

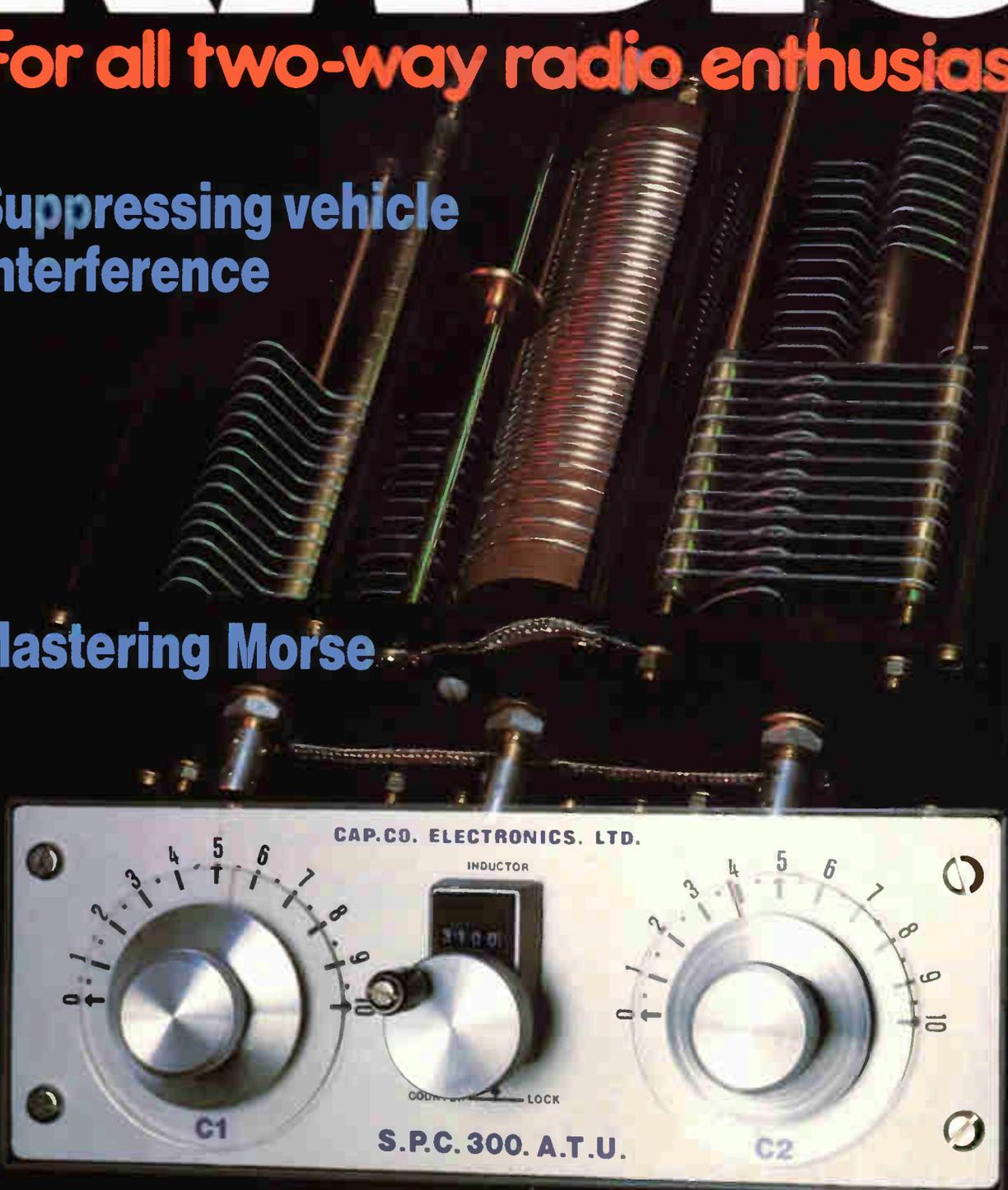
*Amateur*

# RADIO

For all two-way radio enthusiasts

Suppressing vehicle interference

Mastering Morse



**On test:  
Cap Co Electronics SPC300 ATU**

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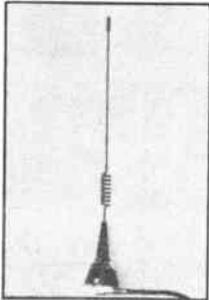
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# R WITHERS



# Amateur RADIO

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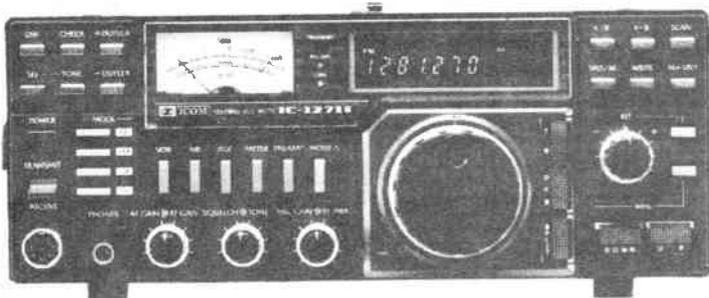
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# HIGHER AND HIGHER WITH

## 2 New models to raise ICOM Amateur frequencies to 1.2GHz.

### IC-1271E Fantastic new multimode 1.2GHz 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.

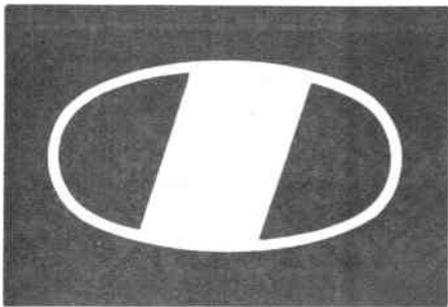
A variety of options include IC-PS25 internal AC power supply, IC-EX310 voice synthesizer, the TV-1200 TV transceiver adaptor and the IC-EX309 computer interface. The IC-1271E is the most compact and lightest all-mode 1200 MHz transceiver currently available.

### IC-R7000 VHF/UHF scanning receiver

Causing quite a stir at the moment is the ICOM IC-R7000. This new receiver is able to give high frequency coverage up to 1.3MHz without sacrificing SSB stability which is maintained throughout the IC-R7000's entire frequency range. For simplified operation and quick tuning, the IC-R7000 feature direct keyboard entry. Precise frequencies can be selected by pushing the digit keys in sequence of the frequency or by turning the main tuning knob. FM/AM/SSB modes, frequency coverage 25-1000 MHz and 1025 – 2000MHz (25 – 1000MHz and 1260 – 1300MHz guaranteed specification). The IC-R7000 has 99 memories available to store your favourite frequencies including the operation mode. Memory channels may be called up by simply pressing the memory switch, then rotating the memory channel knob or by direct keyboard entry. A sophisticated scanning system provides instant access to most used frequencies. By depressing the Auto-M switch. The IC-R7000 automatically memorises frequencies in use, while the unit is in the scan mode. This allows you to recall frequencies that were in use. Scanning systems include memory selected frequency ranges or priority channels, scanning speed is adjustable. Narrow/wide filter selection. Five tuning speeds: 10Hz, 100Hz, 1.0KHz, 10KHz and 25KHz. All functions including memory channel readout are clearly shown on dual-colour fluorescent display with dimmer switch. The IC-R7000 has dial-lock, noise blanker, S-meter and attenuator. Options include RC-12 infra-red remote controller and a voice synthesizer.

For a more detailed specification of the competitively priced IC-R7000 contact your authorised ICOM dealer or telephone us direct on 0800 521 145, our FREE Linkline service for Amateurs and SWL's.





