

# RADio COMMunication

August 1986

**G6XCG SETS A NEW RECORD**



JOHN  
O'GROATS  
TO  
LAND'S  
END  
ON AN  
ELVA

*See story on page 550*

**Journal of the Radio Society of Great Britain**





# YAESU



## Top Band — 70cms\*, Multimode — all in one! Our latest arrival . . . the FT 767 GX!

100w all mode, All band QSK Transceiver — the super new addition to the YAESU range.



State-of-the-art advances in transceiver design and latest computer aided technology have produced the newest addition to the YAESU family, the Incredible new FT 767 GX. The unit has plug-in VHF & UHF 10 watt modules for 2M, 6M and 70cms (\*which come as optional extras) — so you can have all band coverage with one rig.

- Front panel keypad frequency entry
  - Automatic SWR & Watt meter (digital)
  - 10 multi-function memories
  - Auto Tracking
  - Twin VFO's
  - SSB/CW/FSK/AM/FM
  - General Coverage Receiver
  - Built-in Power Supply
  - Built-in auto HF antenna tuner
  - Four internal CPU's
  - Scanning
  - Improved built-in keyer
- Optional Plug-in modules for 2m, 6m and 70cms

Want to know more? Why not write in for further details.

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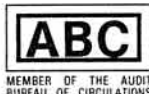
Technical articles on subjects of amateur interest are always welcome and should be sent to: The Editor, *Radio Communication*, Lambda House, Cranborne Road, Potters Bar, Herts EN6 3JE.

All articles received are reviewed for technical merit by the RSGB Technical & Publications Committee, or an acknowledged expert on the subject, before acceptance. Payment at high competitive rates will be made for all articles published.

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The editor will be pleased to send intending authors a manuscript preparation guide and to give any other advice and assistance requested.

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GREAT BRITAIN 1986

remember the TR9000 two metre multimode,  
that revolutionized mobile operation,  
the TR9130, that improved the unimprovable,

now, better than ever, the **NEW** TRIO  
two metre multimode,  
the **TR751E**.



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

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

The transceiver has two VFO's and 10 memory channels. Memory information is easily transferred to either VFO. Each memory holds information on frequency, mode and also the step rate to be set when

transferring the memory information to VFO. Memory channel one is also the ALERT frequency, memories 7 and 8 relate to DCL and memory 9 programs the user defined limits of frequency scan.

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

Operating on 13.8 volts DC, power output from the transceiver is 25 watts (high) and approximately 5 watts (low). The low power setting applies to all modes. When compared with the TR9130, the TR751E is smaller and lighter, TR751E (TR9130) 180mm (175mm) wide, 60mm (68mm) high, 213mm (253mm) deep, 2.1Kgs (2.4 Kgs).

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

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

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

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

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

TR751E ..... £521.00 inc VAT carr £7.00

## LOWE ELECTRONICS LTD.

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## station accessories

### TL922 HF amateur band linear amplifier

The TL922 is a class AB2 grounded grid linear amplifier using two high performance EIMAC 3-500Z tubes. It covers 160 to 10 metres for SSB, CW and RTTY modes of operation. Engineering perfection, those who have seen a TL922 will know what I mean. It is one of the few items of amateur radio equipment which is truly hand built by a specialist engineer.



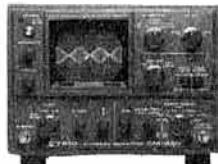
TL922 inc tubes . . . £1250.00 inc VAT, carriage £7.00.

### SM220 station monitor

Based on a wide frequency range oscilloscope, the SM220 station monitor features in combination with a built-in two-tone generator, a wide variety of waveform observing capabilities. The SM220 aids efficient station operation as it monitors transmitted waveforms and it also serves as a sensitive wide frequency range oscilloscope for various adjustments and experiments. When fitted with the optional BS8 panoramic display and connected to one of the following transceivers (TS940, TS830, TS180, TS820 series) signal conditions in the vicinity of the receive frequency can be seen over a 40 or 200KHz range.

SM220 . . . £262.75 inc VAT, carriage £7.00

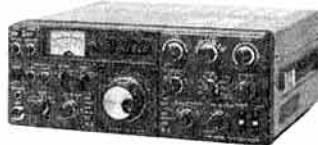
BS8 . . . £66.11 inc VAT, carriage £1.50



## amateur band transceivers

### TS830S HF amateur bands transceiver

Needing no description, the TRIO TS830S, which uses a pair of 6146B valves in the PA, is well known on the amateur bands (160 to 10 metres) for its superb signal quality. Modes of operation are USB, LSB and CW. Having variable bandwidth tuning, IF notch, IF shift and provision for various filters, its receive performance is excellent too.



TS830S . . . £898.00 inc vat, carriage £7.00

### TS530SP HF amateur bands transceiver

An HF amateur bands (160 to 10 metres) valve transceiver without frills but providing today's amateur with all the necessary facilities for reliable worldwide communication. Modes of operation are USB, LSB and CW.



TS530SP . . . £779.79 inc vat, carriage £7.00

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**TRIO**  
general catalogue

All advertised prices subject to exchange rate variation

## amateur band plus general coverage transceivers

### TS940S HF transceiver with general coverage receiver.

Top of the range, the TS940S has every operating feature that the discerning HF operator needs. Amateur bands from 160 to 10 metres plus a general coverage receiver tuning from 150 kHz to 30 MHz. Modes of operation are



USB, LSB, CS, AM, FSK and FM. Forty memory channels, each effectively a separate VFO and easy keyboard frequency entry make operation and ownership of the TRIO TS940S a pleasure.

TS940S . . . £1795.00 inc vat, carriage £7.00.

### TS930S HF transceiver with general coverage receiver

Much has been said and written about the TS930S and it now has a place high in the affection of radio amateurs. Modes of operation are USB, LSB, CW, AM and FSK. Providing full coverage of the amateur bands from 160 to 10 metres and including a general coverage receiver tuning from 150 kHz to 30 MHz, the TRIO TS930S is the ideal rig for today's crowded bands.



TS930S . . . £1395.00 inc vat, carriage £7.00

### TS440S HF transceiver with general coverage receiver

A step forward in compact HF equipment, the TS440S covers the amateur bands from 160 to 10 metres and is also a general coverage receiver tuning from 100 kHz to 30 MHz. It has keyboard frequency entry, full and semi break-in on CW, one hundred memories and provision for fitting an internal ATU. Modes of operation are USB, LSB, AM, FM and AFSK.



TS440S . . . £950.00 inc vat, carriage £7.00

### TS430S HF transceiver with general coverage receiver

A compact HF transceiver suitable for mobile or portable operation, yet having all the facilities necessary for effective radio communication. The TS430S covers the amateur bands from 160 to 10 metres and is a general coverage receiver tuning from 100 kHz to 30 MHz. Modes of operation are USB, LSB, CW, AM with FM optional.



TS430S . . . £750.00 inc vat, carriage £7.00

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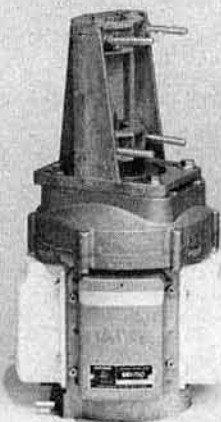
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## DAIWA rotators . . . . .



The new range of rotators from DAIWA, the MR series, are designed so that additional motors can be added around a central core, each motor increasing the rotators turn and braking capacity. The MR series will accept up to four motors being initially supplied with one. As the number and size of aerials increases, additional motors can be added, and both turning capacity and braking effort increased.



MR750E  
MR750PE  
MR300E  
LMC  
MR750U  
MR300U

Multitorque rotator (round controller).....£214.13 inc VAT,  
as above but with preset controller.....£241.44 inc VAT,  
Higher speed version with round controller..£214.13 inc VAT,  
lower mast clamp.....£15.55 inc VAT,  
additional motor for MR750E/PE.....£71.74 inc VAT,  
additional motor for MR300E.....£71.74 inc VAT,

Carriage on rotators £7.00, components £3.00

## DAIWA meters.

CN410M. . .3.5 to 150 MHz, forward 15/150 W, reflected 5/50 W, SO239 connectors. . .£53.28 inc vat, carriage £1.50.

CN460M. . .140 to 450 MHz, forward 15/150 W, reflected 5/50 W, SO239 connectors. . .£57.73 inc vat, carriage £1.50.

NS448 with remote head. . .900 to 1300 MHz, forward 5/60 W, reflected 1.6/6.6 W, N type connections. . .£75.00 inc vat, carriage £2.50.

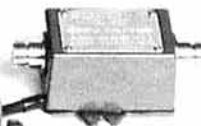
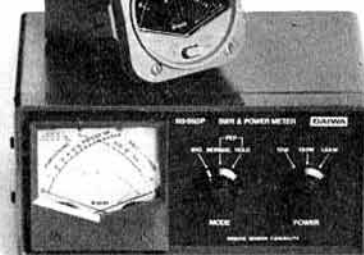
NS660P with switchable meter reading (average, normal PEP and hold PEP) and provision for optional remote head (U66V), 1.8 to 150 MHz, forward 15/150/1500 W, SO239 connectors. . .£99.50 inc vat, carriage £2.50.

U66V remote head. 140/525 MHz, max 300 W, N type connectors. . .£48.00 inc vat, carriage £1.50.

SC20 extension cable for U66V, approx 20 metres long. . .£25.85 inc VAT, carriage £1.50.

CN410M

NS660P



NS448

CN460M

## HOKUSHIN aerials.

### FOR BASE STATION USE

HF5 80 to 10 metre vertical, no radials required when ground mounted. . . £75.04 inc vat, carriage £7.00.  
HF5R Radial kit for use with HF5 when mounted on chimney or gable end. . . £47.43 inc vat, carriage £7.00.  
GPV5 Two metre base station colinear, 6.5 dB gain, 3.1 metres high. . . £47.36 inc vat, carriage £7.00.  
GPV23 as above but 3 section colinear, 7.8 dB gain, 4.45 metres high. . . £46.80 inc vat, carriage £7.00.  
GPV7 Seventy centimetre triple 5/8 base station colinear, 6.8 dB gain. . . £39.13 inc vat, carriage £7.00.  
GPV720 Dual band (144/430 MHz) base station aerial. . . £39.23 inc vat, carriage £7.00.

### FOR MOBILE USE

2E Two metres 3/4 whip, 3.4 dB gain, foldover base. . . £12.50 inc vat, carriage £2.00.  
2NE Two metres 3/4 whip, 4.5 dB gain, foldover base. . . £18.92 inc vat, carriage £2.00.  
OSCAR430 Seventy centimetre triple 3/4 whip, 6.3 dB gain. . . £23.81 inc vat, carriage £2.00.  
OSCAR720 Dual band (144/430 MHz) whip. . . £20.93 inc vat, carriage £2.00.  
HS770 144/430 MHz diplexer for use with OSCAR720. . . £19.77 inc vat, carriage £1.50.  
GSS Gutter mount (requires RG4M cable assembly). . . £5.55 inc vat, carriage £1.25.  
RG4M Cable assembly for GSS base, complete with SO239 and PL259 plug. . . £5.55 inc vat, carriage £1.00.  
12B Car wing mount with SO239 top and bottom. . . £5.11 inc vat, carriage £1.00.  
HSTMB Car boot mount including cable and PL259. . . £13.35 inc vat, carriage £1.50.  
MA200S High quality mag mount with cable and strong protective cover to prevent paintwork damage. . . £22.90 inc vat, carriage £2.00.

## data communications equipment.

CD600. . .RTTY, CW, ASCII, TOR, AMTOR decoder, output for UHF television, monitor and printer, can also be used as morse tutor. . .£188.19 inc vat, carriage £7.00.

CD670. . .A higher specification RTTY, CW, ASCII, TOR, AMTOR decoder complete with liquid crystal dot matrix display, variable RTTY shift, normal/reverse mode switch, outputs for TV, monitor and printer and can also be used as morse tutor. . .£286.73 inc vat, carriage £7.00.

CD660. . .Similar to the CD670 but without the built-in display. . .£231.79 inc vat, carriage £7.00.



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# NEW from TRIO, a 45 watt fm mobile.....



The TRIO TM2550E is a high power 2 metre FM mobile transceiver.

Power output from the TM2550E is 45 watts. Current drain is approximately 9.5 amps in the high power position (45 watts) and approximately 3 amps in the low power position (5 watts). Low power can be adjusted up to 40 watts. Power requirement of the transceiver is 13.8 volts DC.

Frequency selection is easy using the backlit front panel keypad. The selected frequency is displayed on a backlit LCD together with

additional operating information, eg priority channel, reverse repeater, simplex or repeater shift etc.

The TM2550E has 23 memory channels into which frequencies are easily written. The TM2550E automatically selects simplex or repeater mode in accordance with the band plan. This function is easily overridden by using the "OS" key.

Scanning operations are divided into keyboard, memory and priority scan. Frequency hold on an occupied channel can be either "time" or "carrier" operated.

As an option, the TM2550E can be fitted with the DCS system, DCL (Digital Channel Link) enables your rig to automatically QSY to an open channel. The DCL system searches for an open channel (checks the next eleven 25kHz spaced frequencies above a user designated one), remembers it, returns to the original frequency and transmits control information to the other DCL equipped station that switches BOTH rigs to the clear channel.

TM2550.....£399.00 inc vat, carriage £7.00.  
MU1 DCL unit.....£26.78 inc vat, carriage £1.00.

HK704

HK708  
HK702  
TX3

EK150

DK210

MK1024

## KEYS & keyers.

TX3. Morse practice oscillator.  
£11.55 inc VAT, carr. £1.50  
HK708. Straight key.  
£18.09 inc VAT, carr. £2.50  
HK702. Deluxe version on marble base.  
£34.44 inc VAT, carr. £3.00  
HK704. Squeeze paddle.  
£17.10 inc VAT, carr. £1.50  
EK150. Electronic keyer with built-in sidetone. Solid state or relay keying.  
£114.85 inc VAT, carr. £3.00  
MK1024. Electronic keyer with 1024 bit memory.  
£198.00 inc VAT, carr. £3.00  
DK210. DAIWA electronic keyer. Requires paddle.  
£59.93 inc VAT, carr. £2.50

BST 1

BY2

BENCHER Iambic Paddles.  
BY1 Black base, £67.42. BY2 Chrome base, £76.97  
BY3 Gold plated base, £141.75. VAT inc.  
BENCHER Single Paddle.  
BST1 Black base, £67.42. BST2 Chrome base,  
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Carriage on BY & BST series, £3.00

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the shop manager is Sim, GM3SAN,  
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the shop manager is Hank, G3ASM,  
the address, 56 North Road, Darlington,  
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the shop manager is Tony, G4NBS,  
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telephone 0223 311230.

In Cardiff.

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

In London.

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

In Bournemouth.

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

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

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# TWO FOR THE ROAD.

## The very latest IC-28E 2m. FM mini-mobile from ICOM.

This new 2 metre band transceiver is just 140mm (W) x 50mm (H) x 133mm (D) and will fit nearly anywhere in your vehicle or shack. Power output is 25 watts or 5 watts low power and is supplied complete with an internal loudspeaker.

The large front panel LCD readout is designed for wide angle viewing with an automatic dimmer circuit to control the back lighting of the display for day or night operation.

The front layout is very simple, all the controls are easy to select making mobile operation safe. The IC-28E contains 21 memory channels with duplex and memory skip functions. All memories and frequencies can be scanned by using the HM-15 microphone provided. Also available is the IC-28H with the same features but with a 45 watt output power.

Options include IC-PS45 13.8v 8A power supply, SP8 and SP10 external speakers, HS15 flexible mobile microphone and PTT switchbox.



→ Rx Range 138-174 MHz. ←

## IC-290D/490E Mobiles

These SSB, CW, FM transceivers are ideal for mobile or base station operation. The IC-290D for 2 metres produces 25 watts/5 watts low power. The IC-490E for 70 centimetres produces 10 watts/1 watt low power. Both transceivers have a range of operating features, these include 5 memory channels, dual V.F.O.'s and a priority channel to automatically check your most used frequency. Squelch on FM and SSB to allow silent scanning whilst searching for signals, slow or fast AGC for SSB and CW and a noise blanker to suppress pulse type QRM. Sidetone is provided on CW.

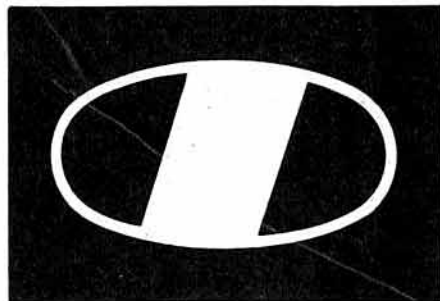
Memory and full or programmable band scan with internal switches to stop on busy or empty channels. Programmable offsets are included for odd frequency splits.

Options include: IC-PS45 13.8v 8A power supply, IC-BU1 memory back up battery unit, IC-SP8 and SP10 mobile speakers.



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# ICOM

## The ICOM Control System

If you have a BBC Micro (Model B) or Commodore 64 or 128, the ICOM control system can control up to four (or more) ICOM radios in the range: IC-751, 735, R71, R7000, 271, 471 and 1271 (and 745 with modification). The help menu shows the available functions.

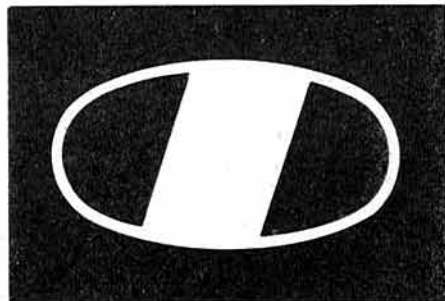
H = HELP	↔ Frequency Steps
FO Frequency	↑ V Up/Down (arrows)
F1 Select Mode	M Memory Channel
F2 Freq/Memory Scan	/ Memory Up/Down
F3 Mode Scan	/ VFO/Memory
F4 VFO → Memory	B Bargraph Select
F5 Memory Write	@ Occupancy On/Off
F6 Memory Clear	: Scan Stop Off/On
F7 Set 'SIG' Level	S Change Set
F8 Memory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



## IC-735, The Compact HF Radio

The new ICOM IC-735 is ideal for mobile portable or base station operation. It has a general coverage receiver from 0.1MHz to 30MHz and transmits on all amateur bands from 160m to 10m. SSB, CW, AM and FM modes are included as standard. RTTY and Amtor are also possible. The IC-735 has a built-in receiver attenuator, pre-amp, noise blanker and RIT to enhance receiver performance. A 105dB dynamic range with pass band tuning and a sharp I.F. notch filter for superior reception. The twin VFO's and 12 memories can store mode and frequency. The HM12 scanning mic is supplied. Scanning functions include programme scan, memory scan and frequency scan. The IC-735 is one of the first H.F. transceivers to use a liquid crystal display which is easily visible under difficult conditions. Controls that require rare adjustment are placed behind the front panel hatch cover but are immediately accessible. Computer remote control is possible via the RS-232 jack. Output power can be adjusted from 10 to 100 watts with 100% duty cycle. A new line of accessories are available, including the AT150 electronic automatic antenna tuner and the PS55 AC power supply. The IC-735 is also compatible with most of ICOM's existing line of HF accessories. See the IC-735 at your authorised ICOM dealer or contact Thanet Electronics Limited.

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## IC-1271E, 1.2GHz Multimode Transceiver



ICOM, a pioneer in 1.2GHz technology are proud to introduce the first full feature 1240 – 1300 MHz base station transceiver. Features include: multimode operation, 32 memories, scanning and 10 watts RF output. The IC-1271E allows you to explore the world of 1.2GHz thanks to a newly developed PLL circuit that covers the entire band, a total of 60MHz, SSB, CW and FM modes may be used anywhere in the band making the IC-1271E ideal for mobile, DX, repeater, satellite or moonbounce operation. The IC-1271E has outstanding receiver sensitivity, the RF amplifiers use a low noise figure and high-gain disc type GaAs FET's

for microwave applications. The rugged power amplifier provides 10 Watts which can be adjusted from 1 to 10 Watts. A sophisticated scanning system includes memory scan, programme scan, mode-selective scan and auto-stop feature. Scanning of frequencies and memories is possible from either the transceiver or the HM12 scanning microphone. 32 programmable memories are provided to store the mode and frequency in 32 different channels. All functions including memory channel are shown clearly on a seven digit luminescent dual colour display. The IC-1271E has a dial-lock, noise blanker, RIT, AGC fast or slow and VOX functions. With a powerful 2 Watt audio output the IC-1271E is easily audible even in a noisy environment. The transceiver operates with either a 240V AC (optional) or 12 volt DC power supply.

**Available soon~The IC-12E 1.2GHz FM handportable.**

## IC-R71E, General coverage receiver.

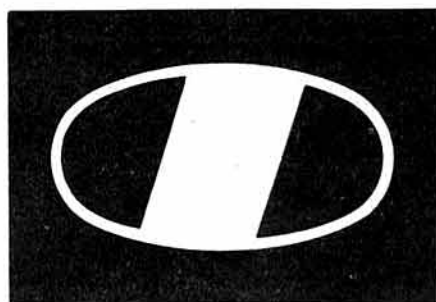


The ICOM IC-R71E 100KHz to 30MHz general coverage receiver features keyboard frequency entry and infra-red remote controller (optional) with 32 programmable memory channels, SSB, AM, RTTY, CW and optional FM. Twin VFO's scanning, selectable AGC, noise blanker, pass band tuning and a deep notch filter. With a direct entry keyboard frequencies can be selected by pushing the digit keys in sequence of frequency. The frequency is altered without changing the main tuning control. Options include FM, voice synthesizer, RC-11 infra-red controller, CK70 DC adaptor for 12 volt operation, mobile mounting bracket, CW filters and a high stability crystal filter.



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# ICOM

## IC-3200E Dual-band



If you are a newly licensed or just undecided about which band to first operate, then the ICOM IC-3200E is just the answer. This is a dual-band (144-146/430-440MHz) F.M. transceiver ideally suited for the mobile operator. The IC-3200E has a built in duplexer and can operate on one antenna for both VHF and UHF, and with 25 watts of output power on both bands (the low power can be adjusted from 1 to 10 watts) you can never be far from a contact whether simplex or 2m/70cm repeater.

The IC-3200E employs a function key for low priority operations to simplify the front panel and a new LCD display which is

easy to read in bright sunlight, 10 memory channels will show operating frequencies simplex or duplex, and four scanning systems memory, band, program and priority scan. Try this exciting set from ICOM the IC-3200E, when only the best will do.

Options include IC-PS45 AC power supply, HS15 mobile boom mic, SP10 external speaker, UT23 speech synthesizer and AH32 dual-band mobile antenna.

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

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

You can get what you want just by picking up the telephone. Our mail order department offers you free same day despatch whenever possible, instant credit, interest free H.P., Barclaycard and Access facility, 24 hour answerphone service.



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

Alyntronic, Newcastle, 091-761002.  
Amateur Radio Exchange, London (Ealing), 01-992 5765.  
Amcomm, London (S. Harrow), 01-422 9585.  
A.R.E. Comms, Earlestown, Merseyside, 09252-29881.  
Arrow Electronics Ltd., Chelmsford, Essex, 0245-381673/26.  
Beamrite, Cardiff, 0222-486884.  
Booth Holdings (Bath) Ltd., Bristol, 02217-2402.  
Bredhurst Electronics Ltd., W. Sussex, 0444-400786.  
D.P. Hobbs, Norwich, 0603-615786.  
Dressler (UK) Ltd., London (Leyton), 01-558 0854.  
D.W. Electronics, Widnes, Cheshire, 051-420 2559.  
Eastern Communications, Norwich, 0603 667189.

Hobbytronics, Knutsford, Cheshire, 0565-4040. Until 10pm daily.  
Poole Logic, Poole, Dorset, 0202 683093.  
Photo Acoustics Ltd., Buckinghamshire, 0908-610625.  
Radcomm Electronics, Co. Cork, Ireland, 01035321-632725.  
Radio Shack Ltd., London NW6, 01-624 7174.  
R.A.S. Nottingham, 0602-280267.  
Ray Withers Comms, Warley, West Midlands, 021-421 8201.  
Scotcomms, Edinburgh, 031-657 2430.  
South Midlands Comms. & branches, 0703 867333.  
Tyrone Amateur Electronics, Co. Tyrone, N. Ireland, 0662-42043.  
Reg Ward & Co. Ltd., S.W. England, 0297-34918.  
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ICOM IC 3200E 2m/70cm 25w each band	479.00
ICOM IC 47E 25w FM very small 9 memories	445.00



**NEW**

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YAESU FT 980 gen cov tcvr inc AM/FM	839.00
YAESU FT 757GX gen cov tcvr inc AM/FM/Keyer	1299.00
ICOM IC 751A gen cov tcvr inc AM/FM/Keyer	925.00
ICOM IC 745 gen cov tcvr	829.00
ICOM IC 735 gen cov tcvr inc AM/FM	



## HF LINEAR AMPLIFIERS

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YAESU FL 7000 solid state integral PSU and ATU	POA
TOKYO HL 1K 1kw amplifier	829.00
TOKYO HL 1KGX new 1K linear	POA
TOKYO HL 2K new 2K linear	POA
TOKYO HL 3K 3Kw new linear	POA
ICOM IC 2KL/LPS	1625.00

## HANDHELD TRANSCEIVERS

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YAESU FT 203R with FNB 3 nicad 2.7w	215.00
YAESU FT 203R with FNB 4 nicad 3.7w out	219.00
YAESU FT 203R with FBA 5 battery case 1.8w	229.00
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YAESU FT 209RH with FBA 5 battery case	235.00
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YAESU FT 209RH with FNB 4 nicad 3.7w	269.00
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AOR 2002 UHF/VHF 25Mhz-550Mhz and 800Mhz-1300Mhz	425.00
YAESU FRG 9600 UHF/VHF Scanning receiver all mode 100 mem	429.00
ICOM R7000 Scanning rcvr 25-2000Mhz 99 memories all mode	849.00
FDK ATC 720 airband rcvr handheld 720 channels	189.00
FDK RX 40 141-180Mhz handheld rcvr	159.00
JIL SX 400 UHF/VHF rcvr inc PSU	598.00

## RTTY/CW

TONO 5000E CW RTTY ASCII and AMTOR c/w 5" high res monitor	POA
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## VHF MOBILE TRANSCEIVERS

YAESU FT 290R mob/port 2m all mode c/w nicads, chgr, case	369.00
YAESU FT 290R as above with Mutek	399.00
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YAESU FT 270RH 45w FM with fan	359.00
YAESU FT 2700RH 2m/70cms 25w each band full duplex	449.00
YAESU FT 290D 25w all mode	359.00
ICOM IC 290D 25w FM 9 mem	399.00
ICOM IC 27E 25w FM 9 mem	449.00
ICOM IC 27H 45w FM 9 mem	279.00
FDK M750XX 2m all mode 20w	
FDK M725X 2m FM 25w	

## VHF BASE STATIONS

YAESU FT 726R/2M all 726 options available	899.00
ICOM 271E multi mode 25w 32 mem	779.00
ICOM IC 271E/H multi mode 100w	979.00

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HL30U 70cms Gaasfet preamp 1-15w in 60w out	215.00
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HL120U 70cms Gaasfet preamp, Gaasfet	—
HRA 2 2m mast preamp, Gaasfet	—
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LPM144-3-100 2m c/w preamp 3w for 100w out	197.50
LPM144-3-100 2m c/w preamp 25w for 160w out	250.00
LPM144-25-160 2m c/w preamp 3w for 180w out	290.00
LPM144-3-180 2m c/w preamp 3w for 180w out	290.00
LPM144-3-180 2m c/w preamp 10w for 50w out	125.00
LPM144-10-180 2m c/w preamp 3w for 50w out	125.00
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LPM432-10-100 70cm c/w preamp 10w for 100w out	—

MICROWAVE MODULES range also available, call for details or literature on above.



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TOKYO HC 400 9 band 350w pep with SWR/power meter	399.00
TOKYO HC 2000 9 band 2Kw pep	85.00
WELZ AC 38 3.5-30Mhz 200w	345.00
ICOM AT 100 100w auto antenna coupler	475.00
ICOM AT 500 500w auto antenna coupler	318.00
YAESU FC 757GX auto antenna coupler	49.85
YAESU FRT 7700 receiver antenna tuner	—

## HEIL ACCESSORIES

HEIL HC3 Mic element Yaesu/Trio	22.85
HEIL HC5 Mic element Icom SM5/6	25.40
HEIL HM5 Desk Mic (300Hz-3KHz) cardioid	59.00
HEIL MM5 handheld Mic with HC3	29.00
HEIL SS2 Speaker special comms spkr	59.00
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YAESU FP 700 20A	175.00
BNOS 12/6amp	69.00
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BNOS 12/40amp	340.00
BNOS professional range also available on request	POA
ICOM IC PS 35 switch mode	182.00
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ICOM IC PS 55 20amp	185.00
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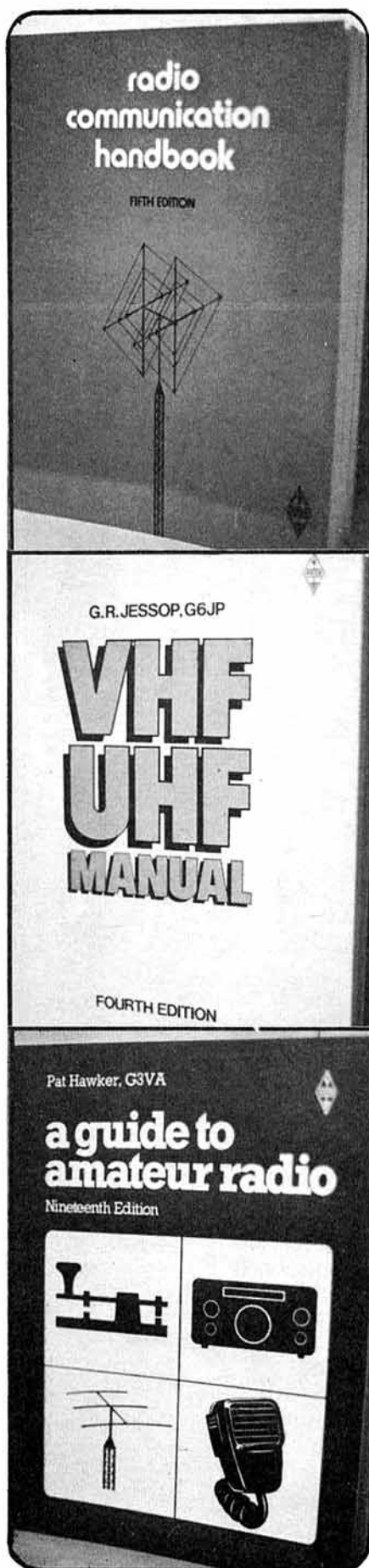
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**THE VHF/UHF MANUAL** is also held in high esteem and is essential reading for all those who are interested in this part of the radio spectrum. The first chapter 'Historical Perspectives' is a fascinating insight into the early days of VHF/UHF. Did you know that Marconi built a 150MHz AM transmitter in 1919? This book certainly isn't all history however. Most of the Manual contains up-to-date information on VHF and UHF receivers, transmitters, filters, antennas, satellite communication, test equipment, and equipment for the microwave bands. The appendix gives lots of useful information on feeder characteristics, VHF and UHF PA valves and transistors, mixers, and much more. Fourth edition, Copyright 1984, 528 pages, £9.52 to members by post, hardbound.

**THE GUIDE TO AMATEUR RADIO**, by Pat Hawker G3VA, is primarily intended to assist the newcomer to learn more about amateur radio and to help him or her to obtain an amateur transmitting licence. The book also contains technical information and operating data of interest to all radio amateurs and listeners. The conditions of the UK amateur licences and the syllabus for the Radio Amateurs' Examination are incorporated together with a set of specimen questions. There is also a separate chapter devoted to the principles of electronics. Both newcomers and all those seeking basic information on the very large range of equipment that has been produced for amateurs will find the chapter on factory-built receivers, transmitters and transceivers particularly useful. Nineteenth edition (first published in 1938), Copyright 1983, 154 pages, £3.52 to members by post, softbound.



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NEW

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Replacing our previous scanners guide, this new book sets out to cover the complete spectrum between 25 and 2000MHz. It thus keeps pace with the extended coverage of some of the latest receivers. And what's more there are no gaps! If you have any interest at all in this part of the radio spectrum then you cannot afford to be without a copy of this new publication. Beautifully set out in large easy to read pages it starts off with a few hints and tips on receivers and then it goes straight into the heart of the matter; what services operate where! Full details of duplex frequencies are given and there are very comprehensive details of military and civil air bands plus a very comprehensive section giving you all the details you will ever need for marine band monitoring including full listings of all the shore stations. Other entries include sections on police allocations, ambulances, fire etc, and such fascinating entries as NASA and Russian Space frequencies, weather satellites, navigation beacons and much more. So don't waste money on those expensive American publications listing frequencies not applicable to the UK. Send today for this brand new book which will answer all the questions you have ever wanted to know about the mysteries of the VHF/UHF spectrum.

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#### WELZ

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23cm £163.00

SP10X Budget HF/VHF £36.50

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SP425 Dual meter £109.95

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AZDEN PCS5000

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140-150MHz

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Datong Morse Tutor £56.35

Mutek Pre-amps £39.95

Revcone Discone (RX) £29.00

CDE AR40 Rotator £115.00

KR400 Rotator £148.00

KC038 Mast clamps £13.80

KS065 Bearing £26.45

KR500 Elevator £139.95

AR250 Rotator VHF £69.00

#### TRIO

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AT940 Int ATU £218.00

TS HF 430S tcvr. £250.00

PS403 PSU for above £139.00

AT250 Auto ATU £314.00

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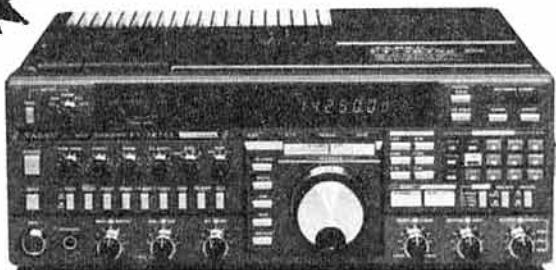
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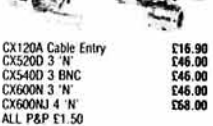
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#### HONORARY OFFICERS

**Audio Visual Library co-ordinator:** R G Auckland, G2PA

**Awards manager:** HF: P Miles, G3KDB; VHF: Jack Hum, G5UM

**HF manager:** E J Allaway, G3FKM

**Microwave manager:** D S Evans, G3RPE

**Observation Service organizer:** R J Osborne, G4FJN

**Trophies manager:** Mrs H Clayton-Smith, G4JKS

**VHF manager:** K A M Fisher, G3WSN

Correspondence to RRs and honorary officers should be

addressed directly to them (QTHR), not to RSGB HQ

#### ANNUAL SUBSCRIPTION RATES

Once-off joining fee: £1.50

Corporate member: UK and overseas (Radio Communication by surface

mail): £18.50.

UK associate member under 18: £6.95. Family member: £7.40

UK students over 18 and under 25: £10.45 (Applications should give applicant's

age at last renewal date and include evidence of student status)

Affiliated club or society/registered group (UK): £18.50 (including Radio

Communication): £11.10 (excluding Radio Communication)

Senior citizen: £11.10

(Subscriptions include VAT where applicable)

Membership application forms available from RSGB HQ

## EDITORIAL

### AMATEUR RADIO INFORMATION BY TELEPHONE

The DataBox information service based at RSGB HQ has been in operation since 1 October last year. It must be counted as a success despite its experimental nature and despite no great efforts being made to publicise the service: each week, on average, 500 calls are received for the up-to-date information that is a feature of this type of service. Its success is all the more pleasing when it is realized that many of those who use the facility have to pay the full toll rate for the telephone call—not an insignificant factor if you live at an extremity of the country.

I am happy to be able to report three pieces of good news. The first is that, as from 1 August, the information available on the DataBox will also be available on the national Prestel service—thanks to Micronet/Clubspot 810. This means that many members will be able to access the service for the price of a local or a short-distance call, rather than the long-distance call as at present. For those who do not subscribe to Prestel/Micronet, the DataBox will remain available directly on 0707-52242.

The second is that Prestel/Micronet are offering, with this issue, a three-months free trial of what overall is a most comprehensive information (and shopping!) service.

Finally, since a large number of our members have access to a home computer, with this issue are details of a very special offer from Micronet for the modem which is necessary to interface your computer to the RSGB Database via a telephone line—the offer is hardly one that can be refused.

One of the features of this type of electronic publishing is that it is possible for the user to print out the information seen on the screen for further dissemination, perhaps via a club magazine. Indeed, the information which RSGB puts into the system will be formatted with this type of use in mind. The speed of communication can be quite stunning: because the national Prestel data-base can now be up-dated from RSGB HQ, new information can be made available within minutes. As an example, one item of news that you are reading in the *RSGB News Bulletin* with this issue—that the morse qualification now lasts for life—was on national Prestel within hours, and on the RSGB DataBox within half-an-hour of its announcement on 18 June. I find that impressive. The Society wishes to encourage members to use this service to find the information they need and to use it as one means of keeping themselves up-to-date with the latest news.

David Evans, G3OUF



## FRONT COVER

### John O'Groats to Land's End

RSGB member Mike Butler, G6XCG, of Basildon, Essex, has set a new record for the run from John O'Groats to Land's End. He made the trip on an Elva, a new all-British electric three-wheeled vehicle which promises to transform the lives of elderly or disabled people with a mobility problem. It became the smallest powered vehicle to complete the 825-mile trip, and did so without a hitch.

Mike undertook the run to raise funds for research into the disease from which he and two of his daughters suffer: neurofibromatosis, a genetic disorder which affects one in every 3,000 people in the UK. Although Mike's symptoms are comparatively mild, his 13-year-old daughter has already suffered the loss of a leg through the disease, for which there is neither treatment nor cure at present. His drive raised funds for the charity Link which plans to establish a central clinic for sufferers and encourage vitally needed research.

Mike carried with him a handheld fm transceiver on the Elva and other equipment in the support van was manned by GIPPR and GIOBE, so he was not short of company on the lonelier stretches of the road. As well as making many new friends, he received invaluable help from radio amateurs along the route, and thanks all concerned for their assistance and support.

## RAC Courses, 1986-7

**Bristol.** Twyford House, High Street, Shirehampton, Bristol BS11 0DE, tel 0272 822400. Wednesdays, commencing 1 October. Enrolments, by post, now being accepted. Details from Twyford House.

**Fareham.** Adult Education Centre, Wickham Road, Fareham, Hants. Full 27-week course, Fridays 7-9pm, commencing 26 September. Short 11-week course, Mondays 7-9pm, commencing 15 September. Details: tel Fareham 280709, or tutor, G3CCB, Fareham 288139.

**Farnborough.** Wavell School, Lychford Road, Farnborough, Hants. Thursdays commencing 25 September. Details tel (0252) 540084 or 518305.

**Guildford.** College of Technology, Stoke Park, Guildford, Surrey. Mondays (except college holidays) until May 1987, commencing 15 September. Enrolment 2-4pm and 6-8.30pm, 8 and 9 September. Details from tutor, B E Purse, G1RNV, tel (0483) 31251 during college hours.

**Halesowen.** Halesowen College, Wittingham Road, West Midlands, Thursdays 7-9pm, commencing 18 September. Enrolment 2 and 3 September. Details from tutor, C Prior, G6OTT, tel 021-550 1451.

**Leamington Spa.** Mid-Warwickshire College of Further Education; Warwick New Road, Leamington Spa. Thursdays, commencing 11 September for approximately 30 weeks. Enrolment 1, 2 September.

**Manchester.** North Trafford College of Further Education, Talbot Road, Stretford. Monday or Thursday evenings or Wednesday afternoons. Enrolment 3, 4, 5 September. Tel 061 872 3731.

**Paddington.** Paddington College, Dept of Engineering Technology, 25 Paddington Green, London W2 1NB. Twice weekly between mid-September and May 1987 (30 weeks). Enrolment 8, 9, 10 September and May 1987 (30 weeks). Enrolment 8, 9, 10 September, 1-4pm and 6-8pm at the college, or during the first few weeks of the course. The course aims to provide an elementary

grounding in electronics, using the college facilities, as well as an amateur radio licence. Details G4KKM, tel 01-892 7585, or from the college, tel 01-402 6221.

**Swindon.** Oakfield School, Marlow Avenue, Swindon, Wilts. Thursdays. Details from tutor A Pritchard, G0CPA, tel 0793 20734.

**Woolwich.** Woolwich College, Villas Road, London SE18. It is hoped to start this course in September, on Tuesday evenings. Any interested persons are asked to contact the college, tel 01-855 1216.

## Morse Courses

**Birmingham.** Selly Park Centre, Pershore Road, Birmingham B29 7PL. Wednesdays 7.15pm. Enrolment 7-8.30pm, 10 September. Details G4IUX, tel 021-475 8403.

**Cambridge.** Coleridge Institute, Radegund Road, Cambridge. Commences 22 September. Enrolment 15 September. Details G3BYW.

**Farnborough.** Wavell School, Lynchford Road, Farnborough. Beginners: Mondays, commencing 22 September. Advanced: Thursdays, commencing 25 September. Details: tel (0252) 540084 or 518305.

**Manchester.** North Trafford College of Further Education, Talbot Road, Stretford. Tuesday evenings or Wednesday mornings. Advanced course, Monday evenings. Enrolment 3, 4 and 5 September. Tel 061 872 3731.

**Swindon.** Dorcan School, St Paul's Drive, Swindon. Wednesdays. Details from tutor A Pritchard, G0CPA, tel 0793 20734.

## Special Event Stations

**1 May-26 October, GB4NGF, GB8NGF, GB2NGF**  
North Staffs ARS are operating three special events stations, for the National Garden Festival, Stoke-on-Trent. GB4 and GB8 will be on the Festival site, GB2 is located at the QTH of G4XEE. Open 11am-8pm. Transmission on all bands using cw, rtty and tv. Special QSL cards. Details G6MLI, tel 0782 332657.

**1 April-31 December, GB2RIP**  
Celebrates 1,100 anniversary of the granting of the Charter by King Alfred the Great to the city of Ripon. Station on air most evenings on hf cw/ssb, 144MHz fm. Other modes/bands as equipment becomes available. QSL via RSGB. WAB-SE37, Maidenhead 1094FD. Details G0CLY.

**13 July and 17 August, GB4BGG**  
GB4BGG will operate on all major hf, vhf and uhf bands from BBC Beechgrove Gardens, centre of Aberdeen. Open morning and afternoon. Forms part of the activities associated with the twice yearly opening of the gardens to the public. Special QSL card. A QSL card from this station will count as a "wildcard" towards the Worked all Scottish Regions Award, WASR, operated for the ARS by GM4BKV. Details GM4GXD, tel Pitcaple 251.

**14 July-11 August, GB2FRH**  
Pre-event and demonstration station for Hamfest '86, FR Sports & Social Club, Merley, Wimborne, Dorset. Station operated by members of the Flight Refuelling ARS on hf and vhf. Special QSL cards. Reports via QSL Bureau or direct to G4YTA, tel 0202 882271.

**24 July-2 August, GB8CG**  
Commemorates the 1986 Commonwealth Games, Edinburgh. Organized by the Lothian RS from a venue near to Meadowbank Stadium. Operation on as many hf bands as possible and 144MHz fm ssb. Special QSL cards via bureau. QRP contacts welcome. Details GM6JAG, tel 031-664 5403.

**31 July-12 August, GB4MEJ**  
International Scout and Guide Jamboree, Mount Edgcombe Park, Torpoint, Cornwall. Operated by Torbay and Plymouth AR societies on all bands from 1.8MHz to 30MHz, also 144MHz. QSL cards to all contacts and swl reports. Details G4SBH, tel 0803 34640.

**August, GB0OHH, GB1OHH, GB2OHH, GB4OHH, GB6OHH**

These five stations will be operated by the West Bromwich Central RC during August to promote the Oak House Museum, GB0OHH and GB2OHH on hf ssb, GB4OHH on hf ssb and cw. GB1OHH and GB6OHH on 144MHz ssb and fm. Details of some awards available from operators of the stations.

**2, 3 August, GB0NFB**  
Second annual vintage fire-engine rally, Wollaton Park, Nottingham. Station operated by four

members of the Robin Hood ARS on hf, vhf and uhf, ssb, fm, cw and rtty. Special QSL cards. Details G6PDA, tel 0777 707698.

**2-9 August, GB4FES, GB8FES**  
Operating during "Festival", a Christian family festival at Royal Agricultural Showground, Stoneleigh, Warwick. Operation on hf and vhf. Special QSL cards. Details G4OXM, G4LOF, G1PCD.

**6-10 August, GB2MRI**  
The Ballymena RC will operate this station to commemorate Marconi's experiments for shipping on Rathlin Island, ngr D148513. 1.8-28MHz plus 144 and 432MHz. Skeds wanted for fstv on 432MHz. QSL cards via G3FFF. Details G1HCH or G14DCC.

**8, 9, 10 August, GB4YHA**  
Youth Hostels Association. Transmissions on hf and vhf from Holmsbury St Mary Youth Hostel, Nr Dorking, Surrey. Details G1LKJ, tel 01-688 4075.

**8-10 August, GB2YFT**  
Yeovil ARC will be operating from the Yeovil Festival of Transport, Yeovil Showground on 3-5 to 432MHz ssb and cw. Meteor scatter is planned from the evening of 8 August on 144MHz and skeds would be appreciated. Details G4JBH, tel 0935 23873.

**8, 9, 10 August**  
To be operated by the South Tyneside ARS at the Shields Flower Show, Bents Park, Coast Road, South Shields, on atv, hf, vhf and uhf. Display of homebrew equipment. Special QSLs. Talk-in on S22. Details G4XWR, tel 4543955.

**9 August, G6SL**  
Eddystone Radio Ltd will operate on hf, vhf, uhf and microwaves using its callign G6SL during its Open Day for members of staff.

**9, 10 August, GB4RRM**  
During the Grand Summer Steam Weekend at the Rutland Railway Museum, Cottesmore, Leics, the Grantham RC will operate on all bands 3-5-432MHz. Special QSL card. Details G3PJR, tel 0476 61439.

**9-16 August, GB4BIF**  
Station operating during the Billingham International Festival. Operation on all hf bands, 144MHz and 432MHz. Particularly looking for contacts with stations of the competing countries. Details G1NOY, tel 0325 310058.

**15-20 August, GB4RI**  
Dunstable Portable ARG, in conjunction with Dunstable Downs RC, will operate this station from Ramsey Island (WAB-SM62) off Pembroke, on 1-8, 3-5, 14 and 144MHz ssb, with some early-morning activity on 7MHz. Special QSL cards. Information requested on previous expeditions to the island. Details G0COQ, tel 0582 508259.

**16 August, GB2MSS**  
Yeovil ARC will be operating from the Mid-Somerset Show, Shepton Mallet Showground, on 3-5 to 144MHz ssb and cw. Details G4JBH, tel 0935 23873.

**21 August, GB0HEL**  
Helensburgh RC will operate this station on all bands to celebrate this re-opening of its newly-refurbished club rooms. Talk-in on S22 and SU8. Details G0BZF, tel 0389 841452.

**22-25 August, GB2TVF**  
22nd annual Towseley Village Festival. Operation on hf and vhf, 3-5, 14, 144MHz ssb and cw. Details G0FCV, tel 0844 208635.

**22-26 August, GB2FI**  
Barry College of FE RS expedition to Flat Holm Island. All hf bands, 50-432MHz, 1.3-10GHz. Sked frequencies 50-12, 70-22, 144-27, 432-27 and 1,296-27MHz; arrange through GW8NVN, GW1JCB or GW8CMU. (See item in VHF/UHF for more details).

**23-31 August, GB2CRC**  
Carlisle & DARS will be operating from Carlisle Museum & Art Gallery on hf, from 10am to 5pm, to commemorate 150 years of railway history in Carlisle railway city. Details G4WOQ, tel Scotby 500.

**23 August, GB0ABC**  
Station run during the annual Billingham Carnival by Stockton & DARG. Operation on hf, 144 and 432MHz. Special QSL cards. Details G1NOY, tel 0325 310058.

**23, 24, 25 August, GB2FHI**  
Barry College of Further Education RS operating from Flat Holm Island, Bristol Channel. Operation on hf, vhf and uhf. Location qualifies for the WAB islands contest and will be the only opportunity to work it this year. Details GWOAG.

**23-25 August, GB2RSG, GB1RSG**  
Saga 86, Star & Garter Appeal run by West Middlesex RG. Operational 9am-7pm. Looking for sponsors. Details G1DDR, tel 01-579 7860.

## 24 August, GB2GR

Operation on hf and vhf from Gwill Railway Steam-up Day, Bronwydd Arms Station, near Carmarthen, by Swansea ARS. Details GW4HSH, tel 404422.

## 24, 25 August

The Workshop ARS will operate this station from the Bassestow Trade Fair. Details G4ZUN, tel 486614.

## 25 August, GB2MLF

This station will be operated by Mersea Island amateurs at the Mersea Museum, High Street, West Mersea, Essex, when the Mersea Island Lions set up stalls, sideshows in the town centre for a "fun day".

## 30 August, GB2MAC

Celebrates 250yrs of Margate as sea-side resort. Station operated by Radio Club of Thanet from sea-front location, Margate. Operation on hf and vhf. Special QSL cards. SWL reports welcome. Details G4SBD, tel 0843 33213.

## September, GB9DB

To celebrate the 900th anniversary of the Domesday Book, which was conceived in Gloucester cathedral, the Gloucester ARS will operate this station from Gloscat, Oxstalls Campus, Oxstalls Lane, Gloucester, on various days during the month. Transmission, on hf and vhf, will commence at 1200gmt on 6 September to coincide with the Gloucester Local History Festival at the same site. Details G6AWT, tel 0452 504515.

## 1 September, GB2STC

Celebrates the centenary of the official opening of the Severn Tunnel, at Pilning Railway Station. Operational 10am-6pm on hf, 144 and 432MHz. Details G1DJW, tel 0934 514429.

## 13 September, GB2RAF/GB2AB

Royal Air Force Abingdon Battle of Britain At Home Day. GB2RAF on 3.5 ssb and 14MHz cw. GB2AB on 144MHz ssb and fm. Station operated by Oxfordshire RAFARS. Members wishing to participate contact G6ZH before 31 August.

## 13 September, GB2WMF

Celebrates Annual Winscombe Michaelmas Fair, Winscombe, Somerset. Operated by Weston-super-Mare RS on hf, 432 and 144MHz. Open 10am-6pm. Details G1DJW, tel Weston 514429

## 14 September, GB2WHC

Operational on hf and 144MHz by Welwyn Hatfield ARC at the Welwyn Hatfield Water Carnival, Stanborough Lakes, Welwyn Garden City. Details G0AII, tel 0707 326138.

## 15-22 September, GB2GAF

Commemorates Battle of Britain Week. The station will be operated by the Gloucester ARS from the RAF Association Club, Gloucester. Activity on hf and vhf. Special QSL cards. Details G3MA, 40 Calton Rd, Gloucester GL1 5DY.

## 20, 21 September, GB2TV

From 1200gmt on the 20th until 2000gmt on 21 September, the Boreham & Elstree ARS will operate this station to celebrate the 50th anniversary of high-definition television transmission in the world. Bands 3-5-28MHz and 144MHz, ssb, cw and possibly rtty. Details G4XEW.

## 18-22 September, GB4XXX

Operational on all hf bands and 70MHz, plus QRP on 3-5MHz, during the third "X-net" expedition to North Wales. Details G4AUX, G4CAX and G4LPX.

## 17-19 October, GB4OYC

Station QRV 1800gmt 16 October to 2400gmt 19 October to start the Yeovil ARC's 41st year. Operation from the club HQ on 3-5 to 432MHz, cw and ssb. Details G4JBH, tel 0935 23873.

## 18, 19 October, GB2XSG

South Dorset RS together with Crossways Scout Group will operate this station from the Crossways Village Hall, Crossways, Dorchester, Dorset. Transmissions on hf and vhf using sstv and phone. Special QSL cards. Details G4VBY, tel 0305 853408.

## 25, 26 October, GB2EMR

On the occasion of the International Endurocross Motor Cycle Races, from Beach Lawns, Weston-super-Mare. Operated 10am-5pm each day by members of the Weston-super-Mare RS. Transmissions on hf, 144 and 432MHz. Details G1DJW, tel 0934 514429.

## 3-9 November, GB4PW

In remembrance of Poppy Week. Station operational from The Royal British Legion HQ, 49 Pall Mall, London SW1. Open 10am-8pm on 3-5, 14, 144MHz, cw, ssb and fm. Operators required from Services & Royal British Legion Members, class A or B. Contact G4PSH; tel 01-446 0266, giving name, call sign and day/s you wish to attend. SWLs welcome to assist in keeping log and QSL cards up to date.

# Mobile Rallies Calendar

## 3 August

RSGB National Mobile Rally, Woburn Abbey.

## 3 August

Rolls-Royce ARC Mobile Rally, Rolls-Royce Sports & Social Club, Barnoldswick, Skipton. Access from A59 and A56. Open 11am. Free car park and entrance. Enquiries to G4ILG, tel 0282 813271 ext 337, daytime, or 0282 812288 evenings.

## 10 August

29th Annual Mobile Rally celebrating the 75th anniversary of the Derby Wireless Club, Lower Bemrose School, St Albans Rd (off Derby Ring Road A5111) Derby. Open 10.30am. Talk-in by GB3ERD. Details G4EYM, tel Derby 556875.

## 10 August

Hamfest '86, Flight Refuelling Sports & Social Club grounds, Merley, Nr Wimborne, Dorset. Open 11am. Free car park. Talk-in on S22. Details Ashley Hulme, G0CDY, 71 Victoria Gardens, Ferndown, Wimborne, Dorset BH22 9JQ, tel 0202 872503.

## 17 August

West Manchester RC Red Rose Rally, Haydock Park Racecourse, Newton Le Willows (one mile from M6 junction 23). Open 10am. Talk-in on S22. Details G1IOO, tel 0204 24104 evenings.

## 24 August

1986 BARTG Annual Mobile Rally, Sandown Park Racecourse, Portsmouth Road, Esher. BARTG Kits Components. Car boot sale. Free car park. Open 10.30am-5pm. Talk-in on S22. Details G8VXY, tel 021-453 2676.

## 24 August

Preston ARS 19th Annual Rally, Lancaster University. Details G3DWQ, tel 0772 53810.

## 24 August

Torbay ARS Rally, STC Social Club, Brixham Rd, Paignton, Devon. Open 10am. Talk-in on S22 and demonstration hf station with GB2NJA. Free car park. Details G1EUA, tel Teignmouth 78554.

## 24 August

Galashiels & DARS Open Day, Rugby Club, Netherdale, Galashiels. Details G0AMB, tel 0896 55569.

## 24 August

Preston ARS Mobile Rally, Lancaster University, entrance on A6. Talk-in on S22. Opens 11am (earlier for wheelchair disabled). Details G3DWQ, tel 0772 53810.

## 31 August

Telford Mobile Rally, Telford Racquet & Fitness Centre, Telford Centre, Shropshire. Details G3UKV, tel Telford 55416, or G8UGL, tel Telford 584173.

## 31 August

Telford Mobile Rally, Telford Racquet & Fitness Centre, Telford, Shropshire. Talk-in GB4TRG on S22 and S48. Opens 11am (10.30am for disabled). Details G8UGL (Telford 584173) or G3UKV (Telford 55416).

## 7 September

Lincoln Hamfest, Lincolnshire Showground. Further details to be published at a later date.

## 7 September

Vange ARS Rally, Nicholas School, Basildon. Open 10am-5pm. Talk-in on 144MHz. Details Mrs D Thompson, 10 Feering Row, Basildon, Essex SS14 1TE, or G4OJN.

## 13 September

Wight Rally, Wireless Museum, Arretton Manor, Nr Newport, IOW. Details G3KPO, tel 0983 67665.

## 13 September

Ballymena ARC 12th Annual Rally, Ballee High School. Opening address given by RSGB President, G3VPK. Talk-in S22. Details G14HCN, tel 0266 3044.

## 16 September

Rugby ATS amateur radio auction and barbecue, Cricket Pavilion, "E" Building entrance, BTI Radio Station, A5 trunk road, Hillmorton, Rugby. Opens 7.30pm. Details G8TWH, tel 0788 77986.

## 21 September

Harlow Mobile Rally, Harlow Sports Centre, Hammarskjold Road, Harlow, Essex. Open 10am. Talk-in on S22. Details G4KVR, tel 0279 22365, day, or G3UEG, tel 0279 27788 evenings.

## 21 September

National Amateur Radio Car Boot Sale, The Shuttleworth Collection, Old Warden Aerodrome, nr Biggleswade. Open 10am-5pm. Talk-in on S22, GB4SC. Aircraft and motor museum. Free car park. Admission 50p. Details and advance bookings G6EES, tel 0582 607623 evenings.

## 21 September

Peterborough R&ES Mobile Rally, Werrina Sports Stadium, Bishops Road, Peterborough. Open

10.30am to 5pm. Free car parking. Food in the adjacent Tropicana Restaurant. Bar until 3pm. Details G4PNW.

## 5 October

Great Lumley AR Rally, Community Centre, Great Lumley, Chester-Le-Street. Open 11am (10.30am for disabled). Talk-in S22 and RB0 (GB3NT). Details G4MSF, tel 091 4693955.

## 5 October

Wakefield Mobile Rally, Outwood Grange School, Potovens Lane, Wakefield. Open 11am (10.30am for disabled). Free admission, easy parking. Talk-in on S22, GB3WU. Dealer enquiries and further details G4RCH, tel Leeds 536633 or G3SPX, tel Wakefield 828520.

## 12 October

Carmarthen ARS Rally, St Peter's Civic Hall, Nott Square, Carmarthen. Open 10.30am-5pm. Talk-in on S22. Free parking. Details GW3GUE, tel 026-783 460.

## 19 October

South Bristol ARC present the Second Bristol Radio Rally at Hartcliffe Youth Centre, Hareclive Avenue, Hartcliffe, Bristol. Open 10am-5pm. Talk-in and special event station, GB2BRR. Details G1LDJ, tel 0272 667179.

