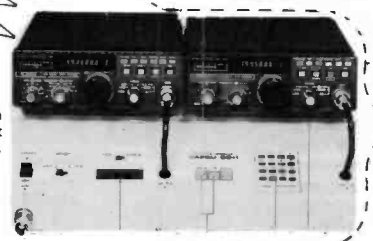
- ★ 430-440MHz (440-450 alternative)
- ★ 1W PEP, 1W/250mW FM/CW out
- ★ FM: 100kHz and 25kHz steps
- ★ SSB: 1kHz and 100Hz steps
- ★ 1.6MHz shift with input monitor,
- ★ 1750Hz burst
- ★ Rx; 100mA/200mA. Tx: 750mA max
- ★ BNC Mounting ½ flexi antenna

SPECIAL OFFER

- ★ USB-LSB-CW-FM (A 3j, A1, F3).
- ★ 30W PIP A 3j, 10/1W out A1 F3.
- ★ Any Tx Rx split with dual VFO's.
- ★ Four easy write-in memory channels.
- ★ Memory scanning with slot display.
- ★ Up/down tuning/scanning from mic.
- ★ Priority channel on any memory slot.
- ★ Digital RIT. Advanced noise blanker.
- ★ Satellite mode allows tuning on Tx.
- ★ Semi break in with side tone.
- ★ Very bright blue 100Hz digital display.
- ★ Display shows Tx & Rx freq (inc RIT).
- ★ String LED display for "S" and PO.
- ★ LED's; "On Air" Clar, Hi/Low, FM mod.
- ★ Size (Case): 8.3" D, 2.3" H, 6.9" W.

*Limited Offer

*If you buy together a FT480 & 780 you get the SC1 Consol free.



N.B. If you bought your 480 from SMC and you buy a 780 SC1 offer applies.

## FT480R £369 inc. VAT @ 15% & SECURICOR

- ★ 144-146MHz (143.5-148.5 possible).
- ★ ±600kHz standard repeater split.
- ★ Excellent dynamic range and sensitivity.
- ★ FM; 25, 12½, 1kHz steps.
- ★ SSB; 1,000, 100, 10Hz steps.

- ★ 430-434MHz (440-445 possible).
- ★ GaAs Fet RF for incredible sensitivity.
- ★ FM; 100kHz, 25kHz, 1kHz, steps.
- ★ SSB; 1,000, 100, 10Hz steps.
- ★ FT780R 1.6 fitted 1.6MHz Shift £409 inc.

## FT780R £399 inc. VAT @ 15% & SECURICOR

- ★ Keyboard entry of frequencies/splits
- ★ LCD digital display with backlight
- ★ Any split + or − programmable
- ★ Ten memory channels '5 year' back up
- ★ Up/down manual tuning. Memory scan
- ★ Manual or auto scan for busy/clear
- ★ Priority channel with search back
- ★ Scan between any two frequencies
- ★ Auto scan restart. 1.750Hz tone burst
- ★ Built in condenser microphone
- ★ 500mW to int/ext speaker
- ★ External speaker/mic. available
- ★ 168(H) x 61(W) x 39(D)mm
- ★ C/w Quick change NiCad pack, helical

2 or 70!

## FT208R £199 VAT @ 15% & CARRIAGE

- ★ 144-146MHz (144-148 possible).
- ★ 12.5/25kHz synthesizer steps.
- ★ ±600kHz repeater split.
- ★ 2.5 or 0.3W RF output.
- ★ Rx: 20mA squelch 150mA max. AF.
- ★ Tx: 800mA at 2.5W RF.
- ★ 0.25μV for 12dB SINAD.

## FT708R £229 VAT @ 15% & CARRIAGE

- ★ 430-440MHz (440-450 option).
- ★ 25kHz synthesizer steps.
- ★ ±7.6MHz EU split standard.
- ★ 1W or 100mW RF output.
- ★ Rx:20mA squelch, 150mA (max AF).
- ★ Tx: 500mA at 1W RF.
- ★ 0.4μV for 12dB SINAD.

- ★ Four easy write-in memory channels
- ★ Rx priority channel (auto check)
- ★ Scanning band/memory empty/busy
- ★ Up/down tuning/scanning from mic.
- ★ Optically coupled tuning control
- ★ Manual and automatic tone burst
- ★ String LED's for 'S' and PO, 7 status LEDs
- ★ 1½W of audio to internal/external speaker
- **FT720** Control Head
- ★ 3.3 (4.3)" D x 6" W x 2 (2.2)" H
- **S72** Switching box
- ★ Pushbutton band change Auto steps/splits.

| | |
|---|---|
| **E72S** | Extension cable, 2m long |
| **E72L** | Extension cable, 4m long |
| **MMB3** | Mobile Mounting bracket for deck |

Ills. c/w S72 and two E72S cables.

2 and/or 70!

## FT720RV £199 inc. VAT @ 15% & CARRIAGE

- ★ 144-146MHz (144-148MHz possible).
- ★ 12½kHz synthesizer, 600kHz shift.
- ★ 0.3μV for 20dB quieting.
- ★ Rx 0.5. Tx RV 3.5A, RVH 6.5A.
- ★ 5.8 (6.5)" D x 6" W x 2(2.2)" D.

- ★ 430-434MHz.
- ★ 25kHz synthesizer steps, 1.6MHz shift.
- ★ 0.5μV for 20dB quieting.
- ★ Rx 0.5A, Tx 4.5A.
- ★ 5.8 (6.5)" D x 6" W x 2 (2.2)" D.

## FT720RU £229 inc. VAT @ & CARRIAGE

## FT726R £649 inc. VAT @ 15% & SECURICOR

★NEW★

MULTI-BAND VHF/UHF

*Option

- ★ 3 Bands*! 2 metres. 70cms* (10MHz) & 6M* plug-ins.
- ★ Full Duplex*! Cross band Tx & Rx simultaneously.
- ★ SSB-CW-FM! All optimumly catered for, clarifier all modes.
- ★ Variable bandwidth *and* IF shift! SSB & CW.
- ★ Processor! Front panel mic gain *and* variable power.
- ★ Two main VFO's! A & B with 20Hz/1KHz steps.
- ★ Separate channelised VFO! (for FM operation).
- ★ Scanning! band scan, memory scan, memory mode.
- ★ Repeater splits! programmable *and* preset.
- ★ Instant reverse! *and* + & − splits *and* A/B.
- ★ Twin meters; PO/DISC, S/ALC. Duplex switchable.
- ★ Switchable; AGC, CW bandwidth,* dial lock, noise blanker.
- ★ Priority channel operational split mode end split band.

| | | |
|---|---|---|
| FT726R(2) | Transceiver c/w 144 MHz | £649.00 |
| 430T726 | 430-440 MHz module | £208.90 |
| 50T726 | Six meter module | £157.15 |
| SAT726 | Full duplex unit | £82.80 |

## JRC JST100 Price TBA

★NEW★

- ★ 160-10 Metres (inc WARC) plus standard service Rx.
- ★ SSB, CW FSK, 100 Watts output (adjustable).
- ★ Two 10 Hz step digital variable frequency oscillators.
- ★ Split frequency or cross mode single frequency operation.
- ★ 3 PLL's (inc BFO) locked to 10MHz reference.
- ★ 11 Channel memory retains operating freq. and mode.
- ★ Listen on memory (fix Tx on VFO), microcomputer control.
- ★ Display of memory contents during operation. Up/down/lock.
- ★ Pass band tuning, tuneable notch, 10-20dB attenuator.
- ★ Adjustable noise blanker, switchable AGC, calibrator.
- ★ Adjustable RF output, RF speech processor, Vox.
- ★ Comprehensive metering including compression level.
- ★ Small 300(W), 327(D), 130(H), mm. 10Kg.

**NBD500** Mains PSU. **NFG97** A.T.U.
**NVA88** Ext. speaker. **CFL260** 600Hz filter.
**CHG43** Desk Mic. **CFL230** 300Hz filter.
**CHG44** Hand mic. **KY3A** Morse key.

## FT980 £1,115 inc. VAT @ 15% & SECURICOR

CREDIT COVER

- ★ Rx 150 kHz-30MHz.
- ★ Tx 160–10m. 9 bands x 3 x 500 kHz Aux bands.
- ★ All modes AM, CW, LSB, USB, AFSK & FM (inc.)
- ★ IF shift & variable bandwidth 2.6 kHz-300 Hz.
- ★ Inbuilt keyboard operation + scanning.
- ★ Switchable attenuator 10, 20, 30 dB.
- ★ Audio peak + notch filter — 40 dB.
- ★ RF processor and Auto mic gain control.
- ★ 3rd order IMD −40dB at 100W PEP.
- ★ AFSK shift 170, 425, 850 Hz selectable.
- ★ Multi channel memory + programmable scan limits.
- ★ Optional computer interface available.
- ★ Notch filter in IF (AGC immune to hetrodynes).
- ★ Full break in keying. 500/600/700 Hz beat.
- ★ Unique analogue scale of digital type.
- ★ Comprehensive twin meter metering.
- ★ Memory retains mode information.

## FT ONE £1,349 inc. VAT @ 15% & SECURICOR

FREE FINANCE

- ★ Rx: 150kHz-30MHz. Continuous general coverage.
- ★ Tx: 160-10m (9 bands) or 1.5-30MHz commercial.
- ★ All Modes: AM, CW, FM*, FSK, LSB, USB.
- ★ 10 VFO's!!! Any Tx-Rx split within coverage.
- ★ Two frequency selection ways, *no* bandswitch.
- ★ Main dial, velvet smooth, 10Hz resolution.
- ★ Inbuilt keyboard with up/down scanning.
- ★ Dedicated digital display for RIT offset.
- ★ Receiver dynamic range up to 100dB!!!
- ★ SSB: Variable bandwidth *and* IF shift.
- ★ 300* or 600Hz*, 2,400 → 300Hz, 6kHz*, 12kHz*.
- ★ Audio peak and notch filter. FM squelch.
- ★ Advanced variable threshold noise blanker.
- ★ 100W RF, key down capability, solid state.
- ★ Mains and 12VDC. Switch mode PSU built in.
- ★ RF processor. Auto mic gain control. VOX.
- ★ Last but not least *full* break-in on CW.

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## ADVERTISERS' INDEX



# SHORT WAVE MAGAZINE


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## CONTENTS




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AUTHOR'S MSS

*Articles submitted for Editorial consideration must be typed double-spaced with wide margins on one side only of A4 sheets. Photographs should be lightly identified in pencil on the back with details on a separate sheet. All drawings and diagrams should also be shown separately, and tables of values prepared in accordance with our normal setting convention — see any issue. Payment is made for all material used, and it is a condition of acceptance that full copyright passes to the Short Wave Magazine, Ltd., on publication.*

*Short Wave Magazine Ltd.*

E. & O. E. VAT Reg. No. 239 4864 25

The SHORT WAVE Magazine

EDITORIAL

# Of Good Manners and Sound Sense

Many holders of VHF licences complain that they are treated as second-class citizens by the Class-A types. Perhaps they forget that generally a man is judged on what he is and what he does. If he *is* a lousy operator, why does he get angry at being regarded as a bit of an idiot?

However, equally hard words could be aimed at the many holders of 'A' licences who indulge in the same sort of anti-social operating practices. Whether he holds an 'A' or a 'B' licence, anyone who sits on a repeater from the home station using it as a chat channel to the exclusion of mobiles, for whom it was originally installed, and who tells a mobile that he is an intruder on 'their' channel deserves all he gets. That is not to say that a base station should not use a repeater — far from it — but that mobile operators should always be given priority.

Band-plans are voluntary in this country, thank goodness; but too much of this particularly selfish behaviour will lead us headlong into enforced band-plans and barred frequencies on shared bands. The whole basis of our licensing is on self-policing, which in turn means self-discipline. The slogan "use or lose" should be altered to "use properly or lose" — and if a few hotheads had their licences revoked then sense would rapidly come to the others.

# National Amateur Radio Convention

With an attendance of around 10,000 people over the two days, the first National Amateur Radio Convention to be held at the N.E.C. in Birmingham on March 5th and 6th, organised by the RSGB, must be judged a considerable success from every point of view. Facilities were excellent, as indeed they should be at a modern purpose-built exhibition centre, with many expressions of satisfaction from both visitors and traders; the lectures were all of high standard and well attended. The only general criticism being voiced was that it should have been held over three days rather than two. Without doubt the light and airy Hall 6, with its wide gangways between stands, created a pleasant and positive atmosphere; altogether a welcome change when compared to most of the other venues of which we have all had experience.

Perhaps we have reached a situation where just one national exhibition/convention should be held each year. It would certainly make a lot of sense.

# "Magazine" Prizewinner

The prize of £85 for the best article in Volume 40 of *Short Wave Magazine* goes to — no surprise, perhaps — Rev. George Dobbs, G3RJV, for his really splendid series "Plug In Your Soldering Iron and Begin Here". This series introduced many a radio amateur to home-construction for the first time, as well as encouraging others to have another go at it; indeed, we know that it even brought some people back into amateur radio. The current trend of a return to home-building is due in no small measure to G3RJV's enthusiasm for his other 'gospel' of kitchen-table technology. As winner of this annual prize for the second time, congratulations, George, and thank you!

Deciding on a winner can often be a difficult task which only means, of course, that we greatly value the work of *all* our contributors. In other words, thank you to everyone who has written for us during the past year.

*WORLD-WIDE COMMUNICATION*

# VHF BANDS

NORMAN FITCH, G3FPK

## Award News

CONGRATULATIONS to Jim Rabbitts, G8LFB, from Whetstone in north London, who is the 24th member of the 2m. QTH Squares Century Club, his certificate being issued on March 1. His 100 QSLs revealed 86 tropo contacts, 11 *via Aurora* and 3 *via E's*. The station consists of an *Icom* IC-202S, *Microwave Modules* 25 watts amplifier, *Datong* automatic speech processor and 16-ele. *Tonna Yagi* aerial at 10m. *a.g.l.* The site is 80m. *a.s.l.*

Another reminder concerning the Annual VHF/UHF Table that there are 104 counties in the British Isles. They comprise the 78 *administrative* ones in England, Scotland, Wales, Ulster, the Isle of Man and the Channel Isles, together with the 26 in the Irish Republic. The countries are the DXCC ones, *plus* Shetlands (GM) and Sicily (IT9). You can work them on any mode and by any "natural" propagation, which latter means repeater and satellite QSOs are not acceptable.

## Contest Notes

Full details of the rules for the *9H Falcon Contest,* organised by the *9H VHF/UHF/SHF* Group in Malta have now been received from Henry Souchet, 9H1CD. The dates are from 0001 on June 1, through 2400 on June 15 and the single band is 144-146 MHz. All propagation modes are valid except satellites and repeaters. All competing stations must log a minimum of ten 9H stations, but the *same* station may be logged more than once, provided the *dates* are different. Contest exchanges to be RS(T) *plus* serial number starting at 001, and QTH locator. Only QSOs *over* 500 kms. in your own country count, but all contacts over borders can be included. (*E.g.* A QSO between a London "G" and a fellow in Land's End would not count; but one between a "G" in Bristol and a "GW" in Cardiff would.)

The entries go to:— The Contest Manager, 9H Falcon Contest, P.O. Box 144, Valletta, Malta, to reach there by July 1. Logs must show:— date, GMT, callsign of station worked, both reports and serial numbers, QTH locators and QRB points claimed, the latter at one point *per* kilometre. The winner will receive a trophy and diploma, the runners up diplomas. So, work as much DX as possible in that fortnight and look for *Sporadic E* openings at the peak of the *E's* "season". Henry, 9H1CD, told your scribe there about 30 Maltese stations on 2m., so, given one or two good *E's* openings, some U.K. stations could well qualify to enter. If any reader would like a copy of the rules, please send an *s.a.e.* to the office address marked "9H Contest".

## Repeater News

After more than two years, the Home Office issued the first new VHF and UHF repeater licences in mid-February. These comprise 12 on VHF (Phase 5) and 10 on UHF (Phase 6). About half were operational when this was being edited. The full list, with channels where known, is:— 2m. GB3AE, Barnoldswick; GB3AM (R6) and GB3BX (R2) both local coverage relays in Birmingham; GB3ES (R7) Hastings; GB3EV (R4) Appleby; GB3HG, N. Yorks; GB3LM (R5) Lincoln; GB3MB, Manchester; GB3PW, Newtown, Powys; GB3RD (R3) Reading; GB3TY, Hexham and GB3WB on Dartmoor.

On 70cm, GB3FN (RB15) Farnham; GB3GC, Goole; GB3HA, Hornsea; GB3HB, St. Austell; GB3HD, Huddersfield; GB3PD, Peterhead; GB3UL (RB2) Belfast; GB3WP, Manchester; GB3WU (RB15) Wakefield and GB3XX (RB15) Daventry.

*The North Cambridgeshire 70cm. Repeater Group* has submitted a proposal to the *RWG* for a Fenland repeater to cover the Wisbech, March and Chatteris area. Further details from Mr. J. P. Arnold, G4NPH, 5 Princes Road, Wisbech, Cambs.

## Beacon Notes

A change of frequency for the 70cm. Angus beacon is imminent due to a slight problem with the Perth repeater, according to a recent *GB2RS* news item. The new QRG will be 432.980 MHz, the frequency previously earmarked for GB3NEB.

## Auroral Studies

As everyone knows, the *polar auroras* have both visual and radio effects and in this feature we are concerned only with the latter. The reports readers send in form part of the overall data eventually processed by Charlie Newton, G2FKZ, of the *RSGB's Propagation Studies Committee.* Similar work is being done by the *Auroral Observations Group* of the *British Astronomical Association,* the co-ordinator of which is Mr. R. J. Livesey, whose efforts were brought to your scribe's attention by George Grzebieniak, G6GGE.

The intention now is that we co-operate with Ron Livesey by exchanging information for the mutual benefit of both groups. Accordingly, Ron would like to receive copies of readers' reports on radio events for comparison with solar, visual *aurora* and magnetic storm data. The required reporting format would be the same as for the radio reports, *i.e.* dates, times, locations of stations worked and any relevant comments on the events. All reports will be acknowledged and data would be included in the *B.A.A's* auroral analysis which is published annually in their *Journal.* Any reader wishing to correspond directly with Mr. Livesey can do so by writing to:— 46 Paidmyre Crescent, Newton Mearns, Glasgow, G77 5AQ.

## VHF Down Under

Steve Mahony, VK5AIM, is a reader of the *Magazine.* He lives in South Australia and wrote after reading about the 6m. U.K. band. As there is Band 1 TV still in Australia, their band is 52-54 MHz which makes working DX very difficult. In the summer, there are *E's* contacts on SSB across the continent, the southern VKs work into New Zealand and the northern folk into Japan. During the winter, it is mostly local FM activity. Most stations run 10w. from transceivers or transverters with 4-ele. *Yagis* but some have 100w. amplifiers and 8-ele. long *Yagis.* However, the latter combination in a city area is "asking for trouble", due to the problem of RFI with home video equipment.

On 2m. there are repeaters in the 146-148 MHz part of the band which give continuous coverage from north Queensland, down the east coast, through Melbourne and across to Adelaide. Repeaters account for two-thirds of the 2m. activity and there are many local FM nets. SSB is confined to the first 200 kHz of the band with a "No-man's Land" up to the 145.8-146.0 MHz satellite part. The SSB calling QRG is 144.100 MHz and regular skeds are held over 150 mile paths.

70cm. activity seems rather sparse and *Microwave Modules* gear is popular and helped things get moving when the *Oscar 7* satellite was launched. Now there are the familiar oriental multi-modes to buy. There are UHF repeaters in most capital cities and UHF CB has boosted FM activity on 438 MHz using modified *Philips* transceivers. Most evenings, Steve, and another local, VK5QM, work VK5ZRG, 150 miles away, often with just 10w. and a 10-ele. beam. 2m./70cm. "duplex" is used when conditions permit and these experiments have shown that 70cm. often gives better results.

## Four Metres

Syd Harden, G2AXI, (Hants.) was on for the second and third legs of the *Cumulatives* which provided four more counties for this year's score. Arthur Breese, GD2HDZ, was on for the Feb. 13

session and worked G3JXN in London and G3BPM in Surrey, for best DX. Other new ones for the 1983 Table were, G3NPI (Bucks.), G4FRO (Avon), G3UKV (Shropshire), and G3OIC (Herefordshire & Worcs.).

Dave Robinson, G4FRE, is now settled in Felixstowe and is QRV on several bands, including 4m., where he uses a *Trio* TS-120V, home built transverter and PA. The aerial is a 3-ele. *Yagi* at 10m. *a.g.l.* Best DX so far, during the *Cumulatives,* is G4APA (Cheshire) but Dave wonders, "Does anyone deliberately beam towards the east coast?" Dave Lewis, GW4HBK, (Gwent) heard GM3MOX at 2222 in the *Ar* of Feb. 4, but failed to work him. The next day's *Ar* brought QSOs with G4BAO at 1625 and GM3TAL at 1809, the latter again worked in a second phase at 0015 on the 6th.

Welcome to Denis Jones, G3UVR, from the Wirral (Merseyside) who leaps into first place in the Table. The Fixed Contest on the 16th of Jan. and the *Cumulatives* account for his 28 counties and six countries already. He has 50w. output and a 4-ele. Yagi on the band with 38 squares and nine countries since Jan. 1980. He transverts from 10m. with a home built unit.

**ANNUAL VHF/UHF TABLE**

**January to December 1983**

| Station | FOUR METRES Counties | FOUR METRES Countries | TWO METRES Counties | TWO METRES Countries | 70 CENTIMETRES Counties | 70 CENTIMETRES Countries | 23 CENTIMETRES Counties | 23 CENTIMETRES Countries | TOTAL Points |
|---|---|---|---|---|---|---|---|---|---|
| G3UVR | 28 | 6 | 30 | 21 | 34 | 9 | — | — | 128 |
| G4NBS | 12 | 1 | 28 | 8 | 33 | 11 | — | — | 93 |
| G4ARI | 11 | 1 | 54 | 13 | 1 | 1 | — | — | 81 |
| G2AXI | 20 | 2 | 30 | 10 | 11 | 7 | *1* | *1* | 80 |
| G3FPK | — | — | 58 | 15 | — | — | — | — | 73 |
| G8TFI | — | — | 25 | 10 | 22 | 13 | — | — | 70 |
| G4ROA | — | — | 26 | 6 | 22 | 7 | 6 | 3 | 70 |
| G8FMK | — | — | 18 | 4 | 18 | 6 | 20 | 4 | 70 |
| G6DER | — | — | 37 | 8 | 20 | 5 | — | — | 70 |
| G6HRI | — | — | 37 | 8 | 18 | 6 | — | — | 69 |
| G6ECM | — | — | 47 | 19 | — | — | — | — | 66 |
| G8ULU | — | — | 23 | 9 | 22 | 8 | — | — | 62 |
| G4DEZ | — | — | 39 | 22 | — | — | — | — | 61 |
| GD2HDZ | 15 | 2 | 3 | 6 | 17 | 6 | — | — | 49 |
| G4FRE | 14 | 1 | — | — | 21 | 11 | 1 | 1 | 49 |
| G3PBV | *2* | *1* | 17 | 12 | 7 | 7 | 3 | 2 | 48 |
| G4MUT | 10 | 2 | 12 | 9 | 9 | 4 | — | — | 46 |
| GW6JDK | — | — | 29 | 11 | — | — | — | — | 40 |
| G8PNN | — | — | 3 | 6 | 14 | 8 | 3 | 4 | 38 |
| G8KAX | — | — | 17 | 8 | 5 | 7 | — | — | 37 |
| GM4CXP | — | — | 18 | 12 | — | — | — | — | 30 |
| G3FIJ | 14 | 1 | 5 | 6 | — | — | — | — | 26 |
| GW4HBK | 16 | 3 | — | — | — | — | — | — | 19 |
| G8XTJ | — | — | 13 | 5 | — | — | — | — | 18 |
| G4NRG | 4 | 1 | 3 | 4 | — | — | — | — | 12 |
| G2DHV | 4 | 1 | 2 | 1 | 3 | 1 | — | — | 12 |

**Three bands only count for points. Non-scoring figures in italics.**

## Six Metres

Paul Turner, G4IJE, (Essex) has now worked 13 of the other 39 6m. licensees and has been busy with many tests. The converter he sent to DJ5MS arrived in Peter's letter box very quickly and they had a 6m./2m. cross-band MS QSO on Feb. 27, completed in one hour, with DJ5MS getting four bursts from Paul, using a 20m. dipole. OK1OA has built a 6m. converter and, using a dipole taped to a window, completed a cross-band MS QSO with G4IJE in 50 mins.! Just as this was being written, G4IJE reported another 6m./2m. test with CT1WW (WB) on Mar. 5 when confirmation from Tiago was still awaited.

GW4HBK put out his first call on 6m. at 0605 on Feb. 2, with no luck. G6XM (Dorset) was heard at 0733 on CW on Feb. 21, and Dave's only QSO up to Feb.25 was with G4GLT (Leics.) at 0037 on the 24th and which was a very difficult contact. His equipment includes a QQV06-40A PA at 10w. with a 5-ele. *Yagi.*

It seems that some Class B licensees feel they should have had equal opportunity to apply for 6m. licences and cite the *W.A.R.C.* 1979 Convention whereat it was decided that national administrations could waive the morse code requirement above 30 MHz. However, it has to be pointed out that *no* amateur allocation in the 50-54 MHz region was made for Region 1 of the *I.T.U.* Nevertheless the Home Office *has* exercised its right to grant an amateur band to us in this region. The situation is the same as for the 4m. band, which few other countries have. Consequently, the Home Office is not under any *I.T.U.* obligation to licence either band for Class B licensees.

Fortunately, many Class B licensees are adopting a positive approach by doing a lot of listening on 6m. Their reception reports on various propagation modes will be just as useful as the QSOs reported by the lucky 40, during this trial period.