# ICOM

## IC735 compact HF Transceiver



As predicted the ICOM IC-735 has rapidly gained the reputation it deserves. When compared with similar 'top names' transceivers the IC-735 towers above them (despite its smaller size). The IC-735 has a larger number of programmable channels, but notably most important is the superb sensitivity in all modes SSB, CW, AM and FM. This superior sensitivity is due to the excellent front end performance. All amateur frequencies from 1.8MHz to 30MHz are available including the three new bands 10, 18 and 24MHz. RF output is approximately 100 Watts. Tuning ranges from 100KHz to 30MHz, made continuous by using a high-side IF and a CPU control system. RTTY operation is also possible.

Dynamic range is 105dB with a 70.451MHz first IF circuit. Pass-band tuning and a sharp IF notch filter provide clear reception even under duress. Preamp is 10dB and attenuator 20dB. Computer remote control is possible via the RS-232C jack. Options include: the AT-150 automatic antenna tuner, the PS55 AC power supply and the SM-6 and SM-8 desk mics. Why not find out more about the IC-735 by ringing us or your local ICOM dealer.

Thanet Electronics are proud to offer their continued complete service for all Amateur radio requirements - no matter what your problem may be regarding the smooth operation of your shack Thanet have the answers, and technical 'know-how'. If you require a demonstration of any ICOM equipment telephone our retail premises on Herne Bay (0227) 369464 where we will be pleased to hear from you.



## WANT TO LEARN MORE?

Telephone us free-of-charge on:

# HELPLINE 0800-521145.

*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.*

## ICOM authorised dealers in the U.K.

Alyntronics, Newcastle, 0632-761002.  
 Amateur Radio Exchange, London (Ealing), 01-992 5765.  
 Amcomm, London (S. Harrow), 01-422 9585.  
 A.R.E. Comms, Earlestown, Merseyside, 09252-29881.  
 Arrow Electronics Ltd., Chelmsford, Essex, 0245-381673/26.  
 Beamrite, Cardiff, 0222-486884.  
 Booth Holdings (Bath) Ltd., Bristol, 02217-2402.  
 Bredhurst Electronics Ltd., W. Sussex, 0444-400786.  
 D.P. Hobbs, Norwich, 0603-615786.  
 Dressler (UK) Ltd., London (Leyton), 01-558 0854.  
 D.W. Electronics, Widnes, Cheshire, 051-420 2559.

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.  
 Tyrone Amateur Electronics, Co. Tyrone, N. Ireland, 0662-42043.  
 Reg Ward & Co. Ltd., S.W. England, 0279-34918.  
 Waters & Stanton Electronics, Hockley, Essex, 0702-206835.

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.



**Thanet Electronics**  
 Sea Street, Herne Bay, Kent CT16 8LD  
 Tel: (0227) 363859.  
 Dept. AR

# LEVEL



### THE RIGHT FREQUENCY

Completely new circuitry in the Quartzlock Model 2A frequency standard is contained on a CAD PCB. The latest design operates using current and 1988 BBC transmissions. Outputs of 1MHz and 10MHz are accurate to 2 parts in  $10^{11}$  long term and medium

term 1 part in  $10^{10}$  with no additional drift, ageing or temperature coefficient.

Uses include the calibration, audit and certification of frequency meters, counters, timers, signal sources and generators and radio-telephone test equipment.

The new Model 2A uses a

ferrite antenna but external input is provided. The CAD PCB can be retrofitted on earlier Gould Advance OFS2B and Quartzlock Model 2 receivers.

More details are available from: *Dartington Frequency Standards, Moor Road, Staverton, Devon TQ9 6PB.*

### MAPLIN COMPONENT GUIDE

November sees the publication of the *Maplin 1986 Buyer's Guide to Electronic Components*. The new edition of Europe's top selling electronic guide features over 3,000 reduced prices plus many new exciting lines.

Maplin reports that their 'Mapcard' - Maplin privileged account holder - facilities are being used by an increasing number of customers. These give the user credit facilities and the ability to purchase items up to 24 times the agreed monthly payments.

The card facilitates priority ordering by telephone or payment at a Maplin store. Meanwhile, the Maplin 'CASHTEL' (Computer Aided Shopping by TELEphone) facility has proved popular.

Already Maplin have programs and suitable modem interfaces for such home computer systems as the Commodore 64, Dragon,

Sharp MZ80K, Spectrum, VIC-20, ZX81 and the BBC.

Maplin one source shopping now covers the Heathkit range of training computers and robot kits. In fact, Maplin's HERO and HERO Jr are the UK's best selling training robots following personal appearances on TV and radio, Harrods and Fulham Football Club.

The *Maplin 1986 Buyer's Guide to Electronic Components* costs £1.45 (£1.85 including p&p) and is available from Maplin Mail Order, or Maplin Stores in London, Birmingham, Manchester, Southampton and Southend, or branches of W H Smith.

### POCKET MICROSCOPE

A self-illuminated pocket microscope by Cobonic Ltd is about the size of a long slim pack of cigars. It weighs 4½ ounces and provides a clear 30-power magnification (the

Spirig-30, £18.90), or a 100-power magnification (the Spirig-100, £27.90), of any surface on which it is easily focused.

For further information please contact: *Cobonic Limited, 32 Ludlow Road, Guildford, Surrey GU2 5NW. Tel: (0483) 505260.*

### PCB POWER SUPPLY

An A4 leaflet on the OF422 dual input, 4 output, printed circuit board (PCB) power supply is now available from Advance.

Listing the major features of the OF422, the leaflet also includes technical details, dimensions and fixing centres, diagrams, and applications.

For more details, and a copy of the leaflet contact: *Advance Power Supplies Limited, Raynham Road, Bishop's Stortford, Herts CM23 5PF. Tel: (0279) 55155.*

# All the latest news, views, comment and developments on the amateur radio scene

## TOWNIES

Nevada have just released two new low cost 934MHz personal radio band mobile antennas, selling at £25 each and distributed via Telecomms. These low profile mobile antennas offer 3.5dB gain with wide angle coverage useful at this frequency.

Each antenna is supplied complete with 4.8 metres of cable. The G900A is fully adjustable with an inox steel whip, while the G900R is finished in black in common with many cellular radio antennas. Both antennas feature an 'SL' UHF low loss base connector.

The specifications are as follows: impedance - 50 ohms; frequency range - 920-934MHz; gain - 3.5dB; VSWR - 1.2:1; maximum

power - 50 watts; length (approx) - 335mm.

For certain uses in built-up areas, Telecomms have found that lower gain and wider angle of radiation are an asset and are preferable to the narrow angle high gain existing range of antennas they distribute.

In a town centre 934MHz signals arrive at the vehicle from many angles, being reflected by the tall buildings and other objects. For this use the wider acceptance angle of the company's G900 range gives better average levels of reception/transmission than higher gain mobile antennas.

To find out more about these aerials, contact: *Telecomms, 189 London Road, North End, Portsmouth, Hants. Tel: (0705) 698113.*

## DIGITAL MULTIMETER

Now available from Electronic Brokers is the Thandar TH302 pocket-size digital thermometer, which measures temperature ranges of -40° to 1100°C and -40° to 2000°F with an accuracy of ±0.25% of reading and 0.01° or 1° resolution.

Temperature is shown via a 0.5 inch liquid crystal display (LCD) which indicates when five hours of battery life remain and has a typical life of 200 hours.

The TH302 is supplied with a naked bead thermocouple, but will accept any Type K probe.

A range of optional accessories is available, including Type K hand-held probes, carrying case and service manual.

