55p

# The SHORT WAVE Magazine

VOL. XL APRIL 1982 NUMBER 2

# LOWE SRX30D

***a familiar name, but a whole new receiver***

A familiar name, but a whole new receiver behind it. Building on all the excellent features of the SRX-30, including the drift cancelling system covering 500 KHz to 30 MHz; the selectable sidebands and AM; the easy to use tuning system; we now introduce the all new SRX30D which incorporates the suggestions made by our customers. Outstanding new features are:—

- Extended coverage 200 KHz - 30 MHz.
- Digital readout in large green display units which give true unambiguous frequency information — even when you switch sidebands or use the clarifier.
- All new frequency sythesis using Plessey SL6 1641 double balanced modular ICs for a new high standard of performance.
- All new audio system which produces outstandingly good quality on the built in speaker, and is capable of driving external hi fi speaker units for even better sound.
- All new IF filters with optimum bandwidth for mode in use. Automatic filter selection from mode switch.

There is so much that is impressive about the SRX30D that you have to see it and handle it to really appreciate the performance.

We predict that the SRX30D will be a landmark in low cost, high performance SWL receivers. Just consider how much you should pay for a receiver covering 200 KHz - 30 MHz with accurate digital readout; high performance USB/LSB/AM with switched filters; drift cancelling frequency systhesis; built in mains supply and built in speaker; high quality construction and advanced design — and so much more.

Then look at our price for the SRX30D and you will be even more impressed.

**£215.00 inc VAT, Securicor carriage £5.00.**

# UL1000

## £39.50 inc. VAT

The UL-1000 is a new concept receiving station accessories and will help any keen listener to improve the performance of his station, particularly in the difficult conditions existing in the medium wave band (500 KHz-1.6 MHz).
The UL-1000 is a self-contained variable gain, tuned preamplifier suitable for use with various aerial systems. A particular feature of the UL-1000 is the use of a high Q loop aerial for the 500 KHz-1.6 MHz band.

Carriage £2.00

# COMPARING THE COST OF A TRIO TR2300/TR2200GX WITH THE COST OF A POPULAR FAMILY CAR

| YEAR | TR2200GX/TR2300 | POPULAR CAR |
|---|---|---|
| 1976 | £173.70 | £2,108 |
| 1977 | £173.70 | £2,676 |
| 1978 | £210.00 | £3,221 |
| 1979 | £199.00 | £3,488 |
| 1980 | £166.75 | £4,470 |
| 1981 | £166.75 | £5,255 |
| 1982 | £166.75 | £5,300 |

So the TR2300 now costs less than its predecessor did in 1976. Not only that, the TR2200GX of 1976 only had 12 channels where the TR2300 of today covers the full amateur band. To give some idea of how costs have increased over the same period we quote, in comparison, the cost of a popular four door family car.

So we rest our case — the TR2300 has to be, in today's market, outstanding value for money and, what is more, the TR2300 has an unprecendented reliability factor.

There is no need to talk of full 2 metre band coverage, the 1 watt of perfect transmitted signal, the fully comprehensive list of included accessories: carrying case, Nicad charger, 12 volt power cord, shoulder strap, hand microphone, collapsible whip antenna, reverse repeater facility, automatic tone burst, switchable illuminated frequency dial, consequent long life operation out in the field.

Don't ask us about the Trio TR2300 — ask our best form of advertisement: one of the 5,000 owners!

**TR2300 £166.75 inc VAT carriage £5.00**

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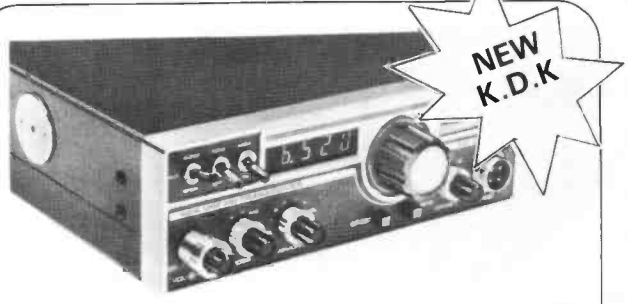
LE

# VHF/UHF MOBILES — SIX OF THE BEST!


## 70cms, SSB, £129.00 inc.!!

**KLM JUMBO (Liner 430)** 432.00-432.48MHz (Plus further 480kHz band (430 up fitted), USB/LSB, 10W PEP Auto Scan ± 10kHz, semi break-in CW, FET RF and mixer, RIT N.B., c/w mic and bracket.




## 2m, 25W, FM, £199 inc.

**2025 MARK II** Full coverage 2M Transceiver, 12½kHz (set 12½-200kHz), rapid tune, 10 "easy write" memory channels, memory or band-scan between programmable limits, auto scan stop dependant on squelch *and* centre zero.


## 2m or 70cms FM, from £245 inc.

**FT720R** 'remotable', 4 memories, RX priority, scanning, mic tune, FT720RV (2M, 12.5kHz/600kHz) 10W £245, 25W £255. FT720RU (70cm, 25Khz/1.6MHz) 10W £265. Dual band capability.


## 2m, 25W, FM, £239 inc.

**FT230R** 6" × 2" × 7", 12½/25kHz, ± 600kHz, special LCD display, 10memories, memory and band scan, RX priority feature, two independent VFO's.

## FT480R (2m) £379 inc. VAT @ 15% & SECURICOR

- ★ USB-LSB-CW-FM (A3j, A1, F3).
- ★ 30W PIP A3j, 10/1 W out A1 F3.
- ★ Bandpass filter no tune design.
- ★ Bandwidth 2.4kHz and 14kHz at −6dB.
- ★ 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.
- ★ Digital receiver offset tuning.

- ★ Advanced effective noise blanker.
- ★ Memory scanning with slot display.
- ★ Up/down tuning/scanning from mic.
- ★ Priority channel on any memory slot.
- ★ Satellite mode allows tuning on Tx.
- ★ Scanning for busy or clear channels.
- ★ Size (Case): 8.3" D, 2.3" H, 6.9" W.
- ★ LED's; "On Air" Clar, Hi/Low, FM mod.
- ★ Matching PP80 Mains PSU available.

YAESU

SMC

## FT780R (70cm) £449 inc. VAT @ 15% & SECURICOR

- ★ 144-146MHz (143.5-148.5 MHz possible).
- ★ Excellent dynamic range and sensitivity.
- ★ FM; 25, 12½, 1kHz steps.
- ★ SSB; 1,000, 100, 10Hz steps.
- ★ Any TX Rx split with dual VFO's.
- ★ ±600kHz standard repeater split.
- ★ Four easy write-in memory channels.

**FT480R**

- ★ 1.6MHz shift now available

- ★ FT780R 1.6 fitted 1.6 MHz Shift **£459** inc.
- ★ 430-434MHz (440-445) possible.
- ★ GaAs Fet RF for incredible sensitivity.
- ★ NMOS four bit micro control.
- ★ FM; 100kHz, 25kHz, 1kHz, steps.
- ★ SSB; 1,000, 100, 10Hz steps.
- ★ Repeater access by use of dual VFO's.
- ★ Four easy write-in memory channels.

**FT780R**

# SPRINGTIME — TIME TO BE THINKING HAND PORTABLE

LOW PRICE

## FT207R £169 inc.

VAT @ 15% & POSTAGE

- ★ 144-146MHz (144-148 possible)
- ★ 12.5kHz synthesizer steps
- ★ 4 bit CPU chip for freq. control
- ★ Keyboard entry of frequencies
- ★ Keyboard lockout safety features
- ★ Digital display to hundreds of Hz
- ★ Display auto shutdown timer
- ★ Four Channels of memory
- ★ Memory back up disable
- ★ Up/down manual tuning
- ★ Bandscan for busy or clear channels
- ★ Memory scanning features
- ★ ±600kHz split built in
- ★ Any split + or − programmable
- ★ Easy change NiCad packs.
- ★ BNC antenna connector
- ★ "On Air" and "Channel Busy" LEDs
- ★ Built in condenser microphone
- ★ 200mW AF to internal/external speaker
- ★ Extenal speaker/mic available
- ★ 2.5/0.2W of RF output
- ★ Rx; 35mA squelch, 150mA full vol.
- ★ Tx; 250mA low, 800mA high
- ★ 0.3μV for 20dB quieting
- ★ Double conversion 10.7MHz and 455kHz.
- ★ D.T.M.F. encoder built in
- ★ 1.7 (2.2)" D x 2.5 (2.7)" W x 6.7 (7.2)" H
- ★ C/w NiCad pack, helical and case

## FT290R MULTIMODE PORTABLE/MOBILE £249 inc.

VAT @ 15% & SECURICOR

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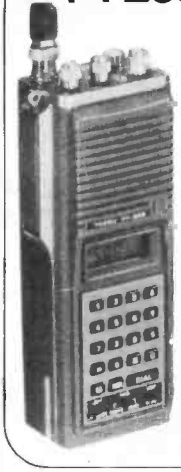
FULL RANGE OF MATCHING ACCESSORIES

- ★ 144-146MHz (144-148 possible)
- ★ Multimode USB, LSB, FM, CW
- ★ 2.5W PEP, 2.5W RMS/300mW out
- ★ LED's, "ON AIR", "BUSY" MC meter; S.PO
- ★ Integral telescopic antenna
- ★ Bandwidth 2.4kHz and 14kHz @ − 6dB
- ★ Optically coupled main tuning
- ★ 100Hz backlit LCD Frequency display
- ★ 10 memory channels "5 year" backup
- ★ FM: 25kHz and 12.5kHz steps
- ★ SSB: 1kHz and 100Hz steps
- ★ Any TX/RX split with dual VFOs
- ★ ±600kHz repeater split 1750kHz burst
- ★ Up/down tuning from microphone
- ★ AF output 1W @ 10% THD
- ★ 58 (H) x 150 (W) x 195 (D) (1.3kg)
- ★ Rx, 70mA, Tx; 800mA (FM maximum)
- ★ Mobile bracket available
- ★ Matching 10W linear Amplifier
- ★ 8.5 – 15.2V DC External
- ★ 8 'C' NiCads or Drys
- ★ SMC 2.2 A/Hr NiCad **£2.70 inc**

## FT208R(2m) £209 inc.

VAT @ 15% & POSTAGE



- ★ 4 bit CPU chip frequency control
- ★ Keyboard entry of frequencies/splits
- ★ LCD digital display with backlight
- ★ Ten channels of memory
- ★ Memory back up five-year lifetime cell
- ★ Up/down manual tuning
- ★ Manual or auto scan for busy/clear
- ★ Priority channel with search back
- ★ Memory scanning feature
- ★ Scan between any two frequencies
- ★ Auto scan restart
- ★ Quick change NiCad pack
- ★ 1,750Hz tone burst
- ★ Built in condenser microphone
- ★ 500mW AF to int/ext speaker
- ★ External speaker/mic available
- ★ Keyboard offers 16 tone DTMF
- ★ 168(H) × 61(W) × 39(D)mm
- ★ C/w NiCad pack, helical

## FT708R(70cm) £219 inc.

**FT208R**

- ★ 144-148MHz (144-148 possible)
- ★ 12.5/25kHz synthesiser steps
- ★ Any split + or − programmable
- ★ ±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
- ★ Dual conversion 16.9MHz and 455kHz

**FT780R**

- ★ 430 – 440MHz (440 – 450 option)
- ★ 25kHz synthesizer steps
- ★ Any split + or − programmable
- ★ ±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
- ★ Dual conversion 46.255MHz and 455kHz

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| FRV-7700A | 118-130MHz | 130-140MHz | 140-150MHz |
| FRV-7700B | 118-130MHz | 140-150MHz | 50-60MHz |
| FRV-7700C | 140-150MHz | 150-160MHz | 160-170MHz |
| FRV-7700D | 118-130MHz | 140-150MHz | 70-80MHz |
| FRV-7700E | 140-150MHz | 150-160MHz | 118-130MHz |
| FRV-7700F | 150-160MHz | 160-170MHz | 118-130MHz |

**Phone for latest prices, and remember, our basic Receiver price includes a FREE Heliscan Aerial.**


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This unique HF communications receiver with keyboard entry and LCD covers AM/SSB/CW from 150kc to 30MHz and FM from 76-108MHz with six station memories.

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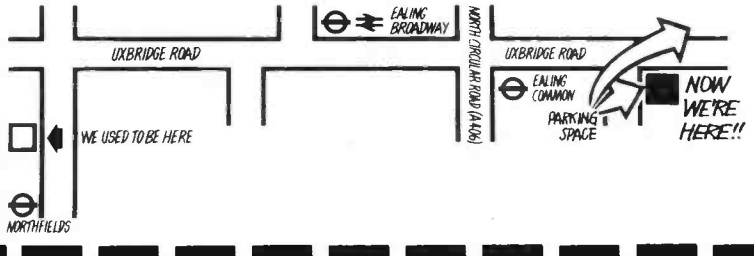


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# SHORT WAVE MAGAZINE


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### CONTENTS




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AUTHOR'S MSS

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FOR THE RADIO AMATEUR AND AMATEUR RADIO

The SHORT WAVE Magazine

EDITORIAL

# Un-Amusing Whitehall Farce

The shambles resulting from the inept and cavalier announcement in the *London Gazette* of February 12th must surely by now have come to the attention of every reader in the U.K. In this action the Home Office failed to consult the RSGB on new licence schedules, having made a firm commitment to do so: they just drew up and published changes without saying a word to anyone. It was only by pure chance that the RSGB came to hear of it at all.

The *Gazette* notice was full to the brim with errors of basic fact, and required immediate action to stop Class-B licensees using the HF bands; in addition, reciprocal Class-C and D licensees had been completely ignored. The position as this is written is that, happily, most of the problems have been resolved: essentially, power levels below 1 GHz will be measured in terms of output to the aerial terminals — which is long overdue. Above 1 GHz CW input power will be measured or, on SSB, power output; plus bringing the licence requirements into line with best practice in terms of RF radiation hazard to others.

About the time this issue comes to be read, there will be a second, correction, entry in the *London Gazette* which will largely set matters to rights; but we have to accept the loss of the bottom 10 kHz of Top Band, as this was in the WARC plans anyway.

It was a sorry mess, and we can all be very grateful that the RSGB, when it discovered what was going on, jumped so hard on the Home Office — which has emerged with egg on its face and a bloody nose to go with it. Those who were giving the RSGB so much stick, both on the phone to Hq and over the air, would do well to appreciate that in this instance the Society served the amateur radio movement with great skill and application — and at almost impossibly short notice. They certainly deserve the thanks of all of us for taking such prompt and effective action.

We hope — though doubt — that those in the Home Office responsible for that *Gazette* notice will receive the treatment appropriate to such sheer incompetence and downright bad manners.

# "S.W.M." Prizewinner

Last year it was QRP, this year it's QRO. John Nelson, G4FRX, takes the contributor's prize of £75 with his excellent series of articles, "A High Performance Power Supply and Control System for 4CX350/4CX250 Amplifiers". The well thought-out, carefully built and thoroughly tested design emerged as a masterpiece and, we feel, likely to become something of a classic. Congratulations, John!

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This is also the time to thank all the other contributors to Volume 39 — their work is just as much appreciated, and we hope they will continue to share their ideas and experience.

To those who feel they have something they *could* write about, but have never quite taken the plunge — well, take it! We are always glad to consider for publication articles on any aspect of amateur radio. As we said this time last year on the subject of articles, small can indeed be beautiful.

*WORLD-WIDE COMMUNICATION*

# COMMUNICATION and DX NEWS

E. P. Essery, G3KFE

THIS just *has* to have been the most eventful month in amateur radio for many a year! Primarily, of course, the Home Office fiasco comes to mind, but this matter is dealt with elsewhere in this issue.

Next politics, and we are pleased to note that the Chinese authorities have at last made formal announcement that Amateur Radio in the country is acceptable. Initially it will be schools, clubs and so on and individuals, maybe, later on. Applications from interested parties are being taken now, although no firm date for the start has at the time of writing been given. Welcome aboard, BYs!

Then of course we can talk of conditions. Since February 27 to March 16, the forecast hasn't a single 'normal' in it — mostly disturbed, below normal and low normal.

Turning to another matter, KF10/CE0X seems unlikely to count in the DXCC leagues at the time of writing; thus *TDXB,* but we don't as yet know the outcome.

## Top Band

Not much reportage, but quite a lot of activity. D. A. Whitaker (Harrogate) has noticed quite a lift in the inter-G activity, and quite a bit of garden-variety DX to the tune of some 25 countries heard on SSB; and in the CQ WW 160 affair David logged some 38 G stations in there and digging. The Americans weren't very audible until the dawn lift, during which some 38 were heard on SSB, plus one from the Caribbean in the shape of Herb, KV4FZ. Also heard were IR8ONU, LZ1KDP, EA8QL, EA9EU and — rare one, this — GU3KFT.

Poor old Ted at G2HKU (Sheppey) is going to the bandage-factory as soon as his report is done, and reckons he'll not be on the air for a while after the repairs are completed. Ted hooked up with SSB to EA3VY, PA0JKF, and PA0PN, but he prefers CW, and this managed to work OK1KPX, UA1DZ, HB9CEY, UQ2PM, W3IH/MM, OZ1LO, UQ2GEI, GJ2LU, PA0LOU, UT5AB/UI8, GM3GNM, UT5AB/UJ8, EA2OP, LZ1KDP, UK2RDX, EI9J, YU3TU, UK9CET, UP2BAW, OL4BBP, UL7PBY, and FC9VN.

Now we come to the whopping list from G4AKY (Harlow), and the accompanying comments. Dave's month's score this time is up to 30 countries, and gotaways included such as EZ7RAC, G3ZYY/KV4, W4OWJ, PY1ZAE, plus ZD7BW and C53AP who were both a bit too weak to be copiable. Looking at the pile, we see all continents represented again, VK6HD doing the Oceania honours, and PY1MAG playing for S. America. N. America was represented by some Ws and VP9BK, Africa by 5Z4CS (QSL *via* JI1VLV) and EA8QO, and Asia by UA9CSG, UK9FCW, UT5AB/UI8, UH8DC, and RF6FFW. Some 19 countries in Europe were represented, perhaps the most interesting being the Fs, possibly a short-term licensing for them. Turning to SSB, we have to note some twelve EU countries, W1CF, K4CNW, W8LRL, and finally a gotaway in KV4FZ.

One final comment here is that the loss of the lower 10 kHz of the band indicated in that fatuous Home Office announcement may possibly stick — after all, it was a WARC decision. A listen to the RSGB Hot Line may be able to indicate the latest, as the final announcement in the current round of talks will appear about the time we come to issue. Even if we don't lose it now, we have to accept that it is going to go in the end.

## Eighty

One has never heard Eighty in such a tizzy as it was in the week after February 12 as it then seemed that all the QRO SSB merchants were going to have to come down to Top Band levels — and as for the hot air, there was enough of that to blow the ionosphere away into space!

G3ZPF (Dudley) claims his absence from the band was "pure absent-mindedness and 'flu", which at least is a *different* excuse! His Winfield Wonder Wire seems to have performed adequately, as he managed to work most of the stations called, including 7X2MB, 3AONF, ZL3ABV, VE1ZZ, W1KM, K4BI, KE1F, WD4AXM, W3RJ, N2JJ, CO1HJ, OY6FRA, ZB2HB/A, and EA8FJ.

On Eighty, G2NJ (Peterborough) found G4EIM/P, who was on a platform in the North Sea off Den Helder in the Netherlands, with home-brew gear and a 599 signal; while the other one was LU1ESC/MM in the English Channel.

Long time since we last had word of G2BON (Aldridge), but Tom reckoned to be quite chuffed at working his first ZL on this band — achieved in a month in which he also picked out UA2FBR, N1XZ, KR2N, CN8CY, OY9R, 6W8AR, PJ8UQ, ZL2BT, N6WO/4, K3UZE, G3ZYY/KV4, VO1OO, and PR2DD. Tom reckons his IC-701 will load up nicely on 18 and 24 MHz into his G5RV aerial, but it won't play on 10 MHz. Quite surprising this, as for most people a G5RV loads up quite nicely at 10 MHz.

Turning back now to D. A. Whitaker David says he hasn't exactly flogged the band to death, but he has heard on SSB, such as IZ1AN, 6Y5DA, C6ANI, VP2MKD, 5T5CJ, W6, W7, J6LF, VP2EEA, KH6XX, CE6COR, PY5AJK, and HC1HC, all progressively in time between 0500-0800z; and in the evenings progressing from 2100 to midnight zulu there were 7Z2AP, UI8FFF, UJ8SAO, UI8ZAC, UH8YAC, EP2TY, Z21EV, ZB2CW, PY1YLK, 5T5RR, ZB2J, 7Z2AP, 3V8DX, and J73BB.

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

May issue — April 1st
June issue — May 6th
July issue — June 3rd

*Please be sure to note these dates*

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## Forty

For those who know how to deal with it, 7 MHz this year has been quite superb. David Whittaker already has his first 119 countries heard on the band, and knows of another thirty which have been available — as he says "who needs Twenty for DX?" His SSB loggings start from around 0700z and include VK9NS, often a very good signal, 3V8DX, 6Y5DA, VP2EX, FJ8CR, HC2GR, FY0FOL, JW0P, 6Y5AG, VP2MF, VP2EV, ZL4OY/A, and TG9WE. During the day, of course, David is working, but by 1700z the receiver is in use again and finding 9X5SL, FR7CC, 9K2BE, YB2CR, JB4IJ, YB0WR, HV2VO, 5T5CJ, ZD7BW, UL7PBI, EP2TY, JN0ATW, UF6FBX, 3V8DX, UK0AMM, ZD8MW, CX3TU, CP6EL, A71AD, 5B4CV, ZB2HD, UJ8ZCW, JA6XMM, CO5CV, HS2AMZ, EP2TY, CP1FQ, 9M2AE, C31SD, EA9IB, SV5JH, UI8ZAC, FM7WJ, HK0FBF, and 7Z2AP taking him to midnight.

Going now to the note from G2HKU, Ted mentions just one, in 9H1BB, worked on SSB.

G3NOF (Yeovil) is the next reporter, somewhat unusually; Don says he is on the band a bit to try and balance up his country score a bit, with EA6NC, EA8ZS, M1C,

UK2PRC, 1A0KM, while a A22BW was audible weakly but not workable.

G2BON starts his list with OH0NA, W6KG/PZ1, HC1NEA, VK3XI, 6W8AR, HK0FBF, ZL4OY/A (San Andreas and Campbell Is. respectively), VK2WC and VK2AVA.