## Two Metres

Dave Sellars, G3PBV, (Devon) reports generally poor tropo. conditions in February, but he did catch the *Auroras* on Feb. 4 and 5. The one on the 4th was found at 1715 and was still going on at 0010. Gs in AL square were quite loud, along with Ds and PAs. GM4ILS (YR) and GM6PZ (XQ) at 1945 and 2019, the former on the key, the latter on SSB, provided a couple of new squares. On the 5th, Dave noticed the *Ar* at 1305, but did not get on till 1515 when GD, GI and GM signals were heard. At 1530, GI4ONL (WO) was worked on CW and the event faded at 1900.

G3UVR is already up to 21 countries this year, even though Denis does not use MS mode. He has 400w. output from a home built transverter and PA with an 8-ele. *Yagi.* Tim Raven, G4ARI, (Leics.) added 22 more counties for the year. The rarer ones listed on the 4th are obviously *Ar* QSOs and later in the month, there were tropo. contacts in with such as GW6DDB (Gwynedd) and GW8TBG (W. Glam.). Mar. 1 brought G6CGY in Co. Cleveland.

On Mar. 2 there was another *Ar* that started soon after lunch and lasted for some time. In the south, it was not very spectacular, but the DX was there for those with "good ears". G4IJE worked seven GMs, along with OZ and DL. Paul reported that GM3WCS worked a couple of OKs at a QTF of 80° which suggests it was a rather southerly event. Ian Parker, G6DFT, (Herts.) heard five new squares in this event but did not work any stations therein.

Jon Stow, G4MCU, (Essex) missed an hour of the Feb. 4 *Ar,* but did get RQ2GAG (MQ) for new square and country, and GM4FZH (YS) around the 1900 period. SM6AOQ (GR) and SM6CMU (FR) were worked around 2100, all at QTFs between 5 and 15 degrees. He missed the events on the 5th and 6th, but worked OZ1EYE (FQ) at 1524 and GM6PZ (XQ) at 1559 on the 7th. Feb. 18 saw good tropo. conditions, but Jon's aerial rotator decided to go on strike, so he did not work anything.

Tony Collett, G4NBS, (Berks.) was a little more active on 2m. in February and mentions ON1BCG (BK) on the 22nd and GM6MJY/A (YR) on CW the next day Adrian Chamberlain, G4ROA, (Coventry) worked GM6PQE (Tayside) in the *Ar* on the 4th then decided to have a go on CW. He heard the GMs working ONs and PAs he could not copy. Mick Cuckoo, G6ECM, (Kent) operated in the Feb. *Ar* for three hours from 1800. He lists EI2BBB (VM) in Limerick, G8YWF (ZO), GI6DCQ (XO), GM3JIJ (WS) in the Western Isles, GM4JCM (YQ) and GM6PBF (YQ) along with other Gs in YM and YN. The next day, between 1300 and 1600, Mick's best DX were:— GI6AGB (XO), GM4NHI (YR), GM6PLE (YQ), GM8VRU (YP) and SM7LXV (GP). That is a good tally for SSB mode. On the 18th, GM8MBP (YR) was heard calling "CQ" at 0100 and a quick QSO resulted before he faded into the noise. Later that day, many D, ON and PAs were worked, the best being DD9QT (EL), DJ1SU (FM), DJ5KB (EL) and OZ1DPR (EP).

Russell Coward, G6HRI, (Blackpool) hopes to have two 10-ele. *Parabeams* at 34ft. *a.g.l.* by now. In the Feb. 5 *Ar,* G4RNL and GI6DNP (XO) were worked at a QTF of 30° but no other stations were heard. On the 7th, in another *Ar* GI6ATZ (XO) and G4RQG/A (Staffs.) were contacted. Ray Cox, G8FMK, (Oxon.) got several GM and GI stations in the Feb. 4 and 5 *Ar's,* GI4OUN (Tyrone) and GM3ZXE (Tayside) being new, all-time counties. In the Feb. 4 *Ar,* Martyn Jones, G8CXQ, (Warks.) added a new square, thanks to GM3JIJ in WS.

Derrick Dance, GM4CXP, (Borders) rarely misses an *Ar* and his lists show the difference in areas workable from YP square, compared with what can be heard from more southerly latitudes. At 2317 on the 4th, a visual *Ar* alerted Derrick to switch on the radio and between 2322 and fade-out at 0020, nine QSOs were made at QTFs 45° to 55° with DF1ZE (EJ), OZ1AZZ (FR), OZ1HWS (GQ), GM6PZ (XQ), EI4CL (WN), GI4MXW (WO), GW3LDH (YN), LA7KK (FU) and LA9BM (EU). On the 5th, a 'phone call at 1330 from GW3LDH alerted him to another event, the first contact being with 'LDH (YN) at 1405. 23 stations were worked up to 1532 when he switched off including 10 Germans, mostly on the EJ and EM squares, PAs and ONs in BK, CK and CL, F5SE (CJ), LA8AK (DS) and SM7GEP (HR). QTFs were from 45° to 80°.

Another affair was in progress at switch-on on the 6th at 1520, which brought GM4IAO (YR), PA2VST (CM) and G8XVJ (YN) before switch-off at 1624. The QTF was 45° during this event. A holiday from work enabled Derrick to be QRV during a fine tropo. spell on Feb. 17 and 18, during which many Scandanavians and Germans were worked on SSB. OZ1CSI (HP) was a new square.

Andy Steven, GM4IPK, (Edinburgh) took full advantage of the Feb. 4, 5 and 6 *Ar's* and worked no less than 233 stations, adding another nine squares. These were:— OY5NS (WW), F9LT (AI), LA1K (FX), G3DAO (AK), UP2BKH (KP) a new country, too, F5SE (CJ), SM1BSA (JR), OH1ZAA (KV) and EI8EV in UO70c. Andy also lists SM5DFF (IS), OH1ZP, OH1DP and OH1BS all in LU, and SM0BKZ (IT).

**QTH LOCATOR SQUARES TABLE**

| Station | 23cm. | 70cm. | 2m. | Total |
|---|---|---|---|---|
| G3POI | — | — | 393 | 393 |
| G3IMV | — | 39 | 324 | 363 |
| G3VYF | — | 117 | 307 | 424 |
| DK3UZ | — | — | 304 | 304 |
| G4IJE | — | — | 290 | 290 |
| SP2DX | — | — | 280 | 280 |
| EA3LL | — | 30 | 252 | 282 |
| G4IGO | — | 19 | 245 | 264 |
| G4DEZ | — | — | 236 | 236 |
| G4ERG | — | 16 | 235 | 251 |
| GJ4ICD | 1 | 103 | 225 | 329 |
| G3CHN | — | — | 225 | 225 |
| G8VR | — | 3 | 224 | 227 |
| 9H1BT | — | 11 | 210 | 221 |
| LA8AK | 25 | 62 | 200 | 287 |
| G3BW | 3 | 35 | 198 | 239 |
| GM4COK | — | 26 | 194 | 220 |
| G3FPK | — | — | 193 | 193 |
| GJ8KNV | 12 | 76 | 191 | 279 |
| GW4EAI | — | — | 187 | 187 |
| G3KEQ | — | — | 186 | 186 |
| GW3NYY | — | 48 | 185 | 233 |
| G3UVR | — | 38 | 178 | 216 |
| G8KBQ | 4 | 91 | 172 | 267 |
| G4PCI | — | 28 | 167 | 195 |
| G4OAE | — | 28 | 164 | 192 |
| G3PBV | 18 | 85 | 163 | 266 |
| G4MCU | — | 50 | 163 | 213 |
| GM4CXP | — | 26 | 163 | 189 |
| GJ8SBT | 3 | — | 161 | 164 |
| G3JXN | 57 | 98 | 155 | 310 |
| G3COJ | 36 | 87 | 150 | 273 |
| G8LFB | — | — | 150 | 150 |
| G8RZO | — | 75 | 148 | 223 |
| G8RZP | — | 76 | 147 | 223 |
| G8CXQ | — | 61 | 146 | 207 |
| G6ECM | — | — | 141 | 141 |
| G4JZF | — | 68 | 140 | 208 |
| G4HMF | — | 32 | 140 | 172 |
| G8WPD | — | 24 | 139 | 163 |
| GM4IPK | — | — | 139 | 139 |
| G4NFD | — | 36 | 138 | 174 |
| G8HHI | 12 | 70 | 133 | 215 |
| G8TGM | — | — | 133 | 133 |
| G3XDY | 30 | 86 | 131 | 247 |
| G8ATK | 15 | 81 | 129 | 225 |
| G6ADH | — | 27 | 129 | 156 |
| G3NAQ | — | 58 | 128 | 186 |
| G6DDK | — | 11 | 122 | 133 |
| G4ERX | 6 | 46 | 121 | 173 |
| G2AXI | 9 | 72 | 120 | 201 |
| GM8OEG | — | — | 115 | 115 |
| G4MEJ | — | — | 114 | 114 |
| G4NQX | — | 47 | 113 | 160 |
| G8XIR | — | — | 112 | 112 |
| G4MJC | — | 12 | 108 | 120 |
| G8PNN | 30 | 70 | 106 | 206 |
| G4KUX | — | 30 | 105 | 135 |
| G4GHA | — | — | 104 | 104 |
| G4HFO | — | 59 | 102 | 161 |
| G8VRJ | 16 | 38 | 101 | 155 |
| G8ULU | — | 66 | 97 | 163 |
| GM4WD | — | — | 95 | 95 |
| G4NBS | 13 | 75 | 92 | 180 |
| G3FIJ | — | 29 | 92 | 121 |
| GD3HDZ | 13 | 46 | 91 | 150 |
| G6HKT | — | 60 | 89 | 149 |
| G8VFV | — | — | 89 | 89 |
| G8SRL | — | 21 | 83 | 104 |
| G8RWG | — | — | 83 | 83 |
| G8TFI | — | 95 | 82 | 177 |
| G8KAX | 17 | 56 | 82 | 155 |
| G4MUT | — | 54 | 82 | 136 |
| G8FUO | 3 | 86 | 80 | 169 |
| G8WPL | — | 30 | 79 | 109 |
| GW3CBY | 5 | 16 | 79 | 100 |
| G8ORP | — | 37 | 76 | 113 |
| G6DER | — | 26 | 76 | 102 |
| G8XQS | — | 4 | 76 | 80 |
| G6ABB | — | — | 75 | 75 |
| G8FMK | 21 | 59 | 74 | 154 |
| G4KLX | — | 5 | 74 | 79 |
| G8WUU | — | 27 | 72 | 99 |
| GW6JDK | — | 2 | 72 | 74 |
| G4RSN | 2 | 19 | 71 | 92 |
| G6ADE | — | 64 | 70 | 134 |
| G6ELQ | — | — | 69 | 69 |
| G6HTJ | — | 17 | 66 | 83 |
| G6CNX | — | — | 63 | 63 |
| G8XMP | — | — | 62 | 62 |
| G4NRG | — | 11 | 61 | 72 |
| G4ROA | 6 | 43 | 58 | 107 |
| G4NWT | — | 22 | 55 | 77 |
| GM8BDX | — | 33 | 53 | 86 |
| G4PEM | — | — | 50 | 50 |
| G8XTJ | — | — | 48 | 48 |
| G8ZYL | — | — | 46 | 46 |
| G4LDY | — | 3 | 41 | 44 |
| G8LXY | — | 20 | 34 | 54 |
| G6HRI | — | 12 | 32 | 44 |
| G4BVY | 9 | 72 | — | 81 |

Starting date January 1, 1975. No satellite or repeater QSOs. "Band of the Month", 2m.

Welcome to yet another new contributor, Kelvin Weaver, GW6JDK, from Blackwood in Gwent, who passed the *R.A.E.* a couple of years ago when he was 15. His father, Phillip, is GW6JDJ and their licences arrived last June. The station comprises a *Kenwood* TS-770 and *Dressler* D-200 amplifier, a *Datong* Automatic Speech Processor, the aerials being two 9-ele. *Tonna Yagis* at 20ft. with a *Dressler* 0.7 dB masthead pre-amplifier. Planning permission for a 60ft. *Versatower* is awaited, upon which a couple of the new, 17-ele. *Tonna Yagis* will be placed. The QTH is 750ft. *a.s.l.* and Kelvin lists some very nice DX he has already worked.

Jan-Martin Nøding, LA8AK, (DS80b) in Vågsbygd, has now reached 200 QTH squares on the band and, in the Feb. 6 *Ar* found two new squares on CW, ZT and FY. At present, his PA is out of order so he is running 50w. to a 16-ele. *Yagi,* with a BFT66 type preamplifier.

The activity in the 144/432 MHz contest on the Mar. 5/6 weekend was high, although a number of club and other multi-operator stations did mention a lack of help due to the N.E.C. Exhibition creaming off some operators. As observed from G3FPK, stations on the east and south coasts were doing well with 700 and 800-plus QSOs at the end. Propagation to the north and northwest was flat, though, with only GM4CXM and GI8EWM heard weakly in ZL60j. The only consistent Welsh portables were GW3OXD and GW4NFD, while GD4IOM was a good signal at times.

## Seventy Centimetres

LA8AK is one of a growing number of operators carrying out 70cm. *Ar* work. On Feb. 6, Jan-Martin mentions working, ". . . a few SM4, SM5, OZ and DL stations on CW". Going back to the Jan. 23 fine tropo. opening, he reports contacts with 19 squares. His rig runs 50 w., but a 300w. PA is being built, with two 21-ele. *Yagis* and a 3SK97 preamp. John Tye, G4BYV, (Norfolk) reports that Simon Freeman, G3LQR (Suffolk) worked EA1KC and EA1NU during the Jan. 23 tropo. event.

G3UVR used the Feb. 6 contest to help his 1983 score along well. He uses a home built transverter and runs 20w. output to a 21-ele. *Yagi.* G4FRE (Suffolk) uses either a *Yaesu* FT-290 with *Elektor* 144/432 transverter, or a *Trio* TS-120V and home built transverter for 70cm. Dave has an MGF1401 preamp. and a 4CX250B amplifier in either case, the latter being

". . . half a K2RIW to a design from *DUBUS Magazine* . . ." and which has proved a very easy one to build and get going. He also worked the two EA1s on Jan. 23, but the best DX was OE3OBC in II square, with several Ds in the F and G squares. In six days of putting up outdoor aerials, Dave notched up 11 countries and 40 squares!

G4MCU's reluctant rotator which was stuck to the east, enabled Jon to copy the beacon OK0EA (HK18d) at S9 on Feb. 18 at 2200, while OZ2ALS (EP79c) was S2 off the side to the beam. He and John Lemay, G8KAX, suggest that, just because distant beacons at great heights can be copied, it does not follow that QSOs between stations at lower altitudes are possible. For example, over the Feb. 18-20 period, GB3MLY — as it now is — was an enormous signal, whereas there was little increase in the strength of signals from northern amateur stations. This phenomenon has also been observed with HB9HB and DL0PR on 2m.

G4NBS took his gear down to G8FUO's QTH in Windsor for the Feb. 6 contest and they made 110 QSOs, working well to the north. Best DX was G8PNN in Northumberland and the total points was about 500. From home, Tony found conditions poor, but then mentions working DF9JS (DL), DL2KBB (DK), DL4OX (FM), DJ9BV (EN), DF6HT (FN) and ON and PA. However, activity seemed low. Other noteworthy contacts were GW8AAP/P (Clwyd) on the 22nd, and G3LQR and G6OUF (Chesterfield) on the 27th.

G6HRI now has a weekly sked. with GW3CCF in Clwyd. Russell intends to go out portable in YO square as soon as he has a suitable aerial. He has worked some reasonable GDX during February from the Blackpool home station. G8FMK also found OK0EA at S7 on Feb. 18, but little else from the east in the short lift which lasted but two hours in Thame. Pete Godfrey, G8ULU, (Kent) got DC7QH (GM) and GM4JLY (YR) for a couple of new squares on the 18th to make it 66 on 70cm.

A short note from Don Hughes, G8WPL, (Stockport) indicates he has a *Yaesu* FT-780R and *MM* 100w. amplifier with 23-ele. aerial on the band and this combination has brought QSOs with D, EI, F, G, GD, GI, GU and GW stations in 30 squares, so far. GD2HDZ worked 13 more counties and two more countries in the Feb. 6 contest, including G8ZHP (Lincs.), G4FUF (Essex) and G3SEK (Oxford).

"Contaminated coax" is keeping GM4CXP off the band at present. Derrick mentions all sorts of aerials to go up for 4m. and 6m. so it seems some "muscle" is needed at St. Boswells! GW6JDK has only 10w. to an 11-ele. *Yagi* at the moment, but a 4CX250B amplifier and *Gasfet* preamp. are envisaged, plus two 21-ele. *Tonna Yagis*. Kelvin mentions that GW8UCQ and GW8XMT, also in Blackwood, Gwent, are QRV on the band, each with 50w. and single 21-ele. beams. They are looking for skeds and both are *QTHR*.

For TV addicts, your scribe learned from Tim Stanley, G4DBL, who was operating G6IBA at the time, that the latter club station will be transmitting FS/TV soon on 70cm.

## Gigahertz Bands

From Norway, LA8AK is QRV on 23cm. with 15w. to a 23-ele. beam. A 150w. PA is being assembled. G4BYV has supplied some East Anglian microwave news. John is QRV on 13cm. and, on Jan. 22, made contacts with DJ9PC (DI), DB5KS (DL) and G8LMW (ZM). G3LQR also worked DJ9PC, plus OE3LFA (II) on Jan. 23, a QRB of 1,139 kms. Bob Hope, G3AUS, (Devon) is now on 13cm. with 6w. from an NE3005 device. His gear is all home designed and built and he has worked G4LRT in ZM square.

G4FRE plans to take down his 4m. beam later in the year and put up aerials for 13cm. and 23cm. On 23cm. at present, Dave has 10w. from a home built, solid state transverter with a 15-over-15 aerial on the side of the house, fixed to the east. Even so, GB3MLE, F1BUU (ZE), DL7QY (FJ), and HB9AMH/P (DH) have been heard. No QSOs were possible as his *Gasfet* preamp. and changeover relay had been left at work.

G4ROA is pleased to report very good activity on 23cm. in February, as heard from Coventry, the 19th bringing four more 1983 counties and G8TXG (YM) for a new square. In the brief tropo. event on the 18th, G8FMK closely monitored 23cm. and found beacon DB0JO peaking at S5 at 2130. This is in DL48a on a QRG of 1,296.854 MHz with 35w. *e.r.p.* from four, 15-over-15 *Yagis,* QTF 275°. The only station heard and worked was DF1EQ (DL76a) who was S9-plus 20dB.

G8ULU had hoped to be QRV on 23cm. by now but still awaited an *MM* transverter which has been on order from his local dealer since the end of October! Ken Willis, G8VR, (Kent) *does* have one of these, however, and is now on 23cm. He plans to build a 2C39A amplifier and hopes, eventually, to install a 12ft. dish for *E-M-E* work.

## Satellite News

G6HRI is the only reader to mention any satellite activity and has had a QSO with WA3YGQ in Pennsylvania, but did not state which satellite/mode. Russell has also worked numerous Europeans. The latest launch date for the *Phase 3B* "bird" is June 5 — it changes every month.

The recorded message from the University of Surrey on Mar. 8 said that UOSAT's gravity gradient boom was successfully deployed early on Mar. 7. However, after one metre extension, a cable fouled so the remaining three metres of deployment was stopped. Even so, this one metre extension was sufficient to stablise the satellite for two days. Hopefully, the cable will be disentangled by the time this is read.

*AMSAT-UK's* A.G.M. takes place on April 9 at 1300 at London House in Mecklenburgh Square, off Guildford Street, London, W.C.1. Lunch facilities are available at this venue from midday.

## Domestic Contests

The Barking Society's 2m. event is on Mar. 27, see details on p. 42, last month. The last three legs of the 4m. *Cumulatives* are on Mar. 27, Apr. 10 and 24, 0900-1100 GMT. The 23cm. Trophy Contest is on Apr. 2, 1600-2400 GMT, with the 70cm. version the next day from 0900 to 1700 GMT. Both are two section affairs, Single-op. and Multi-op. with one point *per* kilometre on 23cm. and the radial ring scoring system on 70cm.

The Stevenage and District A.R.S. is running an FM contest on 2m. on Apr. 10, 1300-1700 GMT in the 144.500-144.845 and 145.200-145.575 MHz parts of the band. Three sections, 1) up to 25w. output; 2) over 25w. o/p; 3) *S.w.l.* More information from G6NZC, 82 Lingfield Road, Stevenage, SG1 5SN on receipt of an *s.a.e.* The 2m. CW event is on Apr. 17, 0900-1500 GMT, again a Single-op. or Multi-op. contest, according to *RadCom.* (Last year it was a "classless" affair.)

## Deadlines

**April 6** is the next copy deadline and for June it is May 4. All your letters, etc., to:— "VHF Bands", SHORT WAVE MAGAZINE, 34 High Street, WELWYN, Herts., AL6 9EQ. *73 de G3FPK.*

# A MICROPROCESSOR CONTROLLED MORSE DECODER PART V

PETER LUMB, G3IRM

## Pulse Generator

SOME useful, though not essential, tests can be carried out by means of a pulse generator and a suitable circuit is shown in Fig. 10. Each time the microswitch is pressed a positive-going pulse appears at pin 11 of IC22 and a corresponding negative-going pulse appears at pin 8. Only one pulse is generated each time the switch is pressed and its length depends on the value of C12 and the position of R32. Using the values shown, the pulse width can be varied from 7mS to 400mS. The range can be altered by changing C12, and R32 should be calibrated by means of an oscilloscope. The negative-going pulse from the generator is taken to one of the Morse inputs. Y1 on the oscilloscope is connected to pin 12 on IC18; with a double beam oscilloscope Y2 can be connected to the pulse generator output. Using C11 = 0.68 μF set the pulse generator to produce a pulse about 100mS wide. Y1 should now display pulses 10mS wide each time a dot is inserted corresponding to 12 w.p.m. Trigger the oscilloscope from Y2 so that the display appears each time a pulse is inserted. Varying the pulse length slightly should produce the following results:

| *Pulses* | *Meter* | *Oscilloscope* |
|---|---|---|
| made longer | goes lower | Y1 pulses lengthen |
| made shorter | goes higher | Y1 pulses shorten |

There will always be 10 clock pulses for each dot inserted by the pulse generator unless very wide pulse variations are made. If the dot length changes from very short to very long or *vice versa* it takes the speed controller some time to catch up as only one correction pulse is generated by the microprocessor for each dot received. If very short pulses are inserted they will be rejected by the program and the speed of the Morse clock oscillator as indicated by Y1 and the meter will not vary. Insertion of a long pulse to correspond to a dash will change the display to a 'T' (D1 lights) but again neither the 'scope display nor the meter will change.

**Table of Values**
**Fig. 10**

| | |
|---|---|
| IC22 = 74LS00 | R31 = 1K |
| IC23 = 74LS121 | R32 = 47K |
| SW6 = microswitch | C12 = 1 μF tant. |

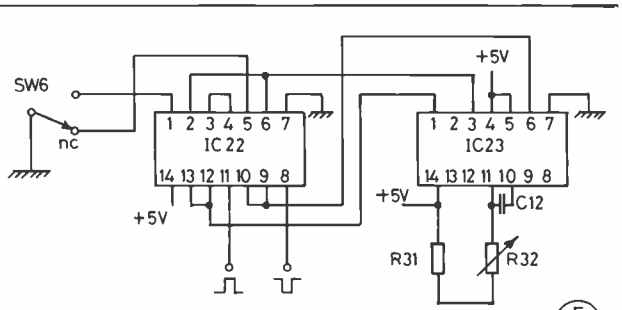



Fig.10 PULSE GENERATOR

**Table of Values**
**Fig. 11**

| | |
|---|---|
| R33, R34, R35, R36, R39, R40 = 10K | C18 = 200 μF |
| R37, R38, R42, R43, R44, R45, R46 = 1K | C19 = 82 pF polystyrene |
| R41 = 10M | TR3 = BC108 or similar |
| R47 = 3K3 | IC24 = 4118 |
| R48 = 2K2 | IC25 = 8212 |
| R49, R52 = 270R | IC26 = *see text* |
| R50 = 68R | IC27 = 74LS174 |
| R51 = 100R | IC28 = SFF96364 |
| | IC29 = RO3-2513 |
| | IC30 = 74LS165 |
| | IC31 = 74LS163 |
| C13, C14, C15, C16 = 0.01 μF disc at various points on board | IC32 = 74LSO4 |
| | IC33 = 74LS132 |
| C17 = 47 μF | X2 = 1.008 MHz |

## The Display Circuit

This part of the circuit is a quite straightforward constructional job with nothing in the way of complications. It is based on the *Thomson* EFCIS CRT controller, the SFF96364. A number of designs have been published using this IC and each has closely followed the circuits shown in the data sheets produced by the manufacturers. The design used six small memories which had to be connected together, a thing the writer does not like to have to do. The published circuits all use about 18 to 20 integrated circuits, whereas the writer's version has only 10 and provides the same facilities as the original design. Only one memory is used and the latches and gates used in the original circuits have been replaced by an 8212 input/output port manufactured by *Intel* and a number of other makers. The circuit diagram is shown in Fig. 11 with a board layout in Fig. 12.

As in Fig. 4 the address lines have been omitted and the corresponding 'A' lines must be connected. These only involve the CRT controller IC28 and the memory IC24; no other address lines are needed. IC26 deserves a special mention as it is a ROM specially programmed to the instructions given by the CRT controller manufacturers and is required to interpret the inputs to decide whether a character is intended or one of the various cursor movements available. It can be bought ready programmed as the ROM for "Elekterminal"; this is one of the designs published (in *Elektor* magazine) using the SFF96364 and is therefore programmed to the maker's requirements. The circuit can be assembled on a piece of *Veroboard* the same size as the processor unit, but it only needs one 12-way Minicon for connections to the processor; the connections needed are PBO to PB6, $\overline{\text{STB}}$ and power lines. These all connect to the corresponding connector on the processor board. The video output, which is a standard 1v pk/pk signal is also taken to the connector strip for connection to the video monitor; R51 controls the width of the display. A direct connection can be made to such a monitor and this is recommended as better definition can be obtained. Alternatively, the signal may be tapped into the video circuits of a television receiver.