For further information contact: *Electronic Brokers Limited, 140-146 Camden Street, London NW1 9PB. Tel: 01-267 7070.*

## HAND-HELD DSO

Now available in the UK from House of Instruments is the Soar Model 1000, a hand-held battery operated 3.2MHz digital storage oscilloscope.

Weighing only 2.1kg with dimensions of 264x214

x60mm, the Model 1000 features a dual-trace liquid crystal display (LCD). The display unit comprises a 128x160 dot matrix LCD with an effective display area of approximately 76x95mm, and a dot size of 0.55x0.55mm.

A built-in battery back-up memory allows storage of the waveform for later analysis and a waveform alarm function ensures correct operation.

Features of the Y-axis operation include a scale of four vertical divisions for each channel, a nine-range sensitivity from 10MV/div to 5V/div, and a frequency characteristic of ±3dB or less for dc to 200kHz.

The X-axis operation has 10 divisions, a 20-range sweep speed of 5µs/div to 5s/div, continuous-sweep and single-sweep measurement modes, and positive, negative and switchable trigger slopes.

The Model 1000 also incorporates a separate 7-function 27-range DMM with automatic and manual ranging.

More information is available from: *Advance House of Instruments, Raynham Road, Bishop's Stortford, Herts CM23 5PF. Tel: (0279) 55155.*

## OPTICAL POWER METERS

New from Advance House of Instruments is the Soar 1800 Series of optical power meters designed for measuring power in fused silica and plastic fibres.

The instruments enable a selection of relative and absolute measurements including watts and dBm and also provide digital multi-meter functions allowing measurement of dc and ac voltage, dc and ac current, continuity, temperature and resistance.

Designed for simple operation and easy sensor replacement, the 1800 Series has a 480-1800nm wavelength capability, with several sensors being available to suit

the measured wavelength. Measurements are indicated by a 3½-digit liquid-crystal display (LCD) with a maximum display of 1999, automatic polarity, and overflow indication.

Features include a twice per second sampling rate and, type dependent, optical power output functions, as well as a light source.

Easily portable, the optical power meters weigh only 450g including batteries. Accessories include 0.85µm and 1.3µm sensors, adaptors, batteries, test probe and case.

For further information contact: *Advance House of Instruments, Raynham Road, Bishop's Stortford, Herts CM23 5PF. Tel: (0279) 55155.*

## GIFTU CW

New from Pearsons Computing is G1FTU CW, a program designed for the 48K Spectrum.

It enables the computer to both generate and decode Morse audio directly. A new software filtering technique has been specially devised for the receive side, which along with the generated tones on transmit may be adjusted to the optimum for any given transceiver.

G1FTU CW features selectable full or split screen operation with type-ahead capability in both transmit and receive modes. There are 9 user memories of up to 255 characters each, which may be saved on cassette, and a

special memory for your contact's callsign, which may be edited 'live' during reception.

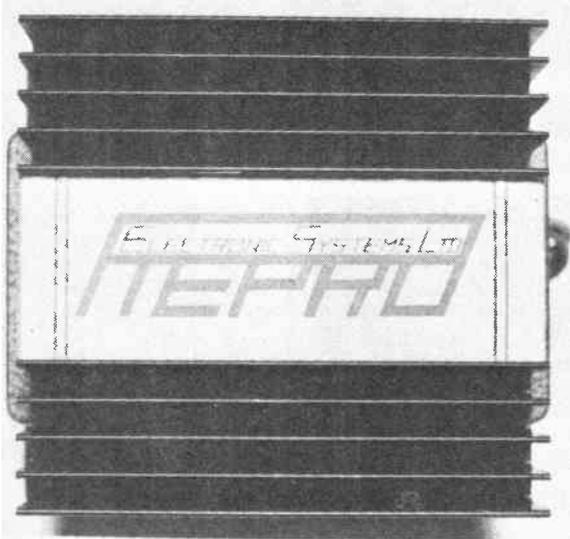
Other facilities include a 3-digit QSO counter for contest work, screen colour customising, full Sinclair-type printer support (ZX, Alphacorn, etc) and a large receive buffer with a QSO review function.

The program costs £10 (£11 Europe) and orders from licensed amateurs should be accompanied by a callsign which will be incorporated into the program.

Further details can be obtained from: *Pearsons Computing, 42 Chesterfield Road, Barlborough, Derbyshire S43 4TT. Tel: (0246) 810652.*



# STRAIGHT & LEVEL



## VOLTAGE DROPPER

Voltage droppers are designed to reduce 24 volts to 12 volts and have a wide use in the commercial vehicle world for fitting into trucks, buses, coaches, etc to allow the use of radio cassettes, transceivers, telephones and other types of equipment. Unfortunately most droppers only give a current rating of around 2 amps, which means that they are operating close to their maximum all the time.

Just on the market, however, is the Rebro Electronic Systems voltage dropper which guarantees to operate equipment up to a continuous rating of 5 amps. This means that as well as powering combinations of cassette radios, transceivers and portable televisions, the latest innovative business

communications tool – cellular telephones – can also be safely powered.

Measuring 10x6x12cm the unit has a 'chunky' feel to it and incorporates a full sized heatsink to ensure maximum heat dissipation. Full installation instructions are provided for fitting to negative earth and insulated return system vehicles. Fitting is a simple matter of connecting three wires. The fitting instructions incorporate very straightforward diagrams to make installation extremely simple.

The Rebro Voltage Dropper is distributed through selected dealers at around £34.50.

More details are available from: *Rebro Electronic Systems Ltd, Unit 7, Bentley Street Industrial Estate, Gravesend, Kent DA12 3DH.*

## RF FETs

A new range of broadband RF FETs, developed by Teledyne Crystalonics, is now available in the UK from MeTL of Oxford.

The range comprises three distinct families of devices. The CP640, CP664, CP665 and CP666 FETs are for high dynamic range HF and VHF amplifiers. Housed in TO-5 packages, they are for use in common gate configurations. Usable to over 300MHz, they offer drain-to-source and drain-to-gate voltage ratings from 20 to 50V and low noise figures (2.2dB typical at 50MHz).

The CP643, in a TO-46 package, is for high dynamic range RF amplifiers. Specified for the HF band and usable up to 500MHz, it has

drain-to-source and drain-to-gate voltage ratings of 30V and a low noise figure when used direct from a 50Ω line (the noise figure is improved at the cost of gain when used in a 75Ω line with a 2:1 output winding ratio or in a 50Ω line with an input step-up transformer). A dual version, the CD643, is available matched for pinch-off voltage (VPO) and transconductance (gm).

The CP650 and CP651 FETs are in TO-5 packages and feature extremely low gate-to-drain capacitance (20pF typical), high drain current (0.5A typical) and high transconductance (150,000μmhos typical).

For more information, contact: *MeTL Limited, Unit 2, Gt Haseley Trading Estate, Great Haseley Oxfordshire.*

## SPEECH PROCESSOR

There are occasions in the life of the DXer when the need arises for something to improve speech clarity under difficult transmission conditions. One such unit is the Rebro SP/1001 speech processor.

Designed to be used in conjunction with the standard mike supplied with the radio, the processor works by limiting and boosting modulation to an improvement of around 10dB (approx 3 times). The unit itself measures 15x5x8cm and all controls are grouped together on the front panel. At the rear of the unit are two leads for connecting to the radio and to a standard 12 volt power supply. A reverse polarity protection circuit is incorporated.

On the front panel there are LED indicators for 'limit' and 'power on', two switches for 'power on' and 'bypass' plus two rotary controls for 'limit' and 'mike gain'. In addition there is a socket to plug in a standard 4-pin mike.