## 26 October

Aycliffe & Shildon ARC "Ham-day", Elm Road, Working Mens Club, Shildon, Co Durham. Talk-in S22. Open 11am-5pm. Details G4OHZ, tel 0325 314638.

## 23 November

West Manchester RC Mobile Rally, Pembroke Halls, Walkden, Worsley, Gtr Manchester. Details G1IOO, tel 0204 24104 evenings.

## 7 December

Verulam Christmas Rally, The City Hall, St Albans. Open 11am-5pm. Talk-in on S22 and SU8. Details G4JKS, tel St Albans 59318.

## 14 December

Leeds & DARS Annual Christmas Rally, Pudsey Civic Centre, Dawsons Corner, Pudsey. Open 11am (10.30am for disabled). Talk-in on S22. Trade enquiries G4WYD, tel 0274 685039, details G1EBS, tel 0274 665355.

## 8 February, 1987

Bury RS Hamfest 1987, Mosses Youth and Community Centre (only minutes from the M66), Cecil St, Bury, Lancs. Details available from G1PKO, tel 061-764 5018.

## 5 April 1987

Pontefract & DARS Components Fair, Carleton Community Centre, Pontefract, midway between Pontefract and Darrington just off the A1. Open 11am-4pm. Details G0AAO, tel 0977 43101.

## Other Events

All information for inclusion in this column must be sent to the editor, not to RSGB HQ.

## 13 September

SCOTAM '86, Lomond Centre, Glenrothes. Details GM3YBQ.

## 21 September

Third National Amateur Radio Car Boot Sale, organized by the Dunstable Downs RC, Old Warden Aerodrome, Nr Biggleswade, Beds. Talk-in by GB4SC. Admission 50p. Open 10am to 5pm. Details G6EES, tel 607623.

## 28 September

RSGB HF Convention, Belfry Hotel and Conference Centre, just outside Oxford on the M40.

## 5 October

Welsh Amateur Radio Convention, Oakdale Community College, Blackwood, Gwent. Details GW3KYA, tel 0495 225825

## 11 October

RSGB Midlands VHF Convention, Madeley Court Centre, Telford, Shropshire. Details G3UBX.

## 24, 25 October

Leicester Amateur Radio Exhibition; Granby Halls, Leicester. Details G4PDZ, tel (day) Leicester 553293, (evng) Leicester 871086.

## OBITUARIES

Consequent on the move from Chelmsford to Potters Bar and the loss of editorial staff, it has not been possible to include obituaries in this issue.



# Members' Mailbag

THE EDITOR,  
RADIO COMMUNICATION,  
LAMBDA HOUSE,  
CRANBORNE ROAD,  
POTTERS BAR, EN6 3JE

The views expressed in published correspondence are not necessarily those of the RSGB, and readers are urged to verify independently any factual statements on which they may wish to rely as it cannot be guaranteed that such statements are correct.

## CONTESTS

**Sir**—Having participated in NFD and SSB Field Day for at least the last 10 or so years, and last year also in VHF/UHF Field Day, I would like to suggest a change in the rules. We in Scotland feel at a disadvantage, although certain Scottish stations in recent years have done reasonably well in the various competitions at various times.

To me it seems that the emphasis on the difference between the open and restricted stations is misplaced. I feel that the open section stations do not require a search receiver, but the restricted section should be allowed one to compensate for the lesser type of antenna. It's not sour grapes, but I was interested to see in the equipment used, that the top three stations in the open section of SSB Field Day were all using 2kW input linears. These should be prohibited. Having used a TL-922, for example, I know that it is difficult to hold one of these beasts down to 400W p.e.p., yet still radiate a clean signal. I feel the rules should be changed so that the difference between the two sections is one of power and search only. Open stations to use maximum permitted power, and restricted stations 100W p.e.p. This would encourage stations to use more efficient antennas to gain an increase in erp instead of stoking up the boilers and firing up the afterburners.

Likewise at VHF Field Day I feel especially disadvantaged up here in Scotland with only 25W. The antenna restrictions are too severe and add an extra handicap. 25W in central and southern England goes a long way when you have a high station density, but it is clearly more difficult here in GM. It is very frustrating to be able to hear many stations down south which you cannot raise as they are not beaming towards GM because of the low density of operation. I am in agreement with the 25W maximum for restricted operation, but feel the antenna restrictions are too severe. We should be allowed to use any antenna provided we do not exceed the height limit. By this method we could increase our erp without being anti-social and using excessive bandwidth caused by unnecessary high power. We would also have the added advantage of receive gain.

A few Scottish stations have been knocking at the door in the various events, but in the main we are all at a disadvantage and I think that those successful stations rely on a great amount of dedication and expertise which has been developed over the years. It is much more difficult to start a successful contest group than, for example, down south with the added problem of propagation difference to contend with.

Keep the power restrictions but let us use larger antennas. Let us generate our erp by more sensible means than generating large amounts of rf. It makes more sense in the long run and causes less QRM and less aggro with those non-contesting stations. Most stations at VHF FD can produce many antennas, but only the larger and the lucky can provide the large and illegal linears. Let's have more and meaningful inspections and disqualification of offenders.

T G Wylie, GM4FDM (RR14)  
Member, GM4AGG Contest Group

The chairman of the HF Contests Committee replies:

*A study of the results for the cw event over the past 10 years suggests that Scottish stations have done quite well and have always been*

*competitive. Groups in the south of England often feel that the GMs have a marked advantage as the skip frequently favours the northern stations over the path to the DL portables. Analysis of the logs during the past three NFDs certainly seems to confirm this.*

*On the suggestion that restricted section entrants should be allowed search receivers, GM4FDM may have forgotten that the section was introduced at the request of the smaller groups and clubs that had difficulty in finding enough people to install and man their stations. Our intention was to make things as simple as possible for these groups. If the GM4AGG Contest Group has operators to spare to man a search receiver, then perhaps they should enter the open section where these are permitted.*

*For some years the SSB FD has been run under the common IARU Region 1 rules, as it is an IARU event. Their rules permitted full licensed power without any restrictions on the use of linear amplifiers in both the open and restricted sections. As it now seems that this event will soon revert to being a National Field Day, the position might change, but this will be a matter for the HFCC to consider after the next IARU Regional Conference.*

R L Glaisher, G6LX

## KENWOOD SERVICING ANOMALY

**Sir**—In your March issue I found the two letters concerning Trio/Kenwood of great interest. As I am a proud owner of a Kenwood radio I cannot see the reason why in this country they make a difference between the two names Kenwood and Trio; after all they are both produced in the same factory.

At the RSGB convention at the NEC, Birmingham, on 5 April 1986, I visited the Trio stand with its circular "Trio" pendant aloft and had a look at a few transceivers. Lo and behold, tucked away in a corner was a Kenwood TS670—my eyes could not believe it. When I questioned the assistant on the stand about this he could not give me a satisfactory answer. I walked away shaking my head. He did tell me that anyone who bought a Kenwood radio abroad could have it serviced and repaired if they could produce their receipt of purchase.

If they can service those Kenwoods why not ours? Drop all this passport to service rubbish, whether it be Trio or Kenwood it's only a hobby, and to me an enjoyable one. If they can display Kenwood equipment why not service it, whether bought here or not. Let's have an answer from them.

C J Reid, G1SHF  
(supported by G S Smith, G1LXR)

## 1986 CALL BOOK

**Sir**—I write to congratulate all concerned with the production and distribution of the new Call Book for 1986. It contains a wealth of information coupled with a reduction in price compared with last year's.

As an old-fashioned naval signal officer, using the Bible on appropriate occasions, I refer the book editors Christopher Drake and Janet Atfield to Ecclesiastes, Chapter 4, Verse 9: and to all others at Chelmsford and Potters Bar flag hoist Bravo Zulu from the Fleet Signal Book—"Well done".

Ellis Diggle, G3LSD

## CHARITY FUND RAISING

**Sir**—As PRO for the group of Cornish radio amateurs who had a special event station on an uninhabited island in the Isles of Scilly in late May this year, I would like to pass on my experiences for the benefit of others to save them unnecessary time and expense.

In time-honoured and, I suppose, traditional style, I wrote to various firms that sell to radio amateurs and advertise in the national magazines, telling them about the event, its aims and objectives, and asking them for their support in a number of ways: the choice to be up to them. I asked for either sponsorship, the

purchase of raffle tickets for a national raffle we were holding, or the loan and/or donation of equipment; if donated, the item would be included in the list of raffle prizes. The whole event was to be in aid of the RNLI. A sponsor form was included with each letter, and we hoped at the least to have a couple of pounds returned with each of them. But... and this is the reason I am writing, many of the firms didn't even bother to reply at all!

I accept that they may well have been asked many times in the course of a year to support innumerable events, and that to support them all would be a considerable drain, but in my book—and as far as my upbringing is concerned—their behaviour is rank bad manners! One hears, on 3-5MHz especially, comments and criticism of amateur radio firms and their profits. Whatever the ultimate truth, profit is being made—and in abundance if the expansion of some of these firms recently is anything to go by. Certainly, in light of their behaviour toward our special event station, amateurs could hardly be blamed for thinking that money and profit ruled supreme and that the provider of its means took second place.

I would like to add, however, that some firms did reply, and their support and generosity was superb; I do not believe their motive to be purely profit motivated. To them, very many thanks, and to those who did reply but were unable to assist, rest assured we do understand and thanks for answering.

P A Bevington, G4ZUI

## CONVERTING MARINE-BAND TRANSCEIVERS

**Sir**—Recently a quantity of good-quality, brand-new marine-band fm transceivers made by SAIT-Marine were released onto the surplus market, minus their processor and control logic. These sets were sold as suitable for conversion to our 144MHz band, but investigation proved that the synthesizer was not directly addressable. In the event I have had to do a great deal of R&D in order to finally produce a simulated control circuit and program for the necessary eeprom. The final result, however, is an extremely versatile and high-quality full-coverage mobile rig.

My feeling is that due to the daunting prospect which the original conversion presented, there must be quite a number (over 70 have been sold, I understand) of these sets which have managed to slide slowly into the junk box! So, in an effort to revive them, and activate an interest in "home-brew", may I suggest that owners of these rigs send me an sae and I'll provide details free of charge of the work involved and the likely cost of getting them "on the air".

Peter Walton, G4WAL, QTHR

## RADIO AMATEURS IN THE SECOND WORLD WAR

**Sir**—I am researching material for a book intended to describe the contributions and achievements of radio amateurs in the three Services, and particularly those engaged upon research and development of radio and radar devices used by the Services in the second world war.

I would be extremely grateful if those radio amateurs with such experiences, modest or otherwise, would write to me or contact me with details. All letters will be acknowledged.

James Wood, G3VG,  
7 Sherring Close,  
Wick Hill,  
Bracknell RG12 2LD.

## BACK NUMBERS ANYONE?

**Sir**—I have a pile of Radio Communications going back to 1981, and I would be pleased to give them to anyone who would like to call for them.

E M Barrell, G6CAJ,  
135 Kings Parade,  
Holland-on-Sea,  
Essex CO15 5JL.



# A VMOS FET POWER

## AMPLIFIER

Charles Fletcher was first licensed at the age of 16 in 1948, following training as a Merchant Navy radio officer. After a short spell at sea he undertook further education, and has worked on navigational electronics (Decca), control and protection in electricity generation (CEGB), and latterly medical electronics and computing (Lincoln hospitals). His prime interest in amateur radio is to obtain top performance from low-cost homemade equipment, and his preferred communication mode is cw.

C F Fletcher, BSc, MIEE, CEng, G3DXZ\*

THIS ARTICLE describes a cheap, medium-power, untuned high-gain amplifier intended as an add-on to QRP equipment or, alternatively, to form part of homebrew transmitter-receiver. The design has an air-proven performance record at G3DXZ and is well mannered and tolerant of abuse.

### VMOS devices

The vmos power fet has been around now for several years, and despite its excellent qualities of ruggedness, stability and good high-frequency performance it is only commonly seen in its switching form. The mystery of why the rf devices are so rare is simply solved by asking the price; switching types £1 to £5, rf types £25 to £100! In this latter financial area, "experiment" becomes a dirty word! However, as the general characteristics of rf and switching types are generally similar, I was tempted to see what could be achieved using the low-cost switching types, goaded on by the old maxim that what anyone can do for £1, a good engineer can do for 25p. All very well, but a scrutiny of the published data [1] revealed the Achilles heel of the switching mosfet, ie rather high input and output capacitance. Of all the many devices listed, the only types offering real promise as a broadband amplifier were the VN90AA (2A 90V TO3 metal package) and its relations like VN88AF (2A 80V TO 202 plastic package). I used the VN90AA, available cheaply from [3], although the plastics-encapsulated variety also works well with slightly lower device dissipation.



Fig 1. (a) Schematic symbol of the standard unprotected vmos device. (b) The protective gate diode found in many switching devices

Before proceeding to discuss the circuitry, a few words regarding the characteristics of the vmos devices might be worthwhile. To anyone brought up in valve technology the mosfet is the nearest approach to a power pentode yet devised. For those of less advanced years, it is a big brother to the insulated gate-mosfets that have been around for years in small-signal guise.

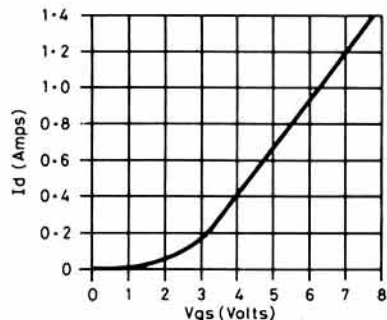


Fig 2. Input/output characteristic of the vmos device

Fig 1(a) shows the schematic symbol of the standard unprotected device and Fig 1(b) illustrates the protective gate diode found in many switching devices. The input/output characteristic is shown Fig 2. Note that conduction starts only when the gate is positive with respect to source, zero gate-source volts turns the fet firmly off. The gate can swing negative with the unprotected type, but negative excursions are limited to 0.3V for gate-protected devices. This latter limitation is the reason why normal tuned or transformer-coupled circuits cannot be applied directly to drive the gate protected mosfet. The following circuitry was developed to overcome this limitation and can be used with protected or unprotected devices. Finally, the family of devices chosen, which have tolerable input capacitances, unfortunately have an "on" resistance of  $2\Omega$  when driven hard. This relatively high drain-source resistance in a 2A device reduces their efficiency in low voltage applications, ie 12V ht use, and to make them effective as a power amplifier one must use the maximum drain-source voltage they will stand. Luckily these mosfets will work happily right up to their maximum voltage rating, which is one reason why they are referred to as rugged!

### Driver section

The driver circuit is based on the classical long-tailed pair, and just in case some are not familiar with this old workhorse, Fig 3 shows the basic arrangement. The transistors, pnp in this case, have their emitters commoned, and dc bias voltages are developed by the  $R_{b1}$ ,  $R_{b2}$  potentiometers. The voltage across  $R_{b1}$  less the emitter-base voltage of the transistors, which is fairly constant around 0.4V, appears across  $R_t$ , the so-called "tail" resistor. The current in  $R_t$  splits equally between TR1 and TR2 provided the base voltages at A and B are equal. In balance, therefore, the currents through and voltages across the collector load resistors  $R_{c1}$  and  $R_{c2}$  will be equal. Any voltage difference between A and B causes the balance to be disturbed and an amplified difference appears at C and D (NB: the changes at C and D have opposite polarity). The dc conditions are extremely stable, as the resistors dominate the circuit provided that  $R_t$  is not too small, or, in the language of the circuit engineer, provided the tail is long! Thus the circuit lends itself well to use as a driving stage for a push-pull vmos amplifier, allowing easy control of both ac and dc conditions.

Now refer to Fig 4, the actual driver circuit. Here Darlington-coupled pairs of transistors are used in place of the single devices used in the prototype circuit to give increased current gain to the amplifier and reduce the load on the rf drive transformer and bias network. The amplifier is brought into life when the tail current is switched on by TR2, the keyed line being taken to ground. Keyswitch current is 5mA. TR1 establishes the dc bias voltage for the long-tailed pair, and RV1 should be set to produce 3V dc across  $R_7$  and  $R_8$  with RV2 adjusted to maximum resistance (ie minimum gain condition). This is a convenient gate voltage for the vmos

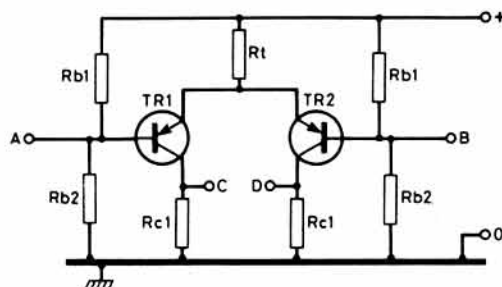
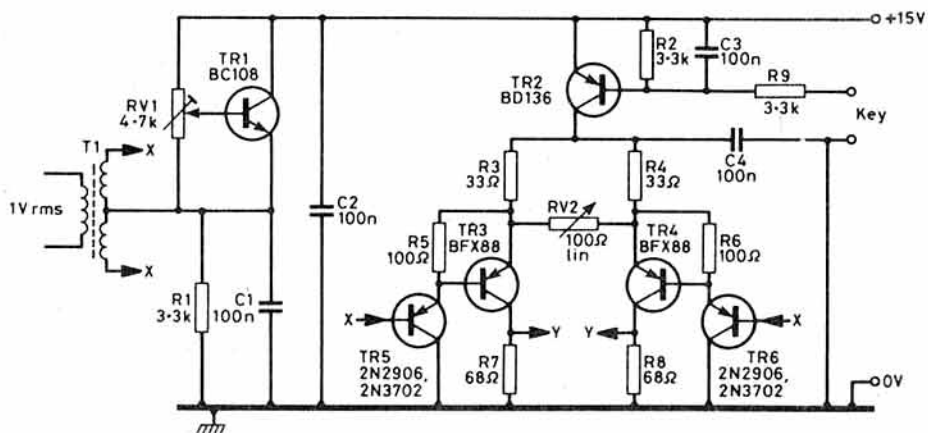


Fig 3. The long-tailed pair

\*12 Park Crescent, Retford, Notts DN22 6UF.

Fig 4. The driver circuit



devices and puts the push-pull fets into Class AB1—old valve men take note! The resulting vmos standing current should be 500–600mA. The position of the rf drive control RV2 has little effect upon dc conditions but affects the rf gain as follows. Resistors R3 and R4 are introduced into the emitter circuits purposely to reduce the stage gain of the circuit. As RV2 is reduced it progressively shorts out R3 and R4 and brings the gain up to maximum. The rf drive is applied via T1 which is formed on a twin-hole ferrite bead. The centre-tapped secondary winding (wound bifilar) produces the push-pull rf drive voltage needed by the long-tailed pair from a single-ended source of 1V rms and low impedance (50Ω is adequate). The drive can be left on continuously, as when the key is up the amplifier is absolutely dead. This aspect of the design is a great help in using full QSK keying in dc transceivers, for which the amplifier was originally designed.

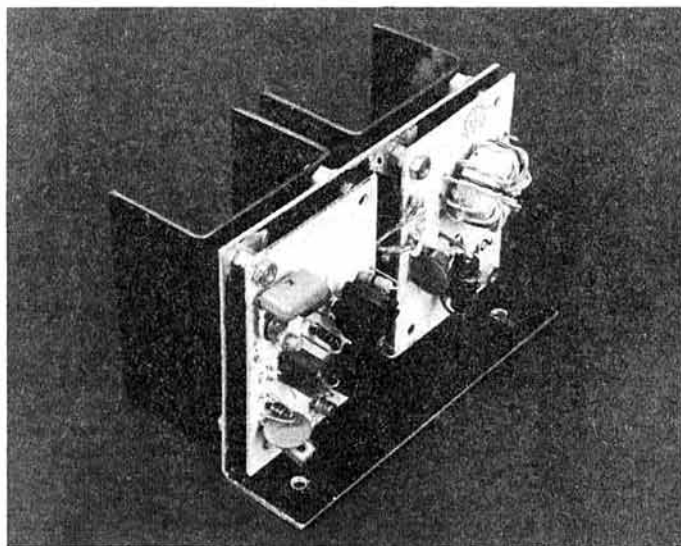
### Power section

To achieve a dc input of 60W, the drain load resistance presented to the vmos pairs needs to be about 16Ω. This value is derived by the following reasoning. Assume an ht supply of 40V and that the vmos drain voltage will not swing below 4V. This assumption allows a peak drain voltage swing of 36V. For a dc input of 60W, the mean supply current must be  $60/40 = 1.5$  A mean or  $1.414 \times 1.5 = 2.12$  A peak (assuming sinusoidal waveforms). So the drain load resistance to drop 36V at 2.12A must be  $36/2.12 = 16.98\Omega$ . Rounding down to 16Ω is permissible, as the vmos have plenty in hand and working backward through the logic will show that 16Ω allows 63.6W input. In practice, if the pa is hard driven and the waveform tends to become square, the input will be even higher. This latter condition is highly efficient but does produce more harmonic power; so beware if interference is a prime consideration.

Coupling the vmos to the atu and achieving a good impedance match together with adequate harmonic attenuation can be done in a number of ways. The two methods considered were (a) step-down impedance transformation balanced to unbalanced and an "L" matching section, and (b) step-up transformation and elliptic filter. Two good references on these topics are [4] and [5]. Given that a tuning range of less than 100kHz is adequate on the 3.5MHz band, the "L" section's simplicity wins, but if the

full band needs to be covered without tuning—or use on 1.8MHz is considered—then the elliptic filter technique is superior. For exclusively 3.5MHz cw use, I chose the "L" section.

Push-pull amplifiers in good balance suppress even-order harmonics, leaving only the odd-order third, fifth and seventh to be controlled. An impedance-matching "L" section becomes effective as a filter when the input and output impedances are markedly different, ie when the effective "Q" is high. To achieve this, transformer T2 is wound to step down the impedance from 16Ω at the drain of the fet to 4Ω at the input of the "L" section, which in turn raises the impedance level to 50Ω suitable for a coaxial cable. The 4 to 50Ω impedance transformation achieved by the "L" section permits a reasonable operating "Q" and effectively removes the unwanted



The power amplifier, showing the separate input and output circuit boards

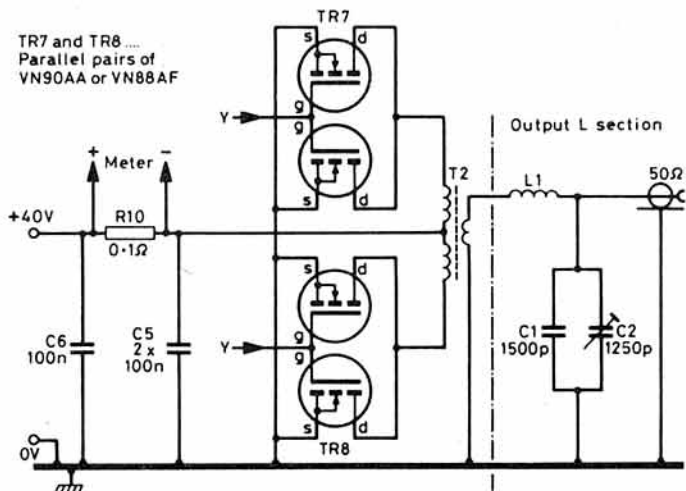
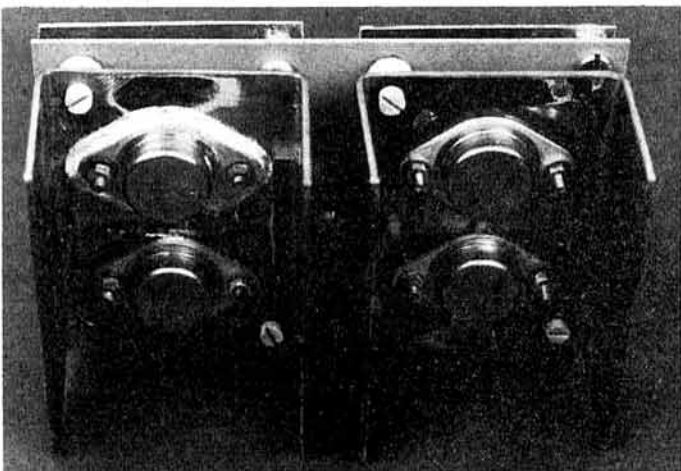


Fig 5. The power circuit



The parallel push-pull vmos fets (VN90AA) mounted on simple heatsinks run only warm to touch at 70W input





# POWER SUPPLIES ON A SHOE STRING

John Case, GW4HWR\*

## (PART 2)

### Putting on the new winding

The method of putting on the winding will depend on the type of construction used in the original manufacture. If a paxolin bobbin has been used there will be no great problem in holding the turns in place as they will be confined by the cheeks of the bobbin, but if the winding is open, ie no bobbin as such, then a special technique to be described later must be used. In either case a simple mandrel will be necessary to enable the thick wire to be wound on in even layers. Note it is most important that turns should lie flat, if one turn crosses over another it is almost certain to lead to a shorted turn and the eventual breakdown of the transformer.

The mandrel can be a block of wood that will just fit into the centre of, and is slightly longer than, the bobbin. The block is drilled through the centre using a 0.25in or 0.5in drill bit, depending on the size of the transformer. A piece of steel rod or a long bolt is passed through the hole and is then clamped into the jaws of a vice. This enables the bobbin to be turned and leaves both hands relatively free for the other tasks.

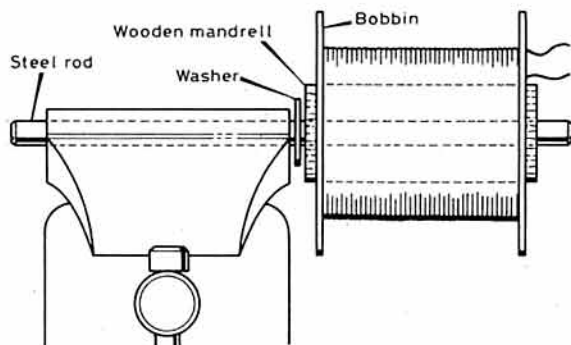


Fig 6. Method of holding the bobbin during winding

Pass one end of the new wire, covered with sleeving, through a convenient hole in the side of the bobbin, making sure that the wire will not be in the way of the core when it is re-assembled. If there is a terminal tag strip then only a short end, long enough to reach the appropriate tag, will be needed, if there is no tag strip then leave a longer end so that it will reach the rectifier bridge in the psu. The next job should be done when there is little chance of interruption, as it is necessary to count accurately the number of turns put on. Keep the turns tight and even, but avoid allowing the new wires to slip down between the existing primary and the bobbin sides. Continue winding evenly until the full number of turns is wound on, then pass the end of the wire, again covered in sleeving, out through a convenient hole in the bobbin side.

If the bobbin is flimsy it would be a good idea to adopt the technique that must be used when there is no bobbin. This process is a bit more fiddly but is not so difficult in practice as the following description might suggest. Before starting, cut 12 lengths of 0.5in linen tape, each about 6in long; two or three lengths of adhesive tape, about 1.5 times as long as the circumference of the bobbin, to wrap around the winding if you are interrupted so that the turns do not spring loose; and have a pencil and paper handy so that the turns count can be jotted down. Fix four pieces of linen tape to the bobbin with paraffin wax so that one end is about level with the edge remote from the edge of the bobbin, wind the first turn over the top of the four tapes, then as the next turn is put on, fold each tape back

to the opposite end and wind about five or six turns over the top of both layers of tape. Pull firmly on each of the long ends so as to lock the first turn firmly in position against the subsequent turns. Continue winding until about 0.25in away from the edge of the bobbin, insert a strip of insulation paper and wind the next turn over it. Bring the next turn up on top of the last, double the tapes back over and again wind over the top of them. This time working back towards the beginning.

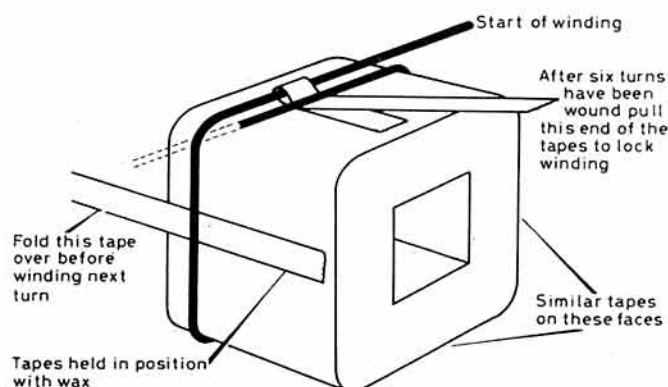
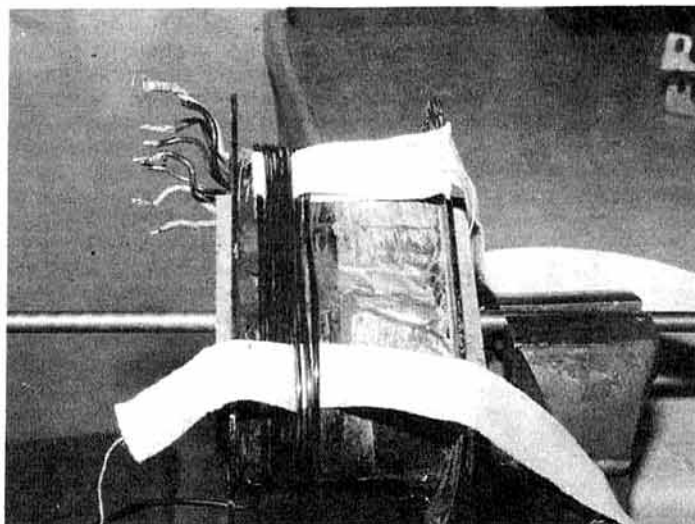


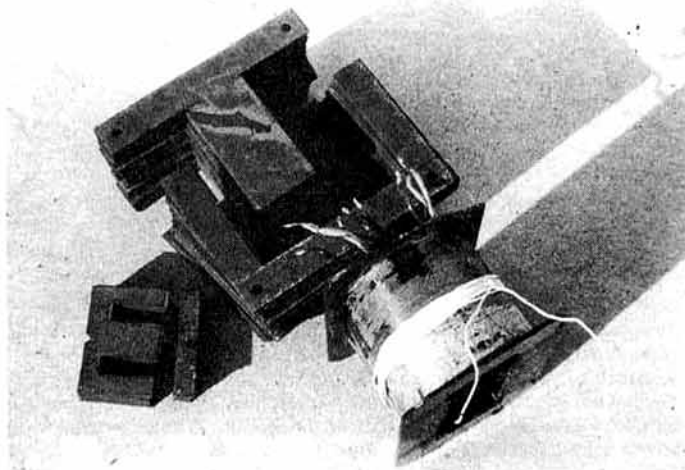
Fig 7. Using tapes to hold the new winding in position

Repeat the process, locking the turns at the end of each layer, as already described, and inserting a layer of insulation between layers. Continue until five or six turns remain to be put on, then take some more tapes, double them and wind all but the last turn over them so that the closed loop is at the end. Pass the end of the wire through the loops, pulling the end of the tapes so as to hold the last turn and the rest of the winding in position. Cut off the ends of the tapes, then cover the winding with several layers of suitable insulation material. A coating of wax or, if preferred, polyurethane varnish over each layer as the winding progresses will help to keep the damp out.



Using tapes to hold the turns in place

\*2 Abbey Cose, Tyrrhiw, Taffswell, Mid-Glamorgan



Ten test turns in position

## Re-assembly

The core should now be put back, but this time the laminae must be put in singly and fully interleaved. Also try to keep the laminae all the same direction, ie with the insulated sides all facing the same way. If you wish to put back any pieces that were damaged during removal, it is a good idea to put them in the middle of the stack rather than leave them to last. When almost all are in position the space will appear to be too little to accept the remaining pieces. The blade of a set-square or similar piece of metal can be used to compress the laminae, and it should be possible to insert all but one or two pieces. Stand the transformer on one side and, with a piece of wood and a hammer, tap the laminae on all sides to get them fully in position. Complete the outer layers (both sides) with Ts or Is and then reassemble the clamps and fasten the bolts very tightly. If there was a tag strip, connect the ends of the windings to convenient points. The transformer is now complete and should be tested in the same way as the original. The secondary voltage can be checked and, if left switched on, there should be no significant increase in core temperature after 30min or so.

## Rectifiers

Radio rallies can again help with these. I bought a bag of assorted diodes for 50p about three years ago. This proved to be a very good buy; you only need to have one good power diode to be out in front, but in fact there were very few duds. There were over 200 pieces in the bag, ranging from switching diodes, 1N4148, to large power diodes, some of which have been tested up to 25A. The main snag with the power devices is that they are stud mounting and were without nuts, which should be 10/32 UNF. The studmounting types come in stud-anode and stud-cathode, and both types were in the bag.

These allow bridge rectifiers to be made up with the use of two heatsinks (see Fig 8). If the power diodes are unmarked (as most of mine were) don't let this put you off, as it is a relatively easy matter to find out all you need to know with some simple tests. First check the polarity using an ohmmeter. Remember that with an analogue type instrument (AVO8 etc), the red lead

will be negatively polarized when being used to measure resistance. A good diode should indicate about 1,000Ω in the forward direction and in excess of 1MΩ in reverse. Next check the current rating. Mount the rectifier on a heatsink to delay the rise in temperature while the test is being made. Borrow a low-value, high-current slider-type variable resistor. Connect the rectifier to the circuit shown in Fig 9. Start with the variable resistor at maximum; the current indicated by the ammeter should be less than 1A. After a few minutes feel the diode—take care, it might be very hot! If cool, reduce the value of R to increase the current to 2A, leave a few minutes and again test the temperature of the diode. Continue reducing R and checking temperature. If the required current is reached, leave switched on for 10min or so and if at the end of this time the diode is just about touchable, it should be OK. By this time the heatsink will also be getting hot unless you have used a very big one.

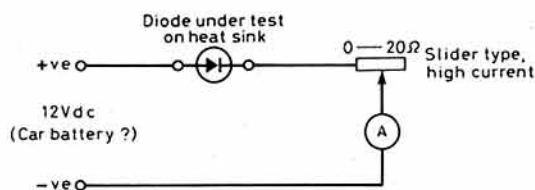


Fig 9. Circuit used for testing the current rating of diodes

If you are using the diodes in a bridge circuit or a full-wave circuit, then the current that each diode must be able to pass is only half the total output of the psu. The only other thing you need to know is the voltage (piv). If the rectifier is a bridge circuit, then the diodes must be able to withstand 1.5 times the rms input voltage, but in a full-wave or half-wave circuit the diodes must be able to stand up to three times the rms input. This is because the diode sees the peak input voltage plus the charge in the reservoir capacitor, which in the "off load" condition will be equal to the peak input. In a bridge circuit there are always two diodes in series, so that each diode sees only peak volts. To be quite safe, a wide margin of safety is advised as transients in the mains supply may increase the applied voltage to well above the expected value. It is suggested that the calculated value for piv be increased by a factor of four times. To check the piv you will need to have the use of a variable-voltage psu with a maximum voltage of about 20 per cent higher than the piv needed, eg if the input voltage (off load) to the rectifier is 22V then the peak will be 33V, and the required piv  $33 \times 4 = 132V$ . If the diodes are to be used in bridge then about 150V would be needed for the following test (Fig 10 shows the test circuit).

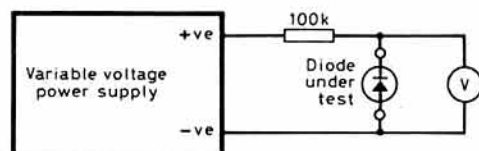


Fig 10. Circuit for testing the peak inverse voltage (piv)

Increase the voltage of the psu while watching the reading on the voltmeter. It should increase and have about the same value as the output of the psu. If the reading of the voltmeter reaches 150V all is well, but if it stops rising at 100V then the piv is 100V. A value as low as this is most unusual, and with a 22V input to a bridge rectifier there would be little danger of breakdown occurring even if the above test was not made. The simple test described can always be used to find the piv of any diode. The voltage across the diode stops rising when the diode becomes conductive in the reverse direction, but damage to the diode is prevented by the high-value series resistor. Of course, if the diode under test has a very high piv then the

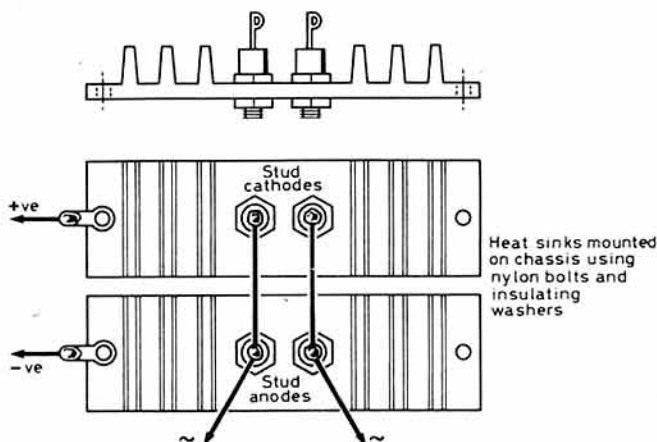


Fig 8. A bridge rectifier using discrete diode

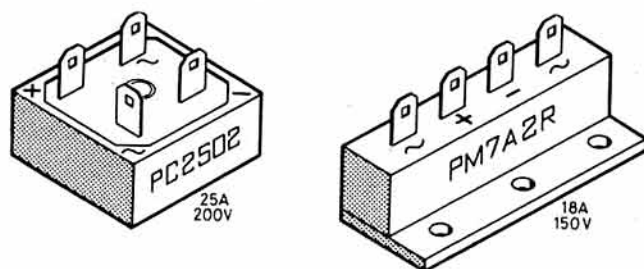


Fig 11. Some types of bridge rectifiers to look for at rallies

"breakover" condition may not be reached when the output voltage of the psu has reached its maximum, but that does not matter as long as that voltage is higher than the value required.

Although not as common, it is sometimes possible to find high current bridge rectifiers of the types shown in Fig 11 at some radio rallies. They are usually sold as being 18A, 25A or 35A, but if no rating is quoted be careful, as they are rather difficult to test. They are also dearer than single diodes. Numbers printed on the side that contain figures like 25 or 35 often, but not always, indicate the rating.

## Reservoir capacitors

Again, these items can be very expensive if bought at normal retail prices, but radio rallies can usually be relied upon to provide a fairly low-cost item. When choosing a reservoir capacitor the most important thing is to make sure that it has a high ripple capacity. This must be at least as high as the current output of the finished psu. Sometimes the ripple capacity is marked on the unit together with capacitance and working voltage, but if it is not then a simple rule is to look at the terminals—if they are screw type then the ripple capacity is high and the capacitor should be satisfactory.

If the polarity is not marked, it can easily be found by means of an ohmmeter of the analogue type. When connected one way the needle will move almost to 0Ω and then climb back towards infinity. After 30s or so note the resistance reading. Now reverse the meter and repeat the test. A similar result will be obtained, but in one case the resistance reached after 30s will be much higher than in the other. The higher resistance indicates that the meter is correctly connected—again remember that the polarity of the meter is reversed, ie the red lead is negative.

Next, the capacitance must be decided. If a voltage stabilizer is to be used, a useful rule of thumb is: 2,000μF for each ampere of output current. If a smaller value is used there is a very good chance that the voltage across the capacitor will drop below the minimum value required for the input to the stabilizer while the rectifiers are non-conductive and ripple will appear on the output of the psu.

Finally, the working voltage must be higher than 1.5 times the rms output voltage of the mains transformer. So for our original example—a 210VA transformer giving 21V at 10A—the reservoir capacitor would need to be  $10 \times 2,000 = 20,000\mu\text{F}$  with a ripple capacity of 10A and a working voltage of at least  $21 \times 1.5 = 31.5\text{V}$ , a practical value being 40V. The retail price of such a unit could well be £9-£10, but at a rally can often be found at about £1-£2. Capacitances and working voltages mentioned above are minimum, and no harm will occur if they are bigger than necessary.

With transformer, rectifier and reservoir capacitor, the basic unit can be set up. A common mistake at this stage is to use heavy-gauge wire from transformer to rectifier and from rectifier to stabilizer, and then to use a lighter gauge wire to connect the reservoir capacitor. This wire must be of equal current rating as the rest, because the leads to the capacitor carry the charge and discharge currents, and resistance in the leads would reduce the effectiveness of the capacitor. In fact the ripple capacity is very largely decided by the size of the internal wires connecting the foils to the terminals of the capacitor.

## Stabilizers

Much has been written on this topic, so only simple circuits will be considered here. One of the simplest methods of obtaining a stable voltage at a high current is to make use of a voltage stabilizer chip which will give a stable output voltage at a relatively low current, and to follow with a current amplifier which can be almost any high-current, high-power transistor. The basic circuit is shown in Fig 12.

If the maximum current output of the stabilizer chip is 0.5A, it will be more than enough to drive a 2N3055 to its maximum rating. The voltage at the emitter will be about 0.6V lower than the output of the stabilizer, which should be adjusted to about 14.1V in order to give a 13.5V output. If the voltage across the reservoir capacitor is 25V then the 2N3055 must

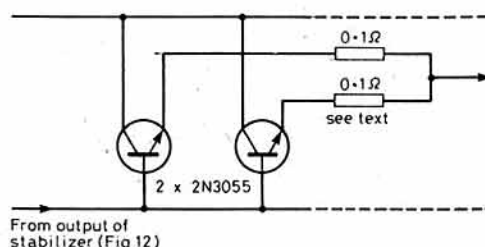


Fig 13. Using power transistors in parallel to increase output current

drop  $25 - 13.5 = 11.5\text{V}$ . If the output current rises to 10A then the power dissipation of the transistor  $11.5 \times 10 = 115\text{W}$  which is in fact its maximum rating. Even with a very good heatsink, early failure is likely. It would be much better to have two 2N3055 transistors in parallel so that the dissipation is shared. Unfortunately transistors cannot be operated in parallel without modification; they might oscillate at some indeterminate frequency but, more important, one transistor would pass more current than the other and so get hotter. Because transistors have a negative temperature co-efficient, the unbalance will get worse as the conductivity of the hotter transistor increases, resulting in the failure of one transistor followed rapidly by failure of the second.

To prevent this happening, a ballast resistor of about 0.1Ω is connected in series with the emitter of each transistor. The only problem is finding suitable resistors—0.1Ω at 2.5W. Nichrome wire from an old electric fire element can be used but is difficult to solder. Two strands, 4cm long, twisted together and crimped into a small soldering tag at each end will make a resistor that will be able to pass 5A without getting too hot. The exact value of the resistor is not too important as long as the two are near enough equal. Connect as shown in Fig 13. The main problem with this simple type of stabilizer circuit is the difficulty of including short-circuit protection and, unless you are very lucky, a brief short-circuit across the output of the psu will result in the loss of both 2N3055s if more than one is used. Incidentally this transistor was chosen because it is readily available at very low cost.

There are better transistors available, such as the 2N3772/3, both of which will dissipate 150W and can pass currents of up to 20A; but they are much more difficult to obtain and are very much more expensive—up to £3 on the normal retail market. The recommended stabilizer chip is the 123 or 723 ic which will allow current limit to be easily incorporated. The maximum output of these ics is only 150mA and an extra amplifier will be needed to drive the 2N3055s. A complete practical circuit is shown in Fig 14.

Either L123 or L723 may be used, as they are electrically the same but in different packages. I prefer the L723 simply because it is generally easier to obtain at rallies etc, and is easier to fit into Veroboard or a pcb because of the 14-pin dip encapsulation. The pin connections of both types are shown in Fig 15. Note that the diagrams show the pin connections looking at the top of the ic. The voltage sampled by the resistors R4 and R5 and RV2 determines the voltage at Vout of IC1. This in turn fixes the voltage output of the psu. RV1 enables this voltage to be varied within narrow limits, about 12-14V. The top of R4 may be brought out of the psu by means of a separate terminal. For normal use this will be linked directly to the positive output terminal, but if the leads to the linear amplifier or other load are long there will be a voltage drop across these long leads; this voltage drop will vary according to the current being drawn, so spoiling the stability of the supply.

To maintain a constant voltage at the load, the sense terminal should be connected to the positive rail at the point of entry to the linear etc. This will produce a slightly strange phenomena if the psu voltage is monitored by a meter, either internal or connected to the terminals of the psu. The voltage will rise as the load current is increased. This is because the output voltage

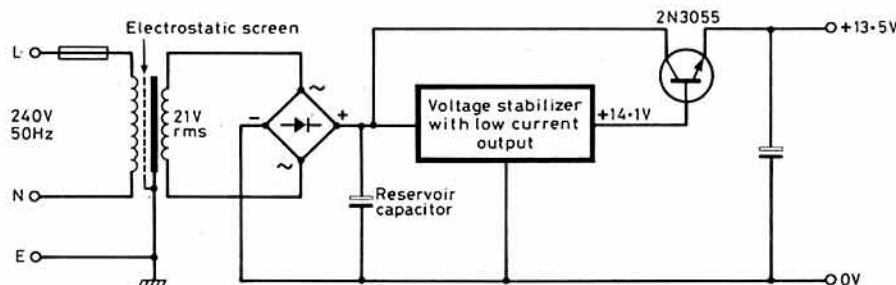


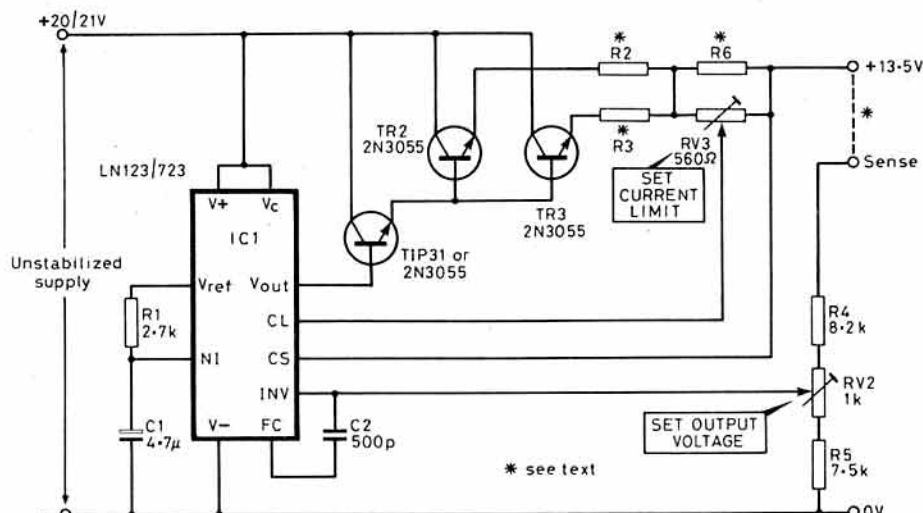
Fig 12. Basic psu using a power transistor as a current amplifier



## CORRECTION

In Part 1, on page 490, column 1, final paragraph, the first line should read: Incidentally "Test turns used/ measured voltage" gives what is known as. . .

Fig 14. Complete stabilizer circuit with variable current limit but less over-voltage protection



will be adjusted by IC1 to offset the voltage drop in the supply lines between the psu and the load. If more output current is required, further 2N3055s may be connected in parallel with TR2 and TR3, with a stabilizing resistor in series with *each* emitter. Four 2N3055s will produce an output current of up to 20A; remember that the transistors will need some hefty heatsinks. Note that TR1 need not be a 2N3055 and could be of much lower rating, eg TIP31. Also, TR1 will only require a modest heatsink.

to IC1 to be adjusted to give a moderately variable limiting value. Note that if you are making a psu to give 20A you cannot expect to make it limit at 1A, because this would require a value of 0.55Ω for R6 and if the full output current of 20A was drawn there would be a voltage drop of 11V across R6!

## Over-voltage

If the psu shown in Fig 14 is to be used with sensitive equipment that is critical of its supply voltage, then some form of over-voltage protection is necessary. If one of the 2N3055s should become short-circuit (emitter to collector) then the equipment would receive around 20-25V which would probably despatch most rigs. The simplest protection is of the "crowbar" type. A fuse connected in the line from the reservoir capacitor is blown by means of an scr connected across the *unregulated* supply on the opposite side of the fuse remote from the reservoir capacitor.

IC2 is a custom-built crowbar device costing about £1 and is very effective. Radiospares RS3423 is one device easily obtainable. Many component retailers supply Radiospares components, but if difficulty in obtaining this item is experienced then the MC3423 PI is a direct equivalent. Fig 16 shows a suitable circuit. The scr is fired by a pulse from IC2 when the voltage at the output of the psu rises above the level set by the preset control RV4. Resistors R7 and R8 protect the scr which becomes a very low resistance and can pass hundreds of amps when it discharges the large reservoir capacitor. The value of these resistors depend on the designed output current and output voltage. For supplies at 13.5V, R8 should be 15Ω and R7 given by  $20/4 \times \text{rating of the fuse}$ ; eg for a 20A psu, the fuse rating could be 13A and  $R7 = 20/52$  about 0.5Ω. The choice of a 13A fuse for a 20A supply is quite deliberate. It must be remembered that 13A is the current that it can carry continuously and almost indefinitely. A current of twice the rating will not cause the fuse to blow, it needs just about 2.5 times the rating to do that. A 13A fuse causes a lower overload when the scr fires. C3 gives a small delay in firing the scr so that it is not operated by short duration pulses that can occur in the mains and that are not filtered out by the reservoir capacitor etc. A value of 10nF gives a delay of 0.1ms.

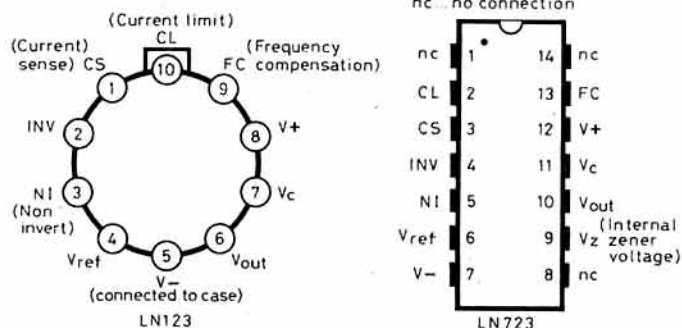


Fig 15. The pin connections

## Current limit

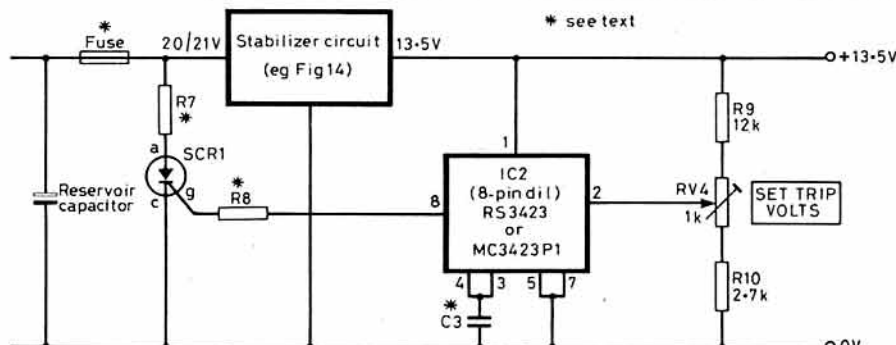
This is provided by R6, which applies a voltage between CL and CS of IC1. When this voltage reaches 0.55V the output at Vout is progressively reduced so that the output current cannot increase beyond the fixed limit. The value of R6 may be calculated by dividing 0.55V by the current at which limiting is to take place; eg at 20A,  $R6 = 0.55/20 = 0.0255\Omega$ . Note that if a short-circuit occurs across the output, the current will rise to 20A and remain at that value until the short is removed. It is therefore necessary to be sure that the heatsinks can maintain a sufficiently low temperature to prevent damage to the transistors.

R6 can be made up as described for the 0.1Ω ballast resistors, but using more strands depending on the current to be carried. The exact value of R6 can be found experimentally by starting with a value that is too high and progressively reducing it until the correct value of current is reached. Alternatively the arrangement as shown in Fig 14 may be used where R6 is rather bigger than the calculated value and RV3 allows the voltage applied

I hope that some of these suggestions will be of help to constructors who, like myself, try to build things for less than nothing! Do have a go, it's not nearly so difficult as it sounds.

GW4HWR

Fig 16. The extra circuitry needed to provide protection against excessive output voltage. To set the "trip volts" control, disconnect R8 from the gate of SCR1 and connect a voltmeter between the open end of R8 and 0V. Adjust RV4 until the meter reads high, then back it off until it reads low



# A HOME-BUILT FREQUENCY SYNTHESIZER FOR 45 TO 75MHz

John Crawley, GM3LBX\*

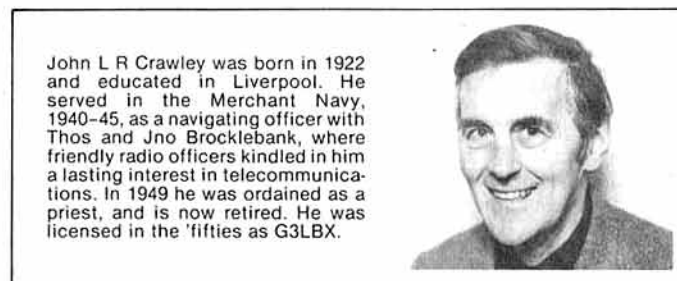
THE CIRCUIT to be described is intended to be used as the heart of an up-converting receiver or transceiver covering the band from 100kHz to 30MHz. There have been considerable differences of opinion as to the advantages or disadvantages of using a synthesizer rather than a vfo in hf equipment, and I wish to demonstrate that a very reasonable synthesizer can be built by an amateur from parts which are easily obtainable. I also wish to remove some of the mystery from the whole subject!

## The development of the system

The aim then was to provide the necessary injection frequencies for a double-superhet with a first i.f. at 45MHz, and a second i.f. at 455kHz. Clearly the first injection would need to vary from 45 to 75MHz, and it was decided to do this with a single tuning control and no band-switching. It would be more accurate to write "apparently no band-switching" because the thing does in fact work in such a way that the first loop in the system covers "bands" of 6.4kHz which are selected automatically by the state of the tuning control.

As with all synthesizers using digital circuits, the final frequency at the output changes in steps. The first decision which needed thought was what size the ultimate steps should be. Experience showed that steps of 10Hz produced a smoothness of tuning which seemed, even to my elderly ear, to be entirely acceptable. A little further thought resulted in the conclusion that to achieve such small steps across a 30MHz band was going to mean the use of at least two separate phase-locked loops. The ideal to aim at, was to make each loop share the work of dividing the final frequency down to the 10Hz, onto which the system would lock. We would then have something which would look like Fig 1.

Suppose that the vco in loop 1 is just a little over 45MHz and the vco in loop 2 is running at about 40MHz, then the resultant from the mixer would be around 5MHz; we would design the bandpass filter to pass 5 to 35MHz. The "divide-by-n" would be programmed to divide by 500, and the resulting 10kHz would lock with the 10kHz of the reference for this loop. The exact frequency of the output within the 10kHz which loop 1 has selected would be set by the frequency of the vco in loop 2. This would be arranged to vary in steps of 10Hz between, for example, 40MHz and 40.010MHz. If we were tuning upwards from 45MHz, the programming of



John L R Crawley was born in 1922 and educated in Liverpool. He served in the Merchant Navy, 1940-45, as a navigating officer with Thos and Jno Brocklebank, where friendly radio officers kindled in him a lasting interest in telecommunications. In 1949 he was ordained as a priest, and is now retired. He was licensed in the 'fifties as G3LBX.

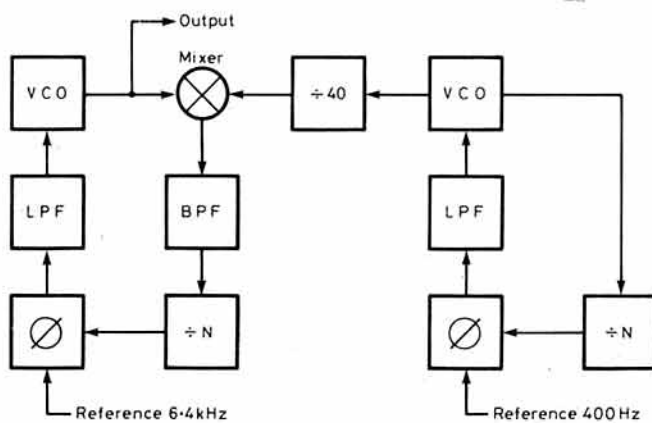


Fig 2. Achieving 10Hz steps with a 400Hz reference

the "divide-by-n" counter in loop 2 would be arranged to step from divide by 4,000,000 to divide by 4,001,000. But, of course, such high divisors would be complicated to achieve, and not possible with the parallel programming which had been decided on.

In fact the chosen device to do the phase-locking job was the MC145151. Since this is programmed in binary form and since certain divisors are available within the chip to provide a convenient reference frequency, the step size (and therefore the reference frequency) for the first loop was to be 6.4kHz. This is easily arranged by providing a crystal at 3.2768MHz for the oscillator in the chip, and programming the internal reference divider to divide by 512 to give 6.4kHz; see Fig 2.

In the second loop a reference frequency of 10Hz was going to make difficulties in the lowpass filter; the solution was to think in terms of a step size of 400Hz and then to divide the vco frequency by 40. The interpolating frequency from loop 2 is to be mixed with the output from the vco in loop 1, and the difference frequency is to be divided down to 6.4kHz. Therefore, it is necessary for the loop 2 output to be within a few Megahertz of the lowest frequency required from the vco in loop 1. In fact the bandpass filter arrangements in loop 1 dictate that the best frequency for loop 2 would be about 40MHz. This would mean the vco in that loop running at 40 times 40MHz-1.600MHz! The answer is to use further mixing in loop 2. As there would, in any case, be a need for a second injection frequency for the receiver of 44.545MHz, this could be doubled and mixed with the vco output in loop 2 (running between 95.3876 and 95.6432MHz). The resulting difference frequency of 6.2976 to 6.5532MHz could be filtered and used to feed the MC145151, while the straight 44.545MHz is mixed

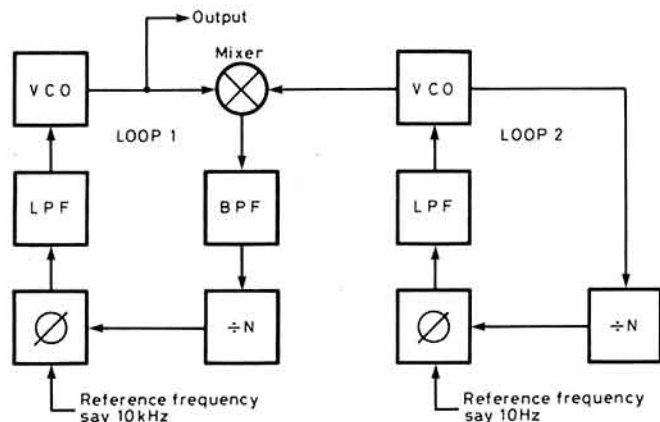


Fig 1. A basic arrangement

\*Cove, Campbeltown Road, Tarbert, Argyll PA29 6SX.