Perhaps the easiest alternative to a video monitor is to add a modulator as used in TV games and home computers and feed this signal into the aerial input of the television receiver.

## Checking the Display Board

Connect the monitor and board together and supply 5v to the circuit. Do not connect the processor board at this stage but take the PB0 to PB6 lines to the six lowest switches on the programmer;

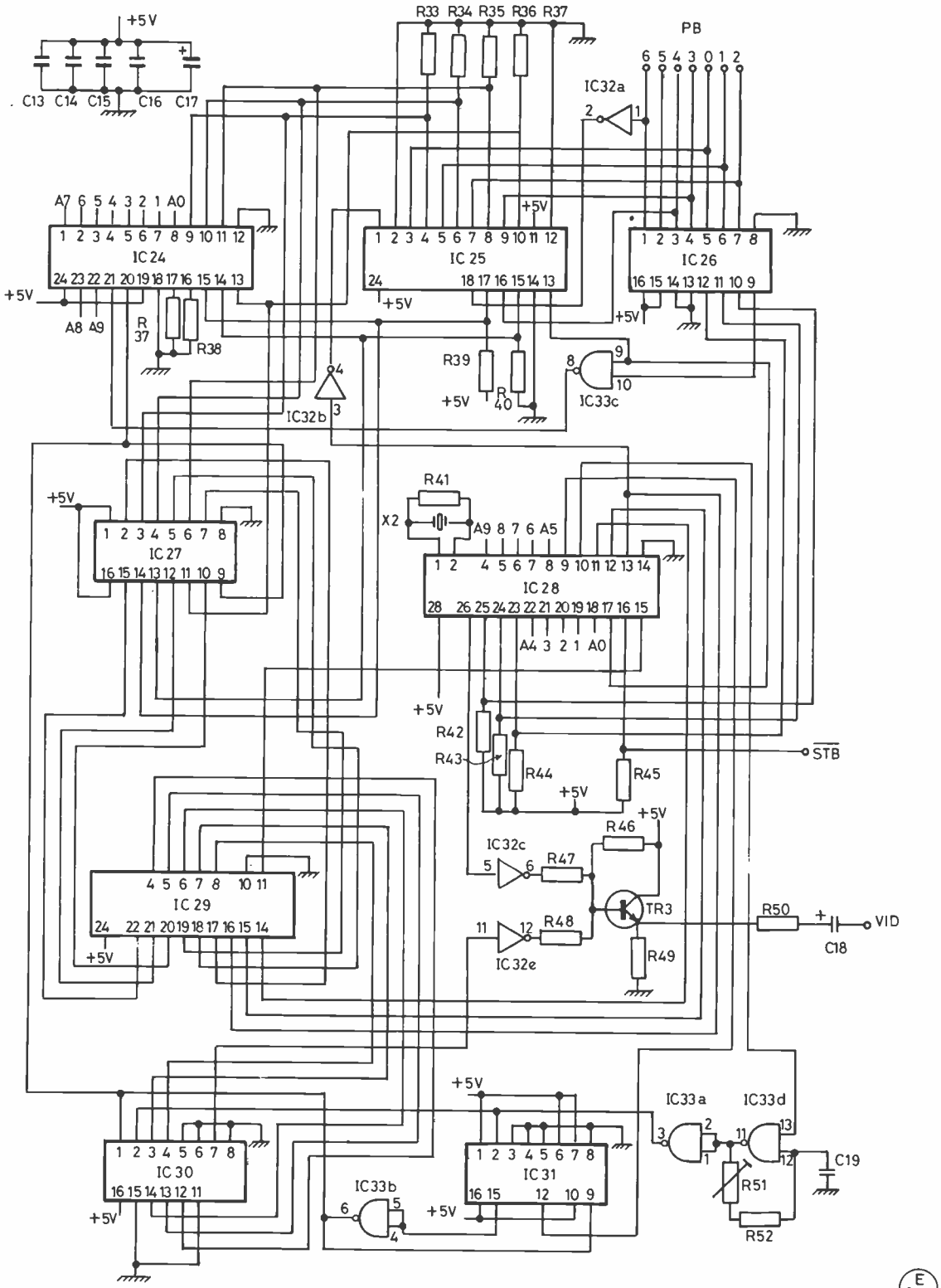



Fig.11 DISPLAY CIRCUIT

no connection is needed to switch 7. Connect $\overline{\text{STB}}$ to the negative-going pulse output on the programmer. ASCII data can be set up on the switches and each time the programming switch is pressed the symbol corresponding to the data will appear on the display. A list of codes in octal is given in Table 7. Also shown are the meanings allocated to some of the codes in this design though these can easily be changed by the program if so desired. There is obviously no need for a back space. It might be thought that this could be used to correct an error but the processor would not know how far to go back to make the correction!

## The Spacing Switch

The diagram for this is given in Fig. 13. It can be built on a small piece of *Veroboard* and soldered on to unused tags on the switch for support. The switch is 11-way single-pole stopped down to 8 positions; these positions give spaces of 030 to 120 clock pulses (24

**Table 7**

| | (*Note* — codes not shown are non-print) | | *Holding code* |
|---|---|---|---|
| 010 | Back space | | |
| 011 | Forward one space | | |
| 012 | Line feed | | |
| 013 | Up one line | | |
| 014 | Clear display and cursor home | | |
| 032 | Clears line but cursor remains in position | | |
| 033 | Line feed | | |
| 034 | Cursor home | | |
| 035 | Carriage return | | |
| 040 | Space | | |
| 041 | ! | Error | see text |
| 042 | " | | 121 |
| 043 | # | Understood | 041 |
| 044 | $ | | |
| 045 | % | | |
| 046 | & | | |
| 047 | ' | | |
| 050 | ( | | |
| 051 | ) | | |
| 052 | * | $\overline{VA}$ | 104 |
| 053 | + | $\overline{AR}$ | 051 |
| 054 | , | | 162 |
| 055 | - | | 140 |
| 056 | . | | 124 |
| 057 | / | | 061 |
| 060 | 0 | | 076 |
| 061 | 1 | | 056 |
| 062 | 2 | | 046 |
| 063 | 3 | | 042 |
| 064 | 4 | | 040 |
| 065 | 5 | | 037 |
| 066 | 6 | | 057 |
| 067 | 7 | | 067 |
| 070 | 8 | | 073 |
| 071 | 9 | | 075 |
| 072 | : | | 167 |
| 073 | ; | | 151 |
| 074 | < | $\overline{CT}$ | 064 |
| 075 | = | $\overline{BT}$ | 060 |
| 076 | > | $\overline{KN}$ | 065 |
| 077 | ? | | 113 |
| 101 | A | | 004 |
| 102 | B | | 027 |
| 103 | C | | 031 |
| 104 | D | | 013 |
| 105 | E | | 001 |
| 106 | F | | 021 |
| 107 | G | | 015 |
| 110 | H | | 017 |
| 111 | I | | 003 |
| 112 | J | | 026 |
| 113 | K | | 014 |
| 114 | L | | 023 |
| 115 | M | | 006 |
| 116 | N | | 005 |
| 117 | O | | 016 |
| 120 | P | | 025 |
| 121 | Q | | 034 |
| 122 | R | | 011 |
| 123 | S | | 007 |
| 124 | T | | 002 |
| 125 | U | | 010 |
| 126 | V | | 020 |
| 127 | W | | 012 |
| 130 | X | | 030 |
| 131 | Y | | 032 |
| 132 | Z | | 033 |
| 133 | [ | | |
| 134 | \ | Brackets | 154 |
| 135 | ] | | |
| 136 | ^ | $\overline{AS}$ | 047 |
| 137 | _ | Invalid code | various |

to 80 decimal). How it works will be described in the second part of the program.

## The Program — Part II

This is listed in Table 8 which shows the additions required to complete the main program together with a few amendments to the preliminary program. Once again only the addresses listed need be programmed, all others can be skipped by pressing the addressing switch only. 000 005 to 000 032 clear the monitor display and return the cursor to the top left hand corner of the screen, its home position. 000 271 to 000 276 decides if a word space has been received and if it has the program jumps to 001 070 to insert a space. This part between 001 070 and 001 114 also counts the number of characters and word spaces printed out on each line of the display and stores the count in register 'L'. It also checks 'L' to see if the count is 065 or more; if it is, the carriage return and line feed are initiated at 001 150. In this way a line nearly always ends in a complete word.

One of the faults of the earlier display built by the writer was that each line was filled before a new line was started resulting in nearly every word at the end of each line being broken between this and the next line. Very long words starting near the end of a line can still over-run on to the next line but these are few and far between particularly in amateur Morse. A program was written to insert a hyphen at the end of such lines and, although this was fairly long, it worked until it was realised that if only one letter was carried forward to the next line it could just as well have been printed in its correct place at the end of the previous line in place of the hyphen. To avoid this the program was made even longer and the whole idea was abandoned as not being worth the trouble.

The address which determines whether a space is to be inserted is 000 272, and the data at this address can be changed by the spacing switch. Some amendments have been made at 000 333 to 000 337 and the program continued to 000 373. Before the Morse holding codes can be printed out they must be changed into ASCII and this is done by this revised program. What is known as a 'look-up table' will be programmed between 002 000 and 002 377. When the processor is holding a Morse holding code it goes to the corresponding address in the look-up table where it finds the ASCII code required, which it then transfers to its 'A' register to print out at 000 341. This section in conjunction with 001 226 to 001 233 clears the 'L' register when a line of print is full, and a word carries forward to the next line so that 'L' can start again at zero to count characters in the new line.

000 366 enables the interrupt circuits. If the restart (interrupt) switch is pressed, this fact is remembered in IC20 and the EI instruction at 000 366 transfers the program to 001 000 *via* 000 054 to 000 056. How the interrupt works is illustrated in Table

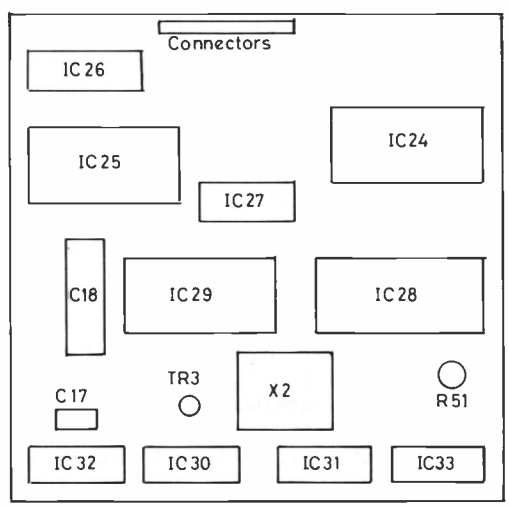



Fig.12 DISPLAY BOARD LAYOUT

E 044

**Table 8**

| *Address* | *Data Mnemonic* |
|---|---|
| 000 005 | 076 MVIA |
| 006 | 014 |
| 007 | 323 OUT |
| 010 | 201 |
| 011 | 076 MVIA |
| 012 | 007 |
| 013 | 323 OUT |
| 014 | 203 |
| 015 | 075 DCRA |
| 016 | 323 OUT |
| 017 | 203 |
| 020 | 036 MVIE |
| 021 | 000 |
| 022 | 123 MOVDE |
| 023 | 035 DCRE |
| 024 | 302 JNZ |
| 025 | 023 |
| 026 | 000 |
| 027 | 025 DCRD |
| 030 | 302 JNZ |
| 031 | 023 |
| 032 | 000 |
| 271 | 076 MVIA |
| 272 | 100 |
| 273 | 271 CMPC |
| 274 | 312 JZ |
| 275 | 070 |
| 276 | 001 |
| 303 | 325 |
| 325 | 173 MOVAE |
| 326 | 007 RLC |
| 327 | 202 ADDD |
| 000 330 | 332 JC |
| 331 | 030 |
| 332 | 001 |
| 333 | 137 MOVEA |
| 334 | 345 PUSHH |
| 335 | 046 MVIH |
| 336 | 002 |
| 337 | 153 MOVLE |
| 340 | 176 MOVAM |
| 341 | 323 OUT |
| 342 | 201 |
| 343 | 076 MVIA |
| 344 | 007 |
| 345 | 323 OUT |
| 346 | 203 |
| 347 | 075 DCRA |
| 350 | 323 OUT |
| 351 | 203 |
| 352 | 341 POPH |
| 353 | 054 INRL |
| 354 | 076 MVIA |
| 355 | 077 |
| 356 | 275 CMPL |
| 357 | 312 JZ |
| 360 | 226 |
| 361 | 001 |
| 362 | 006 MVIB |
| 363 | 000 |
| 364 | 120 MOVDB |
| 365 | 130 MOVEB |
| 366 | 373 EI |
| 367 | 000 NOP |
| 370 | 000 NOP |
| 371 | 303 JMP |
| 372 | 250 |
| 000 373 | 000 |
| 001 000 | 333 IN |
| 001 | 202 |
| 002 | 346 ANI |
| 003 | 360 |
| 004 | 017 RRC |
| 005 | 062 STA |
| 006 | 272 |
| 007 | 000 |
| 010 | 076 MVIA |
| 011 | 005 |
| 012 | 323 OUT |
| 013 | 203 |
| 014 | 075 DCRA |
| 015 | 323 OUT |
| 016 | 203 |
| 017 | 363 DI |
| 020 | 006 MVIB |
| 021 | 000 |
| 022 | 110 MOVCB |
| 023 | 120 MOVDB |
| 024 | 130 MOVEB |
| 025 | 311 RET |
| 030 | 076 MVIA |
| 031 | 137 |
| 032 | 323 OUT |
| 033 | 201 |
| 034 | 076 MVIA |
| 035 | 007 |
| 036 | 323 OUT |
| 037 | 203 |
| 040 | 075 DCRA |
| 041 | 323 OUT |
| 042 | 203 |
| 043 | 303 JMP |
| 044 | 353 |
| 001 045 | 000 |
| 070 | 175 MOVAL |
| 071 | 376 CPI |
| 072 | 065 |
| 073 | 322 JNC |
| 074 | 150 |
| 075 | 001 |
| 076 | 076 MVIA |
| 077 | 040 |
| 100 | 323 OUT |
| 101 | 201 |
| 102 | 076 MVIA |
| 103 | 007 |
| 104 | 323 OUT |
| 105 | 203 |
| 106 | 075 DCRA |
| 107 | 323 OUT |
| 110 | 203 |
| 111 | 054 INRL |
| 112 | 303 JMP |
| 113 | 073 |
| 114 | 000 |
| 150 | 076 MVIA |
| 151 | 015 |
| 152 | 323 OUT |
| 153 | 201 |
| 154 | 076 MVIA |
| 155 | 007 |
| 156 | 323 OUT |
| 157 | 203 |
| 160 | 075 DCRA |
| 161 | 323 OUT |
| 162 | 203 |
| 163 | 036 MVIE |
| 001 164 | 000 |
| 165 | 026 MVID |
| 166 | 005 |
| 167 | 035 DCRE |
| 170 | 302 JNZ |
| 171 | 167 |
| 172 | 001 |
| 173 | 025 DCRD |
| 174 | 302 JNZ |
| 175 | 167 |
| 176 | 001 |
| 177 | 076 MVIA |
| 200 | 012 |
| 201 | 323 OUT |
| 202 | 201 |
| 203 | 076 MVIA |
| 204 | 007 |
| 205 | 323 OUT |
| 206 | 203 |
| 207 | 075 DCRA |
| 210 | 323 OUT |
| 211 | 203 |
| 212 | 036 MVIE |
| 213 | 000 |
| 214 | 026 MVID |
| 215 | 005 |
| 216 | 035 DCRE |
| 217 | 302 JNZ |
| 220 | 216 |
| 221 | 001 |
| 222 | 025 DCRD |
| 223 | 302 JNZ |
| 224 | 216 |
| 225 | 001 |
| 226 | 056 MVIL |
| 227 | 000 |
| 230 | 303 JMP |
| 231 | 073 |
| 232 | 000 |

9. Port C is read which inputs the switch codes. The lowest four bits are masked out to zeros and the data rotated right producing the octal numbers listed. The number selected is then transferred to 000 272 to determine the length of the next space detected. The interrupt is then disabled at 001 017. Registers B, C, D and E are cleared and the program returns to where it left off at 000 370, followed by a jump back to the space input. As mentioned earlier, 001 150 to the end of the program are to initiate line feed and carriage return.

The look-up table is given in Table 10 and fills the whole of the third section of the memory, 002 000 to 002 377. All the addresses must be programmed, all those not listed being programmed as 137 — the code for a dash on the line in ASCII. All data held as a Morse holding code must lie between 000 and 377 and those which correspond to a valid symbol are listed in the look-up table. Should any other data be present it will be one of the codes represented by a dash so that any invalid code will initiate a dash print out on the line. If letters are inadvertently joined the number produced by the ADDD instruction at 000 327 can be over 377 and, if this happens, what is known as a 'carry flag' is set in the microprocessor. This carry is detected at 000 330 and the program jumps to 001 030 to insert an invalid symbol; this is a slight modification made after the preliminary program was written and ensures that all invalid codes are detected. (In the preliminary program some of the very long ones were missed and an incorrect symbol printed).

A small complication arises when an erase is received. The holding codes are 077, 177 and 377 depending on whether 6, 7 or 8 dots are received. Should a string of 9 or more be received the register overflows and produces a wrong print-out. In all the time the writer has used a decoder this has never occurred. In fact many amateurs send a series of the letter E when they mean erase and this prints out accordingly; the additional alterations to the program to avoid this were not considered worthwhile.

## Final Wiring

The interconnections between the various units can now be made from Fig. 9, the programmed memory board inserted on its

**Table 9**

**Interrupt coding**

| *Switch* | *PC* | *RRC* | *Octal* | *Decimal* |
|---|---|---|---|---|
| 1 | 0011XXXX | 00011000 | 030 | 24 |
| 2 | 0100XXXX | 00100000 | 040 | 32 |
| 3 | 0101XXXX | 00101000 | 050 | 40 |
| 4 | 0110XXXX | 00110000 | 060 | 48 |
| 5 | 0111XXXX | 00111000 | 070 | 56 |
| 6 | 1000XXXX | 01000000 | 100 | 64 |
| 7 | 1001XXXX | 01001000 | 110 | 72 |
| 8 | 1010XXXX | 01010000 | 120 | 80 |

X = don't care

**Table 10**

*Note:* all addresses between 002 000 and 002 377 not listed below must be programmed with data 137

| *Address* | *Data* | *Address* | *Data* |
|---|---|---|---|
| 002 001 | 105 | 002 041 | 043 |
| 002 | 124 | 042 | 063 |
| 003 | 111 | 046 | 062 |
| 004 | 101 | 047 | 136 |
| 005 | 116 | 051 | 053 |
| 006 | 115 | 056 | 061 |
| 007 | 123 | 057 | 066 |
| 010 | 125 | 060 | 075 |
| 011 | 122 | 061 | 057 |
| 012 | 127 | 064 | 074 |
| 013 | 104 | 065 | 076 |
| 014 | 113 | 067 | 067 |
| 015 | 107 | 073 | 070 |
| 016 | 117 | 075 | 071 |
| 017 | 110 | 076 | 060 |
| 020 | 126 | 077 | 041 |
| 021 | 106 | 104 | 052 |
| 023 | 114 | 113 | 077 |
| 025 | 120 | 121 | 042 |
| 026 | 112 | 124 | 056 |
| 027 | 102 | 135 | 047 |
| 030 | 130 | 140 | 055 |
| 031 | 103 | 151 | 073 |
| 032 | 131 | 154 | 134 |
| 033 | 132 | 162 | 054 |
| 034 | 121 | 167 | 072 |
| 037 | 065 | 177 | 041 |
| 040 | 064 | 377 | 041 |

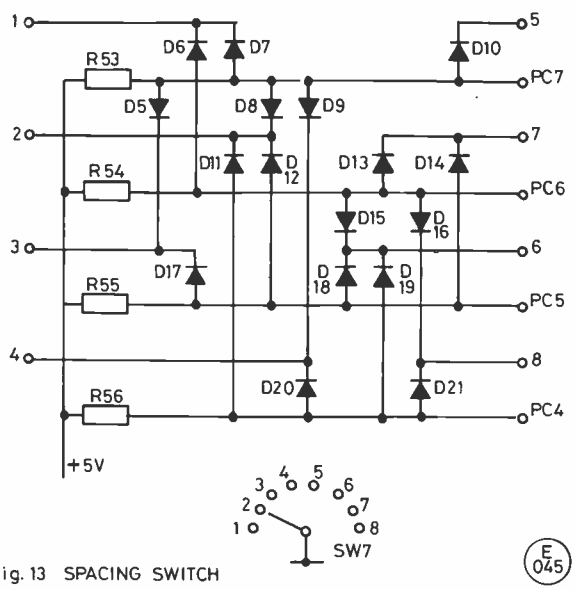



Fig. 13 SPACING SWITCH

**Table of Values**
**Fig. 13**

R53, R54, R55, R56 = 2K7
D5 to D21 = 1N4148
SW7 = 1-pole 8-way rotary switch

pin connector and power connected. Morse can now be decoded and printed out on the monitor. At this stage the Morse must be at negative-going TTL levels and the final article in the series will deal with filters and conversions to TTL.

*to be concluded*

*BOOK REVIEW*

# A GUIDE TO AMATEUR RADIO

## Nineteenth Edition

A LARGE proportion of people now entering the amateur radio hobby does so *via* Citizens' Band radio experience. Unlike the reviewer and his contemporaries who graduated to their full licences through a short wave listening apprenticeship, these *ex*-CB-ers have very limited, if any, knowledge of amateur radio, so Pat Hawker's, G3VA, *A Guide to Amateur Radio* is essential reading.

First published fifty years ago, this new, nineteenth edition has been extensively revised to include the new amateur bands resulting from the W.A.R.C.. Conference in 1979, and the consequential revisions to U.K. and international regulations. The book comprises twelve chapters, the first, "This is Amateur Radio", being mostly in question and answer form. The next, "Fundamentals of Electronics", briefly introduces Ohm's Law, capacitance, inductance, etc., symbols for components, colour codes, and so on. Chapter 3, "Getting Started", deals with propagation, simple antennas and log keeping, but includes material on frequency synthesisers and phase-locked-loops.

"Amateur Radio Equipment" is the fourth chapter and covers sets, ancient and modern, from the past 45 years. It is amply illustrated and has an eight-page list of 22 manufacturers' equipment with some references to vintage dates. The following two sections deal with "Communications Receivers", and "Transmitters" with numerous block and circuit diagrams, and physical layouts. The latter chapter also includes sections on TVI, AFI and frequency measurement. Chapter 7 is a short one entitled, "The Antenna" and includes the usual, basic material.

The next chapter, "Workshop Practice", is based upon an earlier *Radio Communication* article by G3OMK and contains some useful notes and illustrations on "chassis bashing", etc. Chapter 9, "The Licence Examinations", includes a U.K. amateur bands availability table as at April, 1982, so does not show the 18 and 24.9 MHz bands, the EHF ones above 24 GHz, or the restricted 50 MHz details. The tenth chapter, "Operating an Amateur Station", covers reporting, the Q-code, band plans and countries lists. The final two chapters are devoted respectively to the RSGB and International AR Organisations.

The first appendix is called, "1982-85 Radio Amateurs' Examination Syllabus and Objectives", which says it all, and lists the subjects the R.A.E. candidate needs to know before enrolling for the examination. The next appendix lists forty sample R.A.E. questions and gives the answers, while the last appendix, "Safety Pointers", is a brief one suggesting how best to avoid injury and death in pursuance of the hobby. The book has a useful two page index.

*A Guide to Amateur Radio* is published by the Radio Society of Great Britain and is a paperback of 160 pages, in 246 x 184mm. format. It can be well recommended to all would-be radio amateurs as a first-class reference book. It is available from *Short Wave Magazine* Publications Department at 34 High Street, WELWYN, Herts., AL6 9EQ, for £3.40, including postage and packing.

*N.A.S.F.*

# THE "WHITFIELD" SSB/CW/QSK TRANSCEIVER, PART II

## AN EASY-TO-BUILD, 5 WATTS OUTPUT, MODERN DESIGN COVERING 160 METRES, 80 METRES, AND 3 – 3.5 MHz

IAN KEYSER, G3ROO

WE start this month with the main interconnection diagram, Fig. 2. It can be difficult to know where to put this in a series article: some would say at the end, but I think it will provide the prospective constructor with some insight into the finished project. Also, references will have been made to it while explaining the various sections of the rig.

### The Receiver Section

This time we are going to cover the main receiver PCB and SSB generator. This is starting at the back-end and working towards the aerial, but the PCB will be described in the opposite direction — the signal in towards the loudspeaker. The complete diagram is given in Fig. 3. It looks a lot to take in at one go, but really it's not too bad. This PCB includes receiver mixer, filter, IF strip, AF pre-amp., AF filter, and audio output stage; in addition there is the Tx microphone amplifier, the balanced modulator and the SSB IF amplifier.

The signal in from the RF preselector (or RF amplifier if used) is fed into pins 12 and 13 of IC1. This device is a high level mixer from Plessey, the SL6330, having characteristics which approach those of diode ring mixers when run under optimum conditions; this section, along with the IF amplifier, is identical to Peter Chadwick's design. The mixer current, and so its operating conditions, is set by R1001, and C1004 decouples the programming current input, pin 11; pin 4 of this device is the supply input and is decoupled by C1003, the mixer output being on pin 3. The signal load is a 1mH RF choke, RFC1001, capable of push-pull output if required; however, this is not needed in this application and so the second output is taken to the supply rail from Reg 1001, C1005 serving the dual function of decoupling the output of Reg 1001 and the mixer unused output on pin 14.

The decoupling capacitors throughout the rig have been set, wherever possible, at 0.01 $\mu$F for the sake of simplicity, as the only requirement for these components is that their reactance at the frequency present at a point is less than one-tenth of the impedance of the circuit at that point and so act as a short-circuit to the RF/IF signal. In the majority of cases this also applies to the coupling capacitors in the set.