To operate the processor it is necessary to connect the

power supply and plug in to the radio. Connect the standard mike to the socket on the front panel, switch on the unit and, with the 'limit' control on level 2 or 3, adjust the mike gain control to give a copy level similar to that obtained with the processor out of circuit. In this condition the red limit LED will flash briefly on signal peaks. Now advance the 'limit' control slightly so that the red LED glows reasonably brightly when speaking into the mike.

The 'bypass' switch is used to revert back to standard mike operations. In addition, all types of power mikes can be used with the processor but the power level on the mike will need reducing to avoid distortion.

The processor is supplied ready wired for Cybernet or Uniden chassis radios but other wirings can be accommodated on request.

The SP/1001 costs £38.00. More information is available from: *Rebro Electronic Systems Ltd, Unit 7, Bentley Street Industrial Estate, Gravesend, Kent DA12 2DH.*

## EDUCATIONAL SATELLITE

Maths and science teachers are looking to the heavens this Christmas for inspiration – and discovering the great potential of the University of Surrey's Educational Satellite Project.

The two satellites, UoSAT 1, launched in 1981 and known as Oscar 9, and UoSAT 2 or Oscar 11, launched in March 1984, are helping to generate more enthusiasm from pupils for geometry, maths, science, geography and computer systems.

However, until recently communicating with Oscar 9 and Oscar 11 has not been easy, involving electronics, computing and satellite tracking knowledge.

Now, after 15 months of dedicated work, the problems have been eliminated by Steve Webb whose track record in the electronics industry includes ten years' work with Ferranti and Marconi on space and defence satellite systems.

Steve says his children provided the inspiration for ASTRID – short for Automatic Satellite Telemetry Receiver and Information Decoder – which is now about to be launched world-wide.

The development finance was provided by M M Microwave Ltd, of Kirkbymoorside, North Yorkshire and ASTRID has been rigorously tested by computer industry experts, schools and colleges.

At £149, including VAT and packaging, the system, which includes receiver-decoder, antenna, power supply and leads plus test tape with display software, will appeal to serious home computer users, radio hams and schools world-wide.

The system was originally developed with the BBC Micro because of the good quality educational software readily available with this computer, although it will operate with any computer that has a suitable serial interface and has been adapted for the Sinclair Spectrum and others in recent weeks.

The antenna can be attached to a TV mast, even a garden fence, providing it can see as much sky as possible. Some who have tested the product say it will even work with the aerial indoors.

For further information contact: *M M Microwave Ltd, Kirkbymoorside, York YO6 6DW. Tel: (0751) 31620.*

## CLUB NEWS

### Radio aid

During a sponsored contest to raise money for famine relief in Sudan G4FHR, the Frensham Heights School Amateur Radio Club, made contact with Alastair ST5ALR, in central Sudan. Alastair works for CARE, the huge American aid organisation, and their contact with him resulted in the setting up of an aid programme whereby the school is funding a crop planting scheme run by three boarding schools in Kordofan province.

Excited by the ease with which this small-scale programme came about, members of the club discussed the possibility of formalising the notion of an amateur radio aid

and development project.

Two main possibilities emerged. Their first thought was to examine the setting up of contests similar to the one that they had devised. Each contestant would organise his/her own sponsoring prior to the contest, the points system being appropriate to the particular situation. Resultant funds would be placed in a central bank account and contributed subsequently by a co-ordinating body to a specific aid scheme. Contests might be organised under the auspices of the RSGB or through the loose network of local clubs, Scout stations or school stations. The potential exists for the organisation of international contests too.

A second idea captured the

club's imagination and they are in the process of examining its practical potential. There are radio amateurs in every part of the globe, as all seasoned DXers know, including in the Third World. In fact, the only major African nation that does not seem to provide any official facilities for its radio amateurs is Mozambique.

Many of the amateurs in Third World countries are Europeans engaged in contract work, so their knowledge of English and their contacts with Europe are sound.

The club has begun the task of compiling a directory of such amateurs and has already despatched 46 circulars to hams all over Africa, describing in detail how, with

their help, it might be possible to directly fund and/or supply local aid and development schemes.

It would be the radio amateur's responsibility to contact aid agencies operating in their area and then, in co-ordination with the field workers and organisers back in the United Kingdom, to direct funding into the scheme.

Operating within the terms of licensing regulations, the general task would be greatly facilitated by contact on the radio. Indeed, this would be a vital aspect of the scheme's operation.

More information is available from: *D Jones G1JCD, Frensham Heights, Rowledge, Nr Farnham, Surrey GU10 4EA.*

### RTTY

Because of the recent upsurge of interest in RTTY, the Bury Radio Society is hosting a lecture called 'Getting started on RTTY' by G3VC on 14 January, so you'll be in plenty of time to start this new project for the coming year.

The club's meetings are held every Tuesday evening at 8.00pm in the Mosses Youth and Community Centre, Cecil Street, Bury. Main meetings are held on the second Tuesday of each month and the other meetings are informal.

The publicity officer of the BRS will be pleased to supply any further information. Contact: *C J Ashworth G1PKO, 16 Wheelton Close, Bury, Lancashire BL8 2HZ. Tel: (061) 7645018.*

### Duplex and crossband

The method by which licensed radio amateurs transmit and receive on different frequencies – known as duplex or crossband working (involving one or two amateur bands) – has been clarified after talks between the Department of Trade and Industry and the Radio Society of Great Britain. The following guidelines have been agreed to assist operators:

- (a) A licensed UK amateur may receive any other properly authorised amateur transmission, but may only transmit on frequencies for which he/she is licensed;
- (b) Each station must be identified but the identification of the second station

should not be retransmitted by the first. Details of the receiving and transmitting frequencies should be given at the beginning and end of the establishment of communication and at every 15 minutes throughout a long contact;

(c) Class B licensees may use space satellite transponders which transpond from a frequency band in which they are licensed to transmit, to any band authorised for the amateur satellite service.

If you want more information, contact: *The Department of Trade and Industry, 1 Victoria Street, London SW10 0ET.*

### BARC programme

The BARC meets at the Forest Ring Community Centre, Sycamore Way, Winklebury at 7.30pm on the first Monday of each month. The January meeting features a 23cm operation by Colin Desborough G3NNG.

To find out more about the club, contact the secretary at: *14 Winchfield Gardens, Tadley, Basingstoke, Hampshire RG26 6TX. Tel: (07356) 5185.*

### Sprat-catching

The G-QRP Club has sent us the autumn '85 issue of their journal, *Sprat*, which is full of technical tips and news about the club's activities during the year.

If you want to know more, contact: *Reverend George Dobbs G3RJV, St Aidan's Vicarage, 498 Manchester Road, Rochdale, Lancs.*

### BDXC

The British DX Club has sent us the fifth edition of its publication *Radio Stations of the United Kingdom*, compiled by David Kenny and Colin Wright.

It consists of a comprehensive list of stations plus their location and frequency. The publication costs 75p or 3 IRCs and is available from: *British DX Club, 54 Birkhall Road, Catford, London SE6 1TE.*

### Morse tests

The Department of Trade and Industry has announced that it has appointed the Radio Society of Great Britain to take over the running of the amateur radio Morse tests on its behalf from 1 April 1986.

Radio amateurs who wish to operate on the high frequency (HF) bands with the potential for world-wide communication must, in accordance with the requirements of the International Radio Regulations, have a knowledge of Morse code. In the UK this means that they must have a class A licence as distinct from a class B licence, which allows operation on the VHF bands with, generally, much reduced range of contact.

At present the Morse test, which is a pre-requisite of the class A licence, is run for the department by British Telecom International. But the department decided to invite new proposals for running the test. The RSGB, the City and Guilds of London Institute, as well as British

Telecom International, were invited to submit proposals.