## Odds

Looking first at *TDXB,* we see that there is a planned Mellish operation by VK2BJL during May with DJ9ZB and EA8AK accompanying; they will probably be signing VK9ZR which they have had in the past. It is noted also that on the way back the group will try to be on from Willis Is. for a few days. As for the Kermadecs, they are still trying for a licence, and it seems the authorities are not very willing for radio amateurs to visit the island.

4Z4TT hopes to get on from the Andaman Is., but we wonder about this one, as the Indian authorities have a one-year residence requirement for an amateur ticket.

Having just recently heard of all the problems in Tonga after Hurricane Isaac, one rather doubts the A35FR operation between March 26 and mid-April will be very active; one hopes that by the time this comes to print that Tonga will be something like back to normal after a nasty experience.

Looking for a candidate for our 'Lemon of the Month' award, we just have to offer G3RRA, noted by several as encouraging people to come on 10 MHz SSB "as the band is under-used!" He must be deaf or something. Other 'Lemons' go to those G8 and G6 Class B licensees who had the cheek to come up on Top Band (and, indeed, other HF bands) quoting the H.O. announcement of February 12 as their authority.

## Twenty

With things somewhat off song on 21/28 MHz this last few days, Twenty has been doing good business, even if the noise level on it is almost beyond belief.

G3RJV (Birmingham 37) says he hasn't found anything exciting on the band, but that he has been too occupied with preparing the next issue of the QRP Club magazine; nevertheless, the evening before his letter he did put his three watts on the band to obtain a nice 579 report from PY2SHC.

G4NKM (West Wickham) is preparing for a move, and as a result reckons he couldn't face the thought of operating 14 MHz — perhaps his mind was too occupied in the matter of a good DX aerial in a smaller garden than before. We sympathise!

G2HKU says his SSB found its way over to ZL3OI, ZL3FV, and ZL3RS, and he also keyed to KV4AA, and KV4CI.

On we go now to G2BON; Tom was another to largely ignore this band, mentioning only his QSOs with VK2NN, VP2SV, and 9Y50S.

Next we hear from G3FPK (Purley) who is quite enjoying the sensation of being back on the HF bands. Norman's makeshift vertical (one half of the driven element from an old tri-band beam!) loads up quite well on the bands through the station ATU. Norman mentions that anyone looking for Gozo may like to listen for the Gozo net on 14.280 MHz on Sunday mornings; and that in August some Gs are hoping to get permission to go to Aaland in the week beginning August 10 — primarily a VHF DX-pedition but the HF side is being handled by a Drake station with them and G4JVG and G4IWA. Turning now to the operating, G3FPK had just one SSB contact, with ZK1CG, caught just as Victor was asking for any replies from G. The QSL address is P.O. Box 618, Rarotonga. On CW best contacts were with 3D2VU, FO0PT, who was being upset by non-amateur QRM, PJ7, VP2MMP, and an ID9.

G3NOF hasn't spent much time operating the band, but he does note the early-morning VK/ZL long-path opening around 0800 as being fairly consistent, and the same areas noticeable short-path around 2000z, with evenings in general good to the Americas. Don sums it up as SSB contacts with such as VK3ATL/P, VK3ATM/P, VK5QX/P, VP2MIX, VP2EU, and XT2AU; while gotaways included EP2TY, FG7TD/FS7, and 1A0KM (who is now off until the autumn, we understand).

## 10 MHz

Not a bad old band, were these pestilential SSB signals not so persistent; and it is quite noticeable that the commercial activity has lifted since the amateurs got a look at it!

G2HKU says he had a QSO with GM3JDR up in Wick, who said he was going to appear on Top Band 'ere long, after a twenty-year break; we recall GM3JDR here for his 7 and 21 MHz lists from Golspie.

G3FPK notes that some surprising bits of DX are to be found; for instance C6ABA is quite a regular. It is nice to get such good reports with the makeshift aerial and ATU, which have added some 'new' European countries and good reports from South America and the Caribbean.

Another one who has looked at 10 MHz is G4NKM, who mentions a DF3 and a PA0 as being worked.

## Award

An interesting one, sponsored by the radio club of Marconi Space & Defence Systems, and called the Mary Rose Award. They will have GB2MAR on the air throughout May and October, the former to take in Telecommunications Day (May 17) and the latter covering the period of actually raising the *Mary Rose.* The certificate will have as its background motif the *Mary Rose* as she is shown in the 1545 list of King's Ships with, around the border, the Tudor Rose and the address of the Mary Rose Trust in suitable script. To get it, you have to make up 25 points; the idea is either 25 Hampshire stations at one point each, or twenty of them plus a QSO either with GB2MAR, or G4JMR the club Hq call. No QSLs, just a list certified by a club or two other amateurs, plus five IRCs if in UK, or ten from overseas. All we can add is to suggest a donation to the Mary Rose Trust wouldn't come amiss, as when she is lifted she will contribute almost as much to our knowledge of the period as did the *Vasa* of 1628 when she was raised from Stockholm Harbour (after finding her in 1957) on May 5, 1961.

## 21 MHz

G4NKM mentions working HI8RHB and SM0LH, and by a step down to five watts he made QRP CW contact with KA2KOA and YU3TWV.

Turning to G3FPK's log, Norman mentions 3V8DX as worked on SSB for a new one — this of course is G4JDT. On CW, he worked KN2M/J6L, VP2EL, VP2ESE, VS6CF, YB5AES, and 6E5MX from Mexico.

A big list of SSB stuff from G2BON for which we are duly grateful; it includes UA0SBO, JA3EGZ, HL1WD, W9TQA, PY5BI, ZC4MT, ZS6HW, JX6BAA, WA0CYW, G3ZCZ/4X, OD5LX, ED9IFP (Melilla), 7X2KBS, VK2BAG, 5N0KUY, EP2TY, SV8QH (Kefalonia Is.) and VK2XG.

Again just one for G2HKU — Ted seems to have worn himself out with his Top Band efforts! — in PY2GSA on CW.

G3NOF has his usual analysis of the band, noting that on occasions the East Coast Ws were audible weakly to as late as 2300z. He made SSB contact with A4XIJ, A92P, AP2P, FY0FOL, H44PT, HR1JSH, J3AH, JW5IJ, K9LA/V2A, KA5HVO, KC7EK (Arizona), KM5D,

**May issue due to appear on Friday, April 30th.**

N5CIO, N6DHX, N7BMX, TF3JB, VP2ED, VP2EU, VP2EV, VP2EX, UG6AF, UO5OBE, W6MEF, Z22JV, ZS2OM, 5N0ATW, 5T5AY, 6E5MX, 8P6OR.

## Ten Metres

Despite the general poor conditions, this does still seem to have been a favourite band, even if it's only for zapping the pirates at the bottom end. Indeed our first letter on this band, from G3LRO in East Ham, who points out that a CW QSO conducted with another local on top of a CB contact is a good idea, and wants to encourage folk to come on the band for local CW nets; or even Phone ones in the proper part of the band, which will, he reckons be a help to those B licensees wishing to get their CW copying ability up to the test standard. As he so rightly points out, it seems as though the only ones who will help with the problem are ourselves.

Next we have G4NKM, who offers a couple of UB5s on SSB with his sloping end-fed wire.

G3FPK notes that although in his area there is no let-up in the CB activity on the band, more of the locals are coming on the band to help shift them, and there are some obvious commercial firms using AM on the band as well. Norman himself had a spell of QRT as a neighbour was suffering TVI on a rented colour set, even though there was no problem with the same neighbour's portable TV. The BT lads suggested a month of QRT while it was sorted out, as they reckoned the set was picking up signals both direct into the IF *and* into the AF stages as well! Having heard no more, after 28 days, G3FPK was back in business. On SSB he worked VP2EV, while CW came up with FY0FOL and 9H4P.

Ten for G2BON included SSB with Z22JO, HH2DD, UI8CAJ, Z22JV, UA4WBJ/U9G, VS6HJ, and 3X1Z in the Guinea Republic.

Looking at the report from G2HKU we note he stuck to CW, and this mode raked in W6OV, N6EA, and N6RA.

An all-Ten and all-SSB report comes in from G4HZW (Knutsford) who has a two-element quad at 24 feet. He found things very poor most of the time, but with one or two very bright patches. February 27/28 were good, with VE7DXI pushing the needle up, as indeed did the KH6 and West Coast Ws. Stations worked from February 4 included VP8QG, ZB2J, Z21EV, FR7CG (Reunion), JAs, LU5ZI, CX2BJ, VP8ZV, KB2TY/VP2V, W2NQ/7 (on 11th at 23.46z), W7WKR at midnight on February 13, before the band died totally on 14/15th. Then came morning ZLs, and evening South Americans, and 3B8DB, after which another dead day was noted on 20th. 21st gave Europeans and P29CH, while 22nd was dead. On February 23, VP2ED and some West Coast Ws were found but again on 24/25th the band was dead. On 26th there were JAs and VK4NLR, and on 27th things were very good, with JAs, HL1SF, HL1QO, UA0LBM, XT2AT, DU1CPL, YBOAET, VE7DXI, 9Y4TM, W6s and W7s. On 28th, FK8CQ came back to a speculative CQ call, and some JAs were booked in, plus UAOs, VK3VXV, 3V8DX, 7Q7LW, KH6BOG, and K7RI. On March 1 Tony found ZB2ER and JAs, at which point Aurora came along and killed everything.

Now we come to G4LDS (Chelmsford) who notes that we got his reports crossed *again* last time round; and, would you believe, this month we missed his 14/21 MHz reports and now haven't time or space to slot them in. Sorry, Chris — there really seems to be a jinx around! Next month, *surely* all will be well. . . . Turning to the G4LDS Ten-metre report, we have to compress it somewhat, but in essence we have VK, W6, W7, VE1, VU2NP, SV100, JY9RV, DK6NL/5NB, CE6CFX, TI2RQ, a call from TI2SRR, ZD7BW, more Ws, VU2CJ, 5B4AN, TR8LJ, VE3OCU, PJ3HM/M, a call from VP8PG while the latter was beaming Stateside, VK9LA/V2A, OD5MU, SV1LS, VK9YC (hence removed from the Most Wanted Gotaway spot), EA8SK, VP2EU, K9MK/V2A, J6LB, YJ8NSO, and 5T5AY, not to mention the smaller fry.

Nice to be hearing from G3CED (Broadstairs) who says he hasn't been on the band very much, partly due to work, and partly because at age 74 he reckons that if he stayed in the shack he would be hypothermic in short order! When he did get on, it was all Ten metres, and includes CW to VP2ESE, VU2BK, PY1HQ, SV1NN, W3ARK, VP2ES, K7RDG, DK4PY/V2A, and a long and entertaining chat with UA9MX in Omsk; seems George said temperature was 6 degrees, and got back the observation that that was very hot — the temperature in Omsk being minus 20. Then came the comment that Edward's father was born in 1915, so G3CED "must be a very old man"!

Finally, we have an interesting report on the Russian RS7 satellite, heard on Ten metres and on 145.8 MHz by SWL Kelly in Belfast; the gear in use is the Yaesu FRG-7700 on Ten and a Bearcat 220 on Two metres, both receivers having simple indoor aerials.

## Finis

That's it for another month. Deadlines are as in the 'box', and the address is "CDXN", SHORT WAVE MAGAZINE, 34 High Street, Welwyn, Herts. AL6 9EQ.

# CIRCUIT OPERATION AND ALIGNMENT OF THE TRIO R-1000 RECEIVER, PART II

## THE CIRCUIT IN GREATER DETAIL, CONCLUDING WITH A DESCRIPTION OF THE ALIGNMENT PROCEDURE

**J. L. LINSLEY HOOD, C.ENG., MIEE, MIMC**

IN the first part of this article I looked at the general circuit layout of the R-1000, as a representative example of the new style of 'third generation' communications receivers, using double-conversion, with the first IF stages operating at a high enough frequency for the age-old problem of 'second-channel' interference to be eliminated; and with quartz crystal 'synthesised' first oscillator to abolish the other problem of oscillator drift. I also had a brief look at the actual method by which a phase-locked loop could be used to generate a reasonably stable VFO, by combining the outputs of a pair of crystal oscillators with the variable frequency signal from a fairly standard FET LC tuned oscillator. Although this a long way short of true crystal-divider frequency synthesis, used in some of the very up-market receivers, nevertheless it works quite well — and is a lot less expensive!

In this part of the article, I propose to take a more detailed look at the circuit itself — although the total circuit is so very complex that a complete guided tour would demand more space and patience from *S. W. M.* and its readers than would be reasonable to expect. I shall therefore, look mainly at those bits which are interesting in their own right, or which are replicated several times — like the input bandpass filters — or which, because of their nature, have a large influence on the final performance of the receiver. It is also worth noting, in passing, that the circuit used by the Yaesu FRG-7700 is so close to that of the **Trio R-1000**, except in respect of the detailed organisation of the frequency synthesised oscillator — which would not be expected to have any influence on the Rx sensitivity or s/n ratio — that remarks about the **R-1000** could well apply to the 7700 as well.

Looking at these two circuits, it is difficult to avoid the thought that one was copied from the other, and my own conclusion from an examination of these two is that the Trio came first, and that Yaesu designers then did a bit of lily-gilding in odd places, in the hope of getting a bit of an improvement in performance. The major difference between these two is, however, in the PLL frequency synthesiser circuit, where the 7700 is organised to allow the recall from memory of a predetermined operating frequency — a possibility which does not exist with the **R-1000.**

### The Circuit Design

Looking at the circuit design for the first time, a puzzle confronts anyone brought up in the world of conventional radio receivers to find any tuned circuit which will determine the chosen operating frequency. This is because the signal input to the receiver (shown in my block diagram of Fig. 7), having been selected from one or other of three possible aerial inputs (two high Z, one low Z) through appropriate input matching transformers, and 0-60dB attenuator pads, it merely routed through a sequence of diode switched wide-band filters and broad-band amplifiers into the first mixer input circuit, with no specific attempt at individual signal selection.

This leaves the actual determination of signal frequency to the post-mixer selectivity and the local oscillator output. While this very effectively achieves the desired aim of single-knob signal tuning, without any of the inconvenience of the need to ensure accurate tracking of oscillator and signal circuitry, it does impose some heavy demands on the linearity and s/n ratio of the imput circuitry.

Each of the input bandpass filters, which, with the exception of the first, 0.2-1.0 MHz section, covers a frequency band of a 1:2 ratio, is of similar design, and is built up from a straightforward five-element LC high-pass element, followed by a similar five-element low-pass section, as shown in Fig. 8. With good layout, this could be expected to give reasonably flat-topped pass-band, with an attenuation ratio of some 30dB octave outside this, of the general shape shown in Fig. 9. In the receiver tested the results obtained were reasonably close to this, though the overall signal attenuation was more than suggested by the 'typical' signal voltages indicated in the service manual.

As in all the other signal switching in this circuit, with the exception of the aerial input selector, the signal routing is through forward/reverse biased diodes, whose bias voltage is, in this case determined by the main 0-30 'MHz' switch.

From this input bandpass filter circuit, a 1 MHz-plus slab of signals is amplified by a comparatively straightforward RF amplifier-mixer circuit, shown in Fig. 10. The first stage of this is a

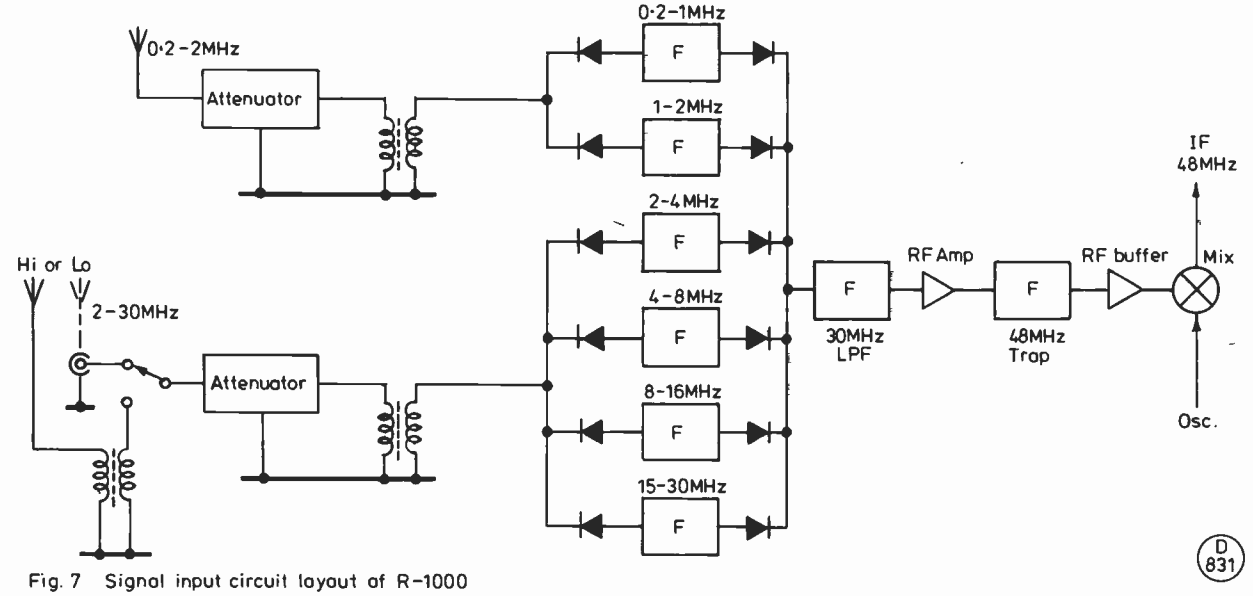



Fig. 7 Signal input circuit layout of R-1000

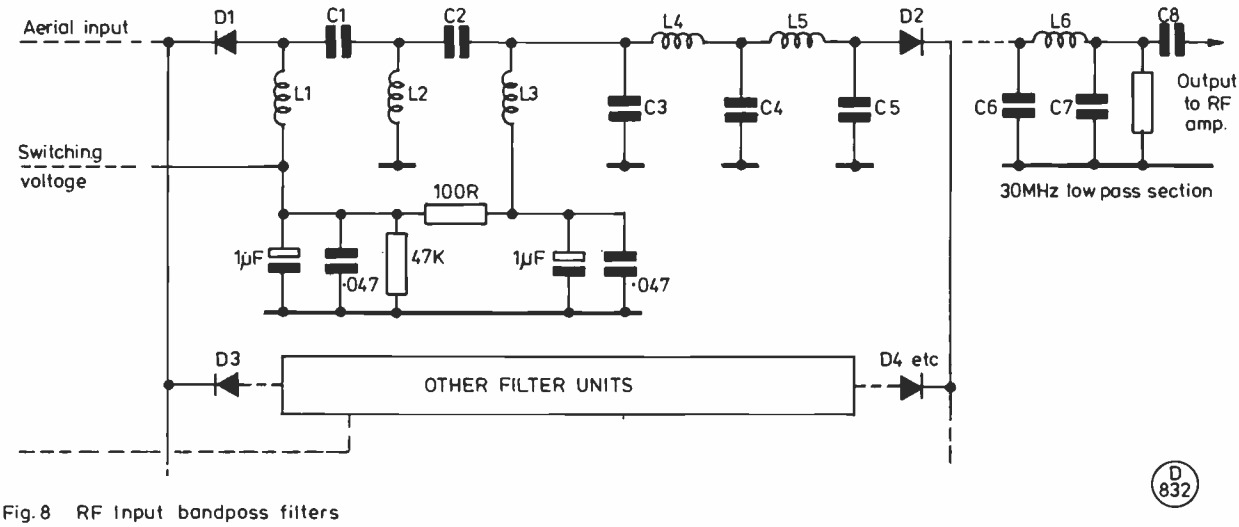



Fig. 8 RF Input bandpass filters

conventional dual-gate MOSFET RF amplifier, having a nominal gain of about 7-times, choke-capacitance coupled to a junction FET acting as a source follower buffer stage. Between these two is a sharply tuned IF trap, operating at 48 MHz, consisting of C2, T19 and C61, to remove any spurious signal input at the first IF frequency.

TR3 and TR4 are another pair of dual-gate MOSFETs connected as a single-balanced mixer, whose oscillator signal input is obtained from the PLL frequency synthesiser. The output from this is transformer-coupled to a 48.005 MHz, relatively narrow bandwidth crystal filter, shown in Fig. 11. (The FRG-7700 uses a common-gate balanced pair of junction FETs as the first mixer, with a further common-gate connected junction FET as an output buffer/gain stage. I would guess that this would give a slightly better s/n ratio . . . but this is only a guess!) The output of the 48 MHz crystal filter is taken (in the 7700 as well) to a further pair of dual-gate MOSFETs connected as a second single-balanced mixer, whose oscillator input is derived this time from the 47.6 MHz crystal oscillator also housed in the PLL box. The 455 kHz output to the second IF gain stages is obtained from the tapped output transformer T11, which also provides a signal output to the noise blanker circuit.

Full AGC is applied to the signal gate of the RF stage, and to the 455 kHz IF stages, from a later AGC amplifier, while the line which I have labelled AGC2 is used to provide a partial AGC and also a mute facility.

As a very conventionally brought up circuit designer, I raised a metaphorical eyebrow to observe that there was no formal gain stage — apart from any gain which might be obtained from the first mixer — in the 48 MHz signal line. Since the crystal filter gives an attenuation of about 4.5-times, this cancels out the stage gain of the first mixer, and leaves two sets of conversion stages effectively operating at the same signal level. Not, I would think, the best recipe for good s/n.

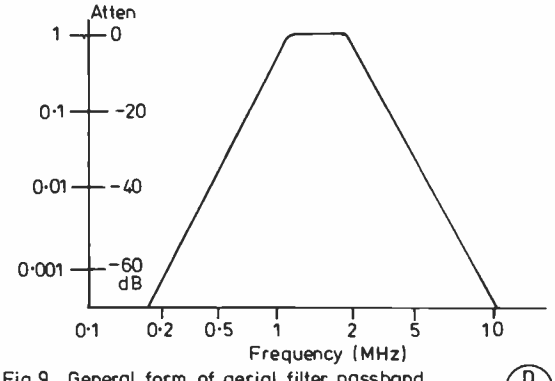



Fig. 9 General form of aerial filter passband (1–2 MHz filter illustrated).

## The 455 kHz IF

This is also fairly conventionally designed, and is shown in a slightly simplified form in Fig. 12. This gain stage employs a further pair of dual-gate MOSFETs, and gives an overall gain of about 2000-times. A choice of selectivities is provided by three diode-switched surface acoustic wave filters, giving approximately ±12, ±6 and ±2 kHz bandwidth. (Changing the position of plug PL3 will alter the AM bandwidths to ±6 kHz and ±2 kHz). Of these, the first two are available for AM use, while the third is restricted to CW, USB or LSB use, with an automatically switched BFO.