The local oscillator signal is coupled by C1006 into pin 5 of the mixer, and the signal out of pin 3 is coupled to the filter FL1001 *via* C1007; R1007 is set to the input impedance of the filter to ensure the flattest possible response of its passband. The output of the filter is the 455 kHz difference signal resulting from the subtraction of the input signal from the local oscillator signal. This filter has a bandpass of about 3 kHz, adequate for SSB and a very good stop-band figure; the slope of the filter is perhaps not quite as good as one might wish, but when the cost is taken into consideration it is more than adequate for the job in hand.

The IF amplifier integrated circuit, IC1002, is the Plessey SL6700, which includes two IF amplifiers, AGC detector and the SSB balanced demodulator. The two IF amplifiers are capacitively coupled by C1008 and the output of the second amplifier, on pin 6, is connected to the tap on the primary of IF transformer T1001; C1009 is used to block the DC component,

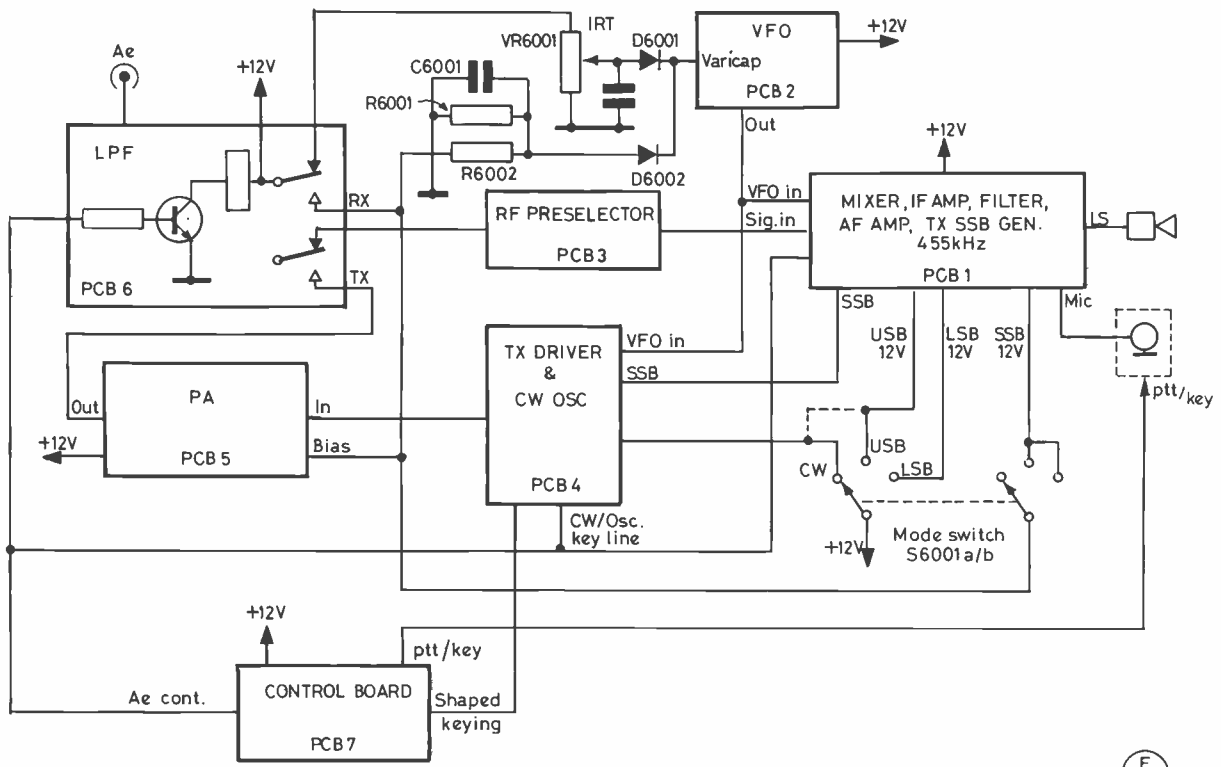



Fig. 2 THE "WHITFIELD" INTERCONNECTIONS

E 029

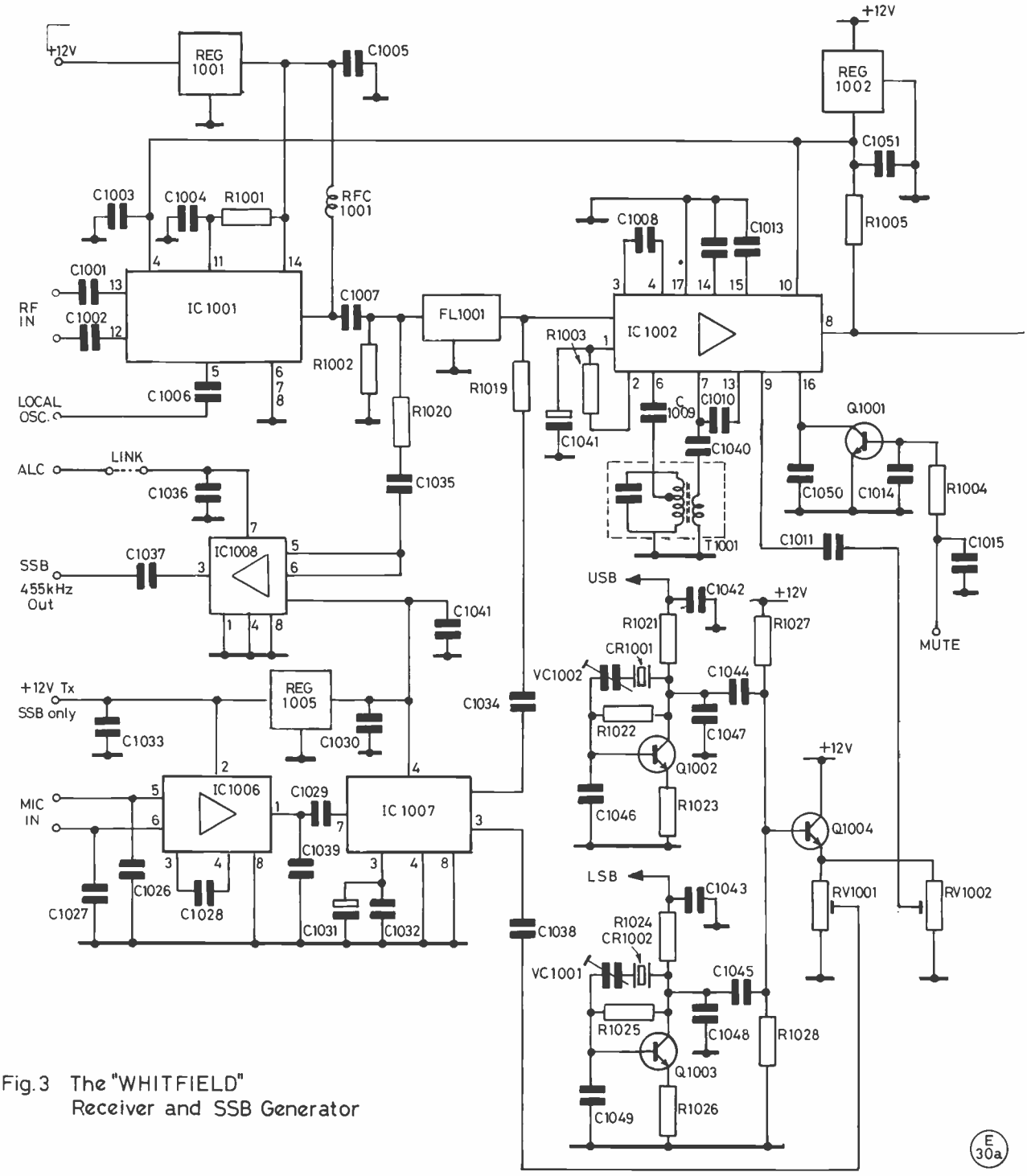
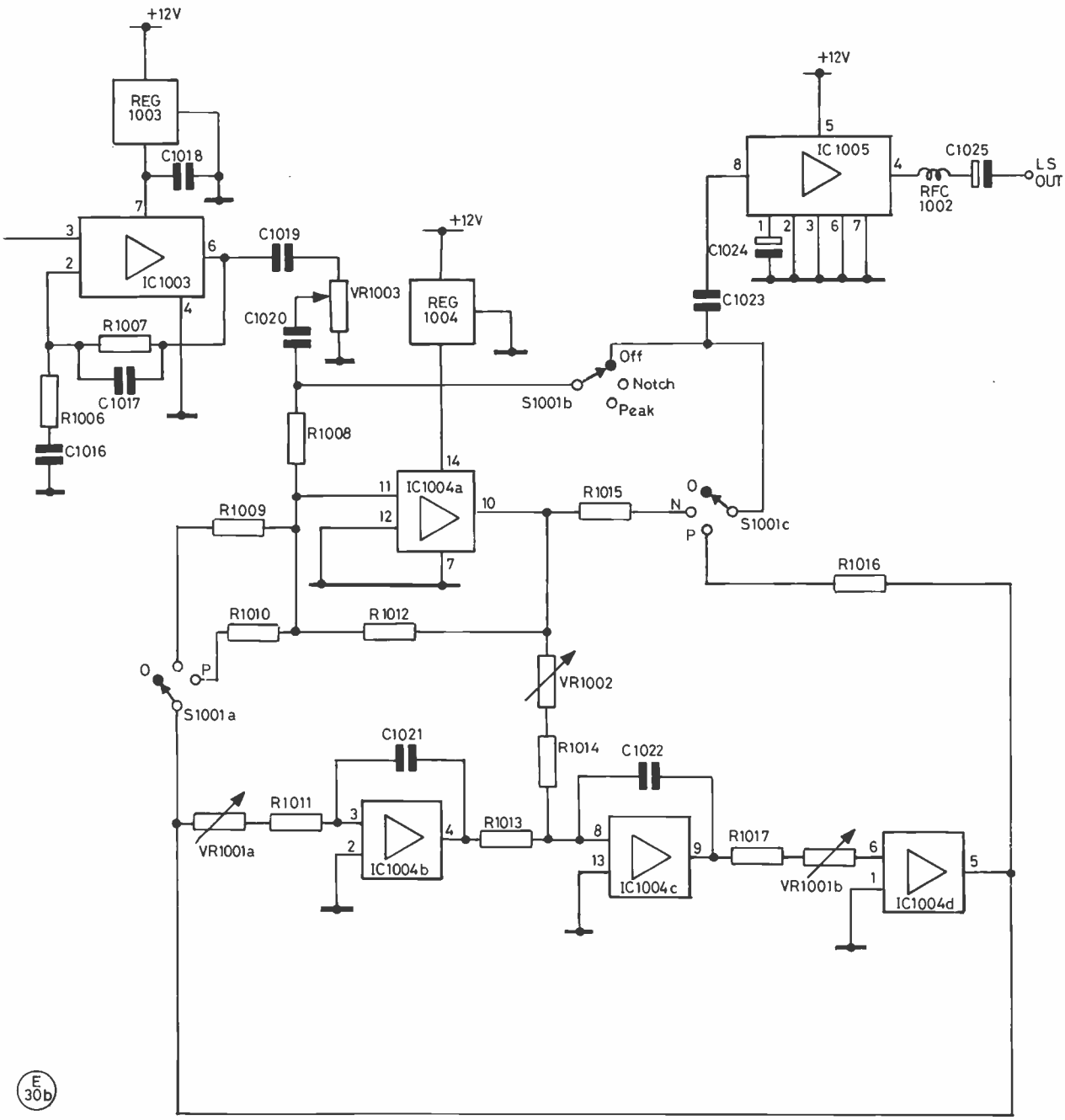



Fig. 3 The "WHITFIELD" Receiver and SSB Generator

T1001 is used to transform the impedance of the output to match the relatively low input impedance of the two detector inputs (the AGC detector and the balanced demodulator). Pin 13 has a DC component and C1010 prevents this from shorting out *via* the secondary of T1001. The BFO or CIO (carrier insertion oscillator) signal from the output of the emitter of Q1004 is coupled into the balanced modulator on IC1002's pin 9 *via* C1011, and the SSB audio is available on pin 8 — R1005 acting as the collector load for the balanced modulator.

The supply for IC1002 is five volts from Reg 1002, the output of which is decoupled by a small 100 μF electrolytic capacitor. C1012 decouples the AGC detector on pin 14, and C1013 decouples the output of the detector on pin 15; pin 15 also has an audio component which can be used for AM detection if required. To mute this IF amplifier on transmit it is possible to use the AGC line by shorting-out the AGC decoupling point on pin 16. This is not done directly but by a transistor, the reason for this being that it is unwise to trail wires from RF sensitive points throughout the set when it is not necessary, Q1001 acts as the switch, and its base as the control which is well and truly decoupled by C1014, C1015 and R1004. By increasing the voltage on the mute input the gain of the IF strip steadily decreases.




Before going on to the AF stages I will cover the C10 circuit. There are two oscillators, Q1002 and Q1003, one for lower sideband and the other for upper sideband. The circuits of these oscillators are very straightforward and hardly need any explanation. To enable one or other oscillator the supply is switched by the mode switch shown on Fig. 2. When in CW mode either oscillator can be used according to which one gives the best tone, and this depends on the frequency of the CW oscillator in the transmitter. The outputs from these two oscillators are fed to the base of Q1004 which is an emitter-follower stage. The emitter load is made up of two miniature presets, one for the receiver balanced demodulator and the other for the transmitter balanced demodulator, enabling the levels to be set independently.

Now for the audio stage. IC1003 is a 741 op. amp., something that everyone must have used at one time or another! Its function here is as a high-gain AF amplifier with frequency-dependent feed back C1016, C1017, R1005 and R1006; this gives a roll-off at about 6 kHz. An eight volt supply is provided by Reg 1003 and decoupled by C1018, an electrolytic. The output from pin 6 is DC blocked by C1019 to feed the volume control. C1020 is a DC block to preserve the DC levels in the filter circuitry.

Ah, now the AF filter! Here I will reserve the right not to go too

deeply into the circuit having tried to find a way of describing it without becoming too verbose — and it's just not possible! I think that it is sufficient to say that in the notch mode IC1004*a*, in conjunction with the IC1004*b, c,* and *d* loop, provides an amplifier with unity gain at all frequencies except at resonance; in the peak mode IC 1004*a* does nothing, and the conventional loop filter comprising IC1004*b, c, d* takes over. I have used this filter for years with the 741 but they are much too bulky to be included in this circuit. Instead I have used a Norton amplifier (LM3900), though not quite as the manufacturers intended (that's amateur radio!). The problem was trying to keep the component count down, and allowing proper biasing would have meant a lot of extra components. By running the device at reduced supply voltage (6 volts from Reg 1004) and due to the very low audio level — tens of millivolts — there is no audible distortion.

At this point, a few words on using the filter in notch mode could be useful. At first it will appear that the filter is not working: this is due to the fact that the 'Q' is very high and you're tuning through the tone you wish to reject. The trick is to switch to the peak mode and peak the undesired signal, then switch to the notch mode and adjust the filter tuning to give maximum rejection.

IC1005 serves as the audio output stage, this device developing 1 watt of audio into 8 ohms with a 12 volt supply. C1023 is the input coupling capacitor, valued at 0.1 μF. A word here about these low value audio coupling capacitors: we are used to using in audio circuits values of 1 to 10 μF for audio coupling, but in these instances the impedances are high. Considering C1023, for example, the output impedance of IC1004*a* or IC1004*b* (depending on the filter mode) is low, in the region of 500 ohms or so, the input impedance of IC1005 is very high — in excess of 100K at a guess. Now, the reactance of a 0.1 μF capacitor at 1 kHz is only about 1.5K ohms, so if you look at the equivalent circuit the amount of signal lost is minimal. The output of IC1005 is on pin 4 — the RFC in the output is for stability and is called for in the application notes; however I have, in the past, left it out and not noted any instability.

## The SSB Generator

The microphone signal is amplified by IC1006, an SL1630. C1026 and C1027 are RF filter capacitors of 0.001 μF; these are

### Table of Values
### Fig. 3

R1001, R1019, R1020 = 220R
R1002, R1005 = 1K8
R1003 = 1K
R1004 = 1M
R1009 = 4K7
R1006, R1010 = 220K
R1008, R1012, R1021, R1024 = 47K
R1011, R1013, R1017, R1018 = 2K7
R1014 = 10K
R1015, R1016 = 470R
R1012, R1025 = 470K
R1023, R1026 = 100R
R1027, R1028 = 33K
C1001 to C1007, C1011, C1033 to C1038, C1040 to C1045 = 0.01 μF d/c
C1008 to C1010, C1013, C1014, C1026, C1027, C1039, C1048 to C1050 = 0.001 μF d/c
C1015, C1016, C1019, C1020, C1023, C1029, C1030, C1032, C1051 = 0.1 μF, C280
C1017 = 220 pF d/c
C1018, C1031 = 1 μF, 16v. elec.
C1021, C1022 = 0.033 μF, C280
C1024 = 10 μF, 16v. elec.
C1012, C1025 = 100 μF, 16v. elec.
C1028 = 0.0047 μF, d/c
C1046, C1047 = 400 pF, poly. or disc
Q1001 to Q1004 = BC108 or equiv.
IC1001 = SL6440
IC1002 = SL6700
IC1003 = 741
IC1004 = LM3900
IC1005 = ULN2283
IC1006 = SL1630
IC1007 = SL1640
IC1008 = SL610
Reg 1001, 1003 = 78L08
Reg 1002 = 78L05
Reg 1004, 1005 = 78L06
FL1001 = CFS455/LFD 2, *Ambit*
CR1001 = CRM460A, *Ambit* 16-46073
CR1002 = CRM455, *Ambit* 16-45573
T1001 = *Toko* YHCS11100, or *Ambit* 35-11000
RV1001, 1002 = 4K7 min. horizontal preset
VR1001 = GM70R, 25K dual, *48-25315*
VR1002 = VM10, 50K lin., *48-50313*
VR1003 = VM10, 50K log, *48-50314*
VC1001, 1002 = 9-50 pF, *06-50003*
RFC1001 = 1mH
RFC1002 = 33 μH
S1001 = 4-pole, 3-way

**Note:** all resistors are ¼-watt; semiconductors and presets available from *Ambit International.*

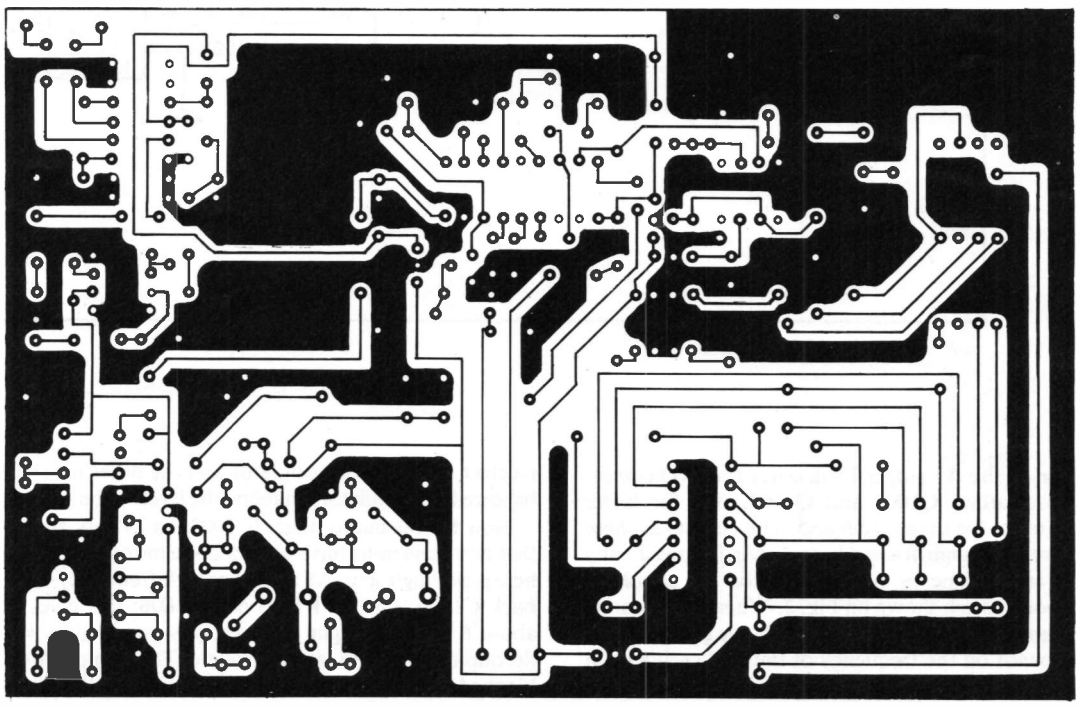


Fig. 4 WHITFIELD PCB — TRACK SIDE

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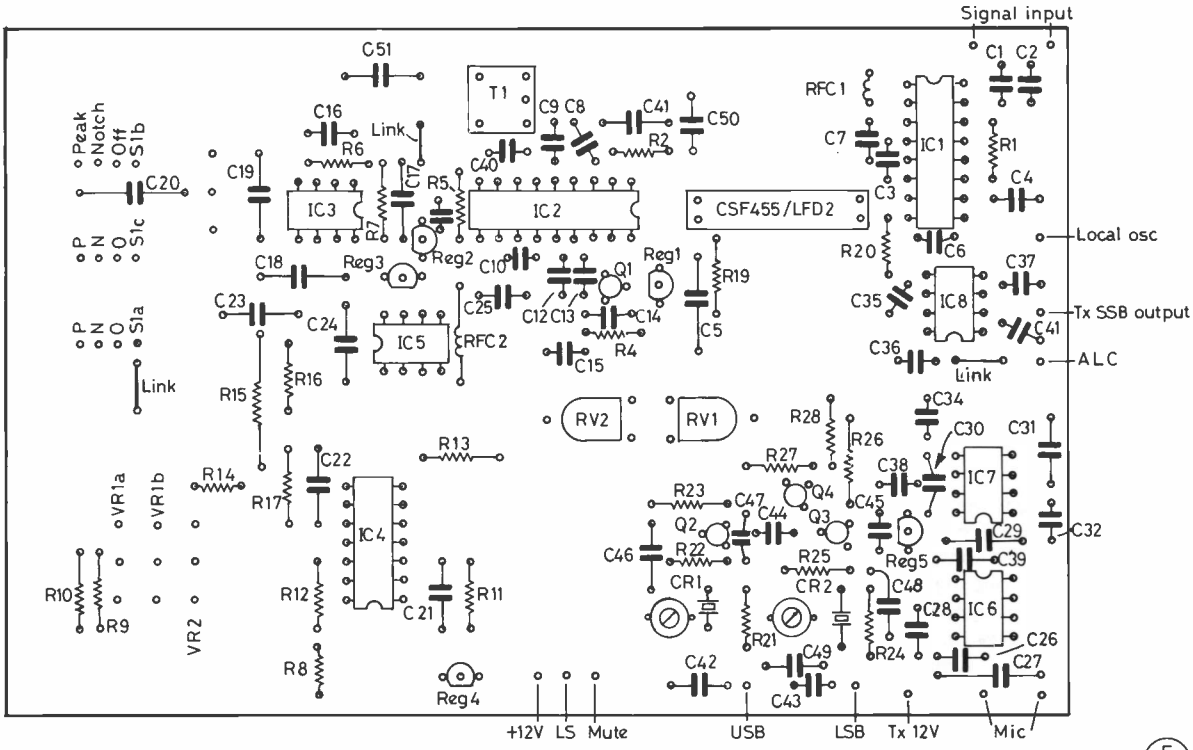



Fig. 5 WHITFIELD PCB COMPONENT LAYOUT

sufficient to keep RF problems to a minimum, providing that screened leads are used for the microphone. There is only one external component of note associated with this device, and that is C1028 which sets the roll-off frequency of the amplifier; I have it set at about 5 kHz. C1030 decouples the incoming 12 volts on Tx supply, and C1029 is a 1 $\mu$F capacitor for DC blocking to couple the amplified audio signal to the balanced modulator, IC1007. No external balancing of the carrier signal is required as the device itself provides over 20dB; that combined with the 20dB or so of the filter is quite sufficient. C1031 and C1032 are decoupling capacitors for the internal bases of the balanced modulator, and as there are both audio and radio frequencies present I have used values of 1 $\mu$F and 0.01 $\mu$F to cover the whole spectrum; the internal inductance of the 1 $\mu$F capacitor would not enable it to be an efficient decoupler at RF.

IC1007, an SL1640, has internal output load and so C1034 is used for DC blocking. R1019 reduces the loading effect of the output of the balanced modulator on the modulator in the filter circuit, so losing gain in the receiver; R1020 serves the same purpose but is not so important. The reason for this is that the input impedance of IC1008, an SL1610, is relatively high and so the loading effect is minimal. The SL1610 is a wideband RF amplifier with a gain of 10dB and is interchangeable with the SL1611 and SL1612, which have gains of 20dB and 34dB respectively; thus if there is insufficient gain it is possible to replace this IC to compensate for losses. Pin 7 on this device is for AGC purposes and is brought to the board edge in case it is required or ALC at a later date. The SSB output signal of 455 kHz has an amplitude of about 200mV, sufficient to drive the Tx mixer. With that, the description of this PCB is ended!

## PCB Construction Notes

The PCB foil side is given in Fig. 4, and the component side in Fig. 5. The PCB uses double-sided board, the top side for the groundplane and the underside for the interconnections. Actually, with careful drawing, it is possible to get all the earth connections on the underside, but it is tight and not really necessary. One point to note is that prior to putting any components on the board at least one interconnection from top to bottom for each groundplane island should be drilled and soldered to prevent any problems of DC continuity later on.

The board should be cleaned using an abrasive — I find that one of those green pan scrubbers is ideal — then washed in hot water and dried thoroughly. The board is then placed under Fig. 5 and, using a sharp point such as a scribe, all the holes are marked. Drill the holes with a 0.8mm. drill and remove the burrs with fine emery paper; this makes marking the pads with the pen very simple. Carefully draw all the tracks, and if mistakes are made use an ink-rubber to remove the fault before re-drawing.