Fig 3. Block diagram of final arrangement

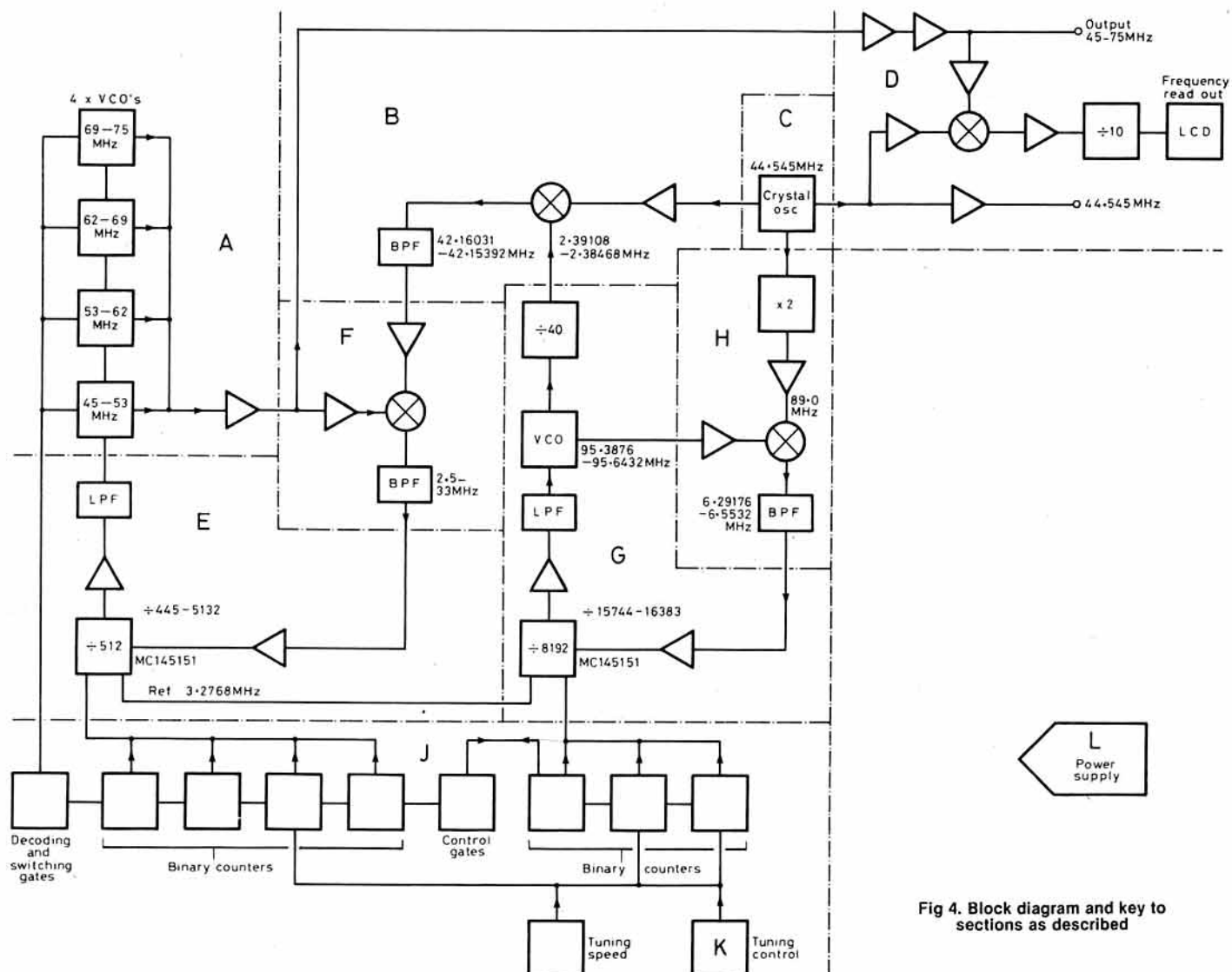
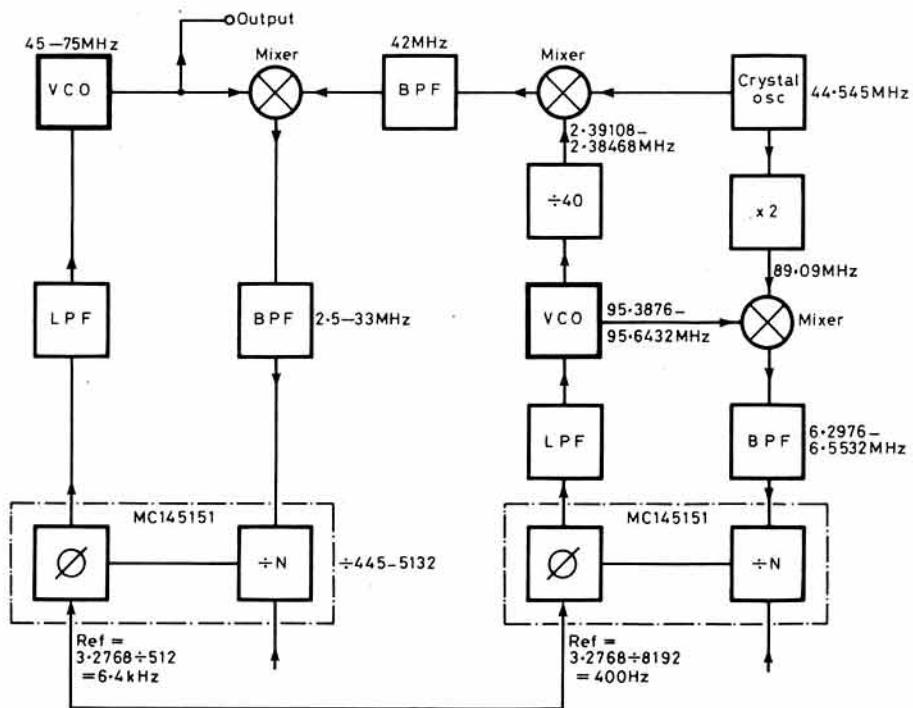


Fig 4. Block diagram and key to sections as described



with one fortieth of the vco frequency and the difference frequency (just over 42MHz) filtered and passed to loop 1. See Fig 3 for the final arrangement arrived at.

This arrangement has a lot of advantages. It keeps the vco in loop 2 well above the receiver passband and also above the highest output from the vco in loop 1. It also means that the range of frequency change in loop 2 is proportionally much smaller, so that the overshoot of the feedback necessary to produce the change from top to bottom of the range or vice-versa, is very much easier to limit.

## The control circuit

The choice was made to use parallel input devices (MC145151) in order to be able to use a straight-forward tuning control which did not involve the complexity of microprocessors. The clearest approach seemed to be to use a string of binary counters, which has subsequently proved very reliable and trouble-free. The counters chosen are 74C193. They are run with a supply at +8V which they share with the rest of the control logic. IC908 (a 74C02) provides for the counters, which programme loop 2 to count between 15744 and 16383, and also provides the carry or borrow pulses to increment or decrement the counter in loop 1.

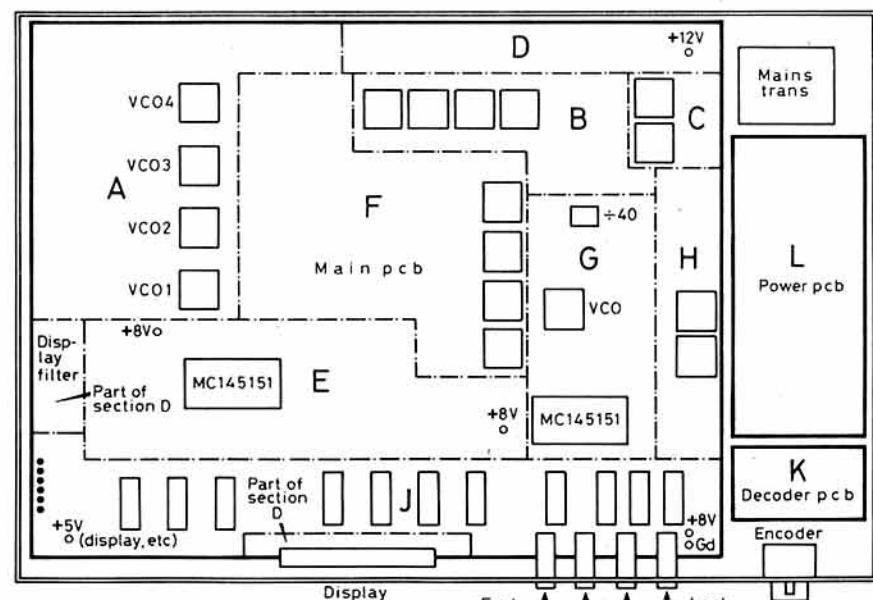


Fig 5. Plan of enclosure and pcb sections

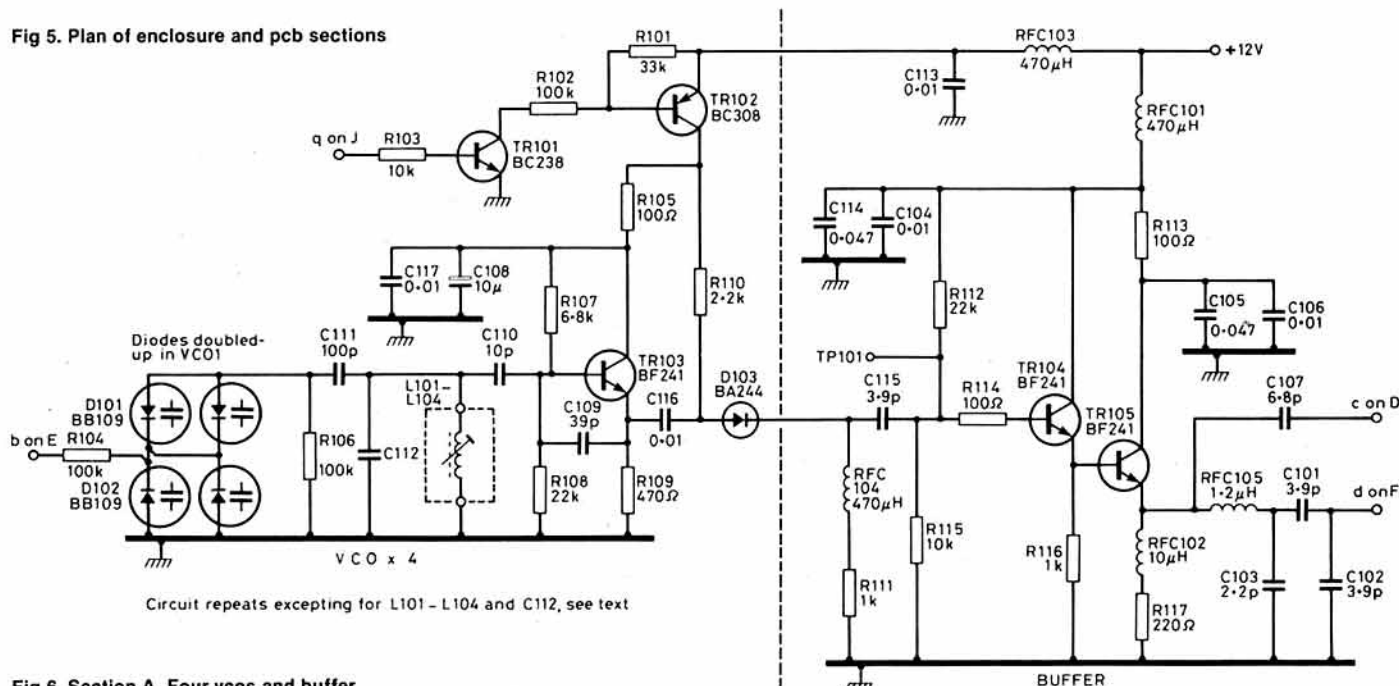


Fig 6. Section A. Four vcOs and buffer

## The vcOs in loop 1

In order to cover the whole range from 45MHz to 75MHz, there are four separate switched vcOs in loop 1. By using very expensive varicaps you could get away with fewer, but there is little to be gained and you will need, in any case, to switch the front-end of the receiver. The status of the most significant bits in the 74C193 counter-chain is used to do the switching after decoding in IC909, 910, 911, an MC14012 and two MC14555s—these are Motorola versions of cmOs 4012 and 4555.

## Tuning control

It is convenient to be able to alter the tuning rate of a receiver, so the control pulses which originate in a shaft encoder are routed to one of three different points on the counter-chain. A push-button selects either *slow* (10Hz per pulse) *normal* (160Hz) or *fast* (41kHz). This allows the operator to move very quickly about the whole band, and then to select *normal* to look for signals and finally, *slow* to tune in the exact frequency required. The buttons are placed where the thumb of the "knob-twiddling" hand can find them most easily. A fourth button locks the frequency which has been selected.

## Frequency display

An led is provided which displays receiver frequency. The resolution is to the nearest kilohertz. Obviously a larger display could be used. It would be nice to have another digit, but I was (and still am) counting the pennies.

## BFO

In the prototype a third loop was used to generate the necessary 455kHz bfo injection. However, it was decided that the extra board space and component cost was not justified. There are, anyway, many good ways of getting 455kHz. I leave it to the reader to choose.

## The circuit described by sections

### Section A. The four vcOs (Fig 6)

The four vcOs are all alike apart from the inductances and C112.

- (1) 45–53MHz approximately. L101 is eight turns 28g wire on Toko 10K former with adjustable core, but with no pot-core. C122 is omitted.
- (2) 53–62MHz. L101 is Toko Style MC120 100079. C122 is 6.8pF.
- (3) 62–69MHz. L101 is Toko MC120 100076. C102 is omitted.
- (4) 69–75MHz. L101 is Toko MC120 100075. C122 is 4.7pF.

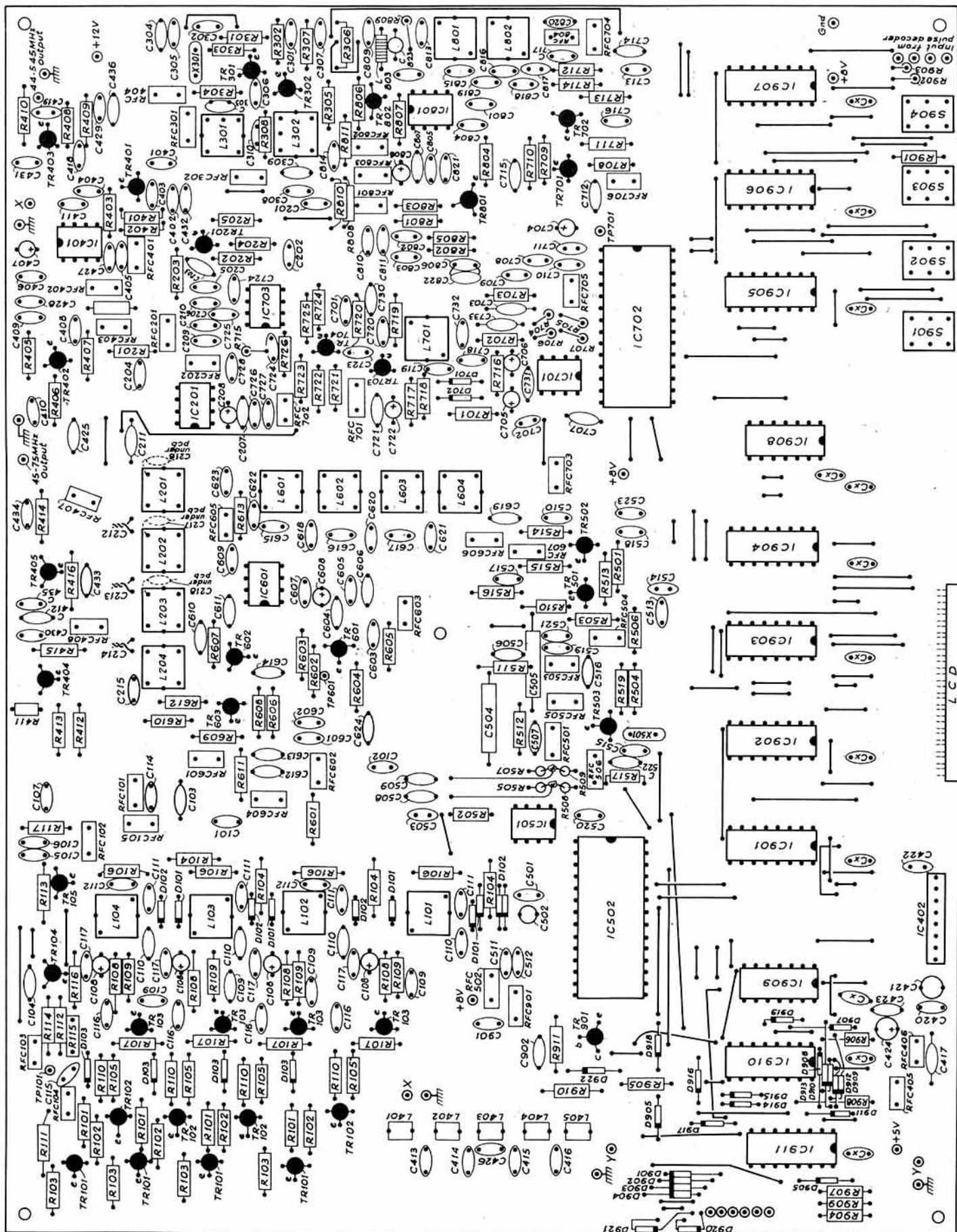


Fig 7. Main pcb component layout

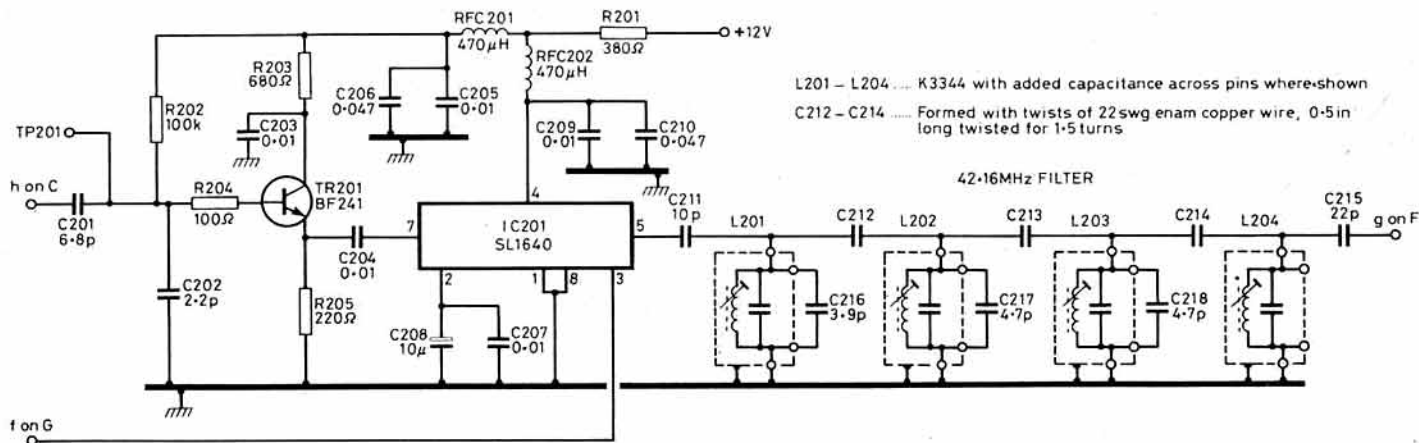


Fig 8. Section B. Second mixer and 42MHz filter

The varicap diodes are BB109B, with additional ITT210 diodes in parallel with the BB109B in the lowest frequency vco to provide for the required range of capacitance. Other diodes would be suitable, but these gave the best results of those which were tried.

The four vcOs occupy the top left-hand side of the pcb with the buffer amplifier, which is common to all four, just above them. The layout can be seen in Fig 7, which shows the board viewed from the component side.

The section should be assembled and tested on the board by providing 12V at the emitters of the four TR102, and switching on each oscillator in turn by applying a volt or two at the appropriate R103. Each oscillator should be tuned to run somewhere at the bottom end of its appointed range.

#### Section B. Second mixer and 42MHz filter (Fig 8)

The mixer IC here, like the other three in the system, is an SL1640. Note the double-decoupling capacitors. R201 drops the 12V line to 6V. Pin 3 on IC201 is fed from the divide-by-forty IC in section G; the frequency at this point should be between 2.38469 and 2.39108MHz and at approximately 100mV. Pin 7 is fed from the 44.545MHz crystal oscillator (section C) via TR201, a BF241. The output at pin 5 is taken to the 42MHz filter via C211. Note that the capacitors C216-218 are small ceramic chips soldered across the pins of the inductances L201-203. The latter are all Toko K3344. C212-214 are small capacitances, made by twisting 0.5in lengths of 22g enamelled copper wire, 1.5 turns.

#### Section C. 44.545MHz crystal oscillator (Fig 9)

This section is a straight-forward crystal oscillator at 44.545MHz followed by a tuned buffer amplifier. Both L301 and L302 are K3335 from Toko, but the small winding is not used in L301. The section is sited near the top right-hand side of the board. Once it has been assembled it can be tested for oscillation at the required frequency, and the cores are adjusted for the best output. The frequency can be "pulled" to that which is needed by altering the value of C302.

R8 across L302 is to dampen out spurious oscillation.

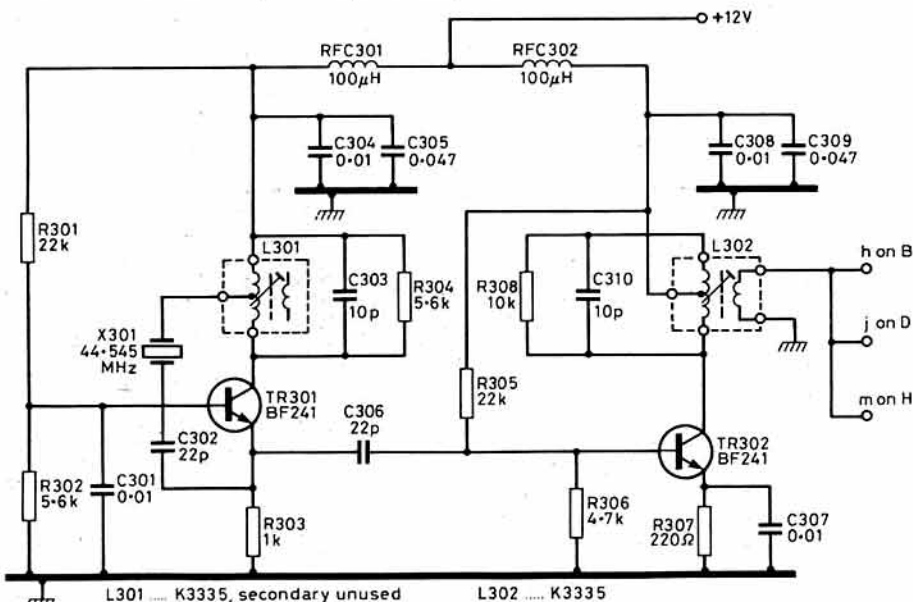


Fig 9. Section C. 44.545MHz oscillator

#### Section D. Output buffers (Fig 10)

This section provides output buffers for the first two injections to the main board of the receiver, and provides for a frequency read-out.

The input to TR401 and TR403, marked j on Fig 10, is from the 44.545MHz oscillator in section C. IC401 mixes this with the vco output loop 1, which has been filtered and buffered by TR404, TR405 and associated circuitry, and applied to pin 3 of IC401 (another SL1640) via its buffer TR402. The difference frequency at the output pin 5 is filtered by the lowpass filter L401, 402, 403, 404 etc and divided by 10, in IC402, before being displayed in the FC177. The latter is an lcd module with internal arrangements, which can be programmed to apply the 455kHz offset, so that the display is that of the receiver frequency.

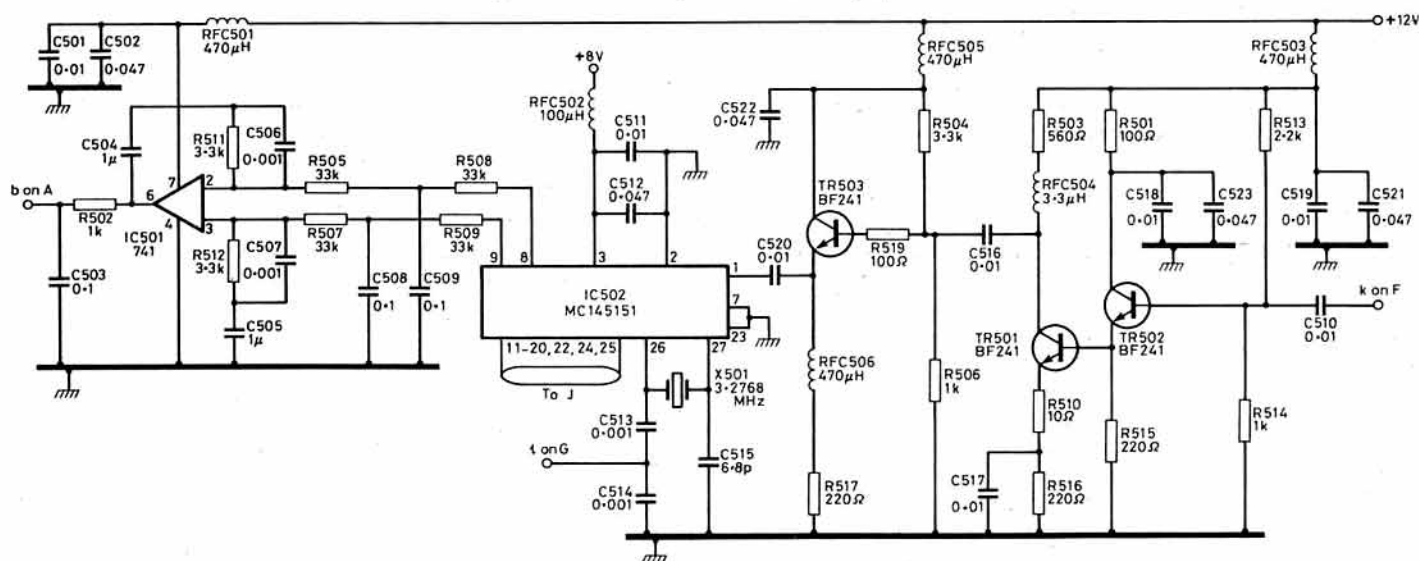
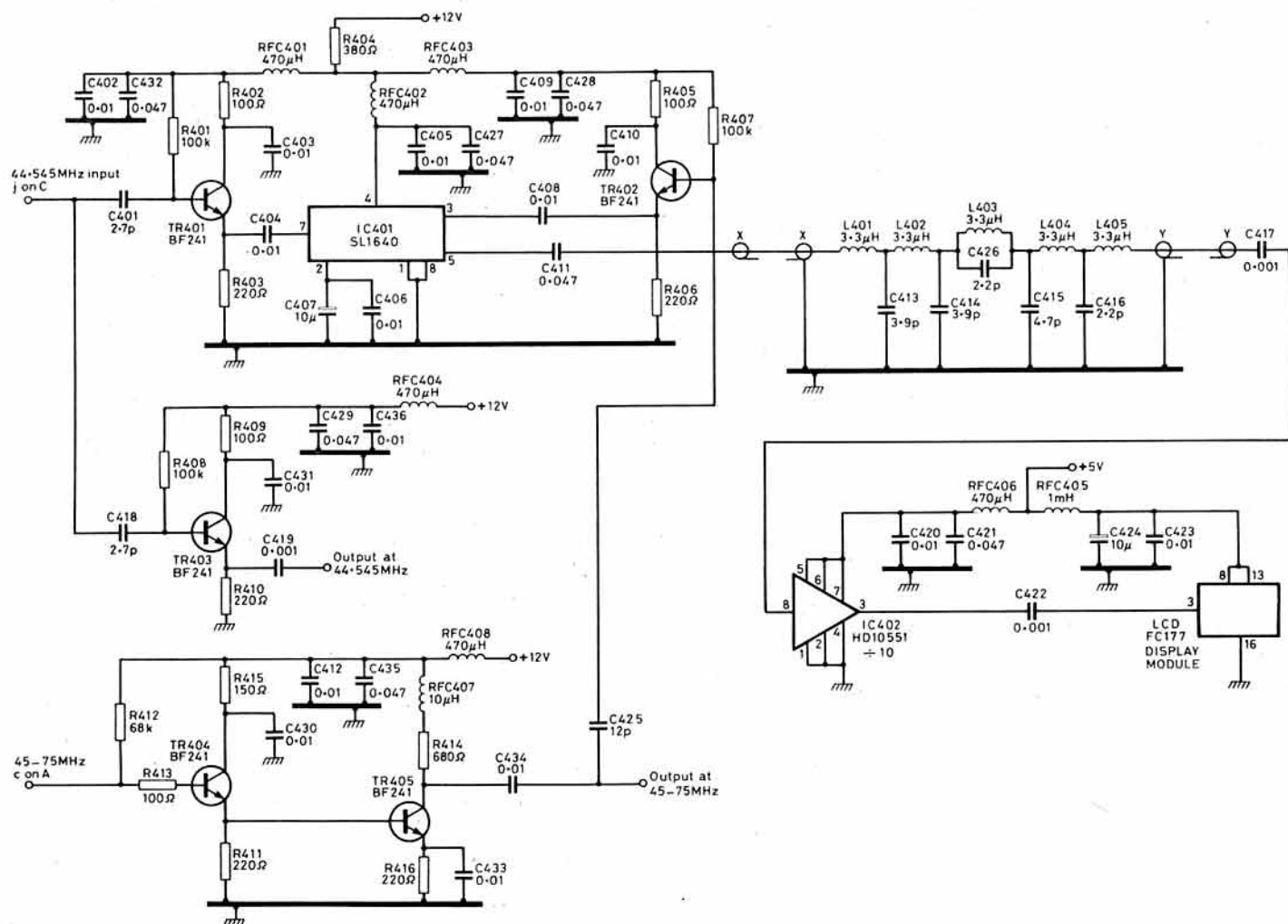
The lowpass filter is designed to give the steadiest read-out on the lcd. It should cut-off sharply above 30MHz. There is a pin on the board at the co-axial connection to C411 on the output of IC401. The TR403 buffer, which includes an output pin on the board for the co-axial lead to the second injection point on the receiver, is sited in the top right-hand corner of the pcb, with the other buffers and mixer (IC401) to the left of it. All the rfcs on this section, like most of the others in the synthesizer, are Toko 7BS series.

The display (an FC177 module from Cirkit) is mounted on the very edge of the board, 20mm lengths of 20g copper wire are soldered to the tracks on the board projecting forwards over the edge, these are slipped through the holes in the sixteen connections of the lcd and soldered. The wires are then trimmed off. The IC402 (HD10551) is mounted just to the left.

#### Section E. First loop, phase discriminator (Fig 11)

IC502 is the MC145151. Pin 1 is the input to the main divider, the count of which is programmed by pins 11 to 25, excluding 21. These pins are high unless grounded. In this synthesizer, their state is controlled by the output data on the 74C193 chain in section J. There is a further divider in the MC145151, which is programmed by the state of pins 5, 6 and 7. This





divider sets the reference frequency. There is also an internal oscillator, the frequency of which is set by a crystal between pins 26 and 27. In this case, the frequency is 3·2768MHz, and pin 7 is grounded to give an internal division by 512, making the reference frequency 6·4kHz. C513 and 514 on pin 26 allow the 3·2768MHz to be used by the other similar device on the board. C515 pulls the crystal onto the correct frequency. This may need alteration.

**TO BE CONTINUED**

# THE GROUNDED, TOP-LOADED, "STEEPLE" AN ALL-BAND ANTENNA FOR DX WORKING

John D Heys, G3BDQ\*

THE UBIQUITOUS tri-band multi-element beam on its metal supporting tower now seems to be almost the essential antenna required for reliable long-distance communication on the hf bands, and many newcomers to the hobby do not realize that excellent results may also be obtained when using very cheap and simple wire antennas. I have never used any kind of rotary beam on the hf bands, but for almost 40 years I have managed to work much dx when using various examples of wire antennas. Perhaps the most popular wire antenna type today is the centre-fed doublet in its different forms. One fashionable variety is the "G5RV" with its matching section and coaxial feed to the transceiver. This family of antennas will perform very well on the higher frequency bands, but on 7 and 3.5 MHz their height above ground is usually well below the half-wavelength needed for low-angle radiation. Such an antenna system will have to be at least 100ft up if it is to put strong signals outside Europe on 3.5 MHz! Strapping its feeders together and then tuning the system against ground will allow operation on 1.8 MHz, but at best such an arrangement is a compromise and will be unlikely to permit long-distance work on that band. Also, such an arrangement will generally have a combined feeder length and top loading section too short to be an electrical quarter-wave, and the use of a bottom loading coil will reduce efficiency. Many such feeders also depart from the vertical near their lower ends, just where the antenna current is greatest and where the effective radiation is at a maximum.

Vertical radiators, whether full quarter-waves or, instead, shorter loaded versions can give excellent dx results on the lower frequency bands, but such antennas are normally single-band devices. Using them on two or three bands when they are bottom fed can involve the use of remotely-switched matching units which, unless motor tuned, will have a very narrow bandwidth, and the swr will climb rapidly on either side of the preset frequency. I have always sought an antenna system which may be used on all the hf bands from 1.8 to 28 MHz and also have a first-class performance on all those bands. This article will attempt to describe the evolution of such a system and provide enough design information for prospective users of similar antennas.

## A top-fed quarter-wave

Twenty-five years ago the ssb mode was rapidly replacing a.m. telephony on the amateur bands, and I was then using a home-built transmitter which operated on the 3.5 and 14 MHz bands with a power output of around 50W p.e.p. My 130ft end-fed wire being used on all bands was at that time horizontal for the whole of its length and, although fine for general dx work on 14 MHz, it was useless for similar work on 3.5 MHz. It became frustrating to hear other British stations working into distant places before dawn on winter mornings yet being unable to make any similar contacts. The QTH at that time was a tall four-storey Victorian "semi" which had a garden dropping away quite dramatically at its rear. This feature allowed the suspension of a 66ft wire from the house eaves down to a point a little way along the garden. This wire sloped at an angle of about 60° and its bottom end was connected to an old and half-buried galvanized water tank. A Zepp feed at the top was arranged, and a 600Ω impedance open-wire feeder came from the antenna through the window frame and into the shack. An atu (really an antenna matching unit) transformed the quite high impedance of the feed line down to the low-impedance output socket of the transmitter.

Using this unusual top-fed quarter-wave with its low-angle radiation enabled QSOs with many North American and Antipodean stations during the winter of 1963-4. The experiment was written up and was published in [1]. A move to another QTH two years later put an end to further experiments with this type of antenna, and it was more or less forgotten.

## An end-fed wire on 1.8 MHz

A growing interest in dx working on 1.8 MHz during recent years inevitably stimulated a search for antenna systems suitable for that band, and initially an end-fed 180ft (3λ/8) sloper was used with some success. However, it soon became obvious that other stations which were using vertical antennas were able to contact weak dx which was not even readable when the 180ft sloping wire was in use; despite the effort of laying down a half-mile combination of counterpoise and buried earth wires. A full or even a half-sized and loaded quarter-wave vertical on 1.8 MHz was quite impossible for several reasons; the most important being the high cost and attendant complications involving the erection of an 80ft or higher tower. In any case a loaded tower would be essentially a one-band device, and it seemed ludicrous to lavish so much cash and effort upon an antenna for a band which was used for little more than half of each year.

## The half-delta loop

The American *Ham Radio* published an interesting article written by John S Belrose, VE2CV, which described his work with a half-delta loop on the lower frequency bands [2]. A delta loop is made from a full wavelength of wire, but the VE2CV version only required about a half-wavelength; the missing half being the antenna's ground reflection. This was an interesting development, for Belrose stated that it also radiated very well on its harmonic frequencies. Unfortunately, when designed for the 1.8 MHz band the half delta needs a 100ft-high support (usually a metal tower) and 206ft of wire connected to and sloping down from that support to a low impedance feedpoint at ground level (Fig 1). Although the feed impedance on the design frequency was said to be around 74Ω, this value did not hold for the higher multiples of that frequency.

Several months later Belrose and Doug DeMaw, W1FB, became joint authors of an article entitled "The half-delta loop: a critical analysis and

G3BDQ retired early from school teaching in 1981 and now can devote more time to amateur radio activities. Has been licensed since 1946 and for almost 40 years has written articles for the amateur press. At present his main interests are operating on 50 MHz and dx working on 1.8 MHz. Antenna testing and development have long been a major interest. His other and almost equally important hobby concerns the study of postal history, particularly the 1914-1918 period.



\*"Whitefriars", Friars Hill, Guestling, Nr Hastings TN35 4EP.

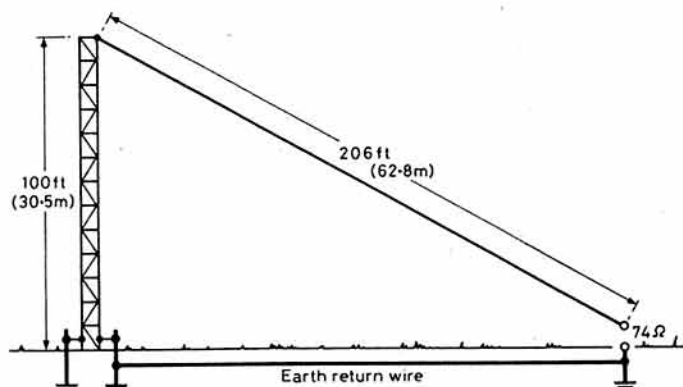


Fig 1. The half-delta loop for 1.8MHz as suggested by VE2CV

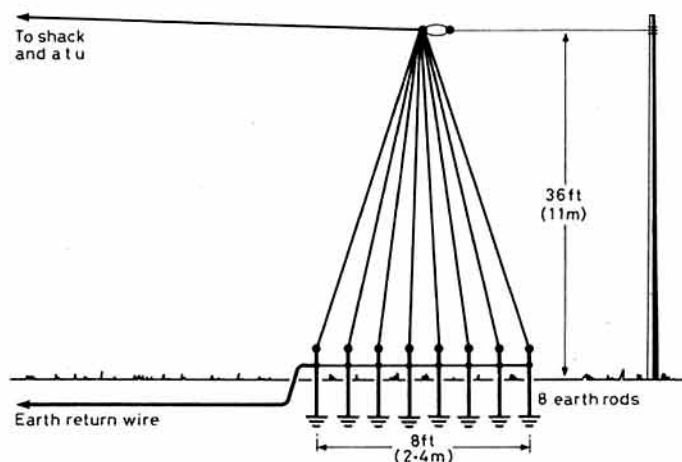


Fig 3. An improved grounded system using the multi-wire "steeple"

practical deployment" [3]. This article contains much valuable data for prospective users of half-delta systems, and includes the circuit of a three-band L-network located at the feedpoint and which is motor tuned! An important feature of the half delta is that it has all-round vertically-polarized radiation on its design frequency and, additionally, a bi-lateral radiation pattern along the plane of the sloping wire with considerable gain when used on the harmonic frequencies. Being a closed loop, the antenna is said to be very quiet for reception. An extensive earth system is an essential part of any half-delta installation, for the antenna must "see itself" as a ground image so that it may perform like a complete full-wave delta loop. Several British stations have built and used half-deltas on 1.8 or 3.5MHz and have found them excellent antennas. Unfortunately, the essential end-support height and the length of the down wire made it impossible to accommodate at my QTH, but the half-delta idea became the starting point for the later development of the "steeple" which is fully described later.

### Earthing the end of the wire

For over a year nothing was done with the antenna system at my QTH, but during the summer of 1984 an additional wire was connected to the far end of the 180ft top, and this wire came down vertically for 36ft to ground where it connected to a single thick aluminium earth rod (Fig 2). The system was certainly now a half-loop with a high rf current in the 36ft vertical section, and it could be brought to resonance with the station at u at the shack end of the wire. The single earth rod was also connected to a buried length of insulated wire which ran back to the main station earthing arrangements in accordance with the half-delta design data. It was found that this antenna could also easily be operated on all the hf bands (via an atu). An immediate result was a greatly-improved groundwave on the 1.8MHz band, and a 2W 'natter' a.m. transmitter could put out S9 signals over a radius of several miles. The dx potential of the antenna also seemed good, and this prompted more thought which eventually led towards a further improvement of the system.

Top-band antennas tend to tune sharply, and the grounded wire did just that. To lower the "Q" of the antenna, three additional down wires, each terminating at its own earth rod, were tried. An improved bandwidth was an immediate result, so four more wires were added, each of the eight with its own earthing rod. The wires were arranged to descend in the shape of a cone or "steeple", and to lessen the strain on the antenna supports some

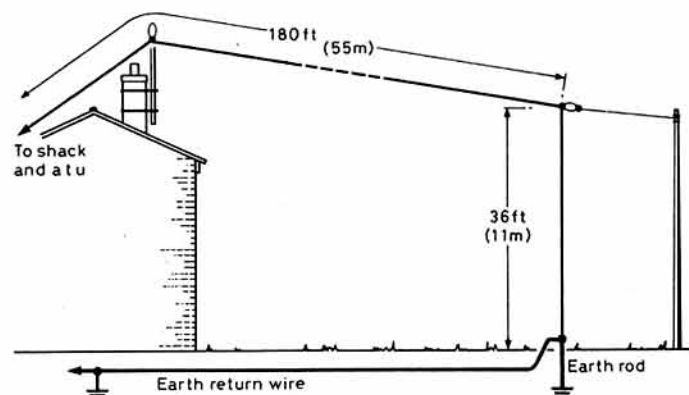


Fig 2. The grounded end-fed wire antenna system derived from the half delta

quite thin pvc-covered stranded wire (1.5mm dia) was used (Fig 3). The eight earthing rods were connected together with thick wire at the points where the down wires joined. Using several down wires not only improved the bandwidth of the antenna but they also brought down the ohmic resistance of the vertical section. A single top-loaded vertical wire which is  $\lambda/16$  long (approx 36ft) has a radiation resistance of only 5.5Ω [4], so anything which can be done to reduce the ohmic resistance of the radiator together with the earth resistance will improve the overall efficiency. The earthing rods were arranged in a rectangular pattern which measured 8 by 4ft, which was a small vegetable bed in my garden; but square, circular, triangular or any other arrangement of the earth rods can be made. The wire spacing is insignificant in terms of wavelength on the 1.8MHz band, so the wire cone of vertical wires will behave almost like a cone of solid metal. Signal reports both in and out on 1.8MHz improved dramatically when the "steeple" wires were installed, and this was particularly noticeable during daylight contacts with local stations using groundwave propagation. Another experimenter who has employed a similar technique (G4AKY) found that the addition of five additional down wires to his original single wire raised his signal levels with local stations by about 3dB. This represents a doubling of the transmitted power.

Some early-autumn 1.8MHz contacts with South Africa, Australia and South America were followed by a busy winter season when many North American and Asian stations were worked on the band. Fine dx contacts with good reports were also achieved on the other bands, with 3.5 and 7MHz being particularly good.

### The improved "steeple"

The acquisition of a 50ft sectional mast and the re-reading of W7DHD's article, "Short vertical antennas for the low bands" [5], initiated another attempt to improve the grounded "steeple" system. In his article, W7DHD had calculated the rf current distribution along a full-sized "perfect" quarter-wave vertical antenna together with the rf currents along both top and base-loaded 23° (35ft at 1.8MHz) verticals. His conclusion was that short verticals can be almost as efficient as full-sized antennas. Using W7DHD's method, I drew some diagrams to show the rf current distribution along a quarter-wave (Fig 4(a)) and top-loaded short verticals (Figs 4(b) and (c)). A perfect earth was assumed in the calculations, but when using a good earthing and counterpoise system similar current distributions will be obtained. Fig 4(c) indicates that a 50ft top-loaded vertical antenna over perfect ground, and when used on 1.8MHz, will have an efficiency of 60 per cent. This is very good for under  $\lambda/8$  of vertical radiator.

The top loading can assume several forms and may involve the use of inductors, capacity hats or top-loading wires such as the horizontal tops of T-antennas. These loading systems are normally used when the radiator is bottom fed, and they are trimmed to resonance by using a small and adjustable inductance at their bottom ends. Ohmic and other losses must be associated with inductors in any antenna arrangement, and I have always tried to avoid their use. In addition, the bottom feeding of vertical antennas complicates multiband use, for the feed impedance may vary from extremely low to very high on different wavebands. Some recent research into the antenna systems employed by amateurs 60 and more years ago, when British stations were restricted to an overall wire length of 100ft, revealed that the multi-wire tops and cages used were most effective in bringing such short radiators up to resonance on the 200m (1.5MHz)



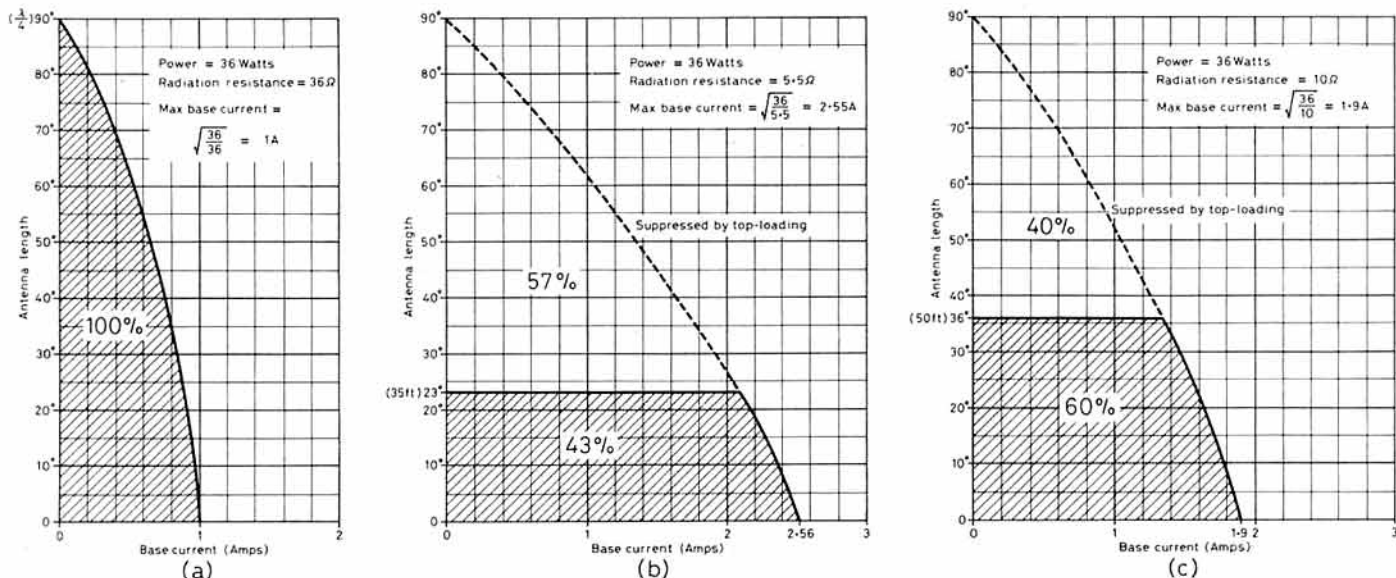


Fig 4. (a) The current distribution along a  $\lambda/4$  vertical antenna assuming perfect ground. (b) The current distribution along a 35ft top-loaded vertical showing a radiation efficiency of 43 per cent. (c) The current distribution along a 50ft top-loaded vertical showing a radiation efficiency of 60 per cent

waveband then employed. A capacity hat will have a self-capacitance of about 40pF for every 11ft<sup>2</sup> of hat area. This value will apply when the loading capacitance is distributed radially around the connecting point of the antenna end, but will be reduced when the loading extends away in one direction from the radiator. It was decided empirically that a three-wire "fan" about 65ft long opening out to a maximum width of 2m and joined to the top of a vertical 50ft five-wire "steeple" would add a considerable loading capacitance. The far end of the loading fan could easily be joined to a single wire running back horizontally to the shack (Fig 5).

### Practical details

The three-wire loading section seems to electrically lengthen the vertical part of the antenna by about 16ft. This means that on 3.5MHz the 50ft vertical works almost as a true quarter-wave. The 65ft fan has wires across its length at intervals (see Fig 5) and similar "shorting" wires are connected across the five vertical wires in the vertical "steeple" section. A cylindrical capacity hat has a self-capacitance of more than double that of a disc of the same diameter (assuming that the cylinder length is equal to its diameter), so a multi-wire cage having a diameter of about 2m would be an effective top-loading capacitance, and it would be considerably shorter in length than the three-wire fan suggested. Such a cage arrangement was considered but rejected for reasons of weight and aesthetics; the reactions

of neighbours to skywires must always be a factor! The three fan wires continue vertically downwards to become three of the five wires in the "steeple", and the 110ft horizontal feed wire was a part of the original end-fed antenna and is a length of 16swg hard-drawn copper.

Two spreaders are needed, one for the "steeple" and one for the top-loading section. The prototype antenna used a pair of 2m-long 0.75in diameter white plastic pipes as used by plumbers. These are very light in weight and add little to the total weight of the antenna—this is considerable, there being about 445ft of wire altogether in the vertical and loading sections, plus the length of feed wire. Sturdy end supports are needed for this antenna. The ends of the vertical wires connect to earth rods which may be positioned in one of many possible forms, as was outlined earlier. My present "steeple" antenna has them in a "U" configuration. These rods are interconnected and also joined to about 20 buried radial wires which vary in length from about 40 to 100ft. Additionally, the rods connect back to the station earthing arrangements which include a well, other earth rods, counterpoise wires in hedges and several earth mats made from 10m lengths of 1m wide "chicken wire" [6]. A low-reading resistance meter can be used to measure the ohmic resistance between the shack end of the 110ft feed wire and the station earth system; it should be very low indeed and certainly not more than from 0.2 to 0.5Ω. The importance of a good earth system cannot be overstressed, for the total transmitter output power is dissipated across a "resistance" made up from the antenna radiation resistance, the system ohmic and the ground resistance all in series. If the radiation resistance were to be equal to the sum of the ohmic and ground resistances, then half the power would be lost. We cannot change the radiation resistance (about 10Ω for a top-loaded vertical 50ft long) but we can work towards bringing down the other resistances; especially the ground resistance. A couple of earth spikes or a connection to a cold water pipe will not be enough for high efficiency, and most successful 1.8MHz workers spend time and money each year in the improvement of their ground systems.

(Continued on page 575)

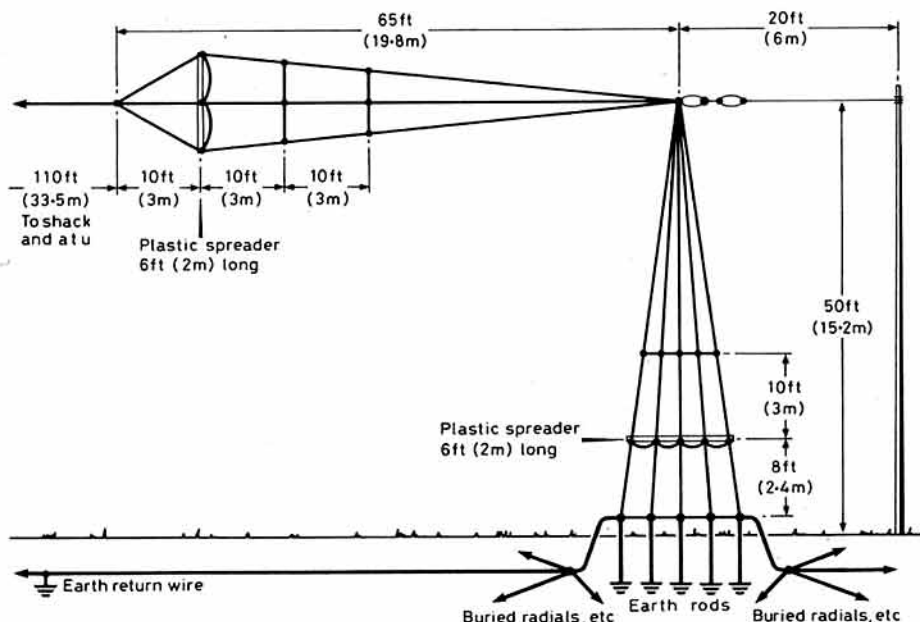


Fig 5. Details of the top-loaded, grounded "steeple" antenna. Many more buried radials etc were used than the diagram suggests, and a good low-resistance earthing system is the key to high efficiency with this antenna

# Technical Topics

by Pat Hawker, G3VA

TRADITIONALLY, it has always been a feature of the UK amateur radio scene that much has been left to "self-regulation" brought about largely by the recommendations of the "national society" (ie RSGB) and a sense of responsibility on the part of licence holders. I recall, in the late 'forties, being one of those involved in drawing up the first RSGB "band plan" (hf only) designed to separate the a.m. sheep from the cw goats (or should it be vice versa?).

In those days the IARU (founded in 1925) was, to put it frankly, an almost moribund organization which, in the late 'twenties, had been rescued from complete oblivion by the ARRL and changed from being an "individual membership" society into a loose confederation of "national societies". It served mainly to give an international look to one or two pages each month in *QST* but did, at least, also publish a regular newsletter (IARU Calendar) that served to keep societies in touch with one another.

It was the setting up of the Region 1 Bureau in the early 'fifties that heralded a serious attempt to harmonize the "self-regulatory" activities of the fast-growing number of European amateurs. What had been the RSGB band plan became, with minor adjustments, the IARU band plan, later extended to cover vhf and uhf, including fm channelling, repeaters etc. IARU has also become involved in contests and the even more controversial "squares" debate.

This is fine in many ways, but it has left some Region 1 amateurs with the feeling that decisions that directly affect them are made by committees and delegates over which or whom they have little or no influence. In the jargon, there is little or no democratic "accountability" to individual members. There appears to be no way in which an individual can input and promote his or her views directly to the IARU unless these views have already been fully endorsed by the national society. Even in the well-known case of the separate or combined field days it has not proved possible for the RSGB to reverse completely an IARU recommendation that was endorsed primarily by delegates from countries that had never been closely involved with NFD.

What has this to do with technical topics you may be asking? The answer is that, for example, band planning can have very important technical consequences in encouraging or, alternatively, inhibiting technical developments. Take for example the IARU recommendation, in force now for several years, that no speech transmissions should be made in the 10-1MHz band.

## Are we using 10-1MHz fairly?

As a 99 per cent cw-only operator I initially liked the idea that this narrow, 50kHz band should be reserved for telegraphy only, at least until the many point-to-point and other commercial stations move out in the fullness of time. But the lamentably low level of activity on what should be a most interesting and valuable allocation suggests that it is more than time that we pay attention to the seemingly-valid technical arguments in favour of ssb activity in part of the band. These have been repeatedly raised by Les Moxon, G6XN, and a few others over several years, but which somehow never seem to appear in print. Only recently, IARU headquarters declined to circulate to the member-societies G6XN's carefully considered views on the grounds that they can do this only when such views have already been fully endorsed by the national society. This is rather like saying that in an election only the governing body should be allowed to try and influence the voters!

I understand that RSGB committees are seriously considering G6XN's views, but it is surely important that these are understood by amateurs who still have the final say in whether they accept or reject those IARU recommendations that are not endorsed and made mandatory by their own licensing authorities. Decisions need to be made on the basis of a fully informed public opinion.

To summarize a few of G6XN's technical arguments:

**Propagation:** 10MHz is a part of the spectrum where long-path chordal-hop propagation is of particular interest and importance (see *TT* September 1979 and *Telecommunication Journal*, Vol 46, V1/1979, pp 320-7).

The intelligent use of ssb for long-haul dx contacts could do much to augment the contribution already made by amateurs to the initial recognition (by VK3AHH/DL3EC) of the extent of chordal-hop

## COMMENTS ON THE 10MHz BAND BY THE RSGB SECRETARY

The 10MHz amateur band is the smallest of all of our allocations, being only 50kHz wide. The band is shared with other services, and in consequence the amateur service has secondary status. The 10MHz band is one which exhibits some interesting propagation characteristics, and is a band which undoubtedly the amateur service would wish to keep on a permanent basis.

Because of the narrowness of the 10MHz band, the International Amateur Radio Union has considered it sensible to recommend that national amateur radio societies seek voluntary agreements for amateurs to use only narrowband modes; firstly, to reduce the likelihood of interference to primary users, and secondly, so that more amateurs can use the limited space available. In addition, award hunting, such as for DXCC, and contests have not been considered appropriate on this band.

The above illustrates the concern which is shared among the majority of the world's 124 national societies that the amateur service should not run into any difficulties on this band which could jeopardise its future.

Though the policy to encourage only narrowband modes remains a firm conviction at this time, currently each of the three regions of the IARU has been asked, through their national societies, to review this policy. In November 1985, Region 3 reviewed the present policy at its Auckland Conference. In October this year, Region 2 will have an opportunity to discuss the 10MHz band at its conference in Buenos Aires. It will be the turn of Region 1 to examine its policy towards the 10MHz band at its conference in the Netherlands in April 1987. In the UK such policy is co-ordinated on behalf of the Society's Council by the IARU Committee which would value any input from members on this subject.

When each of the three regions of the IARU have had an opportunity to consider their views, these will be presented to the IARU Administrative Council for further consideration in the light of all the factors and information which it has available.