The noise blanking circuit is operated, as shown, from a tap on the input transformer driving the balanced diode switching circuit, and preceding the SAW filters. This allows the noise blanking system to have a faster rise-time in operation than the main IF system, and contributes to the effectiveness of this. In the event of a noise pulse in excess of the predetermined trip level, the output amplifier transistor TR22 is tuned hard 'on' and removes the normal forward bias from the switching diodes D15 and D16, which disconnects the following IF stages from the signal line.

As mentioned earlier, a very nice touch in this circuit is the use of a pair of crystal controlled oscillators, TR11 and TR13, as shown in Fig. 13, to provide a solid, drift-free, CW carrier injection for USB and LSB suppressed-carrier reception.

The post-demodulation AF stages are unremarkable, as is the very simple DC power supply stabilisation circuit, shown, for completeness, in Fig. 14.

The only other part of the circuit which needs to be considered is the VFO and the voltage controlled oscillators in the phase-locked loop box. Since, as explained in the first part of this article, the operation of the PLL system is effectively to add a variable frequency signal to a crystal oscillator derived signal, the stability of the VFO is of the utmost importance. The circuit employed is a junction FET Colpitts oscillator, temperature compensated by C101, and tuned by a double-gang capacitor of 3-30pF total capacitance, housed in a screened box behind the kHz 'spread' dial (Fig. 15). The signal output from this, in the 5.645-4.445 MHz range (to provide a bit of overlap at each end of the 'kHz' spread), is buffered by two successive emitter followers (TR101, TR102) and fed into the PLL circuit.

The operation of the PLL was described in the first part of the article (Fig. 5), and a more detailed examination of its function does not seem to me to be a very exciting exercise, since the only

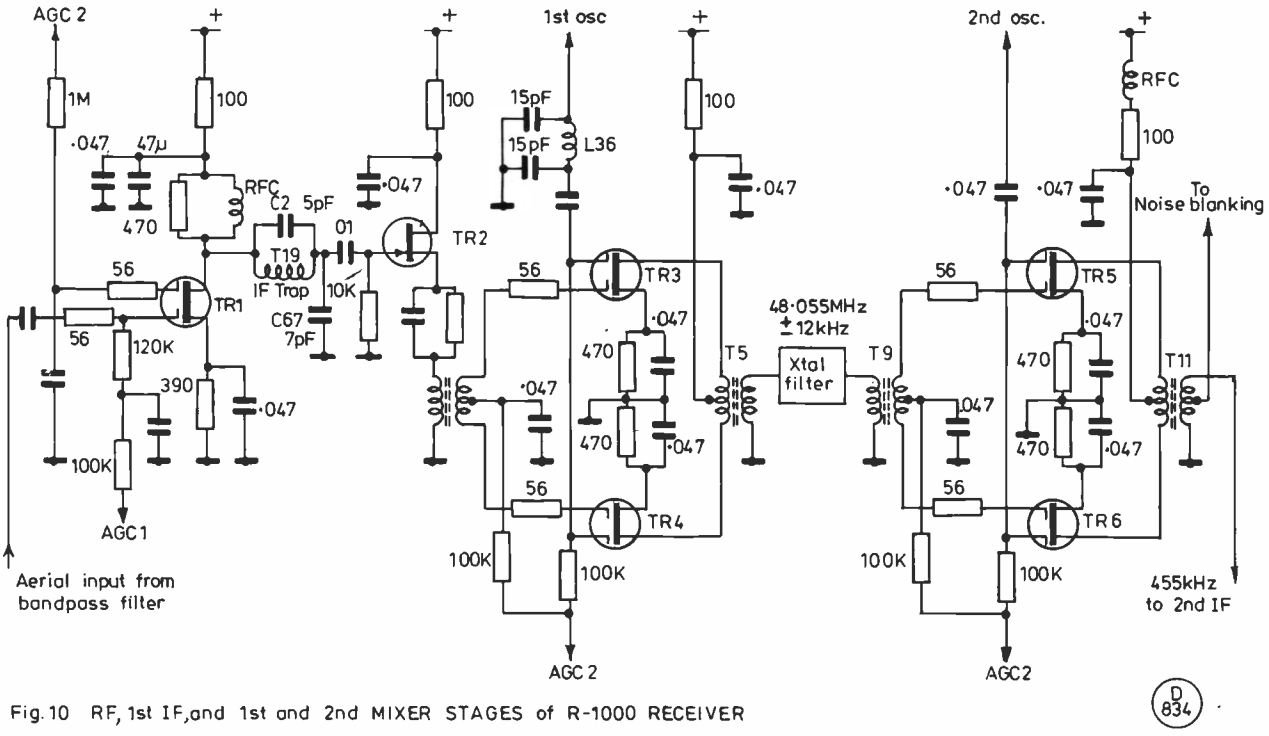



Fig. 10 RF, 1st IF, and 1st and 2nd MIXER STAGES of R-1000 RECEIVER

part the user is likely to come into contact with, except in the unhappy business of fault finding and repairs, is the voltage controlled oscillators VCO1-4. These are all single transistor, variable capacitance diode tuned, LC oscillators of substantially identical design, housed in a screened box mounted beneath the median chassis plane. Their design is shown in Fig. 16.

## Performance and Alignment

The **R-1000** has a very favourable reputation among the SWL community, built up in the relatively short period since its introduction in the UK, a little over two years ago. I was, therefore, very interested to see how well this actually performed. On the credit side, it is a small (11½ x 4½ x 9 ins. deep), light and exceedingly conveniently designed instrument, on which tuning is simply a matter of selecting the MHz band desired, and then tuning the kHz dial until the frequency counter display circuit shows the frequency required. One then turns up the volume to a suitable level, and if the signal is receivable, there it will be.

The operation of the switched selectivity/BFO control is also very simple and convenient, and provides a useful choice of bandwidths to suit listening conditions. The organisation of the IC clock and frequency counter so that it will double, when the set is not in use, as a predetermined time switch, is very crafty, and typical of the general thoughtful approach to the design of the receiver overall. The precision of operation of the input attenuator and the 'S' meter is also something which other manufacturers might emulate (and has allowed me, for example, to determine the signal strengths, in the range 100µV to 20mV, of some of the more interesting commercial SW broadcast stations, as appearing on the end of my own vertical aerial).

On the performance side, as determined by instrumental measurements and comparative trials against my personal FRG – 7, I remain a little less enthusiastic. The input signal level required for a 6dB CCIR weighted s/n ratio at 5 MHz, was about 1µV, as measured on narrow bandwidth AM, and the minimum detectable signal — except on CW, which will do rather better than this — is around 0.3µV. The FRG-7 can better this by a factor of ten in sensitivity and s/n ratio, though it is, of course, much less easy to use and less conveniently designed. The reason for this adverse comparison caused me some thought. Initially, my reaction was simply that I was comparing a straight-off-the-shelf **R-1000** (which had been kindly loaned to me for the purposes of this article by *Lowe Electronics Ltd.*) with an FRG-7 which had been 'breathed on' — in the 'as received' condition my FRG-7 was about three or four times less good, which would have greatly narrowed this performance difference. However feeling that it would be rather unfair to leave matters like that, I checked the alignment of the Trio and found that it was just about spot-on as it stood.

This discovery that the alignment, as received, was almost exact, coupled with the very neat and tidy layout of the receiver, left me with a very favourable impression on the standard of Trio workmanship, and adds up to a very highly recommendable instrument for anyone whose main interest is in SW broadcast listening, where the signal strengths are likely to be 100-10,000 times the noise threshold. However there is still a lot of internally generated hiss, suppressed on signal by the exceedingly effective, though rather slow acting, AGC. This noise is not appreciably lessened, off signal, by removing the aerial input. (By contrast the FRG-7, without aerial, is very quiet). My own supposition is that this internally generated noise has its origins in the complex dual mixing circuitry, all operating at about the same gain level. More amplification at 48 MHz between these two mixers could well swamp any noise due to the second of these. However, it still leaves two RF devices, in cascade, to give an overal signal gain, from aerial to mixer, of rather less than 4-times. Overall, I feel that this is the least well thought out part of an otherwise superb instrument.

My only other operating criticism concerns a large flock of

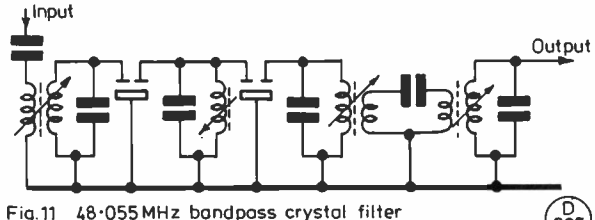



Fig. 11 48·055 MHz bandpass crystal filter

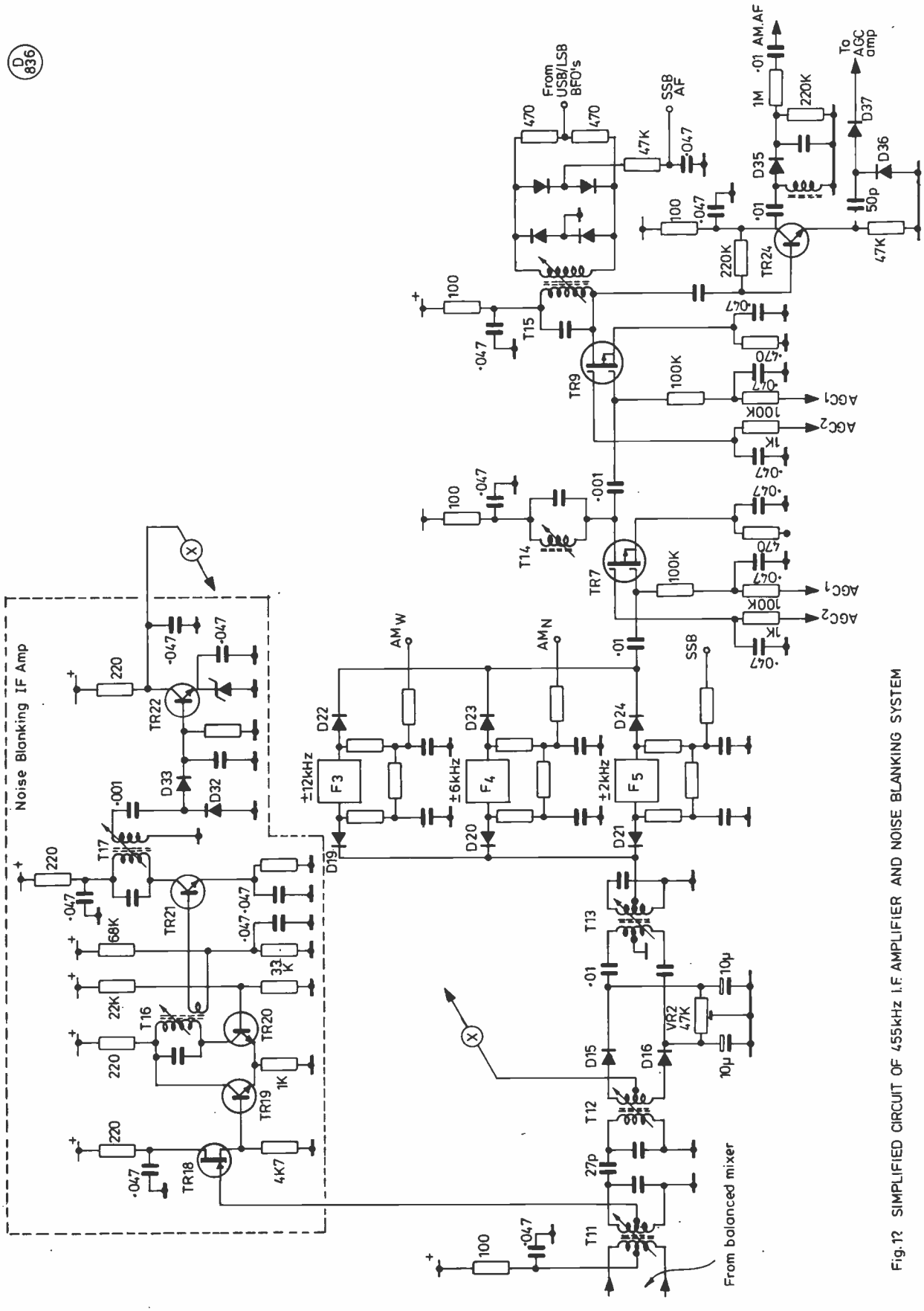



Fig.12 SIMPLIFIED CIRCUIT OF 455kHz I.F. AMPLIFIER AND NOISE BLANKING SYSTEM

small 'birdies' in the 10-12 MHz region, perhaps due to some radiation of VFO second harmonics. Apart from these, the receiver is extremely clear of *spurii* of all kinds.

## Alignment

Although the electrical circuit is very complex, alignment is, by contrast, exceedingly simple, assisted by the easy removal of the top and bottom covers which are only held by six screws on each. As in the FRG-7, the 'kHz' tuning section operates backwards, with the 5.545 MHz output corresponding to '0' kHz, and the 4.545 MHz corresponding to '1000' kHz. This means that any adjustment to the VFO, to ensure that the 'kHz' dial concurs exactly with the frequency counter reading, must be done by adjusting the trimmer capacitor TC1 first, at the '0' kHz setting,

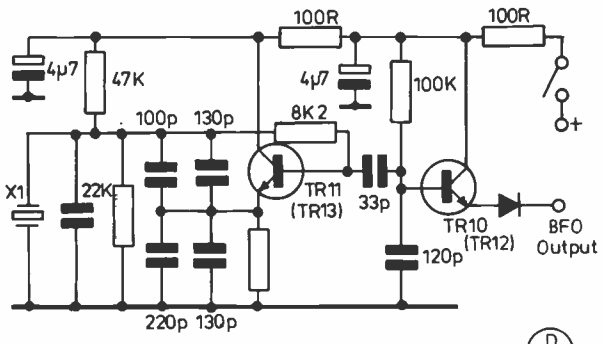



Fig.13 Crystal BFO oscillator circuit used in USB/LSB carrier injection

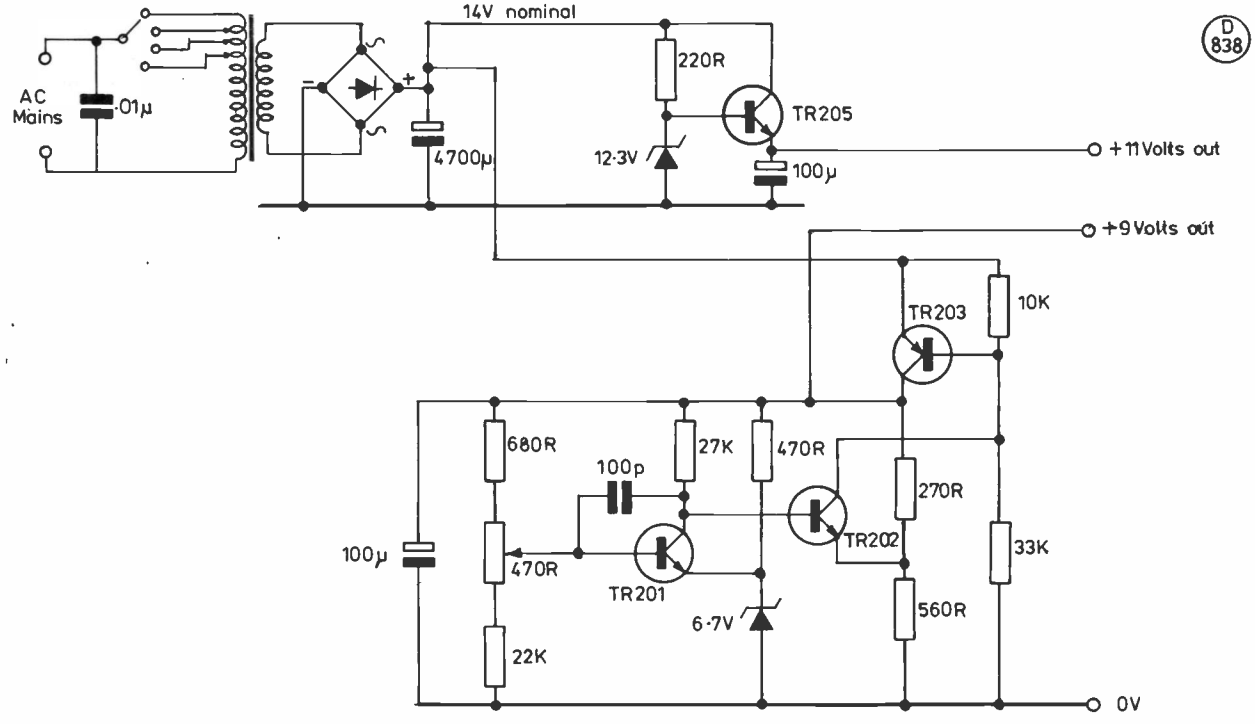



Fig. 14 Mains Power Circuit for the R-1000

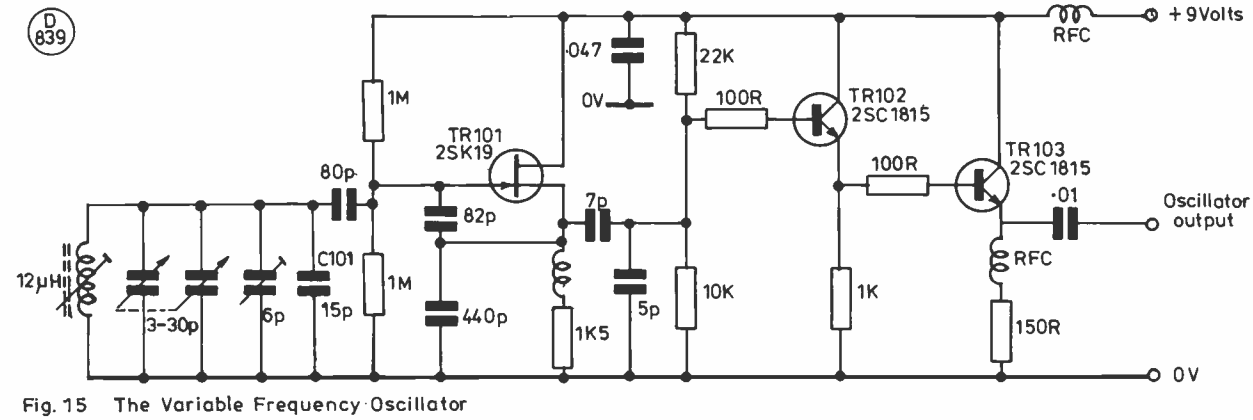



Fig. 15 The Variable Frequency Oscillator

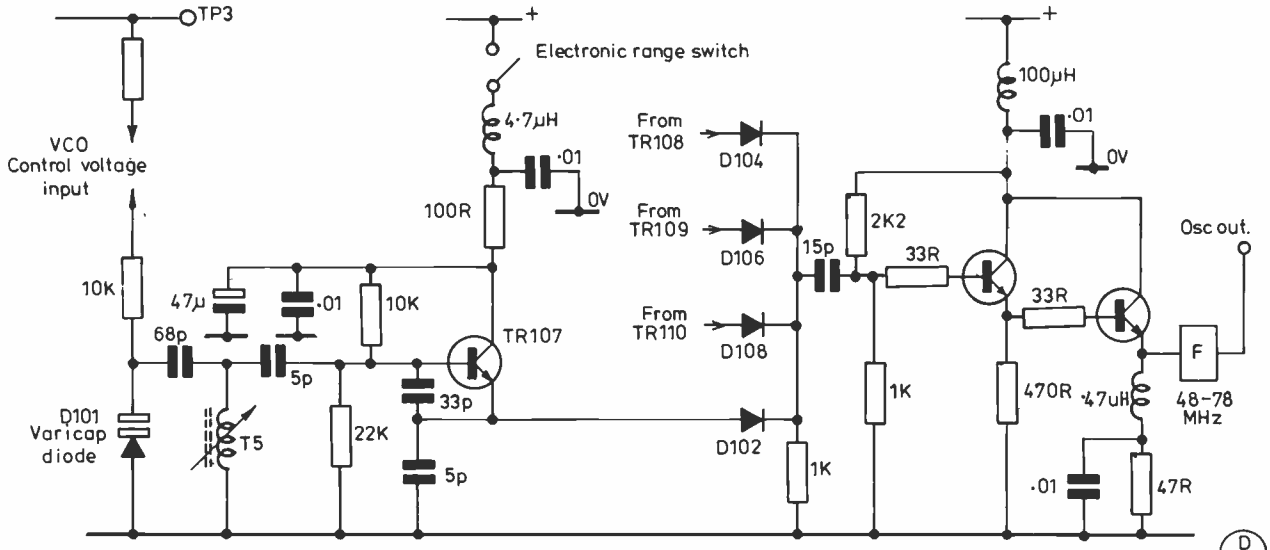



Fig.16 Circuit diagram of VCO's used in PLL 'crystal locked' local oscillators (VCO1-4)

and the inductor L1 second, at the '1000' kHz setting. Both of these are accessible through the lid of the VFO box, under the central chassis divider.

Since the VCOs must be 'in lock' if they are functioning at all correctly, short of a fault condition they are unlikely to require any adjustment. However, the procedure is merely to tune the receiver to 4.5 MHz (oscillator output 52.555 MHz) and then adjust the VCO No. 1 coil (T5) until the control voltage measured at TP3 is 3.8 ±0.05 volts. The same procedure applies to VCO2 (T6) at 12.0 MHz, VCO3 (T7) at 19.5 MHz and VCO4 (T8) at 26.5 MHz.

On top of the chassis, the IF trap (T19) is adjusted with the receiver tuned to 29.5 MHz on USB, and a 48.055 MHz aerial input of 20mV magnitude, so that there is the minimum 'S' meter or audible output.

The use of an HF wobbulator is recommended for the alignment of the 48.055 MHz first IF crystal filter assembly, with an input of 3mV at TP1 and the output signal derived from TP3. However, this seems a bit unnecessary since the coils are fairly damply tuned and the characteristics of the filter are mostly determined by the crystal filters in the ladder network, and not much alterable — except in total transmission loss — by coil adjustment. The selectivity of this filter is not really quite adequate to reject strong MW broadcast signals in the 1 MHz region from the 0.1 or 1.9 MHz second channel regions, but this is the only area in which I found this snag.

The adjustment of the RF (1st mixer input transformer) and the 455 kHz second IF is equally straightforward. For this, an input signal of 1µV at 14.5 MHz is recommended, with the receiver set to 'USB'. The RF transformer T4, and the IF transformers T10-T15 are then adjusted to give maximum output on an AC millivoltmeter connected across the LS coil. Small adjustments to the signal generator frequency, to alter the beat-note pitch, and to the signal generator output, to keep it in the S1-2 region, may be necessary to make sure that the optimum sensitivity is achieved.