Finally, using the pen, fill-in as much groundplane as possible. To save painting the top side of the copper PCB float it in ferrite chloride; however this is an optional idea as it really only saves a few minutes painting. Next take a 3/16th drill and clean the copper away on the top side of the PCB around the holes that take the component wires to the tracks — not those to the groundplane. After completing and testing the PCB these earth points are soldered on both sides of the board.

*to be continued*

# REPEATER SHIFT FOR THE ICOM ICB1050 AFTER CONVERSION TO 10-METRE OPERATION

P. OSBORNE, G4RPF

HAVING modified the Icom ICB1050 CB rig as per G3XSE's instructions (*S.W.M.* February 1983), the pleasures of 10 metre FM contacts soon revealed themselves.

There was, however, one slight problem; many contacts could be heard being made through repeaters on 29.62 MHz and 29.64 MHz (channels 27 and 29 for those of you without calculator brains). At times these signals registered end-stop on the converted rig, which considering the set is slightly deaf anyway thrilled me to bits. (Note the *ex*-G8 enthusiasm). After enquiring as to the input frequencies of these marvellous boxes and being told that they lie 100 kHz lower than the output, I proceeded to play with 'XSE's patented wrist action. Basically this involves whipping the channel selector down 10 channels from the repeater output, transmitting, and then returning to the output again to receive. This is a super method for the first few overs but does cause the wrist to become somewhat limp and in need of refreshment (not by the famous lager as this causes channel inaccuracies to creep in and creates more limpness in other parts).

## It's Got to be Easier

There just had to be an easier way of getting repeater shift apart from obtaining another converted CB rig (must remember to wash my mouth out with best bitter).

In fact three alternatives exist. The first is to obtain an assistant, a young lady if you like, to flash through the channels. This could prove more costly than the other two alternatives as a training session is required and possibly a bit of buttering-up/persuasion (a meal or a pint) and then some tipping afterwards. The second method is to go the whole hog and fork out for a mixer crystal to be switched in for the transmitter repeater frequency shift, *i.e.* a 16.86125 MHz crystal. This may cost over £6 (anything over £1 is out with me) and involves a hell of a wait. Finally there is the logical approach achieved by subtracting or adding 100 kHz (10 channels)on the synthesiser address lines. This should work out the cheapest.

As it is binary coding we are working with, the shift of 100 kHz (10 channels) is easier to add than subtract from the original address, although I did try to find ways round this as a means of imitating the standard method of selecting the repeater output and shifting down from that to transmit.

Original ideas used a handful of resistors, diodes, 4011 and 40106 integrated circuits, which were cheap if not to be found in a junk box. These ideas all failed to pass the final theoretical check before putting solder, components and board together.

On the verge of giving up the idea of solving the problem logically and shelling out for the crystal instead, I made a final dive into a large CMOS data book in which I tumbled upon the solution — a four-bit full adder. This chip combined with previous ideas produced the circuit shown in Fig. 1.

## Circuit Description

Fortunately, whilst the microphone incorporates the four-wire system which many CB sets use, such that without the microphone the audio output is muted, the ICB1050 only uses three of these wires (*i.e.* mic., PTT and ground). The fourth wire is grounded during receive-only, is not used, and lent itself nicely to the modification. An additional switch had to be added to this line, though, because otherwise the repeater shift cannot be switched out. We will deal with this part of the modification later.

When the repeater shift mode is selected the base of TR1 is held low in receive. This causes the collector to rise to almost 5 volts, hence placing the binary count of 0101 onto pins 15, 6, 4 and 2 in that order. The count of 0101 is in fact 10 when looked at in relation to the full binary code word applied to the synthesiser chip, and as the channel spacing is 10 kHz we have a shift of 10 x 10 kHz = 100 kHz. Therefore, the receiver is listening 100 kHz higher than the channel selected and shown on the channel display.

If we now go to transmit the base of TR1 goes high pulled up by R1. The collector goes low to 0V and now the binary count to be added to the synthesiser address is 0000 (*i.e.* a big fat zero channel adjustment); so the transmitter frequency is that selected and shown on the channel display.

**Table of Values**
**Fig. 1**

R1 = 10K, ¼W 10%
R2 = 47K
R3 to R6 = 100K
TR1 = BC109 or similar
IC1 = CD4001 or MC14001, or equiv.
IC socket = 16-pin DIL
*Also* Veroboard or PCB, as preferred.

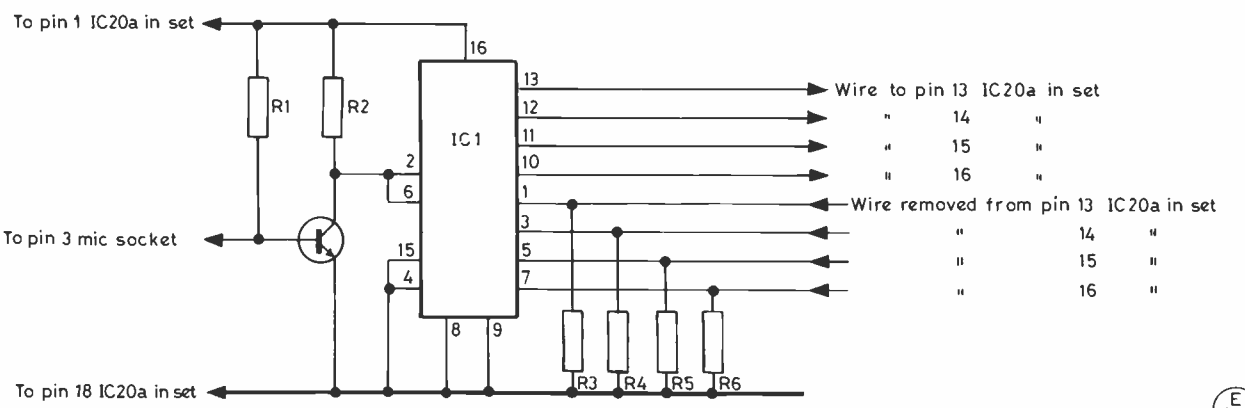
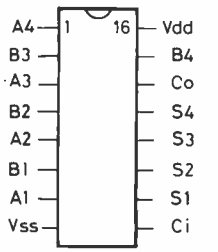


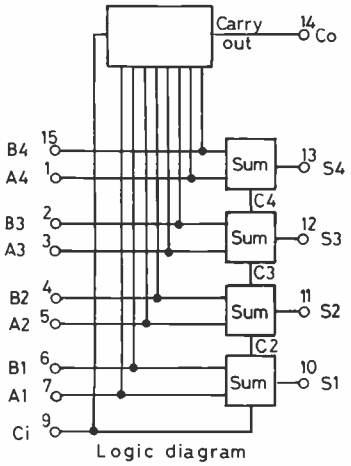

Fig. 1 REPEATER SHIFT BOARD CIRCUIT DIAGRAM

| Ai | Bi | Ci | Co | Sum |
|---|---|---|---|---|
| 0 | 0 | 0 | 0 | 0 |
| 1 | 0 | 0 | 0 | 1 |
| 0 | 1 | 0 | 0 | 1 |
| 1 | 1 | 0 | 1 | 0 |
| 0 | 0 | 1 | 0 | 1 |
| 1 | 0 | 1 | 1 | 0 |
| 0 | 1 | 1 | 1 | 0 |
| 1 | 1 | 1 | 1 | 1 |

Truth table




Terminal assignments




Logic diagram

E 039

Fig.2 LOGIC DETAILS TRUTH TABLE & PIN ASSIGNMENTS

## Construction

The circuit is very simple and components could be easily mounted on a piece of *Veroboard,* as mine were initially. However, there are those of you with the need to have things extra neat on a PCB; the design for the PCB is shown in Fig. 3 and should be easy either to copy photographically or using a good artistic hand and a Dalo pen.

Having obtained your board vero or otherwise remember the construction rates which especially apply to CMOS devices that is, resistors and transistor first, chip last. A chip holder may be a good idea allowing you the ability of gauging the size of board required and where you are going to place components in relation to the chip without actually handling the chip.

## Fitting

Get your rig out and open it up (no — not with a sledge hammer). You will see that pin 3 of the mic. socket has been grounded, along with pin 2. So next lift the wire and the capacitor from pin 3 and transfer them to pin 2. This now leaves pin 3 free for the repeater modification.

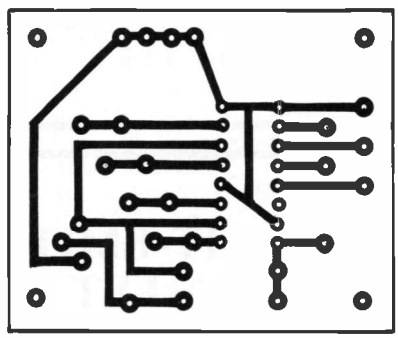
You can now insert your switch in the scheme of things; this can be any single-pole single throw switch which will inhibit ground from pin 3 reaching the repeater shift board. Without this vital item you will not be able to obtain simplex working any more. You can fit the switch anywhere in the line between the microphone and the board. On my set I modified the microphone wiring as shown in Fig. 4 and placed the switch on the back of the microphone, making it easier to use under mobile conditions. Alternatively, the switch can be placed inside the set between the mic. socket and the repeater shift board. There just so happens to be a hole spare on the front backing panel, in line with the power switch, so the front panel could be drilled and the switch fitted there. Someone suggested that the Hi-Lo power switch itself could be used, providing you don't require that option. (Good idea, huh!)

Now you are ready to fit your board. Start by removing the wires from pins 13, 14, 15 and 16 on the synthesiser chip (IC 20A in the manual). Place these into the holes or onto the pins of your board (make sure they are in the correct order as per Fig. 1).

You're on the final leg now. Take your replacement wires and put them into the holes where you ripped the others out. The power supply leads need to be taken behind the board and soldered to pins 1 and 18 on the track side of the board. The wire to pin 3 does just that, although you may want to insert your switch at this point as previously discussed.

Now it's your turn to do a little bit of thinking. Where are you going to put this board? Three suggestions (apart from in the set) are:—

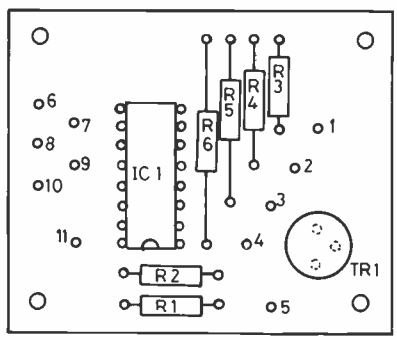
*(1)* Use some good insulating material and twin-stick tape to adhere the board to the inside of the speaker-lid cover.



E 40a

Fig. 3(a) PCB-COPPER SIDE (Full size)

E 40b




| PCB PIN OUTS | |
|---|---|
| 1 | Wire removed from pin 16 IC20a in set |
| 2 | " " " pin 15 " " |
| 3 | " " " pin 14 " " |
| 4 | " " " pin 13 " " |
| 5 | Wire from pin 3 mic socket |
| 6 | Wire to pin 18 IC20a track side |
| 7 | " pin 16 " |
| 8 | " pin 15 " |
| 9 | " pin 14 " |
| 10 | " pin 13 " |
| 11 | " pin 1 " track side |

Fig. 3(b) PCB COMPONENT SIDE AND PIN OUTS

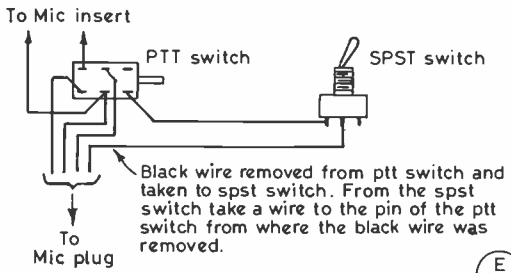



Fig. 4 MODIFICATION TO MICROPHONE

*(2)* Mount the board using standoffs and screws to the speaker-lid cover.

*(3)* Glue the board (if it's small enough) to the main PCB near to the 'S' meter.

Before your take up any mounting option check the board for solder bridges because you won't be pleased to get the unit together and find it doesn't work, or, worse, you've done the synthesiser chip a mischief.

## Testing and Operation

With your super repeater shift board embodied in the set you can switch on. (Tune your nose for maximum sensitivity — no smoke? — good.) If you have a friend (some people haven't, you know) with a 10m. FM set get him to put a carrier up on 29.6 MHz (*i.e.* channel 25). Check you can hear it on channel 25. Now switch in the repeater shift and re-dial to channel 15; you should be able to hear the carrier, because you're listening to channel 25 really (amazing!). Still on channel 15, press the PTT (caution: a dummy load is necessary) and get someone to monitor for you on channel 15.

These tests are conclusive proof that your repeater shift will work on demand — so go get 'em! Your set is now worth approximately £1.00 more and can do almost anything the purpose-built 10 metre FM sets can do. OK, so it's not too brilliant on receive and the channels are limited but if you're a broke G4 like me it's a super way of getting started on 10 metres FM.

Finally, I would like to thank G3XSE for his bent ear and explanations.

# THE LIGHT-EMITTING GaAsFET

## A LOOK AT AN IMPORTANT BRITISH DEVELOPMENT

**JOHN WILKINSON, G4HGT**

## Introduction

SEMICONDUCTOR technology is moving at a fast pace — sometimes advances are made but their applications are not developed fully. The light-emitting GaAsFET, developed by *Silliconex Ltd.*, is one such specimen. By combining the high gain-bandwidth product of the GaAsFET with the usefulness of a light-emitting diode on the same chip, a multiplicity of uses can be thought up. It is hoped that this article will encourage the reader to make use of this interesting transistor. First, let us take a look at the two devices separately before describing the finished product.

## The Light-Emitting Diode

A light-emitting diode consists of a forward-biased *p-n* junction. Within the structure, close to the junction, holes and electrons will be recombining, that is, the energy possessed by unbound free electrons will be transferred to another state. This results in the emission of the excess energy, usually as heat but occasionally as photons. The percentage of energy emitted as light depends on the material used; for silicon and germanium junctions the amount is insignificant but gallium arsenide based devices produce considerable amounts of visible radiation.

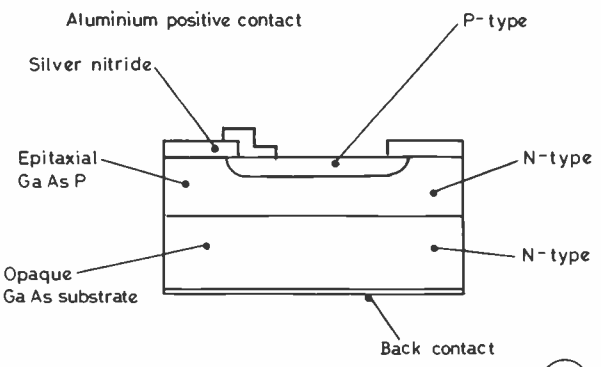



Fig. 1 LIGHT EMITTING DIODE (Cross section)

Gallium arsenide (GaAs) has a bandgap of 1.45eV (electron-volts) which results in radiation at about 850nm, in the infra-red region. By adding phosphorus, to produce gallium arsenide phosphide (GaAsP), the bandgap is increased and the wavelength of the radiated light is reduced. The optimum ration of arsenic to phosphorus is around 60:40 resulting in red light of 650nm wavelength.

Increasing the proportion of phosphorus further results in a reduction in light intensity but fortunately the human eye is more sensitive to green than red light so the reduction in light emission is countered by an increase in eye sensitivity. Gallium phosphide (GaP) produces green light while using nitrogen as an extra dopant (GaAsP.N) results in orange radiation.

The construction of an LED is shown in Fig. 1. The GaAsP layer is grown by vapour phase epitaxy as an *n*-type layer on a single crystal GaAs substrate. The light emitting areas are defined by the deposition of a silver nitride layer into which windows are etched by conventional photolithographic techniques; diffusion from zinc vapour produces *p*-type regions limited by the windows in the nitride layer. Aluminium contacts are then added by evaporation and power can be applied. Light is emitted through the thin (1-2μm) *p*-type region. To maximise the amount of light passing out of the window a substrate of GaP may be used and in this situation a reflective back contact increases light output.

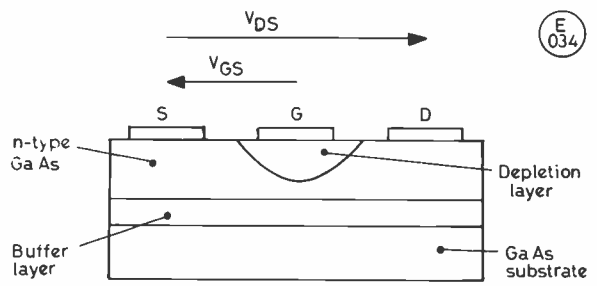



Fig. 2 Ga As MESFET (Cross section)

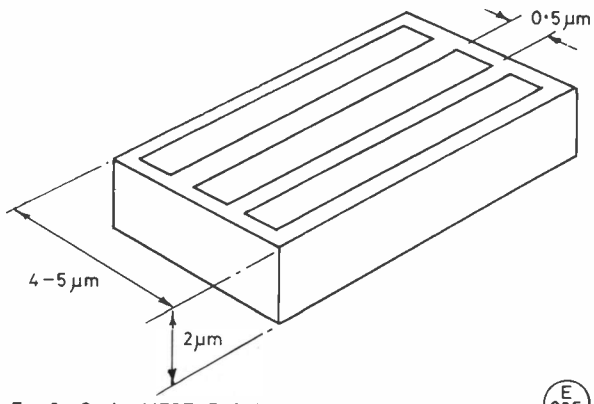



Fig. 3 GaAs MESFET Chip dimensions

## The GaAs MESFET

Most microwave FETs are constructed on GaAs instead of silicon due to the former's higher electron bulk mobility and greater maximum electron drift velocity. The GaAs MESFET is easier to fabricate for microwave use due to its simpler construction.

The structure of a MESFET is shown in Figs. 2 and 3. The GaAs substrate is produced by doping pure GaAs with chromium. An intermediate semi-insulating buffer layer can be grown onto the substrate; this will give improvements in noise and gain performance. Then a very thin ($\simeq$1μm) *n*-type layer (GaAs doped with either sulphur or tin) is grown onto the buffer layer using vapour or liquid phase epitaxy.

The source and drain areas are formed on the surface of the *n*-type layer and sintered to form low resistance ohmic contacts. The gate control electrode is a MEtal-to-Semiconductor (hence MESFET) contact onto the *n*-type layer. For optimum microwave performance the source-gate spacing and the gate length should be small, and using standard photolithography a gate length of 0.5μm can be achieved.

Electrons flow from the source to the drain through the thin *n*-type layer when a positive drain to source voltage $V_{DS}$ is applied. With the gate shorted to the source ($V_{GS} = 0$) and a small $V_{DS}$ applied, a depletion layer is formed restricting the electron flow. For small values of $V_{DS}$ the *n*-type layer will act as a linear resistor; as $V_{DS}$ is increased, the critical electric field is reached and the electron flow starts to saturate. When $V_{GS}$ is made negative enough, the depletion layer reaches the semi-insulating substrate and device is cut off. This is summarised in Fig. 4.

## Combination of the Devices

It can be seen by comparison of Figs. 1 and 2 that the LED and GaAsFET are very similar in construction. This has led to the production of a four terminal device, the Gallium Arsenide Fet Incorporating Extra Light-emitting Diode (or GaAs FIELD), Fig. 5. The light-emitting junction is positioned between the gate and drain terminals of the transistor and the LED is forward biased by application of a positive voltage $V_{LS}$. The chip size must be made larger to accommodate the LED and this has a detrimental effect on performance at high frequencies.

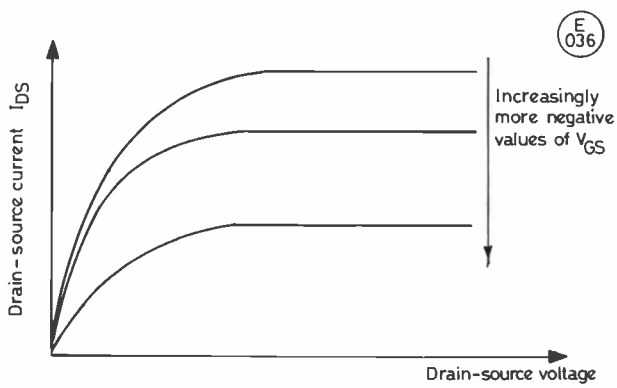



Fig. 4 I-V CHARACTERISTICS OF A GaAs MESFET

The principle of operation can be considered in three ways:

*(a)* $V_{DS}$ applied; $V_{LS}$ = 0V.

The device behaves exactly as a GaAsFET with the LED section reverse biased, hence inoperative.

*(b)* $V_{LS}$ applied; $V_{DS}$ = 0V.

In this situation the LED will operate with the gate terminal voltage $V_{GS}$ controlling the current and hence brightness of the LED. Since the input impedance at the gate terminal is very high ($\simeq$100M at DC, reducing at UHF), control of the light source is achieved by voltage variation only, *i.e.* little current is taken from the driving source so the resultant power gain is very high.

*(c)* $V_{LS}$ and $V_{DS}$ applied.

The performance of the device is determined by the difference between the voltages $V_{LS}$ and $V_{DS}$. The device will amplify as normal but the intensity of the light output will depend on the level of the input signal. For a fixed $V_{LS}$, increasing the current flow $I_{DS}$ by means of $V_{DS}$ will cause the voltage drop across the *n*-type region to increase so eventually the *p-n* junction will become forward biased, causing light to be emitted. In this way the switch-on point of the LED can be selected by choosing the correct values of $V_{GS}$, $V_{DS}$ and $V_{LS}$.

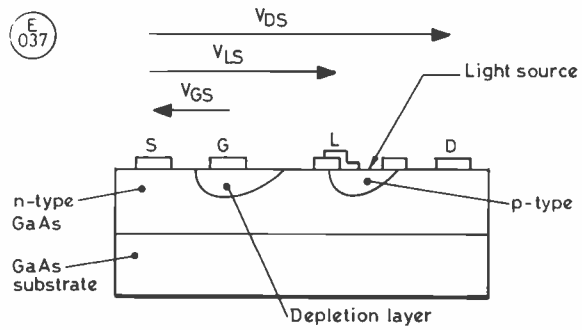



Fig. 5 CROSS SECTION OF LIGHT EMITTING GaAs FET CHIP

## Applications

*Flashing Light Multivibrator.* The light emitting GaAsFET can be used to reduce the component count in toys, etc. The transistors and indicator bulbs in an astable multivibrator can be completely replaced by the new device which is mounted on the front panel of the equipment in a similar manner to conventional LEDs.

*Audio Amplifiers.* Although not really suited for audio purposes, using the new device in the preamplifier/tone-control circuits of an audio amplifier can produce a primitive sound-to-light convertor. As explained earlier, changes in doping levels can change the colour of the emitted light. Thus using different transistors in the bass and treble circuitry will give the desired effect. It is thought that *Mullard Ltd.* used a similar technique on their early germanium transistors marked with red and white spots.

*Receivers and Transmitters.* By using the principles outlined in an earlier section, a signal strength meter can be incorporated in the preamplifier of any amateur receiver. Since the switch-on voltage $V_{LSmin}$ is usually measured in millivolts, only stations using high power will be detected. From path loss and antenna gain calculations, stations running above 10kW e.r.p. (400W and 14dB antennas) should be detectable up to half a mile away on a dipole. This approach has been used in a design which is published in this month's issue of the German magazine *Dubious.*

# COMMUNICATION and DX NEWS

E. P. Essery, G3KFE

DURING the last month, the highlight has been the pleasure of finding *both* ends of my aerial halyard at ground level, thanks to number one son who clambered up aloft to recover it; in other words, I have to admit to rather a low in activity since last putting pen to paper for this column.

Sunspots and things, too, haven't been all that encouraging, though as this comes to be written there are the first signs of the spring 'lift' about, albeit the forecast for the immediate future as to conditions is one of unremitting gloom!

Another hazard we have now to cope with is the mad sweep of the infernal video-tape recorder, as mentioned elsewhere in last month's issue. Yet another design from the drawing-board of Satan, specially arranged to receive TVI from radio amateurs — as if we save up TVI to throw at the poor thing. There are hundreds of thousands of them now, all with this marvellous bit of design which says that when they are switched off the TV aerial is connected to the TV by way of the videocorder; and they have a little amplifier in the VTR to help the signal struggle through as far as the TV set. . . . Has anyone got a proof-tested blunderbuss with full instructions?

## Ten Metres

Still, thank Heaven, has its devotees. G2ADZ (Chessington) wrote a nice letter with some DX and beacon reports, and wondered what had become of his old friends G2XC and G5BY. Both we know to be still about, so perhaps they might drop a line to your scribe who will pass on messages as required. Turning to Bill's DX, and here he notes the band opening up at the 'wrong' times. He managed 9J2TS, XT2BG, CP4FI, FM7CY, VP2EAA, TT8AD, DL1JW/HP1, and various ZSs. Gotaways included VS6BQ, 5Z4CQ/KA7KSY, N0ZO/DU2, VU2VZ, and various A4s. Among the odd signs noted were TO3NJ, EW2A, and L8D/X. EW2A was clearly Russian, around the Minsk area, the L8D/X was another manifestation of the Argentines, but what the TO3 was we don't know.

G3NOF (Yeovil) is back in action after several months of QRT due to ill health, and even now can only have afternoon and early-evening sessions. Nice to have you back again Don, patchy conditions you report notwithstanding! On a few days the North Americans appeared, but often the band was totally dead. G3NOF QSO'ed with East Coast W/VE, FG7BT, N8NCJ/8P6, VP2EAA and 9K2BE.

Voices out of the past next; this one is GD3OOK (Baldrine) who last reported as GM3OOK, and 9V1RS back in the early 'seventies. John uses an elderly and much modified FT-101 Mk.I. On the aerial front there are dipoles for 80 and 40m. on the same feedline, while the 20-metre radiator is the thirty-foot mast which holds-up the 'Vees', fed of course through a simple ATU. As far as Ten goes — not John's main band it must be said — there were CW QSOs with SV3RF and UL7NCL.