G3OUF

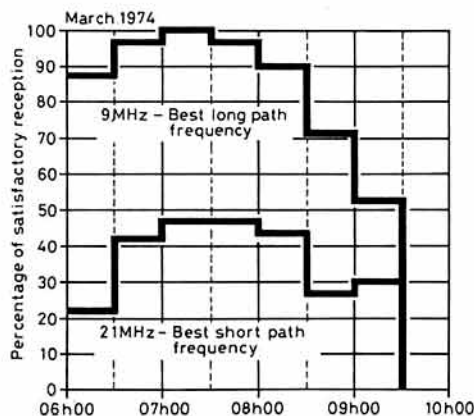


Fig 1. Percentage of satisfactory reception of German (Deutsche Welle) broadcast transmissions in Australia during March 1974 (sunspot-minimum period), showing the marked superiority of the 9MHz long path over the 21MHz short-path route (*Telecommunication Journal*)

propagation at dawn and dusk periods. By force of the large number and variety of locations, amateurs are uniquely placed for contributing to the better understanding of this mode. At sunspot-minimum periods, 10MHz replaces the 14MHz band as the most consistent band for chordal-hop contacts to Australia and New Zealand with relatively modest antennas: Fig 1 relates to high-power broadcasting but underlines the value of 10MHz. A large number of amateurs well qualified to investigate long-distance propagation are undoubtedly discouraged from doing so on this band because of the no-telephony recommendations and consequent lack of activity. As a cw enthusiast, I recognize that not everybody shares this view.

**Innovation:** G6XN argues persuasively that the very narrowness of the 10-14MHz band constitutes a major challenge to developing new techniques that would reduce mutual interference between cw and ssb signals sharing the same channels; for example, using improved narrow-band audio filters for cw reception and improved, tunable and very deep notch filters for ssb reception. For many years it has been claimed by some amateurs that, with suitable filtering, cw signals, with their high average output power, can be copied effectively within the sideband region of even high-power broadcast transmissions. Mutual interference can also be further reduced by the use of directional antennas, by such techniques as radiated power control (rpc) etc. To the experienced cw operator, rtty is often a much more potent source of interference than ssb! For the commercial stations still legally entitled to use the band as primary users, the higher average power of a cw transmission can be more bothersome than ssb.

G6XN has obtained from Dr David Tong of Datong Electronics agreement that, with more suitable filtering, ssb and cw modes could co-exist reasonably happily, although this would place severe constraints on receiver linearity if the full benefits of af filtering are to be gained. Because the average power of a cw signal is higher than for nominally more powerful ssb transmission, the linearity requirements to avoid blocking etc by cw signals can be rigorous.

This is not to suggest that, generally speaking, separation of cw and ssb is not a good thing, but it seems tragic that because of the current IARU recommendations, 10MHz is so under-utilized that it is not even attractive to cw operators when, by making use of technological developments, some of the band could be shared, with the consequence that many more people would make the effort to come on the band. Equally important is that the IARU should be seen to be acting fairly towards *all* licensed amateurs so that its recommendations retain credibility.

## The ill amplifiers are prone to

The essential ability of thermionic or semiconductor devices to amplify the voltage, current or power of an input signal has, unfortunately, to be qualified by the ever-present problem of potential instability. Basically, an amplifier is always liable to turn itself into an oscillator due to positive feedback from output to input in the presence of near-resonances in both circuits.

The classic "tuned plate tuned grid" (tptg) form of oscillator has been recognized since the earliest days of valve amplification at rf. Initially, with

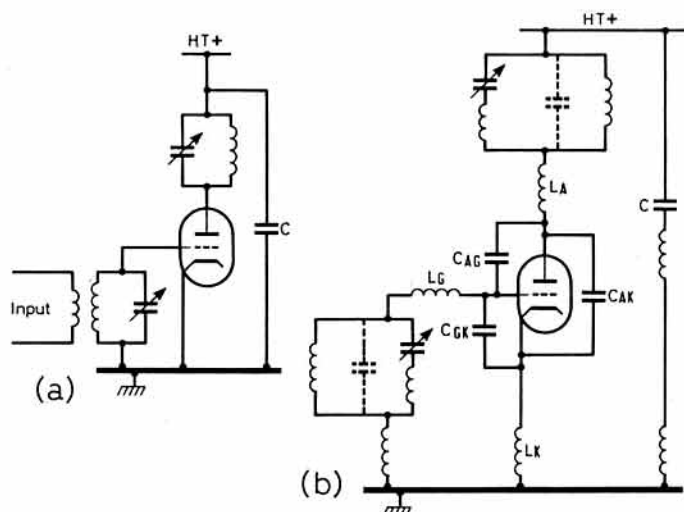


Fig 2. (a) The basic rf amplifier is also in effect a tuned-plate tuned-grid oscillator unless the two tuned circuits are not coupled either inductively or capacitively with positive feedback. (b) The problem is made complex by the presence of stray capacitances and inductances that may also result in parasitic resonances at vhf. This is how the circuit of (a) appears at high or very high frequencies

triode-only devices available, it was countered by the process of neutralization; that is to say, by carefully arranging for an equivalent amount of negative feedback (ie 180° out of phase with the positive feedback), or by reducing inductive feedback by careful physical layout of the components and the use of shielding between input and output tuned circuits, and later by the introduction of tetrode (with effective screen bypassing to earth) and pentode valves to reduce the effect of the feedback-producing inter-electrode capacitances.

But tptg oscillation arises not only from the deliberate resonances of the tuned input and output circuits of an rf power amplifier. The problem also manifests itself in the form of "parasitic" oscillation, usually at vhf but also (particularly in the case of transistor power amplifiers) at very low frequencies, arising from the stray capacitances and inductances as in Fig 2(b).

Spurious tptg oscillation of this type can shorten the life of valves and occasionally destroy them; in the case of transistors an unwanted oscillation can be immediately destructive; it is particularly important in the case of a vmos power fet that the device should not go into strong self-oscillation, or instant destruction of an expensive device is likely to ensue. With valve amplifiers, parasitic oscillation may continue over a long period without necessarily being detected other than in the form of low efficiency, possible rfi problems, sparking over of high-voltage tank capacitors even when the amplifier is fully loaded, and burning up of the resistors, with a few turns of wire wound round them, used as parasitic suppressors.

More serious is that modern high-power (and high-cost) valves *can* be destroyed by parasitic oscillation along with a number of the associated components, in the form of inter-electrode short-circuits, flash-overs etc, together with bypass capacitors, zener bias diodes, tank-circuit switches, meter movements, filament transformers etc.

The unwanted (and often unsuspected) resonances in the input and output circuits are most likely to cause tptg oscillation when they are close to but not exactly on the same frequency. Even short lengths of straight wire leads have appreciable inductance at vhf/uhf and can result in parasitic oscillation. The purpose of parasitic suppressors is usually to provide additional, heavily damped, inductance. The smell of burning from a parasitic suppressor resistor is an infallible sign that despite its presence there is a vhf parasitic.

The following notes on the problems of valve amplifiers at hf and vhf are taken from P R Keller's long-out-of-print *VHF Radio Manual* (1957) but basically the same problems are found in solidstate amplifiers:

"As the operating frequency of an amplifier is raised the following effects become important:

- The input resistance of the valve falls, damping the grid circuit, and reducing the effective anode load of the preceding stage. Increased driving power is required.
- The small capacitances between valve electrodes can no longer be ignored, and give rise to undesirable effects, such as oscillation.
- The transit time for electrons to pass between the cathode and anode becomes an appreciable fraction of the time for a cycle and gives rise to increased losses.
- The inductance of internal connections, and external point-to-point wiring, has appreciable reactance.
- The self-inductance of capacitors used for tuning and decoupling must be considered when choosing components.
- The values of the inductors and capacitors in the tuned circuits become increasingly small and, at the higher frequencies, are difficult to achieve (in conventional LC form).

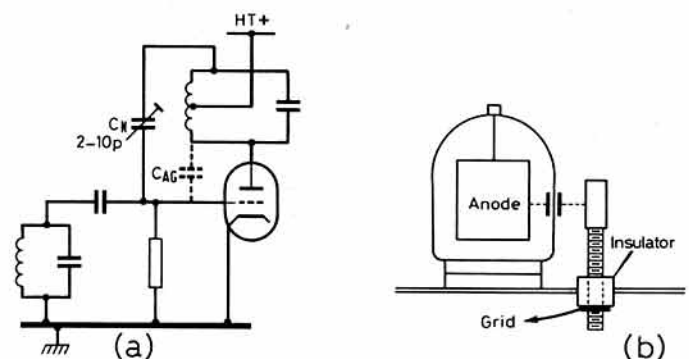


Fig 3. (a) The basic form of neutralizing the anode-to-grid inter-electrode capacitance by providing a balancing out-of-phase feedback path. (b) With the low inter-electrode capacitance of valves intended for use at vhf, only a very small neutralizing capacitance is needed. This is one method of providing the high-voltage low-value capacitor



(g) At very high frequencies, the current in a conductor tends to flow only in the layers of the conductor close to the surface, a phenomenon known as skin effect. The effective resistance of conductors is thus increased so that circuit losses are higher. The depth of penetration of the current in a copper conductor at 100MHz is only a quarter of a thousandth of an inch, and most of the current flows in this shell so that circuit elements for vhf are often made of copper tube or strip and may be silver-plated and polished to give minimum losses.

"Triode valves in grounded-cathode circuits always require neutralising at radio frequencies: Fig 3(a). The grid-anode capacitance of a tetrode or pentode valve is lower, and these valves may often be used up to vhf without neutralising; the frequency limit, above which the valve must be neutralised, varies with individual valves and depends on the circuit application. . . . The anode-grid capacitance of a low-power tetrode valve is only a fraction of a picofarad . . . one method of obtaining the required capacitance is shown in Fig 3(b). Some twin-tetrode vhf valves include neutralising capacitances inside the valve envelope for push-pull configurations. Some types of twin-tetrode valve include the screen-decoupling capacitor inside the valve envelope. For optimum screen decoupling it is frequently better to use a small capacitor forming a low-impedance, series-resonant circuit with the screen-grid lead inductance, rather than to use a larger capacitor."

## Parasitics and grounded-grid amplifiers

While grounded-cathode and common-emitter amplifiers have a 180° phase shift between input and output signals leading to positive feedback via the internal capacitances, the popular high-power zero-bias grounded-grid amplifier has zero phase shift and theoretically is an unconditionally stable amplifier not requiring neutralization. Unfortunately, this does not mean that in practice such amplifiers, even commercially available designs, are free from parasitic oscillation which can, if undetected, shorten the life of such high-cost valves as the 3-500Z, 8873, 8874, 8875 etc.

Richard Measures, AG6K, in "Grounded-grid amplifier parasitics—simple cure extends amplifier life" (*Ham Radio* April 1986, pp31-4) recounts some unfortunate experiences with his kit-built high-power hf linear using a pair of 3-500Z valves in grounded-grid configuration.

Over several years he noted a tendency for his tank capacitor to arc over occasionally and for the parasitic suppressor resistor to overheat. Then, shortly after fitting a new pair of valves, a grid-to-ground choke and a 200pF grid-to-ground capacitor exploded with the noise of a rifle shot. He learned that other users of grounded-grid amplifiers had suffered similar experiences, sometimes afterwards finding a valve ruined with a permanent grid-to-filament short-circuit.

He soon realized that the problem arises from vhf parasitic oscillation and that this stemmed from the combined effect of the grid structure inductance, inter-electrode capacitances, lead inductance etc. These created a resonant circuit connected, in effect, between grid and earth, even though the grid sockets appeared to be effectively bypassed to earth. Where a similar resonance occurs in the tank circuit there will be the 180° phase shift needed to form a triode oscillator even though the main signal path shows no such phase shift. He suggests that in some conditions it is possible for the second resonance alternatively to be in the input circuit of the grounded-grid amplifier.

He believes that this problem is inherent in all grounded-grid amplifiers, and he discovered that Collins ran into the problem many years ago with their 30L-1 linear amplifier using the 811A valve. They solved the problem by adding a resistor shunted by a 200pF capacitor between grid and earth. The resistor lowered the Q of the unwanted resonance, and the series capacitor helped cancel some of the inductance of the grid structure, so raising the natural resonance of the grid. Since then other equipment manufacturers have picked up this technique but without realizing that the capacitor to earth was not functioning as a simple decoupling bypass

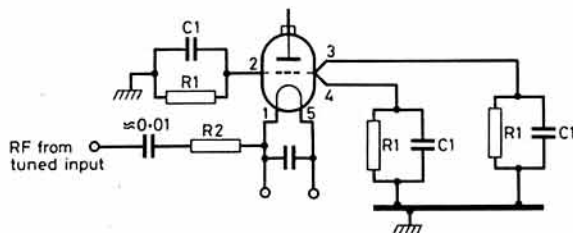


Fig 4. AG6K's grid and cathode modifications to reduce the tendency of hf grounded-grid amplifiers to parasitic oscillation at vhf. R1: 75 to 100Ω, 1 or 2W, non-inductive. R2: three 10Ω 2W non-inductive resistors in parallel; for two valves in parallel use three 10Ω resistors; for a single valve use three 20Ω, 1W resistors. C1: 47 to 75pF, 500V disc ceramic capacitors

arrangement. The result has been a tendency to increase the value of the capacitor in the belief that the bigger the better. For instance, in AG6K's amplifier instead of 200pF, as used by Collins, the total value of the capacitors from the three grid pins of the 3-500Z was 600pF from the three 200pF capacitors.

He recommends the arrangement shown in Fig 4 in which, as a further precaution found necessary primarily for the higher gain of valves when first purchased, he fits a non-inductive resistor in the cathode drive circuit to provide some degeneration even though this means that the amplifier must be driven slightly harder (no problem if the linear is being driven from a typical 100W transceiver).

The 3-500Z is a directly-heated valve, but the technique can also be applied to indirectly heated valves such as the 8877 with the degenerative resistor in the cathode lead. An rf negative-feedback cathode resistor is also useful in grid-driven linear amplifiers since it reduces intermodulation distortion (imd) products.

This is a short summary of a long article that goes into the question of parasitic problems in some detail.

## Instability in solidstate power amplifiers

Despite steady improvements in bipolar and mosfet rf power devices, it remains easy to destroy devices during the building, adjustment and operation of amplifiers based on rf power transistors operating near their maximum ratings. This has led to development of various forms of protection circuits, but the basic problem arises to a considerable degree from the various forms of instability to which such amplifiers are prone. Parasitic oscillation can be defined as any undesired frequencies in the

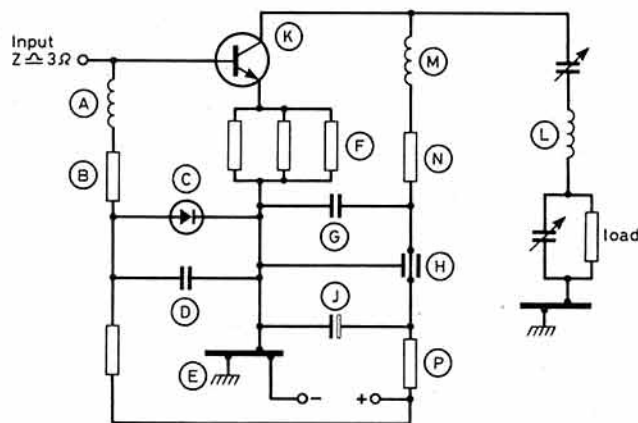


Fig 5. W4ATE's suggested safeguards for a typical medium-power bipolar transistor amplifier.

- A. RFC must be low-Q (high Q causes i.f. oscillation).
- B. Resistor lowers Q of rfc (typically 100Ω).
- C. Bias stabilization diode.
- D. Diode bypass (0.001μF).
- E. Group all earth leads near emitter earth connection using short leads.
- F. Low emitter resistor helps prevent secondary breakdown.
- G. 0.001μF button vhf type.
- H. 0.1μF feedthrough capacitor (hf bypass).
- J. 10μF tantalum af by-pass capacitor.
- K. High-level harmonics are generated due to non-linear characteristics of the transistor plus large dynamic voltage and current swings.
- L. Network for load matching and reduction of harmonics.
- M. RFC tunes out reactive component of admittance.
- N. Low-value resistor lowers Q of the self-resonance of the rfc.
- P. Decoupling resistor, typically 12Ω.

The heavy peak currents and low impedances should be reflected in the use of heavy gauge conductors and high-value capacitors with the tank coil carrying both rf and dc current.

"Mode jumping" in linear amplifiers is generally due to a tuned tank circuit having a different resonant frequency for a strong drive signal than for a weak one. This presents problems with the peaky nature of an ssb drive signal. Precautions include carefully choosing bias values, correct grounding, and using only transistors with low values of parasitic capacitance and inductance.

Make sure there is sufficient drive. Use triple bypassing for af, hf and vhf signal components; electrolytic capacitors for af bypassing should preferably be of the heavier tantalum type; i.f. bypass capacitors can be ceramic feedthrough or (second choice) disc ceramic types; vhf bypass capacitors should be silvered-mica button types with shortest possible leads.

The biasing circuit uses a stud-type silicon power diode bolted to the same heatsink as the rf power transistor(s) as near as possible to the transistor or between a pair of transistors. Any increased heat then lowers the diode resistance, thus helping to maintain a safe dissipation level in the transistor(s). A temperature-sensitive diode can be selected using an ohmmeter and soldering iron: measure the drop in diode forward resistance after touching the hot iron to the stud for a given number of seconds, selecting the diode with the fastest thermal response.

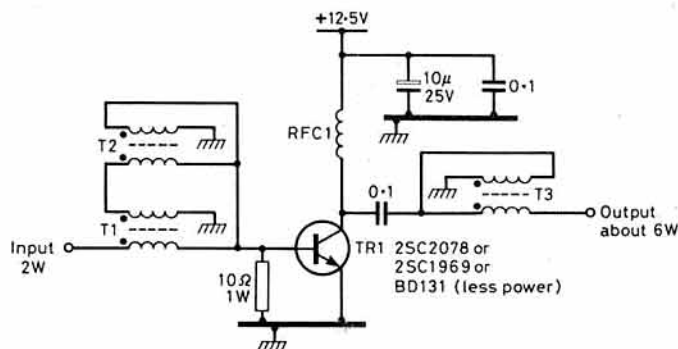


Fig 6. A useful arrangement for a single-ended wideband solidstate amplifier capable of providing about 4-6W output when driven from a 2W QRP rig. From *Solidstate Design for Radio Amateurs* (p61) with component suggestions from Stephen Ortmayer, G4RAW, who finds an amplifier with 10W dc input a great help to his home-built 3.5MHz d-c transceiver in poor conditions. RFC1 is a 25μH choke capable of passing 1A. T1, T2 and T3 have seven bifilar turns of two twisted pairs of No 26 enamel wire on Amidon FT37-61 toroid cores

output not harmonically related to the input frequency. Unlike valve amplifiers this often includes sub-harmonics; transistor amplifier "parasitics" can thus range from a few hundred kilohertz to hundreds of megahertz, and may be short-lived or self-sustaining.

Parasitics seldom appear when an amplifier is precisely tuned, but rather when some change or adjustment is made. The degree of detuning can vary between wide limits. A particularly serious form of parasitic can occur when there is a variation of the load impedance which can result in virtually instant destruction of the device. It is also possible to destroy an unprotected transistor during the tuning up of an amplifier.

A Class C transistor stage, when dc current is flowing, becomes in effect a Class A amplifier superimposed on a Class C stage; it can then be prone to both the linear instabilities of a Class A amplifier and to various non-linear parametric instabilities in its Class C role. The major causes of Class A linear instabilities were defined many years ago as: (a) low-frequency oscillations produced by thermal feedback effects; (b) oscillations due to internal feedback in the device; (c) negative resistance and conductance instabilities due to transit-time effects, avalanche multiplication etc; and (d) oscillations due to external feedback, such as insufficient decoupling of the dc supply. Non-linear instabilities include parametric generation of harmonics and sub-harmonics. The tendency of transistor power amplifiers to burst into destructive self-oscillation at low frequencies has been called the "count-down" effect.

Fig 5 shows some useful safeguards applied to a typical medium-power transistor amplifier as suggested a decade ago by Gene Brizendine, W4ATE. He also listed a number of precautions to be taken during initial tune-up of such amplifiers:

- (1) Always carry out initial checks with a low supply voltage and low drive, gradually increasing both together.
- (2) It may be advisable to connect temporarily a relatively inexpensive transistor in order to gain the "feel" of tuning-up before risking the use of an expensive device.

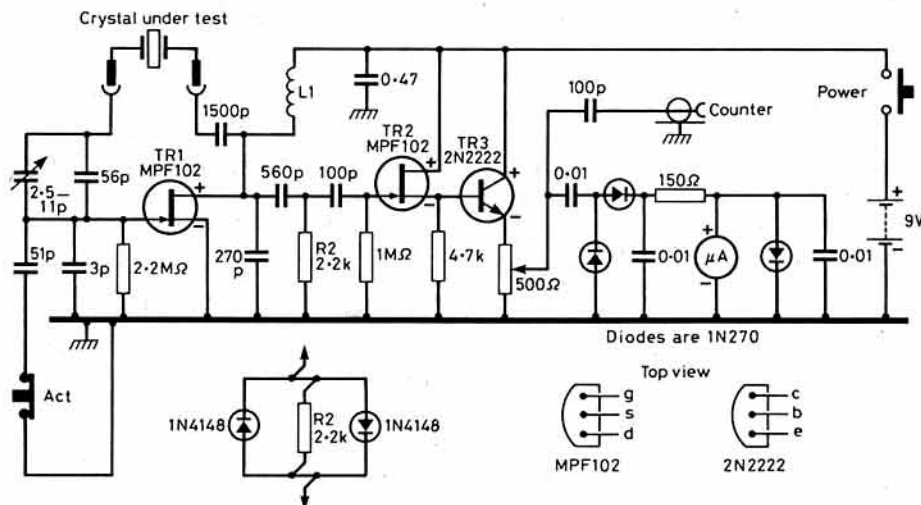


Fig 7. VE6RF's "universal" crystal oscillator (32pF load) used as a combined crystal checker/spotter etc. Diodes type 1N270 or similar except 1N4148 diodes, across R2 for increased harmonic generation. L1 is scramble wound on ferrite rod (Hammond No 1530 C102) 10μH. Resistance about 1,000Ω. Minimum current at 100kHz is about 6mA. Maximum current at 20MHz is between 14 and 22mA, depending on the gain of TR1. Frequency shift over a supply voltage range from 5 to 10V dc is less than 0.5ppm. Battery is 9V dc type Number 1604. Some waveform distortion takes place below about 3MHz. The Activate button is used to test and start third overtone crystals that may need more feedback to start. The fifth, seventh and ninth overtone crystals will probably not oscillate in this untuned circuit. Basic circuit (with C1 and C4 left out) is for a 32pF load. Meter can be up to 200μA full scale, though 50 or 100μA is preferred. Minimum and maximum currents are for the whole circuit. R2 with 1N4148 diodes for increased harmonic generation

(3) Degenerative (unbypassed) low-value emitter resistors offer useful protection during preliminary checks. Several 1W resistors in parallel present lower impedance than 0.5W types.

(4) Use generous heatsinking. During alignment it is worthwhile keeping a constant check on the temperature of the power transistor, using a finger, or a thermometer attached to the device with putty.

(5) Never operate a power transistor without a dummy load or matched antenna.

(6) Monitor collector current continuously; a climbing current is the earliest warning of junction heating. Remember that maximum rf current output does not occur exactly at the collector current dip.

A tunable rf indicator is useful since it is easy to tune an amplifier to an incorrect frequency and to check on spurious or harmonic output. Although harmonic output can be reduced by a high-C tank capacitor, nevertheless it must be recognized that the harmonic output of transistor amplifiers tends to be significantly higher than from valve amplifiers. A good lowpass filter is therefore usually built into the amplifier.

Fig 6 shows a typical low-power transistor amplifier from the invaluable *Solid State Design for Radio Amateurs* by W7ZOI and W1FB (ARRL).

## Coaxial cable and contamination

In *Ham Radio* (October 1985) Joe Reisert, W1JR, wrote a detailed and useful article on coaxial cable, a subject well worth studying, particularly by vhf/uhf enthusiasts where a great deal of expensive rf can so easily be lost in relatively short lengths of cable—especially cheap cables or where some moisture has ingressed.

However, one piece of advice given by W1JR—that it is "penny-wise and pound-foolish" to opt for cables with "contaminating" jackets which use more plasticizer in the vinyl compound than non-contaminating cables—has been refuted by Ronald Steir, W9ICZ, a cable specialist (*HR* April 1986, p9). He suggests that insisting on non-contaminating cables, to avoid plasticizer migration, involves unnecessary expense. He does not believe that, in practice, plasticizer migration, either in exposed or buried environments, is ever likely to be the cause of increased attenuation. Invariably he finds the real cause is water or moisture getting into the cable, most commonly from inadequate sealing at the connector ends of the cable and/or cuts or pin holes caused by abrasion to the jacket.

## Omni Tek universal crystal oscillator/tester

Robert Fransen, VE6RF (*Ham Radio* April 1986, pp 38-40) provides details of a useful device he has developed for checking virtually all types of crystals over the range 100kHz to 20MHz without adjustment, displaying crystal activity on a meter, providing an output for use with a digital frequency meter, or as a calibration "marker".

VE6RF claims that few if any previous circuits will readily oscillate over a 200:1 range, and suggests that the key component is the 10mH choke (scramble-wound miniature coil on a ferrite core). Fig 7 provides details of his arrangement using a fet oscillator, fet buffer and bipolar emitter follower with dual output, but versions have been built by VE6RF using the 6BH6 valve. An "activator button" is included to provide extra feedback for starting sluggish third-overtone or low-activity crystals, though it should not be needed often. When used as a spotter, additional harmonic output can be obtained by connecting back-to-back diodes across R2. The diode across the 200μA meter is to limit the voltage across the meter to



about 300mV because of the high output of some lower-frequency crystals.

VE6RF notes the problem of checking crystals which are soldered on to printed boards and which can easily be destroyed in attempting to remove them. He recommends cutting the traces to the crystal instead, putting two No 18 sewing-machine needles (with the mounting shaft ground off) in the oscillator socket holes and then pressing them against the traces to the crystal still on the board. C13 can be omitted if you intend only to use plug-in crystals. If this is done the crystal sockets provide a convenient test point for the battery voltage.

### Crystal fundamentals up to vhf

Although monolithic bandpass crystal filters up to about 250MHz have been manufactured for several years, crystals based on mechanical lapping and polishing have been restricted to fundamental modes below about 25MHz (usually below about 15MHz) and overtone frequencies below about 150MHz.

Overtone oscillators should not be confused with harmonic oscillators: a crystal in overtone mode produces no output whatsoever at its fundamental frequency. The overtone oscillator is a very useful device but is less easily "pulled" than fundamental oscillators; this means that they do not make a good vxo or vcxo, are less easily frequency modulated, and filters made from them are more restricted in bandwidth.

Recently STC Components Ltd of Harlow have announced the successful development by their affiliated research company STL of a new process for manufacturing crystals (Fig 8) which operate in fundamental mode up to 75MHz, or in third-overtone mode up to over 200MHz. A 75MHz fundamental implies a crystal thickness of only 22microns.

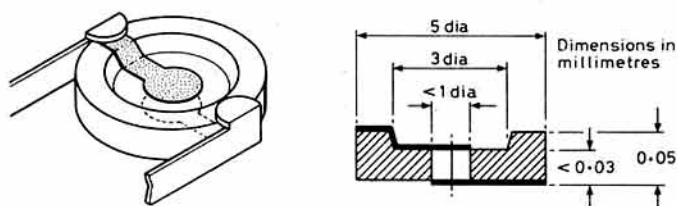


Fig 8. Structure of the new STC vhf crystals

STC believe that this represents an important breakthrough that opens the way to i.f. crystal filters up to 75MHz with low insertion losses, wider passbands and reduced spurious noise than previously possible. Used for oscillators, these crystals make possible temperature compensation at high frequencies, improved spectral purity, low esr (equivalent series resistance) and high pullability at high frequencies, while retaining an inherent temperature stability significantly greater than that of ceramic resonators etc.

During production up to 80µm of material is removed from mechanically prepared AT-cut quartz blanks. The process is based on the etching of quartz blanks in buffered hydrofluoric acid; the crystals retain the required mechanical strength by the use of selective etching of high-purity, high-Q "zero tunnel" synthetic quartz. Using the new processes, 5mm AT-cut quartz elements up to 75MHz mounted in HC45 holders and TO5 packages are now being produced. Work is in progress to develop plasma etching techniques which should make possible fundamental-mode crystals up to 150MHz.

This new range of SQX-3000 (SQX-3001 fundamental, SQX-3003 third overtone) crystals is, at least initially, geared more to commercial and military budgets than amateur radio applications, ranging in cost from about £17 up to over £100 each. But it is clearly an interesting and potentially very useful development.

### Polarization diversity at uhf

TT (November 1985, pp 866) noted how "multipath" propagation brought about by reflections leads to deep fades during mobile operation on vhf. This problem extends also to short-range communication using portable handheld equipment. Indeed, as noted in *Electronics Letters* 22 May 1986, pp609-10: "Radio transmission in the portable communications environment is plagued by deep rapid fading due to random handset orientation and multipath propagation". The problem can be particularly severe inside buildings, and for such applications as the use of radio microphones in lecture halls or television studios it has led to the common use of diversity reception.

In the USA, Bell Communications have been developing 816MHz portable/mobile systems that are required to be reliable and ubiquitous. Among the techniques that have been tried with considerable success is polarization diversity. In an *Electronics Letters* report, S A Bergmann

(State University of New Jersey) and H W Arnold (Bell Communications Research) note that: "Polarization diversity relies on the independence of signals received over two orthogonally-polarized antennas. Polarization diversity is both spectrally and spatially efficient. Frequency diversity requires the use of several frequencies, and space diversity antennas must be separated by at least one-quarter wavelength, while polarization diversity uses one frequency and the cross-polarized antennas can lie directly on top of one another."

Using a modified hand-held transceiver as a portable unit and a receiver with a dual-polarized microstrip patch antenna with approximately hemispherical coverage, the two outputs from the receiving antenna were fed to two spectrum analysers used as tunable receivers and the output sampled automatically every 2ms over a 20s period, with measurements made in both office and residential environments. The writers conclude that "Under non-line-of-sight conditions where deep fading occurs in portable communications environment, polarization diversity can be used to mitigate this signal impairment. In cases where there is a direct line-of-sight between transmitter and receiver, polarization diversity offers protection against random handset polarization." It is a further argument for the use of circular or mixed polarization on 144MHz and above.

American amateurs now have a frequency allocation at 902 to 928MHz, with an interim ARRL band plan providing segments for eme, digital communications, nbfm, fm repeaters, amateur television (a full 6MHz suitable for 525-line 60Hz transmissions to broadcast standards) and another 6MHz for wideband experimental systems including atv and spread spectrum. The band is shared with ism (industrial, scientific and medical) users, and there are restrictions in some states.

A move towards higher frequencies for mobile/portable operation may also come about as the result of the appearance on the market of models such as the Kenwood (Trio) TR-50 transceiver for the 1.3GHz band.

### Digital signal processing

TT (May 1985, pp359-60) described the developing use of digital signal processing (dsp) in hf communication receivers, including the first production model (Collins HF2050) as described at an IEE *HF communications systems conference*. It was already clear that professional designers were becoming anxious to take advantage of the flexible high-grade channel filtering under software control made possible by the advent of mass-produced general-purpose signal processing ic devices. It was also noted that the limited speed of current lsi devices restricts such processing to af or low i.f. signals so that the existing approach is to use a conventional analogue-type front-end and have the digital filtering at af or a lowish i.f. Again, device speed still limits the instantaneous, spurious-free dynamic range of the digital filter, and particularly the A/D conversion.

Despite the present limitations, the advantages of flexible software control, the repeatability and reproducibility of digital performance, reduced component count and smaller size arising from the use of large-scale integrated devices, and reduced manufacturing costs with more automated production etc are all encouraging British and American firms to press ahead with experimental dsp receivers.

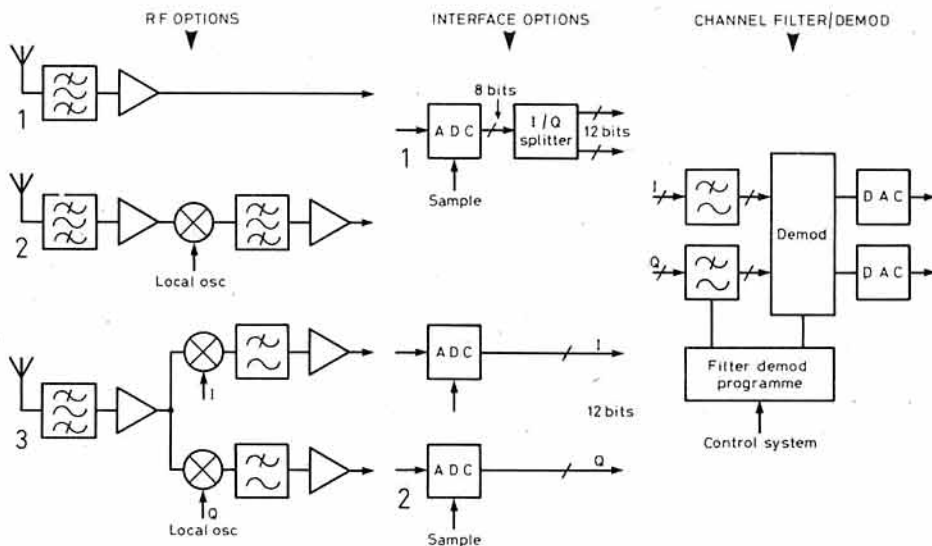
An article by A P Cheer of Plessey Electronic Systems Ltd in *PESL New Technology* No 2, Spring 1986 (brought to my attention by Alan Williams, G3KSU), describes the results obtained by modifying a high-grade Plessey PR2280 receiver to incorporate digital demodulation and digital filtering based on the Texas Instruments TMS32010 dsp ic. It also discusses the present options and architectures open to designers. The author leaves no doubt that he feels strongly that dsp will rapidly come into general use. He writes:

- (1) DSP has arrived and can displace analogue circuit designs.
- (2) DSP modules are smaller, cheaper and offer true modularity by software configuration.
- (3) DSP circuits will shortly outperform analogue counterparts.
- (4) Investment (by manufacturers) in dsp system elements is vital.
- (5) To compete in future equipment markets we (PESL) must offer the attribute of configuration flexibility.

The demonstration model, based on the PR2280, incorporates the rf Option 2 and interface Option 1 (Fig 9). The analogue circuitry is retained up to the final 1.4MHz i.f., and the interface was a cmos eight-bit flash converter sampled at 5.6M samples/s. The data is split into I and Q versions of a square-wave local oscillator at 1.4MHz. The 12-bit digital-to-analogue converters provide a 72dB range. Data reduction is accomplished using a unity-weighted f.i.r (finite impulse response) filter and decimation process by accumulating groups of 128 samples to reduce the data rate to 40kw/s but with an increased word accuracy of approximately 12 bits. Channel filtering uses a lowpass, 60-stage, fir filter, implemented on a TMS32010 in each I and Q path. The demodulator uses a third TMS32010. The software for each lowpass filter requires a main programme of 150 words of



Fig 9. The basic options for hybrid analogue/digital radio receivers. At the present state of the art only e/f/v/f receivers would use rf Option 1 with conversion to digital form at signal frequency. The interface options depend on whether division into quadrature (I,Q) signals is before or after digitalization of the i.f. signal. (Plessey New Technology)



assembled code, plus 30 words for a set of filter coefficients. To add a new filter bandwidth requires only 30 words of extra storage. For demodulation of cw, a.m., usb, lsb, isb and fm, the software totals only 530 words.

The entire digital section is implemented on two double Euro cards reduced to fit into the receiver module box. It replaces two similar-sized analogue demodulator boards plus a further large board containing five crystal filters for the various mode bandwidths.

A P Cheer concludes: "It is essential that we rapidly exploit the now clearly established advantages of dsp in future communication systems . . . we are already in a position to develop a cost-effective standard i.f. transceiver module. . . . But the real competitive edge will be achieved in the future with the realization of a full custom chipset which would give an ultimately lower unit price and increase the performance to a level where the complete all-digital transceiver system would become a reality."

Since amateurs seldom require such a large choice of bandwidths as the professionals, the advantages of dsp for this application are rather less evident—and the disadvantages remain. However, I would guess that dsp will soon prove irresistible to the Japanese amateur radio firms, if only as a marketing ploy. So we need to understand what digital receivers are all about.

## Tips and topics

The new high-dynamic range mixer with resonant-gate drive developed by Ed Oxner, KB6QJ (March *TT*, p187, with correction note in April *TT*) is fully described in a new 16-page publication by Siliconix *Designing a super-high dynamic range double-balanced mixer* including a data sheet for the Si8901 ring mixer ic and application note AN85-2 on the new mixer. This publication is now available from the Publicity Department, Siliconix Ltd, Morriston, Swansea SA6 6NE (tel (0792) 74681).

Dr Geoff Grayer, G3NAQ, noted the recent references in *TT* to the Conblock 6A three-pin mains plugs and sockets and adaptors, and admits that he uses this system for his hi-fi equipment. However, he is not in favour of introducing yet another "standard" plug because of the problems that arise when equipment is used away from the home location. The almost universal UK 13A plug has meant that we have at last almost got away from the old mixture of 2, 5 and 15A three round-pin connectors and all the various two-pin sockets found in a diminishing number of homes. The problem of multiple "standard" systems is well illustrated in the variety of coaxial sockets, audio and DIN sockets, standard and miniature mono and stereo jack plugs and sockets etc. With multiple mains standards a traveller needs to take along a formidable range of adapters, spare plugs etc. Writing from CERN, Geneva, G3NAQ adds: "The point I want to make is that the standard Swiss plug looks rather similar to the Conblock 6A system (*TT* March, p189) though slightly larger with 19mm rather than 16mm overall pin spacing, and has more substantial pins, being rated at 10A. By removal of the central earth pin (Heaven forbid that I should ever be guilty of doing such a thing!) it will fit the standard German and French two-pin sockets. Presumably because of its larger volume of production, it is substantially cheaper than the 'Con' 6A fittings. It would have been a simple matter to fabricate a lightweight compact distribution block based on the Swiss system, and this would have had a potential export market also. Perhaps an even more attractive alternative is the 'Europlug', fast becoming a standard on electronic equipment. This is almost identical in size to my

'Con' plug and also possesses an extended earth pin. It is similarly rated at 6A though having flat pins. Although I have met it only as a male chassis socket and female plug, I see no reason why the opposite should not be fabricated for the kind of applications for which the 'Con' block is intended. It seems a pity to introduce a connector with yet another set of dimensions."

John Bird, G3GIH, adds to the saga of low-cost open-wire feeder spreaders cut from plastic containers. For his, he uses containers for the farm spray Betanal used on weeds in sugar beet, but feels there must be similar plastic containers for domestic and garden applications. He uses a triangular three-wire feeder (permitting choice of element legs) and has no problem with twisting into the plane of the feeders; when used with two-wire feeders it might be necessary to clip some small squares of the material next to each spreader for restraint. The spreaders survive wind and weather well, and can be slid up and down the wire for adjustment. The material is easily marked out and then cut out with a Stanley trimming knife. The original Betanal containers were white but they now come also in blue and green. G3GIH strongly recommends using green spreaders and putting a coat of green paint on any alloy elements etc. Green is much more environmentally acceptable and relatively inconspicuous against a background of sky and trees; he bemoans the fact that so many feeder cables, multiway rotator cables and some domestic coaxial cables are bright white.

For non-readers of "Members Mailbag" and *TT* (May) a 1min club quiz: "In what mode does the power of the constant-frequency carrier vary with the modulation index?" Anyone answering "amplitude modulation" should be given a three-months sentence of cw-only. Those giving the correct answer "frequency modulation" should be asked to try and convince the others—they are likely to find this as difficult as convincing those who continue to argue that an a.m. carrier is constantly varying in amplitude! It is permissible to quote P R Keller in support: "Frequency modulation differs from amplitude modulation, where the carrier remains

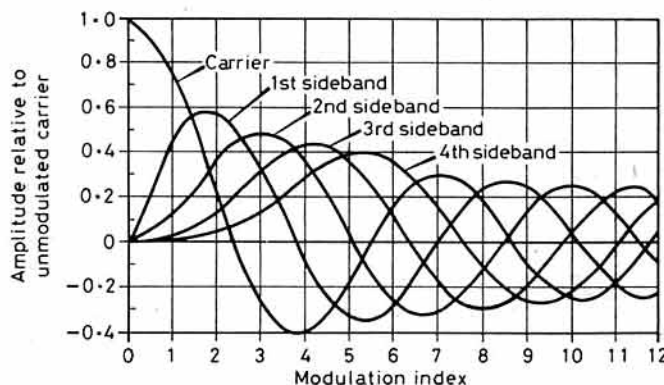


Fig 10. How the amplitude of the carrier and sidebands of a frequency-modulated wave varies with the modulation index (modulation index is the ratio of maximum frequency deviation divided by maximum audio frequency). Note that there will be some power in fifth, sixth, seventh etc sidebands not shown

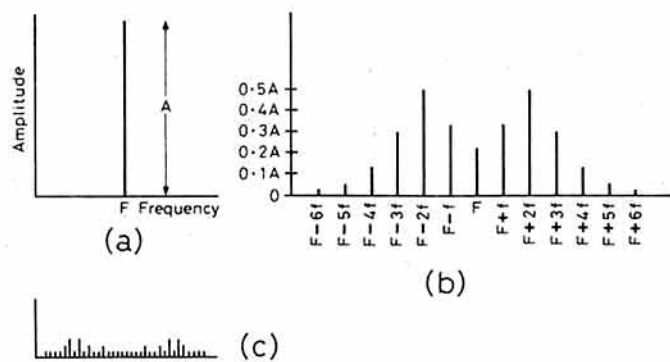


Fig 11. Frequency-modulation sideband spectrum. (a) Unmodulated carrier wave. (b) Carrier frequency modulated with a single audio tone (F carrier frequency, f audio frequency) with a modulation index of three. (c) Carrier frequency modulated with a single audio tone with a large modulation index

constant in amplitude and plays no part in transmitting intelligence, in that the amplitude of an fm carrier (and also that of its sidebands) varies with the modulation index. For certain values of modulation index the carrier disappears altogether. The values of modulation index for which the carrier is zero are approximately 2.40, 5.52, 8.65, 11.79 and thereafter at intervals of approximately  $3.14 (\pi)$ . Just as amateurs tend to be misled by those a.m. "envelopes", so in elementary terms we are led to believe that the

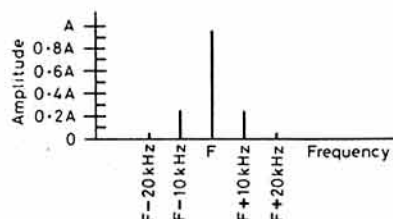


Fig 12. Narrowband frequency modulation using a modulation index of only 0.5 in order that the bandwidth is reduced to that required for a conventional a.m. signal. Diagram shows a carrier (F) modulated with a 10kHz tone with 5kHz deviation

carrier of an fm transmission is constantly varying in frequency at a steady power. One seldom associates fm with sideband theory but they are really there, extending the transmission bandwidth theoretically to infinity though in practice the power in the higher-order sidebands drops off rapidly, and we usually assume a bandwidth of twice the frequency deviation plus twice the maximum audio based frequency. With a.m. the total (envelope) power output of carrier plus sidebands increases with modulation, though the carrier is of constant amplitude, whereas with frequency modulation the total power output (carrier plus sidebands) remains constant, as does the carrier frequency. Believe it or not! A reminder that some of the basics of fm, though not its spectrum analysis, were described in 77 December 1985, pp939-40, under "The frequency-modulation paradox".

## THE GROUNDED TOP-LOADED STEEPLE

(Continued from page 568)

I have discovered that the soil in my garden does not seem to corrode aluminium, so that is the reason for a preference for that metal instead of the more usual copper. Aluminium nuts and bolts are used for the down-wire connections and these are liberally coated with a waterproofing such as silicone-rubber sealant. Care should be taken to prevent metal fatigue and wire snapping which is induced by the down wires swinging in windy conditions. To reduce such movement the plastic spreader may be anchored with a lightweight nylon cord.

### The antenna effectiveness

The antenna described will work on all bands, and it presents a low to medium impedance to the station atu. Many atus can only cope with wire impedances within the range 20 to 500Ω, so antenna lengths which result in very high impedance at the shack end cannot be matched properly. On the 3.5MHz band the "steeple" antenna has a considerable capacitive reactance which can be removed by the insertion of a 22μH inductance between the feed wire and the atu. On all the other bands my atu easily copes with the antenna impedance, and 1:1 swr readings between the atu and the transceiver are easily achieved. On the higher frequency bands (7, 14, 21 and 28MHz) the antenna tunes very flatly and a mid-band tune-up will suffice for any operations over those bands. Even on 1.8MHz a tune-up for unity swr on 1,840kHz can be left untouched when working  $\pm 30$ kHz to either side of this frequency, with swr readings rising to only 1:1.4. When on 1.8MHz, and assuming an antenna efficiency of 60 per cent (Fig 4(c)) there is a fall of only 2dB in radiated power from that of a full-sized vertical radiator over the same ground system. Such a quarterwave antenna would be 126ft high! When used on 1.8MHz the top loading section of the "steeple" antenna contributes little to the radiation for it is at high voltage, and the antenna current only starts to rise again well towards the shack along the 110ft feed wire. On 3.5MHz and the higher frequency bands there is some horizontally-polarized radiation from the antenna top in addition to the vertical component from the down wires. The antenna does not seem to exhibit any marked directional properties, and fine all-round coverage has been possible. Although on the higher frequency bands the vertical section of the antenna will radiate considerable power at high angles, the horizontal top radiates well enough to allow good reports from dx; often

reports on 21MHz have been better than those obtained by other British stations using beams. Amateurs whose chief interest lies in inter-G net working on 3.5 or 7MHz will not find the grounded "steeple" so effective as a low dipole or "G5RV" type antenna, but those who are interested in long-distance communication will be well satisfied!

Some excellent dx results have been gained on 1.8MHz during the quite short time the "steeple" was used and tested; most notable were three April contacts with ZL3GQ. In mid-April this station was contacted at around 1900gmt with 579 reports both ways. Much dx has been worked on the other bands, and the reports received have often bettered those received by stations employing rotary beams. The Papua New Guinea station P29PR returned to a "CQ" on a seemingly "dead" 7MHz band one evening in May, and in pile-ups or during contests my call sign is often the first to be heard through the QRM.

Smaller versions of this antenna may be tried by experimenters whose gardens cannot accommodate the full 180ft needed for a copy of the prototype. Shorter feedwire lengths will present different impedances at their ends, and in some cases it will be necessary to use either inductors or capacitors (or both!) externally to the normal station atu in order to achieve a good match on some bands. An approximation of the feed impedance can be gained by working back in half-waves from the ground connection. The low impedance at that point will be repeated at half-wave intervals, taking into consideration the effect of the top-loading section which will be electrically longer than its physical size.

The grounded "steeple" is really a derivation of the half delta antenna and I wonder now whether the half delta antenna itself is in fact no more than a top-loaded and top-fed grounded vertical, but cut to a length which gives a reasonable match to 50Ω coaxial cable on its fundamental frequency.

There is nothing new under the sun! A 1946 QSL card to a VU station sent by Reg Fox then operating AC4YN in Tibet reveals that Fox was using "... a grounded long wire". I also now feel less uneasy during thunderstorms, for there is no need to earth the antenna!

### References

- [1] "A grounded semi-vertical aerial for the lf bands", J D Heys, G3BDQ. *RSGB Bulletin* February 1964.
  - [2] "The half-delta loop", J S Belrose, VE2CV. *Ham Radio* May 1982.
  - [3] "The half-delta loop: A critical analysis and practical deployment", J S Belrose, VE2CV and Doug DeMaw, W1FB QST, September 1982.
  - [4] *Radio Antenna Engineering*, Edmund A Laport, (McGraw-Hill, 1952).
  - [5] "Short vertical antennas for the low bands", W J Byron, W7DHD. *Ham Radio* May 1983.
  - [6] "Earths, radials and counterpoise systems", J D Heys, G3BDQ. *Amateur Radio* August 1984.
- See also: "A multiband grounded antenna", J D Heys, G3BDQ. *Amateur Radio* February 1985.

# NEWS & VIEWS

## HF

*John Allaway, G3FKM\**

A PAPER presented to the recent IARU Region 1 HF Working Group makes interesting reading, and is apposite to some of the current operating habits. It is headed "Net Operation and Amateur Ethics" and goes as follows:

"The HFWG views with some concern the lack of amateur ethics prevalent in some of the present-day net operations, and therefore recommends that all Region 1 national societies make clear to their members:

- (1) No net or single operator has the exclusive right to a specific frequency unless carrying emergency traffic as defined in the "HF Emergency Operating Procedure".
- (2) In the event that a QSO is in progress on a so-called net frequency, the net must either wait until the QSO is terminated or alternatively establish the net elsewhere.
- (3) The net controller is responsible for ensuring that the net is conducted in an orderly manner with courtesy and consideration and does not disturb other traffic.
- (4) On no account, other than when carrying emergency traffic, may a net hold a frequency when there is no traffic to be passed.
- (5) All national societies are again requested to direct their efforts to a return on the bands to the amateur radio operators' code."

### Overseas news

SV1JG has kindly supplied me with a copy of a letter, sent by the Supervisor of Ministry of Transport & Communications in Athens to the Security Department on the island of Rhodes, which revokes the temporary operating licence granted to Franz Turek, DL7FT, to allow him to operate from Greek territory. In this he is alleged to have violated regulations by using a false callsign and saying that he was transmitting from Mt Athos, which is forbidden. He had said that he would be in Rhodes between 3 and 25 May, but it seems that he was not, and, in fact, SV1JG mentions that he was arrested on the island of Cos on 20 May.

On a much happier note is a letter from Tom Wong, VE7BC, in which he gives the good news that he has been appointed by the government of the Chinese Peoples' Republic as a member of the China Radio Sports Association in Beijing. The presentation was made during a banquet held in his honour. This is a very much deserved honour for Tom, who has done so much to bring about the appearance of amateur radio in China. In the letter he also says that he thinks that private stations may be allowed in five or so years' time.

G4NQL visited Hong Kong recently and attended the Hong Kong club meeting on 8 May when it was being addressed by Tom Wong on amateur radio in China. He said that there should be 11 club stations on the air by the end of 1986, all of them with operators who speak English. The long-term objective is to have a club station operating from every province. It seems that Tom is the only person to have a personal callsign, which is BX1BC. G4NQL would like to thank VS6AD and HARTS for making him so welcome.

G4ILW visited the High Speed Club meeting in Buedigen, near Frankfurt, at Easter. The meeting was attended by about 120 HSC members, including the presidents of VHSC, SHSC and EHSC. James was the first G station (and RSGB member) to visit the meeting, and to date is the only G who is a member of all four groups. He can provide information on all four clubs on receipt of an sae, he is QTHR.

Nick Langmead, G4OOE, is at present in Cyprus and has the callsign ZC4EE. He says that ZC4RSJ is a special event callsign to celebrate the silver jubilee of the Royal Signals ARS. It will be on the air from Dhekelia



A group of expert cw operators at the HSC meeting in Buedigen. (L to r) DK4KV, G4ILW, DL2FAK, PA0DIN, ON5ME, DF5DD and DL6MK

Sovereign Base Area until 31 December this year, with ssb, cw, and rtty on most of the hf bands. QSLs go to the address in "QTH Corner".

Maurice French, ZL2BNJ, should now be in Jeddah for a two-year period. He has written to the Saudi PTT and officials of HZ1AB and is hoping to obtain a licence.

A copy of *5B4 News 1985-86* was received recently. This is a brief account of happenings during the year in review in the amateur world of Cyprus. Many 5B4s took advantage of the opportunity to use the 5B25 prefix which marked the 25th anniversary of the establishment of the Cyprus Republic. Unfortunately plans for a special award did not come about, but 5B25 QSLs can of course be used in claims for the Cyprus Award. JOTA was a success, with 5B4CSA, 5B25ES/J, 5B4LSG and 5B4LSS all taking part—the last took place from the shack of 5B4GJ and attracted some 200 Scouts! Many 5B4s are now using rtty, and 5B4MD and 5B4OA were pioneers on Amtor—others now active include 5B4s OK, FN, OP and IT. 5B4s LP, MF and ES have been working through RS satellites, but there has not been too much activity on Oscar 10 although 5B4s KP, OA and HF are now on. 5B4s CV, HF, OA and MD use sstv occasionally, but OA and MD are only able to transmit letters as they have no cameras. Cyprus amateurs provided the communications network for the 1985 Cyprus Rally, and were active all along the course handling emergency messages. Lastly, visits from foreign amateurs, including A71AD, G3GIQ, SU1ER, OH8MA and SV5RW, are noted. A very creditable performance from a small society with about 450 members.



Terry, G3MHV/W6 at the home of Nami, JA6AV, in Fukuoka. Nami is a vice-president of the JARL.

\*10 Knightlow Road, Birmingham B17 8QB.



# K A B U L Y A 3 U U

## AFGHANISTAN

Receipt of a QSL doesn't always prove a contact with a particular country. Older readers will remember the series of rare dx calls which all had the 'UU' suffix—only the prefix varied at the whim of the operator!

### Welcome . . .

. . . to the following who became RSGB members during April and May: EA1ASA, EIs 2AVB, 2CT, 2EL, 2UXN, 4CP, 4CRB, 4CPB, 5FO, 6AS, 8AN, F2YT, F6BAG, IIRB, I2AGE, JA1FUY, KA5ZIA, K7RDH, KS2T, LA4YW, LA0EM, PA0JOP, VE3ID, VE6KT, VK2CFJ, VP9IM, VU2KZ, ZL2AK1, 6Y5SM and 9L1RH. New listener members are: M Kieffer Bruno (F), F Kazkaz (YK), M Yussof (V8) and R Aked (F).

### SSTV

Richard, G3WW, reports that TU2JJ, 3D6CA and EA9NP all appeared on the 14,230kHz sstv frequency in late May. EA5FIN is transmitting 92s single-frame colour with his modified SC-1, and G3OQD together with some DLs is transmitting 42s quasi-colour sstv with home-built crystal-controlled sstv converters. New European sstv stations are appearing weekly, and enthusiasts should watch 3,730 and 14,230kHz for developments.

### DX news

According to the *DX Bulletin* there may be two new stations on the air from Thailand by now. These will be HS0SM, located at the Science Museum, and HS0RS located at RAST HQ. Equipment for both has very largely been donated by Japanese amateurs. A new law was expected to come into effect on 27 July, and to be followed by a gradual return to normal licensing in the country. Fred Laun, who has in the past been HS1ABD, has now returned to Thailand to marry a Thai lady.

*DX News Sheet* reports information from AP2AD which suggests that AP0A, who asked for QSLs via W3LPL, may be a pirate. The same source says that a "Mozambique International Amateur Radio Association" has been formed and that its members go around wearing amateur radio t-shirts. I find this all rather hard to believe in view of the known attitude of the Mozambique administration to amateur radio at the present time, and would be very disappointed if it were true and could mean the discrediting of amateur radio in C9 for years to come.

FR5AI may return to Glorioso Is later in the year. He has been in France but was due to leave at the end of June.

There are no amateurs among the relief crew which took over on Marion Is recently, so ZS2M will not be active for another year.

The new Chinese station BY5QA is now on the air almost daily on 14MHz cw and ssb. It is located in Fuzhou. Dr Sid, ST2SA, has been active again between 14,180 and 14,250kHz, particularly after 1600, and the *Long Island DX Bulletin* says that 6T2BA and 6T2MG are on or near 14,220kHz from 2330 fairly often.

With effect from 1 July, calls in Belize were changed and now have the following significance: V31 indicates a Grade 1 licence, and V32 a Grade 2. The suffix will indicate areas, eg AA-BZ Corozal, CA-DZ Orange Walk, FA-KZ Belize, LA-MZ Stann Creek, NZ-OZ Cayo and PZ-QZ Toledo.

G4GED writes that Alan, T30AT, has been surprised by reports that "KS6DV/KH1" was active from Kanton Is. He has checked with the resident commercial operator on the island, who confirms that there is no amateur radio operator there and has not been since Alan's visit as T31AT in July 1985. In any case, any legitimate operator would use T31 and not KH1. The log-periodic antenna referred to was dismantled last year and all that is left is a broadband inverted-cone which T31AT used.



Mandy, G4WHV/KA6ZYF, visiting Father Jim, KP4CZ, at his mission in the centre of Puerto Rico

### Contests

#### European DX Contest

0000 9 August-2400 10 August (cw)  
0000 13 September-2400 14 September (phone)  
0000 8 November-2400 9 November (rtty)

3-5 to 28MHz. Single-operator multi-band and multi-operator single-transmitter categories only. The former may only operate for a maximum of 36h, and the 12h rest period may be taken in up to three parts and clearly marked in the log. Europeans work non-Europeans and each QSO counts one point—a station may be worked on each band for credit. Exchange RS/T plus serial QSO number (from 001), in addition USA stations will give their state. Multiplier is total DXCC countries and call areas in JA, PY, VE, VO, VK, ZL and ZS, as well as UA9/0 and each USA state worked on each band added together. Note that W/K call areas do not count as multipliers. The multiplier on 3-5MHz should be multiplied by four, on 7MHz by three, and on 14/21/28MHz by two. It is recommended that official DARC log sheets be used, and these may be obtained from WAEDC Manager, WAEDC Committee, Postbox 1328, Kaufbeuren, FR Germany, to whom a large envelope and ircs should be sent. Submit logs before 14 September for the cw section, 14 October for the phone section, and 14 December for the rtty event. Copies of the official rules (which also describe the "QTC" system for earning additional points) are available from G3FKM (sase please).

#### LZ DX Contest

0000 to 2400 2 September  
3,510-3,560, 7,000-7,040, 14,000-14,060, 21,000-21,080 and 28,010-28,200kHz cw only. Single-operator single- and multi-band and clubs (multi-op) as well as swl sections. Exchange RST plus ITU zone (UK is 27). QSOs with LZ count six points, with other stations in Europe one point and with others three points. Stations may be worked once per band. Multiplier is sum of ITU zones worked on each band. SWLs earn three points by logging both call signs and exchanges, and one for both call signs and one number. Submit separate log for each band and summary sheet showing zones worked on each band plus the usual declaration, and post within 30 days to: Central Radio Club, PO Box 830, Sofia 1000, Bulgaria. Logs may be used as applications for the NRB, W-100-LZ, 5-Band LZ, W-28Z/ITU, Black Sea and Sofia Awards.