The RSGB's successful proposal includes a test fee of £7, which will be held at this price for two years, and the establishment of at least 70 testing centres, one in each county, region or designated island. Tests will be held every two months in each centre.

The department believes that the RSGB's proposals represent a significant improvement in the service offered to radio amateurs who wish to take the Morse test – what are your views?

## STOP PRESS...

### RSGB AGM

We were delighted to learn at this year's RSGB AGM that our very own Angus McKenzie G3OSS and John Heys G3BDQ were elected to sit on the General Council. G3OSS won the highest recorded vote, with 2,552 votes counted. Congratulations chaps!

### 6m confirmation

The RSGB announced on 7 December that the 6 metre band (50-50.5MHz) will be made available to radio amateurs, in February 1986.

At the time of going to press the exact licence regulations concerning the use of the band have not been decided, but are expected to be announced by January.

## RAE helpers

Following an appeal on RSGB news GB2RS, several people have come forward offering to help RAIBC members who need assistance with study at home.

However, more are still needed. If you are willing to help please write to RAIBC HQ as soon as possible so that you can either be put in touch with a member in your area, or put on file for future reference. No qualifications are needed, just a little time to help sort out queries or problems.

The address of the Radio Amateur Invalid and Blind Club is: *9 Conigre, Chinnor, Oxon OX9 4JY.*

## A good idea

The members of Chelmsford Amateur Radio Society have come up with a rather good idea in light of the recent changes in the Radio Investigatory Service (it will now cost £21 to call out the RIS to investigate any interference problems).

Attached to their November newsletter was a survey form concerning details of interference. The aim is 'to collect information so that we are able to help each other to solve the most important problem we are likely to encounter (other than increased licence fees!)...'

The newsletter itself produced a real gem: apparently the AGM on 1 October was completed in just one hour. Beat that!

If you want to join these Great Men of our Time (who knows, it might rub off), contact Ian G4BYR at 40 Great Leylands, Harlow, Essex CM18 6HR.

## Singapore sked

Glenrothes and District Amateur Radio Club meets at 7.30pm on Wednesdays and the third Sunday of every month at their club at the rear of the library in west Leslie. The club transmits slow Morse every Thursday after 7.00pm on 145.550 (S22) at 3-15 words per minute. If you are interested and have any comments or suggestions to offer, they would be appreciated by the club organisers.

Another piece of information which caught our attention in the latest newsletter is that GDARC has a contact in Singapore. This is Graham Smith (GM3SNO at home), the

'man from the BBC', who now has the callsign 9V1WL. A sked with Graham can be had on 14-343MHz every Monday at 1500Z. Graham uses a G5RV and 100 watts. His address is 11 Swiss Chalet Road, Singapore 1128.

For further details about the club's activities contact: *Anne Edmonson GM4TCW 94 Prinlows Road, Leslie, Fife KY6 32W. Tel: (0592) 744449.*

## Across the pond

The Irish Radio Transmitters Society has been computerised and is now tightening up its rules. In the past, subscription payment was a little casual so a couple of changes have been made. Now, when subscriptions have not been renewed after 2 months from the due date, the newsletter and QSLs will no longer be sent.

While most subscriptions remain due on 1 January, the subscriptions of new members only will become due each year on the first of the month following the date of their election. The society suggests that perhaps other clubs might benefit from similar reforms.

The society's address is: *PO Box 462, Dublin 9, Eire.*

## KDARS venue change

The Kidderminster and District Amateur Radio Society recently changed its meeting place from the Aggborough Community Centre to the Harrier's Vice President's Club, Hoo Road, Kidderminster, Worcestershire.

The club believes that the new venue is one of the best radio sites in Wyre Forest, and comes equipped with 70ft masts so on-air nights promise to be much more exciting.

Contests, special event stations, /P operation and DXpeditions are planned for the coming year. More emphasis will be placed on construction projects and better use made of the skills and knowledge of club members.

If you want more information, contact: *Mr A J Hartland, 22 Granville Crest, Offmore Farm, Kidderminster, Worcestershire DY10 3QS.*

## Components fair

The Pontefract and District Amateur Radio Society is holding its Annual Components Fair on 16 March 1986, and as usual the venue will be the Carlton Community Cen-

tre, situated between the A1 and Pontefract. The club has, however, been able to obtain extra space in the building and hopes that the fair will be larger than previously.

Enquiries for bookings, etc can be addressed to: *N Whittingham G4ISU, 7 Ridgedale Mount, Pontefract WF8 1SB. Tel: (0977) 792784.*

## EARS to the ground

The Echelford Amateur Radio Society (EARS) holds nets every Sunday at 11.00am local time on 1.980MHz ± QRM (AM/SSB) and every Wednesday at 20.00 local time on 144.575MHz FM, and invites participation from everyone, including non-members.

The society meets every second Monday and the last Thursday in the month at 7.30 for 8.00pm start, at The Hall, St Martin's Court, Kingston Crescent, Ashford, Middlesex.

On Wednesday 30 December there will be a post-Christmas 'Natter Nite' for anyone who is interested, and Bob Crane G4PHS is delivering a lecture about frequency and power measurement in the shack on 13 January.

If you want further details contact: *Peter Coleson G4VAZ, 122 Green Street, Sunbury, Middlesex. Tel: Sunbury 83823.*

## Mobile rally

The Oldham Amateur Radio Club meets every Thursday evening at 8.30pm in the Moorside Conservative Club, Ripponden Road, Moorside, Oldham, Gtr Manchester.

The club will hold its first mobile rally on 26 January 1986 at the Birch Hall Hotel, Rhodes Hill, Lees, Oldham and admission will be 30p. The doors open at 10.30am (10.00am for the disabled) and attractions include a bring-and-buy stall.

For further information contact the new secretary: *Mrs K Catlow, 137 Haven Lane, Moorside, Oldham, Greater Manchester. Tel: (061) 6247354.*

## Weather wise

If you want to find out about the weather from the people who know, pay a visit to the North Wakefield Radio Club on 23 January, when the Leeds Weather Centre staff will be giving a lecture.

The club meets every

Thursday at 8.00pm at the White Horse Public House, East Ardsley, North Wakefield, and there are many interesting events lined up for the next few months.

If you want to know more, contact the secretary, G4RCH, on Morley 536633.

## Slow Morse

The Glenrothes and District Amateur Radio Club will be transmitting slow Morse every Thursday after 7.00pm on 145-550 (S22). The speed range will be from 3 to 15 words per minute.

Channel S22, although not ideal, has been chosen to assist several Class B licence holders who have crystal-controlled equipment. If you are keen to learn, listen also on Wednesdays after 7.30pm.

For further information about the club's other activities, contact: *Anne Edmonson GM4TCW, 94 Prinlows Road, Leslie, Fife KY6 3BW.*

## Greetings from MARS

The Midland Amateur Radio Society has moved to new premises at Unit 5, Henstead House, Henstead Street, Birmingham B5 6QH, just off the city end of the A38.

They run a Morse class on Wednesday evenings starting at 7.00pm and hope to start an RAE class on Monday 6 January.

For more information about the MARTians' activities telephone Tom Brady G8GAZ on (021) 3571924, or call him on the air on S17 145.425 between 10.00am and 10.00pm, where he can be found most days.

## Xmas net

The Crawley Amateur Radio Club have a club net every Friday at 20.30 local time on 2m, S22, and this year they are holding one on Christmas day.