Adjustment to the noise blanker circuit is principally one of adjusting the broadband IF amp. tuning (T16/17) for maximum gain (maximum signal at the output of the diode pump D32-D33) and then adjusting the control, VR2, in the balanced diode switch circuit at the beginning of the 455 kHz IF chain, for minimum impulse noise.

The 'S' meter, which is accurate and reproducible, is adjusted, if required, with a 14.5 MHz input signal. VR3 is set, on no input signal, to give a reading of '0'. VR4 is then set, with an input of 31.6µV, to give an 'S' meter reading of 9; this input should be at 50 ohms impedance into aerial input 'A'.

*EQUIPMENT REVIEW*

# DATONG MODEL MK MORSE KEYBOARD

THIS piece of equipment, one supposes, must represent close to the ultimate in Morse keys! And so it should, at its price of £129.00 (inc. VAT/carr.) — but a superb bit of work it is, in both the design and engineering areas.

The *Model MK* will take up a width of 10¾ inches and want 6¼ inches front to back, on the shack table. As to its height, 1¼ inches is the maximum and that includes the rubber feet. The entire keyboard area is covered with a sheet of black polycarbonate, and all the panel markings are screen-printed on the *under* side of this sheet of plastic — so no fear of rubbing the key markings off, and no serious problem if a cup of coffee gets upset on it; you just wipe it clean.

## Operation and Controls

Operating the *MK* is very definitely not to be attempted until you have read and fully understood the comprehensive instructions. In the normal way of things one just switches on and types one's message onto the keyboard; each letter is put into a buffer store where it waits its turn to be keyed out. The signal going out is audible as a sidetone (the level may be set by the on-off switch-*cum*-volume control). If, for instance you set the 'Speed' control for 15 w.p.m, for as long as there are letters waiting in the buffer, the keyer will send them out at a precisely regulated speed and letter spacing, with the inter-word spaces called up by the equivalent of the space bar of a typewriter. You can go up to 16 letters ahead before the buffer store is full, at which time the 'Buffer Full' LED comes up and the bleep tone is continuous; the keyboard just disregards whatever keys are hit after the buffer is


filled. Normal operation means that one just keeps a few letters ahead in order to get the perfect letter-and-space output.

Where the shift key of a typewriter would live, on the left side, is a key marked 'Shift' and on the right a key labelled 'Tune' — handy for tuning up the rig. The normal letters of a QWERTY keyboard are used, and 'Shift' enables several other letters and symbols to be made available; in the lower case set one finds /, ?, $\overline{CT}$, $\overline{BT}$, $\overline{AR}$, a full set of letters and numbers, and some accented letters, while the use of the shift key adds access to $\overline{VE}$, $\overline{AS}$, $\overline{VA}$, brackets, single and double inverted commas, full stop, equals, plus, and some more accented letters. The 'Speed' control covers 5-33 w.p.m. on its slow range, and there is a switch on the back panel to multiply the speed by four; and 132 w.p.m. is fast enough for meteor scatter as well as general use of the keyboard on the band.

Having mentioned the back panel, let us look at it a bit more closely. Directly behind the volume control there is a socket for AF out and, progressing to the left, one finds a socket for positive keying, another for negative keying, a T/R output which can be used to turn the rig on just before the first dot or dash arrives (to get rid of that annoying clipping of the first dot which some rigs are fond of), an external input if you don't like to run off the internal battery, a bleep volume control, followed finally by a control labelled 'Delay' which inserts an extra long space between letters — handy for the use of the keyboard either directly for Morse training, or for recording Morse tapes for a student. To look a bit more closely at these back controls, what it boils down to is that the keyboard will key about anything in the way of a commercial rig you care to throw at it, and most of the home-brew ones too; AF output seems a bit redundant save for taping-in directly when making Morse practice material, as there is enough sidetone for normal needs. The bleep volume didn't do much in ours, as the MK arrived with a fault in it — no bleep tone at all, and shortly after that no 'Buffer Full' LED. But more of that anon.

Returning to the top, along the rear there is the on/off-plus-volume control, a speed control, a weight control which will enable a controlled adjustment to the weight to be made if the user is a believer in this. Then there is another knob labelled 'Delay' — this one sets the time delay when used in conjunction with the 'Auto Repeat' control to its right; if the memory is loaded with, say a CQ call, at the end of the message if the auto repeat button is pressed and the 'Delay' adjusted to a given number of seconds, then the CQ call will automatically repeat after the given delay interval — handy for contests. If the 'Auto Repeat' button is pressed a LED beneath it lights up.

Continuing to the right across the top we find 'Record' with another LED beneath, M1, M2, M3, M4 and a key labelled 'Cont' — of these more in the next paragraph. We have already mentioned the shift key, and on the left hand side of the keyboard proper we find, to the left of Q a key labelled 'Clear' whose action is to clear whatever may be lying in the buffer store — this means that an error in sending due to hitting a wrong key can be removed, and with only a momentary hiccup be sent again without the need for an erase signal. To the left of the letter A is a key labelled 'Merge'; this is used to run two letters together, for example in sending an erase, hold down 'Merge' and type in two H's. One thing this keyer is unable to do is to send gibberish, as so many el-bugs will do if one gets 'out of sync' with the keyer.

## Memory

There are four of these, each of a nominal 64 characters. If one is careful, one can pre-program a complete QSO, from the first CQ right through to the final $\overline{VA}$. Provided the battery is in place, the contents of the memory remain while the keyer is switched off; and if the battery is there but normal operation is from an outboard DC PSU, one can still retain the memory contents provided one switches off at the keyer first. Even while changing batteries, provided the actual change is done in under a minute the memory will remain intact.

To inject a message into the memory, one just pushes the 'Record' key and, say, 'M1' and keys the message in, as slowly and hesitantly as you like, finishing with 'Merge' and a tap of the space bar. A second depression of 'Record' puts out the record lamp and the memory is now ready for use. All one does to use it is to tap 'M1' once, and off it goes. If you wish to inject something into the middle of the message a tap of the space bar stops the memory sending, you key in your extra bit, then a tap of the 'Cont' key and the memory recommences just where it left off: handy if you are getting Gs back to a CQ DX, as you can insert 'DX only please' into the already pre-recorded message without losing the contents of the memory. In a similar way one could insert a different report, or a contest serial number or whatever. The 'Speed' control is operative on both the memory and the output of the buffer store so that such an interjection will be at exactly the same speed as the rest of the message, so at worst there will be a moment's hesitation in the outgoing signal, while all the characters remain perfect specimens of their kind.

## Using the Keyboard

If you can type or use a teleprinter keyboard or the QWERTY keyboard of a home-computer, you can't go wrong; and even those who have never touched a typewriter keyboard will find it quite surprising how they can keep a few in the buffer store at 15 w.p.m. after only an hour or so's practice. And of course, if you have 'screws' in the keying arm, or are afflicted with that 'glass elbow' phenomenon after a couple of minutes sending so that you seem to be sending more 'erase' signals than E's, then this will solve your problem; and if you send Baghdad or Martian Morse, or with the left foot, this will be a godsend to the chap at the *other* end!

## Problems

We always pray for something to go wrong with a review item, so we can see what the back-up service is like! Up till now, Datong have managed to escape as we have always received equipment from them in faultless condition. This time however, although the keyboard arrived all nicely packed in typical Datong fashion, when we first tried the *MK* we found the 'bleep' tone, which is supposed to pip each time a character goes into the buffer store and continuously if you try to overfill it, was conspicuous by its absence, regardless of the setting of the preset control at the back. As mentioned before, the LED which should also appear with the bleep, then turned its toes up — pretty obviously the same fault.

Datong service? Well, they turned round the keyboard in just 24 hours — which leaves nothing more to be said.

A second item is the polycarbonate membrane over the whole keyboard. We have managed to put four nasty marks on it where a heavy-ish, sharp item fell; but although unsightly, examination under a magnifying glass shows the membrane is intact and we *did* drop water on the membrane quite deliberately to see if it would upset the workings. It just shrugged off such maltreatment!

## Conclusions

The *Model MK* is a very pleasing and satisfying instrument, well designed and with the usual Datong high-quality 'feel', and surely a godsend to many amateurs who would like to operate CW but are deterred by their inability to send for more than a short period before muscles 'seize-up' to cause the sending of lots of erasures. For the contester or M/S buff, the keyboard and the memories are invaluable, and the ability to 'break in' to the contents of a memory enables the owner to retain the personal touch. The *MK* can only be unhesitatingly recommended.

All of which being said, who is going to produce a Morse *reader* that will cope with hand keying?

# SPREAD SPECTRUM TECHNIQUES FOR THE RADIO AMATEUR

**DR. R. SUPWARD, D.Eng.**

*The author is a lecturer in Advanced Communications Studies at the prestigious State University in Bloomer, Wisconsin, and holds the unique callsign K9P.*

## Introduction

WITHOUT reliable radio communication, no nation can defend itself against airborne attack by an aggressor. Vast sums of money are being spent to try to devise foolproof communications systems, while equally large amounts are devoted to *Electronic Counter Measures* — E.C.M. — in attempts to defeat these systems. One of the more difficult systems to disrupt involves techniques whereby small packets of information are rapidly transmitted on constantly changing frequencies. This is known as *Spread Spectrum Communication* and some ingenious ideas have been demonstrated to keep a distant receiver synchronized with transmissions which are hopping all over the RF spectrum. The more sophisticated ones are highly secret, of course, and cannot be discussed here.

## Amateur Spread Spectrum

It may be asked what this technique had to do with Amateur Radio. Well, it offers an ideal way to deal with deliberate QRM and also to prevent your private conversations being overheard. Amateur spread spectrum, or ASS, can be fairly easily achieved with modern gear. You need a transceiver with a number of memories, and an encoder/decoder device. The basic method is to program into the transceiver a number of agreed frequencies. For example, the Yaesu Digital VFO accessory for the Popular FT-707 can accommodate up to twelve.

A simple timer circuit is used to drive a diode switched network which selects these different memories at regular intervals. At the end of each transmission period, the encoder injects a tone which selects the memory associated with that particular tone. In order not to be a constant annoyance, these tones can be sub-audible. At the receiving end, the decoder performs the same function by switching the receiver's memory to the same frequency.

To set up the system, two or more stations have to agree the discrete frequencies and which tone denotes each. The transmitting station then effectively controls all the receivers, remotely. It can be seen that each station can have a different length of transmission per channel. Thus the system is eminently suitable for club nets when confidential matters can be discussed over the air, but in private.

There are some drawbacks, however, and the above system does require reasonably QRM-free reception for, if a tone at the end of transmission is not received, then the receiver gets lost. However, this is not all that much of a problem as eventually a transmission will reappear on the channel to which the receiver is tuned. If transmit periods per channel are kept short, little information will be lost.

It is important to switch off the ASS system when normal operation is required. During the development phase, this was once overlooked resulting in no replies to "CQ" calls for several days, and stations called never replying. To avoid complaints of QRM from QSOs on whose frequencies you will inevitably alight, it is desirable to keep transmission periods quite short. Another useful tip for VHF users is to nominate oddball frequencies.

The system has proven very useful on the lower end of the 28 MHz band which is subject to illegal use by CB-ers. By choosing the popular, so-called "High, High" CB channels used by your local pirates, ASS QSOs can be established, so causing the maximum amount of QRM with the minimum of effort. Obviously, the reader will think up refinements of this basic system. For example, we have used a common computer for the encoder, programmed to give different transmission lengths per channel, for added security.

(*Editor's notes:* The type of emission would be designated by the new system as A7A, A8E, J8E and F8E for CW, AM, SSB and FM modes, respectively. It has been queried if this kind of transmission is covered in the present U.K. licence, now undergoing amendment. At the time of publication, clarification was awaited, an announcement being expected in the *London, Belfast* and *Edinburgh Gazettes* on the first of April.)

# AN INTRODUCTION TO MICROCOMPUTERS

D. J. REYNOLDS, G3ZPF

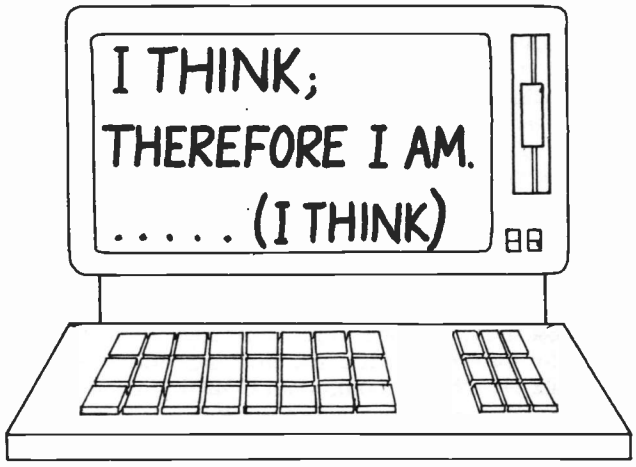
AN increasing number of amateurs are becoming interested in microcomputers, and this is hardly surprising considering that there are several applications within the sphere of amateur radio in which a computer can be of use. The more obvious examples which spring to mind are QRA/distance/bearing calculations, contest scoring and results analysis, together with sending and receiving CW/RTTY/SSTV. Since an amateur would seem to have more reason for wanting a home computer than most members of the public, it is perhaps surprising that the number of amateurs using computers is not far higher than it presently is, but closer investigation tends to suggest why not.

Almost invariably, computers are sold by the "domino effect", after one brave soul (usually well versed with programming) takes the plunge and subsequently demonstrates it to the locals. This often results in one or two others who were already interested, but with no previous experience with computers, also getting the same type, taking heart from the fact that they will have a local "guru" to turn to when things do not go as they ought. This is a fairly predictable attitude, since there are a bewildering variety of computers available, all claiming to be better than their competitors, and all incompatible with one another. The next phase in the domino effect is when the "guru" is summoned to the club net frequency to give advice, and after a few appearances others will become intrigued by these curious discussions, thus falling under the spell of the micro themselves. Eventually the club net starts to be dominated by micro talk, at which point the remainder of the club members feel like banishing them to another channel. Fortunately most amateurs are gentlemen, however, and slide up the band a little to discuss computers, before returning to the club net.

One of the first problems that is likely to be encountered is that of RFI from the computer, caused by the fact that they operate by use of high frequency square waves, and the smart plastic cases they are often contained in do not make the greatest of RF shields. Careful screening, and filtering of all leads will probably be necessary before the computer can be operated alongside the rig without desensitizing the receiver. Furthermore, although the glossy ads. are quick to inform you of the wondrous things a computer would do for your station (like tracking your aerial with Oscar and displaying the current Doppler shift), when it comes down to it very few (if any) emporiums have the necessary programs (software) or interface boards (hardware) for such applications, all of which brings you back to the local "guru". Those tyros with no local computer buff to steer them around the ads., and provide assistance afterwards may well find it all too confusing and simply not bother to pursue the matter further. Hopefully what follows will serve as a general introduction to microcomputers for the uninitiated, and help to clear away some of the jargon and mystique which seems to surround what can be a fascinating aspect of electronics.

During the mid-seventies, integrated circuit technology advanced by leaps and bounds in terms of the number of active devices that could be crammed onto a single silicon wafer (chip). Large Scale Integration (LSI) was the term coined for this new generation of super ICs, and many applications previously unviable due to size and cost limitations could now be manufactured to order on a single chip. Calculators, digital watches, music synthesisers, speech synthesisers; the list was endless. Whenever the public could be persuaded to buy them in sufficient quantities the prices dropped like the proverbial stone as the development costs were recovered.

Gradually the idea dawned that instead of producing a myriad of ICs, each of which was specifically designed for a particular task, it would make sense to have just one single IC which could do any of the tasks. The trick was not to produce an enormous multifunction IC, but an IC which was undedicated to specific tasks and structured internally in such a way as to be externally programmable to perform each task. Initially the manufacturers intended them to be used as sophisticated controller circuits, and the full implications of their potential were not realised at first, but the similarity between the internal structure of these "microprocessor" chips and that of computers soon led to their being incorporated into personal computers. When this trend became established, more sophisticated microprocessor chips were quickly developed with computer application specifically in mind.




Each manufacturer structures his own microprocessor chip in a different way, giving each one its own "instruction set". The instruction set is an in-built table of commands which the chip is capable of executing. Although the commands individually may seem quite trivial, consisting of little more than reading from, writing to, and adding together memory locations, they can be combined to form complex programs in much the same way as our alphabet of only 26 letters and 10 numbers can be used to convey extremely complex information.

The microprocessor chip needs an area of "memory" to work with, and this can most simply be imagined as a large rack of pigeon holes, each with its own reference number. Data is stored, manipulated, and moved within the memory during the execution of a program. Like humans, the chip can only do one thing at a time, but the secret of its usefulness is the speed and accuracy with which it can tirelessly perform repetitive and complex calculations. It should be borne in mind that a computer is not intelligent, and can only follow a predetermined set of instructions exactly. Problems occur when the differences between what you want the computer to do, and what you actually ask it to do are so subtle as to go unnoticed initially. This is often referred to as the GIGO function (garbage in — garbage out), and the frequently used phrase "computer error" is a convenient cover-up for a human error.

To be of use to humans, the computer must present us with information in terms of the numbers, letters, and special symbols which we understand, but within the computers memory only binary information can be stored, so some means of representing symbols which humans understood in terms of what the computer can deal with is called for. Most current microprocessors are referred to as "8 bit microprocessors", since each character, letter, or number is represented by a string of 8 binary digits (bits) ranging from 00000000 to 11111111. The way that characters and numbers are encoded into this form is generally in accordance with ASCII (the American Standard Code for Information

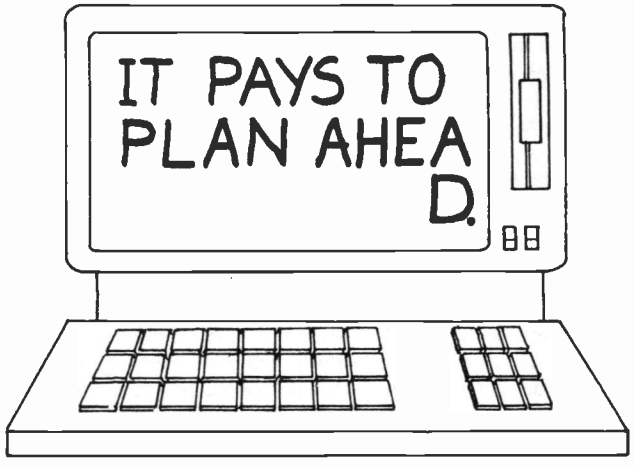
Interchange), often referred to colloquially as "asskey".

In ASCII format, the letter K would be represented as 01001011, which although the computer is happy enough with, humans certainly are not. The strings of 8 bits are referred to as "bytes", and in their present form would be mind-bogglingly tedious to work with, so use is made of a more convenient representation in "hex". Hex (short for hexadecimal) is a system of counting based on 16 rather than 10, in which the numbers from 0 to 9 are represented normally with numbers from 10 to 15 being represented by the letters A to F. The mechanism by which this is done would only serve to confuse the complete tyro, and thanks to high level languages (I'll come to those shortly) can be safely forgotten about until more experience has been gained. Suffice it to say that in hex representation, the letter K is "4B", which you must confess is rather more easy on the tongue than 01001011. Whenever a microcomputer is instructed to display an area of memory on the screen for some reason, a "monitor program" within the machine will make the conversion automatically before displaying it. The range 00000000 to 11111111 in binary is represented in hex by 00 to FF.

A program written directly in terms of the instruction set is called a "machine code" program, and is rather tedious to write (like having to look up the spelling of each word before using it), so it would be more convenient to be able to enter commands in a recognisable form, leaving the computer to make the conversion to machine code for you. Such a translator is referred to as a "high level language", and there are quite a few of them around. Just as each manufacturer structures his microprocessor chip as he thinks best, so the writers of high level languages structure their facilities to be most suited to their own particular applications. The one written for mathematical and scientific usage was FORTRAN (FORmula TRANsformation), whilst COBOL (Commercial Or Business Oriented Language) was intended for business applications. A host of other languages exist, all initially written for mainframe computers, and all requiring a large amount of memory space to operate within. Firstly the language itself has to be stored, together with the program to be converted, and then the converted code has to be stored before being executed. The converted code is referred to as the "object code", and is compiled from the high level language before being run.

Until fairly recently, memory ICs were quite expensive items, and 8 bit microprocessors are only able to access 64k bytes of memory anyway (unless you resort to "paging" memory), so a simpler form of high level language was called for, which could operate within modest amounts of memory space, and be simple enough for beginners to understand. BASIC (Beginners All purpose Symbolic Instruction Code) was written to fulfil this requirement, and is the language most commonly implemented on microcomputers, although each maker tends to have a slightly different version. BASIC does not compile an object code before running it, but "interprets" each line of the program as it is run. This saves on memory requirements, but means that programs run slower due to the finite time it takes to interpret each line as the program is running. In real terms the programs still run quite fast enough for the majority of applications, with perhaps the main exception being programs which make use of moving graphics (space invaders *et al*). Such programs are invariably written in machine code to obtain sufficient speed of movement and minimise flicker.

Another term for the microprocessor chip when incorporated into a computer is the Central Processor Unit, or CPU. Whilst the heart of any computer is the CPU and its associated memory board, all of the electronic wizardry would be useless without a means of communicating with the outside world. Generally speaking, input from the operator will be *via* the keyboard, and the computer will respond either to a printer, or to a VDU (Visual Display Unit) screen. Existing programs will be input either from cassette tape, of from magnetic disc, whilst new programs will be entered from the keyboard and later stored onto tape or disc. Some form of storage outside the computer is necessary because apart from the fact that the computer's memory would very quickly become full, the main area of memory within a computer is generally "volatile", which means that if power is removed from the memory ICs, then any data stored within them is "lost". The main area of memory is referred to as RAM (Random Access Memory), but there will be an area of non-volatile memory or ROM (Read Only Memory) which will contain the computer's monitor program, and probably the BASIC interpreter as well. Although data is retained within ROM without power being maintained, the contents of the ROM cannot be altered (unlike RAM). If the BASIC interpreter is not stored in ROM, then it will have to be loaded into the computer each time it is switched on, and will obviously reduce the amount of RAM that you have free for use with programs. If the computer's BASIC is in RAM, the computer will automatically partition off part of the main memory to prevent your programs from overwriting the BASIC.