G4YEK has kindly supplied a copy of the results of the **1985 Scandinavian Contest**. In the **single-operator cw** section G4UPS scored 49,500 points, G3ESF 33,400, G4IQM 24,035, G3DFV 10,720, G4IJW 10,184, G4OKN 4,806, G6NK 2,740 and G4ZUY 1,647 points. GM3SID with 16,425 and GW3HCL with 29,205 points, were the sole representatives of Scotland and Wales in the list. G4ELZ scored 20,240 points in the **multi-op** section. In the **phone** section G3VZT was top in the single-operator section with 24,910 points, followed by G4UPS with 17,136, G3SRT/P with 15,656, G4CHP with 16,848, G4IOM with 12,750, G4YEK 10,921, G4ZFE 8,379, G4XTM 945, G4ACY 592, G6NK 544, and G4JVG with 464. GM4WEW scored 3,690 in the same category, and G6OI 9,796 in the multi-operator section. Certificate winners are listed in bold type.

#### Howdy Days

1400 3 September to 0200 5 September  
This mid-week contest is for lady operators only, and copies of the rules are available from G3FKM (sase please).

#### All Asian DX Contest

0000 23 August to 2400 24 August  
CW section. Rules the same as for the phone section as given in the June issue. Copies of detailed rules, summary and log sheets are available from G3FKM (sase please).

#### SEANET Contest

0001 16 August to 2359 17 August  
SSB section. 1-8 to 28MHz. Single-operator single- and multi-band and multi-operator multi-band sections. Exchange RS plus serial QSO number (from 001). QSOs with DU, HS, YB, 9M, 9V and V8 count 20 points on 1-8MHz, 10 on 3-5 and 7MHz and four on 14, 21 and 28MHz. With stations in other SEANET

areas, QSOs count 10, 5 and 2 respectively. These other areas are A3, A5, AP, BV, BY, C21, FK, FR, FW, HL, H4, JA, JD, KA, KC6, KH2-KH0, KX6, P2, S2, S7, T2, T3, VK, VQ9, VS6, VU, XU, XV, XX, YJ, ZK, ZL, 3B6-3B9, 3D, 4S, 5W, 8Q, 9N and 129. The multiplier is three for each net country contacted. Entries must reach Cebu Amateur Radio League, PO Box 304, Cebu City, Philippines 6401, by 20 October.

Apologies to the **Aston University** club station **G30DA** which had its call sign printed as **G3UDA** in the results of the **1985 CQ WW WPX SSB Contest** (multi-operator single-transmitter section) in June HF.

The results of the **1985 CQ WW WPX Contest (CW section)** appeared in May *CQ Magazine*. UK scores are as follows:

Single-operator, single-transmitter					
Call sign	Band	Points	Call sign	Band	Points
G3FXB	All	2,357,043	G4CNY	21MHz	343,226
G3ESF	All	456,000	G6QQ	21MHz	1,798
GW3JI	All	333,960	G6NK	14MHz	21,105
GW3OKA	All	205,821	G3LZQ	7MHz	181,864
G4OKN	All	87,341	G3XTM	7MHz	45,980
G4BWP	All	24,360	G3XWZ/A	1-8MHz	8,736

In the **CW and SSB Club Contest** the E Anglian Contest Group scored 6,848,424 points, Lichfield ARS 4,511,430, and Reading RC 737,660. In the **QRP section** G3CWL/A scored 4,455 points on 14MHz and G3VMY 96,036 on 7MHz. In the **multi-operator, single-transmitter section** GB2MM was fifth in Europe with 3,542,175 points, and GB4OPE scored 1,412,218.

Apologies to G4XTM, whose call sign was given incorrectly as G4TXM in the **1985 CW WW WPX SSB Contest** results published in the June issue.

## 1986 28MHz COUNTRIES TABLE

G4JBR — 81	G4XAH — 56	G4DXW — 35
G3XQU — 79	G4MUW — 54	G3BXM — 26 (QRP)
G3VOF — 76	G4RAB — 54 (ssb)	5B4DN — 2
G0AEV — 66	G0DNV — 48	G4YWG — 1
G0AGP — 63		

## Awards

### Worked All Y2

For confirmed QSOs/listener reports with different districts of the German Democratic Republic. These are indicated by the last suffix letter and are: A, U, B, C, D, P, E, F, X, G, W, H, V, I, Q, J, Y, K, L, R, M, S, N, T and O. Class 1 needs 20 points in a minimum of 10 districts, Class 2 40 in 13, Class 3 75 in 15, and Class 4 120 in 15 districts. Each district counts one point per band. The same station on four or five bands counts as four or five bonus points respectively, but this only once per district and only for Classes 2, 3 or 4. Send certified list giving full details of QSOs (which must have all been made since 1 January 1980) plus 10 ircs (or two ircs for upgrading stickers) to Y2 QSL Award Bureau, 1055 Berlin, Box 30, German Democratic Republic.

### The FRO 40 Award

FRO celebrates its 40th anniversary this year and will be using a special event prefix. 7S1FRO will be on the air from 2 to 10 August, and the other HQ stations 7S2FRO, 7S3FRO, 7S4FRO, 7S5FRO, 7S6FRO, 7S7FRO and 7S0FRO have already been active in late May (it is not clear if the latter will be on again in August). All other FRO stations will be identifiable by their call signs—SL followed by a Z as the first suffix letter. The award will be available to all those who make confirmed QSOs (or have confirmed swl reports from) stations giving 40 points during the period 24 May to 31 December 1986. European stations get five points per a 7S QSL and one from other FRO cards. Send list of QSLs (checked by national awards manager) plus 10 ircs to SM5AHK, FRO, Riddargatan 13, S-114 51 Stockholm, Sweden.

### NARS AT 25 Award

The Nigerian ARS celebrates its silver jubilee this year, and this special award is being made to encourage the rest of the world to make more contacts with Nigeria. It is available to both licensed amateurs and listeners, and the requirement is to have worked or heard at least five Nigerian stations during 1986. Club stations worked or heard count as double. Apply to NARS-AT-25 Award Manager, PO Box 2873, Lagos, Nigeria, enclosing USA \$5.

### The 10th Asian Games Award

This is being issued by the Korean ARL in commemoration of the 10th Asian Games which will be held in Seoul in the autumn. Confirmed contacts or listener reports during the period 1 January to 5 October 1986 are required. For the Class HL it is necessary to work/hear at least 10 HL stations including at least one HL1 from Seoul. For the Class DX award confirmed QSOs or listener reports from at least 10 of the countries taking part in the event (including an HL) must be obtained. The special stations 6K8AG and HL86 (plus a suffix) will be active during the games, and their special QSLs will count for five QSOs or five countries whichever is appropriate. Send certified list before 20 September 1987 plus US\$4 or 10 ircs to KARL, CPO Box 162, Seoul 100, Korea. Countries participating include A4, A5, A6, A7, A9, AP, BY, DU, EP, HM, HS, HZ, JA, JT, JY, OD, S2, V8, VS6, VU, XV, XW, XZ, YA, YB, YI, YK, 4S, 4W, 70, 8Q, 9K, 9M, 9N, 9V and HL.

### Norfolk Broads Award

### Norfolk & Suffolk Award

### Worked British Fishing Ports Award

Sponsored by the Lowestoft ARC. Each costs £1 or 12 ircs. The first requires QSOs with stations where last letter of call signs spells the names Barton, Hickling, Hoverton, Malthouse, Oulton, Ranworth, Rockland, Salhouse, Sutton, Wroxham, Filby and South Walsham. Only calls from one country can be used for each name. Class 1 is stations from one country only, Class 2 at

## QTH CORNER

BY4RB PO Box 413, Zhen Jiang, PR China.  
C30CCA J Roscoe, G4OK, 27 Northfield, Bridgwater, Soms TA6 7HA.  
F08MM Box 89, Papeete, Tahiti, Fr Polynesia.  
SV5OX PO Box 157, Rhodes, Greece.  
SV1RP/SV7 SV1NA, 11 Vrettou St, GR-10445 Athens, Greece.  
V44KAR WB2LCH, PO Box 64, Gloucester, NJ, 08030, USA.  
VP2VCW N6CW, 4639 Katherine Place, La Mesa, Cal, 92041, USA.  
ZC4EE ZC4 QSL Bureau, JSB, BFPO 53.  
ZC4RSJ VE7AGC, 528 McMartin St, New Westminster, BC, V3M 4L1.  
ZF8DX TR0A, PO Box 1826, Libreville, Gabon.  
3C0A HK1QQ, H Olarte, Box 51378, Barranquilla, Colombia.  
5J1LR OE6LAG, Reihenhaustrasse 417, A-8662 Mitterdorf Muerztal, Austria.  
5N3BHF WB5VZL, 4132 Birch Cir, Temple, Texas, 76501, USA.  
5W1FS

least 50 per cent from one country, and Class 3 mixed. Details of the other two awards will be given at a future date. Applications go to G4KDL, 50 Kimberley Rd, Lowestoft, Suffolk NR33 0TZ.

## STARS Award

Issued by Stourbridge ARS, which celebrates its 50th anniversary this year. Five points are needed. There are no band or mode restrictions, and the requirement is that five members are worked, or alternatively one or both club stations—G6OI and G6SRS—which each count as two points, plus the remaining points from club members. QSOs via GB3OS or GB6OI count, but no other repeater contacts. Send log details plus £1.25 for the basic award. Endorsements for Silver (16 points) and Gold (24 points) cost £1 each. The starting date is 1 January 1985. Apply to John Sheils, 5 Ombersley Rd, Halesowen, W Midlands B63 4PJ.

## Band reports

Some confusion resulted from a transcription error in G8KG's report in June issue. The second paragraph should have read "The active region responsible for all of this was still present at reduced intensity in the next solar rotation and conditions again improved. In the period from 1 March to 12 April the 28MHz band was open to at least southern Africa and/or the Indian Ocean on 25 days and on 6 March it was open for several hours and to all continents except Oceania. This looked like a classic example of a major rise in F-layer muf's in the initial stages of an intense disturbance." In addition to this, please note that Cycle 11 began in 1867 and not 1876!

Great support this month in spite of the very early deadline, and many thanks to the following: G2HKU, G5JL, GM3CSM, G3s GVV, HCT, KSH, PJT, UKH, YRM, G4s EHQ, JBR, GW4KGR, G4s LRS, MUW, RFE, UOL, XAH, XKR, G0s AEV, AGP, DNV, and RSs 10906, 84869 and 88639.

Stations listed in italics were using A1A.

**3-5MHz** 0000 CT5AT, UP2BOA/UF. 0100 HB0/DA1WA, W1-W3, RT0U. 0400 LU2FFD, VE3BOT. 0500 KH5KIKP2, ZF9SV. 2100 YC6XE, ZS6WW. 2200 JG1FVZ/5N0.

**7MHz** 0000 AZ8DX, AZ8BQ. 0100 5J8LR. 0200 W3BTX/FS7, VP2VA, VP2VCW, ZF9SV. 0400 ZL3RPI/P, ZL4. 0500 T14BGA, VE7, VK2, VK3, W6TSQ, W7ZJ, ZL1OM, ZS2A. 0600 FO0XX, K8HVR/KP2, PJ2LS, VK2-VK5, VP2VCW, W7FU, XE2FLD, ZF8DX, 5J1LA. 2000 R08DX, SV1RP/SV7. 2100 C30CSA, HSOA, UP2NKIUF. 2200 H10JR, JW0A, NP4A, UA0YAG, VK6RZ, VP2VCW. 2300 V44KAR, VP2VA, 6Y6A.

**10MHz** 0500 K7JPF, K7OPU, W7EXR, W6EVL, VK2, VK3, ZL2ADX. 0600 K5AKI/KP2, VK2,3,5. 0700 OY7ML. 1800 W1,2. 1900 CT3DJ. 2000 JA5AUC, W1,2,3,8. 2100 KV4AM, P21DV. 2200 VE2, VE8HL.

**14MHz** 0000 A71BK, KD2HE/VP9, 4M4A. 0100 FM5WE, FG5DL/FS, GB0SWR/IM, VR6KY, 6Y6A, 8P9AR. 0200 J87BS, XE86ALH, 4A1HC. 0500 KH6, KL7, VE6, VE7, VU2BK, 9Y5FS. 0600 NL7G, VK6RU, 0700 JA, 5W1FS, 7X2CE. 0800 F08MM. 0900 SU1DO. 1100 VU2BK, 4U1VIC. 1200 W6GXF. 1500 JA (until 1800), VE2PAB/4U, 1600 HL1LU, HL5AP, HZ1HZ, KV4AM, UA0WCL, YU1RL/5B4. 1700 AP2MQ, JY3MC, 9M2CS. 1800 HSOA, VK2PP, VP2VCW, 5U7AL. 2000 HL1EJ, WC2E/KP4. 2100 OD5AS, TL8KH, W6-W7, 4V7PV. 2200 HL9OB, V44KI, VU2GI, XL7CC, 3G3C, 9K2SA. 2300 C6AAA, CE3BF, VK2WC, 9K2DZ.

**18MHz** 0800 Eu, DL, F, HB, OE, LA, SM, YU. 2300 LA, SM.

**21MHz** 1100 CQ2BOH, JG1K/ZI5N0. 1200 HL2AMO, YC0BAQ. 1600 4U0ITU. 1800 9L1SM. 1900 HZ1HZ. 2000 LU, ZP. 2100 CU2M. 2200 V44KAR, 8P9AR, 9H1EL.

**24MHz** 0800 F.

**28MHz** 0700 UM8MIG. 0900 A92EM, TK/DL4FF. 1000 VE1BNN. 1100 CN2AQ. 1500 EA9MM, OY9/D, TR8RAL, VU2DVP, ZS1DL, 3A2LF, VE2PAB/4U, 7X2VMK, JG1FVZ/5N0. 1600 CE3ES, CN2AQ, HV2VO, TA2G. 1700 CU3AU, HZ1HZ, ON7VD/5N6, 5B4JE, 6W1LL, 9J2BO. 1800 SU1HK, TA1E, TL8CK, U18QAJ, 9K2DZ. 1900 LU, PY, T7TC, TL8KH, 5N3BHF, 9N9GM. 2000 CE3AW, FY5BV. 2100 HK6BER, NP4C, T18ZB, 8P6OM. 2200 DL3ZM/YV5.

Thanks also to the following for information: *DX News Sheet* (G4DYO), *The Ex-G Radio Club Bulletin* (G13OEN/W6), *Long Skip* (VE3IPR), *Lynx DX Group Bulletin* (EA2JGO), *DX Family Newsletter* (JH1KRC), *DX'press* (PA3CXC), *CQ Magazine* (W1WY), *DXNL* (DL3RK), and the *Long Island DX Bulletin* (W2IYX).

Closing date for material for **October** is **28 August**.



# SWL

Bob Treacher, BRS32525\*

## Here and there

First, a second reminder that the QSL Bureau will be closed for the whole of August. G3DRN is taking a well-earned break. Please do not send any outgoing cards to the bureau until early September.

GW4OXB sent details of his International Listeners' Association. The idea being that listeners can exchange information and ideas. Aimed mainly at listeners who do not belong to other clubs or who live in remote areas, the association has 76 members and is affiliated to the RSGB as RS88763. Further information can be obtained from GW4OXB.

Angela Sitton, BRS88639, wrote for the first time. She lives in Stevenage and hopes to take the RAE along with her husband in December. She entered a table score and spends much of her listening time on 14MHz.

## HF news

At the time of writing, 28MHz continued to provide good short-skip conditions, and had provided a wonderful opportunity for listeners to add some of the rarer European countries to their all-time scores. Conditions on 30 May were particularly good, when much of Europe was audible. DL, LA, OE, SM and YU all being well represented; but in addition PA3DOT/EA6, IS0CDS, T77C, 3A2LF and 9H1EL were all good signals. DX logged included EA8, EA9, YV and 5B4. Other notable stations heard during other openings were GB00S (Housay Is, Outer Skerries—part of the Shetland group), TK5BF, EA6BE (Menorca), CN2AQ, EK9AD, SJ9WL and LG5LG (the small independent state of Morokuien between LA and SM.

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## 1986 UHF/VHF TABLE

(Updates only)									
Station	Loc	70MHz		144MHz		432MHz		Total	
		Squares	DXCC	Squares	DXCC	Squares	DXCC		
BRS32525	JO01	0	0	38	13	19	5	75	
BRS25429	IO93	0	0	45	14	10	3	72	
BRS52543	IO83	11	3	28	11	8	3	64	
BRS62088	JO01	0	0	11	5	2	1	19	

## 1985 REVISED FINAL UHF/VHF TABLE

Station	Loc	70MHz		144MHz		432MHz		Total
		Squares	DXCC	Squares	DXCC	Squares	DXCC	
BRS25429	IO93	0	0	108	22	84	20	234
BRS52543	IO83	22	6	96	23	52	18	217
BRS31976	JO01	7	2	105	27	0	0	141
BRS32525	JO01	0	0	95	25	13	4	137
FE8957	JN15	0	0	69	18	13	3	103
BRS62088	JO01	0	0	30	12	2	1	45
G6WDP/P	IN69	0	0	33	6	0	0	39

## 1986 HF COUNTRIES TABLE

Station	DXCC	(Updates and additions only)								Total
		28	21	14	7	3.5	1.8			
BRS32525	165	49	46	91	114	116	55			471
BRS1066	148	26	77	115	103	70	62			453
BRS52543	131	18	60	78	87	82	43			389
BRS88639	91	4	24	86	19	21	0			154

QSL via SM4FTF and LA2ZN respectively), IK2ANI/IM0 (QSL via IK2CIO), and VE2PAB/4U operating from the Golan Heights which counts as YK for DXCC.

## VHF news

A reminder that the Perseids meteor shower occurs around 12 August. For those vhf enthusiasts who chase dx, squares and countries, this ms shower provides a fine opportunity to collect some exotic far-off squares in deepest eastern Europe. Last year, ms signals could be heard from 10 to 13 August. The best direction is probably to the southeast, where signals from HA, I OK and YU can be particularly strong. Listen on 144.200 or 144.400MHz for random ssb ms signals. On cw, much ms work can be heard anywhere

# HF F-layer propagation predictions for August 1986

The time is presented vertically at two-hour intervals 00(00)gmt to 22(00)gmt for each band, ie 0000, 0200, 0400 etc.

The probability of signals being heard is given on a 0 (indicated by a dot) to 9 scale; the higher the number the greater the probability, with 1 meaning 10 to 19 per cent of days, and so on. Additionally 50MHz F-layer and 1.8MHz openings are indicated by a plus (+) sign in the 28 and 3.5MHz columns respectively.

Time / GMT	30MHz	24MHz	21MHz	18MHz	14MHz	10MHz	7MHz	3.5MHz
000001111122	024680246802	000001111122	000001111122	000001111122	000001111122	000001111122	000001111122	000001111122
024680246802	024680246802	024680246802	024680246802	024680246802	024680246802	024680246802	024680246802	024680246802
***EUROPE								
MOSCOW	.....	.....	.....	.....	.....	.....	.....	.....
MALTA	.....	.....	.....	.....	.....	.....	.....	.....
GIBRALTAR	.....	.....	.....	.....	.....	.....	.....	.....
ICELAND	.....	.....	.....	.....	.....	.....	.....	.....
***ASIA								
OSAKA	.....	.....	.....	.....	.....	.....	.....	.....
HONGKONG	.....	.....	.....	.....	.....	.....	.....	.....
BANGKOK	.....	.....	.....	.....	.....	.....	.....	.....
SINGAPORE	.....	.....	.....	.....	.....	.....	.....	.....
NEW DELHI	.....	.....	.....	.....	.....	.....	.....	.....
TEHRAN	.....	.....	.....	.....	.....	.....	.....	.....
COLOMBO	.....	.....	.....	.....	.....	.....	.....	.....
BAHRAIN	.....	.....	.....	.....	.....	.....	.....	.....
CYPRUS	.....	.....	.....	.....	.....	.....	.....	.....
ADEN	.....	.....	.....	.....	.....	.....	.....	.....
***OCEANIA								
SUVA	.....	.....	.....	.....	.....	.....	.....	.....
SUVA/L	.....	.....	.....	.....	.....	.....	.....	.....
WELLINGTON/S	.....	.....	.....	.....	.....	.....	.....	.....
WELLINGTON/L	.....	.....	.....	.....	.....	.....	.....	.....
SYDNEY/S	.....	.....	.....	.....	.....	.....	.....	.....
SYDNEY/L	.....	.....	.....	.....	.....	.....	.....	.....
PERTH	.....	.....	.....	.....	.....	.....	.....	.....
HONOLULU	.....	.....	.....	.....	.....	.....	.....	.....
***AFRICA								
SEYCHELLES	.....	.....	.....	.....	.....	.....	.....	.....
MAURITIUS	.....	.....	.....	.....	.....	.....	.....	.....
NAIROBI	.....	.....	.....	.....	.....	.....	.....	.....
HARARE	.....	.....	.....	.....	.....	.....	.....	.....
CAPETOWN	.....	.....	.....	.....	.....	.....	.....	.....
LAGOS	.....	.....	.....	.....	.....	.....	.....	.....
ASCENSION Is	.....	.....	.....	.....	.....	.....	.....	.....
DAKAR	.....	.....	.....	.....	.....	.....	.....	.....
LAS PALMAS	.....	.....	.....	.....	.....	.....	.....	.....
***S. AMERICA								
StH SHETLAND	.....	.....	.....	.....	.....	.....	.....	.....
FALKLAND Is	.....	.....	.....	.....	.....	.....	.....	.....
R DE JANEIRO	.....	.....	.....	.....	.....	.....	.....	.....
BUENOS AIRES	.....	.....	.....	.....	.....	.....	.....	.....
LIMA	.....	.....	.....	.....	.....	.....	.....	.....
BOGOTA	.....	.....	.....	.....	.....	.....	.....	.....
***N. AMERICA								
BARBADOS	.....	.....	.....	.....	.....	.....	.....	.....
JAMAICA	.....	.....	.....	.....	.....	.....	.....	.....
BERMUDA	.....	.....	.....	.....	.....	.....	.....	.....
NEW YORK	.....	.....	.....	.....	.....	.....	.....	.....
MEXICO	.....	.....	.....	.....	.....	.....	.....	.....
MONTREAL	.....	.....	.....	.....	.....	.....	.....	.....
DENVER	.....	.....	.....	.....	.....	.....	.....	.....
LOS ANGELES	.....	.....	.....	.....	.....	.....	.....	.....
VANCOUVER	.....	.....	.....	.....	.....	.....	.....	.....
FAIRBANKS	.....	.....	.....	.....	.....	.....	.....	.....

The provisional mean sunspot number for May 1986 issued by the Sunspot Index Data Centre, Brussels, was 13.1. The maximum daily sunspot number was 30 on 21 May, and the minimum was 0 on 6-14 May. The predicted smoothed sunspot numbers for August, September, October and November are respectively: (classical method) 8, 7, 6 and 5; (SIDC adjusted values) 1, 0 (+3 to -3), 0 (+3 to -3) and 0 (+2 to -4).



in the cw part of the band. Good luck with your listening, and report your loggings so I can sum up the event in a later issue.

On tropo, little really stirred the dx enthusiasts. 22 May saw unusual conditions, with only two German stations in SE DL audible. Otherwise the band was sparsely populated. The GB8IOS (Scilly Is) expedition were audible in London on 24/25 May. A brief lift occurred for about 30mins on the morning of 25 May when several HB9s and Frenchmen in JN25 and 26 were heard in the London area. Apart from signals from the near-Continent on most days, conditions from the southeast were particularly poor.

Martin Parry, BR552543, has a changed set-up for vhf. He now has a 3SK97 preamp at the masthead and a new Cirkit kit converter which uses 3SK88s. He provided no comment on how he thought the new system compared with the old, but had found little time for listening at vhf, except to pile up the points in all but one of the Society's vhf contests. Martin remarked on his wrongly-quoted success in last year's uhf/vhf table. Indeed, I boomed, overlooking the published scores in January's column. The final table is provided this time with apologies to David Whitaker—the actual winner!

Michel Monteil, F11ATZ, had been fairly inactive on vhf but had entered the French Spring Contest on 3/4 May. Conditions in JN15 were on the whole rather average, but east-west propagation was good, producing three new squares: I2UPG (JN45); IN3JJI/3, I2LHE/P and IK2EAD (JN55); and I1WZ/1 (JN44). Michel also copied the "usual" squares from his QTH: JN11, JN12 and TK4DL/P in JN41JS. On another morning, Michel was surprised and delighted to hear EA6IF (JN20BA) calling CQ on the ssb calling frequency and then working a string of EAs.

Back home, there has been little tropospheric propagation to get excited about. During the contest on 7/8 June, Joan BR562088, took advantage of

the many /P stations which were active from the near-Continent, logging TV6JUN (JN99), ON7GI/P (JO10), ON7ZT/P (JO11) and ON6GP/P (JO20). Unfortunately her domestic responsibilities stopped her from listening at the beginning of the contest when conditions into France were reasonably good. The om copied stations in AE and BF squares, together with F5HV/P (JN36), F6KCP/P (JN17) and PA0GUS/P (CN). On the Sunday, the signals from France on 432MHz were fair with, among others, F5HV/P (JN36) being heard. After the contest stations had packed their equipment away, an opening to Spain occurred; EA1BLA, EA1OD and EA1NU were audible in the south, together with French stations on the Brest peninsula.

More excitingly, two short sporadic-E events occurred in the south, firstly between 1749 and 1811 on 6 June, when IW9AUH/9 and IT9SBZ (both in JM77) were putting 59 signals into my QTH. Other local stations—several miles away—could not hear either of the Sicilians. Strange propagation this sporadic-E! After the event, FIFEN/P in DG square was heard for no more than 3mins. As no other stations at that distance were audible, tropo conditions were non-existent, and the station was located roughly where the ES cloud was situated, could this logging have been a result of FAI propagation as mentioned in VHF/UHF June column?

The second opening lasted about 20min, and took place during the contest mentioned earlier. YU4WEU (JN84OS), YU6AH (JC) and YU4VIP (JN93ET) were logged at my QTH between 1703 and 1719 on 7 June. Once again the opening was selective, as stations in the southeast could be heard working YO7VS, but, alas, there was no copy here.

## Finale

News, views and table scores for inclusion in the October issue should reach me no later than **18 August**; late news must be received by **26 August**. □

# SATELLITES

Bob Phillips, G4IQQ\*

AT THE END of last month's column I mentioned the dismal outlook for the commercial users of satellite launchers after the successive failure of three classes of launch vehicle in the USA: the shuttle, Titan and Delta. The subsequent loss of an Ariane 2 on 30 May has caused further concern about the prospects of being able to satisfy the continuing need for communication satellites. The fault was associated with ignition of the third stage, and there was a total loss of the payload. A full report is expected from Arianespace in July, and it seems inevitable that there will be knock-on delays to subsequent Ariane missions, including the first Ariane 4 flight which is scheduled to carry the Phase 3C satellite.

The situation on the amateur side has also been somewhat difficult during recent months, with few positive developments and a number of significant problems as outlined below. However, the prospects for the future still remain very good, and we are likely to be spoilt for choice as to which satellite to choose before too long.

## Phase 3C

Good progress has been made with the integration of various sub-systems into the spacecraft bus. During May a team from Amsat-DL visited the integration site at Colorado in the USA and carried out a series of checks on the partially-constructed spacecraft, including successful operation of both the Mode B and Mode JL transponders. Several minor problems were encountered during thermal vacuum testing, and appropriate changes made. After the antennas have been mounted and the kick motor installed in its frame, spin balancing and vibration tests will be carried out. When these tasks have been completed the spacecraft will be shipped back to Germany prior to its journey to Kourou for launch.

As mentioned above, the launch of Phase 3C is planned for the test flight of Ariane 4, but this is now unlikely to take place until early 1987, assuming no generic faults are identified from analysis of the failure of the Ariane 2 flight.

## Oscar 10

I just had time to include a few words last month concerning the emergency situation that had occurred with Oscar 10. The event took place on 18 May, when a malfunction caused the satellite to become locked into Mode B

operation. The early diagnosis was that a high-energy particle had affected the integrated housekeeping unit (ihu) which controls all of the satellite's sub-systems. Ian Ashley, ZL1AOX, managed to reload the ihu software, but the system crashed again a short time later. Tests over the following weeks were carried out to determine if the damage was permanent or if it was simply corruption of the control programme loaded into the computer. A comprehensive series of tests should be able to isolate the nature and extent of any problem. Direct control of the transponder switching sequence was achieved after a short period, but it was expected that transponder operation would not be resumed for several weeks, at least.

With some good luck and a lot of hard work at various locations worldwide, the problem should be resolved by the time this appears, but it would be wise to check the operational status before attempting to use the transponders. If all is ok, the general beacon on 145.810MHz will carry appropriate news information. Other sources of information include the

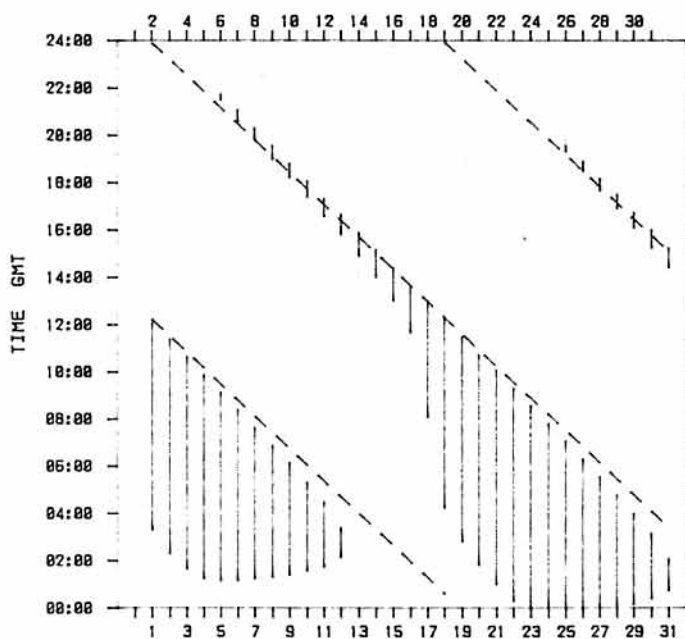


Fig 1 OSCAR 10 VISIBILITY (London area) - AUGUST 1986  
— satellite in view — — — — — perigee (MA=0)

\*Transvaal Cottage, New Barn Road, Swanley, Kent BR8 7PW.

news bulletin transmissions from Uosat Oscars 9 and 11; also the Sunday morning Amsat-UK satellite nets on 3,780kHz at 1015. The times at which the satellite will be visible are indicated in Fig 1. For most of the days of the month the satellite comes into view at times ranging from midnight to 3am for periods up to 10 or 11h.

The following data may be useful for orbit prediction purposes:

Date	Orbit number	Perigee	Mean anomaly
1 August 1986	2357	0034	131.2

Spacecraft attitude changes were planned for the middle of the month, but these plans may need to be modified depending on the outcome of attempts to identify and remedy the problem mentioned above. On the brighter side, Oscar 10 enters a period of no eclipses during the period from mid-August until the end of November.

## Uosat

About one week after the Oscar 10 problem, Uosat Oscar 9 also suffered a system anomaly. The situation arose during routine loading of the weekly software, when it was noticed that unexpected difficulties were being experienced. Diagnostic checks have been carried out and attention has been focused on one of the data ports to the on-board computer. It is possible to access the computer via an alternate port but the University of Surrey is anxious to identify the cause of the problem. During the period of the testing, operation on 145MHz was suspended and transmission was limited to 435MHz only.

# MICROWAVES

Mike Dixon, G3PFR\*

## Operating news

Despite improvements in the weather in early May, that promise was not kept up, the weather deteriorating once more into wet and windy over most of the UK. With this regression, so the build-up of summer activity seems to have been slow. Few significant "lifts" have been reported, and as I was unable to get out on the first three of the microwave and 10GHz cumulatives, I can only report secondhand that activity has so far been low and dogged by what northern correspondents have described as "diabolical weather".

Peter, G3PHO, and Eric, G3MWN, and others tried the 10GHz 200km-plus path from Snowdon to Cairnsmore. Peter, in GM, soon took very strong signals from Eric, but once again the GW end was dogged by a receiver fault. A full account of this and some super-refraction to GW3PPF in Anglesey is given in *Microwave Newsletter* 04/86.

Pete, G6YLO (Herne Bay), reported on the formation of the East Coast Microwave Net which is operative on 144-170MHz ( $\pm$ ) on Wednesday evenings at 2000gmt. The objective is to promote 432MHz activity as well as to discuss and provide technical information on microwave design, data and skeds. Another objective is "to try to co-ordinate 10GHz portable operation with other groups". All "joiners-in" will, of course, be welcome. His other comment was: "I am at last QRV on 3-4GHz ssb and cobbled (should it be plumbed?) together a +20dBm pa using an NE856 and a 2SC2367 rf amp for the May cumulative and worked G4FRE/P, though later tests showed the local oscillator matching to be at fault, causing some 20dB noise figure!"

Iain, G4SNL (Saltash), sent news of some doings in Cornwall and Devon. He, Mark, G4YOI, and Kevin, G0AKH, went portable with 10GHz nb to try to stir up some activity in that remote part of the country. On 11 May their attempts to work Chris, G4DGU/P, at Hartland Point (North Devon) from Caradon Hill (mid-Cornwall) failed when the equipment refused to function correctly. The following day, after realignment and calibration of the 'JVL' transverter which was now producing 250 $\mu$ W, the 50km path from Kit Hill (near Caradon Hill) to Hartland Point was worked at 5/9 each way. When Chris removed his 18in dish, his signals were still 3/5 even under poor weather conditions. The exercise was repeated on 17 May, this time Iain's group using an offset feed (half a 16in dish of f/d 0.26 and a feedhorn designed for an f/d of 0.6) reported improved signals. He said that as a result of these trials, "penny feeds are out from now in Cornwall".

Jack, G5UM (microwave awards manager), sent news of a couple of interesting claims from Richard, GU8FBO. The first was for the FMD 23cm Senior certificate, only the fifteenth to be issued. This qualified Richard for the FMD Supreme No 65, as he already held 144 and 432MHz

Seniors from 1980. His second claim was for a microwave distance award for a 760km 1-3GHz contact with HB9AMH/P, which was a first for both operators and accomplished with low power (2W or less) at both ends of the QSO. Richard's letter said "this contact came as something of a surprise since at the time I was green on the band, this being only my second contact and the first out of the Channel Islands!" His additional news was that he is thinking about 10GHz and that 2-3GHz appeals to him. Due to other commitments and the holiday season, action is unlikely before autumn.

A long and welcome letter from Derek, G3KFD (Kingswinford), gave details of various regular skeds he is running or is associated with. On 1-3GHz the 184-mile path to Dave, G6LEU (Cornwall), has "yielded 90 per cent plus 'hits'" since last October, using Derek's set-up of 50W to two Tonna antennas and Dave's 10W to four Tonnas. G6HV (Tiverton) is a "regular follow-up" to this sked. Dave's regular skeds with France (Brest area) and Spain (north coast) regularly yield high-level exchanges. Derek's observations on activity generally were: "Apart from G3JXN, no QSO with SE England since 9 December 1985, until 11 March when G4NQE and G8XIR were worked. GB3NWK is always audible, so where has the SE gone?"

On 2-3GHz Derek reported the "usual hibernation" with G8SWZ, G8UYR, G4CBW and G8JHL all on a building or re-building programme. In his first year on "13" Derek worked 972km, five countries and 14 squares from his "mediocre fixed location".

On 3-4GHz Derek and Bob, G8GDZ, are testing on a sked basis with 200mW of ssb currently available. 5-7GHz, with both stations, is at a stage of advanced planning, using some of the surplus equipment items mentioned here a couple of months ago. Separate receive and transmit mixers are planned, for Derek and Bob both think that there are too many compromises with the usual transceiver set-up.

Derek especially asked me to pass on his enthusiastic appreciation to the keepers of the beacons GB3BPO, NWK, MLE on 1-3GHz and LES and NWK on 2-3GHz—and also to "all those uhf/microwave types who maintain their efforts on these quiet bands". I will heartily endorse his remarks, for so often this service goes unsung.

## Technical items

Pete, G6YLO, in his letter mentioning the microwave net gave a few details of some Avantek power GaAsfets with which he is currently experimenting. They are as follows:

AT12535 0.1W (4GHz), 60mW (10GHz) cost about £10

AT8150 0.8W (4GHz), 0.5W (10GHz) cost about £50

AT8140 1.5W (4GHz), 1.0W (10GHz) cost about £70.

He says that the AT12535 device looks interesting since it has an nf of about 1dB at 4GHz, and at the current rate of exchange should compete well with the MGF series. He mentioned a new device, the ATF10135, also at around the £10 mark, which appears to have an nf of 0.5dB at 4GHz and 1.4dB at 10GHz.

Apologies for his earlier remarks on his 3-4GHz equipment, he is currently finalising his equipment with an AT8150 mashead pa and a 2  $\times$  AT12535 preamp—"ready for the big October contest". He has also been working on the design and layout of AT12535 preamps for 2-3 and 5-7GHz, and should be able to give some details of his findings soon.

## Committee business

Much time has been spent on IARU business, as mentioned last month. The format of the band allocation questionnaire, to be circulated as an information gathering exercise in preparation for the triennial meeting, was finalised, as were the contents of the other papers mentioned.

The committee proposes to "reinstitute" the John Rouse Memorial Trophy in order to encourage microwave design and construction. Preliminary details should appear in the June issue of the *Microwave Newsletter*, and will be detailed here when the arrangements have been formally ratified by the Society. Briefly, the intention is to encourage submission of designs for receiving and/or transmitting equipment for 3-4GHz or above, with the accent on use of readily available components (for example "consumer" devices), ease and reproducibility of home construction, and simplicity of alignment without recourse, as far as possible, to the use of professional test equipment. Entry is open to all RSGB members and will consist of a brief description of the completed equipment and should be submitted to the Microwave Committee chairman, c/o RSGB HQ, by 1 September 1987. Adjudication of the designs submitted will be by the committee and the award(s) given, hopefully at the RSGB agm. The competition should commence this autumn. It is hoped that the entries will be many, so that we will have a hard job in selecting the "best" design!

\*"Woodstock", Gaze Bank, Norley, Warrington, Cheshire WA6 8LL.



# VHF/UHF

Ken Willis, G8VR\*

THIS MONTH marks the fourth anniversary of my taking over 4-2-70. It was with some trepidation that I took on the task, wondering how I could possibly fill the space each month with news and information related to the vhf/uhf scene. I need not have worried. Four years and a quarter of a million words later, I consider myself one of the most fortunate radio amateurs in the world, since you, the readers, keep me so informed month after month, even when conditions are flat, that my postbag gets heavier all the time and my problem is not what I have to print but what I must necessarily leave out because of space restrictions. So this is to say thank you to all readers of this feature. I have no doubt that you will continue to send in reports of all types, and I will do my best to publish them. Let me know from time to time of your special interests so that as many facets of the hobby can be covered in *VHF/UHF*. I hope to continue writing in this space for some time yet, knowing that the editor will break it to me gently when age makes the text incoherent. May that time be some way off!

## Meteor scatter

At the VHF Managers' Conference attended by the RSGB vhf manager, Keith Fisher, G3WSN, earlier this year, a working group met to discuss various aspects of meteor scatter operation, some of which were reported in *VHF/UHF*, May. The group comprised members from HB, SP, PA, SM, Y2I, DL, EA and G, and one topic which dominated the discussion was the procedure for working on the random channels. The keynote was a British paper submitted by John Matthews, G3WZT, which outlined a procedure for a station to call CQ on one frequency and listen for replies on another (designated) frequency. At first sight this may ring a bell with ms users, but in fact it represents an ingenious new method of avoiding QRM and increasing the chance of making a complete contact. The proposed system, which the group studied in considerable depth, can be summarised as follows:

1. A station calls CQ on the random "channel". For CQs an *area* rather than a specific frequency will be used, namely 144.095 to 144.100MHz for cw, and 144.395 to 144.400MHz for ssb.

2. The station then listens for replies to his CQ on a frequency determined by the last letter of his own callsign. The letters of the alphabet are assigned a number from 1 to 26 in order, and this is the number of kilohertz to be added to 144.100MHz cw or 144.400MHz ssb to determine the listening frequency. Hence, I3LGP calls CQ in the CQ area, but listens on 144.116MHz, P, the last letter in his call, being number 16. Note that wherever in the CW area the call is made, the addition is always made to the frequency 144.100MHz (144.400MHz for ssb).

3. Problems might arise if no reflections occur during subsequent listening periods, for the station replying to the CQ call would then not know whether his call had been heard. The working party took the view that since random operation was mainly confined to major showers (though not so with current UK activity periods on both 144 and 50MHz), there would normally be enough reflections to indicate that someone was QRV on the designated frequency of the CQ-caller. If, however, the caller fails to hear anything, he has the choice of calling CQ again on the same frequency as the original one or indeed anywhere within the CQ *area*. It is admitted that this could lead to the station replying continuing to listen on the caller's designated frequency, unaware that he had gone back to the CQ area again.

4. Once the station calling CQ hears someone on his designated frequency, he also changes to that frequency, both to transmit and receive.

5. For the system to succeed, no QSOs should take place between 144.095 and 144.100MHz (cw) and 144.395 and 144.400MHz (ssb). Similarly, no skeds should be arranged between 144.095 and 144.126MHz (cw) and 144.395 and 144.426MHz (ssb).

A further situation may now arise if follow-on procedure is considered. This can easily be illustrated by a typical case. Suppose EA3LL calls CQ and is answered on his frequency (144.112MHz) by SM6EAN. They complete the contact, and G3WZT, who has been listening, has heard both sides of the contact. G3WZT may now call only EA3LL, since it is the Spanish station's designated frequency. It is easy to progress from this and suggest that after any

contact, a station looking for a follow-on should always revert to his own designated frequency for any calls.

This may all sound complicated to a newcomer to ms, but in fact it is quite a simple procedure to operate. A simple tabulation on the wall of the shack will give instantaneous read-out of the frequency on which to reply to a CQ call on random channels. Things get tricky if you cannot copy the last letter of the station calling, since there is no designated frequency for "QRZ"!

Your own views on these proposals would be welcome, sent either to me or to Keith Fisher, G3WSN, QTHR.

Ian, G4YUZ, reported a 144MHz ms cw contact with SM2CEW (see *VHF/UHF* July 1986) using sporadic meteors on 1 May which was completed in 30 min. Ian then went off to Scandinavia on vacation and handed over QSL cards to both SM2CEW and LA6QBA, the latter for a 50MHz contact. The SM2 contact was over a QRB of 1,972km, and, as Ian comments, "not bad for sporadic meteors". On 22 May he worked OE6WIG (HH) at 0300gmt, the sked taking 1h 30min to complete, giving Ian his 58th square worked on meteor scatter alone.

QST June 1986 contains an excellent article on vhf meteor scatter fundamentals by Michael Owen, W9IP/2. This article, plus those by John Matthews, G3WZT (*Ham Radio Today* February and March 1983), contain all the essential information needed for successful ms working. The October 1986 QST will contain an article on the European system, written by myself, in an effort to dispel some of the illusions and criticisms of the mode current in the USA.

## To see ourselves . . .

That well-known Norwegian vhf operator and designer of so many interesting circuits, Jan-Martin Noeding, LA8AK, has taken the trouble to write and give his impressions of the operating habits of UK vhf/uhf operators. Because Jan-Martin knows his vhf, what he says is probably very much to the point. He enclosed a map showing what UK squares he has worked on 144MHz tropo and aurora, and on 432MHz tropo from his QTH in DS80b. He assesses his own results as "not particularly good", but that it would be possible to "work more stations if they just tried to give a call in his direction". This is a plea we have heard many times, not just from stations outside the UK, but also from GI, GJ, GU and GM.

Jan-Martin goes on to say that many operators outside the UK form the impression that there is much lower vhf/uhf activity in Britain than they would expect from the number of licences in force. When, say, there is a tropo opening, Jan-Martin thinks that many UK amateurs do not get on to the band until the event has been in progress for some time, and may only appear when conditions are declining, so few UK stations are heard. He favours a better warning procedure to alert operators to the fact that the bands are open.

LA8AK does not call CQ on 144MHz during a good tropo opening, but, instead, listens for both cw and ssb (he prefers cw on the uhf/shf bands). However, he does call CQ on 432.200MHz using cw, and monitors 144MHz. He urges anyone who hears a cw CQ call on 432.200MHz to call QRZ on ssb. He says even if you do not read cw, the chances are that any cw on 432.200MHz will be Scandinavian, so take a chance and call.

On the subject of auroras, Jan-Martin says that in 1976-8, when he operated from CU, CS and ES squares, UK stations were heard at their strongest on a beam heading (for UK) of about 300 to 360°. Today, UK stations do not seem to use the optimum beam heading for Scandinavia, and are thus weaker than German, Dutch and Belgian stations during these events. Often LA8AK hears only Scandinavian stations on headings of 300-360°, and these stations can be heard calling in vain for UK contacts.

He agrees that a bearing more towards the east will give the chance of contacts with UA, OK, SP, UB5 etc, but says that although the use of a heading of 90-110° may reduce local QRM and open the way to "the crowd" in Europe, it must be remembered that in weak auroras the strong reflections are obtained only on the more northerly beam headings, between 330° through north to 030°, depending on the area it is possible to work or where the ionization is located. He thinks he could have worked a lot of new squares in the UK and Ireland if people would beam more towards the north "like they used to do".

Incidentally, from Jan-Martin's map, he needs AK square on both 144 and 432MHz, as do many other European operators. He also needs XJ, XK, XL, XM, XQ, XR, WL, WM, WN, WO, WP, WQ and WR, plus all the U and V lines of squares, so maybe someone in those areas will oblige by setting up some skeds; his address is Voelgia 39/B, N-4620, Vaagsbygd, Norway. In conclusion, Jan-Martin says he does not support the new locator, but would support the new ("Polish") system, and to prove it gives his location as DS80b/JODSXC/DSXC, which he says is instead of JO38XC. Work it out for yourself!

Some further comments of LA8AK on the use of beacons carrying data to give propagation indications will be included in a future issue.

\*6 Lerryn Gardens, Broadstairs, Kent CT10 3BH.



## News from Cyprus

Dave Rycroft, ZC4DR, writing from Cyprus, commented on the statements by another Dave, G4FRE, in *VHF/UHF* May 1986, when he said that only 10 countries were available to be worked on the 70MHz band. ZC4DR says that ignoring the Turkish-controlled area in the north of the island, the rest of Cyprus has two licensing administrations. 5B4 licences are issued by the Cyprus government and are valid only in the Republic of Cyprus. The British Sovereign Bases in the country are separately administered by Great Britain, and for use only within these bases ZC4 licences are issued by the administrator of the Sovereign Base Areas. With only one exception, no 70MHz operation is permitted by either 5B4 or ZC4 licensees; the exception being, of course, beacon 5B4CY located near Limassol.

Dave Rycroft would be interested to know the dates on which 5B4 has been worked in contests, as mentioned by G4FRE, also the full calls used, since he thinks they may have been pirate stations. Anyone having worked 5B4 on 70MHz might therefore write either to me or to ZC4DR, who is Cyprus area representative of the RAF Amateur Radio Society, Air Headquarters, Cyprus, BFPO 53. There are only about 20 current holders of ZC4 licences, all in great demand since the prefix is classed as a separate country.

As mentioned last month, they are considering a mountain-top expedition in 1987 and want suggestions and advice. I suppose there are two possibilities of working the UK, the first by picking a date when sporadic-E is likely to occur, the other to work meteor scatter, especially high-speed cw, which would certainly get them a lot of skeds from interested operators. The distance is a bit long for the UK, but not so bad for Central Europe, so they could guarantee being in great demand.

Meanwhile some ms activity from Greece is beginning to be heard about, so this might provide some information prior to the ZC4 expedition on the chances of receiving reflections from ZC4 by this mode. Es would be fine if one could guarantee that it would be there when required!

## Repeater news

Walter Gatt, 9H1DU, has sent an interesting repeater story from Malta. He reports that the Malta Amateur Radio League, MARL, has installed a "homebrew vhf repeater" operating on Channel R7. It was assembled "from discarded sonar buoy parts and an old receiver", the brains behind the project being Fortunato, 9H1ES. Walter says that the repeater has been a great help to the constantly-increasing number of vhf amateurs in Malta, and has also proved to be popular with amateurs in neighbouring countries. Under favourable conditions the repeater has enabled contacts to be made between Malta and Sicily, Southern Italy, Greece and even Israel.

In his report as Regional Co-ordinator "E", Chris, GM8MFP, stated that GB3MM is now back on the air and operating satisfactorily, GB3BM and GB3PW have changed frequency (on 4 May) and both seem ok. GB3CB has in fact been fitted with two new antennas to influence the coverage area towards GB3NH and to reduce interference to both units caused by mobiles within their service areas. This, however, has not proved to be effective, so a change in frequency by GB3NH is under consideration subject to the usual approvals.

## QSL Bureau

This is another reminder that the RSGB QSL Bureau will be closed throughout August, so please send no cards during that month, or even for the early part of September. This will enable any back-log to be cleared, and will ensure that your cards do not pile up in the absence of staff to deal with them.

## Another new award

Wythall Radio Club and Eddystone Radio Ltd are offering the "Worked All Midlands Clubs" award. The organizers are based in Hereford and Worcester, and the aim of the award is to promote amateur radio clubs and societies. It is open to any operator or listener using the 50, 70, 144 and 432MHz bands, and in any simplex mode. There are three classes for which points must be obtained, Platinum 65 points, Gold 50, Silver 35 and Bronze 20. Points are awarded to stations worked/heard whose operators identify themselves as members of a recognized amateur radio society or club in the Midlands area. Some 70 such clubs or societies are known to exist there. For full details send an sae to Wythall Radio Club, Awards Manager G4VPD, 37 Forest Way, Hollywood, Birmingham B47 5JS. Eddystone Radio are sponsoring the award.

## Sporadic-E

Up to the third week in June the indications were that this was not one of the most memorable years for Es openings. Usually one can bank on some significant Es activity during the first and/or second weeks in the month, but Mick Cuckoo, G6ECM (Herne Bay), who keeps records of such events,

commented over the air that the vacation he took in order to be at home during the period was largely wasted. There was some very early 144MHz Es on 16 May when G8LFB is understood to have worked UQ2 in an opening lasting a few minutes. Then on 5 June some YUs appeared on the band, again just for a few minutes, while next day, another brief opening occurred to Italy. Hadyn Barker, G6XVV (Rotherham), managed to be in the right place for another short one, between 1705 and 1715gmt on 6 June, when he worked YU1CF (KN03), YU1ILA (KN04) and YA1AL (KN04). He had a "possible" with LZ1KPG also.

On many days in June the 28,885kHz crossband frequency indicated widespread Es on 28MHz, leading to many 50/28 contacts between UK and Europe, while towards the middle of the month ZB2BL was worked by a large number of British stations, and the Cyprus beacon was copied regularly in the UK. TV pictures on Band 1 from Europe and surrounding countries have been poor compared with other years, so conditions were not quite what might have been predicted for the time of year.

Phil Williams, G3YPQ (Swanage), who also operates as G3YPQ/MM on the QE2, sent an amusing letter saying that his first-ever 144MHz Es experience was on 16 May when he worked UQ2GJN, RQ2GGS, SM7LXV, plus SM1 and some OZs. He said he had to check whether the transverter was plugged in, because it sounded like 28MHz! Incidentally, Phil was the "mid-point" station in the abortive transatlantic 144MHz tests last year which were wiped out by the weather. What about activating a few mid-atlantic squares for us all Phil? "Just keep talking for a couple of more minutes and we will pass from IN16 to IN26 to give you yet another new one."

That would create some pile-up I reckon!

## Some antenna performance figures

In May *VHF/UHF* we reported the antenna measuring facilities provided by the Ipswich Radio Club, and commented on the fact that these would be available at the East Suffolk Wireless Revival on 25 May. Sam Jewell, G4DDK, of Martlesham Radio Society, has sent a list of results of antennas tested at that meeting, and although it is not clear whether these are due to Ipswich or Martlesham or both, here they are:

432MHz			144MHz		
Callsign	Antenna	Gain over reference	Callsign	Antenna	Gain over reference
G3LOR	22-el Yagi	13dB	G4DHF	7-el Yagi	7dB
G3LOR	27-el Yagi	14dB	G4DHF	HB9CV	5dB
G3XGS	10-el Yagi	10dB	G3LTF	12-el Yagi	13dB
G3XGS	26-el Yagi	12dB	G3LTF	10-el Yagi	13dB
G3XGS	20-el Yagi	10dB			
G6AXO	5-el Yagi	5dB			
G4DWF	11-el Yagi	4dB			
G1DSL	48-el mb	6dB			

Measurements were made of the maximum gain achievable by each antenna against a reference dipole, using a high-grade step attenuator to bring the signal levels to the same value, thus avoiding any problems due to receiver non-linearity. In addition, an X-Y plotter was used to plot the antenna polar diagram, and traces at levels corresponding to gains of -10, -20 and -30dB permitted sidelobe and back-to-front ratios to be determined.

There were also some 1-3GHz results which will go to Mike, G3PFR.

## Expeditions

Simon Lloyd Hughes, GW8NVN, of the Barry College of Further Education Radio Society, has sent notification that the "Flat Holm 86" expedition to Flat Holm Island is scheduled for 22 to 26 August. Signing GB2FI, the event is to celebrate the 89th anniversary of Marconi's pioneer tests from this island. All hf bands will be activated, plus 50MHz (signing GW3VKL), 70, 144, 432MHz, 1-3 and 10GHz wideband fm. Sked frequencies will be 50-12MHz, 70-22MHz, 144-270MHz, 432-270MHz and 1,296-270MHz. Skeds can be arranged by contacting GW8NVN, GW1JCB or GW8CMU, all QTHR. The station will provide a contact required for the Marconi Award, as well as representing a rare WAB square (ST26). Simon wishes to thank Microwave Modules and Ransom Electronics for the offer of equipment for this expedition. Send sae when requesting sked or further information.

## For the postbag

Paul Turner, G4IJE, these days a confirmed 50MHz ms operator, made some interesting comments on the operating habits of some operators during a lengthy sporadic-E event. He said: "Considering the need to avoid interference with European tv, the operating techniques used by some stations left a lot to be desired. I kept all transmissions short, and didn't call CQ at all, and I think I worked as much as anyone else. One station G\*\*\*\*\* had his keyer churning out 'CQ crossband' for hours, and worked far less than I did, and was surely much more likely to cause

problems with such long transmissions. G5KW is another who favours the "beacon approach".

So says Paul, and it makes sense. To continue calling on 50MHz while awaiting someone to break in on 28,885kHz is not a procedure likely to make us friends where we most need them. Not only that, the very successful stations owe as much to their operating procedures in all modes and on all bands as they do to their equipment and locations.

From SM6EOC/SM6AFH, EA3DXU/EA6 will be QRV on 144MHz ms from 3 to 24 August, and maybe some eme operation. Contact via vhf net. Also SM1BSA is operational on 144 and 432MHz cw-ms from JR square. VHF net again, or phone 49834282, or write QTHR for skeds. OH2AVP wishes to make a list of all stations capable of working 50MHz or crossband to that band. Write to Peter Lytz, Strandpromenaden 28, SF-10300, Karis, Finland, though Peter should get a lot of callsigns from VHF/UHF following recent activity.

G3AYS (Tring) noted a short but intense opening on 144MHz at 0700gmt on 2 May, and wonders if the logs of others show similar happenings. He usually checks repeaters GB3VA (12 miles) and GB3CF (65 miles). On this occasion GB3CF was S9+, but Buxton GB3HH (120 miles) was heard for the first-time ever. He wonders if it was due to the Chernobyl cloud over the UK at that time, but it is difficult to see how any such ionization, at the height it was said to be by the media, could in any way have enhanced signals over so short a path. There's a lot we don't know about propagation; just sit back and enjoy it while it lasts and ponder the mechanism later!

VHF awards manager Jack Hum, G5UM, reports two more "Supremes", numbers 63 and 64 respectively. G3UVR got one for his three Senior awards on 70, 144 and 432MHz, while GU8FBO had Seniors on 144 and 432MHz plus another on 1.3GHz. Jack reminds us that Monday night activity on 144MHz is still being encouraged, something which he initiated

more than 20 years ago. Centre of activity is 144.050MHz, with QSY after establishing contact in the usual way. The VHF Committee reiterates that the 432MHz Monday Night Award (work every letter in alphabet as last-letter in call of station contacted) is still in force. You need to do it in any 12-month period dating from the first contact claimed.

David Dibley, G4RGK, registered some concern over the conclusions of the Vienna VHF Managers' Conference, especially those related to ms procedures and reported in VHF/UHF May 1986. Dave thinks that the letter "K", used in the past to indicate keying problems, is perfectly adequate, so there is little need to introduce the new "U" for this purpose. He goes on to ask who decided that 144.200MHz would no longer be the random ms frequency, or who accepted "Maidenhead" as the universal locator system? He says "the list appears endless". In fact the UK is only one of the countries providing input to the European conference, so there are others who influence decisions taken on a group basis. Having said that, there is little doubt that UK vhf operators are an important part of the whole European vhf scene, as the quality and quantity of papers submitted to IARU conferences and meetings signifies.

One thing we must try to do in future is to find space for more RSGB VHF Committee discussions to find their way into print so that readers can respond and provide input in those situations which they feel most strongly about.

The first recipient of the newly-introduced WAB Islands award went to a vhf operator, Jack Charnock, G4WXX, of Worsley Mesnes, near Wigan. He was required to work 10 British off-shore islands to achieve the award. Another vhf achievement was the award of a WAB Sapphire to Laurie Segal, G6XLL, of Cricklewood, who worked 1,350 WAB areas. Write to Brian Morris, G4KSQ, 22 Burdell Avenue, Sandhills Estate, Headington, Oxford OX3 8ED, for information about WAB awards and contests, and enclose a large sae. □

## DATA COMMS

Ian Wade, G3NRW\*

The RSGB Repeater Management Group (RMG) has been working hard behind the scenes on packet radio matters, and has asked the DTI for permission for: (1) all amateurs to be allowed to run attended Level 2 digipeaters; (2) specified stations to be allowed to run unattended Level 2 digipeaters, with scope for providing a service to a local community and links into a repeater network; (3) some experimental unattended Level 3 packet switches interlinked via a microwave band, with store-and-forward (mailbox) operation and access to amateurs worldwide via a satellite gateway station. Reaction from the DTI to these proposals has been most favourable, and RMG hopes that all of them will be approved on an experimental basis by the end of the year. To co-ordinate the RSGB's activities in this area, RMG has appointed Martin Stubbs, G8IMB, as data repeater co-ordinator, responsible for handling all data repeater proposals and for planning packet networks in the UK. He has already received 19 proposals for packet repeaters on 144MHz; the original plans for a 432MHz network have had to be shelved because of licensing difficulties (432MHz is a shared band, whereas 144MHz is a primary amateur band). Proposed frequencies for the repeaters are 144.650 and 145.275MHz (S11).