For more information about this and the club's other activities contact: *Dave Hill G4IQM. Tel: Crawley 882641.*

## South Bristol AGM

The South Bristol ARC have started to plot their course for the next year starting with a cure-all 'Hair of the Dog' night on 1 January.

Make a note of the Annual General Meeting on 27 January where you can find out more about the organisation.

For more information, telephone *Len Baker G4RZY on Whitchurch 834282.*

1. What effect has a dipole fed with co-ax over a balanced fed LF dipole?
  - a. It reduces the bandwidth
  - b. It aids next door's receiver by acting as a reflector and helping TVI and BCI
  - c. The feeder radiates much less power and therefore reduces TVI and BCI
  - d. It uses less wire and looks tidier
  
2. The equivalent circuit of an end fed antenna consists of:
  - a. a choke and two resistors
  - b. a capacitor, resistor and inductor
  - c. wire, two egg insulators and a pole
  - d. capacitor choke resistor that will resemble a rejector circuit
  
3. What is the difference between an ultimate transmatch and an SPC transmatch?
  - a. The SPC has, in effect, four capacitors, the ultimate has two
  - b. The SPC has output capacitors in series and parallel, the ultimate has not
  - c. The SPC is a good match on all frequencies when total capacity equals 20nF, 2nF for the ultimate
  
4. On 1900MHz at 12.00GMT, which aerial would be the most effective for transmission into 'G'?
  - a. A twenty metre dipole tuned by an SPC300C
  - b. A  $\frac{1}{4}$  wavelength vertical tuned by an SPC300C against ground
  - c. A  $\frac{1}{8}$  wavelength dipole at 3000mm above ground
  - d. A 50 ohm wire wound resistor, rated at 30 watts, mounted 3cms on top of an insulated pole fed with 75 ohm co-ax
  
5. If you were given three new frequencies to use between 3.9 and 9MHz, which existing tuner could you use on your original aerials to achieve an SWR of 1:1 to run your solid-state transceiver at optimum power?
  - a. Tee match
  - b. Pi match
  - c. SPC transmatch
  - d. L & C match
  
6. If you were /A and wanted to keep a sked on 80 metres, which of the suggestions below would be most likely to work if they were all that could be found to provide an aerial?
  - a. A light bulb
  - b. Bed springs
  - c. The communal TV aerial through a pre-amp
  - d. The hot water pipe system using an SPC300C ATU
  
7. A 10dB power increase in signal would raise a 10W transmission to:
  - a. 31.6 watts
  - b. 100 watts
  - c. 1kW
  - d. 316 watts
  
8. A 50 ohm SWR installation would read a 75 ohm dummy load as:
  - a. 2:1
  - b. 1.5:1
  - c. 1.2:1
  - d. 1:1

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## AMATEUR RADIO – FREE COMPETITION

1  2  3  4  5  6  7  8

Please insert the answer to each question in the box provided.

I believe that the benefit of using a variable inductor/roller-coaster in an ATU is (not more than 75 words).....

.....  
 .....  
 .....  
 .....  
 ..... (use separate sheet if required)

Name .....

Address .....

Competition to be judged by Tony Johnston G4OGP, Angus McKenzie G3OSS and the Editor, whose decision will be final.

Post to: SPC300 Competition, **Amateur Radio** Magazine, Sovereign House, Brentwood, Essex CM14 4SE. (Closing date - 31 January 1986)

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LA4031P	1.95	SL1310	1.60	TAA320A	1.95
LA4420	1.95	SL1327	1.10	TAA350A	1.95
LA4430	2.50	SL1327Q	1.10	TAA570	1.95
LA4422	2.50	SN76033C	3.95	TAA661B	1.95
LA4461	3.95	SN76031N	3.95	TA700	1.70
LC7120	3.25	SN76033C	3.95	TBA120A5/B-	1.00
LC7130	3.50	SN76110N	0.89	TBA395	1.50
LC7137	3.50	SN76115N	1.25	TBA396	0.78
LM1011	3.15	SN76131B	1.30	TBA440N	2.85
LM324N	1.45	SN76229D	1.00	TBA480Q	2.85
LM308N8	0.80	SN76227N	1.00	TBA510	2.50
LM3808N	1.75	SN76533N	1.65	TBA520	1.10
LM3901N	3.50	SN76544N	2.85	TBA520N	1.10
LM3901N	3.50	SN76570N	1.00	TBA530	1.10
MS1513L	3.30	SN76650N	1.18	TBA530Q	1.10
MS155L	2.95	SN76660N	1.00	TBA540	1.25
MS1521L	1.50	STK014	7.95	TBA540Q	1.35
MB3712	2.00	STK015	8.95	TBA550Q	1.95
MB3756	2.50	STK028	11.95	TBA560C	1.48
MC1307P	1.00	STK043	9.80	TBA560Q	1.45
MC1310P	1.85	STK078	11.95	TBA570	1.00
MC1327	1.70	STK415	7.95	TBA641A12	3.50
MC1327Q	0.85	STK435	5.95	7.50	
MC1349P	1.20	STK435	7.95	TBA651R	2.50
MC1350P	0.95				