Having discussed, in general terms, the innards of the computer itself, let us now move on to a consideration of the system as seen by the operator (*i.e.* from the outside). A computer "system" is the term for the entire collection of boxes (or peripherals) containing the keyboard, VDU, printer, tape deck, disc drive(s), and the computer itself. In addition to the above items there may occasionally be others, such as light pens, graphics tablets, plotters, and various interface boards, depending upon the interests (and fiscal wellbeing) of the user. Some models incorporate the computer, VDU, keyboard, disc drives, and sometimes even the printer in one cabinet. The video output from a computer is generally suitable for feeding directly into a video monitor, or (*via* a suitable modulator) into the aerial sockets of a domestic TV set. Although most domestic users start by using a portable TV as the VDU, far greater definition can be obtained using the direct video output and so many either get a monitor later, or modify the TV to accept direct video as well as RF.

When it comes to storing programs, the vast majority of personal computer users will utilise cassette tape storage, on a conventional cassette recorder. This is a far cheaper alternative to buying a disc drive, especially since most people already have a cassette recorder to begin with, but is somewhat less versatile. Loading a program may take up to 2 or 3 minutes, depending on its length and the baud rate of the computers cassette port, whereas loading a program from disc will take only 2 or 3 seconds. In programs which are repeatedly updated (*i.e.* a logbook program) you will need to save the entire program to tape at the end of each operating session, whereas with a disc system only the additional information need be written to the disc. With a tape system the number of entries will be limited by the amount of memory within the computer (since the computer must contain the program *and* all the data), but with the disc system the computer just holds the program, with all the data being written onto disc as it is entered. Having said all this, the vast majority of personal computer users are entirely happy with a tape based

system. Since I have already made repeated references to disc drives, its about time I explained just what they are.

There are basically (no pun intended) two types of disc; hard discs and floppy discs. Hard discs are, as their name implies, rigid discs about the size of LPs, coated with a magnetic material, and stacked one above another on a common shaft. Both sides of the discs can store information, and each side of each disc in the stack will have its own read/write head. Hard discs are capable of storing vast amounts of data, and have access times measured in fractions of a second, compared to the 2 or 3 seconds for floppy discs. The discs are spun continuously at several thousand RPM, and the head (unlike a tape head) does not touch the disc, but is designed as an aerofoil to (quite literally) fly in the airstream above the surface of the spinning disc. The head flies so close to the disc surface that should a dust particle become settled on the disc, the head will collide with it and be drawn onto the surface of the disc. The results of this happening can be spectacular, expensive, and (on the larger drives) potentially lethal to anyone standing close. Fortunately "disc head crashes" are uncommon, as the discs are contained in sealed enclosures, and this type of disc has been used on mainframe computers for years. Over the past couple of years versions have become available for microcomputers (generally referred to as "winchester" drives), which are physically quite small, but still with a staggering price tag. They would only be viable for a small business, where large amounts of information need to be stored and accessed rapidly.

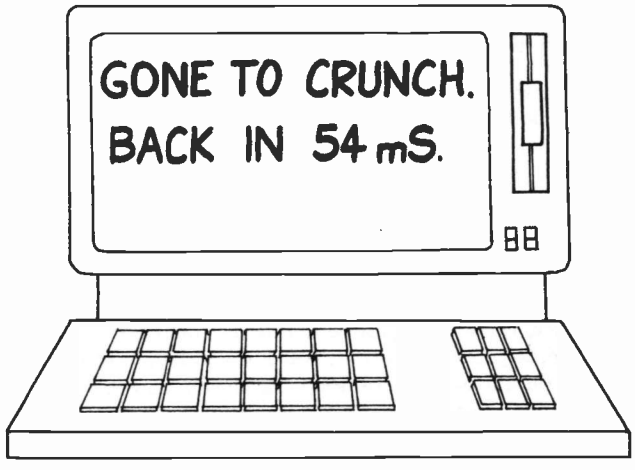
Floppy discs are thin sheets of plastic, coated with a magnetic material, and contained within a protective sleeve. They are either 5¼ or 8 inches in diameter, with business users generally preferring the larger type because of their storage capacity, and domestic users preferring the smaller (mini floppy) because both the discs and the drives are cheaper. They are inserted into the drive as and when required, where they spin at a few hundred RPM with the read/write head actually in contact with the surface of the disc. As the cost of floppy disc drives continues to fall, more and more domestic users are adding them to their systems to take advantage of their greater speed and versatility over a tape storage system. As the head is in contact with the surface of the disc, they do eventually wear out, but normally the disc is only spun during the read/write times and so in practice they do last a considerable amount of time.

Whilst output from the computer will generally be to the VDU screen, there will be times when "hard copy" is required, and output will be sent to a printer. There are two types of printer in general use, the first type being "daisywheel" printers. These produce typewriter quality script, since they are in effect, a computer controlled typewriter, but with the hammers being arranged like daisy petals around a common stem. These printers are normally used for word processing applications, and are capable of right hand justification of text which is not possible with a conventional typewriter. (For the benefit of those unfamiliar with the term, right hand justification is the means by which magazines achieve neat, even borders to both sides of their printed columns.) It is accomplished by "fiddling" the spaces between the words, so that each line is filled completely, and the spacing variations will pass unnoticed by the eye if done correctly. Daisywheel printers tend to be very expensive, rather noisy, and comparatively slow when compared with a dot matrix printer.

Dot matrix printers produce letters by means of a matrix (or grid pattern) of tiny needle hammers. The number of hammers in the matrix will vary from 5 x 7 to 9 x 9 on the more expensive versions. The quality of print improves with the number of hammers, and the better printers give true descenders on lower case letters. There is still a noticeable difference between what is called "correspondence quality" script from a dot matrix printer, and that from a daisywheel printer, but dot matrix printers are more than adequate for most applications. Dot matrix printers with a 9 x 9 matrix are usually capable of reproducing high resolution graphics in addition to normal text.

That about winds up the general overview of a microcomputer and its peripherals, so now let us turn our attention to actually writing programs. Perhaps it should be pointed out at this point that the only real way to gain experience with computers is to actually have access to one, since there is simply no substitute for "hands on" experience.

The types of program of use to the amateur can be loosely grouped under the headings of "applications programs" and "number crunching". Applications programs are ones in which the computer is connected to objects in the outside world, in addition to its own peripherals. Tracking your aerials with Oscar, or transmitting RTTY *via* your rig are both examples of applications programs, and would require some kind of interface to be built, as well as the writing of a program. Such programs would be written (partly at least) in machine code, and will be "machine dependent". This arises not only because of the differing instruction sets of the various CPU chips, but also of




differences in arrangement of the various computers themselves.

Number crunching programs are ones which (say) calculate the points scored during a contest, and are often written completely in a high level language. The language most commonly implemented on microcomputers is BASIC, and although each type of computer tends to have its own version (or "dialect") of BASIC, the differences are not generally all that great, which means that programs can be modified to run on different machines without too much trouble.

It is very tempting at this point to launch off into a series of lengthy programs, painstakingly explaining the function of each BASIC command, but without a computer to try it out on (and this *is* supposed to be an introduction for the uninitiated!) it would not serve much purpose, and in any case most of the "standard" programs (QRA/CW/RTTY etc) have already done the rounds of amateurs using computers. Instead, a *very* simple program of just a few lines will be presented to (hopefully) demonstrate that learning and using a computer language is nowhere near as tedious as learning a human language.

Before typing a program into a computer, it is advisable to have a good idea of how the program will be organised, and the way to do this is to draw a "flowchart". A flowchart can be compared to the block diagram of an electronic circuit, and the program itself as the actual circuit diagram.

Let us consider a very simple program, that given a frequency will calculate the corresponding wavelength. Most amateurs will be able to remember (given a few seconds to ponder about the units) that for a Frequency in MHz, and a Wavelength in metres, that:

$$W = 300 \div F$$

The flowchart for a program to carry out the above calculation can be represented in the manner of Fig. 1(a). This sequence does not contain any check on the validity of the input. All will be

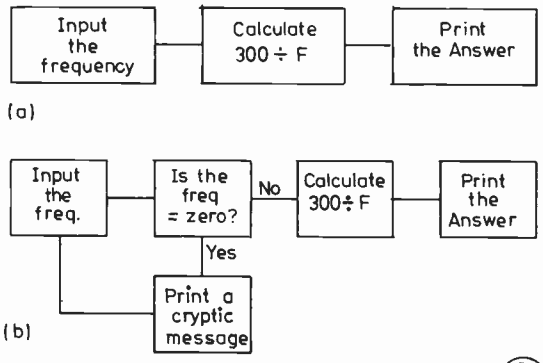



Fig. 1

D 853

sweetness and light, until the inevitable wiseguy enters "0" as the frequency, and the computer attempts to calculate 300 divided by zero. The computer will quickly catch on the fact that something is amiss, and present you with DIVISION BY ZERO ERROR on the screen. (For those of you without a mathematical bent, division by zero is a no-no).

Since it seems to be a deep rooted characteristic of human nature to deliberately "crash" a program in as short a time as possible (assuming they haven't already done it by accident), it is always advisable to check the validity of entries from the keyboard. The consequences of this simple program crashing are insignificant, but if it occurred during the running of a business program, large amounts of data could be lost. It may be some time before you start writing business programs, but it's as well to get into the habit of including "error trapping" to begin with.

The previous flowchart can be modified quite easily to check for a zero input, as shown in Fig. 1(b). Obviously this program flowchart is a trivial example, but will serve to show that even the largest programs are built-up from individually small steps which have been carefully thought about. Given a little practice, amateurs will quickly progress to quite lengthy programs, since it's all a question of approaching the problem carefully and logically. Since very few of us are possessed of such well ordered mental processes, it is perhaps fortunate that bull headed persistence, repeated attempts, and luck, will also get you there eventually.

Undoubtedly by now, several letters will be winging their way towards *S.W.M's* long suffering Editor, overflowing with comments pertaining to my being a charlatan, because of the way in which the flowchart was drawn. In commercial circles, flowcharts tend to range from moderately huge to mind-bogglingly enormous, and in order to make them easier to follow, each box will have a special shape, dictated by the function which it contains. There is a large range of shapes (rectangles, diamonds, parallelograms, etc.) which are undoubtedly of great assistance to the commercial men (who may well be following up someone else's work — never easy at the best of times) but remain "something *else* to learn" for the tyro, who is probably hard pressed to keep up as it is. Initially therefore, it will probably be easier to draw all the boxes as rectangles, since early programming attempts are rarely very large, which has the additional advantage that they fit nicely onto lined paper.

Having considered the flowchart as a means of sorting things out beforehand, it's time to move on to a description of the actual BASIC program itself. A BASIC program consists of a series of numbered instructions (referred to as "statements") which are executed by the computer in ascending order. Line numbers do not have to be consecutive, nor do they have to be of equal increment, which aids subsequent modification or correction. For example, a program may have lines numbered 10, 20, 30, 40, etc., and it is later realised that further instructions need to be inserted between lines 20 and 30. These lines are typed in, numbered (say) 22, 24, 26. If the program is then listed on the VDU screen, using the BASIC command "LIST", the lines will be seen to have been duly inserted in the appropriate place.

Referring back to the first flowchart, the equivalent BASIC program could be written as:

```
10 INPUT F
20 LET W = 300 / F
30 PRINT W
40 END
```

The program is started by typing the command "RUN", whereupon a "?" will be printed on the screen. This is a result of line 10, and indicates that the computer is awaiting for you to enter a value for the frequency (F). If we enter say 10, and then press the RETURN key (sometimes labelled ENTER or NEWLINE) so that the computer knows we've finished, the value of 300 ÷ F is calculated and then printed on the screen. Note that in line 20, the symbol for '÷' in BASIC is "/", and that in most versions of BASIC the word LET is optional, and the line may be written as 20 W = 300 / F.

Now referring to the second flowchart, the program listing could be as follows:

```
10 INPUT F
15 IF F = 0 THEN GOTO 50
20 LET W = 300 / F
30 PRINT W
40 END
50 PRINT "PLEASE DON'T MESS ABOUT"
60 GOTO 10
```

Providing that F is not entered as zero, the program performs exactly as before, but if F is entered as zero, then when the program gets to line 15, it will print the message PLEASE DON'T MESS ABOUT (having branched to line 50), before returning to the start of the program again.

Some versions of BASIC will allow the use of any length (within reason) variable names, and line 10 could just as easily have been written 10 INPUT FREQUENCY, but other versions of BASIC only differentiate between the first two letters of variable names. The latter type would treat the variables with names FREQ and FREAK both as the same variable (*i.e.* FR), and so in versions of BASIC which only check the first two letters — although full names make a listing easier to follow — either just use one or two letter names, or be very careful with your choice of names.

The program as shown is still very much a bare bones affair, and there is much that could be done to improve how it is displayed on the screen. Programs will always be much easier to use if the information is arranged in a neat and logical manner on the screen, and the way in which the "screen formatting" is carried out will depend to a large extent upon the facilities available on your machine.

Hopefully by now the clouds of computer mystique have cleared a little and some of you may even build or buy a microcomputer. Prices start at around £60 for a machine with 1k of RAM and BASIC in ROM, although really you could do with about 16k of free RAM for starters. Whether you buy a cheap machine and upgrade it later, or whether you start with a fairly sophisticated model will depend not only on the depth of your pocket, but also on whether you have ideas about using it for your business as well as your hobby. Having decided roughly what to do, your exact choice of model will probably be strongly influenced by what the other locals already have.

*Book Review*

# "AMATEUR RADIO OPERATING MANUAL"

## Second Edition

WHEN the first edition of the *Amateur Radio Operating Manual* appeared in 1979, it was very favourably reviewed by this writer in the December, 1979 issue of the *Magazine*. Obviously, Amateur Radio is an evolving hobby and, while some aspects of it do not change very much over long periods, others do, and what was state-of-the-art two years ago, can seem quite archaic today.

The second edition of the *A.R.O.M.* essentially retains the same format as the original with ten chapters, the first of which, "The Amateur Service", has been largely re-written following the agreements made during the 1979, World Administrative Radio Conference. Chapter 2, "Setting Up a Station," is unchanged and the excellent advice given in the first edition remains as sound today. In Chapter 3, "Operating Practices and Procedures", a section on CW operation in a foreign language has been added with lists of the more commonly used words and phrases in German, French and Spanish. The paragraphs on Conversation and Telephony Techniques have been expanded.

"DX" is the title of the fourth chapter and now includes paragraphs on the new 10, 18 and 24 MHz bands. The 28 MHz beacon list has been expanded and the graphs showing the progress of Sunspot Cycle No. 21 extended. (It is interesting to see how much the actual behaviour of this cycle departed from that predicted at the time, in 1979). The 7 MHz DX notes have been re-written and on the VHF side, the QTH Locator System is now much more fully explained. The VHF/UHF beacon list has been up-dated and a piece about propagation warning nets added. The only obvious error is the reference to the 10 metre satellite downlink band being 29.4 to 29.55 MHz. This band has long been established by the I.A.R.U. as 29.3 to 29.5 MHz. A list of "Rare Countries" has now been included, but the table showing VHF allocations in Region 1 of the I.A.R.U. in the various countries has been omitted from this edition.

Chapter 5, "Contests", remains the same apart from the inclusion of a list of the major HF bands events throughout the year. Chapter 6, "Mobile, Portable and Repeaters", includes the latest maps of the VHF and UHF repeater networks in the U.K., plus the new 23cm. relays. Otherwise this section has only minor revisions of the first edition material.

"Satellites" are covered in Chapter 7 and this part has been considerably revised with the *Oscar 7* data deleted and *UOSAT* information added. The "Look-up Tables" for *0-8* and *U-0-9* are useful to those who do not want to interpret graphs or fiddle with maps and movable cursors. Unfortunately, the Manual was printed before the latest Soviet *RS* satellites were launched. Chapter 8, "RTTY", and Chapter 9, "Slow Scan TV", are unchanged. Although no expert on either mode, the reviewer would have expected some mention of such systems as *AMTOR* and colour SS/TV. The final Chapter 10, "Special Event Stations", is also unchanged.

Since the first edition of the *A.R.O.M.*, there have been a number of changes in the international political scene which have affected Amateur Radio. Usually these have involved the creation of new prefixes as countries have gained independence upon relinquishing colonial status. Also, the growth of *A.R.* has meant that familiar callsign series have been fully used requiring the issuance of new series, such as the A-series in the U.S.A. These changes have been incorporated in the first three Appendices. Appendix 4, the "DXCC Countries List", is now presented in a better form and has seven columns in which the user can indicate on which bands countries have been worked or heard. Appendix 5 is the "World Wide Legal Time" list. In the first edition, the "Amateur Service Frequency Allocations" were tabulated in Chapter 1, but in the new one they form Appendix 6, complete with lots of W.A.R.C. 1979 footnotes. Appendix 7 is also new and is devoted to "Standard Frequency Stations". This is a most useful addition and gives all the details of the data transmitted from such stations in the U.K., U.S.A., Argentina, Australia, Canada, France, Italy, Japan and the U.S.S.R. The final page is a short index.

Having had the first edition of the *A.R.O.M.* for a couple of years, it occurred to the writer to reflect how useful the book has been to a typical operator who has been licensed for a few decades. It must be admitted that the only parts regularly consulted have been the Meteor Shower data in Chapter 4 and the various appendices dealing with callsign sequences. Therefore, the conclusion must be that this book should be of greatest interest and use to the newly licensed amateur with little, practical operating experience, to whom it can be thoroughly recommended. The editor is R. J. Eckersley, G4FTJ, and the publisher is the *R.S.G.B.* There are 208 pages in 248 by 184mm. format and the *Amateur Radio Operating Manual, Second Edition* is available from "S.W.M." Publications Department at 34, High Street, Welwyn, Herts., AL6 9EQ for £4.95, which includes postage and packing.

*N.A.S.F.*

*KW Communications Ltd.*, **a name well-known in amateur radio circles for many years, recently launched the range of American Ten-Tec equipment. On the left is the Omni-C transceiver with 200 watts p.e.p. input; covers all bands including the new ones and incorporates a full range of up-to-date features, and the price is £598.50 plus VAT. Also with a full complement of features and 200 watts p.e.p. is the Delta transceiver (centre), which is priced at £442.00 plus VAT. On the right is the popular Argonaut QRP transceiver, the specification for which includes SSB/CW, 5 watts p.e.p., 10/15/20/40/80m. coverage with p-t-t and full CW break-in with sidetone; price is £289.50 plus VAT. For full details contact** *KW Communications Ltd.*, **Vanguard Works, Jenkins Dale, Chatham HE4 5RT (0634-815173).**

# CLUBS ROUNDUP

## By "Club Secretary"

SOME three months ago we asked for comments on the question of MCC's future as a contest. So far we have had very few replies, which is both surprising and disappointing. So come on chaps, don't just sit there — start thinking, and let's have *your* ideas!

On a different, but well plied, tack would all clubs please check that details of your Hon. Sec.'s name, address and telephone number, Hq address and meeting routine, are *all up to date.*

### The Mail

**Acton, Brentford & Chiswick** lead off; G3CCD will be talking about "A Chip for Speech Processing" on Tuesday, April 20, at Chiswick Town Hall, Chiswick High Road.

**A.R.M.S.** caters for the interests of the mobile operators, licensed or SWL, within the hobby — details from the Hon. Sec. — *see* Panel.

The gang at **Aylesbury Vale** foregather on April 20 at Elmhurst Youth Centre, Fairfax Crescent, Aylesbury; if you get lost try GB3VA on R4 for a bit of talk-in. For may, we note, the Construction Contest is booked.

**Barking** group have a place at Westbury Recreation Centre, Westbury School, Ripple Road, Barking, which they use on Mondays, Tuesdays for Morse at all speeds, Wednesdays for HF operating activity, and Thursdays for the 'proper' meetings — lectures, etc.

**Barry (College of Further Education)** come next, and they are to be found at the Annexe in Weycock Cross; every Thursday of course, plus a Mobile Rally at Barry Memorial Hall on May 23. Meantime, there is some help for the RAE candidates with a series of quizzes designed for them.

**B.A.R.T.G.** now, catering for all those interested in RTTY operation on our bands whether with the older Creed machines or by the more modern all-electronic rigs. Details from the Hon. Sec. — *see* Panel.

At **Basingstoke** on April 21 they will be hearing all about the 'how' aspect of home construction from G3CBU. No venue quoted so we suggest a call to the Hon. Sec.

### New One

This one is at **Biggin Hill** and they have a booking in Biggin Hill Memorial Library on the last Tuesday each month; for April they have a Calibration evening set up. More details from the Hon. Sec. — *see* Panel. It sounds as though this group is already flying — we wish them every success.

For the new Hq and latest state at **Borders** we must refer you to the Hon. Sec. — and when you 'phone him tell him we need an up-date, *pronto!*

No doubts about **Bournemouth;** the dates are April 2 for a Super Junk Sale, and 16th for a video show of G6CJ's Aerial Circus; Hq is at Kinson Community Centre, Pelhams, Millhams Road, Kinson, Bournemouth.

On April 7, the **Brighton** club will be listening to G3XUS who will be talking about the UOSAT at 47 Cromwell Road, Hove.

Many a long year since we last heard of **British Rail;** their membership are members of the staff of the B.R. organisation, and the club is affiliated to the international railwaymen's group as well. Details from the Hon. Sec. at the address in the Panel.

Our next call is at **Port Talbot;** British Steel Corporation is part of the club name as they foregather at the B.S.C. Sports & Social Club every Thursday evening. More details from the Hon. Sec. — and thanks, OM, for the notes about MCC.

At **Burnham Beeches** the lads have the first and third Mondays of each month at the St. John Ambulance Hq, Serena Hq, Slough — any other details from the Hon. Sec., *see* Panel.

Every Tuesday at the Mosses Community Centre is the **Bury** routine; the 'main' meeting is always on the second Tuesday of the month and on April 13 some Wood & Douglas products will be on show.

On now to **Cambridge,** they are still in the Visual Aids Room, on the ground floor at Coleridge Community College, Radegund Road (a turning off Coleridge Road) in Cambridge. April 9 being Good Friday, the centre is not open, but on 16th they have "Antenna Shop, plus How to Tune a Rice Box", while on 23rd they go back to the mundane SS/TV. Finally, April 30 is an informal.

For **Chelmsford** the venue is at Marconi College in Arbour Lane. However for the April data we must refer you to the Hon. Sec. as it is not mentioned in the newsletter.

**Cheltenham** have their base in the Old Bakery, Chester Walk, Clarence Street, on April 1, when G3RJV will be talking about QRP operation, and on 16th for the natter evening.

Shame! Who dunnit? In February we managed to get the Chesham name mixed up with the **Cheshunt** doings . . . our apologies to both clubs. Cheshunt starts April on the 7th with a junk sale, and on 14th some go to see the Air Traffic Control at Stansted while the rest have a natter at Hq. April 21 is another natter evening, and on 28th G8XYJ will talk about broadcasting techniques. The venue is the Church Room, Church Lane, Wormley.