A group which is making a name for itself is AMRAC, based in the Southampton area. They produce an entertaining monthly newsletter on all aspects of dc, but with an increasing amount on AX.25. In the May issue of the newsletter there is information on a TNC-2 driver program to run on the BBC, offering split-screen operation and support for disc and printer. The program is suitable for all TNC-2 clones, such as the AEA PK-80, MFJ 1270, PacComm TNC-200 and GLB TNC-2A, and is available on rom at £5 to AMRAC members. Another interesting offering is a TNC-2 kit, available to AMRAC members at £135 including all components and a box, together with a fault-finding service which is free for the first hour (which is all that it should take to find any fault on a TNC-2; there is very little to go wrong with it). Send an sae to Tony Trigell, G1JAF, Gleness, East Boldre, Brockenhurst, Hampshire SO4 7WD, for more details.

The other active group in the south is SWAX25, which sees itself as an umbrella organization for networking and packet switching. It has already submitted proposals to RMG for several 144MHz packet repeaters in the

southwest, and hope to link them together on 2.3GHz. More from Ed Harland, G3VPF, 3 Randall Close, Chickereil, Weymouth, Dorset DT3 4AS.

News from Roger Woods, GW8XAN, of the Dragon Amateur Radio User Group. The group is developing an AX.25 packet tnc based on a Z80A micro and XR-series modem chips, and using a Dragon 64 as an intelligent terminal. Total component cost is expected to be about £50. For more information on the tnc and the group send an sae to Roger at 20 Heol-apryce, Yorkdale, Beddau, Pontypridd, Mid-Glamorgan CF38 2SH.

### Transmission of rtty, Amtor and packet

It is interesting to see the different, and perhaps unexpected, ways that data is transmitted in rtty, Amtor and AX.25 packet. Fig 1 shows the different patterns of mark/space pulses transmitted when a single key is struck on the keyboard—in this case, the question mark character (?).

**RTTY (Fig 1(a)).** The binary code for the "?" character in Baudot rtty is 11001. Because rtty is asynchronous, the first bit transmitted is always a space (the start bit), and then follow the five bits of the character, in reverse order (ie 10011). Finally, the signal returns to the mark (stop) state for at least 1.5 bit times, in readiness for the start bit of the next character. Nice and simple. However, the start and stop bits represent an enormous 33 per cent overhead (2.5 out of 7.5 bits)—acceptable for slow telex-style "WX HR IS FB" messages, but totally out of court for high-speed data. Also, because rtty uses a five-bit character code, we are severely restricted in the

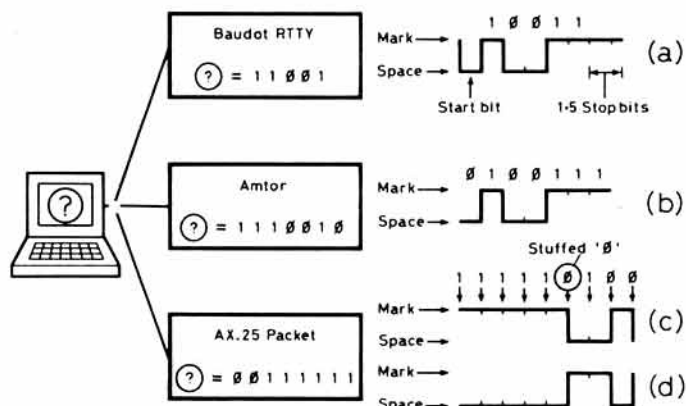


Fig 1. Mark/space waveforms for rtty, Amtor and AX.25 packet signals

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type of data we can send: letters are upper-case only, and we have to resort to time-consuming LTRS and FIGS characters to switch between letters and figures/punctuation symbols.

A further disadvantage of rtty is that the receiving end has no way of distinguishing between a start bit and a "0" data bit; they are both transmitted as spaces. No problem with an interference-free link, but if a start bit gets corrupted by noise so that it is received as a mark instead of a space, the result on the screen or printer is gibberish, often for many seconds. Likewise, noise can corrupt individual bits of a character again giving us rubbish—all we need is an extraneous FIGS, and our "WX" message above turns into "2/ £4 8' %?". Not very useful!

A point to note here is that with rtty a "1" is always represented as a mark, and a "0" as a space, and that by convention the mark frequency is the higher of the two transmitted frequencies. For example, when using mode F2D with an fm radio, the mark tone is usually 1,445Hz, and the space tone is 1,275Hz. The difference between these two frequencies, 170Hz, is known as the "shift". When using mode F1D with an ssb radio, the radiated mark frequency may be 14,090kHz, and the space frequency is 170Hz lower at 14,089.830MHz. Other tones and shifts are sometimes used; more about these in a later column.

**Amtor (Fig 1(b)).** The code for the "?" character in Amtor is 1110010. Unlike rtty, Amtor is a synchronous system, not having any start or stop bits, so only the seven data bits are transmitted, again in reverse order (0100111). Two big advantages of Amtor over rtty become apparent: (1) As there is no start bit in Amtor, there is no start bit corruption problem—once the receiving station is in sync there is no confusion about when each character starts, and a space always represents a "0" bit; (2) Every valid Amtor character has four "1" bits and three "0" bits. At the receiving end, the Amtor system counts the number of "1"s and "0"s in each incoming character—if there are four "1"s and three "0"s then the character is accepted, otherwise it is rejected and the receiving end requests retransmission. Not a foolproof system, but much better than rtty, which has no way of detecting errors and where every character has to be accepted at face value. The Amtor character code has only 35 valid characters with four "1"s and three "0"s, which again is very restricted, making it

necessary to use LTRS and FIGS in the same way as rtty. Nevertheless, for plain language messages Amtor is perfectly satisfactory, and the almost error-free display makes it a joy to use after the frustrations of rtty.

Another consequence of the Amtor code is that every character contains a mixture of "1"s and "0"s. This means that the transmitted signal changes frequently between mark and space, giving the receiving system plenty of clocking edges, so making it easy to stay in sync.

**AX.25 Packet (Fig 1(c/d)).** With AX.25 any character code can be used, but, unless sending pure binary, the usual code is ascii. The ascii code for "?" is 00111111, and yet again the bits are sent in reverse order. However, remember from last month's column that packet does not allow more than five "1"s to be sent in a row (except for flag characters), so in this case the actual data transmitted is 11110100, the "0" bit following the five "1"s having been stuffed into the bit stream.

Looking closely at the mark/space waveform (Fig 1(c)), we see something a little unusual. Unlike rtty and Amtor, packet does not have a fixed meaning for mark or space. Instead, packet uses a convention known as NRZI (non-return to zero inverted), whereby a change in tone (either from mark to space or space to mark) represents a "0", and no change in tone represents a "1". This means that it does not matter which way up the signal is transmitted; the receiving end is only looking for a change between the tones. Thus, when using an ssb radio, either sideband may be used, producing the waveform of either Fig 1(c) or Fig 1(d), both of which are interpreted in exactly the same way at the receiving end.

Why go to all the trouble of generating NRZI? The answer lies in clock recovery. No problem with a stream of "0"s, which will force the tones to alternate rapidly between mark and space, giving plenty of clock edges, making it easy to recover the clock. But what happens when sending a stream of "1"s? At first sight it might seem that there would be no change in tone, perhaps for as long as 2,048 bits (when sending a maximum length information frame), making it much more difficult to keep in sync. However, bit stuffing now comes to the rescue, by inserting a "0" after every run of five "1"s, hence forcing a change in tone and thus another clock edge. So, not only does bit stuffing allow us to send binary data in any code without restriction, but it also helps with clock recovery. □

## BOOK REVIEWS

*Amateur Radio Software*, John Morris, GM4ANB, RSGB. See Mail Order Price List on page 604 for price and ordering instructions.

It's not uncommon these days to find computer books in the shops, usually of the type called "Really useful things to do with your (insert your computer's name here)" and containing very detailed instructions on how to plug the computer in, and then print inane messages many times all over the screen. Most of us who pretend to have a certain amount of knowledge in the computer field acquired a reflex dropping action to deal with these books soon after the ZX Spectrum staggered into the High Street.

My reflex was not up to full strength when I saw *Amateur Radio Software* by John Morris, GM4ANB, and that was a rare piece of luck. I flicked through it, and actually liked it. The listings appeared to be direct facsimiles of computer printouts, which is always a good sign, as many of the bugs appear in book listings in the typesetting process, as a listing is just gibberish to someone who doesn't know the language. On closer inspection, the programs looked efficiently written by experienced programmers, and those which I have found time to type in worked without much effort.

But I needn't have typed in the listings blindly. Full information was given into the theory and background concerned with each program, which is an essential that many programmers find unnecessary. In this respect, it is an excellent textbook for the amateur, especially the mathematically-minded one, and many amateurs do find it difficult to get information in suitable form on, say, satellite orbits. Another field which seems to have a ring of secrecy around it is antenna propagation, a field in which my knowledge is sadly deficient.

John Morris and his contributors seem to have hit what I would call the ideal balance between off-the-shelf software and cold facts: either can be used alone, to make programs and algorithms which are genuinely useful to the technomaniac amateur, and in addition the two can be used together to gain the maximum benefit. An equation from the text combined with a chunk of Basic by someone with a reasonable knowledge can produce personally-tailored programs for use in your own shack. In fact I could use it to write bad programs well—the type of program whose vagaries are known only to me, but are extremely useful to me because I do know them. This might be a bad habit for a programmer, but using the book you can get a reasonable utility program off the ground in a relatively short time—after all, who wants to write a program to score a vhf contest, which will not be finished until after the closing date?

But this is only one aspect of the book. Reading the text conveys enough information for you to be able to understand what it is that the computer is doing for you. Although I am a "child of the computer age", I still feel more like trusting a machine if I know what it is doing.

Reading back, I discover that I have given a rave review. That is what was intended, because I was pleasantly surprised by the aims and successes which the author has put forward and achieved in his book. I look forward to future publications with eagerness.

G6XKQ

*Practical Electronics Handbook* (Revised edition 1986) by Ian Sinclair. Published by Newnes Technical Books, 200 + VIII pages (215 by 135mm). Soft covers, £5.95.

*Op-Amps—Their principles and applications* (2nd edition 1986) by J Brian Dance. Published by Newnes Technical Books, 102 + x pages (215 by 135mm). Soft covers, £4.95.

*Oscilloscopes—How to use them, how they work* (2nd edition 1986) by Ian Hickman. Published by Newnes Technical Books, 124 + IV pages (215 by 135mm). Soft covers, £5.86.

These three books are all practical, workaday handbooks first published between 1978 and 1981 and now fairly lightly revised. They can be recommended as presenting concise and up-to-date guidance in the general field of electronics, though not directed specifically towards the radio amateur. The oscilloscopes described by Ian Hickman are mostly advanced, high-cost devices. Unfortunately little or no information is given on the use of 'scopes for checking transmitters, although their use for checking analogue and digital circuit operation and diagnosing faults is described in some detail.

*Practical Electronics Handbook* includes almost 40 pages of integrated-circuit "pin-outs", the modern equivalent to the old valve base diagrams. The new edition includes rather more information on microcomputers, though perhaps still not to the extent of their present domination of the home-electronics scene. *Op-Amps* provides a lucid and useful introduction to the many types of operational amplifiers now in common use, including practical circuits for audio preamplifiers etc.

G3VA



# ContestNews

## 49th Commonwealth Contest 1986 results

If you are looking for a contest to enjoy, work dx and make many friends, then this is the one. It could also be a very profitable one if you are to believe the rules as published in the Australian magazine *Amateur Radio* which state that "each completed contact will score five pints!" As Kev Phillips, VK3AUQ, put it: "The rules say I can claim five pints per contact, so I should claim for 745 pints, or 93 gallons and one pint." Well Kev, I've heard that Aussies are big drinkers but could you really cope with that amount of alcohol? The 126 entrants made a total of 13,405 QSOs, including 67 on 28MHz—an improvement on last year. Although conditions were slightly better, many stations still struggled to make contacts; the thrill and excitement seems to lie in the challenge to dig out those call areas from the noise and QRM. Perhaps it is the gentlemanly (apologies to the yf operators) operating, with many stations using the contest to keep in touch with old friends, which makes it so much fun. Even though there are many old-timers—some in their 'eighties—who regularly participate, it is by no means an old man's contest, with many youngsters on the scene making a challenge for the honours (eg VK6LW, G4BUO).

This year's winner is David Dudley, VE3BVD, who receives the Senior Rose Bowl. He used a TS830S plus Dentrone 2500 feeding 3.5MHz phased verticals; 7MHz 3el, 2el Yagi; 14MHz 6el, 4el Yagi; and 21MHz 5el, 5el Yagi. Second, for the second year running, is Nigel Hoyow, 6Y5HN, using a TS180S plus SB201 feeding 3.5/7MHz trap, inverted-V dipoles at 30ft and KLM 4el beam at 33ft. Last year's winner, Lee Sawkins, VE7CC, came third using a TS820S plus LB4 feeding 3.5MHz 5-sloper array, 7MHz 2el Yagi at 100ft, 14MHz 5el Yagi at 105ft and 21MHz 4el Yagi at 90ft. Al Slater, G3FXB, returns as the number one UK entrant, winning the Col Thomas Rose Bowl, using a T4XC/R4C combination with 3.5MHz slopers, 3el and 2el Yagis and quad loop on 7MHz and a 20/15m quad.

Eric Trebilcock wins the Receiving Rose Bowl in his 46th entry. Mention should also be made of Russ Coleston, VK4XA, who leads the Australian

entry for the seventh year in succession. Congratulations to all the trophy winners, and to all who receive certificates.

The Australians had an impressive turn out, the only disappointment being the lack of VK1 activity. VK8HA, despite his other commitments, managed to provide many with a sought-after call area; T30AT was a welcome sight to most but was not heard here in the UK. However, the UK does hold the advantage when it comes to working Africa. In all some 53 call areas were worked—again an increase on last year. The Table showing the areas worked on each band illustrates the heavy use of 7 and 14MHz. 14MHz had reasonable openings from the UK to Oceania at the start of the contest, with Canada and Africa appearing later. 21MHz was in good condition to Africa on both days, but was very poor to other areas. 28MHz was open, but for a very limited period. Only two entrants from the UK made a contact with 9J2BO who was 559 at 1444gmt. There was little hf activity during the night. 7MHz was fair, being open to all of Oceania, with Al Slater contacting 28 call areas—obviously those beams work! 3.5MHz was disappointing, and only Barry, G3PEK, made any real impression with his vertical and extensive real system. ZL3GQ was particularly loud on any band! Once again it is those stations who have a good knowledge of band conditions who can make the most out of this contest. Unfortunately for the UK contingent, storms off two coasts produced high noise levels which made reception difficult, especially on the lower frequency bands, which could be why modest set-ups failed to produce results this year.

With the golden jubilee of this contest next year, the RSGB is making some special arrangements to celebrate one of the oldest radio contests in the world. Full rules with details of the arrangements will be published later. Make a date in your diary now for the second full weekend in March next year—something not to be missed! See you all then.

Finally, many thanks to those who sent in checklogs; G3CXM, G3GMM/A, GW3JL, G3OZF, G3WP, G6NK and VK3KF. Special thanks to John Tutton, VK3ZC, for his invaluable help in promoting the event "down under".

G4DJX

### TRANSMIT SECTION

Posn	Callsign	QSOs	Bonus	Areas	Total	Posn	Callsign	QSOs	Bonus	Areas	Total
1	VE3BVD	416	129	29	4,550	64	G3YEC	55	52	22	1,275
2	6Y5HN	471	113	27	4,414	64	VK3KS***	104	38	21	1,275
3	VE7CC	268	155	27	4,400	66	VK4BSQ	61	48	13	1,265
4	VE6OU/3	400	113	28	4,139	67	VK8HA***	82	42	22	1,250
5	VK4XA	276	133	25	3,991	68	G2HLU	54	48	20	1,230
6	G3FXB	235	141	33	3,945	69	VK7RY	63	49	13	1,204
7	G3PEK	200	129	33	3,555	70	ZC4AP	143	26	12	1,185
8	VK2BQQ	220	122	24	3,517	71	VK2SU	59	45	15	1,162
9	G3MXJ	197	129	36	3,468	72	G3GC	54	43	16	1,130
10	ZL1AIZ	203	127	19	3,462	73	G3VW	50	44	22	1,122
11	VK2AYD	196	124	27	3,460	74	VK4TT***	88	35	17	1,115
12	G4BUO	188	125	36	3,440	75	3D6AK	123	30	10	1,090
13	VK3MR	269	117	21	3,302	76	VO1QU	92	33	13	1,088
14	VK6LW	218	111	23	3,295	77	G3JG	46	42	19	1,070
15	P29PR	179	120	20	3,287	78	GM3YOR	50	42	25	1,065
16	G4CNY	191	118	33	3,240	79	VK6AJ***	68	35	19	1,040
17	T30AT	192	128	25	3,187	80	VK3DOV	50	43	13	1,036
18	9J2BO	286	84	25	3,095	81	P29FJ***	71	32	16	990
19	VE1NG	342	72	22	3,087	82	VK5BS	54	39	14	987
20	ZB2EO	386	60	15	3,075	83	GW3MPB***	45	36	21	915
21	VK7BC	161	105	23	2,895	84	G3SJJ	40	33	18	860
22	9V1TL	219	84	20	2,775	84	VE5BAF	41	34	15	860
23	VK3AUQ	149	97	24	2,680	86	5NOBRJ	56	30	9	847
24	G3UJE	172	95	29	2,667	87	G3COJ	34	32	20	810
25	G2GT	141	95	29	2,590	88	GM3CIX	37	33	19	804
26	VK4APZ	142	95	20	2,585	89	VK3XB*	44	29	14	792
27	VK3DQ	138	93	19	2,517	90	VK3RJ***	49	27	14	785
28	VK6IT	134	93	19	2,509	91	VK6ED	34	30	12	770
29	VK2ZC	139	92	18	2,501	92	VK2AZR	40	28	10	758
30	VK5AGX	171	84	19	2,474	93	VK5RG	37	29	14	749
31	VK2AQF	135	90	18	2,412	94	VK4BKM***	53	27	12	745
32	VK5BN	134	89	19	2,351	95	VK3XF	35	32	11	732
33	VK5UM	136	84	20	2,350	96	VK6AUX	40	31	11	724
34	VK6HQ	160	84	17	2,350	97	GM4SID	29	27	15	685
35	VO1AW	285	46	17	2,332	98	VK4SF	33	25	12	665
36	VK4XW	123	85	18	2,302	99	VK7ZO	30	27	10	640
37	VE5RA	150	76	24	2,145	100	Z23JO	43	21	9	635
38	ZL1HV	102	82	19	2,134	101	G3SWH	29	26	13	613
39	G4OBK	99	78	31	2,047	102	VK3FC**	35	22	10	582
40	VK2BAT	135	70	21	2,025	103	9J2LC	53	18	6	565
41	G4DJX	92	79	30	2,015	104	G3UYM***	24	22	16	560
42	VO1MP	252	38	13	1,972	104	VK6RZ**	28	21	17	560
43	ZC4CZ	234	39	18	1,900	106	VK2GT	22	22	10	550
44	VK3BDH	96	71	18	1,892	107	G4LZB	21	21	14	525
45	VK2DID	97	70	19	1,860	108	G3VDL	23	20	10	515
46	VE3ST	183	65	21	1,852	109	G3ATU	22	20	13	510
47	VK5GZ	103	61	16	1,735	110	G3KDB	20	20	16	500
48	ZL2TX	100	69	18	1,730	111	G8OZ	22	21	11	497
49	VK2APK**	149	50	24	1,727	112	G4HPS***	21	19	12	485
50	VK3MJ	93	65	20	1,687	113	G3HAL	17	17	11	425
51	VK3ZC	89	62	20	1,685	114	G3OLU	22	17	9	400
52	G3RZP***	107	58	32	1,631	115	G3JKY***	18	15	10	390
53	G3NOM	79	61	25	1,613	116	G3ILO	17	15	10	385
54	G4CP***	91	55	29	1,555	117	VE1EP***	15	15	12	375
55	VK7CH	79	57	16	1,535	117	G3DOT	20	15	9	375
56	VE3JKZ	147	46	13	1,505	119	G4ODV	14	14	9	350
57	VK6RU	80	54	17	1,464	120	G3TXF***	13	12	7	305
58	G5MY	66	57	24	1,454	121	VK4RAN***	11	9	5	235
59	G3ESF	67	57	22	1,391	121	VK4NUN**	11	9	5	235
60	VK2EL	66	51	19	1,342	123	G3KTT***	10	9	6	230
61	G3KSH	57	52	23	1,325	124	VK2HC	11	9	6	202
62	G3SJK	56	51	23	1,292	125	G3KSK**	7	7	5	175
63	G3APN	66	51	21	1,284	126	G3CWL***	5	5	4	125

Average Totals 106 56 17 1,619  
13,405 7,103 204,020  
\* = 3.5MHz \*\* = 7.0MHz \*\*\* = 14MHz

### RECEIVE SECTION

Posn	Station	QSOs	Bonus	Areas	Total	Posn	Station	QSOs	Bonus	Areas	Total
1	BCRS195	116	81	0	2,200	2	BRS1066	96	82	0	2,095

Posn	Callsign	QSOs	Bonus	Areas	Total	Posn	Callsign	QSOs	Bonus	Areas	Total
1	G3FXB	235	141	33	3,945	24	GW3MPB***	45	36	21	915
2	G3PEK	200	129	33	3,555	25	G3SJJ	40	33	18	860
3	G3MXJ	197	129	36	3,468	26	G3COJ	34	32	20	810
4	G4BUO	188	125	36	3,440	27	GM3CIX	37	33	19	804
5	G4CNY	191	118	33	3,240	28	GM4SID	29	27	15	685
6	G3UJE	172	95	29	2,667	29	G3SWH	29	26	13	613
7	G2GT	141	95	29	2,590	30	G3UYM***	24	22	16	560
8	G4OBK	99	78	31	2,047	31	G4LZB	21	21	14	525
9	G4DJX	92	79	30	2,015	32	G3VDL	23	20	10	515
10	G3RZP***	107	58	32	1,631	33	G3ATU	22	20	13	510
11	G3NOM	79	61	25	1,613	34	G3KDB	20	20	16	500
12	G4CP***	91	55	29	1,555	35	G8OZ	22	21	11	497
13	G5MY	66	57	24	1,454	36	G4HPS***	21	19	12	485
14	G3ESF	67	57	22	1,391	37	G3HAL	17	17	11	425
15	G3KSH	57	52	23	1,325	38	G3OLU	22	17	9	400
16	G3SJK	56	51	23	1,292	39	G3JKY***	18	15	10	390
17	G3APN	66	51	21	1,284	40	G3ILO	17	15	10	385
18	G3YEC	55	52	22	1,275	41	G3DOT	20	15	9	375
19	G2HLU	54	48	20	1,230	42	G4ODV	14	14	9	350
20	G3GC	54	43	16	1,130	43	G3TXF***	13	12	7	305
21	G3VW	50	44	22	1,122	44	G3KTT***	10	9	6	230
22	G3JG	46	42	19	1,070	45	G3KSK**	7	7	5	175
23	GM3YOR	50	42	25	1,065	46	G3CWL***	5	5	4	125

Average Totals 63 46 19 1,235  
2,923 2,158 56,843  
\* = 3.5MHz \*\* = 7.0MHz \*\*\* = 14MHz

### AWARD WINNERS

Senior Rose Bowl	D Dudley, VE3BVD	7MHz UK	G3KSK	3.5MHz o'seas	VK3XB
Junior Rose Bowl	N Hoyow, 6Y5HN	14MHz UK	G3RZP	7MHz o'seas	VK2APK
Col Thomas Rose Bowl	A Slater, G3FXB			14MHz o'seas	VK3KS
Receiving Rose Bowl	E Trebilcock, BCRS195				

### HOW THE LEADERS MADE THEIR SCORES

Callsign	3-5	7	14	21	28	A
VE3BVD	59	23	13	114	51	25
6Y5HN	37	15	8	144	38	21
VE7CC	37	29	15	86	45	20
VE6OU/3	23	17	9	119	43	21
VK4XA	34	19	9	67	36	18
G3FXB	21	14	10	78	50	28

Q = QSOs B = Bonuses A = Areas

CALL AREAS WORKED FROM UK							CALL AREAS WORKED FROM OVERSEAS						
Area	3-5	7	14	21	28	Total	Area	3-5	7	14	21	28	Total
A3		1				1	A2		1				1
P2	1		2			3	A3	1	1	1	1		4
VE1	9	11	21	2		43	G	67	175	340	150	3	735
VE2	2	2	16			20	P2	1	2	3	2	1	9
VE3	11	19	50	1		81	T30	1	1	1	1	1	5
VE4		1	3			4	VE1	8	13	14	6		41
VE5		1	5			6	VE2	3	3	7	2		15
VE6		2				2	VE3	13	36	39	16		104
VE7		1	5			6	VE4	3	5	1			9
VE8			1			1	VE5	4	5	5	2		16
VK2		10	18			28	VE6	1	2	5			8
VK3	3	13	13			29	VE7	2	9	13	7		31
VK4		3	10			13	VE8		1	1			2

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£	(c&p)		
Icom	IC R71	789.00	(—)
Trio	R2000	518.00	(—)
Trio	VC10 VHF Converter	139.00	(2.00)
Yaesu	FRG 8800	575.00	(—)
Yaesu	FRV 8800 VHF Converter	90.00	(2.00)

## HF TRANSCEIVERS

Trio	TS 940S	1795.00	(—)
Trio	TS 930S	1395.00	(—)
Trio	TS 440S	950.00	(—)
Trio	TS 430S	750.00	(—)
Trio	TS 830S	898.00	(—)
Trio	TS 530SP	779.00	(—)
Yaesu	FT 980	1759.00	(—)
Yaesu	FT 757GX	879.00	(—)
Icom	IC 745	989.00	(—)
Icom	IC 735	899.00	(—)

## VHF SCANNING RECEIVERS

Icom	IC R7000	899.00	(—)
Yaesu	FRG 9600	465.00	(—)
AOR	AR 2002	435.00	(—)
Signal	R532 "Airband"	209.00	(—)

## VHF HANDHELD RECEIVERS

FDK	ATC 720 "Airband"	189.00	(2.50)
FDK	RX 40 141-179 Mhz FM	159.00	(2.00)
Signal	R537S "Airband"	64.89	(2.00)

## ANTENNA TUNER UNITS

Yaesu	FRT 7700 Short wave listening	53.50	(2.00)
Yaesu	FC 757AT	318.00	(—)
Trio	AT 230	170.00	(2.50)
Trio	AT 250 auto	314.00	(—)
Daiva	CNW 518 High power	258.00	(—)

## 2M TRANSCEIVERS

£	(c&p)		
Trio	TH 21E Handheld	189.00	(—)
Trio	TR 2600E Handheld	299.00	(—)
Trio	TM 201A 25w FM mobile	296.00	(—)
Trio	TR 751E 25w multimode	525.00	(—)
Trio	TS 711E base station	770.00	(—)
Yaesu	FT 290R Portable multimode	369.00	(—)
Yaesu	FT 203R + FNB3 Handheld	225.00	(—)
Yaesu	FT 209RH + FNB3 Handheld	275.00	(—)
Yaesu	FT 270RH 45w FM mobile	399.00	(—)
Yaesu	FT 2700R 2M/70cm FM mobile	499.00	(—)
Yaesu	FT 726R base station (70cm opt)	899.00	(—)
Icom	IC 2E Handheld	199.00	(—)
Icom	IC 02E Handheld	239.00	(—)
Icom	IC 27E 25w mobile	399.00	(—)
Icom	IC 271E base station	779.00	(—)
Icom	IC 3200E 2M/70cm FM mobile	529.00	(—)

## 70cm TRANSCEIVERS

Trio	TH 41E Handheld	220.00	(—)
Trio	TR 3600E Handheld	324.00	(—)
Trio	TM 401A 12w mobile	350.00	(—)
Trio	TS 811E base station	895.00	(—)
Yaesu	FT 703R + FNB3 Handheld	255.00	(—)
Yaesu	FT 709R + FNB3 Handheld	285.00	(—)
Icom	70cm module for FT 726R	309.00	(—)
Icom	IC 4E Handheld	285.00	(—)
Icom	IC 04E Handheld	299.00	(—)
Icom	IC 471E base station	889.00	(—)

## OTHER BANDS

Yaesu	FT 690R 6M portable	399.00	(—)
Yaesu	6M module for FT 726R	228.00	(—)
Yaesu	21/24/28 HF module for FT 726R	249.00	(—)
Icom	IC 1271E 1.2 GHz	1099.00	(—)

## STATION ACCESSORIES

£	(c&p)		
Drae	VHF wavemeter	27.50	(1.50)
AKD	VHF wavemeter	24.95	(1.50)
Yaesu	FF501DX low pass filter 30MHz 1kW	33.00	(2.00)
Trio	LF 30A low pass filter 30MHz 1kW	27.70	(2.00)
Adonis	AM 303G desk mic with pre-amp	46.00	(2.00)
Adonis	AM 503G desk mic with compression	59.00	(2.00)
SMC	Polar-phaser II	49.00	(2.50)

## ANTENNA SWITCHES

Welz	CH 20N 1300MHz N skts.	46.50	(1.50)
Welz	CH 20A 900MHz SO239 skts	26.50	(1.50)
SA	450N 2way diodecast 500MHz N skts.	22.00	(1.00)
SA	450 as above but SO 239 skts.	15.00	(1.00)
Drae	3way N. skts	19.90	(1.00)
Drae	3way SO 239 skts.	15.40	(1.00)
CS	4 way BNC skts. 1500MHz	26.08	(2.00)

## ANTENNA BITS

Hi-Q	Balun 1:1 5kW PEP	11.95	(1.00)
Ralcom	Balun 4:1 1kW	11.20	(1.00)
Ralcom	7.1MHz Epoxy Traps (pair)	9.95	(1.50)
Self	Amalgamating Tape 10M x 25mm	3.95	(0.75)
T-piece	polyprop Dipole centre	1.60	(0.25)
Small	ceramic egg insulators	0.50	(0.15)
Large	ceramic egg insulators	0.75	(0.15)

## CABLES ETC.

URM	67 low loss coax 50 ohm per metre	0.75	(0.25)
UR	76 50 ohm coax dia. 5mm per metre	0.30	(0.10)
UR	70 70 ohm coax per metre	0.35	(0.10)
UR	95 50 ohm coax dia. 2.3mm per metre	0.40	(0.10)
4mm	Polyester Guy Rope (400kg) per metre	0.20	(0.10)
50mtrs.	16 swg hard drawn copper wire	6.90	(1.50)

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Posn	Callsign	Power (W)	QSOs 3-5MHz	QSOs 7MHz	Points 3-5MHz	Points 7MHz	Total
8	G8DV	1	55	—	805	—	805
9	G3AIO	5	56	—	795	—	795
10	G0BVZ	5	54	—	780	—	780
11	G3VIP/A	5	54	—	775	—	775
12	{G4HZF	5	52	—	770	—	770
13	{G3DNF	5	52	—	770	—	770
14	G4EDG	5	52	—	765	—	765
15	G4JFN	3	49	—	705	—	705
16	G3MA	3	47	—	620	—	620
17	G3KLT	3	40	1	585	15	600
18	G3NEO	5	45	—	590	—	590
19	G4SXE	5	39	—	580	—	580
20	G4YFN	5	43	—	575	—	575
21	G3VTT	1	40	—	570	—	570
22	G4GLC	5	40	—	560	—	560
23	G3AWR	5	38	—	525	—	525
24	G4SLE	5	38	—	520	—	520
25	G4ELZ	1	34	—	510	—	510
26	{G0CLP/P	5	36	—	505	—	505
27	{GM3KPD	3	34	—	505	—	505
28	G4HZV	5	33	—	495	—	495
29	G3BPM	1	33	—	485	—	485
30	G4XUV	4	27	—	405	—	405
31	G8QM	2	27	—	395	—	395
32	G4ETJ	3	25	—	375	—	375
33	G4ODV	5	23	3	335	25	360
34	G13GTR	5	23	—	345	—	345
35	G3ILO	1	22	—	330	—	330
36	G4BUO	5	15	—	225	—	225
37	G4ZME	5	15	—	220	—	220
38	G4JJN	3	15	—	215	—	215
39	G4TJE	3	7	—	85	—	85
40	G4PVB	3	5	—	75	—	75

Posn	Callsign	Power (W)	QSOs 3-5MHz	QSOs 7MHz	Points 3-5MHz	Points 7MHz	Total
1	ON5AG*	5	24	—	325	—	325
2	E14DZ*	3	8	6	115	90	205

\*Certificate winners

†Received certificate for highest scoring station using 1W input or less.

Check logs were gratefully received from G3MCK, G3NNK and GM4XNO.

## Region Round-up 1986 results

The number of logs received was identical to that of last year, which does not reflect the high level of activity that existed during the contest. Analysing the top four logs, a total of 106 stations were participating—how can we persuade them to submit at least a checklog? Log-keeping was generally of a high standard, but several contestants lost points through incorrectly recording the region given or transposing the letters of the call sign. Only one entry was heavily penalized for unmarked duplicates.

Comments included "very enjoyable", "still the best", "great, take back all my previous comments". One station did request that the time be reduced from five to four hours. The comment that really "stung" the adjudicator was: "Where was Region 3". A very good point—only one station appeared in all the logs operating from Region 3.

G3HCT

Posn	Callsign	QSOs	Points	Posn	Callsign	QSOs	Points
1	G4OBK	111	11,322	15	G4EBK	75	7,425
2	{G3TBK	108	11,016	16	G4HZF	81	7,290
3	{G3KAF	108	11,016	17	G4PKU	80	7,200
4	G3SYA	100	10,500	18	G3CCZ	82	7,134
5	G4DJX	100	10,200	19	G3OXC	79	6,399
6	G3LRS	106	10,176	20	G3AWR	75	6,300
7	G4FAM	102	10,098	21	G4WYG	67	5,628
8	GM3YOR	97	9,894	22	G3GMM	62	5,208
9	GW3WVG	102	9,792	23	G3VDL	65	5,070
10	GW3JI	98	9,702	24	G4OKN	61	4,392
11	G5MY	94	9,588	25	G4FJZ	52	3,588
12	{G3JKS	93	9,207	26	G12HFN	45	3,375
13	{G3SXW	87	8,091	27	G4BUO	36	2,160
14	{G3SWH	87	8,091	28	G4WZV	44	2,112
15	GM3VEY	86	7,998	29	G3TXF	24	864
16	G4UZN	80	7,440				

Posn	Callsign	QSOs	Points	Posn	Callsign	QSOs	Points
1	G4ARI	103	10,506	1	BRS1066	—	9,625
2	G4ELZ/P	78	7,020	2	BRS52868	—	7,920
3	G2HLU	72	5,400				
4	G4MOC	51	3,366				
5	G4ODV	28	1,192				

Check-logs were very much appreciated from G3SB, G4HZV and GM3UM.

## 70MHz Trophy & SWL Contest rules

0900-1600gmt 21 September 1986

The general rules published in the "Operating Guide" supplement, *Rad Com January 1986*, will apply. There will be three sections, Section F for fixed stations, Section O for other stations, and an swl section. QTH information must be exchanged in accordance with General Rule 13. The station with the highest overall score will receive the VHF Manager's Trophy.

All entries and check logs to: VHF Contests Committee, c/o C J Easton, G8TFI, Highlands, Townsend, Nympsfield, Glos.

## 432MHz—24GHz UHF/SHF & SWL Contest rules

1400-1400gmt 4/5 October 1986

The general rules published in the "Operating Guide" supplement, *Rad Com January 1986*, will apply. There will be three sections, Section S for single-operator stations, Section M for multi-operator stations, and Section L for swls. Individual band tables and an overall table will be published. Scoring will be at one point/kilometre. Entries will be forwarded for the concurrent IARU contest.

## Contests Calendar

1 Jan-31 Dec	UBA SWL (Rules in December SWL News)
May-Sept	Microwave Cumulatives (Rules in March issue)
May-Sept	10GHz Cumulatives (Rules in March issue)
3 August	DF Qualifying Event, Mid-Thames (Details in June issue)
3 August	Hopscotch (Rules in June issue)
9, 10 August	European DX (cw) (Rules in August HF)
16, 17 August	Seantet (Rules in August HF)
17 August	DF Qualifying Event, Coventry (Details in August issue)
23, 24 August	All Asian DX (Rules in August HF)
24 August	1,296/2,320MHz (Rules in June issue)
31 August	Ropoco 2 (Rules in July issue)
2 September	LZ DX (Rules in August HF)
3-5 September	Howdy Days (Rules in August HF)
6, 7 September	144MHz Trophy and SWL (Rules in June issue)
6, 7 September	IARU Region 1 SSB FD (Rules in May issue)
6, 7 September	IARU Region 1 VHF (Rules in June issue)
7 September	DF Qualifying Event, Slade (Details in August issue)
13, 14 September	BATC International (Details G6IQM)
13, 14 September	European DX (phone) (Rules in August HF)
21 September	70MHz Trophy and SWL (Rules in August issue)
21 September	DF National Final, Salisbury
4, 5 October	432MHz-24GHz (Rules in August issue)
4, 5 October	IARU Region 1 UHF/VHF (Rules in June issue)
7 October	432MHz Cumulative (Rules in August issue)
12 October	21/28MHz SSB (Rules in May issue)
15 October	1,296/2,320MHz Cumulative (Rules in August issue)
19 October	21MHz CW (Rules in July issue)
23 October	432MHz Cumulative
26 October	70MHz Fixed (Rules in August issue)
26 October	DF Treble Night Event, Mid-Thames
31 October	1,296/2,320MHz Cumulative
1, 2 November	144MHz CW (Rules in August issue)
8 November	432MHz Cumulative
8, 9 November	European DX (rtty) (Rules in August HF)
8, 9 November	Second 1-8MHz
16 November	1,296/2,320MHz Cumulative
24 November	432MHz Cumulative
2 December	1,296/2,320MHz Cumulative
7 December	144MHz Fixed and AFS
10 December	432MHz Cumulative
14 December	70MHz CW
18 December	1,296/2,320MHz Cumulative

All entries and check logs to: VHF Contests Committee, c/o T Melvin, GM8MJV, 2 Dudley Avenue South, Edinburgh, Scotland, EH6 4PJ.

## 432MHz Cumulative Contest rules

1930-2200gmt 7, 23 October 1986

2030-2030gmt 8, 24 November, 10 December 1986

The general rules published in the "Operating Guide" supplement, *Rad Com January 1986*, will apply. There will be two sections, Section F for fixed stations, and Section O for other stations.

All entries and check logs to: VHF Contests Committee, c/o M Pharaoh, G3LCH, 49 Streathbourne Road, London SW17 8QZ.

## 1-3/2-3GHz Cumulative Contest rules

1930-2200gmt 15 October 1986

2030-2300gmt 31 October, 16 November, 2, 18 December 1986

The general rules published in the "Operating Guide" supplement, *Rad Com January 1986*, will apply. There will be two sections, Section F for fixed stations, and Section O for other stations. An overall table (Rule 10) will be published.

All entries and check logs to: VHF Contests Committee, c/o D A Yorke, G4JLG, 40 Edge Fold Road, Worsley, Manchester M28 4QF.

## 70MHz Fixed Contest rules

1000-1500gmt 26 October 1986

The general rules published in the "Operating Guide" supplement, *Rad Com January 1986*, will apply. Only fixed stations as defined in General Rule 5 may enter. A multiplier system will be used in this contest. Contacts should be scored using the radial-ring system, and the final score multiplied by the number of counties and countries worked. Where more than one station is worked in a particular Scottish region, additional multipliers can be claimed for each contact, up to a maximum of three multipliers/region. County code letters, or the full county name, should be included in the contest exchange and recorded in Column vi (QTH received) in the log. Each new multiplier claimed must be clearly marked in the log and listed with the QSO serial number on a separate multiplier check list. Each UK prefix (G, GD, GI, GJ, GM, GU, GW) counts as a separate country.

All entries and check logs to: VHF Contests Committee, c/o D J Robinson, G4FRE, 15 Ferry Lane, Felixstowe, Suffolk IP11 8UR.

## 144MHz CW & Marconi Memorial Contest rules

There will be two sub-sections in this contest:

Sub-section 1: 1400-1400gmt 1/2 November 1986

Sub-section 2: 0800-1400gmt 2 November 1986

The general rules published in the "Operating Guide" supplement, *Rad Com*



January 1986, will apply. There will be two sections, Section S for single-operator stations, and Section M for multi-operator stations. Scoring will be at one point/kilometre to allow logs to be forwarded for the Marconi Memorial Contest.

All entries and check logs to: VHF Contests Committee, c/o G M C Stone, G3FZL, 11 Liphook Crescent, Forest Hill, London SE23 3BN.

## 144MHz LP & SWL Contest rules

The rules for this contest, published in *Rad Com June*, p436, should have included the following: "The power output should not exceed 25W p.e.p. measured at the transmitter output".

## 432MHz LP & SWL Contest rules

The rules for this contest, published in *Rad Com June*, p437, should have included the following: "The power output should not exceed 10W p.e.p. measured at the transmitter output".

## DF Qualifying Event—Coventry

Date: 17 August 1986.

Map: OS Sheet 140 1:50,000 series, Leicester and Coventry.

Assembly: 1300bst for start at 1320bst.

Location: Lay-by on A426 near Lutterworth, ngr 545830.

Competitors requiring tea should notify Mr N Rathbone, 7 Foreland Way, Keresley, Coventry, Warks CV6 2NN, tel 0203 337124 (home) not later than 10 August 1986.

## DF Qualifying Event—Slade

Date: 7 September 1986.

Map: OS Sheet 139 1:50,000 series—Birmingham.

Assembly: 1300bst for start at 1320bst.

Location: Beacon Hill car park, ngr 986757.

Competitors requiring tea should notify Mr J Drakeley, 186 Conway Road, Fordridge, Birmingham B37 5LD, tel 021-770 3474 (home) not later than 30 August 1986.

# Club News

The following is the latest information received by RRs from RSGB affiliated societies, clubs and groups in time for inclusion in this issue. Basic unchanged information on other affiliated organizations will be published again in January 1987.

RSGB affiliated organizations are requested to report all programmes and new items to their regional representatives regularly. Information for inclusion in the October issue should reach them by 16 August and for the November issue by 16 September.

Club programmes are given in order of date, subject, time and place of meeting. All call signs of club secretaries and other contacts are QTHR (correct in the current RSGB Call Book) unless otherwise stated.

All clubs welcome visitors and would be pleased to hear from potential new members.

## REGION 1—RR B Donn, G3XSN, 7 Thurne Way, Liverpool L25 4SQ, Tel 051-722 3644.

**Barnoldswick (Rolls-Royce ARC)**—6 Aug (Treasure hunt, 7pm start), 3 Aug (Rally 11am, Free parking and entrance to rally at club QTH, Meetings: 8pm, first Wednesday of month, Rolls-Royce Sports & Social Club. Sec G4ILG, tel 0282 812288.

**Barrow-in-Furness (South Lakeland ARS)**—14 Aug (Visit by B Donn, G3XSN, RSGB Region 1 representative), 8pm, Norweb Sports & Social Club. Sec G6LKB, tel 0229 54982.

**Bury (BRS)**—12 Aug (DF foxhunt, vhf). Please note: society's Hamfest, 8 Feb 1987 at the society's QTH. Meetings: 8pm Tuesdays, Mosses Youth & Community Centre, Cecil St, Bury. PRO G0CUK, tel Bolton 706191.

**Chester (C&DARS)**—26 Aug (Pre-SSB HF Field Day Contest meeting). Morse classes 7.15pm. Main meetings 8pm. Chester Rugby Union Football Club, Hare Lane, Vicars Cross, Chester. Details G6IFA, tel 336639.

**Liverpool (L&DARS)**—5 Aug ("HGV driving", G1JEL), 12 ("Commodore computers", G4PKP), 19 (Video night), 26 ("HF NFD preparations", G4CVZ), 2 Sept (Open night), 8pm. The Churchill Conservative Club, Church Rd, Liverpool 15. Sec G1EXJ, tel 051-728 8811.

**Penrith (Eden Valley RS)**—21 Aug (Bar-B-Q at Church Brough). Meetings: 7.30pm, at The Ullswater School Evening Centre or at The Crown Hotel, Eamont Bridge. Details: G4XPO, tel Culgaith 462.

**Sale (South Manchester RC)**—1 Aug (Visit to Computer Graphics Centre, Manchester Regional Computer Centre), 8 ("Constructional Forum", G4SVR), 15 (DF event), 22 (TBA lecture), 29 (Mini lecture contest), 5 Sept ("The great egg race", part 5), 8pm. Sale Moor Community Centre, Norris Rd, Sale. Sec G3WFT, tel 061-973 1837.

**Thornton Cleveleys (TCARS)**—4, 11, 18, 25 Aug (Informal evenings/club on the air), 7.45pm. 1st Norbreck Scout HQ, Carr Rd off Fleetwood Rd, Bishopham, Blackpool. Details G4BFH, tel 0253 853554.

**Warrington (WARC)**—5 Aug (Open forum), 12 (Barbeque organized by Debby & Mike Mansfield, G1HUX & G6AWD), 19 (Guest speaker Bill Learmonth, G4YZE, from IBA, on Winter Hill Station), 26 (RSGB film, "Melbourne Radio Club"), 8pm Tuesdays. Grappenhall Community Centre, Bell House Lane, Warrington. Details Paul, tel 0925 814005.

**Wigan (Douglas Valley ARS)**—First and third Thursdays of month, 8pm. New venue: Standish Conservative Club, School Lane, Standish. Details Dave, tel Wigan 211397.

**Wirral (WARS)**—6, 20 Aug (Informal/club on the air), 3 Sept (Sale of surplus equipment), 8pm. Clubroom, Ivy Farm, Arrowe Park. Sec G3VEB.

Thanks go to Congleton RC for their hospitality on my recent visit. Would club secretaries ensure the deadlines for publication as shown in "Club News" at the head of this column as I am still getting info too late for publication. RR1

## REGION 2—RR P R Sheppard, G4EJP, 9 Elvington Crescent, Leconfield, Beverley, N Humberside HU17 7LX, Tel 0401 50397.

**Halifax (H&DARS, G2UG)**—19 Aug (VHF foxhunt). Meetings: Running Man ph, Peillon Lane. Details G0DLM, tel 0422 202306.

**Hull (H&DARS, G3AMW)**—8 Aug (DF hunt). Meetings: The Clubroom, Walton St. Details G0DMP, tel 0482 862149.

**Keighley (KARS, RS84851)**—12 Aug (Informal meeting), 26 (Club talk), 8pm. Victoria Hotel. Details G1IGH, tel 0274 496222.

**Leconfield (RCTARS, G4GGD)**—Club closed for holidays. Meetings: Normandy Barracks. Details G4SMB, tel 0401 51200.

**North Wakefield (NWRC, G4NOK)**—7 Aug (Natter night), 14 (On the air), 21 ("History of amateur radio", G3VTB), 23-25 (Special event, Harewood steam rally), 28 (Monthly meeting). White Horse ph. Details G4RCH, tel 0532 536633.

**Todmorden (T&DARS, G4WYT)**—4 Aug (Chat night), 18 ("Firearms", Harry Leak), 1 Sep (Chat night), 8pm. Queen Hotel. Details G1GZB, tel 070681 7572.

**UK FM Group (Northern) (G8KFM)**—3 Aug (Monthly meeting). Royal Hotel, Barnsley. Details G4UNA.

**Wakefield (W&DRS, G3WRS)**—5 Aug (Contest discussion), 19 (Car treasure hunt). Ossett Community Centre. Details G8PBE, tel 0924 378727.

**Wawne (Wawne Raynet Group, G4UWE)**—4 Aug (Communication test, Humberside Raynet), 18 (Training and group meeting). EP Section, Meaux Rd, Wawne. Details G4EJP, tel 0401 50397.

**York (YARS, G3HWW)**—16 Aug (Special event GB2TS, Tollerton village show). Meetings: United Services Clubroom, Micklegate. Details G3WVO, tel 0904 422084.

**York (YRCA, G4YRC)**—12 Aug (Informal), 26 (Antenna construction). Ashcroft Hotel, Bishopthorpe Road. Details G1FTA, tel 0904 704634.

## REGION 3—RR G Ross, G8MWR, 81 Ringwood Highway, Coventry CV2 2GT, Tel 0203 616941.

**Aldridge (Barr Beacon ARC)**—4 Aug (Informal), 18 (Closed for holiday). Meets alternate Mondays, 7.30pm. Barr Beacon Community School, Old Hall Lane, Aldridge. Sec G1OBA, tel 021-353 6233.

**Birmingham (Midland ARS)**—Mondays, construction night; 1st Tuesday, committee meeting; 2nd, computer night; 3rd, lecture, 4th, Raynet Group meeting. Wednesdays, morse and natter night. Thursdays, night on the air. Fridays, RAE class. Weekends, contests. 19 Aug (Club outing).

Unit 5, Henstead House, Henstead St, off Bromsgrove St. Sec G8BHE, tel 021-422 9787.

**Droitwich (DARC)**—25 Aug ("RTTY and slow scan", G3CXI), 8pm 2nd and 4th Mondays. Scout HQ, Droitwich. Sec G4HFP, tel (02993) 3818.

**Halesowen (MEB RC)**—12 Aug ("SSB generation", G6UDX), 8pm. MEB Social Club, Mucklow Hill, Halesowen. Sec G4RWH, tel 021-747 8784.

**Hereford (HARS)**—15 Aug (informal), 8pm. Civil Defence HQ, Gaol St, Hereford. Sec G3WRQ, tel (0432) 54064.

**Shrewsbury (Shropshire (Salop ARS)**—7 Aug (Discussion night), 21 (Daresbury Labs talk), 28 (Telford Rally organization), 8pm. Old Bucks Head, Frankwell, Shrewsbury. Sec G6OMJ, tel 0743 67799.

**Stafford (SARS)**—5 Aug (Natter night), 12 (Night on the air), 19 ("The Prison Service"), 8.30pm. Coach and Horses, Pasturefields, Staffs. Sec G6DAT, tel 08894 2453.

**Warwick (Mid-Warwick ARS)**—12 Aug (Bookswap and natter night), 26 (HF on the air), 8pm. St John Headquarters, 61 Emscote Rd, Warwick. Sec G6VHI.

## REGION 4—RR M Shardlow, G3SZJ, 19 Porreath Drive, Darley Abbey DE3 2BJ, Tel Derby (0332) 556875.

**Derby (DADARS)**—6, 9 Aug (Rally preparation, Lower Bemrose School), 10 (29th Annual Mobile Rally, Lower Bemrose School), 13 (TBA), 20 ("Cellular radio", G4YZG), 27 (Night on the air, using special call sign G83ERD), 3 Sept (Bring and buy sale), 7.30pm. 119 Green Lane, Derby. Sec G3KQF, tel 772361.

**Glossop (GADARG)**—28 Aug ("Japanese morse", Norman Kendrick), 7.30pm. Nags Head Hotel, Charleston Road, Glossop. Sec G4GNQ.

**Leicester (LRS)**—4 Aug (TBA), 11 (Committee meeting/activity night), 18 (TBA), 25 (TBA), 7.30pm. Gilroes Cottage, Groby Road, Leicester. Sec G4PDZ, tel 871086.

**Nottingham (ARCON)**—7 Aug (144MHz foxhunt, No 4), 14 (Activity night), 21 (Activity night), 28 ("My visit to the USA", G4MHB), 4 Sept (144MHz foxhunt, No 5), 7.30pm. The Sherwood Community Centre, Woodthorpe House, Mansfield Road, Nottingham. Sec G4PJZ, tel 624764.

**Worksop (WARS)**—2 Aug (Bar-B-Q at Clumber Park), 12 (Darts and dominoes, with the Sub Aqua Club), 26 (DF hunt), 7.30pm. The Maltins, Gateford Road, Worksop. Sec G4ZUN, tel 486614.

**REGION 5—RR J S Allen, G3DOT, 77 Rosslyn Crescent, Luton LU3 2AT.**  
Tel 0582 508515 or at work on 0582 21151.  
**Dunstable (DDRC)**—1 Aug (Hein Wolf video, "The Spark Transmitter"), 15 (On the air, hf and vhf), 29 ("The Lundy Expedition", Nene Valley ARC), 30 (Summer barbecue). Room 3, Chews House, High Street South, Dunstable. Sec G6EES, tel Dunstable 607623.  
**Leighton Buzzard (LLRC)**—4 Aug (DF hunt), 1 Sept (AGM). Sec Debbie Jones, tel 0908 649238.  
**Milton Keynes (MK&DARS)**—"Lundy Island Expedition", details from sec G3ZPA. "The Meeting Place", Hodge Lea, North Milton Keynes.  
**Sheffield (S&DARS)**—28 Aug (SSB Field Day planning). Black Horse ph, Ireland, nr Old Warden.

**REGION 7—RR R Sykes, G3NFV, 16 The Ridgeway, Fetcham, Leatherhead, Surrey KT22 9AZ. Tel 0372 372587.**  
**Ashford (Echelford ARS)**—11 Aug (Surplus equipment sale), 28 (TBA). 8pm. The Hall, St Martin's Court, Kingston Crescent, Ashford, Middx. Sec G4VAZ, tel Sunbury 82823.  
**Bexleyheath (North Kent RS)**—16/17 Aug (40th anniversary field event), 19 (Natter night). 8pm. The Pop-in-Parlour, Graham Road, Bexleyheath. Sec G4DIB.  
**Biggin Hill (BHARC)**—19 Aug (DF/treasure hunt). 8pm. Downe Village Hall, 24 High Street, Downe, Kent. Sec G0AMP, tel 0689 57848.  
**Cray Valley (CVRS)**—21 Aug (Night on the air), 4 Sept ("Food for Thought" Part 2, G4BWW). 8pm. Progress Hall, Admiral Seymour Road, Eltham SE9. Details G3TAA.  
**Crystal Palace (CP&DRS)**—16 Aug ("Professional satellite communications", G3SGN). 8pm. All Saints Parish Room, Upper Norwood, SE19. Sec G3FZL, tel 01-699 6940.  
**Dorking (D&DRS)**—12 Aug (Informal), 26 (Social evening barbecue). 8pm. Star and Garter (12th), The Fox Revived, Norwood Hill (26th). Sec G3AEZ, tel 0306 77236.  
**Sutton and Cheam (S&CRS)**—15 Aug ("Computers in amateur radio"). 8pm. Downs Lawn Tennis Club, Holland Avenue, Cheam, Surrey. Sec G4BOX.  
**Wimbledon (W&DRS)**—8 Aug (Pre-camp briefing), 9-17 (Annual camp). 8pm. New venue. Sec G3DWW, tel 01-540 2180.

**REGION 8—RR M Elliott, G4VEC, 20 Haysel, Sittingbourne, Kent ME10 4QE.**  
Tel 0795 70132.  
**Crawley (CARC)**—27 Aug (VHF pub hunt). 8pm. Crawley Leisure Centre, Haslett Ave, Crawley. Sec G4IQM, tel Crawley 882641.  
**Dartford (DDFC)**—3 Aug (RSGB hunt), 5 (Pre-hunt meeting), 10 (RSGB hunt), 17 (RSGB hunt), 19 (Night hunt, 7.30pm). Prehunt meetings after 9pm. Horse & Groom ph, Leyton Cross, Dartford Heath. Details G8DYF, tel Greenhithe 844467.  
**Edenbridge (EARS)**—13 Aug ("All you wanted to know about thyristors but were afraid to ask", G6JVT), 10 Sept (RSGB presentation, RR8). Scout Hut, High St, Edenbridge. Details G8VCH, tel East Grinstead 24748.  
**Eastbourne (Southdown ARS)**—11 Aug (Main meeting), 25 (Foxhunt with Hastings Radio & Electronics Club). Main meetings, 7.30pm. Chaseley Home, South Cliff, Eastbourne. Tuesday nights, various courses; Friday nights, 'Chat night'. Hailsham Leisure Centre, Vicarage Lane, Hailsham. Details G4XNL, tel Eastbourne 638653.  
**Gillingham (Bredhurst R&TS)**—7 Aug ("Wire antennas and feeder systems", G5RV). All visitors welcome to this most interesting lecture. 21 ("After the RAE", G8CCJ). 8pm. Parkwood Community Centre, Parkwood Green, Rainham, Gillingham. Details G0AMZ, tel Medway 376991.  
**Hastings (HERC)**—20 Aug ("HF dx", G3BDQ). 7.45pm. West Hill Community Centre, various activities other nights, Ashdown Farm Community Centre. Details G4NVQ, tel Hastings 420608.  
**Maidstone (MYMCAARS)**—Every Friday in August: Natter nights and practical antennas, start 8.30pm. Also Morse instruction and RAE classes, 7.30pm. YMCA Sports Centre, Melrose Close, Cripples Street, Maidstone. Details new sec G0BUW, tel 0622 30544.  
**Margate (RC of Thanet)**—12 Aug ("Natter night"), 26 (C M Howes Communications), 30 (GB2MAC from Margate seafont). 8pm. Grosvenor Club, Grosvenor Place, Margate. Details G4SBD, tel 0843 33213.



On 15 March 1986 the RAFARS, RNARS and RSARS were invited to send a representative to Ian Fraser House, Ovingdean, Brighton, for the St Dunstan's ARS tenth anniversary luncheon. The photograph shows presentations being made to Ted John, G3SEJ, centre, chairman of St Dunstan's ARS. Left: Jack Cooper, G3DPS, representing the RSARS, who presented the shield being held by G3SEJ. Right: Eric Palmer, G3FVC, representing the RAFARS, who presented the plaque with the crest of No 1 Radio School, RAF Locking. G3FVC is holding an SDARS crest which he received from Ted John, who also presented one to G3DPS. A St Dunstan's photograph.