## SEMICONDUCTORS

AA12	0.25	BC182	0.10	BD238	0.40	BFX88	0.25	TI232C	0.42
AC126	0.45	BC182L	0.10	BD239	0.40	BFY50	0.21	TI233C	0.95
AC127	0.20	BC183	0.10	BD246	0.75	BFY51	0.21	TI234B	0.95
AC128	0.28	BC183L	0.09	BD376	0.32	BFY52	0.25	TI241A	0.48
AC128K	0.32	BC184L	0.09	BD410	0.85	BFY90	0.77	TI241C	0.45
AC141	0.28	BC204	0.10	BD434	0.85	BR100	0.28	TI247C	0.47
AC141K	0.34	BC207B	0.13	BD437	0.75	BR101	0.49	TI2120	0.85
AC142K	0.45	BC208B	0.13	BD438	0.75	BR103	0.55	TI2125	0.85
AC176	0.22	BC212	0.09	BD520	0.85	BR303	0.95	TI2142	1.75
AC176K	0.31	BC212L	0.09	BD597	0.95	BRC443	1.18	TI2146	2.75
AC187	0.25	BC212LA	0.09	BD597	0.95	BRCA99	0.45	TI2161	2.95
AC187K	0.28	BC213	0.09	BD701	1.25	BT100A/02	0.85	TI2955	0.80
AC188	0.25	BC213L	0.09	BD702	1.25	BT106	1.49	TI2955	0.80
AC188K	0.37	BC214	0.09	BD707	0.90	BT116	1.20	TI2959	0.80
AD142	0.79	BC214C	0.09	BDX32	1.80	BT119	3.18	TI2962	1.50
AD143	0.82	BC214L	0.09	BF115	0.38	BT120	1.65	TRF0112	15.80
AD149	0.70	BC237B	0.09	BF119	0.65	BU105	1.95	2N1100	5.80
AD161	0.39	BC238	0.09	BF127	0.39	BU108	1.69	2N1306	1.35
AD162	0.39	BC239	0.12	BF154	0.20	BU124	1.28	2N1711	0.30
AD162/1	0.90	BC251A	0.12	BF158	0.22	BU125	1.28	2N2119	0.28
AF106	0.50	BC252A	0.18	BF160	0.27	BU126	1.50	2N2905	0.40
AF114	1.95	BC258	0.25	BF167	0.27	BU204	1.88	2N3053	0.40
AF121	0.80	BC258A	0.39	BF173	0.22	BU205	1.30	2N3054	0.89
AF124	0.85	BC258L	0.30	BF177	0.38	BU208	1.39	2N3055	0.82
AF125	0.35	BC300	0.30	BF178	0.28	BU208A	1.52	2N3702	1.12
AF126	0.32	BC301	0.30	BF179	0.38	BU208D	1.88	2N3703	1.12
AF127	0.65	BC303	0.28	BF180	0.29	BU209	1.20	2N3704	0.12
AF139	0.40	BC307B	0.09	BF181	0.29	BU236S	1.50	2N3705	0.20
AF150	0.80	BC327	0.10	BF182	0.29	BU407	1.24	2N3705	0.20
AF178	1.95	BC328	0.10	BF183	0.29	BU500	2.28	2N3708	1.12
AF239	0.42	BC337	0.10	BF184	0.28	BU508A	1.98	2N3733	9.75
AU106	4.50	BC338	0.09	BF185	0.28	BU526	1.90	2N3773	2.50
AU107	3.50	BC347A	0.13	BF194	0.11	BU807	2.28	2N3792	1.35
AU110	3.50	BC461	0.35	BF195	0.11	BU920	2.18	2N4280	3.80
AY102	2.95	BC478	0.20	BF196	0.11	BU948	1.70	2N4427	1.95
BC107A	0.11	BC527	0.20	BF197	0.11	MJ3000	1.98	2N4475	1.15
BC107B	0.11	BC547	0.10	BF198	0.10	MJ3400	0.40	2N5294	0.42
BC108	0.10	BC548	0.10	BF199	0.14	MJ520	0.48	2N5296	0.80
BC108A	0.11	BC548A	0.10	BF200	0.14	MJ530	0.48	2N5485	0.45
BC108B	0.12	BC550	0.10	BF201	0.14	MPSA13	0.29	2N5486	0.45
BC109	0.10	BC557	0.08	BF241	0.18	MPSA22	0.30	2SA329	0.85
BC109B	0.12	BC557B	0.08	BF245	0.30	MRF7	4.58	2SA715	0.80
BC109C	0.12	BC558	0.10	BF258	0.28	MRF450A		2SC495	0.80
BC114A	0.09	BC639/10	0.30	BF259	0.28	MRF450A		2SC496	0.80
BC116A	0.15	BCY33A	1.80	BF271	0.26	MRF453	13.95	2SC913D	0.95
BC117	0.19	BD115	0.30	BF273	0.15	MRF453	17.50	2SC1096	0.80
BC119	0.24	BD124P	0.80	BF336	0.34	MRF454	26.50	2SC1106	2.50
BC125	0.25	BD131	0.42	BF337	0.29	MRF455	17.50	2SC1172Y	2.20
BC139	0.20	BD132	0.42	BF338	0.32	MRF475	2.95	2SC1173Y	1.15
BC140	0.31	BD133	0.40	BF355	0.37	MRF477	10.00	2SC1173Y	1.15
BC141	0.25	BD135	0.40	BF362	0.38	OC16W	1.95	2SC1306	1.40
BC142	0.21	BD136	0.40	BF363	0.85	OC23	2.50	2SC1307	1.78
BC143	0.24	BD137	0.32	BF371	0.25	OC29	1.28	2SC1364	0.80
BC147A	0.12	BD138	0.30	BF394	0.19	OC36	2.25	2SC1449	0.80
BC147B	0.12	BD139	0.32	BF422	0.32	OC42	0.78	2SC1678	1.25
BC148A	0.09	BD140	0.30	BF423	0.25	OC44	0.78	2SC1905	1.45
BC148B	0.09	BD144	1.10	BF457	0.32	OC45	0.85	2SC1945	2.85
BC149	0.09	BD150C	0.29	BF458	0.38	OC70	0.45	2SC1963	0.80
BC153	0.30	BD159	0.65	BF459	0.68	OC71	0.55	2SC1963	0.80
BC157	0.12	BD160	1.50	BF595	0.23	OC75	0.95	2SC1967	0.80
BC158	0.09	BD166	0.55	BF597	0.28	OC81	0.80	2SC1969	1.15
BC159	0.09	BD179	0.72	BFR39	0.23	OC16W	2.50	2SC2028	1.18
BC161	0.28	BD182	0.32	BFR40	0.23	R208B	1.45	2SC2029	0.80
BC170B	0.15	BD201	0.83	BFR81	0.25	R208B	1.45	2SC2091	1.45
BC171	0.09	BD202	0.65	BFR98	0.38	R2322	0.95	2SC2098	2.85
BC171A	0.10	BD203	0.78	BFR99	1.70	R2323	0.86	2SC2098	2.85
BC171B	0.10	BD204	0.70	BFR99	1.70	R2540	2.48	2SC2166	1.95
BC172	0.10	BD222	0.48	BF424	0.35	RC1633A	0.90	2SC2314	0.80
BC172B	0.10	BD223	0.69	BF433	0.35	RC1633S	0.80	2SC2371	0.95
BC172C	0.10	BD225	0.40	BFW61	0.80	S206D	0.95	2SC2371	0.95
BC173B	0.10	BD232	0.35	BFW92	0.85	SK65F	1.45	2SC2371	0.95
BC174	0.06	BD233	0.35	BFX29	0.30	TI29C	0.42	3N211	2.95
BC174A	0.09	BD234	0.35	BFX84	0.25	TI29C	0.42	3SK88	0.95
BC175	0.15	BD236	0.49	BFX85	0.32	TI29C	0.42		
BC178	0.15	BD237	0.40	BFX86	0.30	TI29C	0.42		