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

*May issue — March 26th*
June issue — April 30th
July issue — May 28th
August issue — June 25th
*Please be sure to note these dates!*

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Now we move on to **Chichester** and the Spitfire Social Club, Tangmere on the first and third Mondays of each month. April 5 is particularly important as it is the AGM.

If you are in any doubt about the **Chiltern** doings, we feel it important that you contact the Hon. Sec. or one of the locals 'in the know', as we read the newsletter as indicating a change of venue for one meeting which could be made permanent if the members' reaction is positive enough.

**Clifton** get together at the New Cross Inn at the junction of New Cross Road and Clifton Rise, London, every Friday evening.

April 1 is down for a film evening, and on 29th is a talk on microprocessor applications; we refer to the **Colchester** club, at Colchester Institute, Sheepen Road, Colchester.

Nice words from the Hon. Sec. of **Conwy Valley;** he reckons their membership is rising thanks to people reading about them in this piece. They foregather on the second Thursday in the month at Green Lawns Hotel, Bay View Road, Colwyn Bay.

### Deadlines

GW4KGI of Conwy Valley club wonders how we work out our deadlines for this piece. Simple: your letters always to arrive by the last Friday of the month, with the gen about meetings for (at least) the next-but-one month ahead. Thus mail for this "Clubs Roundup" reached us by February 26th.

Back to our last, and this time **Cornish** come to be mentioned; they are to the found at the SWEB Clubroom, Pool, Camborne, and on April 1 it is AGM time. About all we can say is that you should get there early as the room becomes very full on most evenings.

Next, **Cray Valley,** based on Christchurch Centre, where April 1 is down for the AGM. The Centre is in Eltham High Street.

Nice to see the familiar duplicator sheet and fist of G3FZL again with the **Crystal Palace** information. The third Saturday

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

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CHESHUNT: R. Gray, G6CNV, 2 Sacombe Green Road, Sacombe, Ware, Herts. SG12 0JH. *(Dane End 203)*
CHICHESTER: S. Talbot, G8FCX, 31 Pier Road, Littlehampton, W. Sussex BN17 5LW. *(Littlehampton 5082)*
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CRAY VALLEY: P. J. Clark, G4FUG, 42 Shooters Hill Road, London SE3. *(01-858 3703)*
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LOUGH ERNE: C. Corderoy, GI4CZW, 32 Old Rossory Park, Enniskillen, Co. Fermanagh, N.I. *(Enniskillen 4500)*
MALVERN: R. Dixon, G4BVY, 9 Wyche Road, Malvern, Worcs. WR4 4EF. *(Malvern 62900)*
MEIRION: Mrs. J. Jones, GW4KYK, 25 Fford Dyfrig, Tywyn, Gwynedd. *(Tywyn 710 402)*
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MID-SUSSEX: J. Brooker, G3JMB, 20 Farnham Avenue, Hassocks, Sussex.
MID-ULSTER: D. Campbell, GI4NKD, 109 Drumgor Park, Craigavon, Co. Armagh. BT65 4AH.
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NORTH DEVON: H. G. Hughes, G4CG, Crinnis, High Wall, Sticklepath, Barnstaple, Devon EX31 2DP.
NORTHERN HEIGHTS: R. Harker, G4CMK, 11 Buck Street, Denholme, Bradford. *(Bradford 844442)*
NORTH WAKEFIELD: N. D. Horne, 81 Denshaw Grove, Morley, Leeds, W. Yorks. LS27 8SA.
ORKNEY-CAITHNESS (Repeater Group): Mrs. K. Gee, GM4LNN, Brinnafea, Orphir, Orkney.
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SOUTH BIRMINGHAM: T. Scrimshaw, G8RGQ, 10 Somerdale Road, Northfield, Birmingham B31 2EG. *(021-459 8312)*
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S.E. KENT YMCA: A. Moore, G3VSU, 168 Lewisham Road, River, Dover. *(Kearsney 2738)*
SOUTHGATE: Mrs. V. Austin, G4MGD, 89 Chaseville Park Road, Winchmore Hill, London N21. *(01-360 5832)*
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THANET: I. B. Gane, G4NEF, 17 Penshurst Road, Ramsgate, Kent. *(Thanet 54154)*
THORNBURY: A. Jones, G8AZT, 9 Queens Walk, Thornbury, Nr. Bristol.
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VERULAM: G. Dale, G3PZF, 16 Palfrey Close, St. Albans. *(St. Albans 57665)*
WAKEFIELD: R. C. Sterry, G4BLT, 1 Wavell Garth, Sandal Magna, Wakefield. *(Wakefield 255515)*
WATFORD: R. J. Willard, G8RCK, 21 Garston Crescent, Garston, Watford, Herts. *(Garston 72832)*
WEST KENT: B. P. Castle, G4DYF, 6 Pinewood Avenue, Sevenoaks, Kent TN14 5AF. *(Sevenoaks 56708)*
WIMBLEDON: E. G. Allen, G3DRN, 30 Bodnant Gardens, Wimbledon. *(01-947 3914)*
WIRRAL: G. Lee, G3UJX, 30 Manor Drive, Upton, Wallasey. *(051-677 1518)*
WORCESTER: D. S. Pritt, G8TZE, 15 Paxhill Lane, Twyning, Tewkesbury, Glos.
YEOVIL: D. L. McLean, G3NOF, 9 Cedar Grove, Yeovil, Somerset. *(Yeovil 24956)*
YORK: K. R. Cass, G3WVO, 4 Heworth Village, York.

evening in the month is the one, and it is at Emmanuel Church Hall, Barry Road, SE22, at 2000.

April in **Derby** should be of interest at 119 Green Lane; on April 7 there is a junk sale, and on 14th John Stiles of Radio Derby will be the speaker. April 21st is down to Dennis Chaddock to talk about Engineering in miniature, while April 28 is for films.

## Another New One

**Derwentside**, first mentioned last month, have a place in the R.A.F. Association Hq, Sherburn Terrace, Consett, Co. Durham, every Monday evening. They say they would like skeds with clubs or individuals on these evenings.

We have an up-date from **Dumfries & Galloway**, where we note the Hon. Sec. has upgraded to GM4NNC. The group meet in the Cargenholm Hotel, New Abbey Road, Dumfries, on the first and third Mondays of each month; the former is the informal and the speakers are usually booked for the later meetings. Looking forward a little they have GB2DHE at the Dumfries Hobby

Exhibition on May 22.

What a pity **Edgware** didn't send us the final details of their Straight Key Evening earlier — April 29 it is, and all are welcome to play; just come on, between 3.520 and 3.580 MHz, straight keys only, from 1900z for as long as you like. Nominations to the Hon. Sec. — *see* Panel — for the Best Fist, Oldest Key, and Oddest Key. CU there! Reverting to the Club, they are based on Watling Community Centre, 145 Orange Hill Road, Burnt Oak, Edgware, on the second and fourth Thursday of the month.

We move on now to **Greater Peterborough;** they have the fourth Thursday of most months at Southfields Junior School, Stanground, Peterborough. This gives April 22 for G400 to talk about his "Fifty Years in Amateur Radio".

Along to **Guildford,** where April 9 is a natter evening, and April 23 is down for the AGM. The Hq is at the Model Engineers' place in Stoke Park, on the second and fourth Fridays.

We mustn't forget **Harlow,** who seem to be blossoming forth more than a little, and in all sorts of ways. They are to be found at Mark Hall Barn, First Avenue, every Tuesday evening.

April for **Harrow** starts on 2nd with "Basics, Part 4", leaving 9th blank as 'no meeting'. April 16 is down for informal and practical, 23rd is a surplus sale; and on 30th there will be a talk — speaker and subject open at the time they wrote. The venue is Harrow Arts Centre, High Road, Harrow Weald.

Next stop **Hastings;** the Main meeting is on the third Wednesday of the month at West Hill Community Centre, Hastings, but they also have a clubroom at 479 Bexhill Road, St. Leonards-on-Sea, on Mondays and Fridays.

**Hereford** foregather at County Control, Civil Defence Hq, Gaol Street, Hereford on April 16 for the Construction Contest, and before this on April 2 for a planned video recording session.

Over to EI now, and **I.R.T.S.** who are the EI equivalent of RSGB. Anything that happens in EI — they can tell you! For more details contact the Hon. Sec. — *see* Panel.

From Ireland to the **Isle of Wight,** where the gang head for the County Hall, Wootton Bridge, near the Sloop Inn, on Tuesday for operating and Fridays for a chat night.

A letter from **Lincoln** mentions their Diamond Jubilee, which they celebrate with a traditional hamfest on May 9 at the Lincolnshire Showground, on the A15 some 4½ miles North of Lincoln. As for their meetings, these are at the City Engineers' Club, Waterside South, Lincoln; dates and details from the Hon. Sec. — *see* Panel.

## Again a New One!

This one is called **Lough Erne** and is based on Lake Sand Sports Centre, Enniskillen, where they are to be found on the second Friday in each month. On a different tack, on April 18 they are running the first Rally ever to be held in Co. Fermanagh, at Killyhaulin Hotel starting at noon. All welcome, boat trips for the distaff side on Lough Erne, and of course all the hotel amenities. There are to be some trade stands, too.

**Malvern Hills** club chose a subject "Early Days of SSB", which jolted your old Club Secretary — it seems only yesterday when he became the first SSB operator in his locality! The Red Lion, Great Malvern, on April 13.

GW now, and **Meirion.** Their meetings are on the first Thursday of each month at the Royal Ship Hotel, Dolgellau; the April 1 meetings is down for the AGM.

**Melton Mowbray** have a Quiz Evening led by G8RBY; it is on Friday, April 16, at the St. John Ambulance Hall, Asfordby Hill, Melton Mowbray.

We haven't had an up-date from **Mid-Sussex** for some time, so we must refer you to the Hon. Sec. for all the details — *see* Panel.

Another rally in GI comes for mention next — this one at Parkanaur on May 23. As for the **Mid-Ulster** club, they foregather on the first Sunday in each month at the home of GI4BAC in Banbridge; the April date is down for a talk on hi-fi. More details from the Hon. Sec. — *see* Panel.

It looks like the first and third Tuesday evenings for **Mid-Warwickshire,** the Hq address being 61 Emcote Road, Warwick.

On now to **Norfolk** and the Crome Community Centre in Telegraph Lane East. April 7 is down for the AGM, and on 14th they have an informal plus Morse practice; the informal meeting on April 28 will probably be given over to the AGM of the Norfolk Repeater Group.

From **North Devon** we have a note of a change in the meeting arrangements. They are in session on the 4th Wednesday in each month; on the odd months at Bideford Community College in Abbotsham Road, and on the even months at Pilton Community College, Chaddiford Lane, Barnstaple. More details from the Hon. Sec. — *see* Panel.

Every Wednesday evening the **Northern Heights** mob head for the Bradshaw Tavern, Halifax. A particularly important date in April is on 7th, when they have their AGM.

**North Wakefield's** letterhead says it all — every Thursday at Carr Gate Working Men's Club; during April they hope to have a visit to BBC Radio Leeds — more data from the Hon. Sec., *see* Panel.

The **Orkney-Caithness** Repeater Group is now active, and have plans to put GB30C on Wideford Hill near Kirkwall. They would like to hear from new members, and of course any help with getting the repeater up and running would be much appreciated; must be quite a financial strain on a thinly populated area. Details from the Hon. Sec. — *see* Panel.

April in **Pontefract** has April 1 for a discussion evening, and 15th a talk on the way into RTTY by G4HYD. That leaves April 29 for a film evening, all at Carleton Community Centre, Pontefract. Again a word of thanks for comments on MCC.

**R.A.O.T.A.** is the Old-Timers club; details from the Hon. Sec. at the address in the Panel, and we hope 'ere long to have more details as to the future running of the Association since the sad death of G2UV.

At **Reigate** we see they are to gather at the Constitutional and Conservative Club, Warwick Road, Redhill, in the upstairs meeting room on April 20 for the Annual General Meeting.

Another national society now, the **Royal Omani Amateur Radio Society,** colloquially known as ROARS. This is the tenth anniversary year of the society, and they seem to be doing a fine job, with local clubs forming where it seems justified and a very good newsletter, which carries a nice balance between international, national and personal news. Details from the Hon. Sec. — *see* Panel.

Back home again, to **St. Helens,** where they have a place on Thursdays at the Conservative Rooms, Boundary Road. St. Helens. The start is at 7.45, but for the previous half-hour Morse practice is there for those who wish it. April 1 is down for the final details for the club stall at Belle Vue on 4th, and on April 8 there is a constructional evening featuring a VHF/UHF wavemeter. This activity continues on April 15, and on 22nd G4CVZ talks about the contest computer — wonder how he made the beast silent enought to live near a contest station? (An article, maybe? — *Ed.*) Finally, on April 29 an HF night-on-the-air.

**Silverthorn** hasn't sent us a recent update on their doings, so all we can say is try Friday evenings at Friday Hill House, Simmons Lane, Chingford; then tell them to tell us!

We must now head to **Southampton,** where the routine is to get together every Wednesday at Toc H, Little Oak Road, Bassett. One evening each month is set apart for a formal meeting; this is April 14 for G8KWV to be talking about Post Office Communications. On the other nights there is usually an HF station on the air from Hq.

The **South Birmingham** group now has some 120 members which makes the club shack a little cramped, but it is hoped to have another room available before long, solely for the station. The routine is to foregather at West Heath Community Association, Hampstead House, Fairfax Road, West Heath, on the first Wednesday in each month; April 4 being down for a talk on radio astronomy by Dr. Alfrey of Birmingham University. Then, on every Thrusday, the HF gear is fired up, while on Fridays it is VHF operating, nattering, Morse, construction, or whatever.

Back to the South Coast, to **Southdown** who have for many years been based on Chaseley Home for Disabled Ex-Servicemen, Southcliff, Eastbourne, where they have the first Monday of each month. For the remaining detail we have to refer you to the Hon. Sec. — *see* Panel.

South-East Kent YMCA is the full name of the club colloquially known as **Dover**; the venue being Dover YMCA in Leyburne Road. It looks like every Wednesday evening with a special in April, this being the AGM on April 7.

Next we can head for **Southgate** — and here we need an update, so we have to refer you to the Hon. Sec., *see* Panel.

**Stanford-le-Hope** is a recently-formed club, based on the Scout Hut, Hardie Road, Stanford-le-Hope, where they are to be found on Monday evenings.

The ex-Hawker Siddeley Dynamics works now know as British Aerospace Plant B is home to the **Stevenage** crowd; they go there on the first and third Thursdays in each month and visitors are welcome.

**Stirlingshire (Falkirk)** group write to say they want others to know they exist and are looking for new members. They meet on the first Tuesday in each month, and details can be obtained from the Hon. Sec. — *see* Panel.

*T.S. Terra Nova* is Hq to the **Surrey** crowd, on the first and third Mondays of the month. April 5 is the AGM and on April 19 the evening will be devoted to RAE revision, so all who are taking the RAE are invited. It is also noted that the May meetings are both put back a week to avoid the Bank Holiday clash.

For **Sutton & Cheam** we have to be careful as to the venue; April 16 is definitely at Banstead Institute, but there is no mention of the place where they are to have the AGM on April 30, although we expect it to be Sutton College of Liberal Arts. However to be sure check with the Hon. Sec. — *see* Panel.

Press on regardless, to **Thanet** where the lads get together at Birchington Village Centre on alternate Fridays; other details from the Hon. Sec.

April 7 is the date for **Thornbury** but for some reason the Hon. Sec. is coy about the meeting-place; they are, maybe, on the hunt for somewhere new. Anyway, contact him for the gen — *see* Panel.

AGM-time for **Torbay** again, on April 24, at the club Hq, Bath Lane, rear of 94 Belgrave Road, Torquay, the starting time being 7.30 sharp, please.

The **Verulam** crowd now have their formal meetings at the Charles Morris Memorial Hall, Tyttenhanger Green, Tyttenhanger, Nr. St. Albans; on April 27 they have Mr. G. Price to talk about maritime communications. In addition, there are informal sessions at the new R.A.F.A. Hq in New Kent Road, St. Albans, on the second Tuesday in each month, and of course visitors are welcome to either.

Alternate Tuesdays are the form for **Wakefield,** at Holmfield House, Denby Dale Road, Wakefield. April 6 is a talk on Raynet by G3KWT, and on April 20 there is the AGM.

The **Watford** chaps have their place at the Small Hall, Christ Church, St. Albans Road, Watford on the first and third Wednesdays. Thus April 7 is an informal, on Easter Monday they have a special-event station at Watford Easter Gala, and on April 21, they will entertain G5UM talking about "Then — and Now."

April 2 is the AGM at **West Kent** and on April 20 they have the Construction Contest, both at the Adult Education Centre, Monson Road, Tunbridge Wells.

Now to **Wimbledon,** and the second and last Fridays of each month, at the St. John Ambulance Hall, Kingston Road, Wimbledon. For the rest — contact the Hon. Sec. at the address in the Panel.

The **Wirral** club members will be entertained by G2AMV on April 7 with a retrospective view of his year as President of RSGB, which should keep the gang well entertained; and on April 21 there is a surplus sale. In between, there is the Annual Dinner on April 16 at the Heatherland, Thurstaton. The venue for the club meetings is Minto House School, Birkenhead Road, Hoylake.

Things have changed somewhat at **Worcester;** the Hq for the formal meetings is now the Oddfellows Club, New Street, Worcester, and there are to be additional informals on the third Monday of each month at the "Old Pheasant" in New Street. They will be at the latter place on April 19 for an informal evening and skittles session.

At **Yeovil** the venue is still Building 101, Houndstone Camp, and on each Thursday in April they have G3MYM to talk on various technical topics; this to ready them for the AGM on May 6! Seriously, they are lucky to have such a 'willing horse' for a member.

Finally we come to **York,** where the group still have their Friday evenings at the United Services Club, 61 Micklegate, York, *except* that they always pass the third Friday in each month. Visitors wanted and welcomed.

## Finale

That's the lot for another month. Don't forget the updates — with a special mention in this connection for **Crawley, Midland,** and **Thames Valley** (to name but three!). Address your letters to "Club Secretary", SHORT WAVE MAGAZINE, 34 High Street, Welwyn, Herts. AL6 9EQ, to arrive by the dates shown in the 'box' and including any Mobile Rally information, *plus* your ideas/comments about **MCC.**

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## More Mobile Rallies

**May 9,** Lincoln Short Wave Club 'Hamfest' at the Lincolnshire Showground. Details from G3PVU, QTHR. **May 18,** Swindon and District A.R.C. Radio and Electronics Rally at Park School, Marlowe Avenue, Swindon, Wilts., from 10 a.m., free parking refreshments, talk-in on 2m. (S22) and 70cm. (SU8, or GB3TD), admission 50p, family attractions. Details from G8SFH, QTHR (tel: 06668-307). **May 23,** Northern Mobile Rally at the Great Yorkshire Show Ground, from 10 a.m. to 6 p.m., talk-in on RB14, SU20 and S22, refreshments, licensed bar, full range of family attractions. Information from Mrs. Pat Horne, G8RKU, 14 Fieldhead Road, Guiseley, Leeds (0943-74986). **May 23,** Barry Rally, Barry Memorial Hall, Barry, S. Glam. Full details from GW8TCF, QTHR. **May 30,** Plymouth R.C. Radio Rally, Tamar Secondary School, Paradise Road, Millbridge Plymouth, talk-in by GB2PRC on S22. Further details from Julie Butcher, G4HKZ QTHR (0752-338417). **May 30,** East Suffolk Wireless Revival at the IACSSA sportsground, Straight Road, Ipswich, transceiver clinic, aerial testing range, trade stands, 'flea market', licensed bar, family attractions. Details from G4IFF, QTHR (0473-44047). **May 30,** Hull & District A.R.S. Mobile Rally at Hull University. Full details from H. V. Cunliffe, G6DUL, 142 Hall Road, Hull. Tel: Hull (0482) 447355. **June 20,** Denby Mobile Rally, Shelley High School, Denby Dale, Huddersfield, 11 a.m. to 5 p.m., talk-in on S22 and SU8, trade stands, refreshments, family attractions. **June 27,** Longleat Mobile Rally, Longleat Park, Longleat, Warminster, Wilts., all the usual arrangements at this splendid site. Details from G4FRG, QTHR (0272-848140). **July 11,** Worcester & District A.R.C. Radio Rally, at the High School, Ombersley Road, Droitwich, talk-in on VHF and UHF, trade stands, excellent selection of family attractions. Details from G8NSL, QTHR (Worcester 620507). **July 18,** Pembroke & District A.R.C. "Bucket and Spade Party" at the Regency Hall, Saundersfoot, from 11 a.m., talk-in on 2m. and 70cm. Further details from GW3XJQ, 09945-267. **July 25,** Anglian Mobile Rally, Stanway School, Colchester, from 10 a.m., talk-in on 2m. Information from G3YAJ, QTHR. (020639-3938).

## Short Morse Course

A 12-lesson course will be held at Beckenham Adult Education Centre, 28 Beckenham Road, Beckenham Kent, on Wednesdays 7.30-9.30 p.m., commencing April 28th; no prior knowledge necessary. Full details from the course tutor, Steve Palmer, at the above address (tel: 01-650 1383).

# A SIMPLE RECEIVER FOR 160 METRES

GEOFF ROBINSON, G4AKW

HAVING recently constructed a QRP Top Band transmitter for "a few pence", I decided to see what could be built in the way of a low budget receiver for this band. A direct-conversion receiver seemed the best approach, and a search for suitable components began. To keep the receiver simple to construct, and cheap, the decision was made to try one of the many AM radio IC's available at the moment. Looking through the data sheets the CA3123E seemed most appropriate and the receiver was built around this device.

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

R1, R2 = 10K
R3 = 390R
R4 = 3K9
R5 = 4K7
C1, C5 = 22 pF
C2 = 10 nF
C3 = 6.4 μF, 25v
C4, C7, C11, C12 = 0.1 μF disc-ceramic
C6 = 100 μF, 25v
C8 = 0.22 μF
C9, C10 = 10 μF, 25v.
D1 = MV104/BB104
L1 = Toko RWR331208
L2 = Toko Y(XRS)18576AQ
RV1 = 10K 1 in.