G4LDS (Chelmsford) seems to have mended his rig almost beyond repair — it now refuses to operate unless the *shack* is well warmed-up. Who should complain of that? Conditions were found to be pretty patchy, but G4LDS managed SSB to WB2MNO, WA3GXI, EA8UX, KE4FJ, KB4XK, UA6AAZ, KQ2V, N8CQA, VP5WJR (QSL to KA5BPE), WD0CQA (N. Dakota), K4NUQ, W6LHI, VU2AID, VU2AIG, VE3YY and VE3MAP.

Up in the Borders GM4CXP found himself with an aerial trying its hardest to 'improve the take-off' in a gale — with of course the inevitable result! On a different note, GM4CXP heard G4CG putting in an Auroral signal while working OH1MY who was also audible at 559 — and clearly not Auroral. GM4CXP then worked OH1MY himself, plus LA2CBA, and SM4DLS, the latter on SSB, all with no trace of *Ar*.

Turning from GM to GW, we have a report from GW4OFQ (Carmarthen) who is still without his linear, but managing. The G5RV aerial has been persuaded to rise to 55 feet, and first impressions are of improved signals. Sad to say, Roger has to work nights which is a bit of a bind for an LF addict — but, hopefully, we can tell him what he's missing! On Ten he didn't miss with SSB to J28DP, PZ1CC, G4AVW/ST3, YC2HV, FG7AA, 9K2BE, A4XCB, N8DCJ/8P6, CP6EL, and WP4ATF, all in the bracket between morning tea and a late-finishing lunch.

Our last report on the 28 MHz scene seems to be the Sage of Knutsford, G4HZW. Tony missed out last time as he was 'away working in Southern G' — sounds as if he had to tote a six-shooter! The TS-820, 'Quad and 28 MHz band didn't get on all that well this month, as there was not a lot of DX about. Interestingly enough, this year, as last, the band made its first try at a (Spring) opening on February 26. This year it was W6/W7, but last year a little better, while the mid-February event of 1981 occurred earlier and yielded KH6 and KL7 with the old FT-75! Anyway, this is the list, mostly SSB but the odd one on CW: 5H3TM, 8Q7AZ, 9J2DS, A4XCB, A22DC, A92DQ, FB8ZP (Amsterdam Is.), UA9s, RL7GFF, RL7GFD, UL7NCM, UI8LBB, UK8JBH, UA0AHV, RA0SFI,UK0WAJ, VK3PGA, VK6AZP, VK6IH, VU2GI, VU2JXO, G4AVW/ST3, all W call areas including WA6SOV, who was RS57 with his three watts, ZS3CP, ZS6BWX, with VK0JS as the Gotaway of Cycle 21! Summing up, an appreciably poorer lot than last year with no JAs or ZLs to note at all.

## Top Band

A notable and welcome revival of interest in this band, but still no sign of W1BB. Does anyone have any news?

G3BDQ (Guestling) has been concentrating on the band of late, and is amazed to find just how many times VK6HD has appeared in his Top Band log; but, as John says, he has everything going for him in that direction, as his QTH boasts a clear run down to the sea with nothing at all in the way. Otherwise, John keyed with UT5AB, UB5NAR, OE1JNB, ZB2EO, 4X4NJ raised at 2015 and 599 both ways on February 22, and various other European Russians.

Turning to G4BUE (Upper Beeding), Chris put up a set of four slopers — the quarter-wave variety — but was not able to come to any firm conclusions about them; all were cut to exactly the same size but the VSWR on each varied quite considerably, and discussion with G3FXB, and re-reading W6SAI's article hasn't cleared up the puzzle. However, this is not to say you can't work things with them! Tests against a quarter-wave sloper and an inverted-V, or just shunt feeding the tower, always brought the sloper out as best. The score with the slopers to date is some 53 countries; in just four weeks the following CW QSOs were made: VE1BVL, EA9EO, UG6BGD, RF6FFW, FC9VN, ZB2EO, 4X4NJ, HH2VP, KV4FZ, EA6JD, W1, W2, W3, W4, W8, EA8QO, 4U1ITU, UM8MAZ, UD6DKW, NP4A, RA9AKM, TF3KG, EA6JD, and all the usual EU prefixes.

VK5AIM (Elizabeth Downs, S. Australia) writes with some news of the VK LF-band scene. He mentions Harry, VK3XI, at 78 a good signal on the bands, until he lost the lot, including his home, in the disastrous fires that swept the area recently. As for the bands, we have it from VK5AIM that they now have 1.8-1.825 MHz as primary users, with 1.825-1.875

MHz shared as secondary users and the requirement to avoid 1.870 MHz, ±4 kHz.

G2HKU (Sheppey) hasn't been 100% fit of late and so his activity has fallen off a little, but he managed SSB with OK1KSO, OH2BNP, PA0PN, GU3HFN, OH1MA, and LX1PD, while CW was used to tackle EK3BI/1, EA6JD, and UT5AB.

G3ZGC/8P6 came on for part of the CQ WW 160m. contest, and noted no other 8P6 stations around before his CQ caused a king-sized pile-up, the more so as the contest had already run for 24 hours. He worked FG7AM, V2AAW, HH2VP, VE3BMV, VE1AXT, and NP4A, plus numerous Ws. A few days later Richard was signing G3ZGC/J6L, and a turn around Top Band yielded absolutely nothing, although there is some weird effect which has it that from Castries, St. Lucia, 80m. may be well open to Europe but nothing whatever will be heard on Top Band — an effect requiring investigation, we suspect!

Nearer to home, we turn to G4AKY (Harlow) who says he has been a little less active due to preparing his talk on Top Band DX for the Bishops Stortford club. However, Dave still manages to get on, and his log includes VE1BVL, UH8DC (at which time YB5AES was just audible, peaking at 2240z), UD6DKW, NP4A, KV4FZ, EZ9MAZ (followed by a hearing of NA5R in Texas), W1FC, HH2VP, V2AAW, EA9KQ, UL7BAK, VE1BVL again, GI4ONL, WA2SPL, KA1PE, N4IN, N4SU, W1JBW, W2KFG, W1HND, W2FJ, W2QD, OK1HBT, UA9CBO, UL7NCL, GU3HFN, GD4BEG, VE1BVL again, K2GNC, 3V8AA, HB9AQS all worked with the G4AKY QRP rig, EI1DA, and of course the usual Gs and EUs.

## Eighty

Here we start with G3ZPF (Dudley) who says he has been surgically separated from his Apple-2 micro, albeit the wound was well staunched with folding money . . . David's brother has gone out now for a BBC micro and colour monitor, and he notes sourly that although the blurb says it has been "designed to keep RFI down" it still has S9 burbles at HF whenever it is in use; hence the sudden interest in a change of QTH! Digging around on Eighty CW did manage to turn up 4U1ITU and SV0BS, and it was a surprise to find both were in the 'wanted' list!

Our most consistent reporter on Eighty is G2NJ (Peterborough) who also keeps his eye on what goes on in the QRP world. This month he has a mention for G2CNN/A who was operating from Ongar earlier in the month; before he left there to return home to Norfolk he was already planning /A trips to Thame and Royston. Nick also mentions three fine QSOs with G4GIQ, Northwich, who was using his new one-watt transmitter; another station at the one watt level was G4OPE in Birmingham. G4EIM/P was worked from a platform on the German Bight, and was to return to Hull on February 16. As for Maritimes, LZ1JK/MM was about late on February 21; he worked YU3DAA but conditions were very bad and he disappeared in the static.

Turning to GD3OOK, we find John looks at all bands, although his favourite is undoubtedly 7 MHz. As far as Eighty goes, the tab was LA9PCA/OY and 7X4AN, both of course on CW. John endorses G2ADZ's words on lists, and mentions the USSR DX Net on 3640 kHz. While the net-control wasn't actually passing reports not copied, he was endeavouring to explain to a recipient that he had it wrong and in which direction his guessing should go! Another abuse creeping in of late years is the widespread idea of 'buying' a QSL; while John was at 9V1RS he often got dollar bills, s.a.e's and so on, asking for QSLs for QSO's *which just didn't exist,* or from stations who were worked on 7 MHz and wrote asking for a QSL for 3.5 MHz as well! John says he feels sure that while most DX stations are aware of the practice, those without managers and snowed under with QSLs could easily make a mistake and send out a QSL for a dud contact.

Eighty for GW4OFQ included such as F5RV/FC, KR2N, KM1R, VK6HD, 7X4AN, K1PT, K1HDO, K2BT, VE1DX, NP4AT, CN8AR, HH5CB, HI8GB, HK3YH, HP3FL, PY8ZWM, KP2G, OY6FRA, LA9PCA/OY, PZ1DH, and 9Y4NP.

Turning to GM4CXP, Derrick was amazed to hear PA0GG one afternoon on fifty milliwatts, RST429 rising in fifteen minutes to a peak of RST539. He seemed not, sadly, to be listening for calls back, as neither GM4CXP nor a PA who called were able to attract his attention; but Derrick's own one watt from a quickly wound-down FT-101B was certainly getting out as he was promptly the recipient of a report from G4RAR up in Derbyshire. However, Derrick says he feels that winding his '101 down in this way is slightly undignified and so he is setting to work to build a QRP transmitter for himself.

Now over to G3ZGC in the Caribbean. Richard was in J6L and says there is a strong Caribbean group around 3797 kHz with KP4DEX/V2A and J6LCV as the leaders. They often get perfect copy of European stations but have the very devil of a job to raise any, despite numerous calls — it may in fact be the European QRM that is upsetting things, although midnight is late enough for much of the casual EU operators to have gone to bed.

Just one QSO mentioned by G2HKU, namely the CW one to JA3SVG/MM, location of the ship not mentioned.

## Forty

Much neglected by many of us. However, for those with older rigs there is little doubt that the noise is daunting. G4ITL changed his rig for a TS-830S a couple of weeks ago and has been quite amazed to find just how much more is audible on the new box — his old one just did not have the dynamic range to cope with the band after dark.

GD3OOK took his key and waved it under the noses of the following successfully: CN8CY, EA6EJ, HK3DDD, HZ1AB, J37AE, KL7Y, LX2BQ, OY7ML, TF3YH, VK0JS, K4FW/VP2K, VP9DR, XE10X, YV4DDT, ZL1AZE, ZL2UW, 4Z4DX, 9H1BB, plus JAs some mornings and lots of PYs at night.

The letter from VK5AIM indicates that the VK band is 7.0-7.1 MHz exclusive, but they also have a shared 7.1-7.3 MHz to play with as well. The band, however, is a bit of a Cinderella at night because of the Asiatic signals, but during the day it gets used for local nattering, and of course dawn and dusk see DX opening aplenty. Again the cry arises from VK — "we can call our heads off, but you lot won't answer!"

Final entry for this band comes in from G3BDQ, who found CW worked well to QSO with VK3AHU, UA9COT, VK3VJ, and ZS2AM, the latter at 2000z.

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**"CDXN" deadlines for the next three months:**

May issue—April 7th
June issue—May 5th
July issue—June 2nd

*Please be sure to note these dates.*

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## The New Bands

VK5AIM reports that the VKs have now got their segments at 10, 18 and 24 MHz.

G3BDQ says he tried the band with his TS-530S — for which he has organised himself an outboard VFO to make split-frequency working a mite easier — and worked VK3MR, VK3YD, VK7RY, KV4CI and sundry Ws.

A few CQs from G3ZGC/J8 yielded interesting QSOs, as it appears the other islands in the Windwards group don't yet have the band. CW contacts are noted with G3AAE, G3RFS, G6ZO, G3YYF, G3JFF, G4FBS, GD3LSF, G4GZQ, G3LIK, G5CPL, VE3JPW, G2TA, DJ9GD, GM4KGJ, and G4LNA, all on February 1 and 2.

Finally GM4CXP; Derrick reckons this 'new contraption' was good enough for his CW to raise KA1XN, VE2LI, VE1ASJ,

KV4CI, and DL2GG/Y V5, with the worst report being 559 from YV5-land.

Nothing at all in the way of reports on the other two bands, although we have heard the odd signal ourselves.

## Snippets

By the time this reaches you, chances seem pretty fair that an expedition to Spratly will have come and gone; the calls, we understand will have been 1S1SI and 1S3NG, the former on CW and the latter SSB, starting March 22 or 23 for five days; the QSLs for this one will go to DK9KD.

Later this year or maybe in the early part of 1984, we hear, a DX-pedition to Clipperton is on the cards, with a team of eight FO8s, six Americans and maybe a couple of JAs.

The proposal for a Bangladesh operation seems to have come to nought at the time of writing. 5X5FS, who is on pretty regularly, says *he* has been operational from Uganda for over 30 years!

If you seek Rodrigues, then look out for 3B8DA/3B9, who is due to remain there until the end of May.

The Heard Island DX-peditions both came off, but both were bedevilled by the poor band conditions, and spent the greater part of their time on Twenty or just twiddling their thumbs; however, they still managed to run up a formidable total of QSOs between them. For all the above, acknowledgments to *TDXB*.

From *DXNS*, we see that BY8AA is mostly QRV on weekdays, around 21048 seems a good spot, while BY1PK is active on Saturdays around 21090 kHz and 0700z.

That Bangladesh operation mentioned earlier didn't quite come to nought — JA8MWU managed about two hours and thirty QSOs before 'army interference' caused him to have to give it best; at the time of writing he is on from 8Q7JA and says he hopes to return to S2 next year.

9U5 now has N4HX as the U.S. Ambassador — he is ex /TT and TYA11 — and he hopes to get something set up in the line of a callsign.

One of those who laughed at the *Panorama* bit about the high-technology drain to USSR was G3ZPF. David notes that one of the items seriously being said to be pirated was the good old 7400 IC; a quick calculation suggests getting half-a-million pounds worth from *J. Birkett*, a £200 air fair to Moscow, flogging them for say five million, then home for a ten-year stretch. Out in five years for good behaviour . . . it seems like a good deal!

We were right about the SP's being let off the hook to work Heard Is; G3ZGC worked SP9PT, the latter enquiring after the whereabouts on the band of the Heard pile-ups.

Despite his recent illness, G3NOF managed to latch on to VK0JS for country no. 340 — congratulations.

G4LDS has some strong words to say about some of the SWL cards he is getting in through the Bureau; just a signal report, no indication of band, or of QSB, QRM, or QSN. He mentions a G SWL, who reported in such a manner when Chris was in the middle of a mini-pile-up of JAs! Some of them never learn — until they get on the air and have to look at SWL cards of similar value!

G4BUE is up to 301C, with an assist from FB8ZQ, LU3ZI and a VK0 for the last three; the first-named was very sharp with the card which Chris received in the week following. Changing tack to QRP, G4BUE offers his 'Ears of the Month' award to K6DDO for hearing his 100 mW signal on 21 MHz; this means Chris has now worked 26 States for a WAS with 100 mW or less of RF.

GD3OOK says he is temporarily land-based as the tanker he served on for the previous six months didn't lift a single cargo of oil — eventually the owners just took half their fleet off the market, which means John may be looking at an "extended period of leave!"

Now W1WY's Contest Calendar. The ARCI QRP Spring Contest is over the weekend April 23-24. No doubt all the details are available from the QRP Club — try G4BUE. Logs to be received by May 21, to WA2JOC, 230 Mill Street, Danville, PA 17821, USA.

We have already mentioned the CQ WW WPX Contest SSB leg over the weekend March 26-27, and it now falls to speak of the CW leg; this is on the weekend May 28-29 and follows the same rules. Logs to *CW Magazine*, WPX contest to be postmarked no later than May 10 for the SSB leg, and July 10 for the CW leg, the address being 76 N. Broadway, Hicksville NY 11801, USA.

We have an airmail letter to hand from D. Anderson, ZD8DA, on Ascension. He says that he and ZD8MF are now QRT from Ascension, and they wish to thank all those who gave them such interesting QSOs; QSL cards are now 'in the works' for despatch as fast as they can manage. They add that ZD8FX is the current operator on the island, and is operational on 7-28 MHz.

## Twenty

GW4OFQ comes in at this point, to report on things in the afternoons, with the newly raised G5RV; it made SSB contacts with ZC4GO, FC6HUP, 3B8FE, 5H3YL, 7X2CK, TU2CJ, 3V8AA, and 7P8CI.

G3ZGC/8P6 made just one QSO of interest on this band, which was CQ3BX, a 'special' in Madeira.

G3NOF mentions hearing VK0HI on in the early evenings, but didn't raise him. However, the 'NOF touch is not gone, as he worked SSB to FB8WH, J39BS, VE7CGD, VE7DX, VK0JS for the 340th country, XO2JCG, and 4X6GS.

Twenty is clearly not the favourite band for G4LDS, but like most of us if you want the DX you have to use it sometimes! This meant SSB contacts with VE3FED, VE3LJX, Europeans, EK9C/0, F8HB/EA6, HV3SJ, KA8JHD, W9SFZ, and W2RWE.

The only 14 MHz activity noted by G4BUE was his CW QSO with VK0CW.

GD3OOK used CW to contact FK8CE, FY7BO, KL7GNP, TA2BO, VKs and WL7E.

Coming to the G2HKU report, on SSB it was just the ZL skeds with ZL3FV, and ZL3RS, while a switch to CW came up with UA9CQS, JA6GU, HL4XM, FY7YE, G6ZY/EA6, 9H1CH, SV0AA, FO8FW, and VK3XB.

The band for G3BDQ was a matter of VKs on CW, plus SSB contacts with 6Y5IC, JW4GN (Bear Island) around 2000z and 14190 kHz.

## Fifteen

Last over before stumps are drawn for this month!

G3ZGC/J8 was the magnet that, as already mentioned, resulted in a call from SP9PT looking for the VK0s, and another contact that same session was with T42AMC, a special from Cuba.

"Patchy but not completely dead" says G3NOF, who proves it by working North Americans as early as 1230 and as late as 2130z. The Middle East was often in evidence around 1700 GMT, and SSB contacts were made with A92Z, K7MX, KW7Y, LU5ZI (S. Shetlands), VE5HP, VE7EYI, VQ9CI, YN5JAR, W6RTN, W6RU, W6XH, XO2JCG (Canadian Winter Games station), ZS2RJ and 5Z4WL.

Fifteen for G4LDS was SSB with 3B8FK, 9U5JM,TF5GW, WB6DEU, and K8IYD.

Most of the G4BUE activity on 21 MHz was CW, in between playing with aerials and work. It took the QRO rig to raise FB8ZQ, and also K4FW/VP2K and ON6BC/C9.

For GD3OOK it was CW all the way and on 21 MHz this mode netted him KC7UU/5N6, LA8UX/OD5, LU3ZI, SV2QR, and 5Z4CS.

There was just one QSO on the band for G2HKU, namely the CW one with ZY5XFR.

It was, on the other hand, SSB that managed ZD9BV for G3BDQ, his QSL going *via* W4FRU; in addition there were, as John puts it, lesser fry not worth a mention!

## Finis

That's it for another time. The deadline for next time will be found in the 'box', and is for arrival, addressed to your scribe, "CDXN", SHORT WAVE MAGAZINE, 34 High Street, Welwyn, Herts. AL6 9EQ. Meantime, have fun!

# A BEARING PLOTTER FOR D/F WORK IN THE FIELD

J. GLANVILLE, G3TZG

ONE of the problems during radio fox hunts, and direction finding competitions in the field is laying off the radio bearing on to the map. Generally one has to support the map board whilst juggling with a protractor, ruler, and pencil. It is a situation which often occurs in amateur radio where a third humanoid hand would be useful. To overcome some of the difficulties of angle measurement in the field the author has developed an instrument which remains stationary on the map board, and will offer the facilities of indication of relative angles and distances from the transmitter site. Also bearings can be marked on the map, or "laid off" without recourse to a separate ruler, or scale.

Basically the device consists of a 360° protractor with a magnet inserted in the centre; the magnet supports a spindle around which an acrylic cursor rotates. Distance scales are marked on the cursor which also has a central slot to enable a pencil to be inserted for the purpose of laying off bearings. A map board with a steel backing or a board made entirely of sheet steel is of course required.

A general view of the instrument is shown in Fig. 1. This depicts the device magnetically held to the map board with the centre lying over the transmitter position. The drawing illustrates the manner in which bearings may be laid off. One hand steadies the tip of the rotary cursor, whilst the other hand enscribes the bearing by means of a pencil inserted into the central slot of the cursor. A sectional drawing showing the basic construction is shown in Fig. 2.

## Construction

The construction is quite straightforward, but some care in marking out, and assembly is required if best results are to be achieved. A *Rolinx* 150mm. diameter 360° protractor was chosen for the prototype. Having chosen the basic protractor the next step is to cut a circular hole in the centre to insert the magnet.

The magnet chosen was a "Shallow Pot Magnet No. 826", marketed by *James Neill Tools,* Sheffield, under the "Eclipse" label. This pot magnet has an approximate diameter of 19mm. so the central hole in the protractor should be expanded to a diameter such that the magnet can be fitted centrally with a firm, but not excessive, push fit. Magnets of the 826 type have a central hole, and into this hole is inserted a 4BA countersunk head machine screw. This screw with suitable spacers acts as the central spindle.

Fig. 2 shows the method of mounting the central knob, which on the prototype was formed from the plastic cap of a shampoo bottle; such caps are about 25mm. diameter and 17mm. high. (This type of bottle cap has a serrated outer surface which is useful for digital operation!) A hole is drilled into the centre of the bottle cap. This hole may be drilled undersize, and opened out with a needle file to locate as centrally as possible on the 4BA screw. A spacer of about 10mm. diameter is mounted on the central screw; Over this is placed a plain washer of about 15mm. diameter. The bottle cap is then placed on the screw, and over this is placed a plain washer of about 10mm. diameter; this is secured by two 4BA nuts, one of which acts as a lock nut. the dimensions of the knob assembly may be varied to suit the particular bottle cap chosen, but accuracy with regard to rotation about the central point must be maintained.

Next the cursor is constructed, the material for this component being acrylic sheet (Perspex) of about 3mm. thickness. Fig 3 shows the outline dimensions of the cursor; the diameter of the central hole will depend upon the particular bottle cap chosen. First form the outer shape of the cursor, then cut the pencil slot somewhat undersize. Drill a pilot hole in the boss of the cursor, and carefully increase the diameter of this hole until it is a firm push fit over the bottle cap knob. If the knob has a serrated outer surface then serrating the cursor hole to match may facilitate a firmer assembly.

Mount the cursor temporarily on the knob, and ensure that it rotates evenly around the central point of the protractor. Having ensured that the cursor is centrally located it is now necessary to mark out the radial line to enable the accurate cutting of the pencil slot. Initially this may be accomplished by marking the acrylic surface with a fine pointed fibre or felt tip pen. Place the assembly on a flat surface with the circular magnet keeper removed. Align the cursor along the 90° radial on the protractor, and with a straight edge mark a line with the pen. Rotate the cursor to the 270° point and check that the alignment matches. Check also at 0° and 180° that the alignment of the ink line is reasonable. If the alignment is unsatisfactory then a probable cause is positional error of the central hole in the bottle cap knob; in this case a fresh cap should be obtained. When the cursor alignment is satisfactory scribe a light line on the upper surface

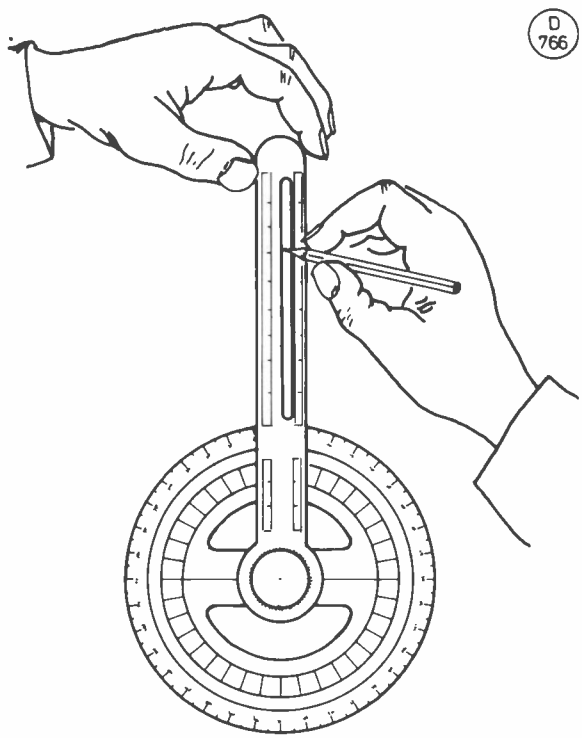


Fig. 1 GENERAL VIEW OF INSTRUMENT

**May issue due to appear on Friday, April 29th**

with a tool such as an engineer's striking knife. This line is the radial to which the pencil slot must be accurately aligned by careful filing and polishing. The cursor is removed from the knob for this operation. Having formed the slot a radial line may also be marked on the undersurface of the cursor in addition to the line on the upper surface; this will help to avoid parallax errors when the instrument is later in use.

At this point the distance scales can be mounted. On the prototype the author fitted two distance scales, one at five miles to the inch, and the other to match the Ordance Survey 1:50,000 scale. The scales were drawn on thin white card and fixed to the underside to the cursor with transparent tape. Gaps in the distance scales were left in the area of the graticules and degree figures on the protractor. The cursor is then carefully re-fitted to the central knob.

Alignment may be checked by placing the instrument on a blank sheet of paper on the map board. Mark off three bearings at 0°, 120°, and 240°, with a pencil. Remove the instrument from the board and extend the pencil lines until they cross. The three lines should cross at the same point, or should exhibit a very small triangle or 'cocked hat'. If the cocked hat is reasonably small the final assembly can commence.

Remove the cursor and the knob. Cement the magnet in place with a small amount of epoxy resin such as *Araldite*. Place the knob on the spindle, and tighten and lock the nuts to give a satisfactory stiffness; a small portion of *Araldite* may be applied to the top of the lock nut at this stage. Then apply a thin layer of *Araldite* to the outer surface of the lower part of the knob and refit the cursor. Having ensured that the cursor rotates satisfactorily a toothpaste tube cap may be affixed to the top of the knob in order to cover the spindle and lock nuts. Assembly is now complete.