**Meopham (MPRC)**—New club. Meets 7.30pm, second Sunday of the month. The Club House, Vigo Rugby Football Club, Vigo Village, Meopham. Details G6TXP, tel 0732 883812.  
**Tunbridge Wells (West Kent ARS)**—8pm. Adult Education Centre Annexe, Quarry Rd, Tunbridge Wells. Details new sec G3XPX, tel 0892 48575.  
**Worthing (WADARC)**—6 Aug (Junk sale). 7.30pm. Lancing Parish Hall, South Street, Lancing, Worthing. Details Roy Jones, G4SWH. WADARC, PO Box 599, Worthing, West Sussex BN14 7TT.

**REGION 9—RR A H Hammett, Rosehill, Ladock, Truro, Cornwall TR2 4PQ.**  
Tel 0726 882758.  
**Axe Vale (AVARC)**—1 Aug (Family picnic), 5 Sept ("Impedance matching at vhf", G3GC). 7.30pm. The Cavalier. Sec G3VW.  
**Exmoor Radio Club**—From 1 Sept, meetings will be transferred to the South Molton Community College, South Molton. All correspondence to Peter Dixon, G4JBR, c/o the college.  
**Exmouth (ERC)**—13 Aug (Field night on Woodberry Common), 27 (Natter night and novice constructors preview). 7.30pm. Scout Hut, Marpool Hill, Exmouth. Details G4RUT.  
**Redruth (Cornish ARC)**—7 Aug ("Radio, the amateur, and the blind", G4FNP), 11 Aug ("Antique computers", various speakers), 18 Aug (Constructors evening). 7.30pm. Church Hall, Treleigh, Redruth. Sec G4USB.  
**Saltash (SCDARC)**—1 Aug (144MHz foxhunt, starting at the clubroom), 15 Aug (Treasure hunt, starting at the clubroom), 5 Sept (Members evening, brief talks by members on a variety of interesting subjects). 7.30pm. Burraton Toc H Hall, Warraton Road, Saltash. Sec G0AKH.  
**Torbay (TARS)**—24 Aug (Torbay rally, STC Social Club, Brixham Road, Paignton. Doors open 10am. Free parking. Talk-in on S22. Trade stands and bring and buy). Details of TARS 30 Award from G3VNG. Sec G1EVA.

**REGION 10—STOP PRESS Mr D A Phillips, GW4KQ, has been co-opted by the RSGB Council as Region 10 representative. His address is 17 Pentre Gardens, Grange Town, Cardiff CF1 7QJ.**  
**Blackwood (BARS)**—Fridays 7pm. Oakdale Comprehensive School, Oakdale, Blackwood. A full programme was arranged for June but was not able to make the "Club News" deadline. During Aug, two lectures are to be finalized: "VHF linears" and "Electrical earthing, trips and fuses". New sec GW6YYR.  
**Cardiff (CRSGBG)**—Tyla Teg, Pantmawr Estate, Whitchurch, Cardiff. 7.30pm. Pantmawr Hotel, 11 Aug (Open forum, with discussion on the series on "aerials", Sec GW0CUM, tel Cowbridge 3212).  
**Rhondda (EARS)**—7 Aug (Natter night), 21 (GW2FOF evening). 7.30pm. National Union of Mineworkers' Club, Tonyandy. Enrolment for RAE at Rhondda College of Further Education, week commencing 1 Sept. A/sec GW1ALQ.

**Swansea (SARS)**—21 Aug (Final preparations for special event station at Gwili Railway on 25 Aug), 4 Sept (Last panic for HF SSB FD). 7.30pm. Lecture room "N", Applied Sciences Building, Swansea University. Meetings commence with Morse practice. Club net, Sundays 11am, 28,530kHz. Details GW4HSH, tel Swansea 404422.

**REGION 11—RR B H Green, GW2FLZ, 1 Clwyd Court, Tan-y-Bryn Road, Colwyn Bay, Clwyd LL28 4AH. Tel 0492 49288.**  
**Porthmadog (P&DARC)**—21 Aug (Foxhunt), 18 Sept (Video film). 8pm. Harbour Cafe, Ffestiniog Railway, Porthmadog. Sec GW1EGQ, tel 0766 2684.  
**Rhyl (R&DARC, GW4ARC)**—4 Aug (Raynet talk, GW4PUX), 18 (Activity night), 1 Sept (AGM). 7.30pm. 2nd Rhyl Scout HQ, Vale Road, Rhyl. Sec GW8OYT, tel 0745 37284.

Please would club secretaries send to me their club programmes for October 86 onwards, as soon as possible, so that I may insert them in "Club News".  
RR11

**REGION 12—RR M R Hobson, GM8KPH, 17 Well Brae, Pitlochry, Perthshire PH16 5HH.**  
Tel 0796 2140.  
**Aberdeen (ARC)**—17 Aug (GB4BGG at the Beechgrove Garden Open Day), 29 (Proposed visit to Stonehaven Radio), 5 Sept (Preparation for 144MHz Trophy, SWL, and IARU SSB FD). 7.30pm. 35 Thistle Lane, Aberdeen. Sec GM4GXD, tel Pitcaple 251.  
**Dundee (Kingsway Tech ARC)**—Tuesdays, 7.30pm. The club is continuing to meet over the summer at an alternative venue. Phone sec GM4UZZ, tel Dundee 644579, for details.  
**Lerwick (LRC)**—Thursdays, 7pm. Islesburgh Community Centre, King Harold Street, Lerwick. Sec GM3ZET.

**REGION 13—RR A J Scott, 2 Manderston Grove, Duns, Berwickshire TD11 3PP.**  
Tel 0361 83221.  
**Border (BARS, GM0BRS)**—1 Aug (Visit to local Coastguard station), 15 Aug ("Safety in the shack"), 5 Sept (FD preparations). 7.30pm. Tweed View Hotel, Berwick. Sec GM1IRN, tel 0289 82491.  
**Galashiels (G&DARS, GM4YEQ)**—24 Aug (Open day at Gala Rugby Club, Netherdale. Opens 11am. Traders, Morse tests, bar, good parking facilities, talk-in on S22). Details GMOAMB, tel 0896 55569.  
**Leslie (Glenrothes & DARC, GM3ULG/GM4GRC)**—13 Sept (Scottish Convention, Scotam '86, Lomond Centre, Glenrothes. Extended facilities, good parking, lectures, bring/buy, traders, Morse tests. Starts 11am. S22 talk-in. Details GM3ZSP, tel 0334 53336.  
**Lothian (LRS, GM3HAM)**—August (DF hunt, top band, date/time from sec). Meetings 2nd and 4th Wednesdays, 7.30pm. Harwell House, Ettrick Road, Edinburgh. Sec GM4YPL, tel 0506 890177.





In his capacity of vice-president of the RAFARS, the Director of Signals (Air), Air Commodore G V Lobley RAF, recently visited the headquarters station of the RAFARS at RAF Locking. L to r: Wing Commander R Stickland RAF, chairman, RAFARS HQ Committee; Mr E Palmer, G3FVC, QRV editor and publicity; Mr D Shaw, G8RJO, RAFARS Callbook editor; Flying Officer B Bust WRAF, admin sec; Air Commodore G V Lobley RAF, vice-president, RAFARS; Flying Officer V Atkins WRAF, treasurer, RAFARS; Group Captain M R M Heyes RAF, president, RAFARS; Flight Lieutenant M Harryman RAF, registration sec; Sergeant J Leaper, G4VUB, communications manager

**REGION 14—RR T G Wylie, GM4FDM, 3 Kings Crescent, Elderslie, Strathclyde PA5 9AB.**

Tel Johnstone (0505) 22749.

**Helensburgh (HARC)—21 Aug** (Re-opening of refurbished club rooms at Cairndhu House, Rhu Road, Helensburgh, 7.30pm. Visitors will be made most welcome. Light refreshments will be provided. GB0HEL will be in operation, and talk-in will be provided on S22 and SU8. Details: contact Dave, tel 0389-841452, or sec Mr J Thomson, 37 Grant Street, Helensburgh.

**Glasgow (West of Scotland ARS)—New sec Mr A Buchan, GM0EFH, 14 Jordanhill Drive, Glasgow, tel 959 4786.** Meetings throughout summer months at 154 Ingram Street, Glasgow.

**Kilmarnock (KLARC)—New sec Mr J Walker, 28 Lomond Place, Castlepark, Irvine KA12 9PG, tel Irvine 72762.**

**REGION 16—RR A Owen, G4HMF, 102 Constable Road, Ipswich, Suffolk IP4 2XA. Tel 0473 51319.**

**Felixstowe (F&DARS)—11 Aug** (Social), 25 Aug (Project evening), 28 (Visit to Radio Orwell). 8pm. The Feathers ph, Walton High Street, Felixstowe. Sec G4YQC, tel 0473 642595.

**Ipswich (IRC)—7 Aug** (Planning Carnival), 27 ("Slow scan", G4BAV). 8pm. Rose & Crown ph, Norwich Road, Ipswich. Sec G4IFF, tel 0473 44047.

**King's Lynn (Norfolk College of Art & Technology Student's Union ARC, G3XYZ)—Welcome to this**

re-formed club. Meetings: Thursdays, 7.30pm. St John's School, London Road, King's Lynn. RSGB members in the area are asked to contact G4OZG.

**REGION 17—RR T Emery, G3KWU, Wilverley, Old Lyndhurst Road, Cadnam, Southampton SO4 2NL. Tel 0703 812435.**

**Amateur Radio and Computer Club (AMRAC)—1 Aug** (Club barbeque, G1JAF's QTH). Sec G6DLJ, tel (0703) 847754.

**Andover (ARAC)—6 Aug** (Natter night), 20 ("Calibration evening"), 3 Sept (Construction contest). 8pm. Wolversdene Club, Andover. Club net, 8pm. Tuesday evenings S18, G0ARC/A. Sec G0AMO, tel Andover 51593.

**Basingstoke (BARC)—4 Aug** (Natter night), 1 Sept ("Surface mounted devices", G4OXK). 7.30pm. Forest Ring Community Centre, Sycamore Way, Basingstoke. Sec G4WIZ, tel Tadley 5185.

**Blackmore Vale (BVARC)—12 Aug** ("Project Competition" judged by Tony of Spectrum Communications), 26 (Project night). 7.45pm. The Bell and Crown ph, Zeals (on the A303). Sec G4YXX, tel 0963 32389.

**Bournemouth (BARS)—1 Aug** (Natter night), 15 ("USA", G4EKE). 7.30pm. Kinson Community Centre, Kinson, Bournemouth. Sec G4EKE, tel (0202) 877945.

**Fareham (F&DARS)—All August meetings given over to portable operation.** Every Wednesday, 7.30pm. Portchester Community Centre, Port-

chester, Hants. Sec G3CCB, tel Fareham 288139. **Hordean (H&DARC)—7 Aug** ("The Society", by G3KWU), 4 Sept (Junk sale), 7.30 for 8pm. Murchiston Hall, London Road, Hordean. 1986 is 10th anniversary year of club, with special award. Sec G4BEC.

**Liphook (Three Counties ARC)—6 Aug** (On air night), 20 ("50MHz operation", G3TCU), 3 Sept ("Propagation", G3LTP). 8pm. The Railway Hotel, Liphook. Sec G0BTU, tel Petersfield 66489.

**New Forest Repeater Group (GB3NF)—For information or to join the group and help support the repeater, please contact G6DLJ, tel (0703) 847754.**

**Poole (PARS)—29 Aug** ("10m—dead or alive", G4YXX). 7.30pm. Commander's House, Constitution Hill Road, Poole. Sec G4YXX.

**Portsmouth Hill Repeater Group (GB3PH)—For information or to join the group and help support the repeater, please contact Mr A L G Price, tel (0329) 281852.**

**UK FM Southern Repeater Holding Group (GB3SN)—For information or to join the group and help support the repeater please contact Mrs Jan Steele, tel Fleet 3311.**

**Wimborne (FRARS)—3 Aug** (Preparing for Hamfest), 10 ("HAMFEST '86"). Sundays 7.30pm. Flight Refuelling Social Club, Merley, Wimborne. Sec G0CDY.

**Weymouth (South Dorset ARC)—5 Aug** ("Slow-scan tv"), 2 Sept ("Radio control of model aeroplanes", G3YWW). 7.30pm. Army Bridging Camp, Wyke Regis. Sec G1AHK, tel 67596.

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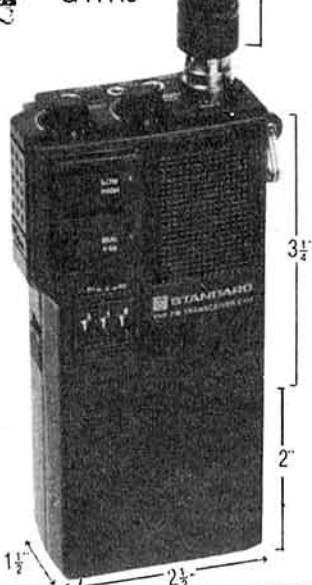
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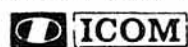


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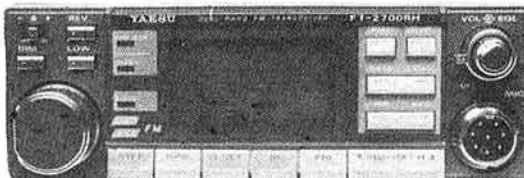
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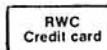
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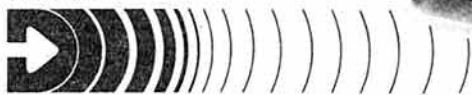
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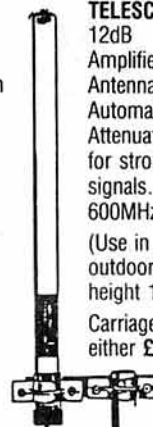
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**SUMMER STOCK CLEARANCE**. FT 757GX + Yaesu P.S.U. £879 (save £199) FT 726R £799 (save £90). FT 101E/B original valves matched pair N.E.C. 6JS6C + NEC 12BY7A (£47) £32 p.p. FT 101ZD matched pair G.E. 6146B + 12BY7A £28.50 p.p. Ditto FT 102 £40 p.p. Shure 444D Mic (£72) £59 p.p. 160m kits for Z match £6.75 p.p. FTV 901 6m units £132 p.p. FT 290R £339 (listen on input, auto tone burst, a brighter audio £15 extra). Black Star 600 MHz counters (£146) £139 p.p. FT 101E/B Epicyclic drives £4 p.p. Double balanced mixer—improves RX older FT 101's £17 p.p. WARC Band Kit 101E/B £15.50 p.p. Holdings/Amateur Electronics, 45, Johnston Street, Blackburn. BB2 1EF (0254) 59595.

**WANTED FC 902 ATUs** also FT 101ZDs, etc. Holdings/AEUK, 45, Johnston Street, Blackburn. BB2 1EF. Tel. (0254) 59595.

## FOR SALE (cont)

**QRP COMPONENTS**. SAE for list, or component guide £1.65 inc p&p. Resistor pack, 60 values, 600 1/4 Watt resistors, £5.45 inc p&p. Cambridge QRP Components, 30 Rookery Close, St Ives, Cambridgeshire PE17 4FX. Tel. (0480) 68330.

**MANUALS/EQUIPMENT**. SSB Products, 42 Halvaras Road, Playing Place, Truro. (0872) 862575. FT200/FP200, FRV7700, rotators, signal generators, etc. SAE for list. Established 1952. Norman Birkett G3EKK.

**GWM RADIO LTD**. 40/42 Portland Road, Worthing, Sussex. tel (0903) 34897. Many one off bargains for callers. No lists. Px welcomed. Few only Pye WA60 UHF base station £45.00 inc VAT.

## RSGB AMATEUR RADIO INSURANCE SCHEME

"ALL RISKS" INSURANCE for portable/mobile/base station amateur radio and ancillary equipment. A service for RSGB members only. Also public liability and equipment insurance for affiliated clubs and societies. Details and leaflets from Nick Gibson, Amateur Radio Insurance Services Ltd, 19 Quarry Street, Guildford, Surrey. Tel: 0483 33771.

## COMPUTER SOFTWARE/HARDWARE

**AMPROM** Transfers files over amateur radio, error-free. For BBC B or B+. SAE for details. CTP Software, 107A Shacklewell Lane, London E8 2EB.

**MARK 2 G3WHO AMTOR** program now available on 16K Eprom for BBC B. Greatly expanded with many new features including RTTY and CW transceive. Price unchanged at £27. This must be the best value amateur radio software available. SAE or phone for details. P.J. Harris, 10 Appleby Close, Great Aine, Alcester, Warwickshire B49 6HJ. (078 981) 377.

**AC LINEAR CIRCUIT ANALYSIS** on BBC Model B. Suite of programs; 30 nodes, active, passive components, full editing, log/in frequency sweeps, mode 0 graphs £60.00. Details Markie Enterprises, 17 Percy Road, Shepherds Bush, London. W12 9PX.

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**FAX FOR THE SPECTRUM!** Now you can receive FAX pictures using your 48k Spectrum. Complete system, with built and tested hardware, £17 including p&p. (Overseas £18). Or send an sae for more information. Other programs available: RTTY, UoSAT and Utilities. G4IDE Micro Systems, 79 South Parade, Boston, Lincs PE21 7PN.

**6809 FLEX COMPUTER KIT SYSTEM**. 16 slot motherboard, CPU, 64K RAM, 80 character colour display, 80/40 track S/or/D sided disks. Full stock of Flex Software. Venture FORTH runs on a standard Flex random access file. Also 6809 for Tangerines. SAE for details. R-Allen Eng, Forncett End Norwich.

## HOLIDAY ACCOMMODATION

**FLYING FROM GATWICK?** Stay with G4MGU. Mill Lodge Guest House. 4 minutes from airport. Transport available. Telephone (0293) 771170.

**SOUTH DEVON HOLIDAY**: Farmborough House, Chudleigh, Newton Abbot, Devon, TQ13 0DR. Tel: (0626) 853258. In own 10 acres near Dartmoor. Opportunities: painting, Yoga, etc. Well equipped radio shack (G4YXC), metal/woodworking facilities. Vegetarian wholefood. Non-smoking. SAE please: Mrs Sophie Edwards.

**STOP PRESS! FAIRMOUTH NOW LICENSED**. Enjoy our wonderful meals, and good wines, in the peace and tranquility of Fairmouth House Hotel. Ensuite bedrooms, all warm, comfortable and with tea-making facilities. Dogs welcome too. Special family holidays. From £18 BBEM. Also meet G6GR, licensed 64 years, use the rigs if you are licensed and try the new Tono communications-terminal computer. Tel (0803) 605446. Fairmouth House Hotel, Herbert Road, Chelston, Torquay.

**PEACE/QUIET SELF-CATERING** chalets. (£15-£120). Central touring, omni for DXing. GOATS shack. 'Chylean', Tintagel, Cornwall PL34 0HH. (0840) 212262.

**SELF CONTAINED FLATS**. Parking, babysitting, reduced autumn rates RadCom readers. Linden House, Ruckamore Road, Torquay 607333.

## MISCELLANEOUS

**HEATHKIT**. UK spares and service centre. Cedar Electronics, Unit 12, Station Drive, Bredon, Tewkesbury, Glos. Telephone (0684) 73127.

**PATENTS TRADE MARKS AND DESIGN**—Booklets on request. Kings Patent Agency Ltd, Established 1866, (B.T. King MIMech, E.J.B. King, regd. Patents Agents)—146a Queen Victoria Street, London EC4V 5AT. Tel: 01-248 6161. Telex 883805.

**REPAIRS** amateur equipment. All bands, all types inc tone demodulators. Fast turnaround, quotes by phone. W.T.S. Electronics, 5-9 Portland Road, Luton, Beds. Tel 24hrs (0582) 458375

## PLEASE REMEMBER

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**RADIO COMMUNICATION**



### TECHNICAL ENGINEERING AND SECRETARIAL VACANCIES

This Company is now in its eighth year of business. During the last two years we have moved to our new premises and operated a policy of carefully controlled consolidation. We are now in a position to offer the following positions to suitable applicants who will support the existing team well into the next phase of our continued growth.

Zycomm, manufactures and supplies all forms of mobile radio and mobile telecommunication products and services to all sectors of industry and commerce both at home and abroad. In 1985 our major contract within that year had an end user value in excess of £1.2 Million. This contract alone involved our staff developing, delivering, and installing a completely new radio system for the Government of Saudi Arabia, at their new Naval Port at Jeddah. In the first six months of this year at home we have increased our executed sales regularly by a monthly average of 30% over that same period last year. In addition to our regular monthly trading we currently have two major contracts, one for a local authority, and one for an electricity authority, valued at well in excess of £400,000. As a Company, we have since the setting up of our 100+ dealer network, given these dealers our 100% support. **This will be the case in the future for those dealers who deserve our continued support.** For the customers we have in areas where we feel some dealers have not offered satisfactory support, we shall either make alternative appointments, or set up our own depots. For this reason we have opened up **Zycomm 2 Way Radio (South West) Ltd., in Bristol, and Zycomm 2 Way Radio (Scotland) Ltd., in Glasgow.**

In the last few months the Minister at the Department of Trade and Industry has acknowledged our local achievements in the industry by granting to Zycomm the East Midlands operators licence for 20 new trunked radio channels in the new Band 3 (175-225 MHz) frequency allocation. This heavily contested award gives us satisfactory spectrum to serve our customers in this area for the next five years. We shall now pursue applications for similar licences in Bristol, then Glasgow, followed by all other areas.

The current vacancies we have are:

#### DEVELOPMENT ENGINEER, RIPLEY

An attractive package will be offered to the successful applicant with an initial salary of between £7,500 and £9,000 depending on qualifications and experience. As a valued member of the development team the applicant will be responsible for investigating worldwide

available product then either applying it or modifying it for U.K., C.E.P.T., and B.A.B.T. approval. An ability to design and follow through from its conceptual stage to preproduction prototype various two way radio products is essential. For this position an excellent working knowledge of both R.F. techniques and a full practical appreciation of micro-processors is mandatory. The successful applicant will need to be equally conversant with state of the art signalling development such as sequential tone, digital, sub-audible, encryption, and fast frequency shift keying (F.F.S.K.). The applicant should be ideally aged under 35, and hold a degree or H.N.D. Electronics (or associated discipline). It is most important that the applicant is equally at home with the practical aspect of this position.

#### SERVICE ENGINEER, RIPLEY

We are in the position at Ripley where we need just half a person in either of the two workshops at any one time. The applicant for this position must feel satisfied with internal bench service work, but be able to assist for 50% of his time at very short notice moving over to the P.D.I. section to assist with special engineering on orders which probably need to go out before 5 P.M. that same day. We do feel however that it is important that the person should be capable of full bench service work to component level on equipment operating up to 1.5 GHz. It is anticipated that this position will primarily be a workshop position with very little outside work, and as such may well suit a partially disabled person who has suitable experience. The ability to use some of the most advanced mobile radio menu-driven testgear is essential. A well read, experienced radio amateur aged 28-40 may well find fulfillment in this position at an initial salary of £6,500-£7,000.

#### SERVICE ENGINEER based at BRISTOL and GLASGOW

These positions differ from the above (Ripley) vacancy in that initially the engineer will be responsible for all the engineering work at each of the depots, using most advanced testgear/apparatus and will work directly under the recently appointed depot manager. In both these positions the successful applicant can look forward to promotion to service/engineering manager at his respective depot, within the year, if he shows the ability. The position is offered initially at a salary of £7,500-£8,000 depending on qualifications, experience, and location. A Company vehicle is offered with both these

positions for business and private use in return for out of hours participation, which is anticipated. The ideal age range for these applicants is 28-38.

#### THE ELECTRONICS CENTRE RIPLEY VACANCY FOR MANAGER(ESS)

The successful applicant will join us in September, to open in November, a new hobby and consumer electronics centre in the town centre of Ripley. Covering the Midlands area, equipped with custom designed showroom and workshops, the facility will serve the consumer, who may either call in directly or order by mail, a full range of interesting and in many cases unique items. Satellite T.V., Meteorological Satellite systems, telephones and telephone accessories, Viewphones together with various Amateur Radio and P.R.S. ranges of equipment is to be offered. Components are a specialised field which will also be catered for, as will the small business computer and home computer market in early 1987 by just one of the several new agencies we have. The applicant should have a comprehensive knowledge of purchasing, market management and identification techniques, together with a full knowledge of consumer credit law and should ideally be under 45 years of age. A good personal interest and involvement in the electronics field is essential for this position together with a full class A Radio Amateur licence. Salary and conditions are fully negotiable.

#### SECRETARY TO DEPOT MANAGER based at BRISTOL and GLASGOW and for the near future applications for the West Midlands and Tyne & Wear will be accepted.

Initially the Secretary appointed to each position will find herself very much a 'Girl Friday' until each depot becomes fully operational. An excellent telephone manner is essential together with normal secretarial skills of wordprocessing and facsimile operation. The appointee will become totally responsible to the depot manager for the smooth operation of the depot . . . in fact to keep him running! The secretary will co-ordinate the operation with her very experienced counterpart based at Ripley. Local advertising and promotion will also be part of this very demanding but rewarding position. Age?, well we never count the years of a lady only the performance, for an initial salary of circa £5,500.

Apply in full confidence to:

**M. I. Sneap, Managing Director, Zycomm Electronics Ltd.,  
Nottingham Road, Ripley, Derby DE5 3AN**

*It should be noted that telephone enquiries or agency enquiries cannot be undertaken.*

## 2 way radio



# RSGB MAIL-ORDER PRICE LIST

	Non-members' price	Members' price		Non-members' price	Members' price
<b>RSGB books</b>			<b>Other publications</b>		
<i>A Guide to Amateur Radio</i> (19th edn)	£4.14	£3.52	<i>All About Cubical Quad Antennas</i> (RPI)	£7.73	£6.57
<i>Amateur Radio Operating Manual</i> (3rd edn)	£6.52	£5.54	<i>Amateur Single Sideband</i> (Ham Radio)	£6.04	£5.13
<i>Amateur Radio Software</i>	£8.69	£7.39	<i>Amateur Television Handbook</i> (revised) (BATC)	£3.25	£2.76
<i>HF Antennas for All Locations</i>	£7.79	£6.62	<i>Antenna Compendium Vol 1</i> (ARRL)	£10.29	£8.75
<i>How to Pass the Radio Amateurs' Examination</i>	£3.62	£3.08	<i>ARRL Antenna Book</i> (ARRL)	£11.29	£9.60
<i>Microwave Newsletter Technical Collection</i>	£7.23	£6.15	<i>AX25 Amateur Packet Radio Link-layer Protocol</i> (ARRL)	£5.68	£4.83
<i>Morse Code for Radio Amateurs</i>	£1.75	£1.49	<i>Basic Radio Electronics</i> (Willey)	£17.71	£15.05
<i>RSGB Amateur Radio Call Book 1986</i>	£5.75	£4.89	<i>Beam Antenna Handbook</i> (RPI)	£8.22	£6.99
<i>Radio Amateurs' Examination Manual</i> (11th edn)	£4.07	£3.46	<i>Better Short Wave Reception</i> (RPI)	£7.57	£6.43
<i>Radio Communication Handbook Vol 2</i> (hb)	£8.96	£7.62	<i>Care and Feeding of (Varian) Power Grid Tubes</i> (ARRL)	£11.07	£9.41
<i>Radio Communication Handbook Vol 1 &amp; 2</i> (pb)	£14.10	£11.99	<i>CMOS Cookbook</i> (Sams)	£14.47	£12.30
<i>Radio Data Reference Book</i> (5th edn)	£9.13	£7.76	<i>Complete DX'er</i> (ARRL)	£8.60	£7.31
<i>Raynet Manual</i> (1984 edn)	£2.95	£2.51	<i>Complete Shortwave Listener's Handbook</i> (Tab)	£13.53	£11.50
<i>Teleprinter Handbook</i> (2nd edn)	£7.67	£6.52	<i>Design of VMOs Circuits with experiments</i> (Sams)	£9.40	£7.99
<i>Television Interference Manual</i> (2nd edn)	£2.45	£2.08	<i>DX Edge (hf propagation Aid)</i>	£15.65	£13.30
<i>Test Equipment for the Radio Amateur</i>	£6.79	£5.77	<i>FM and Repeaters for the Radio Amateur</i> (ARRL)	£4.75	£4.04
<i>VHF/UHF Manual</i> (4th edn)	£11.20	£9.52	<i>Fourth ARRL Amateur Radio Computer Networking Conference</i>	£11.16	£9.49
<i>World at Their Fingertips</i>	£8.21	£6.98	<i>G-QRP Club Circuit Book</i>	£5.00	£4.25
<b>RSGB logbooks</b>			<i>Guide to Oscar Operation</i> (Amsat-UK)	£1.97	£1.67
<i>Amateur Radio Logbook</i>	£2.93	£2.49	<i>Joy of QRP</i> (Adrian Weiss, WORSF)	£9.40	£7.99
<i>Mobile Logbook</i>	£1.30	£1.11	<i>Linear Op-Amp Handbook</i> (Carr)	£12.93	£10.99
<i>Receiving Station Logbook</i>	£3.04	£2.58	<i>Oscar 10 Handbook</i> (Amsat-UK)	£3.87	£3.29
<b>RSGB maps, charts and lists</b>			<i>Radio Amateurs' Antenna Handbook</i> (RPI)	£8.72	£7.41
<i>HF Awards List and Countries List</i>	51p	43p	<i>Radio Amateur Callbook Foreign Listings 1986</i> (ARCI)	£19.43	£16.52
<i>Great Circle DX Map</i> (wall)	£2.57	£2.18	<i>Radio Amateur Callbook North American Listings 1986</i> (ARCI)	£19.98	£16.98
<i>IARU Region 1 Beacon List</i>	42p	36p	<i>Radio Amateurs' Handbook 1986</i> (ARRL)	£18.12	£15.40
<i>Locator Map of Europe</i> (wall)	£2.07	£1.76	<i>Radio Communication Receivers</i> (Tab)	£17.43	£14.82
<i>Locator Map of Europe</i> (card for desk)	75p	64p	<i>Radio Frequency Interference</i> (ARRL)	£4.63	£3.94
<i>Locator Map of Western Europe</i> (wall)	£3.24	£2.75	<i>RTTY the Easy Way</i> (BARTG)	£4.69	£3.99
<i>Meteor scatter data sheets</i>	£3.72	£3.16	<i>Satellite Experimenters' Handbook</i> (ARRL)	£11.19	£9.51
<i>Smith Charts, pad of 25</i> (Chartwell D7510)	£2.35	£2.00	<i>Satellite Tracking Software</i> (Amsat-UK)	£4.73	£4.02
<i>UK Beacon List</i>	42p	36p	<i>Secrets of Ham Radio DXing</i> (Tab)	£8.78	£7.46
<i>UK Repeater List</i>	53p	45p	<i>Semiconductor Data Book</i> (Newnes)	£8.80	£7.48
<i>World Prefix Map in full colour</i> (wall)	£2.68	£2.28	<i>Shortwave Listeners' Antenna Handbook</i>	£17.54	£14.91
<b>RSGB members' sundries (members only)</b>			<i>Simple Low-cost Wire Antennas</i> (RPI)	£10.55	£8.97
<i>RSGB badge car sticker</i>	—	53p	<i>Towards the Radio Amateurs' Examination</i> (Stam)	£4.77	£4.05
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<i>RSGB tie</i> (coffee, maroon, green or blue—please state)	—	£3.20	<i>Towers Op-Amp Selector</i> (Foulsham)	£10.99	£9.34
<i>RSGB callsign cap</i>	—	£4.98	<i>TV for Amateurs</i> (BATC)	£2.45	£2.08
<i>RSGB logo rubber stamp</i>	—	£3.16	<i>Understanding Amateur Radio</i> (ARRL)	£5.20	£4.42
<i>RSGB teeshirts</i> (medium, large ex large—please state)	—	£4.90	<i>Weekend Projects for the Radio Amateur</i> (ARRL)	£5.45	£4.63
<i>Standard callsign lapel badge</i> (Five weeks' delivery)	—	£2.21	<i>World Atlas</i> (ARCI)	£3.72	£3.16
<i>De-luxe callsign lapel badge</i> (Five weeks' delivery)	—	£3.18	<i>World Radio TV Handbook 1986</i> (Billboard)	£17.99	£15.29
<i>Standard lapel badge</i> (RSGB emblem, pin fitting)	—	60p	<i>*99 Test Equipment Projects You Can Build</i>	£10.75	£9.14
<i>Mini lapel badge</i> (RSGB emblem, pin fitting)	—	72p			
<i>Members' headed notepaper</i> (50 sheets) quarto	—	£1.20			
<i>Members' headed notepaper</i> (50 sheets) octavo	—	76p			
<b>Miscellaneous</b>			<b>RSGB kits and components</b>		
<i>Callsign rubber stamp</i>	£3.47	£2.95	<i>RSGB Morseman</i> (Rad Com December 1984)		
<i>Car sticker "Amateur radio"</i> (two colours)	78p	66p	<i>Kit 2</i> (27C16 eeprom, pcb, artwork)	£13.52	£11.49
<i>Car sticker "I'm on the air with amateur radio"</i> (four colours)	89p	76p	<i>Kit 3</i> (Led display and holder, battery holder, potentiometers, knobs and knob covers, case, front panel)	£38.24	£32.50
<i>Car sticker "I'm monitoring -5 are you?"</i> (two colours)	78p	66p	<i>D70008C microprocessor for Morseman</i>	£10.63	£9.04
<i>Radio Communication back issues</i>	£1.40	£1.19	<i>Ferrite ring for interference suppression</i> (Pack of two) (Neosid)	£2.99	£2.54
<i>Radio Communication bound volume, 1983</i>	£17.90	£15.22			
<i>Radio Communication bound volume, 1984</i>	£17.90	£15.22			
<i>Radio Communication bound volume, 1985</i>	£17.90	£15.22			
<i>Radio Communication Easibinder</i>	£7.90	£6.72			
<i>RSGB coffee mug</i> (plastic)	£2.16	£1.84			
<i>RSGB hf contest log sheets</i> (100)	£3.69	£3.14			
<i>RSGB vhf contest log sheets</i> (100)	£3.69	£3.14			

## ORDERING INFORMATION

**NON-MEMBERS.** Use left-hand price columns. Note that members' sundries are only available to members of RSGB.

**MEMBERS.** Use right-hand price columns. It is essential that you quote your call sign or BRS number so that you can be recognised as a member.

**PRICES.** These include postage, packing and VAT where applicable, and are subject to change without notice. For airmail despatch, please ask for price before ordering. Goods are obtainable, less p & p, at RSGB headquarters between 10am and 4pm, Monday to Friday.

**POSTAL TERMS.** Cash with order. Stamps and book tokens cannot be accepted. Cheques and postal orders should be crossed and made payable to "Radio Society of Great Britain". Our Giro account number is 5335256. Please write your name and address clearly on the order, and allow up to 28 days for delivery.

ORDER FROM: RSGB Publications (Sales), Lambda House, Cranborne Road, Potters Bar, Herts EN6 3JE

(Raynet supplies should be obtained from Mrs J. Balestrini, Merrivale, Willow Walk, Culverstone, Gravesend, Kent)

## MORSE INSTRUCTION AID

RSGB morse instruction tape (to 5wpm) £4.80 £4.08

## MAGAZINE SUBSCRIPTIONS

QST (including ARRL membership). One year £33.39 £28.38  
Two years £63.53 £54.00  
Three years £95.02 £80.77  
By air via KLM (to W Europe only) one year £47.45 £40.33  
Ham Radio Magazine, one year, by air £34.69 £29.49

## NEWSLETTER SUBSCRIPTIONS

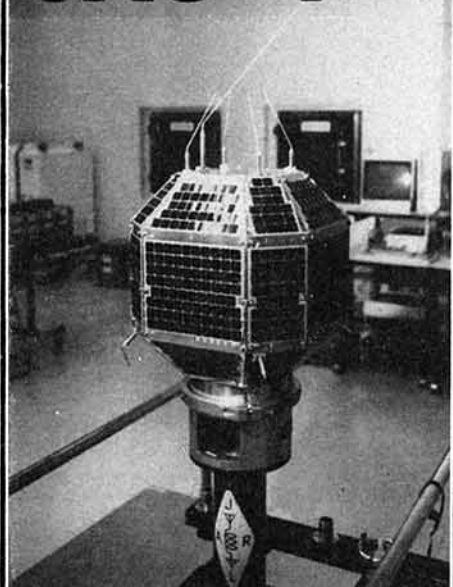
Microwave Newsletter, VHF Newsletter, DX Newsletter. For details contact the membership services department at RSGB headquarters.

\*Items marked with an asterisk may not be available immediately; please telephone before ordering to confirm availability.

# RSCGB News Bulletin

PAGES

## JAS-1



## New launch date 7 August

As we went to press in mid-July it was understood that the Japanese Amateur Satellite, JAS-1 was due to be launched on August 7th. Flight Models 1 and 2 arrived at the Tanegashima Space Centre on June 24th and were made ready for the launch.

After it has successfully separated from the launch vehicle, JAS-1 will transmit a beacon signal on 435.795MHz (complete with the usual Doppler shift, of course). The signal contains telemetry data which is sent in Morse code, beginning with "HI HI" at a speed of about 100 characters per minute. It will give 12 items of data and 33 items of telemetry.

Initially the satellite will be operated in the analogue mode only but after some preparation work it will be available for digital operation. This should be about two months after launch.

## MORSE TEST CENTRES

The following list shows the dates and locations of all the available test centres from September 1st onwards, as we went to press. If you want to take a test and any of the centres shown is within striking distance, send for an application form straight away. Completed applications will be dealt with strictly on a first-come first-served basis.

If there is no appropriate centre for you please contact RSCGB Headquarters in a few weeks. By this time we may well have been notified of some additional centres, one of which may be more convenient for you.

Morse tests will be carried out in groups of three and will be of half an hour's duration. Details of the test, the venue and how to get there will be sent to you as soon as your application has been processed and your place confirmed.

COUNTY	TOWN	DATE
Gwynedd	Bangor	13/09/86
Mid Glamorgan	Rhydyfelin, Mid Glamorgan	14/09/86
South Glamorgan	Penarth	16/09/86
Lincolnshire	Charterhouse Club, Louth	16/09/86
South Yorkshire	Stocksbridge, Sheffield	19/09/86
Notts	Nottingham	20/09/86
Essex	Harlow Mobile Rally	21/09/86
Strathclyde	Glasgow	22/09/86
Northants	Tiffield, Northampton	25/09/86
Shropshire	Dawley, Telford	25/09/86
Grampian	Aberdeen	25/09/86
Avon	Avonmouth, Bristol	26/09/86
North Yorkshire	Scarborough	27/09/86
Highland	Culbokie, Dingwall, Ross-shire	27/09/86
Lancashire	Fleetwood	27/09/86
Leicestershire	Wigston Magna, Leicester	27/09/86
Guernsey C I	Guernsey ARS HQ	2/10/86
West Yorkshire	Wakefield	5/10/86
Nottinghamshire	Mapperley, Nottingham	11/10/86
Northants	Kettering	23/10/86
Leicestershire	Leicester Amateur Radio Show	24/10/86
Leicestershire	Leicester Amateur Radio Show	24/10/86
Leicestershire	Leicester Amateur Radio Show	25/10/86
Leicestershire	Leicester Amateur Radio Show	25/10/86
Avon	University of Bristol	27/10/86
South Glamorgan	Penarth	18/11/86
Guernsey C I	Guernsey ARS HQ	4/12/86
Nottinghamshire	Mapperley, Nottingham	13/12/86

It is likely that more centres will have been notified to RSCGB Headquarters since we went to press, so do give us a call for an application form or for further details. As we went to press it looked pretty likely that centres would become available in the following counties during September:-

Bedfordshire	Hampshire
Buckinghamshire	Hertfordshire
Cambridgeshire	Kent
Devon	Staffordshire
Greater London	Surrey
Greater Manchester	West Sussex
Gwent	Wiltshire



A quick check on the map and yes, amateur radio hit new heights as Vince Loschiavo, G4WDF, Sqn Ldr Mike Farmer, G3VAO, 83-year old polar expert Wilf White, Peter de Meo, I7LGX, and John Middleton, G8VGF flew over the North Pole during a navigation equipment trial.

It was pure luck that the four radio amateurs met on board an RAF VC10 from Brize Norton. The 13-

hour trip was part of an International Aero Systems course to acquaint air force officers from Europe and Australia with modern navigational equipment and its high altitude performance. The inset shows what the pilot of the VC-10 saw in his cockpit as he crossed the Pole at a height of 32,996' at 16:44:45 GMT on 5 June 1986.

Photos: John Middleton, G8VGF

## FIFTY YEARS OF HIGH-DEFINITION TELEVISION

An international conference on "The History of Television - from Early Days to the Present" will be held at the Institution of Electrical Engineers, Savoy Place, London WC2 between 13 and 15 November 1986. The Conference is being organised by the IEE to commemorate the 50th anniversary of the founding of the world's first high definition television service in 1936.

The Conference will cover progress from the first proposals for television, via the experiments of the 1920s and the subsequent low-definition transmissions, to the realisation of high-definition television in the 1930s and the subsequent advantages. Contributions for the Conference have been invited from people in all parts of the world who have had first-hand experience of developments in television, including the commercial and political aspects.

Topics to be covered in the Conference include: national histories, display apparatus, receivers, antennas, transmitters, the television waveform, professional and domestic TV

recording, signal distribution, lighting, telecine, electronic effects and lots more.

For more information, contact Miss J Sutcliffe, Conference Services, IEE, Savoy Place, London WC2R 0BL. The telephone number is 01-240 1871 extn 222.

Special event station GB2TV will be run by the Borehamwood-Elstree ARS (BEARS) next month; it'll be active from BBC TV studios in Borehamwood, Herts (the home of the popular TV programme Eastenders) to celebrate 50 years of high definition TV. Operation will be on the 80-10 metre bands and 144 MHz using CW, SSB and possibly RTTY, starting at 12 noon on Saturday 20 September and continuing non-stop until 10pm on Sunday 21 September. Special QSL cards will be sent for all contacts, and SWL reports will be most welcome. The station is being privately sponsored on the number of contacts and therefore it'll be looking for as many as possible. The main beneficiary of any funds raised in this way will be the North London Hospice Group.

## A4X OMAN SCOUTS

The Royal Omani Amateur Radio Society - whose badge sits proudly in Reception at RSGB HQ - tells us that a special event station will be active during the "17th Arabic Scouts Scouts Camp" at Salalah in the Sultanate of Oman.

Using the callsign A4XOS, the station will be active from 0400 GMT on Wednesday 20th August to 1700 GMT on Sunday 31st August in the 10, 15, 20 and 40m bands using SSB, CW, RTTY and AMTOR.

An award is offered to both licensed and short-wave listener stations who have either worked or heard A4XOS on any two bands, any two modes or a combination of both. Claims must be submitted by a certified log extract only, together with a fee of 10 IRCs.

The address to send your claim to is:-

The Awards Manager,  
ROARS,  
PO Box 981,  
MUSCAT,  
Sultanate of Oman.

## 6K86AG and 6K88SOG

No, they're not the type numbers of exotic microwave GaAsFETs.... not to be outdone by their Omani colleagues, the Korean Amateur Radio League will be running special amateur radio stations during the 1986 Asian Games and the 1988 Olympic Games.

Special station 6K86AG will be active in September for this year's Asian Games and 6K88SOG will be active during the 1988 Olympics - to be held in Seoul. Both stations will be authorised to conduct international 3rd-party traffic on behalf of the athletes.

As well as these two stations, Korean amateurs will be using the special prefixes HL86 and HL88 during the periods when the games are in progress.

## BYLARA changes secs

Ms Alison Soars, GOALI, has taken over as Secretary of the British Young Ladies' Amateur Radio Association. Her address is:

84 Ridge Road  
KINGSWINFORD  
West Midlands  
DY6 9RG

and all correspondence regarding BYLARA should now be sent to this address.



**430  
MHz**

## Ultra-hy(pe) frequency?

Here at Potters Bar we read pretty well all the amateur radio-related magazines. Some elements of the amateur radio press strike us as very good; responsible and accurate journalism which, amongst other things, keeps us on our toes! We must admit, however, that a few bits of it we read solely for entertainment value, since there's no way in the world the output of some columnists consists of anything other than imaginative and elaborate fantasies. Normally they're harmless enough, but when wild rumours become elevated to the status of solemn truths and cause lots of licensed amateurs to worry, it's time to put a spoke in.

The current crop of entertaining tales concerns the forthcoming "loss" of the 430 MHz band. Columnists who cover this "story" all seem to have two things in common - supposed "moles" in high places who, for no very obvious reason, reveal some juicy titbit to this journalist or that, and an inability to pick up a telephone and carry out some rudimentary checking. In one of the current pieces, according to some "...intrepid mole" or other the 430 MHz allocation in the UK is to be withdrawn or drastically modified in favour of some highly secret and special Ministry of Defence-sponsored device or devices. Further details cannot, of course, be given for security reasons but the message is essentially "Be warned - the RSGB hasn't told you but I, the intrepid journalist, will - we're going to lose 70 centimetres".

Because it is shared with the Ministry of Defence, amongst others, the 430 MHz band has often been the subject of "journalism" of this sort; given that many amateurs have an extensive investment in this heavily-used part of the radio spectrum, it is not surprising that alarm and despondency - to borrow a cliché - inevitably follow.

Here are some boring facts. They are facts - as opposed to guesses, gossip or any other "journalistic" non-facts.

1. The Ministry of Defence (Army Department) has a repeater system known as MOULD. Some output frequencies of MOULD repeaters fall in part of the 430 MHz band; they are offset 12.5 kHz from amateur repeater frequencies.

2. The Society is familiar with the details of MOULD and is not worried by its presence; it is far more worried about Syledis, which causes tremendous problems for radio amateurs using 430 MHz.

3. Apart from a few isolated cases where there have been equipment failures, MOULD has never caused problems for the amateur service. In these cases the Society, through its contacts, has been able to get the problems solved.

4. The Ballistic Missile Early Warning System (BMEWS) at Fylingdales, North Yorkshire, operates on frequencies adjacent to the 430 MHz band; it is the reason for the geographical restrictions pertaining to 430 MHz in that part of the world.

5. The equipment at Fylingdales is - to put it politely - rather elderly. The Ministry of Defence is currently modernising it, as reported in Hansard on 22 May and (more or less inaccurately) in some newspapers at around the same time. Not surprisingly, MoD is reluctant to give very much fine detail about the new equipment. Published information suggests a phased-array radar akin to the American "Pave Paws" system.

6. In the words of the Department of Trade and Industry, "...you will have seen...that MoD is modernising the BMEWS at RAF Fylingdales. This statement may have prompted the 'Amateur Radio' piece but rather than being drawn from an 'intrepid mole' it is in fact public knowledge and nothing in this can be taken to support the rather provocative conclusion in the piece that the band will disappear. MoD are, of course, aware of the feelings of the amateur community about the band, as expressed to us by the Society from time to time" (telex to RSGB from RRD, 8 July 1986).

7. We don't imagine that, having invested several millions in MOULD, the Ministry of Defence will now proceed to render it useless by means of megawatts of radar energy. We don't imagine either that, given the status of 430 MHz elsewhere in Europe, the Ministry of Defence would attempt to use the lower bit of the band either. Unless we're being over-complacent, we've lived with Fylingdales quite happily for a number of years and - from what our own sources tell us - we don't think that the new system is going to make 430 MHz any less tenable.

8. Unless the Society's sources - and we really do have some at quite high level, they're emphatically

not figments of our imagination - aren't as on the ball as usual, the Ministry of Defence isn't about to put any other radio system into operation in the 430 MHz allocation. If we hear that they're planning to, we'll start asking questions, making noises and generally kicking up a fuss.

9. Finally, we'd obviously prefer it if our status at 430 MHz was a bit stronger; we'd obviously like to have something better than "shared secondary" status to MoD and radiolocation but for the moment that's what we have. Obviously we'll keep trying to do better. In particular we'd dearly love to see radiolocation removed from that part of the spectrum; 430 MHz is simply the wrong place for trans-horizon systems like SYLEDIS. However, there emphatically isn't something about our status at 430 MHz which automatically implies that we could lose the allocation at the whim of someone in MoD.

In other words, don't believe all you read in some amateur radio magazines. We're not about to lose 430 MHz and that's that.

## LICENCE FEES UP.....

The Department of Trade and Industry issued a press release dated 25th June 1986 which stated:-

"The Wireless Telegraphy (Licence Charges) Regulations 1986, which revise the fees for Wireless Telegraphy Act licences, have been announced. They come into effect on 14th July 1986.

"In most cases the fees are increased over present levels except for amateur and citizen band radio licences which remain unchanged.

"The licence fees were last amended in June 1983."

So it's good news for radio amateurs, with the licence fee unchanged at £12 per annum (or just less than 4p per day). Chasing the DX won't cost you any more than it did last year - can't be bad.

## NEW TOP BAND

### FOR HUNGARY

As from the 12th of July, radio amateurs in Hungary were allowed to use the 160 metre band for the first time. It's understood that CW only will be permitted at present, and that the band allocation will be from 1,830kHz to 2,000kHz.

## JA1AN honoured

Shozo Hara, JA1AN, the President of the Japanese Amateur Radio League, was decorated with a Blue Ribbon Medal recently in recognition of his outstanding contribution to amateur radio in Japan.

The honour was conferred on JA1AN by the Japanese Ministry of Posts and Telecommunications at a ceremony on April 28th. The Blue Ribbon is awarded by the State for distinguished social or scientific work or invention. It is considered to be the highest honour that can be made to a private citizen.

Shozo Hara has been the President of the JARL for 15 years.

## MORSE TESTS

### - statistics so far

Now that the Society has overcome the inevitable teething troubles since it took over the Morse Testing Service from BTI on April 1st this year, it's interesting to take a look at some of the statistics.

No fewer than 258 individual tests had been carried out by 14 July. Of those, 144 candidates passed and 84 failed, which makes a current pass rate of 63%. There have been 8 candidates who failed to turn up for the test and there were 52 unfilled places at the test centres.

As of 14 July, there were 176 candidates booked in for tests on or after that date and there were 647 vacant places.

Since 1 April 1,135 places have been made available to candidates (and the number is still rising rapidly), whereas only 412 candidates had applied for and been allocated tests as of mid-July. In other words, just under two-thirds of all the available places are NOT being taken....

Before 1 April 1986, BTI provided 22 Morse Test Centres, most of which were dotted around the coast. The RSGB is currently providing 51 different test venues in 31 counties or regions, with 5 additional counties almost ready to come on-line and a further 11 which only need another examiner before tests can be held there. As we went to press, a grand total of 137 examiners had been appointed - in 47 areas.

So the current state of play is that there are about 650 places still available for the taking of Morse tests - that's over twice the number of centres for half the previous cost!

Good, eh?

## COMMITTEE EXPENSES - the facts

At the Annual Meeting in December 1985 a question was asked regarding a "breakdown" of the expenses associated with Committee, Regional and Council Meetings. The details of these expenses are as follows;

	£
Committee expenses	26,443
Council expenses	7,376
Regional expenses	1,898
RAYNET expenses	2,840
AGM expenses	5,016

Basil O'Brien, G2AMV, Chairman of the Society's Finance & Staff Committee, has contributed the following notes on the figures;

"It is not Society policy to publish the costs of the sixteen individual committees and the ad hoc working groups. The cost of a committee depends on the number of times it meets each year, which in turn is a function of its current workloads. These can be formidably high - for example, when it is the turn of the RSGB to adjudicate in an IARU Region 1 contest. The composition of a committee also has a distinct bearing on its overall cost.

"When a committee draws on the expertise of members who reside a long distance from London, the payments for travelling are bound to influence the cost of that committee. The same is true for Zonal Council members. These

expenses are unavoidable; the only alternative would be a return to what was once referred to as the "London Wireless Club syndrome"!

"Society policy is to cover all out-of-pocket expenses incurred by volunteers - albeit at a modest level. Volunteers give freely of their time, and in some cases this can be considerable; nevertheless, it is believed that many individuals choose to make their claims more modest than they need to be! It would be a revealing exercise to calculate what the Society would have to pay for the work currently done by volunteers, and probably an impossible one. As far as Council and committees are concerned, for example, the figure would have to take into account travelling times and the considerable amount of work carried out at home. Consider how much time is spent by a member of a Contest Committee sitting at home scoring a contest, for example. It would also be interesting to include in the calculation the time given by newsreaders, QSL sub-managers, Slow Morse senders, Representatives and all the other volunteers who give their time so freely. There is absolutely no doubt that the total bill would be well beyond the Society's ability to pay, certainly at current subscription rates!

"Thank you volunteers".



Trevor Emery, G3KWU, the RSGB's Region 17 Representative, is seen here presenting an RSGB pennant to Mr Sako Hasegawa, JA1MP, President of Yaesu Musen, at the opening of SMC's new premises in Chandlers Ford, Hampshire.

### AREA REPRESENTATIVE ISLE of MAN

With reference to the notice published on page 475 of the July issue of 'Radio Communication', the following nominations have been received for the office of Area Representative for the Isle of Man:-

B W Brough, GD4PTV  
F S Ellis, GD3LSF  
Colin Matthewman, GD4FWQ

Members resident in the Isle of Man are invited to vote for one of these candidates. All votes should reach the Region 1 Representative, Mr B Donn, G3XSN, 7 Thurne Way, Liverpool L25 4SQ,

PS. RAYNET supplies are now to be obtained from RSGB HQ, not from Jane Balestrini. MNI TNX Jane for all your hard work.

PPS. "PS" - back next month.



## Members'

## Ads

## PAGES

## FOR SALE.....

YAESU FT690 50MHz TCVR and MET 3-ele beam, boxed, as new, £280. Yaesu FT707 TCVR, FC707 atu, FP707 psu, Yaesu YM-38 desk/mic, all with boxes & manuals, mint condx, £500. GOWNS, QTHR, tel: 0474-357795.

ANTENNAS: SOY06, £15; HB9CV, £5; 5/8 whip c/w gutter/mount, £5. SEN 500 swr meter, £15. Morse practice oscillator, £5. G6DXR, QTHR, tel: 021-354 4125.

G8CZW DIGITAL FREQ METER, £750 ono. Code Master CW/RTTY decoder model CWR610E, £210. Oscar 2 10m FM, £55 ono. G4XDI, QTHR, tel: 04577-4026.

MICROWAVE MODULES MMT432/144R 2m/70cm tvtr, £100. Icom IC4E 70cm handheld, vgc, spare nicads, chgr, £130. Welz AC-38M HF atu, £50. Paul, GOCYB, QTHR, tel: Mansfield (0623) 657472.

ICOM IC251E, 10W multimode TCVR, as new, unmarked, untampered, with manufacturers packaging, £400 ono. Also BNOS LPM10/100 linear amp, as new, 4 months old, £130 ono. G4WZS, QTHR, tel: St Helens 817144.

SOMMERKAMP FTD500 TCVR with matching spkr cabinet £200 ono. Hansen FS500H pwr/pep/swr bridge, £35. WANTED: Yaesu FT708R 70cm handheld TCVR. Hardy, tel: 0436-831515.

NEWLY LICENSED? Ideal first TCVR, Shimizu SS105S, fully xtalld, 500Hz filter, aligned by Lowe, £250 ono. G4QJO, QTHR (Cornwall), tel: 028883-485.

EDDYSTONE 840C gen/cov RX, immac, £85. Eddystone 358X with plug-in coils and psu, £50. Marconi CR100 gen/cov RX, £50. Jennen Trio JR-102 gen/cov plus 2m RX, £45. Ken, RS84603, tel: Basingstoke 56732.

RAIBC Member's Triumph 2500 automatic, power steering, power brakes, all hand controls incl single lever for accelerator/brake/handbrake mod, vgc, reluctant sale, £750 ono. Ideal for many disabilities, telephone for advice on suitability for your particular requirements. John, GOCRU, QTHR, tel: 0827-895957.

YAESU CPU2500R 2m FM TCVR, freq range 144-148MHz, 25W/3W o/p, digital display, memories, keyboard, mic, scanning for clear/busy channels etc, £150 ono. Tim, G1CMI, Cheltenham 576411.

IC751 with options, SM6, workshop manual, orig packing, importer checked, perfect, £1,000 carr paid. G3FPD, QTHR.

ICOM IC-R70, £425. ICS AMT-2 terminal unit, £175. Commodore 64 software for AMT-2, £25. Carriage extra. G4BGE, QTHR, tel: Bracknell (0344) 421502.

KENWOOD TS711E, 2m multimode base TCVR, as new, only 8 months old, any trial, £600. Pete, G0EDU, tel: 0386-858829.

KW2000B plus psu, ex condx, £200. Homebrew Z match and swr bridge, £20. G3WRO, QTHR, tel: Harlow (0279) 30609.

STANDARD C5800E/W 2m multimode, vgc, mobile mount, £295. Dave, G4YBO, QTHR, tel: Locksheathe 82041.

MINI BEAM for 10/15/20m, gc, cleaned, £60. Hall, (Surrey), tel: 037284-2451.

ATLAS 180 and mains console, fitted new toroid trfm, £230 may split. G-whip 10-160m, £30. Collins CC2 carrying case, £60. All items buyer collects. G3CGK, QTHR Cambs, tel: 0954-210374.

HRO RX model 5T c/w psu's type 697 115/230V ac. Type 686s 6V dc Vibrapak. Phones, spkr, handbook, 2 wooden transit cases containing 12 coils 50kHz-30MHz with 14 & 28 bandspread. All gc, £50. Prefer buyer collects. G3MAK, QTHR Epsom area, tel: 07373-58843.

YAESU FT707 TCVR, FC707 atu, FP707 psu, FV707DM vfo, mint condx, £560. G4TXV, tel: Kidderminster 515305.

STANDARD C58 2m multimode mobile/portable TCVR, 1W o/p c/w CMB8 mobile mount, chgr, helical, carrying handle, £200 ono. Alinco ELH 230E linear, 1W i/p 20W o/p, £20. QDX 2m double quad yaqi, mint, £20. Buyer collects. G6ZXN, tel: 0380-830383

YAESU FT101E HF TCVR, SSB/AM/CW, CW filter, speech processor, 240/12V psu, spare pa valves, £350. Rascal RA117 prof full/cov RX, 1-30MHz, £195. WANTED: TS830S, FT102, WHY? G4FYF, QTHR, tel: Crawley 514788.