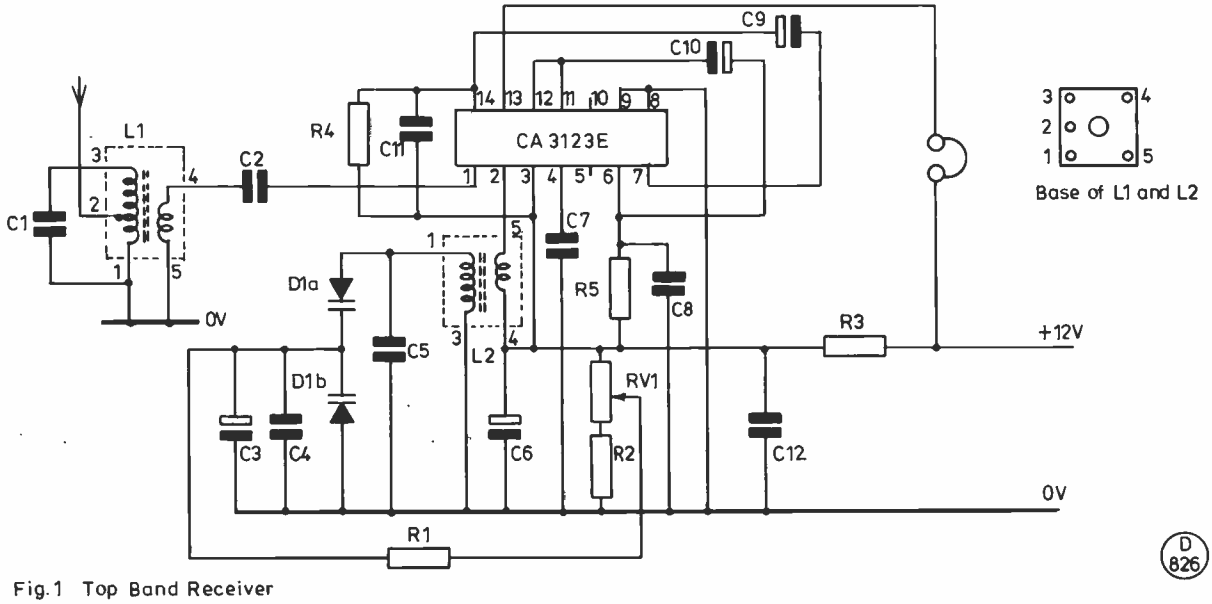


Fig. 1 Top Band Receiver

## The Circuit

The CA3123E is a 14-pin IC which contains an oscillator, RF amplifier, IF amplifier, mixer and voltage stabiliser. In the circuit shown in Fig. 1, the RF and IF amplifiers are actually used as AF amplifiers with the "RF" amplifier driving a pair of low impedance head phones (less than 600 ohms). The receiver was designed for use with a reasonably effective transmitting aerial, hence there was no need for an RF amplifier. The received signal is passed directly to the mixer after being filtered by the input tuned circuit which is resonant at 1.9 MHz. The oscillator is tuned from 1.8 to 2 MHz by one half of the dual varicap diode, D1; the other half is not used and is simply bypassed by C4. The tuning voltage is provided by RV1 which should ideally be a multi-turn pot., but a single turn pot. will do. The two simple low pass filters formed by R4, C11 and R5, C8, together with the internal impedance of the IC, determines the selectivity of the receiver.

## Performance

With the aid of a spectrum analyser a couple of measurements were made on the receiver. The oscillator leakage at the antenna input was measured as -40 dBm into 50 ohms. The rejection of the input tuned circuit to signals at 6 MHz was also measured as 30 dB relative to signals at 2 MHz. The reason for the last measurement is as follows: the non-linearities in the mixer produce a signal at the oscillator third harmonic (and others), consequently any signals at this frequency appearing at the mixer input will be converted to audio. Unfortunately some of the strongest signals on the short wave bands are to be found around 6 MHz, namely 49m. broadcast stations. Occasionally then, with some aerials and matching units breakthrough from these stations is experienced near 2 MHz, but it is never serious.

The oscillator proved very stable, even without any conscious attempt at temperature stabilisation, and was quite adequate for SSB and CW reception.

## Construction

The layout is not critical provided all the RF connections are kept short. Once constructed the core of L2 should be adjusted first so that the oscillator tunes from 1.8 to 2 MHz. The core of L1 is then adjusted for maximum output at about 1.9 MHz.

The total cost of the receiver should be no more than £3 and the components can be obtained from a number of suppliers.

# "A Word in Edgeways"

**Letters to the Editor**

*The views expressed here are not necessarily those of the Editor, nor should they be taken to represent any particular SHORT WAVE MAGAZINE policy.*

*Dear Sir* — G3NXC seems to have been thoroughly upset by my "divisive diatribe" (what lovely alliteration!), so this reply is intended to clear the air a little.

I'm sorry I omitted the inverted commas that show "dinosaurs on the DC bands" to be a humorous reference to a friendly rivalry that well pre-dates the 'B' licence. Yes, I omitted the new DC bands, just as I omitted the UHF/SHF changes, since I was trying to be brief and pithy! A few seconds' consideration should acquit me of sour grapes — 17½ years of activity on VHF/UHF could not possibly be sustained in the face of an unrequited hankering after an 'A' licence. I will pass over the word "gloating"; since Mr. Plant evidently felt my letter was offensive, he is entitled to be offensive in return. Perhaps denying the title "experienced" to non-CW operator needs more general forgiveness, but that's for others to say. Certainly, nothing I said could be more intentionally "divisive" than that!

The crux of the matter is CW. My data was obtained in precisely the same haphazard and unreliable way as G3NXC's. Perhaps it's about time we put this whole business on a sound footing by collecting some reliable data which could be subjected to meaningful analysis. *S.W.M.* and *Rad Com* could print questionnaires, randomly sampled G3/G4's could be questioned at rallies and conventions, and clubs could canvass their own members; but even data of this sort, though representing a big improvement, would only be a collection of opinions. Random short Morse reading tests would be better, but are probably impracticable. A matter which generates so much heat deserves a bit of effort to nail it down, and if I turn out to be wrong to the extent that G3NXC expects, I will apologise without reservation.

But if I am right, what then? The arguments I posed stand or fall by the proportion of 'A' operators retaining CW proficiency and not by how much traffic is carried by CW, nor by vague attempts to second-guess the thinking of governments. If the majority of 'A' operators allow their CW to decay, then either CW proficiency is irrelevant or they are wilfully neglecting the needs of their governments. It is reasonable to assume that a government would take steps to correct any situation that it sees as harmful to its interests; but if I am right, they must see such action as unnecessary. After all, the forces have their own techniques for inducting CW proficiency in a matter of weeks — and so much for experience!

Turning to CB, I don't agree that intrusion is reducing, and have good reason to expect that things will get much worse. I bought a licence and a CB rig out of curiosity, and am very perturbed by the frequency with which breakers ask me where they can buy "ham transmitters" as soon as they find out that I am a ham. Breakers have already appeared on 2m., and it's no good trying to shout them down because this only simulates their natural environment! The largely negative attitude of the RSGB must be replaced by an aggressive policy of education and encouragement so that breakers not only see the R.A.E. as their logical next step, but are fully aware of how much help and encouragement the ham fraternity can offer them. We can only benefit from this, since any operator that can cope with the horrendous crowding and general sillyness on 27 MHz would be a real acquisition to us. The trouble is, many of them have never heard of the RSGB, and have a vague image of a ham as a highly qualified but inimical being! This is *our* fault, and the solution rests with us all individually, whether or not the RSGB co-ordinates our efforts.

*Brian Carter, G8ADD*

*Dear Sir* — Whilst much enjoying the contents of your magazine, I must admit to some disappointment at the recent letters you have published. With so many brick-bats flying around and, with respect, on such essentially unimportant points, I wonder whether the casual reader would feel that the abundant goodwill amongst radio amateurs was quite as evident as indeed it usually is on the air. Would you allow me therefore to inject a lighter note, not as an "old hand", but as a newcomer who has just celebrated one whole year on the bands?

I have thoroughly enjoyed amateur radio since I first became interested after a trip to New York about four years ago. A friend produced a portable SW broadcast set and — low and behold — received the BBC. On my return, I too bought a SW portable and started to listen to broadcast bands. Soon I discovered BFO's and SSB and the amateur bands and became an avid SWL. Last year I was licensed as G6AFP (when G6s were still a novelty!). I soon met up with many local amateurs, both newcomers and established stations. I once (falsely) "accused" — though well-intentioned — another station of spreading all over the band when the front end of my Liner-2 let in everything from police cars to Radio 4, suffered a reprimand and hurt pride, and re-incurred vengeance when the same Liner-2 spread itself (in fact) all over the bands once or twice in return! Many £s later, a new multi-mode and a little better placed confidence and life was more tranquil. I had great fun with the almighty aurora of July last year and worked an OK1 as best VHF DX. In summer I went to France with a F0 call and felt very honoured to cause a pile-up across the Channel on 2 metres. Meanwhile the second batch of G6s came along, and I began to feel quite venerable with six months' experience behind me. I continued to meet on the air, and sometimes in the flesh, all sorts of interesting people with all sorts of different interests and background and eventually the time seemed right to think about CW.

In November last year, my brain teeming with dits and dahs, I trekked to Trusthorpe, our local Mecca for the aspiring G4, and passed the Test. Since December (no long waits then!) I have chalked up 85 countries worked on HF; I've spoken to missionaries in Africa, DX-peditions at the South Pole and even a maritime mobile in Mayotte, which was not "somewhere in the Mediterranean" as I had thought but near Madagascar.

This is a very ordinary potted history for a new ham. Many can tell far more interesting stories about their new exploits. There are many aspects to Amateur Radio, some excellent, some less so. But as a hobby I am sure it is unique in its potential. Of course we must print our grouses, but do let's also enthuse and encourage a little. There's surely room for that too.

*Jeremy Boot, G4NJH*

*Dear Sir* — I was pleased to read that G9BF has been re-issued. I thought I had worked a pirate, having received a crumpled QSL card with GB3SWM crossed-out and G9BF substituted in felt pen. DC input was also crossed out, with 200 B.H.P. inserted instead, and my RST given as 297X. The card was endorsed with a "Not in FOC" sticker. Welcome back!

*Rev. George Dobbs, G3RJV*

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*Address your letters for this column to "A Word in Edgeways", SHORT WAVE MAGAZINE, 34 High Street, Welwyn, Herts. AL6 9EQ.*

# VHF BANDS

NORMAN FITCH, G3FPK

## Yes Minister?

THERE can be few British readers unaware of the fiasco following the unheralded publication of the new amateur radio licence schedule in the London, Belfast and Edinburgh *Gazettes* on February 12. The history of this event has been broadcast and chronicled well enough, so will not be commented upon here. As this is being compiled, the several meetings between RSGB Headquarters staff and Home Office personnel have produced worthwhile results which can be summarised as follows:— *4m.* Power at the aerial 16 dBW for A1A, or CW mode, equivalent to a 40W carrier, and 22 dBW PEP for J3E or SSB mode, equivalent to 160W. *2m and 70cm.* The same power-at-the-aerial idea prevails, but the CW value is 20 dBW or 100W, and the SSB one is 26 dBW or 400W. On 70cm., all previous emission modes have been restored. *23cm and above.* Above 1.24 GHz, all references to *e.i.r.p.,* that mysterious effective *isotropic* radiated power, have been deleted, as have those concerning aerial heights which latter, if retained, would have put the *kibosh* on all UHF mobile operation. For the moment power levels have reverted to the old, 150W DC *input* and 400W PEP *output,* pending final agreement with the Home Office. It is expected that the new schedule, in final agreed form, should be published by the time this appears, and in due course, all existing licensees should get a copy with their new licences.

It is a sensible approach to depart from the DC power input idea. Although the easiest parameter to measure, it can lead to sub-standard signals when people try to squeeze the last watt of RF from a device. *Output* power is a far better way of defining the permissible power since the user can opt for Class AB1 operation on CW mode, rather than Class C, which could produce a better quality signal. Of course, there was nothing to stop anyone using the idea before, but the low efficiency was not attractive.

## Awards News

Another overseas reader has been elected to the 2m. QTH Squares Century Club. Welcome to the first, Swiss member, Rudolf Furrer, HB9LE, from Winterthur, EH57e. Rudy's certificate is number 18 and was issued on Feb. 22, with 101 squares credited in 22 countries. He complains that many of the expected QSLs have never arrived. The actual QTH is Kronberg, 1,666m. *a.s.l.* which sounds fine, but in the southerly direction, there are higher mountains to cross. All but two of the contacts were *via* tropo., with EA5ZF (ZY) and 9H1BT (HV) the only *E's* QSOs. 15 were on CW, the rest on SSB.

## Sporadic E Study

From this year onwards, the CCIR will be developing the study of VHF *Sporadic E* propagation. *E's* events on 2m are well reported in this feature and elsewhere and some of the more spectacular events of the past have been carefully analysed by Serge Canivenc, F8SH, the IARU Region 1 Co-ordinator. Some readers may have seen these reports which, although compiled from amateur reports, are in fact official CCIR papers.

An important aim of this long term project is to establish the duration of particular events. Most of the CCIR information on record relates to frequencies between 40 and 70 MHz and it would be a valuable contribution to the replanning of various services, following the WARC, 1979, to have available information relating to higher frequencies.

This study will be in support of existing IARU Region 1 work by *DUBUS* and F8SH, acting as coordinators. A full interchange of reports between IARU, *DUBUS* and RSGB is planned. A reporting form has been printed on one side of which can be listed amateur stations heard or worked *via E's,* while broadcast FM and TV stations heard on various frequencies can be listed on the reverse side. Copies of the forms will be available at RSGB stands at various exhibitions and rallies, as well as from RSGB Headquarters in which case an *s.a.e.* should be enclosed. Any reader wanting to participate can indicate this when writing and your scribe will pass on the particulars so that a register can be compiled.

The above information was supplied by Mike Lee, G3VYF, a member of the RSGB's Propagation Studies Committee and a contributor to this feature.

## Beacon Notes

Beacons are becoming a growth industry on 23cm. On March 7, GB3NWK (AL51b) came on stream on 1,296.81 MHz and has been widely heard at good strength. The beacon is 525ft. *a.s.l.* with 4W output to a 15-over-15 *Yagi* aerial beaming west-north-west. GB3FRS (ZL57j) referred to last month came on Feb. 28 on 1,296.85 MHz and is also being well received. In the 4m band, the Home Office has formally approved the new beacon frequencies and GB3SU (ZN61a) is now operating on 70.05 MHz.

## Repeaters

The RSGB has approved proposals for UHF relays in the Medway, York and Biggin Hill (Kent) areas, and for an RTTY one in Leicestershire. These will be submitted to the Home Office under Phase 7, later this year. The UHF repeater GB3SY on RB6, serving Barnsley, came on from a new site on Feb. 27.

It continues to amaze your scribe that the dreadfully abused GB3SL at Crystal Palace continues to operate. What an advert for Amateur Radio! Just what *service* does it provide for licensed radio amateurs? It seems perpetually commandeered by pirates or else rendered useless by being jammed by unmodulated carriers. The pirates must think that radio amateurs are made to pay for the building, installation, maintenance and electricity costs of something they can rarely use. It is akin to buying a travel season ticket yet never being able to get on the train. Why should the amateur radio movement provide a free broadcasting service to the vandals of the air, or doesn't anyone care?

## Contest News

Saturday, Apr. 3 sees the 1,296 MHz Trophy Contest, with the 432 MHz Trophy and *s.w.l.* event the following day. The *BARTG* is running its new, three band affair this weekend too; see page 18, last month. The final two legs of the 4m. *Cumulatives* are on Apr. 11 and 25, from 0900 to 1100 GMT. 144 MHz CW addicts will be at it on Apr. 18 and the first of the six legs of the 10 GHz *Cumulatives* is on Apr. 25.

On to May, and the first weekend is devoted to the 432, 1,296, 2,304 MHz affair. The Low Power 14 MHz Contest is on May 2. The times of some of the above are not known and may be different from the corresponding events in 1981 for "european" reasons.

## Satellite Matters

Very few readers ever mention that they operate through any of the present five transponders orbiting the Earth, or listen to the telemetry from *U-O-9.* Monitoring the downlink bands reveals the same, few stations using *0-8,* etc., many of whom are never heard on any other mode at all regularly, apart from net participation.

In *Oscar News,* No. 36, AMSAT-UK secretary Ron Broadbent, G3AAJ, wrote that 520 copies of the *Handbook* were sent to schools, clubs and education authorities. Not one single reply had been received, however, as to what use this information has been put. The first issue of the new, bi-monthly *Orbital Calendar,* mentioned last month, has been received and covers *0-8* and *RS3* through *8* until May 2. While all the information is there, the quality of the printing is poor — and this is acknowledged by AMSAT-UK — and one really needs a good magnifying

glass to assist in reading the figures. It is anticipated that future issues will be better.

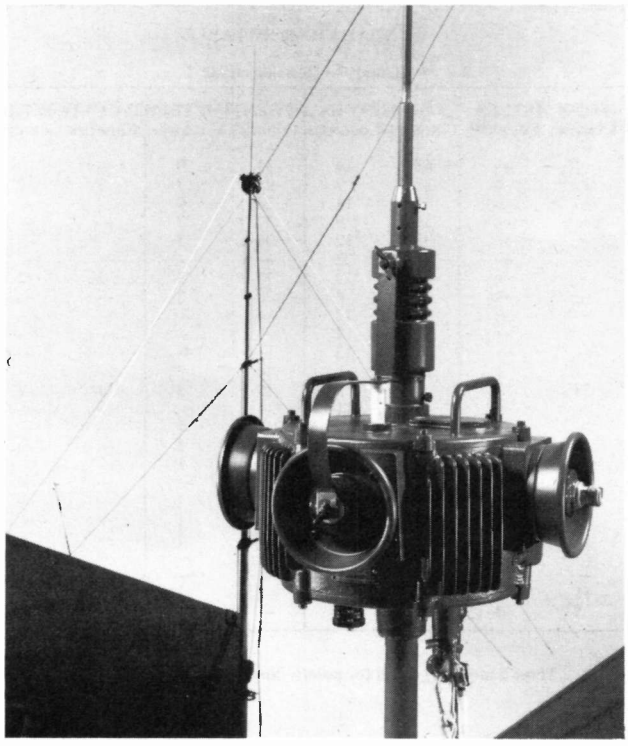
Although *U-O-9* was launched last October 6, it was still not fully operational at the time of editing. There has been a lack of information at times from the University of Surrey and this is regrettable. The hundreds of members of AMSAT-UK who donated money to the *UOSAT* project are entitled to be kept informed of progress, or problems, on a regular basis. With this in mind, a meeting took place on March 6 with Dr. Martin Sweeting, G3YJO, at which it was learned that the University of Surrey command station had been unable to achieve full control over the satellite for some time. However, this problem was overcome on March 1 and the U.O.S. team have been able to load data into the on board computer and to control all aspects of the spacecraft. Martin promised to activate the Speech Synthesiser Experiment by the time this appears. The *Digitalker* has a 120-word capacity.

Satellite information is discussed every evening from 1900 local time on 3,780 kHz *plus/minus* QRM, and on Sunday mornings from 1015 local time. Details of AMSAT-UK membership and services can be had for an *s.a.e.* to 94 Herongate Road, London, E12 5EQ.

## DX Notes

Rainer Bertelsmeier, DJ9BV, has written to inform that a group of Hamburg operators will be going to the island of Helgoland, DO70j, for the May 1/2 contest weekend, with planned operation on 2m., 70cm. and 23cm. using the call, DK0IK/P. They will have 500W and 15 dBd. aerial gain on 2m., with *Gasfet* preamp. on receive, the QRGs being 144.382 and 144.022 MHz for SSB and CW respectively. On 70cm., 250W, 20 dBd., *Gasfet* preamp. on 432.162 MHz SSB and CW and on 23cm., 100W, 21 dBd., *Gasfet* preamp on 1,296.162 MHz, both modes. They will continue till May 7 and MS and tropo. skeds can be arranged *via* the VHF net on 20m. on 14.345 MHz or by direct telephone call to the station on 010 49 472 5310, from the U.K. Others in the team include DK3XT and DJ7HK.

During the first two weeks in July, a group of amateurs from Berlin will be operating from Liechtenstein, HB0, over the first two weeks in July. More details later. Another summer trip, to take in the *Perseids,* is planned by Dave Crisp, G8IXG, and Steve Lowe, G4JVG, who will be going to the Aaland Islands, OH0, (KT05). They are taking Dave's station which comprises a *Yaesu* FT-225RD with *muTek* board, and the 4CX350 amplifier. One or two 19-ele. *Cushcraft* Aerials are likely. The target arrival time is late on Aug. 10, with MS operation on the 11th through 14th. The party will probably leave on the 17th or 18th. G4JVG will be taking his *Drake* HF bands station for use on the 20m VHF net. G4IWA and G8SYE, with an *s.w.l.* will complete the team and Dave is C.-in-C. MS skeds and can be reached at his new QTH, which is:— 2 Flaxman Close, Earley, Reading, RG6 2TH.



**An interesting new *Rohde & Schwarz* HF antenna system, Model AK-501, shown here in mobile operation; the GH-044 antenna switch in front is for selection between ground-wave communication and high-angle radiation and for bisecting the antenna length, as against conventional high-angle antennas. The AK-501 is designed specifically for the propagation conditions in the frequency range 1.5 to 30 MHz, and is capable of meeting all the requirements of radio-communication over any distance in the RT and HF range.**

## Four Metres

The *Aurora* on Feb. 1 brought a CW QSO with GM4DIJ (Lothian) for Syd Harden, G2AXI, (Hants.) On the 14th, there were tropo. contacts with G4FRE/A (Suffolk), G4FKI (Essex) and G4CIZ (Devon). Dave Sellars, G3PBV, (Devon) says that local activity is on the increase with G4CIZ in Exeter and G4MAW (ex-G8ABP) in Paignton both participating in the *Cumulatives* and working towards the legal power limit for the band.

Arthur Breese, GD2HDZ, also worked GM4DIJ in another *Ar* on Feb. 6. He used the *Cumulative* sessions on Jan. 31 and Feb. 14 to good effect, the log showing stations worked from Cumbria to London, and S. Yorks. to Hampshire. Obviously these short activity periods are proving popular.

## Two Metres

Bill Hodgson, G3BW, (Cumbria) has sent in his first score for the Annual Table this year. He has three of the aerials back aloft following the earlier gale damage and, thanks to a few *Ar* events, has already 14 countries in the log for 1982. G3PBV also sent in his first 1982 Table figures. Dave asked if a list of counties/countries worked is required to substantiate these claims. Well, no: if readers say they have worked what they claim, then that is good enough for your scribe. After all, what satisfaction would there be in cheating? Although he has caught most of the recent *Ar's,* they have been pretty disappointing affairs in the south-west with only weak EI, GI, GM, G and PA stations heard. However, GM4LHA (XP) on Feb. 6 provided a new square. Dave interrupted his letter to join in the Mar. 1 event which brought GM3WCS (YQ) for another new one. GI6BNI (XO) gave the first SSB QSO *via Ar* and reflexions were very strong from all over the U.K. OZ3ZW and PAs were copied at QTF 25°. G3PBV asks whether we still need this idea of an SSB calling frequency on 2m now that there is so much more activity? When the band is crowded, it would seem quite unnecessary, but it is probably useful, say, in the middle of a weekday afternoon when band occupance is very low.