Any thin flat sheet of steel will serve as a map board. The author's board was made from the outer skin of a washing machine that had gone "silent key". Remove all sharp edges from the board for it will be used in close contact with fingers. Thin brass 'U' clips will hold the map in place, and a thin sheet of acrylic of the type sold by art shops may be placed over the map if required.

## Use

To establish the device on a given position on the map draw feint lines passing through the required position running north/south and east/west. These lines should be long enough to extend beyond the protractor diameter. Then remove the keeper from the magnet and align the 0° mark of the protractor along the north/south line. Align the 90°/270° protractor line along the east/west line on the map. The instrument is now centred, and bearings can be laid off. To lay off a bearing first set the bearing number with the central knob, hold the tip of the cursor with forefinger and thumb of the left hand, insert the pencil in the cursor slot, and draw a line by running the pencil along the left hand side of the slot.

If the instrument is constructed with a reasonable amount of care it should enable bearings to be laid off to within an accuracy of a degree or so. This should be quite adequate for the average fox hunt, for it must be remembered that a Class-A commercial radio bearing is classified as having a tolerance of within ± 2 degrees.

Having constructed the device the question arises — what do you call it? After all it is not exactly a protractor. An angle measuring device is a goniometer. You can have crystal goniometers, and radio goniometers, so since this instrument is secured with a permanent magnet what about "Magnetic Goniometer"? That seems sufficiently grandiose!

I can just visualise the scene on a hectic field day! "By George! We are having a good field day. Hand me the magnetic goniometer old man. I want to lay off the true bearing of the VK I've just QSO'd on 70cm. simplex."

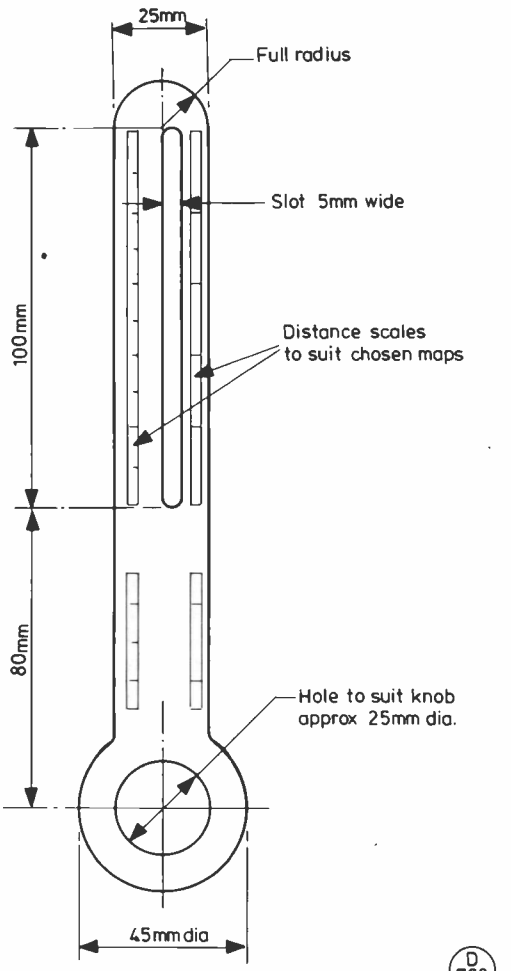


Fig. 3 ROTARY CURSOR (3mm Acrylic sheet)

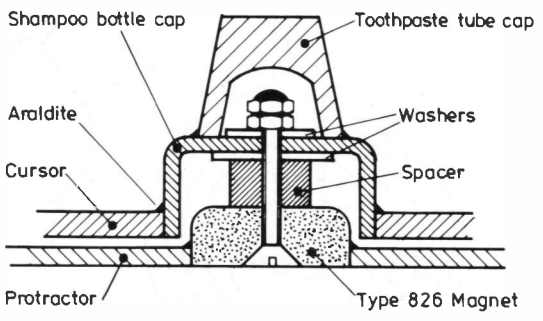


Fig. 2 Sectional view of the construction

# BASICS FOR THE S.W.L. AND R.A.E. CANDIDATE, PART X

## SUGAR-COATED THEORY

LAST time around we looked firstly at how an aerial radiates — the electric field along the line of the wire, and the magnetic field around the wire, remember? — and then we went on to talk in general terms about transmission lines.

Let us now imagine we have a longish piece of fifty-ohm twin-feeder. If you've never seen this stuff, it looks for all the world like the flat twin plastic mains wire often used with a table lamp. We know that if this length of feeder is open circuit at one end, and energised with RF at t'other, we will see a point of high voltage at the end, and a point of low voltage at a quarter-wave back from the end; and we will see standing waves aplenty if we look for them. Now, let us take this feeder, and open it out from the end for a quarter-wave length, and hang it up in free space; we will have a horizontal top of half-wave length over-all, with twin feeder at the middle to energise it. We have made ourselves, to a first approximation at least, a *half-wave dipole.*

If now we had some means of measuring the resonant frequency (don't ask just how, for the moment) we would expect to find our dipole would want to resonate exactly at our chosen frequency. Alas, it wouldn't — due to some minor effects we didn't take into account — but it would nonetheless be pretty close. Bring it down out of 'free space' into our back-yard or loft and we might find the picture a bit different, though still we would be pretty close. In fact, if we are talking about a wire dipole and HF, we can say that the half-wave length of wire, in feet, is given by 468/f(MHz). Thus for, say, 14.1 MHz, 468/14.1 = 33.2 feet. If you are one of the disadvantaged who can't calculate in feet, then use length in metres = 143/f(MHz) in the same way and get the answer out in your pet units. Both formulae take into account the *end effects,* and lots of folk are satisfied to cut their dipoles so and hang 'em up with no more ado. Not us — we're not that daft!

Now, let's imagine we have our half-wave dipole in free space and we want to know to where it will radiate. To a close approximation you can do this by circulating the aerial and noting the proportion of aerial you can see, taking the power at right angles to the aerial line as, say, unity. If you are looking at a horizontal half wave dipole in free space, and you sketch out the result of your efforts, you will see you have drawn a vertical doughnut shape with the aerial wire poking through either side of the hole in the doughnut's middle. Lo! — we are in agreement with the Book of Words! There are, however some Practical Types who will say "my half-wave dipole radiates off the ends for sure — I work Joe Bloggs in that direction every Sunday morning, so sky-wave can't come into it!" Truly, Practical Man confuses himself, and us, all the time! *We* were talking about our dipole in free space. His aerial, on the other hand, is near ground, and there are other reflecting or refracting objects within range of the aerial.

To give you some sort of 'feel' for how much objects can disturb things, here is a short anecdote. The writer used to work, years ago, on an aerial development job; some of the work could be done in the lab, but for the rest we had to have a clear test site. This was a field, some twenty acres in size and as near as dammit a square. In the middle, we had a mast with a rotator up on top; at the bottom of the mast was a box with mains power so we could supply a signal generator and feed RF as required up aloft. In one corner of the field was a hut fitted out with mains power and lighting, and a receiving aerial. A couple of hundred yards to one side was a house in the garden of which was a large apple tree. In a line from the mast, through the receiving aerial and on behind the latter was a valley with a railway line running across. We found that when the tree came into blosson and leaf in the summer it put a quite definite and noticeable lopsidedness into any 'polar diagram' measurements, while a train coming out from behind the valley would instantly upset our gain measurements, sometimes by over two dB!

To revert to our low practical aerial, if we imagine the aerial sitting over a mirror, and look along the end of the wire, we can see not the end of the aerial but some of its reflection in the mirror. Now, mention of the mirror brings us to the matter of the vertical quarter-wave of 'Marconi' aerial (our dipole is a 'Hertzian' one). Now, the Marconi is only half an aerial; its other half is its *reflection in the ground.* Without the reflection, it won't — it can't — work.

Imagine for a moment a mirror laid on its back and stick a pin upright on it with a dab of Blu-Tack or such. Now sight along the mirror surface and always you will see the reflection of the pin. If you scrape off the silvering from the mirror back, the image disappears. Repeat the experiment with a smaller mirror; this time you will notice that as you get your eye down to the plane of the mirror, so the image of the pin in the mirror gets nearer the edge of the mirror and disappears off it. This is a useful analogy when trying to understand the quarter-wave vertical aerial — which *needs a good earth,* and that ideally that good earth should extend several wavelengths all round the feedpoint of the aerial. While you can buy good verticals, you can't buy a kit of parts for a good earth — you have to create such by the sweat of the brow and swear-words, not to mention blistered hands and thirsts raised and quenched. Such is the *real* nature of DX!

To return to our horizontal half-wave aerial in free space. We discovered that if we plotted the strength of radiation from it we ended up with a thing like a doughnut. This is rather in the nature of a three-dimensional polar diagram, but what we generally mean (always, unless clearly stated otherwise) by the words 'polar diagram' is a graph of field strength at a distance 'X' from the aerial, as one circulates round the aerial, and plotted on 'polar' graph paper, where zero is the centre, and the other axis radiates out from the centre by degrees —· *see* Fig. 2. What our polar diagram actually shows us is a slice, or section, through the three-dimensional doughnut; and so for our horizontal dipole, a horizontal slice through level with the aerial would give us a pattern like a figure-eight with the dipole sticking out of the middle.

Now, why do we keep on talking about half-wave dipoles, or quarter-wave aerials with a reflection in the ground? Is there a magic about them? Your old-timer will growl from behind his pint "you can make *anything* radiate, provided your ATU can match it to the transmitter!" And *he's dead right!* So — why all the fuss? Well, most of us like to make or own something that does what it claims to do, and we like to know that we have it 'perking' just-so. When we talk aerials we have a pretty limited range of test equipment to hand, and most of that is hardly of precision nature. In this case, if we make a design that can be expected to give certain SWR readings in return for certain dimensions, then we

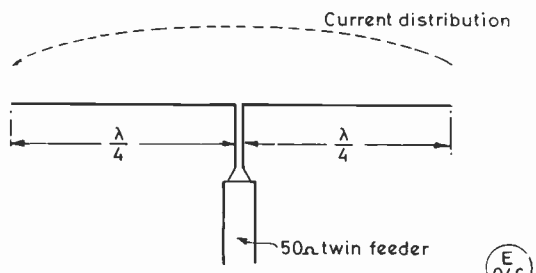


Fig. 1

**The half-wave dipole, as derived by opening out a quarter-wave of 50-ohm transmission line.**

can look at the SWR and 'prune' until we get it right, and then reasonably assume that the aerial is 'on the nose'.

The old-timer had even less test-gear than we have (even the GDO is a post-war invention!) and so his aim was to get the beast to radiate as best he could regardless. If the RF didn't go to VK and he wanted to work VK, then he pulled it down and put another one up, until he found one that would raise the VKs. A simple field-strength meter at the bottom of the garden, a pair of binoculars, and lots of 'suck-it-and-see' would, in many cases, bring our OT to the conclusion that the easy option was to stick up a half-wave dipole, but not before he had learned that RF can be got out and away from some very unpromising places and set-ups *provided* one isn't too fussy about where it goes and possesses an ATU that will match anything you hang on its output terminals to whatever the transmitter wants to see. However, the above statement doesn't alter the basic fact that if you are using a system requiring an earth (Marconi feed) then the more work you can do on the earth the better.

A summary so far; there are two basic types of aerial, namely the half-wave dipole, and the quarter-wave Marconi which can only resonate by virtue of the 'image' of itself *in the ground* and which therefore needs a ground connection. However, the old-timer can take an old bit of wire, string it up, and persuade it to radiate.

Clearly, then, if we now cast off the shackles of 'length' as part of our thoughts, we should still be able to obtain radiation or reception. Thinking about the dipole for a moment, let us take it down from free-space and pull it open further until the feeder has split down to give us a half-wave either side of centre. Each side will present an open-circuit to the end of the feeder it is connected to, so the SWR will be pretty alarming. The practical result might be that if we put much power up the feeder it would flash-over, or the current at the low-voltage points might even be enough to melt the insulation; but if we beefed-up the feeder and the spacing a bit it would still work — always providing we could dream up an ATU to match it. And here we might find that it is useful to adjust the feeder length to something the ATU finds easier. No, 'pruning the feeder' doesn't mean we are changing the SWR; it means we are changing the impedance presented to the ATU to something a bit more amenable, usually in the reactance term. To put it bluntly, this is 'grope-and-hope' for most of us moderns. The old-timers often used open-wire feed (polythene wasn't invented, co-ax was both expensive and lossy, so open-wire feeder was a very much better bet) and they discovered that if a multi-band aerial was Zepp-fed with open-wire feeder, then on some bands it would need a series-tuned circuit in the ATU and on others a parallel-tuned arrangement. This was a bore for multi-band ops, so experimentation led to the observation that certain feeder lengths made it possible to get away with the preferred method of tuning on, for instance, all bands but one. They didn't have 10, 18, 21 or 24 MHz though!

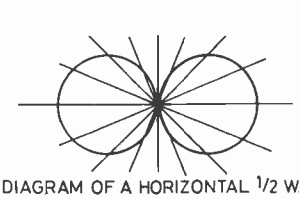


Fig. 2 POLAR DIAGRAM OF A HORIZONTAL 1/2 WAVE DIPOLE

**Polar diagram of the half-wave dipole, related to the strength of the signal transmitted from the dipole in free space, in all directions. If we drew the entire pattern in 3-D we would have a vertical doughnut with the aerial element in the centre hole.**

If we adopt the modern scheme and arrange things so our feeder operates with low SWR, then we don't, in theory, need an ATU. In practice, though, especially with solid-state PA lacking any tank circuit, one would find an ATU worth while. If, on the other hand we just hang up a wire and work it against earth, particularly if we do lots of grafting on the earth arrangements, then with an ATU we might do as well, particularly if the idea is to work all bands. It is probably a fair bet that most of the world will be covered on one band or another, so you will have to get to know your own system by lots of listening. Another good reason for being an SWL!

Next time we'll take a look at directional aerials.

*to be continued*

# CLUBS ROUNDUP

## By "Club Secretary"

WE must come back to this question of *updating* your club's details at regular intervals. The situation is just this: we know from our experience that a change of a fundamental nature can happen overnight — a club Hq burns down, or a major personality clash occurs, or the sudden death of a guiding hand in club affairs — and our records, made as they must be of history, are out of date. A new chum writes in, we say to him "join the local club" and give him the now out-dated details, and he goes away to find for himself. If he succeeds in making contact, the incorrect data he was given doesn't exactly give him confidence in the club officers (or, indeed, in us!) and if he isn't 'taken up' very actively on his first visit he will probably be lost as a member. In the worst case, of course, he just fails to make contact and is surely lost to the club.

Hence our firm rule: we expect the data to be updated, at least quarterly, on venue, Hon. Sec. name and address, telephone number, and meeting routine, and we take this information on to a card-index system here. If our information is older than that, the lot goes out as being no longer recent enough for publication.

### Reports

**Abergavenny** have a weekly berth in Pen-y-fal Hospital, Abergavenny, above Male Ward 2, every Thursday evening. Their RAE courses are at Nevill Hall Hospital, most Tuesday evenings, in the Seminar Room.

At the AGM of **Acton, Brentford & Chiswick** they talked about putting MCC back on the calendar — we would if there were firm indications of support from enough clubs. Their next session at Chiswick Town Hall is on April 19, for a discussion of members problems.

Down in Axminster, the "Cavalier Inn" is the home of the **Axe Vale** crowd, on the first Friday of each month. They also have an RAE class. More details from the Hon. Sec. — *see* Panel.

A new Hon. Sec. appears in the Panel for **Aylesbury Vale**, and she tells us they are now to be found at the Stone Village Hall, Stone, near Aylesbury on every fourth Tuesday. The next date noted is April 19 for a surplus equipment sale, with G4JFZ as auctioneer.

Over to GI now, and the **Bangor** crew. They are booked in at

the Sands Hotel, Bangor, Co. Down, on the first Friday of each month, where new members and visitors are always welcome. Details from the Hon. Sec. — *see* Panel.

We notice that **Basingstoke** have just celebrated their first 21 years of life. We hear that they have moved their club address to the British Legion Hall, Crown Lane, Old Basing, Basingstoke, on the second Tuesday in each month. In addition they have RAE and Morse tuition as needed.

April 6 is AGM time for the **Bath** gang. This will be, as usual, at the "Englishcombe Inn", Englishcombe Lane, Bath, where they normally foregather on alternate Wednesdays.

Over at **Biggin Hill**, they will have a demonstration station at the Spitfire Youth Centre on April 9, and on 19th the meeting will be a constructional evening with a competitive element. Ian Daniels leading the doings. The venue for this is at Biggin Hill Memorial Library.

If you are in the **Bolton** area, try a look in at Horwich Leisure Centre on a Wednesday evening; although details are not available, we understand they have quite a varied and interesting routine and lots of members.

Turning to **Bournemouth**, we are in need of some up-dated information. As far as we know they are still in Kinson Community Centre on first and third Fridays.

A similar situation applies at **Braintree** where we believe that they still have their place at the Community Association, next door to the town's bus station, on first and third Monday evenings.

Turning now to **Bristol** we see they have the quarterly business meeting on April 5, projects evening on 12th, RTTY on April 19th, and on 26th the computer group have their bite, with a general natter later; all are at the YMCA, Park Road, Kingswood, Bristol.

**B.A.R.T.G.** is synonymous with RTTY, whether by way of mechanical or electronic teleprinters or home computers. Details of membership from the Hon. Sec. — *see* Panel.

**Bromsgrove** have the second Friday in every month at Avoncroft Arts Centre, with a QRP meeting on the fourth Friday, also at the Avoncroft venue. For April the Construction Contest is to be judged.

## First!

**Bury** recently had a quiz contest against Warrington, at which *both* clubs were 'at home'! The trick was turned by the use of TV links; Warrington transmitted in colour, and Bury in b/w, the arrangements at Bury being handled by G8GTP; the path was one of 18 miles, and picture quality very good both ways. As for the result, Warrington won by the proverbial gnat's whisker. Find the Bury crowd at Mosses Community Centre, Cecil Street, on any Tuesday evening.

At **Cambridge** the gang are still to be found at the Visual Aids Room, Coleridge Community Centre, Radegund Road. April 1st is skipped as the college is closed and on 8th they have a Grand Junk Sale at Comberton Village Hall. Back to 'home base' for a two-metre Fox Hunt on April 15, and on 22nd they will be addressed by G3WLD — topic unspecified.

## Changes

The **Cheltenham** change of venue to the Stanton Room, in the Branch Library at Charlton Kings also means a change of routine; they now foregather on first and third Fridays evenings, except that as Good Friday falls on one of their April dates, for that month only they have the second and fourth Fridays. The new place lies behind the church, and there is a car park alongside, which is handy. More details from the Hon. Sec. — *see* Panel.

For details on the **Chesham**, club, we are advised to refer you to the Hon. Sec. — *see* Panel for his name and address.

Church Room, Church Lane, Wormley is the home of the **Cheshunt** club every Wednesday evening. April 6 is down for a talk on the "BBC Micro and Amateur Radio" by G3TIK, with a slide show of the members' shacks organised by G8LNM on April 20. April 13 and 27 both natter nites, with some RAE revision on the latter date.

**At the end of January, Bury and Warrington radio societies held an inter-club quiz with a two-way video link on 70cm. Here we see the Bury team, with video from Warrington being received: left to right, G4GSY ('home' question master), G3RSM, G6HBF, G8XUR and G8OVT. Warrington team members were G3NFB, G4JYP, G8HYP and G6AWD — and they won by two points! The mostly home-built video equipment at Bury was provided and operated by G8GTP, and for the quiz he ran 30 watts peak sync. output on 70cm. to an 18-ele. Parabeam.**

*Photo by G3VNQ*

Down in **Chichester** the Hq is at the Green Room, Fernleigh Centre, 40 North Street, Chichester, on the first Tuesday and the third Thursday of each month. April 5 seems to have been undecided at the time of their letter, and on April 21 they will be having the AGM.

April 21 is the date for **Colchester** at Colchester Institute, Sheepen Road, when they will be told all about the design and production of printed circuit boards by Bev Clues.

It's AGM time for **Cornish** on April 7, the venue as ever being the SWEB Clubroom, Pool Camborne.

At **Crawley** it seems to be the fourth Wednesday in the month, at Trinity Church Hall, Ifield, Crawley. They also have informal meetings which are rotated among the various member's homes.

April 7 and 21 are the dates for **Cray Valley** at Christchurch Centre, High Street, Eltham. The former date is the AGM, and on the latter one there is the Constructional Contest.

Turning to **Crystal Palace**, they have their sessions on the third Saturday evening of every month, the details of the April meeting being still 'in the works' at the time of their writing. The venue for this one is the All Saints Parish Room, Upper Norwood, which lies at the junction of Beulah Hill and Church Road, just opposite the old ITA mast.

**Dartford Heath D/F** are next on the list, and they have their meeting at the "Malt Shovel", Eynsford, Kent, on April 6; these are usually arranged for the Wednesday before a Sunday hunt event, and so for any other dates we must refer you to the Hon. Sec. — *see* Panel for the details.

April 13 seems to be the main date for **Denby Dale**, when they will be welcoming *Lowe Electronics* to their Hq at the Pie Hall, Denby Dale. For other meeting details, we suggest you contact the Hon. Sec. — *see* Panel for his statistics.

At **Derby** they have the top floor of 119 Green Lane, and they use it every Wednesday evening. Thus for April 6 there is a bring and buy sale, on 13th a rig marking session with a UV pen — a good idea in case the rig is pinched — and on 20th they will be visited by "Evets Communications of 119", leaving just 27th to mention for a talk on energy and nuclear power by a member of the CEGB.

**Derwentside** continue to inhabit their Hq at the R.A.F.A. Sherburn Terrace, Consett; for the other details we must refer you to the Hon. Sec. — *see* Panel.

## Names and Addresses of Club Secretaries reporting in this issue:

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YEOVIL: A. Dening, G4BJH, 19 The Rock, Yeovil. *(Yeovil 23873)*.
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The first Monday in every month is the one for the **Droitwich** group, in the Scout Hq, Station Road.

Over to **Dudley**, and here the venue is the Central Library, on the second and fourth Tuesday. April 12 is down for G3RJV of the G-QRP Club to give his chat about QRP working.

The **East London RSGB Group** are one of the few Sunday clubs — find them on April 17 at 3 p.m. in Wanstead House, Wanstead, Ilford, Essex. The entertainment will be a talk on Cable TV.

The **Echelford** arrangements are to gather in the Hall, St. Martin's Court, Kingston Crescent, Ashford, Middx, on the second Monday and the last Thursday of each month. For the rest, we have to refer you to the Hon. Sec. — *see* Panel.

On April 14, members (only) of the **Edgware** group will be making a visit to the *Lowe Electronics* shop at Kings Cross, while on 28th they will be back at Hq for an informal session, at 145 Orange Hill Road, Burnt Oak, Edgware.

A new Hon. Sec. reports in for **Exmouth**; they foregather on alternate Wednesdays at the 6th Exmouth Scout Hut, Marpool Hill, Exmouth. The programme details and any other information desired will be passed on with pleasure by the Hon. Sec. — *see* Panel.

Nice to hear again after a long time from the **Fareham** lads, still based on Portchester Community Centre, on Wednesday evenings. April 6 is down for a talk on RTTY, April 20 is a talk on making your own PCBs, with natter evenings on the remaining April 13 and 27 dates.

Turning to the **Farnborough** programme, we see a bring-and-buy sale on April 13, while the details of the April 27 entertainment were still not finalised when they wrote. The Hq is at the Railway Enthusiasts Club, Access Road, off Hawley Lane, near the M3 bridge, Farnborough.

A change of venue is reported for the **Fylde** group, to the Kite Club, Blackpool Airport, where they foregather on the first and third Tuesday of each month. On April 5 G4AHZ will be talking about aircraft instrumentation, while the April 19 evening is an informal.

Up in GM land the **Glenrothes** crowd will be foregathering at Provosts Land, Leslie, on April 17 for their main meeting, but we understand they also have informals each week — doubtless the Hon. Sec. will be pleased to put you in the picture.

We turn now to the **G-QRP Club**, where the accent is on QRP operating, whether on transmit or receive, and of course, it follows, of home-construction. With 1500 members in all continents, it just has to have something! To find out more, contact the Hon. Sec. — *see* Panel for his details.

Nowadays, the **Grafton** group is to be found on second and fourth Fridays of every month, at the "Five Bells" in East End Road, Finchley. At the time of writing we don't have the programme details for April, for which we must refer you to the Hon. Sec. — *see* Panel.

A restricted number of the **Greater Peterborough** gang will be paying a visit to a power signal box on April 28. For details of the club, contact the Hon. Sec.

Since January 13 the **Grimsby** club is to be found fortnightly on Thursdays at Cromwell Social Club.

April 8 for a natter, and 22nd for the AGM is the **Guildford** routine, at the club house of the Guildford Model Engineers in Stoke Park, Guildford.

The normal weekly meeting routine for **Harrow** is interrupted on April 1. However, they will be together again on April 8 for an informal, with a colour SS/TV demo. down for April 15. On April 22, G2TA will give his talk on DX-ing, and on 29th there is a computer games evening.

At **Hastings** the group is nowadays based on West Hill Community Centre for the main meeting; April 20 is a junk sale. They also have meetings on other Wednesdays and Fridays at Ashdown Farm Community Centre, not to mention an RAE class on Tuesdays, preceded by a Morse class.

The **Havering** chaps have a place at Fairkytes Arts Centre, Billet Lane, Hornchurch, Romford, Essex, where they are to be found each week, as follows: April 6 and 20 are both informals, April 13 is a talk "A Staircase for the Shack" by G3KFW and on 27th they have a talk by G3RZP on "Plessey ICs for Communications".

As ever, the **Hereford** group are still meeting at the County Control, Civil Defence Hq, Gaol Street, Hereford. Here they are to be found on the first and third Friday of each month. Programme details from the Hon. Sec. — *see* Panel.