FT101Z TCVR, ex condx, not modified, c/w Yaesu mic, £400. G3RAE, QTHR, tel: 0502-712129.

ICOM HF TCVR IC701 with matching IC701PS, mic, manual, orig packing, £400 carr negotiable but prefer buyer inspects/collects. Close to junc 8 of M1. Church, tel: Hemel Hempstead 59970.

DISC DRIVE 8", £30. Winchesters plus controllers, large qty requiring care & attn, sensible offers please. 2114 1kx4 memory, 10p. Phillips 1500 video in/out, £30 incl tapes. Assorted Z80 peripheral chips, ask. Bob, G4TTZ, QTHR, tel: Yateley 871077, evenings and weekends.

YAESU FT270RH, fitted FVS-1, very little use, as new, £285 no offers. Datong Morse tutor, 2 months use, £35. Thomas, tel: 01-514 5998.

FRG8800 gen/cov RX, FRV8800 VHF cvtr fitted, mint condx, unmarked, boxed with manual, 6 months old, £400. FR7700 matching atu, £25. SP102 ext/spkr/filter, £25. Icom IC2E plus accessories, ex condx, £115. G4YGF, QTHR, tel: Washington 417343, after 6.30pm.

HYGAIN model 5BDQ half-wave doublet antenna for 10-80m, new, unused, £85. ZX Spectrum 48k, ZX printer, program tapes, B&W monitor, manuals, £95. Yaesu YD-844A mic, new, boxed, £22. Buyer collects or add carriage. G3KCT, QTHR, tel: 0763-44550.

FR50B amateur bands RX incl 160m and 2m, gc, £55. Pye Cambridge 6ch FM TCVR c/w Heathkit HA202 FM amplifier, 40W, suit beginner, £25 the lot. G3VPE, QTHR, tel: 021-777 1320.

PAIR NEW TT21B, boxed, £12. New 8uF 2500Vdc wkg, £6. Class D wavemeter, manual, spare valve, xtal, £10. Eddystone 898 s/m drive, £10. Twice 362/362 C core transformer with 5V & 6V windings, £10. G3A10, QTHR, tel: Pembury 2836.

ICOM 720A HF TCVR with gen/cov, all bands, 2 vfos with PS15 psu, £550. SP3 spkr, £27.50. SM5 desk mic, £25. Complete outfit, £590. G4TMH, Essex, tel: 0702-203802.

TRIO TS-520 TCVR, manual, boxed, vgc, £350 ono. Going QRP hence sale. Will p/exch for good scope and cash adjust. G0CCQ, tel: Worcester 56208.

AMT-2 all mode data terminal unit with software for BBC-B, all as new with warranty from ICS, £199 complete but may split. G1DIL, QTHR, tel: 0902-743164.

SILENT KEY SALE: Trio TS530S, £450. Eddystone EC10 MK2 RX, £45. QM70 cvtr, £10. HP filter Labgear ES034, £8. SWR meter, SMC, £10. SWR meter, KW, £3. Scope, Heathkit S3610, £20. Voltmeter, Heathkit 1M70U, £5. BC221 freq meter, £20. G4MH mini-beam, £35. Desk, MFI and filing cabinet, £30. Offers? Details from E. Cadman, tel: 01-560 5896.

10m multimode TCVR, SSB/AM/FM, full coverage 28-29.7MHz, EPROM conversion, tvtr o/p & switching c/w mic, £110 ono. WANTED: ORO HF TCVR, FT707S,

TS130V, FT77S, condx not important if right price and working or WHY? P/exch? G4ABF, tel: Malvern 66202, before 7pm.

1kW linear, 144MHz with psu, pair almost new 4CX250R, 2 rack mount units, £600. Drake TR7 TCVR, £750. AOR2001 scanner, £275. Bob McHenry, G3NSM, Oxford, tel: 0865-56321.

3kW linear, commercially made in USA, pair 4CX1000A, all psu's except HV, requires construction of i/p and o/p ccts, would work HF or VHF (144MHz). Send SAE for details & photographs, £500 ono. G3NSM, QTHR.

MINT COLLINS 75S-3B, 32S-3, 516F-2, 312B-4, round emblem DL-1 dummy load, SM-1 desk mic CP-1, xtal packet extra filter, spare valves, manuals, spares incl new vfo tripltt, valve tester, no splitting, condx as new, limited use, reluctantly selling, reason given, sensible cash offers, letters only. Eddystone 880/4, needs attn or for spares, £20 plus carriage. SB220 linear outer case with front and back panel knobs, fan plus carriage Shure boxed 526T, £30 plus postage. G3DAM, 71 Lichfield Avenue, Evesham.

MORSE TUTOR MMS1, ex condx, still under warranty, £90. Mrs K Field, tel: Tamworth (0827) 899195, evenings.

EXCHANGE: Lowery electronic organ, 2 keyboards, pedals, Leslies, rhythm section, wah-wah, reverb, worth £300, for 2m multimode, sailing dinghy or motorcycle. Hi-mount electronic twin-paddle keyer, £50. Thorn-EMI scope, double beam with manuals and ccts, £75. G4RYF, QTHR, tel: 0905-54162.

VALVE 2m 2kW pep of very clean signal, Zoff Dressler D200S 1000W linears, £995 or will sell separate at £550 ono ea. 300W-400W FM, 750W-1kW SSB. G6HHI, QTHR, tel: 0703-437888, evenings.

SX4000E SCANNER, mint box, £199. ZX Spectrum Plus, interface and two microdrives, 30 tapes programmes books etc, the lot £199 or WHY? G4JYH, QTHR, tel: 01-886 0126, daytime.

RACAL RA17 with cabinet, £120. BC221, £15. Palm IV 433MHz TCVR, £70. G3B0C, tel: Oswestry 830845.

FT290R c/w nicads, s/p, mic, chgr, case, f/whip, 144-148MHz, £250. FT708R, s/p, mic, chgr, £145. Both gc. Microwave Modules 144/25 linear/pre-amp, £30. G6LNF, tel: 0935-825319.

YAESU FT101E HF TCVR, CW filter, 10MHz, spare tubes, vgc, £350. Yaesu FR101S HF RX, fitted 2m and FM, vgc, £175. Pye SSB170 mobile HF SSB TCVR, vgc, £120. Carriage extra or collect. Len, tel: 021-747 4570.

TRIO 430S TCVR, mint, never on air, one owner, stored for 2 years, plus PS430 and FM, impossible QTH and neighbours, £600 plus Securicor. G3Y1I, QTHR (Tyneside), tel: 091-438 3050.

FDK Multi Palmsizer II 2m FM handheld c/w nicads, chgr, 1/4 wave antenna, £100 ono. Tim, tel: 0252-874569, evenings.

TRIO TS520 c/w VF0520, SP520, all unmarked, orig condx, £350 ovno. Prefer buyer to collect. Rod, GW4SLK, QTHR, tel: Mostyn (0745) 560212, evenings and weekends only please.

FT221R with Welz SP15M swr meter, £275. FT1012D Mk3, £495. FC902 atu to match, £95. FV101DM digital memory vfo for FT1012D, £100. All in mint condx, in orig boxes. G4PPU, QTHR, tel: 01-399 6746, anytime.

Boff Glassfibre quad spreaders c/w steel boomless spider, £75. SEM Transmatch Ezitune, built-in 10-80m, £50. G4SGV, QTHR, tel: Redditch 45304.

UNIDEN 2030, 13ch 2m mobile TCVR, gmo, 13W o/p, xtalld 4 rpters R0/R5/R6/R7, R6 i/p, 6ch simplex S10/S18-S23, 1 vacant position, £65. Eddie, G3AVJ, QTHR, tel: 051-489 3325.



COMPLETE 9cm RX, 2m if, 66-ele QLY 9cms. 2m linear 2 X 4CX250B, no BHT transformer. 70cm IC490E, MML432/100, 17-ele MET, comline filter. 23cm systems. TS700S. 10GHz oddments. 10GHz SSB tvtr, WJ35 watt TWT + psu, dish, all feeds, call and haggle. Bob, tel: 01-675 7737, evenings.

ATTRACTIVE SEMI-DETACHED BUNGALOW, East Cornwall, 750' asl, ex DX, 2-bds, ing, kit, bath/shwr, hall, c/hing, d/glaz, grg, gdn, 50' tower c/w TB3 tri-bander, 9-ele Tonna, KR600 rotator, planning permission. No time wasters please. £30,000. G4RLZ, QTHR.

FT203/FNB3 handheld, 2m FM, 2.5W o/p, orig packing and chgr, £150. G4FAS, QTHR (Manchester), tel: 061-437 7784.

AX25 PACKET RADIO UNIT, £129. MML144/100 2m linear E60. Green screen monitor, £25. Atari ST RTTY program, £10. Dual-beam scope, £20. Trevor Tugwell 50 Mayridge, Fareham, Hants, PO14 4QP, tel: 04895-81032.

SOTA 2m linear amp, 10W i/p 100W o/p c/w pre-amp, pmo, seldom used, £85 carriage paid. G140UN, QTHR, tel: 0504-84529.

70cm MOBILE TCVR with 10W pa, shoulder carrying case for portable section, mobile bracket for complete rig, also mobile co-linear, c/w handbook, £160 cash. G4C1H, QTHR, tel: 01-304 8975.

B2B, B40, Eddystone 358X, all gmo and complete, buyer collects, £45 ea. G3AJT, QTHR, tel: 0794-512557.

TS510 HF TCVR, £150. CCTV camera HV405, £30. 22" B&W monitor, £25. SSTV unit, Robot 400, £250. 12V psu 5A, £6. Philips VLP700 disc player, £120. Bill Ball, G4RSA, 21 Rede Ave, Fleetwood, NOT QTHR tel: 72203, after 6pm.

COUNTRY HOUSE in Suffolk with established craft pottery business, kitchen, dining room, lounge, 3 double bedrooms, 2 bathrooms, garage, carport, large brick workshop used as pottery, 40' tower, pleasant garden with views, £69,500. G3RK, QTHR, tel: Wangford 619.

JRC NRDS15 communications RX c/w 26ch memory unit, r/control unit, matching spkr, additional 12.5kHz AM filter and half RTTY filters, ex condx, £1,050 ono. G6YUR, QTHR.

EXCHANGE heavyweight gents 5oz 9ct gold identity bracelet with polished link and identity panel, length approx 22cm, for HF equipment. Fabricius, tel: 0226-292983, after 4pm.

YAESU SONMERKAMP 9600 VHF/UHF SSB/AM/FM RX, 1 week old incl HF cvtr, covers 0-905MHz without gaps c/w ac adaptor and mobile mount, reluctant sale, best offer secures. Lancaster, tel: 01-845 4008.

TR10 TR2500 2m handheld c/w PB25 and flexiwhip antenna, boxed as new, £190. New 3-section telescopic tilt-over tower, complete rotator head, winch, ground socket, £345. Mike, tel: 0772-635560, anytime.

CODAR CR70A broadcast RX with PR30 preselector in gmo, £15 + carriage. DEC professional 256K RAM card, new, offers please. WANTED: Datong RF speech processor, will pay up to £35. G4UFG, QTHR (Manchester), tel: 061-633 7892.

PROP PITCH MOTOR and power unit, weather-proof box, control switch, £55. 8off bamboos, 1.25" butt 13' long, £8. Dural boom, 1.5" diameter 8'6" long, aluminium boom to mast plate pair of aluminium Quad spiders, £20. Magazines: QST mostly, some pre-war, others to 1971, cheap to buyer taking the lot, no single copies, buyer to collect. Baker, tel: Buckley 545177.

DRAKE TR7 service manual, £22. G4PAI, tel: 0202-872354.

TR10 TS711E 2m multimode base stn, mint condx, c/w orig packing, £650. G0EVU, tel: 0480-216442.

FDK MULTI 2700 2m TCVR, all modes, dual tune (vfo/synth) 144-148MHz, also receives 70cm, base/mobile, £250. G4KEW, NOT QTHR, tel: 01-561 1522.

EX-RAF 4-section telescopic mast, brass construction, 2.5" diam base, 1" diam top, ideal vertical, offers? VIC20 computer with accessories, offers? MET 6XV 2m Yagi, £25. All under offer or exch WHY? G4XRF, QTHR, tel: 0307-64619.

LUNAR ELECTRONIC HF amp and pre-amp, HF3100LZ solid-state, vgc, instructions, cct diagram, suit TS120/130V, FT7 etc, £60 ono. Also atu AT130 Trio, 8-bands, max thro' pwr 150W, c/w mobile mount, mint, £70. G6UCU, QTHR, tel: 0302-841530.

TEN-TEC Century 22, 50W CW only TCVR, xtal calib fitted, Ten-Tec atu, BNOS G4 psu, all less than 2 yrs old, as new, cct, manual, £400 ono. G4FHH,

tel: 0278-784812.

FT290R with MML144/30LS linear, carrying case, nicads, chgr, flexiwhip & rubber duck c/w manuals and orig packing, £295. G4TLS, QTHR, tel: 0403-53051.

SILENT KEY SALE: Equipment of the late G1FEQ, all in gc, base stns, mobile radios, amplifiers, coax, aerials, meters etc. Offers around £1500 for complete station or will split. Prices & info from Townsend, tel: Ashford (Kent) 23944.

HY-GAIN vertical antenna 18AV0, gc, any reasonable offer accepted. G3MCS, 1 High House Close, Morpeth tel: 512905.

TOWER, 30' 3-section tilt-over, new, unused, complete, £270. Clover, RS88766, tel: 04023-45470 or 0268-284550.

COAXIAL RELAYS, 28V, one very large (approx 2kW) 1GHz latching DPDT, £30. Ioff Microwave associates 3GHz 400W SPDT exc, £25. All N-type sockets. Zoff new Amperex DX553 military spec 4CX350A with data, £30 ea. G6ELH, QTHR, tel: Watford (0923) 30254.

JVC PORTABLE VIDEO SYSTEM, HRC3 compact VHS recorder incl chgr, mains psu, std VHS adaptor cassette, GXNSE high sensitivity colour camera with internal caption generator, power zoom, electronic viewfinder. All perfect condx, little used, £750. G6MCD, QTHR, tel: Tewkesbury 294082, evenings.

SCANNER RX HX2000 handheld, as new, freq 60-90MHz 118-175MHz 406-496MHz AM/FM in 5/10/12.5kHz steps 20 memories, nicads, chgr, antenna, 8 months old, first £200 ono secures, buyer collects. Drysdale, RS8873, tel: Southampton 582465, evenings only.

16-ele Tonna, £18. Eddystone 730/4 gen/cov, vgc, £95. Mark, tel: 01-847 3142.

RACAL RA-17 RX, £150. BC-221 freq meter, £20. 0-15V/1.5A psu, £17.50. HP-1FM hi-band Bantams, £21. Celoso CA/105 vfo, £10. Wavemeter class D No1 Mk2, £15. Yaesu FT101 Mk2, spare p.s. handbook, ex condx, £250 buyer collects/pays carriage. G3MOE, QTHR, tel: 0242-524217.

YAGI, 3-ele 4-band Altron minibeam, 20m-6m, worked VK7/VK2/KL7, turning circle about 12', square spokes, £100 can deliver locally. Mutek 10m-6m tvtr, as new, works with most HF rigs, £100 G4VQV, QTHR (Essex), tel: Braintree 42702.

YAESU 225RD multimode 2m base stn, muTek board, immac condx, £550. Yaesu 290R, no mods, never used mobile, 18 months old, £225. Chas, tel: 01-764 6767.

TR10 R600 gen/cov RX, 0.1-30MHz, mains or 12V dc, instruction manual, boxed, £225. G3NOQ, QTHR, tel: 0245-75145.

SWAN ATLAS 215X, 15m-160m, 100W plus G-Whip mobile tri-band with 80-160m coils. TET HB23M 10/15/20 minibeam with rotator DNT H40 10m. Multimode 3MHz 25W FM 10SSB/CW 10m rig, £325, £125, £30, £120. All gc. Dave, tel: 09856-274, anytime.

BIRD Wattmeter, £12.50. Sig/gens: URM-25/26/27, TS-497B, TS-174, TS-175A, TS-323A, HP-608. RX's: R-389, R-390A, R-391, R-444, URR-27A, URR-35C, HRO coils. Valves: 2C39AS, £10; 7213, 4CX1000A, £20. WANTED: Loctal valves, nuvistors. Bob, 249 Sandy Lane, Hindley, Wigan, tel: 0942-55948.

SUPERB FREEHOLD split-level semi-detached Dornier house, built on elevated land, ex accommodation on 3-levels, delightful panoramic view. 3-beds, gardens, brick garage, extra parking space, storage room, workshop, £30,000. Wright, 249 Sandy Lane, Hindley, Wigan, tel: 0942-55948.

KR-5400 dual-control antenna rotor, azimuth and elevation, little used, vgc, £150. Also Polarphaser two signal control for 2m, £30. Buyer collects. G6NSF, tel: 0625-611942.

160m/80m SSB TCVR, 25W pep c/w dc-dc inverter, heavy duty 12V stabilised psu, handbook, £65. G3DXJ, NOT QTHR, tel: 0509-502360.

107m ASL, extended 3-bed semi, open aspect to rear fields, 16 mile view N-SE, gas c/h, garage, lounge extension, offers around £24,000. Antenna, HF rig included. Dordon, N Works, access Birmingham and motorways via M42. SAE to G4HZG, QTHR.

YAESU FT101ZD HF TCVR incl fan and mic, £375. Western DX33 Penetrator, £75. Daiwa CNA1001 atu, hardly used, £85. Datong D70 Morse tutor. All ex condx. Graham, G4WKZ, QTHR, tel: Redditch 44394.

TR10 TS120V HF TCVR + matching TL120 amp, £375. Yaesu FT480R 144MHz multimode TCVR, £275. Yaesu FT780R 432MHz multimode TCVR, £275. Microwave Modules 70MHz tvtr 28MHz in, offers? G4LWI, QTHR, tel: 0902-782036, after 6.30pm.

FT290R. muTek plus 4MHz coverage from new, nicads, chgr, case, vgc, boxed, £240 ono. Also pair PFI's, xtalised RB6, £15. 19 set whip aerial base, £3. G4RYX, tel: 068-686 255.

FT101E, mint condx, dc leads, orig packing, £275. FC301 switched atu/swr/pwr, mint, £100. TB1 trap dipole, 8 months old mint, £40. Altai GDO, brand new, never used, £35. Owner going QRT. Ron Haggerty, G4T5Z, (Manchester), tel: 061-794 6536.

YAESU FRG-7 gen/cov RX, LED readout, handbook, mint condx, no mods, £115. Dumbleton, tel: St Albans 53220.

INTERNATIONAL REPLY COUPONS (IRCs), 20 for £5.75 incl postage. Parkes, 6 Hazeley Close, Hartley Wintney, Basingstoke, RG27 8QS.

YAESU FT101B, gc, £250 ono. G3TFA, tel: 092681-2367, anytime.

MULTI 2700 2m multimode TCVR, mains or 13.8V dc supply, 10W o/p, vfo/synthesised, vgc, c/w leads, manual and mic, £150. G6BNZ, QTHR, tel: 0822-832743.

KENWOOD TS830S, vgc, £675. G4TKC, QTHR, tel: 04536-77714.

YAESU 9010M TCVR, FTV901R tvtr 2m-70cm. Tokyo HL400 atu. Azden 25W/3W mobile TCVR. All in gc incl GSRV and 901SP. £1,000 the lot. All in boxes c/w manuals. G1NOH, QTHR, tel: 05436-75301, after 6pm.

HENRY TEMPO 2002, mods for improved cooling, new (Nov 85) 8874s, £1,000. FT726 c/w everything but the kitchen sink and 50MHz! £950. 8x7-ele 144MHz antenna system (echoes!) buyer collects, £100. MML432/100, £225. Chris, G8FEV, tel: 0409 24-493.

SEM AUTO pre-amp for 2m, £15. Twin meter swr meter, £10. Type 'D' Morse key with cover, £20. WANTED: Matching vfo and CW filter for Trio TS515 TCVR. G3JFC, QTHR, tel: 0474-872743.

CW FILTER 600Hz, suit FT101Z, FT901, FT707 etc, £12. Dust cover for Ten-Tec Argonaut, £3. BC221 c/w psu and handbook, ex condx, £25. Turner, (Kent), tel: 0622-39936, weekends or evenings.

FT209RH new and not used c/w FNB3, FNB4, NC9C, NC18C, YH2, £250 ono. Also Tokyo HL82V 2m linear amp, immac, hardly used, £75. Phil, G4T5X, tel: 0602-616619.

TR10 130S, ATU230, mint condx, hardly used, mic, £600. Icom 211E multi TCVR, virtually mint condx, ex working order, with mic, £325. Manuals and orig packing all items. Buyer inspects and collects. G4SIB, QTHR, tel: Newdigate 362.

MUTEK 10GHz (GDIF 107UB) board, £42. Xerox 400 telecopier, £20. Yaesu SP102 spkr, new, £40. F80A psu, matches 480, new, £39. Jaybeam D15/24 23cm Yagi, new, £45. Wraase SC1 SSTV/FAX unit, as new, £700. Paul, tel: 0293-515201.

ICOM 271E c/w muTek, ext/spkr, v/synth, h/mic, SM6 d/mic, ex condx, £700. MM432/144R tvtr, £130. Kenwood SW200 p/meter, swr/meter, 2No. heads £70. Mutek SLNA145S, £15. 10A psu, £10. LHM 23cm RX kit, complete/working, £40. Paul, G6EUR, tel: 0533-59245.

TS940, TS440, Collins KWM2A, all in as new condx, ring for best price. Hart, tel: Derby 833684.

FT290R, as new, case but no nicads, £250. FT7 HF TCVR, 10W o/p, vgc, £200. COCBU, QTHR, tel: Hornchurch 45135.

HRO, reg/psu, 10 coils, bandspread, gc, gmo, £60. Sony 2001 plus psu etc, £75. Sony 7600D plus psu etc, £105. G3MPN, QTHR, tel: Wyomondham 603382.

FT290R, muTek, nicads, chgr & case, 9-ele Tonna and UR67, offers? Also Marconi CR150 2/60MHz RX c/w psu, free to anyone who can lift them! GOCZU, QTHR, tel: 0946-67599.

EC10 gen/cov RX, vgc with box and manual, £65. Bird TS-118/AR RF Wattmeter (Termaline) 5-500W with accessories and manual, £70. Would exch either or both for amateur bands RX, FR400 or WHY? G8EUX, QTHR (Towcester), tel: 0327-51716.

WELZ DP-CP5, 5-band vertical antenna with trapped radials, ideal for small location, all you need is 14' upwards and 8' sideways, £45. G3CIB, Berkhamstead, tel: 04427-2814.

DRAKE SPR4 gen/cov RX c/w loop antenna, ex condx, instruction manual, £150. Trio TR599 Custom Special gen/cov, ex condx, operating manual, ideal for swl. Wevell, tel: 041-779 2137.

ICOM IC-202S, xtals for 144-144.4 and 145.8-146MHz vgc, £100. Welz SP-400 pwr/swr meter, £45. Buyer collects or carriage extra. G6ETA, QTHR,

tel: Chestfield (022779) 3262, evenings only please.

FT290 plus 30W linear, £300. Fishon, tel: 01-485 2243 or 01-907 7977.

SPYSET: Mk21 Set type A, covers 2.9-6.0MHz, best offer over £100, possible p/exch FT290 considered. G4TMO, tel: Ottershaw (Surrey) 3892.

11 off CLOTH-BOUND VOLUMES Wireless World, 1949 to 1959, £15, p&p extra. G3SQM, QTHR, tel: 0491-571443.

YAESU FTV707 tvtr with muTek pre-amp fitted, 10m-2m, vgc, £85. G0DLG, QTHR, tel: Bideford 76109, evenings.

SINCLAIR 48k ZX Spectrum, ZX printer, DK'tronics keyboard, lightpen, joystick interface, data recorder plus, £150+ of games, worth £250+, will sell for £150 or swap 2m handheld, FT209R, TR2500 or similar. G4WJO, QTHR, tel: 0407-2330.

FOR SALE or exch TRS80 computer as used by author of the 'Radio Amateur Software' book, offers? M121HO 2m SSB portable plus nicads, £75 ono or exch both for HW7 or HW8 or similar. G4XBD, tel: 0438-62554.

TR10 TS830S + AT230, 160m-10m TCVR with new bands, valve o/p, variable bandwidth, IF notch filter + shift control c/w atu. One hour's use only on TX, offers £800+. Roger, G3UAX, QTHR, tel: Reading 590424 (office) or 584858 (home).

KENWOOD TR9000 multimode, £300. Kenwood TR7730 2m FM, £175. Mirage 2m linear/pre-amp, 160W, 12V, £200. 14-ele Yagi 2m 13dBd, new, boxed, £25. RCA 8122 valve, new, £10. Cavity filter DB4001 144/160MHz adjustable rejection, £50. G4TTE, QTHR, tel: 0984-23333.

TS520, fitted CW filter, spare pa's and mic, immc, £300 no offers. Sagant EL40X compressed 80/40m dipole with balun, adjustable without cutting, ideal -/P, £15. Buyer collects or carriage extra, David, G3ZPF, tel: Brierley Hill 263020.

YAESU HF SSB TCVR FT707 with mobile mounting bracket MMB-2, very little used, £330 ono. RCA AR880 RX, unused since new, offers? Hallicrafters S36A AM/FM RX, 28-143MHz, ex condx, £40. Hallicrafters S37 AM/FM RX, 130-210MHz, ex condx, £45. Roy, tel: 09904-3612.

ATU AMTECH 300 c/w swr bridge T3-170L unused, £38. G-whip (flexiwhip) with coils for 20m & 80m, unused, £30. Shakespeare fibre glass telescopic fishing Roach pole, 22' when extended, unused, £15. G3NJP, QTHR, tel: Cranbrook 714482.

## WANTED....

DRAKE TR6 TCVR for 50MHz operation. Dave Newman, G4GLT, QTHR, 'Newhaven' Beveridge Lane, Bardon

Hill, Leics, LE6 2TB, tel: 0530-35835.

T199/4A computer software, hardware & literature. Particularly need user manual, will pay expenses to borrow and photocopy. Also need cassette lead. G4HIY, NOT QTHR, tel: Ramsey (0487) 823112.

BC348 RX, good price paid for clean example. G3AAZ, QTHR, tel: 0480-56781.

WIRELESS SENDER No76 with supply unit, rectifier No14 and psu No18. Also R109A/B. Also N021 TX/RX. Any cables for WS(CDN) No29, particularly connector psu to 'B' set. Taylor, G3UCT, 1 Harewarren Close, Wilton, Salisbury, Wilts, SP2 0LY, tel: 0722-744133.

BIRD 43 elements. Also handbooks for Murphy. POE VHF RX WT No12, EMI scope 2300, WW2 RX DST100, Pye HFS/8 valve amp and BCC 33 TCVR. G8BWA, QTHR, tel: Chertsey (Surrey) 64483, evenings.

INFORMATION on HRO-500 required for complete re-alignment and possible mods to improve HF sensitivity and general performance. Copy, borrow or buy. Expenses refunded. All help much appreciated. Ken Lee, G4HYQ, 25C La Pleta, Ordino, Andorra.

DRAKE 7 SERIES equipment, eg MN2700, RV7, RV75, MS7, SP75, TR7A, L7, DL1000 etc. Also Hygain TH3 Mk3. G4DFU, QTHR, tel: 0602-609345.

BOUND VOLUMES of Radio Communication and Bulletin for 1955-1968 inclusive, can collect Midlands or South West. G6JNS, QTHR, tel: 0905-620041, anytime

RESTORING old Navy TX/RX model No. CW546159, need valves 12SA7, 12S07, 12SK7 and any advice or diagrams. Also HF tri-bender or bits of. FOR SALE: Microwave Modules 6m-2m cvtr, £30 ono. Dave, G4GBZF, QTHR, tel: 0389 841-452.

OSCILLOSCOPE to aid cct design, suitably compact for home use, dual-beam, 25MHz or better and electrically working, preferably with manual and 2off probes. Buyer will inspect and collect up to 100 miles from London area. Collins, tel: 01-579 9455.

RSGB 'MORSEMAN' CW Tutor, complete and in working order. John, tel: Worthing 502272.

SP120 matching ext/spkr for FT221R, top price and costs paid. Nixon, tel: 01-980 3283, after 6pm please.

HEATHKIT monitor scope, any condx. Have KW204 TX, vgc, £120 and Racal R17L, vgc, £160. Both with manuals but primarily want monitor scope. TX will work with any gen/cov RX. G4NAX, QTHR (Northumberland), tel: Ashington (0642) 818442.

SECONDHAND TRAILER TOWER required by contest group, condx immaterial as can renovate, ex plant hire? scrap? any ideas please? Also wanted 21-ele ATV Tonnas, splitters, WHY? for keen ATV contest group. Ron, G4SHC, QTHR, tel: 061-653 3005, days.

HQ1 MINIBEAM, gc, with balun preferred. 29MHz FM TX or TCVR 10W min, reliable. Urgent info on RTTY problem driving FDK750E from Iono 5000E. All offers and letters answered. G3ADZ, QTHR (Rugby).

US ARMY COLLINZBITZ R392/URR pwr plug (Amphenol 164-4FS), tube case CY1298/URR (full), 5-meter, rightangle Bristo No.8 wrench, rightangle Phillips driver. G8JFJ, QTHR, tel: 0705-591216.

HF MOBILE ANTENNA, Hustler or Super Hamcat required. Have FT726 c/w 2m, will exch for HF rig. COBLR, QTHR, tel: Wilmslow (Cheshire) 535644.

YAESU FT757GX plus FC757 atu in exch for Yaesu FT902DM, CW & FM filters fitted, FC902 atu, FTV901R tvtr 2m, Y0901 multiscope, all as new and boxed c/w manuals, going mobile, will deliver reasonable distance. G4ATUL, QTHR, tel: 0495-791884.

40'-60' LATTICE TOWER, telescopic, tilt-over if possible c/w all winches and head unit. G4SQI, QTHR, tel: Abingdon (Oxon) 24349.

FT1012Z HANDBOOK urgently required, photostat or original, price to Brad, 34 Quay Street, Scarborough, N Yorks, YO11 1PL.

CW FILTER YG88C to suit Trio TS820. G3JENJ, 3 York Place, Dunfermline, Fife, KY12 0DA, tel: 0383-721860, after 6pm.

CIRCUITS OR HANDBOOKS, borrow or buy for Pye F30AM, L470, R470. Also looking for 3CX100A5, 2C39BA, TH326, TH328 valves. G4JKN, QTHR, tel: 0271-76625.

BBC 'B' microcomputer, preferably with colour monitor and disk drive, all vgc, price negotiable. Richard, G8XYS, QTHR (Exeter), tel: 0392-76629, evenings only.

HQ-1 MINI-QUAD in gc. G4YSM, QTHR, tel: Doncaster 537686.

ICOM 730 or similar HF TCVR, would consider IC720 etc, must be gc, cash waiting for clean rig. Also good small atu such as Trio AT230. G3WCS, QTHR, tel: 0383-726456.

A PAIR OF 587BLY TRANSISTORS (no longer available at Lincoln!), been careless once too often! G3JQL, QTHR, tel: 0385-61116.

TR10 TS120S or 130S or 530S. G3XFB, QTHR, tel: 0902-850033.

H/B FM HANDHELD, 6ch, 166-170MHz range TCVR. G1DXQ, QTHR, tel: 0603-745734.

MANUAL or copy required for Pye UHF sig/gen SG1U or any info for same. Also xtals HC6/U type 12.027MHz, 12.030MHz, 12.037MHz. G8WTY, QTHR, tel: Malvern 4968.

HEATH RA-1 RX. Price and condx to Mr N Cameron, 16 St.Mary's Crescent, Westport, Co.Mayo, Eire.

**RSGB**  
RADIO SOCIETY OF GREAT BRITAIN

# APPOINTMENTS

## EDITORIAL ASSISTANT

The Society is looking for an editorial Assistant to work in its newly formed Publications Group. We seek someone in their twenties with previous experience of either books and magazines, who is not afraid of work in a busy office. The ability to type accurately and be friendly towards word processing computers is a must, as is the ability to properly proof-read and write Good English.

Oh - and when you apply, send us a corrected version of this advertisement. Apply in writing to David Evans, Secretary.

## MEMBERSHIP SERVICES OFFICER

RSGB members ask many questions every day. The job of a Membership Services Officer is to provide the right answers, quickly and efficiently.

If you have an agile mind, are not afraid of working hard when the pressure is on and have the ability to acquire specialised amateur radio knowledge, you could join the MSD team at RSGB HQ.

The successful applicant will probably be in his or her twenties and a keen licensed amateur. He or she can expect to work a flexible 5-day week which will involve occasional weekend working. This is to

permit either the operation of the HQ station - since we plan to expand its use for bulletins and other special transmissions - or attendance at rallies and exhibitions around the UK.

If you are well educated and feel you fill the bill, we can guarantee job satisfaction working as part of a small team serving amateur radio.

Apply in writing to David Evans, Secretary.

**RSGB, Lambda House, Cranborne Road, Potters Bar, Herts EN6 3JE**

## Nominations for election to the 1987 Council of the RSGB

The Society's Articles of Association require that members who are entitled to vote be notified of those Council members who retire at the end of each year. The Council members who retire on 31 December 1986 are:

### ORDINARY MEMBERS

D S Evans, G3RPE, who is eligible and willing to accept nomination for re-election.

B O'Brien, G2AMV, who is eligible and willing to accept nomination for re-election.

### ZONAL MEMBERS

There are no Zonal vacancies for the 1987 Council.

### Election of the 1987 Council

#### The role of Council & its members

To assist candidates and those making nominations, the following notes are intended to summarise very briefly the main functions of Council and Council members.

The size, complexity and long-term nature of the Society's activities makes it necessary for the day-to-day control of its affairs to be in the hands of a stable administration. As organised at present, the workload is divided between the full-time staff, approximately 30 in number, and the volunteer effort represented by the 16 sub-committees of Council and its honorary officers. Of the HQ effort, roughly half can be regarded as being devoted directly to amateur radio matters, the remainder being concerned with normal administrative tasks. Responsibility to Council for the working of HQ is primarily with the Finance & Staff Committee, with the Licensing Advisory Committee being heavily involved with licensing aspects. The work of the other committees is mainly concerned with amateur radio matters, although there may be major financial implications.

The main work of Council is that of monitoring the work of HQ and the committees to ensure their effectiveness in handling the commercial aspects of the Society's operation (an income of over £1 million per annum), together with those matters it has identified as being important to amateur radio on both the national and international level.

The main duty of Council members obviously is to play an active part in this operation. This will involve, inter alia: the attendance at, typically, seven Council meetings each year; the critical review of the 200 or so sets of committee minutes and working documents produced during the same period; and the capacity to react constructively to this and other information. Council members are also expected to deal with individual members' problems: their duty is to ensure that these are dealt with by the responsible committee or other body.

#### Candidate's qualifications and details.

(a) The candidate must have been a corporate member for at least three years at the time of nomination.

(b) The candidate must submit the following statements:

(i) Written, signed consent to accept office, if elected.

(ii) If appropriate, a statement that he/she is over 70 years of age or will become so during the term of office if elected. Under the Companies Act, it is necessary for her/his election to be confirmed by the annual general meeting, which is part of the annual meeting.

(iii) A statement declaring any commercial interest in the field of amateur radio.

These declarations, together with nominations, may conveniently be made by using the "Candidate's Form for the Election of Ordinary Members of Council" available on request from: The Secretary (DAE), RSGB, Lambda House, Cranborne Road, Potters Bar, Herts EN6 3JE.

#### Nomination procedure

(1) The nominators for each candidate, at least 10 in number, must be fully-paid-up corporate members at the time of nomination.

(2) Nominators may nominate only one candidate.

(3) The nominations may be made on the "Candidate's Form" referred to above, the associated "Nominator's Form" or on any sheet of paper. Each nomination must be signed by the nominator, who should include the name of his town.

#### Additional information on candidates

In order to assist the membership in voting, a candidate may enclose a maximum of 200 words as a cv or statement describing pertinent experience which will be circulated with the ballot forms. This must be confined to biographical facts. Clearly, involvement with decision-making in organisations of similar size to the RSGB (or larger) would be relevant, and this should be stated. Prospective candidates will find it useful to have had experience of RSGB procedures, including committee membership, duties as regional or area representatives, writing for Society publications or organising events. This experience should be quoted, together with details of participation in amateur radio at the local level. Bona fide statements will receive the minimum of editing consistent with good style and factual accuracy: however, statements exceeding 200 words are likely to be cut to that number.

The candidate may also supply a recent black-and-white head and shoulders photograph for publication with the cv, if s/he wishes.

#### Information on nominators

Nominators are required to give details of their place of residence. It is to be noted that voters may place higher value on nominations if they are seen to have come from many parts of the UK.

Nominators may also supply for publication details of how long they have known the candidate and of relevant positions that they hold or have held; for example, as the chairman of an amateur radio club, a member of Council etc, or who can indicate management experience. The standard nomination form referred to above is designed to facilitate the supply of this information.

The candidate's declaration together with the completed nominations should be sent in a single closed envelope and addressed to: The Secretary (DAE), RSGB, Lambda House, Cranborne Road, Potters Bar, Herts EN6 3JE, to arrive no later than 10 October 1986. Please mark the envelope "1987 Council Nomination". Nominations for all candidates will be acknowledged by return of post.



# PHOTO ACOUSTICS LTD. TEL: 0908 610625

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# MAIL ORDER



## Trio

TS440S	NEW Amateur band transceiver/General coverage RX	1795.00	(1.00)
TS940S	9 Band TX General Cov RX	1395.00	(1.00)
TS930S	160-10m Transceiver 9 Bands	898.00	(1.00)
AT230	All Band ATU/Power Meter	170.65	(2.00)
SP230	External Speaker Unit	51.43	(1.50)
TS305SP	160m-10m Transceiver	779.79	(1.00)
TS430S	160m-10m Transceiver	750.00	(1.00)
PS430	Matching Power Supply	139.01	(3.00)
SP430	Matching speaker	39.50	(1.50)
MB430	Mobile Mounting Bracket	13.56	(1.50)
FM430	FM Board for TS430	45.00	(1.50)
SP120	Base Station External Speaker	33.33	(1.50)
MC50	Dual Impedance Desk Microphone	39.56	(1.50)
MC35S	Fist Microphone 50K ohm IMP	18.65	(1.00)
LF30A	HF Low Pass Filter 1KW	27.70	(1.00)
TR930	2M FM Mobile	365.60	(1.00)
TR9130	2M Multimode	544.73	(1.00)
TM201A	2M 25W mobile	296.00	(1.00)
TM401A	70cms FM 12W	350.91	(1.00)
TH21E	2M Mini-Handhelds	189.30	(1.00)
TH41E	70cm Mini-Handhelds	220.95	(1.00)
TM211E	2m FM Mobiles	398.00	(1.00)
TM411E	70cm FM Mobiles	466.18	(1.00)
TS111E	2M Base Stations	770.74	(1.00)
TS111E	70cm Base Stations	895.00	(1.00)
TR3600	70cm Handheld	324.36	(1.00)
TR2600	New 2M FM Synthesised Handheld	299.00	(1.00)
ST2	Base Stand	66.11	(1.50)
SC4	Soft Case	16.95	(1.00)
SMC25	Speaker Mike	19.78	(1.00)
BP25	Spare Battery Pack	32.20	(1.00)
MS1	Mobile Stand	38.41	(1.00)
R600	Gen. Cov. Receiver	323.78	(1.00)
R2000	Synthesised 200kHz-30MHz Receiver	518.73	(1.00)
HS5	Deluxe Headphones	29.39	(1.00)
SP40	Mobile External Speaker	18.08	(1.00)
TL922	160/10M 2kW Linear	1265.00	(7.00)
TS780	2M/70cm M/M Transceiver	1061.20	(5.00)
TS670	5, 10, 15, 40M 10W M/M Transceiver	774.13	(5.00)
TR9300	6M M/M Transceiver	499.00	(5.00)
SPECIAL OFFER			
TR4000A	2M/70cms mobile ONLY	398.00	(3.00)
NEW			
TR751E	2M Multimode with DGL (mobile)	525.00	(3.00)

## Linear Amps

<b>MICROWAVE MODULES</b>			
MML144/30-LS	inc preamp (1/3w i/p)	94.30	(2.00)
MML144/50-S	inc preamp, switchable	106.95	(2.00)
MML144/100-S	inc preamp (10w i/p)	149.95	(2.50)
MML144/100-HS	inc preamp (25w i/p)	159.95	(2.50)
MML144/100-LS	inc preamp (1/3w i/p)	169.95	(2.50)
MML144/200S	inc preamp (3/10/25 i/p)	334.65	(2.50)
MML432/30L	inc preamp (1/3w i/p)	169.03	(2.50)
MML432/50	inc preamp (10w i/p)	149.50	(2.50)
MML432/100	linear (10w i/p)	334.65	(2.50)

<b>B.N.O.S.</b>			
LPM 144-1-100	2m, 1W in, 100W out, preamp	197.50	(2.50)
LPM 144-3-100	2M, 3W in, 100W out, preamp	197.50	(2.50)
LPM 144-10-100	2m, 10W in, 100W out, preamp	175.00	(2.50)
LPM 144-25-160	2m, 25W in, 160W out, preamp	255.00	(2.50)
LPM 144-3-180	2m, 3W in, 180W out, preamp	295.00	(2.50)
LPM 144-10-180	2M, 3W in, 50W out, preamp	125.00	(2.50)
LP 144-10-50	2m, 10W in, preamp	125.00	(2.50)
LP 432-1-50	70cm, 1W in, 50W out, preamp	235.00	(2.50)
LP 432-3-50	70cm, 3W in, 50W out, preamp	235.00	(2.50)
LP 432-10-50	70cm, 10W in, 50W out, preamp	195.00	(2.50)
LP 432-10-100	70cm, 10W in, 100W out, preamp	335.00	(2.50)

## SWR/PWR Meters

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

NEW RANGE OF WELZ METERS NOW AVAILABLE

<b>DAFWA Power and SWR METERS</b>			
CN410M	3.5-150 MHz mobile cross needle meter	53.30	(1.50)
CN460M	140-150MHz mobile cross needle meter	57.75	(1.50)
CN630	140-150MHz mobile cross pointer meter up to 200W	108.90	(2.50)
NS488	900-1300MHz swr/power meter S/20W	78.00	(2.50)
NS660P	1.8-150MHz PEP Cross Needle Meter up to 1 SKW	99.50	(2.50)
<b>TRIO Power and SWR METERS</b>			
SW100A	SWR/power meter 1.8-150MHz	42.95	(2.50)
SW100B	SWR/power meter 140-450MHz	42.95	(2.50)
SW200A	SWR/power/PEP meter 1.8-150MHz	92.70	(2.50)
SW200B	SWR/power/PEP meter 140-450MHz	92.70	(2.50)
SW2000	SWR/power/PEP meter 1.8-54MHz up to 2KW	99.00	(2.50)
SWC1	Optional coupler for SW200 1.8-150MHz	25.50	(1.50)

<b>SWC2</b>	Optional coupler for SW200 140-450MHz	25.50	(1.50)
<b>VHF Receivers</b>			
AOR2002	VHF/UHF continuous coverage scanner	435.00	(3.00)
FRG9600	60-905MHz scanning receiver	465.00	(3.00)
HX2000E	Handheld VHF/UHF scanner	269.00	(3.00)
RS375	Handheld Airband receiver	64.90	(2.50)
RS32	Mobile/Base/Portable Airband receiver	209.80	(3.00)

## Icom Products

IC751A	HF Transceiver	1399.00	(1.00)
IC745	HF Transceiver	989.00	(1.00)
IC735	New HF Transceiver	899.00	(1.00)
PS15	P.S. Unit	149.50	(4.00)
PS30	Systems p.s.u. 25A	343.85	(1.00)
SM6	Base microphone for 751/745	39.10	(1.00)
IC2900	2m 25w M/Mode	519.00	(1.00)
IC271E	2m 25w M/Mode Base Stn	779.00	(1.00)
IC271H	100W version of above	979.00	(1.00)
IC27E	25W FM mobile	399.00	(1.00)
IC47E	25w 70cm FM mobile	595.00	(1.00)
ICBU1	B/U Supply for 25/45/290	31.05	(1.00)
ICR71	General Coverage Receiver	789.00	(1.00)
IC02E	2m H/Hand	299.00	(1.00)
IC2E	2m H/Hand	199.00	(1.00)
ML1	2m 10W Linear	79.35	(2.00)
IC4E	70cm H/Hand	285.00	(1.00)
IC04E	70cm handheld	299.00	(1.00)
BC35	Base Charger	67.85	(1.00)
HM9	Speaker mic	20.70	(1.00)
LC3	Carry Case	6.90	(1.00)
ICBP3	Std Battery Pack	28.75	(1.00)
BP5	High Power Battery Pack	58.65	(1.00)
CP1	Car Charging Lead	6.90	(1.00)
DCV	12v Adapter	17.25	(1.00)
R7000	VHF/UHF Scanning Receiver	899.00	(1.00)
IC3200	2M/70cm Mobile Transceiver	529.00	(1.00)
<b>SPECIAL OFFER</b>			
IC505	50MHz multimode 10W ONLY	349.00	(3.00)

## Mutek Products

SLNA 50	50MHz Switched preamp	1.50	(1.50)
SLNA 144s	144MHz Low noise switched preamp	1.50	(1.50)
SLNA 145sb	Preamp intended for 290	1.50	(1.50)
GLNA 432e	2M Mast Head preamp	2.50	(2.50)
RPCB 251ub	Front end FT221/225	1.50	(1.50)
RPCB 251ub	Front end IC251/211	1.50	(1.50)
BBBA 500u	20-50MHz Preamp	1.50	(1.50)
RPCB 271ub	Front end for IC271	1.50	(1.50)
TUHF 230c	2M-FM Transverter	5.00	(5.00)
LBPF 144u	Bandpass Filter	1.50	(1.50)
LBPF 432u	Bandpass Filter	1.50	(1.50)
TVVF 50c	6M Transverter	2.50	(2.50)
GLNA 433e	70cm Pre-amp	2.50	(2.50)
TVVF 144a	2M Transverter	2.50	(2.50)
GMFA 144e	2M Mast Head Preamp	119.95	(2.50)
TVVF 50a	6M Transverter	249.90	(2.50)

## CW/RTTY Equipment

<b>BENCHER</b>			
BY1	Squeeze Key, Black base	67.42	(2.00)
BY2	Squeeze Key, Chrome base	76.97	(2.00)
<b>H&amp;MOUND MORSE KEYS</b>			
HK708	Straight key	18.10	(2.50)
HK702	Deluxe version of above on Marble Base	34.50	(3.00)
HK705	Straight key	19.50	(2.50)
HK707	Straight key	18.50	(2.50)
MX704	Squeeze paddle	17.50	(2.50)
MX705	Squeeze paddle on Marble Base	27.90	(3.00)
<b>RTTY EQUIPMENT</b>			
AMT-2	Terminal Unit RTTY/AMTOR/ASCII/CW	245.00	(3.00)
AMT-2/CBM64	Software for the above for the Commodore 64	51.75	(2.50)
AMT-2/VIC20	Software for the above for the Commodore VIC 20	51.75	(2.50)
AMT-2/BBC B	Software for the above for the BBC B	44.85	(2.50)
CWR 610E	RTTY/CW/ASCII Decoder	216.45	(3.00)

<b>KEYERS &amp; ACCESSORIES</b>			
Star Master Key	Electronic Keyer	54.70	(3.00)
New Star	Masterkey electronics CMOS memory keyer	95.00	(3.00)
TRX3	Morse Oscillator	11.70	(1.50)
Drae	Morse Tutor	52.00	(3.00)

## Yaesu

F11	HF Transceiver	P.O.A.	(1.00)
F1580	HF Transceiver	1759.00	(1.00)
SP980	Speaker	85.09	(2.00)
F1757GX	HF Transceiver	879.00	(1.00)
FC757	Auto A.T.U.	318.00	(2.00)
FP757HD	Heavy Duty PSU	390.00	(2.00)
FP757GX	Switched Mode PSU	199.00	(2.00)
FT290	2m M/Mode Port Transceiver	369.00	(1.00)
FT290	With Mutek front end fitted	399.00	(1.00)
FT690	6M M/M Portable Transceiver	289.00	(1.00)
FL2010	Linear Amplifier	79.00	(1.00)
MMB11	Mobile Bracket	33.00	(1.00)

NC11	Charger	10.00	(1.00)
CSC1A	Carrying Case	6.50	(1.00)
YHA15	2m Helical	7.50	(1.00)
YHA440	70cm i-wave	10.95	(1.00)
YM49	Speaker Mike	19.00	(1.00)
MMB15	Mobile Bracket	14.55	(1.00)
FT203R	NEW 2m H/Hand/C/W FN83	225.00	(1.00)
FT205R	NEW 2m H/Hand/C/W FN83	265.00	(1.00)
FT703R	70cm H/Hand	255.00	(1.00)
FT709R	70cm H/Hand	285.00	(1.00)
FT270R	2m 25W F.M.	359.00	(1.00)
FT270RH	2m 45W F.M.	399.00	(1.00)
FT2700R	2m/70cm/25W/25W	499.00	(1.00)
FRG 9600	60-905MHz Scanning RX	465.00	(1.00)
MMB10	Mobile Bracket	8.50	(1.00)
NC9C	Charger	9.60	(1.00)
PA3	Car Adapter/Charger	18.00	(1.00)
FN82	Spare Battery Pack	25.00	(1.00)
YM24A	Speaker Mike	27.00	(1.00)
FT726R	2m Base Station	899.00	(1.00)
430/726	70cm Module for above	255.00	(2.50)
FRG8800	HF Receiver	575.00	(1.00)
FRV8800	Converter 118-175 for above	90.00	(1.50)
FR17700RX	A.T.U.	49.85	(1.50)
MH188	Hand 600 Spin mic	17.50	(1.00)
M0188	Desk 600 Spin mic	14.75	(1.00)
MF1A3B	Boom mobile mic	23.00	(1.00)
YH77	Lightweight phones	17.50	(1.00)
YH55	Padded phones	17.50	(1.00)
YH1	L/weight Mobile H/et-Boom mic	17.00	(1.00)
SB1	PTT Switch Box 208/708	18.50	(1.00)
S82	PTT Switch Box 290/790	16.00	(1.00)
SB10	PTT Switch Box 270/2700	18.50	(1.00)
QTR240	World Time Clock	39.00	(1.00)
FFS01DX	Low Pass Filter	33.00	(1.00)

## Power Supplies

<b>DRAE</b>			
4 amp	40.50	(2.00)	
6 amp	63.00	(2.50)	
12 amp	86.50	(3.00)	
24 amp	125.00	(4.00)	
<b>BNOS</b>			
6 amp	69.00	(2.50)	
12 amp	115.00	(3.00)	
25 amp	169.00	(4.00)	
40 amp	345.00	(4.00)	

## Aerial Rotators

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

## Switches

Sigma	2 way S0239	14.49	(1.00)
Sigma	2 way 'n' S0239	19.95	(1.00)
Welz	2 way S0239	23.95	(1.00)
Welz	2 way 'n' S0239	43.95	(1.00)
Drae	3 way S0239	15.40	(1.00)
Drae	3 way 'n' S0239	19.90	(1.00)

## Aerials

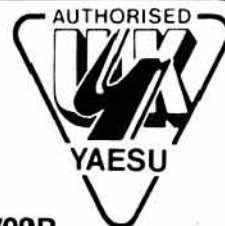
<b>JAYBEAM</b>			
Jaybeam	TB3 Mk3 HF 3 element Trnbander Beam	287.50	(10.00)
Jaybeam	TB2 Mk3 HF 2 element Trnbander Beam	195.50	(10.00)
Jaybeam	TB1 Mk3 HF Trnbander Rotary Dipole	97.75	(10.00)
Jaybeam	VR3 HF Vertical Trnbander	55.77	(10.00)

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

<b>TONNA</b>			
Tonna	5 element 50MHz	37.90	(5.00)
Tonna	9 element fixed 'N' socket 144MHz	25.65	(5.00)
Tonna	2 x 9 element 'N' socket 144MHz	41.05	(

# YAESU

**THE WORLD'S  
No1  
HANDHELD  
RANGE**



## FT203R/FT703R

The FT203R/FT703R is packaged in a lightweight, high-impact plastic case providing comfort and convenience with high durability. The small size is made possible by using chip components. Thumbwheel frequency selectors (with 5kHz up button) plus standard repeater shift. Volume and Squelch controls are on the top panel along with jacks for the antenna (BNC), external microphone and earphone. With the optional external YH-2 Headset, the internal VOX system provides voice-actuated transmit/receive switching, for "hands free" operation when mobile or walking. (As FT209R). Also included is an S/PO meter for monitoring of relative power output and signal strength. (As FT209R). The FTE-2 1750Hz Tone Burst Generator, which is standard, is activated manually by a button on the side of the FT203R. (As FT209R). A range of slide-on Nicad packs or AA-cell cases provides the optimum power source for your needs (As FT209R).

**144-146MHz**  
-10kHz (+5kHz)  
Supply: 5-5-13V DC  
IF's: 10-695-0-455Hz  
Selectivity:  $\pm 6$ kHz  
@ -6dB (2:1SF)

**430-440MHz**  
10kHz (+5kHz)  
Supply: 5-5-13V DC  
IF's: 21-6-0-455Hz  
Selectivity:  $\pm 6$ kHz  
@ -6dB (2:1SF)



## FT209R/FT709R

The FT209R/FT709R with two 4-bit CPU's and a lithium backed RAM offers features far beyond anything yet conceived, in a package smaller and lighter than any previous CPU-controlled transceiver. Ten memory channels allow storage of either standard + / - shifts, or independent Tx and Rx frequencies for any split/repeater shift on any channel, with touch-key reverse or simplex on either frequency. Scanning capabilities include step-programmable full or partial band memory bank priority scanning etc. Battery life is greatly extended with a programmable Power saver which activates the receiver momentarily at programmable intervals. Nineteen soft rubber dual function keys provide greater control than ever, yet operation remains easy: the keypad is carefully arranged, colour-coded and most commands are one-touch operations. Fat 1" LCD digits are complemented by ten memory and nine special function indicators showing status at a glance.

**144-146MHz**  
25/12-5kHz  
Supply: 6-15V DC  
IF's: 10-7-0-455Hz  
Selectivity:  $\pm 7$ -5kHz  
@ -6dB (2:1SF)

**430-440MHz**  
50/25kHz  
Supply: 6-15VDC  
IF's: 21-6-0-455Hz  
Selectivity:  $\pm 15$ kHz  
@ -6dB (2:1SF)

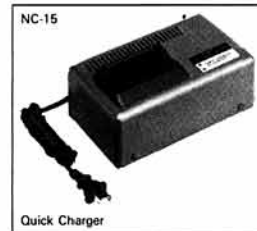
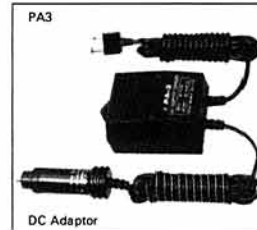
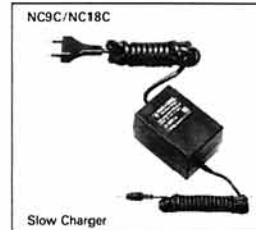
### GENERAL SPECIFICATIONS

Good 50 ohm match to linears and antennas. Frequency modulation (FM-F3-G3E) variable reactance linear modulator

Sensitive, quality 2K ohm condenser MIC.  $\pm 5$ kHz max. dev, 16kHz max. bandwidth. Transmitter spurious output -60dB

Sensitivity: 0-25 $\mu$ V for 12dB Sinad.  
1 $\mu$ V for 30dB S/N.  
AF O/P: 450mW into 80ohms @ 10% THD

Large range of accessories available. Supplied with YHA 14A/YHA 44D helical antenna and appropriate soft case



### MODEL, SUPPLIED CELL, POWER OUTPUT (Hi/Low), CASES, DIMENSIONS

FT203R	FT703R	FT209R	FT709R	FT209RH
1-5/0-2W* C/W FBA5 CSC6 65W, 34D, 153H mm	1-5/0-2W* C/W FBA5 CSC6 65W, 34D, 153H mm	1-6/0-2W* C/W FBA5 CSC10 65W, 34D, 168H mm	1-8/0-2W* C/W FBA5 CSC10 65W, 34D, 168H mm	2-3/0-3W* C/W FBA5 CSC10 65W, 34D, 188H mm
2-5/0-3W C/W FNB3 CSC6 65W, 34D, 153H, 482gms	2-5/0-3W C/W FNB3 CSC6 65W, 34D, 153H mm, 480gms	2-7/0-3W C/W FNB3 CSC10 65W, 34D, 168H, 512gms	3-0/0-3W C/W FNB3 CSC10 65W, 34D, 168H mm, 535gms	3-7/0-4W C/W FNB3 CSC10 65W, 34D, 168H mm, 512gms
3-5/0-4W C/W FNB4 CSC7 65W, 34D, 172H, 490gms	3-5/0-4W C/W FNB4 CSC7 65W, 34D, 172H mm, 495gms	3-7/0-4W C/W FNB4 CSC11 65W, 34D, 186H, 520gms	4-0/0-4W C/W FNB4 CSC11 65W, 34D, 186H mm, 520gms	5-0/0-5W C/W FNB4 CSC11 65W, 34D, 186H mm, 520gms

FT203R C/W FBA5.....£195.00  
FT203R C/W FNB3.....£225.00  
FT203R C/W FNB4.....£229.00  
FT703R C/W FBA5.....£229.00  
FT703R C/W FNB3.....£255.00

FT703R C/W FNB4.....£260.00  
FT209R C/W FBA5.....£239.00  
FT209R C/W FNB3.....£265.00  
FT209R C/W FNB4.....£270.00  
FT209RH C/W FBA5.....£245.00

FT209RH C/W FNB3.....£275.00  
FT209RH C/W FNB4.....£279.00  
FT709R C/W FBA5.....£255.00  
FT709R C/W FNB3.....£285.00  
FT709R C/W FNB4.....£290.00



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