Mike Lee, G3VYF, (Essex) in a late note, reports that in the 144/432 MHz

**ANNUAL VHF/UHF TABLE**

**January to December 1982**

| 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 |
|---|---|---|---|---|---|---|---|---|---|
| G8RZP | — | — | 62 | 14 | 33 | 9 | — | — | 118 |
| G2AXI | 29 | 4 | 37 | 9 | 25 | 7 | *3* | *2* | 111 |
| G8RZO | — | — | 61 | 14 | 24 | 9 | — | — | 108 |
| G8TFI | — | — | 39 | 9 | 37 | 7 | — | — | 92 |
| G4JZF | — | — | 35 | 12 | 36 | 7 | — | — | 90 |
| G4DEZ | — | — | 64 | 22 | — | — | — | — | 86 |
| G3BW | — | — | 40 | 14 | 14 | 3 | 2 | 2 | 75 |
| G6ADC | — | — | 39 | 8 | 20 | 3 | — | — | 70 |
| G3FPK | — | — | 55 | 12 | — | — | — | — | 67 |
| G8LFB | — | — | 52 | 12 | — | — | — | — | 64 |
| G6ECM | — | — | 50 | 13 | — | — | — | — | 63 |
| G3PBV | 1 | 1 | 29 | 8 | 14 | 3 | — | — | 56 |
| GD2HDZ | 23 | 3 | 5 | 2 | 19 | 3 | *1* | *1* | 55 |
| GM8OEG | — | — | 44 | 11 | — | — | — | — | 55 |
| G8VR | — | — | 23 | 20 | 10 | 1 | — | — | 54 |
| G8WUU | — | — | 35 | 5 | 9 | 1 | — | — | 50 |
| GW3CCF | — | — | 32 | 4 | 6 | 1 | — | — | 43 |
| G6AJA | — | — | 38 | 5 | — | — | — | — | 43 |
| G4MUT | — | — | 19 | 6 | 12 | 1 | — | — | 38 |
| G4KLX | — | — | 22 | 9 | 2 | 1 | — | — | 34 |
| G4FKI | 17 | 1 | 3 | 2 | 9 | 1 | — | — | 33 |
| G8VFV | — | — | 24 | 7 | — | — | — | — | 31 |
| G6ANS | — | — | 16 | 9 | — | — | — | — | 25 |
| G3FIJ | 11 | 1 | 4 | 3 | 1 | 1 | — | — | 21 |
| GW4HBK | 5 | 3 | 2 | 3 | — | — | — | — | 13 |

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

Contest on Mar. 6/7, the G4BAR/P station made over 650 contacts, including over to the F squares. The two 11-ele. *DL6WU Yagis* and *SM6CKU-type* power divider, all from *muTek Limited* gave a very clean polar diagram. Ken Osborne, G4IGO, (Bristol) seems to have been on for most of the *Ar's* from Jan. 31 to when he wrote on Feb. 20. Jan. 31 saw two sessions: 1426-1522 and 1645-1835 with a trio of GMs worked and half a dozen more heard. On Feb. 1, 1821-2040 brought G, GM, GW, OZ and SM stations worked in AL, EQ, HT, WS, YN, YO and YQ, with many more G, GM, GI, GW and PA folk heard. There were two, distinct QTFs, 25° and 55° In a short second phase, 2124-2145, a GW and a GM were heard. On Feb. 4, four GMs in YP and YQ were heard between 2140 and 2157, followed by a longer opening, from 2301 to 0042 in which GM4ILS (YR), SM4IVE (HT) and GM3ZXE (YQ) were worked.

On Feb. 6, Ken again noticed two different QTFs, 25° and 50° between 1632 and 2000. The former QTF produced GI, GM, LA and SM stations, the latter G, GI, GW and PAs. He missed out on the Feb. 10/11 affair but caught that on the 12th, from 0005 to 0040 when an SM6 was heard, plus G and GM stations. On the 13th, Ken notes three phases: 1455-1555, 1658-2025 and 2207-2226, the last at a QTF of 60°. G, GM, PA and SM were worked, and DJ, GI and GW heard. At 1741, GM3JIJ was S9A at 15° and the *Doppler* shift changed from LF at 30° to HF at 0°, the note changing from truly *Auroral* at 30° to T7 at 0°. On the 14th, G, GI, GM, GW and SM stations were heard, 1805-1943 at QTFs 10-30° and 45°. Between 1804 and 1839, Ken saw Band 1 TV pictures from SM or LA, possibly *via Auroral E?* Finally, on the tropo. scene on Jan. 30, G4IGO worked a few Fs in AD, AG, ZE and ZF and EAs in VD squares, while in the Scandinavian contest on the 2nd of Feb., he contacted OZ1DPR (EP) and OZ2ZB/A (EQ).

Paul Turner, G4IJE, (Essex) worked UQ2GLO (KQ) on Mar. 1 *via Ar* at a QTF of 50° and says that PA0OOM worked UA3LBO (QO) in this event. *Via* MS mode, Paul worked SM4GVF (HT) on Feb. 13; LA5IH (CU) on the 20th, and OK1OA (HK) on the 21st, receiving a 21 seconds burst at S9 from the latter. Jon Stow, G4MCU, (Essex) was on for the *Ar's* on Feb. 1, 4, 6 and 12 and Mar. 1, but missed out on the one on Feb. 22 when some very weak OH and UP2 signals were just fading out. Four new squares were added in GM, LA and SM and Jon has 96 confirmed.

Adrian Chamberlain, G6ADC, (Coventry) does not mention having participated in any of the numerous *Ar's,* but has been working some tropo. GDX, plus DD3KF (DK) on Feb. 27. Martyn Hunt, G6AJA, (Cumbria) has got interested in the Worked All Britain scene but says there is not much interest in WAB on 2m. Welcome to Roger Greengrass, G6ANS, (Essex) who enters our tables. His station consists of the *FDK-750* and 9-ele. *Yagi,* but there are hopes for an HF bands transceiver with VHF and UHF transverters, now that the Morse test has been passed, with the G4 call awaited.

Graeme Caselton, G6CSY, (Kent) was only using a *halo* aerial on Mar. 1/2, yet heard many strong *Auroral* signals from GM, G, GI and SM. He mentions some new licensing arrangements in Holland whereby the Class D novices — FM and repeaters only — are on 145.0-145.8 MHz now, instead of 145.25-145.4 MHz. Mick Cuckoo, G6ECM (Kent) concentrated on tropo. contacts. Jan. 30 saw a QSO with F0GWN/P (XH10h) and that is rather rare as it is about 95% sea! HB9AEN/P (DG13b) was another new country and square, and Fs in YI, ZI and ZF were also worked. The next day Mick contacted EI9Q (WM55d) for another new country and square. Good conditions to the south on Feb. 7 brought F1DV (BG), F1CMB (AH) and F6CCI (AH). On an apparently dead band on Feb. 14, GI8TBQ (XO33j) and GI4GVS (XO21b) were worked. The only *Ar* QSOs were GI8UPV (XO) on Feb. 1 and GM8OEG (YQ) on the 14th.

Jackie, G8RZO, and John, G8RZP, Brakespear (Sheppey) are making a determined effort in the Annual Table and have, between them, managed to work a nice selection of tropo. and *Ar* stations. The rarer ones included GM6CFN (Highlands); GI8YWV (Antrim) and G6CBN (Tyne & Wear) in the Feb. 1 *Ar.* On the 4th, Jackie sneaked G6CGY (Cleveland); G8XDF (Durham) and GI8TBQ (Down). During the *Ar* on Feb. 7, John got GM8OEG in Tayside and both netted EI2DW (Dublin) on the 28th. Chris Easton, G8TFI, (Gloucs.) is finding his newish QTH working well for DX, and Dutch stations can be worked in flat conditions with about one kilowatt *e.r.p.* F0GWN/P in XH (QSL *via* PA0FTF) and EA1TA (VD) were worked on Jan. 30. In the Feb. 1 *Ar* Chris managed GMs in Borders, Highlands, Strathclyde and Grampian, plus GI4JYJ in Antrim.

In a recent *Ar* event, Ken Willis, G8VR, (Kent) heard a French station, *Aurorally* being called by a northern G chap who was beaming south and who then called "CQ Aurora" to the south! In the Scandinavian, monthly contest on Feb. 2, G3VYF worked SK6HD (GS68j) *via* tropo. and in their first-ever opening to England, they worked about 50 Gs. In the Feb. 22 *Ar,* Mike worked UR2RQT (MS80e) at 1820. GD2HDZ has managed to miss most all the *Ar's* so has a lot of catching up to do on the band.

Andy Steven, GM4IPK, (Edinburgh) is another MS buff, whose best DX so far is UA3LBO in the *Quadrantids* on Jan. 3. Static rain was a problem for him but he managed to receive 15 bursts and 8 pings. Valera got a 7 secs., S9 burst from Andy, the QRB being 2,205 kms. GM4IPK is assembling a four times 16-ele. long *Yagi* array with *az-el* control and is pondering over what type of masthead preamp. to install.

Andy Swiffin, GM8OEG, (YQ35e) is another new contributor and enters the tables. The present station comprises a *Trio* TS-700 with 2SK88 "front end", a 4CX250B amplifier and a 9-ele. *Yagi* at 20ft. An 11-ele. *H.A.G. Yagi* has been received and will be put up at 35ft. The site

QTH LOCATOR SQUARES TABLE

| Station | 23 cm. | 70 cm. | 2 m. | Total |
|---|---|---|---|---|
| G3JXN | 43 | 87 | 123 | 253 |
| G3XDY | 30 | 83 | 123 | 236 |
| G3COJ | 24 | 74 | 126 | 224 |
| G8FMK | 16 | 57 | 71 | 144 |
| G3PBV | 14 | 65 | 125 | 204 |
| G4NBS | 13 | 57 | 89 | 159 |
| GD2HDZ | 12 | 44 | 90 | 146 |
| G8KAX | 10 | 45 | 78 | 133 |
| G4BVY | 9 | 58 | — | 67 |
| GJ8KNV | 8 | 73 | 164 | 245 |
| G2AXI | 8 | 60 | 106 | 174 |
| G4GFX | 7 | 40 | 103 | 150 |
| G8ATK | 6 | 56 | 113 | 175 |
| G8HHI | 6 | 52 | 121 | 179 |
| G4ERX | 6 | 46 | 104 | 156 |
| G3BW | 5 | 31 | 189 | 225 |
| G8KBQ | 4 | 50 | 115 | 169 |
| GW3CBY | 3 | 14 | 65 | 82 |
| GJ4ICD | 1 | 96 | 208 | 305 |
| GJ8SBT | 1 | — | 138 | 139 |
| G3VYF | — | 93 | 278 | 371 |
| G3POI | — | — | 346 | 346 |
| G3IMV | — | — | 293 | 293 |
| DK3UZ | — | — | 285 | 285 |
| SP2DX | — | — | 280 | 280 |
| EA3LL | — | 15 | 231 | 246 |
| G4IJE | — | — | 240 | 240 |
| G4ERG | — | 16 | 223 | 239 |
| G4IGO | — | 17 | 205 | 222 |
| 9H1BT | — | 11 | 210 | 221 |
| G3CHN | — | — | 213 | 213 |
| G4DEZ | — | — | 201 | 201 |
| GM4COK | — | 12 | 178 | 190 |
| G3NAQ | — | 58 | 128 | 186 |
| G3FPK | — | — | 179 | 179 |
| G8VR | — | 3 | 173 | 176 |
| G4BWG | — | 38 | 136 | 174 |
| G4NFD | — | 36 | 138 | 174 |
| GW3NYY | — | 35 | 138 | 173 |
| G3KEQ | — | — | 173 | 173 |
| GM4CXP | — | 25 | 142 | 167 |
| G8MFJ | — | 28 | 133 | 161 |
| G4JZF | — | 37 | 119 | 156 |
| G4MCU | — | 32 | 122 | 154 |
| G4AWU | — | 22 | 130 | 152 |
| GW4EAI | — | — | 150 | 150 |
| G8CXQ | — | 25 | 123 | 148 |
| G8IXG | — | 7 | 140 | 147 |
| G8JJR | — | 38 | 108 | 146 |
| G8VLQ | — | 38 | 106 | 144 |
| G8RZP | — | 38 | 102 | 140 |
| G8RZO | — | 38 | 101 | 139 |
| G4HFO | — | 55 | 80 | 135 |
| G3FIJ | — | 29 | 86 | 115 |
| G8LFB | — | — | 115 | 115 |
| G8TGM | — | — | 109 | 109 |
| GM4IPK | — | — | 102 | 102 |
| G8KPL | — | 7 | 91 | 98 |
| G4GHA | — | — | 95 | 95 |
| G4MJC | — | 12 | 76 | 88 |
| G8JAG | — | 7 | 81 | 88 |
| G4IRX | — | — | 85 | 85 |
| G4MUT | — | 31 | 48 | 79 |
| G8RWG | — | — | 71 | 71 |
| G8VFV | — | — | 68 | 68 |
| G4KLX | — | 5 | 59 | 64 |
| G8XMP | — | — | 62 | 62 |
| G6ADC | — | 14 | 47 | 61 |
| G8TIN | — | 3 | 56 | 59 |
| G8WUU | — | 13 | 46 | 59 |
| GM8OEG | — | — | 58 | 58 |
| G6DDK | — | 4 | 53 | 57 |
| G4GXL | — | 4 | 52 | 56 |
| G6ECM | — | — | 52 | 52 |
| G8LXY | — | 18 | 34 | 52 |
| G8WAQ | — | — | 52 | 52 |
| G8XQS | — | — | 47 | 47 |
| G4LDY | — | 3 | 41 | 44 |
| G8MBI | — | — | 40 | 40 |
| G6ANS | — | — | 33 | 33 |

**Starting Date January 1, 1975. No satellite or repeater QSOs. "Band of the Month," 23cm.**

is 400ft. *a.s.l.* with some higher ground to the south making tropo. in that direction a bit difficult. Andy started MS operation in the December *Geminids* and found himself in some demand. Likewise, "CQ" calls in an *Aurora* are unlikely to produce anything except "locals" in the near continent. In the *Ar* of Mar. 2, he was at work in the afternoon phase and did not find an early evening one. However, the late evening one began around 2245 and was still on 0230 when Andy fell into bed. 85 stations in 35 squares were worked, best DX being:— SM7HFW (GQ); SM7MRJ, (GP); SM7CAD (HR); SM7EML (HQ); DG4NAE (EJ) and DB2AY and DB1AT, both in FM.

## Seventy Centimetres

The Contest on Feb. 7 gave most readers a chance to add some 1982 counties and countries, in G2AXI's case, 9 counties. In the southerly lift on Feb. 9, Syd added GJ3RAX and F1FHI. For G3PBV, the event was disappointing, the slight northerly lift in the morning being missed due to *GB2RS* news bulletin duties. Dave did not manage to work any further than Derby. The best of the lift on Feb. 9 was over by the time he got on the band, but F6DZK in AI was worked for a long sought-after square. The Frenchman was just using a 21-ele. aerial pointing out of his window! G3VYF also worked this F6. Mike noted a distinct lack of Gs on the band in the Mar. 6/7 Contest and, with G3NOX, wonders if uncertainty over the omission of SSB mode on the cock-eyed "new licence" schedule was to blame? Undaunted by such nonesense, the G4JAR/P lads made 223 QSOs, mainly into the continent, including DL7QY (FJ) on CW.

Graham Taylor, G4JZF, (Staffs.) concentrated on 70cm. in the Feb. 9 lift, adding eight new squares. He reckons there were two ducts, one to the south, the other towards Paris. In the Contest a couple of days earlier, conditions seemed quite good for the first two hours but then it became a bit of a struggle. Best DX were G3DAH (Kent) and G3PBV (Devon), while GD2HDZ was also worked. Operation in the Mar. 6/7 event was unlikely as the *Icom* IC-402 had to go to hospital for a check-up.

G6ADC reports a miserable 30% QSL return for 70cm. QSOs, as compared with 85% on 2m. Adrian always asks 2m. stations if they have 70cm. too, and gets some contacts that way. On Feb. 1, he worked G8SVK near Heathrow Airport and they ended up running very low power FM over the 95 miles path. Both were using *Yaesu* FT-780R transceivers, G6ADC's aerial being a *Jaybeam* MBM-48, and G8SVK's a 21-ele. *Tonna*. G6ANS has a 19-ele. *Yagi* up the mast but no gear for 70cm. yet. An *FT-101ZD* and transverter is the immediate goal for Roger.

It was G8RZP's turn in the Feb. 7 contest and John did quite well, making 94 contacts worth 619 points. After the contest, the next good day was Feb. 9, when John and Jackie worked a mixed bag of GDX and F1DV (BG); F1FHI (ZH); F1FHR (BI); F1SA (CI) and ON7PA. On the 20th, they worked G5UM (Leics.) and were joined by G8BAV (Derby) and G3OSS (London).

G8TFI reckons he will concentrate on 70cm. Chris has commissioned a ". . . simple, cheap and remarkably good masthead preamplifier using a 3SK97 MESFET device". These can be used to make an amplifier with a *practical noise figure* of 0.8 dB. on 432 MHz and are used in commercially made, Japanese TV tuners. The circuit is a tuned, stripline input and untuned passive output design with a gain of about 15 dB. Chris operated in the Feb. 7 Contest and made 110 QSOs for 760 points, in flat conditions. Best DX was DJ9DL at 654 kms. but he wonders where were all the GMs?

GD2HDZ complains of *Syledis* interference during the Contest and struggled to make 29 QSOs which provided another 13 counties for 1982.

## Gigahertz Bands

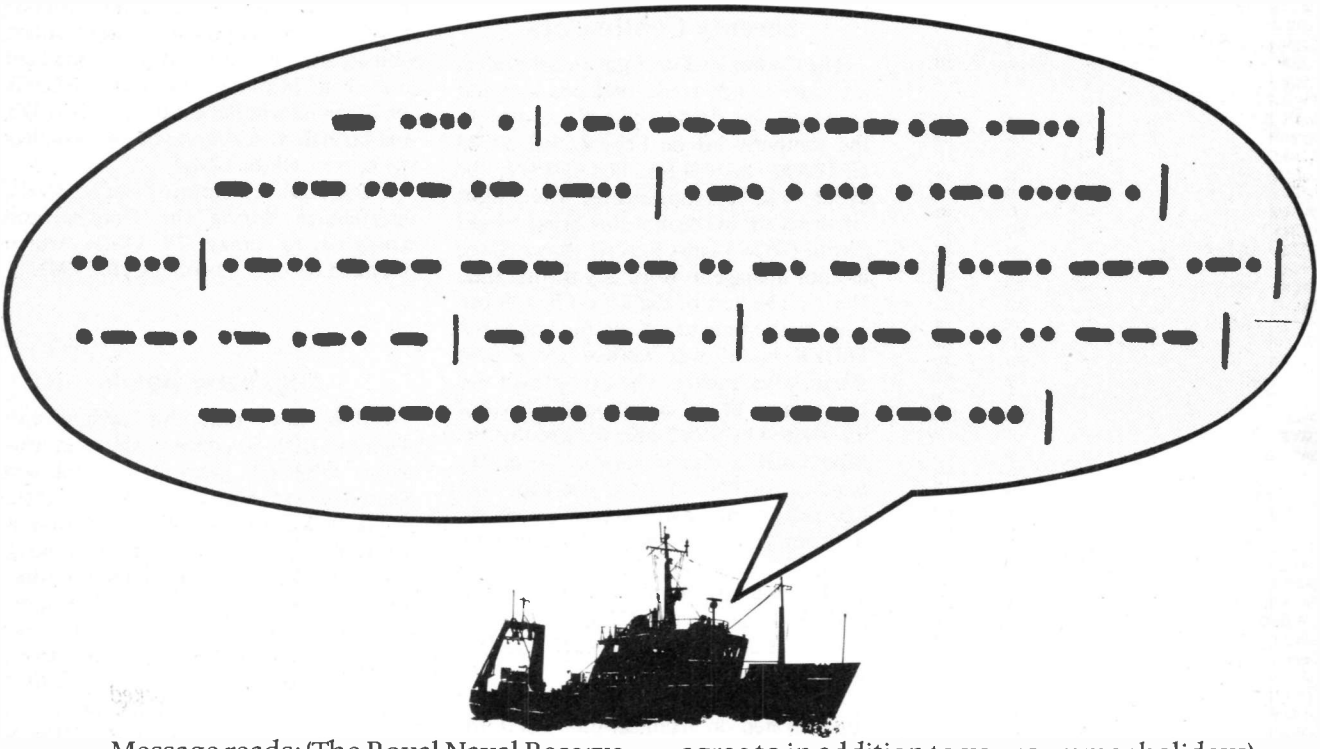
G3BW now feeds his aerials with *Andrews* LDF-50 coaxial cable and now copies GB3CLE every night. Bill was pleased to read about GB3FRS last month. Angus McKenzie, G3OSS, (London) now has 85W output on 23cm. and mentioned a QSO with DK1VC in the evening of Mar. 6,with RS53 reports each way. A short note from John Tye, G4BYV, (Norfolk) refers to Jan. 14, when Steve Berry, G4LRT, (Northants.) worked PA0EZ (CM) and PA0WWM (CM) on 13cm. John worked DF4LY (EO) and DF9LN (FO) on the same band. The DLs and PAs have moved from 2,304 MHz to 2,320 MHz. John and Simon Freeman, G3LQR (Suffolk) have also moved and have had a QSO on the new QRG.

## Late News

G8VR reports that PA2VST and PA0RDY will be operating from the Duchy of Luxembourg on 2m. from the late evening of May 7 till late on the 11th. They will be listening for tropo. QSOs towards the U.K. with 'VST in FJ square and 'RDY in CJ. The CW frequency will be 144.144 MHz and the SSB one, 144.244 MHz.

## Deadlines

So much for the February doings. All your news, views and claims for the May column by Apr. 7 and for the next piece, by May 5 to: "VHF Bands," SHORT WAVE MAGAZINE, 34 High Street, WELWYN, Herts., AL6 9EQ. *73 de G3FPK.*



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| Cubical Quad Antennae. 2nd Edition | £3.15 |
| Simple Low Cost Wire Antennas, by Orr | £4.45 |
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