Over in East Anglia, **Ipswich** are to be found at the Rose and Crown, at the junction of the A45 Norwich Road and Bramford Road, on the second and last Wednesdays in each month; there is often Morse available on the other Wednesday evenings too. April 6, the club room is closed, but on 13th they have a talk on Ignition Interference Suppression instead; then on April 27 the essential matter of the AGM is tackled.

If there is anything you want to know about Amateur Radio in El-land, or the clubs around the country, we suggest you get in touch with the Hon. Sec. of **I.R.T.S.** On a different note, we see that they have the AGM down for Sunday, April 24, at the Grand Hotel, Malahide, Co. Dublin, at 2.30 p.m. The previous evening is the Annual Dinner at the same venue, and on the Sunday morning there will be a Trade Show.

The GD lads have their **Isle of Man** club Hq at the Keppel Hotel, Creg-ny-Ba, every Monday evening, alternating between social and activity evenings. Visitors to GD are welcome, and doubly so if they can spare time to give the gang a talk; get in touch with the Hon. Sec. at the address in the Panel.

This month we seem to have solved the mystery of the clubs in **Jersey**. First we take the Amateur Radio Society; they have Hq at Le Hocq Tower, St. Clements on Friday evenings and Sunday mornings. The Amateur Electronics Club has its base at Quennevais Communicare Centre on the second Wednesday of the month. Other details from the Hon. Sec. at the appropriate address in the Panel.

## New Club

This one is at **Keighley**, and they meet on the last Tuesday in each month at the "Globe Inn", Parkwood Street, Keighley. We understand that on April 26 Bill Cost will talk about the "Techniques of the Cinema".

It is the second Monday in each month for **Leyland Hundred**, at Astley Park Social Club, Chorley, Lancs.


*Litesold* **announce the introduction of the SK18 soldering/de-soldering kit for the electronics hobbyist. The kit is centred around an 18-watt mains iron fitted with a 3.2mm. bit, and includes two alternative bits (1.6 and 2.4mm.), a 3-metre reel of 18 s.w.g. flux-cored solder, stainless steel tweezers, three double-ended soldering aids and a reel of de-soldering braid. Providing all that is required for soldering and de-soldering by beginner or expert, the SK18 kit comes in a PVC wallet and is available direct from** *Litesold* **at the special mail-order price of £14.55 inc. postage and VAT. Further details and order form from: Light Soldering Developments Ltd., 97/99 Gloucester Road, Croydon, Surrey CR0 2DN. (Tel: 01-689 0574.)**

Over now to **Lincoln**, where the group, as for so long, foregathers at the City Engineer's Club, Central Depot, Waterside South, Lincoln. On April 13 they have a talk on contest preparation by members of a local contest club, and on 27th G3SZJ will be giving a talk and slide show about the RSGB.

The **Lothians** club, is based in Edinburgh, at the Drummond High School, on second and fourth Thursdays. April 14 is an operating night, and on 28th they start with D/F Hunt preparation, and follow that with the Construction Contest.

**Maltby** club has just held its AGM, so we don't have any programme details for April; however, we can say you can find them on Fridays at the Methodist Church Hall, Blyth Road, Maltby.

Talking of AGMs it is time for that event at **Meirion** on April 7. The venue is the Nannau Country Club, Llanfachreth, two miles north of Dolgellau.

April 19 at **Midland** is down for the final discussion on their Drayton Manor commitments, at 294A Broad Street, Birmingham, opposite the Repertory Theatre. We understand they do have other informal meetings at the same venue, and no doubt their Post Boy, G8GAZ, will tell you if you call him on S17 anytime between 1000 and 2200, or contact the Hon. Sec. at the address in the Panel.

A new Hon. Sec. takes over at **Mid-Warwickshire**, and she says they are still to be found at 61 Emscote Road, Warwick, on first and third Tuesdays. April 19 is down for a talk on electronics in medicine.

April at **Newark** is down for G4MDV and a Workshop and Construction project. The venue is the Palace Theatre, Appleton Gate, and the date the first Thursday of each month.

**Norfolk's** AGM is down for April 6 at Crome Centre, Telegraph Lane East, Norwich. On April 13 they have one of their short meetings, on 20th they go to Anglia TV, and on 27th they are at the short meeting game again.

Oddly enough, April 6 is also the AGM for **Northern Heights**, while on 20th G4DAX talks about RSGB; both are at the Bradshaw Tavern, Bradshaw, Halifax.

A busy lad is G4DAX; he also appears on the **North Wakefield** list on April 14. This group foregathers weekly at Carr Gate Working Men's Club, on Thursdays.

**Nottingham** have a Forum on the first Thursday of each month, when they talk over the committee work; the second Thursday of the month is a talk, the third Thursday they put the club station on the air, and there is again a lecture on the fourth Thursday. Should there be a fifth Thursday in any month, then they "play it by ear".

Turning now to **Pontefract**, we have it that they are in the club rooms at Carleton Community Centre in that town every Thursday evening, the Hq being on the top floor.

If you know of anyone interested in our hobby, but blind or disabled, you should put them in contact with **R.A.I.B.C.** which exists to get them going as may be needed; and of course there must be supporters and representatives to do the work, with a lot of help given by clubs by way of donations or other activities. Details of RA1BC from the Hon. Sec. — *see* Panel.

April 12 at **Reading** is a demonstration by *SMC*, and on 26th the VHF Contest Committee of RSGB, in the person of G2H1F, will be explaining their *raison d'etre*. Both at the "White Horse", Emmer Green, Reading.

April 19 is the AGM of the **Reigate** group, and will be held at the Constitutional and Conservative Club, Warwick Road, Redhill, starting at 8 p.m.

At **Rhyl** they have a base at the 1st Rhyl Scout Hq, Tynewydd Road, Rhyl, on second and fourth Thursdays, the first meeting in each month being the informal, with club station on the air, and the second one the 'set piece' session, with lecture, films or whatever.

Anyone associated with the **Royal Navy**, either past or present; can join the club, as can folk from the Merchant Navy or foreign navies. All the details from the Hon. Sec. — *see* Panel for his vital statistics.

On to **St. Helens**; this means the Conservative Rooms, Boundary Road, St. Helens. On April 6 they have a talk by G4LHL on receivers, and on 13th there is a talk on an 'unknown subject' by G3WOH; but it does look as if the club gathers every week.

**Salisbury** had just had their AGM when we last heard; they foregather every Tuesday at Grosvenor House, Salisbury, where help with RAE and Morse is available as required.

It is some time since we last heard from **Sefton**, who are still to be found at the Liverpool Prison Officers Association Club in Hornby Place, Hornby Road, Walton, Liverpool 4, on alternate Wednesdays as from February 23 last.

Thursday evenings it as for the **Shefford** crowd, at the Church Hall, Ampthill Road, Shefford. For the other details we must refer you to the Hon. Sec.

April 5 seems to be the date for the **South Dorset** crowd, at the Army Bridging Camp, Wyke Regis, Weymouth. Other details from the Hon. Sec. — *see* Panel.

On to **Southdown**, serving the area around Eastbourne; they usually have the first Monday of the month at Chaseley Home, South Cliff, Eastbourne, but for April the date is April 11 for a talk by Ron Lobeck, the local TV weatherman.

**S. E. Kent (YMCA)** is the name of the club serving the Dover area, the name obviously being a statement of the Hq which in fact is at Dover YMCA, Godwynehurst, Leyburne Road. April 6 is down for the AGM, but they are to be found every Wednesday evening.

**Deadlines for "Clubs" for the next three months —**

*May issue—March 25th*
June issue—April 29th
July issue—May 27th
August issue—June 24th

*Please be sure to note these dates!*

**Spalding** have a talk on SSB/TV by G3CCH on April 8, at Maples Room, White Hart Hotel, Spalding.

Next we come to **Stevenage**, and their Hq at *TS Andromeda*, Fairlands Valley Park, Shephall View, Stevenage — and if you have a vision of a Leander-class frigate on dry land you've got it wrong! April 5 is 'to be confirmed' and on April 19 likewise; they have Morse classes before every meeting and there is always something teed up on the night.

**Stourbridge** have a problem with the Hq, as the pub is being modified (to increase the power of the PA?); so we must refer you to the Hon. Sec. for the latest position.

The Hq is the brewery with no beer at **Sunderland**; the opening hours are Monday and Thursday evenings from 7-9 p.m., and Sunday mornings from 10-12.30 p.m. Find the spot in Westbourne Road, Sunderland.

April 11 is the AGM for **Surrey**, and on 25th they have an RAE revision session. The Hq is at *TS Terra Nova*, 34 The Waldrons, South Croydon, on the first floor mess deck.

A natter night is down for April 11, and on 25th the **Sutton Coldfield** lads have the Spring Clean Junk Sale. Both are at the club Hq at the Central Library, Sutton Coldfield.

Some rather elegant note-paper advises us that the **Swale** crowd are to be found at Nina's Restaurant, 43 High Street, Sittingbourne, every Monday evening. It is also understood that this month they are hoping to start both RAE and Morse classes — get the details by turning up at a meeting.

The Caernarvon Trophy of **Thames Valley** is being awarded on April 5, after a construction contest for a 10 MHz QRP transmitter. This one is at Thames Ditton Library meeting-room, Watts Road, Giggs Hill, Thames Ditton.

April in **Thanet** shows us meetings at Birchington Village Hall on April 8 for a talk on propagation by G3MOO, and on VHF contesting by G4DCV on 22nd. In addition they have a special-event station, GB2TH, running at Thanet Marathon.

**Torbay** mourn the loss of two local stalwarts in G2BNT and G3BHL. The club meets on Friday evening at Bath Lane, rear of 94 Belgrave Road, Torquay for informals each week; and on April 30 they have the AGM, for their Saturday evening formal, at the same place.

The **University of Kent at Canterbury** foregather on Mondays from 7.30 p.m. at the club shack; listen out on S15 for talk-in, or get in touch with the Hon. Sec. — *see* Panel.

There is a junk sale in store for the **Vale of White Horse** members on April 5, at the "White Hart" in Harwell village, with an informal on 19th too.

We hear that there are moves afoot to change the venue for the **Verulam** formal meetings, and so we feel it best to refer you to the Hon. Sec. — *see* Panel for his details.

Next we come to **WACRAL**, the club comprising those who feel themselves to be dedicated Christians as well as amateurs or SWLs; details from the Hon. Sec.

April 5 at **Wakefield** is a Questions Night, at Holmfield House, Denby Dale Road, Wakefield; on 19th they have the AGM, at the same venue.

Just one meeting is noted for **West Kent**, namely the AGM on April 29, at the Adult Education Centre, Monson Road, Tunbridge Wells. In addition they have informals at the Drill Hall in Victoria Road; details from the Hon. Sec. at the address in the Panel.

The **Wirral** crowd have a place at Irby Cricket Club, where they are to be found on April 13 for a demonstration by *Sota Communications;* on 27th they have a talk on passive D/F, tips and wrinkles by G8UZZ and others. In between, there is the informal on April 6 at the Railway Hotel in Meols, and on 20th at "The Harp" in Neston.

One week later than usual, the **Worcester** meeting at the "Old Pheasant" in New Street is on April 11, for the Construction Contest. April 25 is down for an informal at the same venue.

**Yeovil** have moved to Milford Recreation Centre, Milford Park, Yeovil; on April 7 G3KSK talks about the half-wave dipole, and on 14th G3MYM takes over to talk about aerial height. April 21 is down for a talk by an SWL member on his home-built delta-loop aerial, and on 28th there is a natter evening.

They would welcome visitors or new members at **York**, where the gang foregather every Friday evening at the United Services Club, 61 Micklegate, York. To judge by G3WVO's letters each month they sound a really nice crowd there.

## Finale

That's it for another bumper month; the deadlines for the next few months are in the 'box', and are for arrival at Welwyn; address to your scribe, SHORT WAVE MAGAZINE, 34 High Street, Welwyn, Herts. AL6 9EQ.

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## Radio Amateur's Examination

The periodic review of the syllabus for the Radio Amateur's Examination is now due and the City and Guilds R.A.E. Subject Committee has established a working party for this purpose.

The principal objective of the Examination is to ascertain the candidate's ability to operate an amateur station within the terms of the licence and not necessarily to test expertise in particular aspects of the Amateur Service. Suggestions for alterations or amendments to the existing syllabus would be welcome and should be sent to Mr. S. D. Allison, City and Guilds of London Institute, 46, Britannia Street, London WC1X 9RG

## Mobile Rallies, 1983

**April 10,** Swansea A.R.S. Rally in the Patti Pavilion (next to St. Helens County Cricket Ground) on the A4067 Swansea-Mumbles road, 10.30 to 5 p.m., talk-in on S22 by GB2SWR, trade stands, local repeater groups, bring-and-buy, RSGB bookstall, operational HF/VHF stations, licensed bar and refreshments. Further details from Roger Williams, GW4HSH, QTHR (tel: Swansea 404422). **April 10,** Lough Erne A.R.C. Rally at the Killyhevlin Hotel, Enniskillen, from 1 p.m., talk-in on S22, trade stands, bring-and-buy, family attractions. Details from A. Sammon, 0365-4821 working hours. **May 1,** Maidstone A.R.S. Rally at the YMCA Sports Centre, Melrose Close (off Cripple Street), Maidstone, Kent, 11 to 5 p.m., admission 50p, talk-in on S22 by GB2YSC, trade stands, bring-and-buy, bookstall, family attractions, ample parking. Full details from D. Wilcox, G4FOE, QTHR. **May 8,** Lincoln Hamfest at the Lincolnshire Showground (4 miles north of Lincoln on the A15), starts 11 a.m., talk-in on 144 MHz (S22) and 432 MHz (SU8), facilities for the disabled, family attractions, refreshments, licensed bar, ample parking. Further details from Pam Rose, G8VRJ, c/o City Engineers Club, Central Depot, Waterside South, Lincoln. **May 15,** Northern Mobile Rally at the Great Yorkshire Showground, Harrogate, 11 a.m. to 4.30 p.m., talk-in, trade stands, bring-and-buy, full range of family attractions, bar and refreshments, ample parking. Details from J. Annakin, 25 Ashfield Place, Otley, Leeds LS21 3JN. **May 15,** Swindon and District A.R.C. Radio and Electronics Rally at Park School, Marlowe Avenue, Swindon, Wilts., doors open at 10 a.m., admission 50p, trade stands, talk-in on 2m. (S22) and 70cm. (SU8), many family attractions, refreshments, ample free parking. Further details from K. Saunders, G8SFM, QTHR. **May 22,** B.A.T.C. Exhibition of Amateur Television at the Post House, Leicester, doors open at 10 a.m., demonstrations of fast-scan, slow-scan and narrow-bandwidth television, plus the B.A.T.C. outside broadcast unit, trade stands, full range of Club books, bar. Full details from T. Brown, G8CJS, QTHR (tel: 0532-670115). **May 29,** East Suffolk Wireless Revival at the Civil Service Sportsground, The Hollies, Straight Road, Ipswich, from 10 a.m., trade stands, transceiver clinic, aerial testing range, 'fleamarket', 'car boot' sale, family attractions, licensed bar. Full details from J. Tootill, G4IFF, QTHR (tel: 0473-44047). **May 29,** Plymouth R.C. Rally at Tamar High School, Paradise Road, Stoke, Plymouth, starts 10 a.m., many trade and general interest stands, refreshments and bar, talk-in on SU22 and SU8. Full details from D. Whitbread, G6EQM, QTHR (tel: 0753-20224). **June 12,** Elvaston Castle Mobile Rally at Elvaston Castle Country Park (5 miles S.E. of Derby on the B5010), all the usual attractions with full on-site catering, opens 10 a.m., talk-in on 144 and 432 MHz by GB2ECR, admission free, 35p car park charge levied by local authority. Further details from Ian Cage, G4CTZ, QTHR. **June 19,** Denby Dale and District A.R.S. Rally at Shelley High School, Skelmanthorpe, Huddersfield. Full details from J. Clegg, G3FQH, QTHR. **June 26,** 26th Longleat Mobile Radio Rally, Longleat Park, Longleat, Warminster, Wilts., all the usual arrangements at this splendid site. Details from C. Rose, G8YCV, QTHR (tel: 0225-311687, or 0272-218279 day). **July 10,** Worcester and District A.R.C. Rally, at Droitwich High School, Ombersley Road, Droitwich. Details from B. Jones, G8ASO, QTHR (tel: Worcester 351565). **July 24,** Anglian Mobile Rally, at Stanway School, Colchester, starts 10 a.m., talk-in on 2m. Information from D. Sellen, G3YAJ, 020639-3938. **August 27,** Scottish Amateur Radio Convention, organised by the West of Scotland A.R.S., at Cardonald College, Mosspark, Glasgow. Full details from I. McGarvie, GM4JDU, QTHR (tel: 050581-2708).

More mobile rally dates will appear in subsequent issues. If you have not yet notified us of *your* rally, now is the time to do it! Send the information to our Club Secretary, marking the envelope "Mobile Rally". And don't forget we are always glad to receive photographs of rally events for possible publication.

## ("SITUATIONS" AND "TRADE")

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### TRADE

**Aluminium dipoles:** 4m., 6m., 10m., £7.95 each; 12m., 15m., 17m., 20m., £9.95 each. **Cables:** RG58, 19p/m; RG8, 49p/m; 300-ohm TF, 12p/m. **Connectors:** PL259/6, 49p; PL259/9, 49p. **SWR meters:** 5w. HF, £5.95; 100w. HF, £15.95; 10w. 2m/70cm., £19.95. **PSU,** 13.8v. 3/5A, £14.95; 5/7A, £16.95. **Halbar aerials.** Barclaycard/Access. All prices include VAT and post/packing. —**Electronic Facilities,** 3 High Street, Sandy, Beds. (Tel: 0767-81494).

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**Morse Code cassettes, C90,** 8-13 w.p.m. in groups of five, plain language, 3-minute sections, numbers, exam pieces, etc., with readback, inclusive price £3.20.—**S.M. Spain (Bromsgrove) Ltd,** 2 New Road, Bromsgrove, Worcs. (Tel: Bromsgrove 72460).

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### READERS

**For Sale:** Yaesu FT-707 HF transceiver with 11 metres, £350 for quick sale.—Ring Hatton, Derby 372696.

**For Sale:** Eddystone EC-10 communications receiver in good working order, £45.—Ring Bassnett, 041-632 9250.

**Selling:** Yaesu FT-101ZD(FM) Mk.III transceiver, as new, boxed with handbook, £535. Yaesu FRG-7700 receiver, as new, boxed with handbook, £230. Yaesu YS-2000 SWR/Power meter, 1.8-60 MHz. Dummy load, 3.5-500 MHz, offers.—Ring Taylor, 0452-721508 after 6 p.m. or weekends.

**Selling: Trio R-1000 receiver, almost new, mint condition, with manual, bargain £195 cash.—Ring Howard, Thanet 601041 after 6 p.m.**

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**Sale:** Sony ICF-2001 synthesized LCD receiver, new and boxed, under guarantee, £100 cash.—Ring Gosling, 021-360 5429.

**For Cash Sale:** National Panasonic Model RF-4800 communications receiver, FM/LW/MW/SW, unscratched, little used, £185. Buyer collects.—Ring Lippincott, Crewkerne 72082 after 6 p.m.

**For Sale:** Realistic DX-200 receiver, excellent condition, **£105** or near offer.—Mehta, 32 Blenheim Road, Gloucester GL1 4ER.

**Wanted:** K.W. Vespa or Viceroy, or similar HF SSB Tx. Or exchange AR88D in excellent condition for KW-2000 or similar transceiver. New G4, studying 'A' Levels, with sparse finances!—Ring Green, Durham 733743 after 6 p.m.

**Selling: Yaesu FT-707, FP-707, FC-707, FV-707DM and YM-35 scanning mic., all absolutely mint and still under guarantee, £675. —Ring Goodwin, 051-606 9170.**

**Selling:** FT-708R 70cm. hand-portable, complete with extension mic., 12v. adaptor and mobile mount, very good condition, £150. —Ring Moyse, G8RWF, Dunstable 64682.

**Sale:** Hilomast 56-ft. telescopic mast, electric winch operated, with tilt-over, £250.—Ring Bootman, G3MWG, 01-959 5156.

**For Sale:** Eddystone 830/9 and 680X receivers, both overhauled, with manuals, £200 and £75 respectively. Or would exchange both for mint Grundig Satellit 3400 or Zenith R7000. Spares for 680X available.—Ring 01-699 4413 after 6 p.m.

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**For Sale:** KW-204 Tx with Shure 201 mic. and spare 6146's; KW-202 Rx with matching speaker, handbooks and connecting cables; KW-107 Supermatch. Mint, may split, £375.—Ring Taylor, G4KKG, Yeovil 25327.

**Selling:** AR88, working order, not in original case, £30. Buyer collects.—Ring Jones, Wellington 4540.

**For Sale:** RTTY. **Siemens** T100 teleprinter, tape punch and reader, own loop supply, 75 bands, excellent order, £35. Siemens full works manual for T100, £5. **Datong** FL2 filter, £70. **UT4,** buffer storage, up/down speed converter, £70. **ST6** terminal unit, single/double current, £75. **Heathkit** SB-610 Monitorscope, £65. **Amtor Mk. I,** all interfaces, documentation, etc., £60. RTTY time clock, prints and sends time, £60. G3PLX/G3MEJ 1024-character message store with counter, £60. **Tech** TE-20D RF generator, £30. **Tech** TE-22D audio generator, £30. **Central** 280 VTVM, £28. **Heathkit** AV-3U millivoltmeter, £28. **Eagle** RF indicator, £4. High-impedance mic., £8. **Lafayette** TE-18 grid dip meter, £16. Three Creed spring gauges, £10. **Heathkit** IB-1100 frequency counter, £35. All items delivered for cost of petrol.—Michaelson, G3RDG, QTHR. (Tel: 01-455 8831).

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**Sale:** Tasco CWR-680 Telereader, £135. Codar PR-40 preselector, £10. Microwave Modules 432/28 MHz converter, £10. S.E.M. 144-4 MHz converter, £10. S.E.M. HF pre-amp., £5. G2DYM trap dipole, unused, £30. ASP-667 432 MHz mobile colinear, unused, £10. Postage extra.—Hunt-Duke, G4I0T, QTHR. (Tel: Folkestone 76063).

**For Sale:** Eddystone 840A general coverage receiver, 0.5-30 MHz, provision for SSB/CW, excellent condition, recent professional overhaul, complete, with long-wire and insulators, £100.—Ring Reg, St. Helens (0744) 36178.

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**Sale:** Z-match, 80-10m., 80-ohm dummy load, SWR bridge (as *Rad Com*, July 1976), £25. Speaker, new, 8-ohm, 6 × 4", £3. Two U.S.A. General Electric 6JS6C valves, boxed, £4 pair.—Ring Edwards, G3MBL, 01-445 4321.

**Selling: complete 144 MHz station: Icom IC-251E all-mode transceiver; Icom HM7 dynamic microphone; Yaesu FRG-7000 communications receiver; Yaesu YH-55 headphones; Amtech 200 ATU; Hokushin GP-144W colinear antenna with wall brackets; *plus* "The Radio Amateur's Handbook", "Two-Metre Antenna Handbook" and many other books and magazines. Everything is *mint condition*. £675, *the lot*.—Ring Newell, Hemel Hempstead 62138.**

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**Exchange:** B2 receiver and set of coils for PSU for same apparatus. Also required, meter covers for TR9 transmitter.—Ring Pantony, G3KXB, Whitstable (0227) 792340.

**Selling:** Icom IC-701 digital HF rig, with 701PS and Electret mic., mint, £398.—Ring Thanet 69642 anytime.

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| Cubical Quad Antennae. 2nd Edition | £3.90 |
| Simple Low Cost Wire Antennas, by Orr | £4.85 |
| Aerial Projects (Penfold) | £2.30 |
| 73 Dipole and Long-Wire Antennas (E. M. Noll) | £6.55 |
| Antenna Book (ARRL) *new 14th Edition* | £6.70 |
| The (ARRL) Antenna Anthology | £3.65 |
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| How to Build Hidden, Limited-Space Antennas That Work, by WB4KTC (Tab) | £7.65 |
| The Antenna Construction Handbook for Ham, CB and SWL (Tab) | £5.55 |
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| The Shortwave Listener's Antenna Handbook (Tab) | £8.80 |

### BOOKS FOR THE BEGINNER

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| Elements of Electronics, *Book 1* | £2.50 |
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| Elements of Electronics, *Book 5* | £3.35 |
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| Guide to Amateur Radio, *new* 19th Edition (RSGB) | £3.40 |
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| Radio Amateur's Examination Manual, *Latest 10th edition* (RSGB) | £3.35 |

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| Projects in Amateur Radio and Short Wave Listening *(Newnes)* | £3.65 |
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| Teleprinter Handbook. New 2nd Ed. (RSGB) | £13.70 |
| TVI Manual *(2nd Edn.)* (RSGB) | £1.85 |
| Working with the Oscilloscope | £4.60 |
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| Oscilloscopes — How to Use Them, How They Work (Newnes) | £4.45 |
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| The Complete Shortwave Listener's Handbook 2nd Ed. (Tab) | £7.65 |

### USEFUL REFERENCE BOOKS

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| Solid State Design for the Radio Amateur (ARRL) | £6.35 |
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| U.K. Call Book 1983 (RSGB) | £5.25 |
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| Amateur Radio Awards, (RSGB) | £3.40 |
| Electronics Pocket Book, 4th Edition (Newnes) | £6.20 |

### VALVE AND TRANSISTOR MANUALS

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| Towers' International Transistor Selector, latest Edition (Up-Date No. 2) | £10.60 |
| Semiconductor Data Book, 11th Edition (Newnes) | £7.10 |
| International Transistor Equivalents Guide | £3.35 |
| International Diode Equivalents Guide | £2.60 |

### VHF PUBLICATIONS

| | |
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| VHF Handbook, Wm. I. Orr W6SAI | O/S |
| VHF/UHF Manual (RSGB) 3rd Edition | *temp. O/P* |

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