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D16-100GH/65	75.00	D16-100GH/67	85.00	M28-133GH	49.00	V6007DP31	65.00
D16-100GH/67	85.00	D16-100GH/79	69.00	M31-101GH	55.00	V6008GH	59.00
D16-100GH/79	69.00	D16-100GH/97	65.00	M31-182GR	55.00	V6034WA	59.00
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A2293 6.50	EBF85 0.95	EL821 2.95	M8223 4.50	QV06-40A 27.50	U93 0.85	2C42 29.50	6AL5 0.60	6G66 5.50	12BA4 4.80	274A 16.00
A2426 29.50	EBF89 0.70	EL822 12.95	M8225 3.50	QV07-40 32.00	U251 1.00	2C51 0.75	6AM4 3.25	6G68A 0.50	12BA6 1.50	307 5.00
A2599 37.50	EBF93 0.95	EM1 9.00	M8225 3.50	QV07-40 32.00	U251 1.00	2C53 32.00	6AM5 2.50	6G68 1.50	12BB7A 2.80	328A 15.00
A2792 27.50	EBL1 2.50	EM4 9.00	M8225 3.50	QV07-40 32.00	U251 1.00	2C55 1.50	6AM6 2.50	6G68 1.50	12BL6 1.75	404A 10.95
A2900 11.50	EBL21 2.00	EM4 9.00	M8225 3.50	QV07-40 32.00	U251 1.00	2C55 1.50	6AM7 2.50	6G68 1.50	12BY7A 2.75	425A5 8.00
A3042 24.00	EC52 0.75	EM80 0.70	M8225 3.50	QV07-40 32.00	U251 1.00	2C55 1.50	6AN5 2.85	6GV7 2.50	12CA5 1.95	431U 4.50
A3263 24.00	EC70 1.75	EM81 0.70	M8225 3.50	QV07-40 32.00	U251 1.00	2C55 1.50	6AN6 2.85	6GW8 0.80	12CX6 1.20	572B 65.00
AC/TH1 1.00	EC80 9.80	EM84 1.65	M8225 3.50	QV07-40 32.00	U251 1.00	2C55 1.50	6AN7 2.85	6H1 9.50	12DQ65 3.80	5636 1.50
AC/T22 56.75	EC81 7.95	EM85 3.95	M8225 3.50	QV07-40 32.00	U251 1.00	2C55 1.50	6AN8 2.85	6H3N 1.10	12DW4A 3.50	6146A 7.50
AC/S2/PEN 8.50	EC86 1.00	EN32 16.90	M8225 3.50	QV07-40 32.00	U251 1.00	2C55 1.50	6AN9 2.85	6H6T 1.95	12E7 1.95	6386 14.50
AH221 38.00	EC90 1.10	EN91 1.80	M8225 3.50	QV07-40 32.00	U251 1.00	2C55 1.50	6A08 3.95	6H6T 1.95	12E14 38.00	6883B 9.95
AH238 38.00	EC91 8.50	EN92 4.50	M8225 3.50	QV07-40 32.00	U251 1.00	2C55 1.50	6A09 3.95	6H6T 1.95	12E14 38.00	6883B 9.95
AL90 6.00	EC92 1.95	EN93 1.80	M8225 3.50	QV07-40 32.00	U251 1.00	2C55 1.50	6A10 3.95	6H6T 1.95	12E14 38.00	6883B 9.95
AN1 14.00	EC93 1.50	ES150 19.95	M8225 3.50	QV07-40 32.00	U251 1.00	2C55 1.50	6A11 3.95	6H6T 1.95	12E14 38.00	6883B 9.95
ARF12 0.70	EC95 7.00	ES151 0.80	M8225 3.50	QV07-40 32.00	U251 1.00	2C55 1.50	6A12 3.95	6H6T 1.95	12E14 38.00	6883B 9.95
ARF34 1.25	EC97 1.10	ES152 0.80	M8225 3.50	QV07-40 32.00	U251 1.00	2C55 1.50	6A13 3.95	6H6T 1.95	12E14 38.00	6883B 9.95
ARF35 2.00	EC97 1.10	ES153 0.80	M8225 3.50	QV07-40 32.00	U251 1.00	2C55 1.50	6A14 3.95	6H6T 1.95	12E14 38.00	6883B 9.95
AZ11 4.50	EC9010 12.00	ES154 0.80	M8225 3.50	QV07-40 32.00	U251 1.00	2C55 1.50	6A15 3.95	6H6T 1.95	12E14 38.00	6883B 9.95
BL83 4.50	EC93 1.50	ES155 0.80	M8225 3.50	QV07-40 32.00	U251 1.00	2C55 1.50	6A16 3.95	6H6T 1.95	12E14 38.00	6883B 9.95
BS450 67.00	EC95 7.00	ES156 0.80	M8225 3.50	QV07-40 32.00	U251 1.00	2C55 1.50	6A17 3.95	6H6T 1.95	12E14 38.00	6883B 9.95
BS810 65.00	EC97 1.10	ES157 0.80	M8225 3.50	QV07-40 32.00	U251 1.00	2C55 1.50	6A18 3.95	6H6T 1.95	12E14 38.00	6883B 9.95
BS814 55.00	EC98 1.00	ES158 0.80	M8225 3.50	QV07-40 32.00	U251 1.00	2C55 1.50	6A19 3.95	6H6T 1.95	12E14 38.00	6883B 9.95
CIK 19.00	EC99 1.10	ES159 0.80	M8225 3.50	QV07-40 32.00	U251 1.00	2C55 1.50	6A20 3.95	6H6T 1.95	12E14 38.00	6883B 9.95
CJ3JA 36.80	EC99 1.10	ES160 0.80	M8225 3.50	QV07-40 32.00	U251 1.00	2C55 1.50	6A21 3.95	6H6T 1.95	12E14 38.00	6883B 9.95
CSA 9.00	EC99 1.10	ES161 0.80	M8225 3.50	QV07-40 32.00	U251 1.00	2C55 1.50	6A22 3.95	6H6T 1.95	12E14 38.00	6883B 9.95
C1112G 70.00	EC99 1.10	ES162 0.80	M8225 3.50	QV07-40 32.00	U251 1.00	2C55 1.50	6A23 3.95	6H6T 1.95	12E14 38.00	6883B 9.95
C1124 65.00	EC99 1.10	ES163 0.80	M8225 3.50	QV07-40 32.00	U251 1.00	2C55 1.50	6A24 3.95	6H6T 1.95	12E14 38.00	6883B 9.95
C134 32.00	EC99 1.10	ES164 0.80	M8225 3.50	QV07-40 32.00	U251 1.00	2C55 1.50	6A25 3.95	6H6T 1.95	12E14 38.00	6883B 9.95
C1148A 118.00	EC99 1.10	ES165 0.80	M8225 3.50	QV07-40 32.00	U251 1.00	2C55 1.50	6A26 3.95	6H6T 1.95	12E14 38.00	6883B 9.95
C1150/1 138.00	EC99 1.10	ES166 0.80	M8225 3.50	QV07-40 32.00	U251 1.00	2C55 1.50	6A27 3.95	6H6T 1.95	12E14 38.00	6883B 9.95
C1534 32.00	EC99 1.10	ES167 0.80	M8225 3.50	QV07-40 32.00	U251 1.00	2C55 1.50	6A28 3.95	6H6T 1.95	12E14 38.00	6883B 9.95
CCA 2.80	EC99 1.10	ES168 0.80	M8225 3.50	QV07-40 32.00	U251 1.00	2C55 1.50	6A29 3.95	6H6T 1.95	12E14 38.00	6883B 9.95
CC3L 0.90	EC99 1.10	ES169 0.80	M8225 3.50	QV07-40 32.00	U251 1.00	2C55 1.50	6A30 3.95	6H6T 1.95	12E14 38.00	6883B 9.95
CL33 2.00	EC99 1.10	ES170 0.80	M8225 3.50	QV07-40 32.00	U251 1.00	2C55 1.50	6A31 3.95	6H6T 1.95	12E14 38.00	6883B 9.95
C Nos Prices on request	EC99 1.10	ES171 0.80	M8225 3.50	QV07-40 32.00	U251 1.00	2C55 1.50	6A32 3.95	6H6T 1.95	12E14 38.00	6883B 9.95
D34 29.50	EC99 1.10	ES172 0.80	M8225 3.50	QV07-40 32.00	U251 1.00	2C55 1.50	6A33 3.95	6H6T 1.95	12E14 38.00	6883B 9.95
D41 22.50	EC99 1.10	ES173 0.80	M8225 3.50	QV07-40 32.00	U251 1.00	2C55 1.50	6A34 3.95	6H6T 1.95	12E14 38.00	6883B 9.95
DA42 17.50	EC99 1.10	ES174 0.80	M8225 3.50	QV07-40 32.00	U251 1.00	2C55 1.50	6A35 3.95	6H6T 1.95	12E14 38.00	6883B 9.95
DA90 6.00	EC99 1.10	ES175 0.80	M8225 3.50	QV07-40 32.00	U251 1.00	2C55 1.50	6A36 3.95	6H6T 1.95	12E14 38.00	6883B 9.95
DA100 128.00	EC99 1.10	ES176 0.80	M8225 3.50	QV07-40 32.00	U251 1.00	2C55 1.50	6A37 3.95	6H6T 1.95	12E14 38.00	6883B 9.95
DAF91 0.45	EC99 1.10	ES177 0.80	M8225 3.50	QV07-40 32.00	U251 1.00	2C55 1.50	6A38 3.95	6H6T 1.95	12E14 38.00	6883B 9.95
DAF91 0.70	EC99 1.10	ES178 0.80	M8225 3.50	QV07-40 32.00	U251 1.00	2C55 1.50	6A39 3.95	6H6T 1.95	12E14 38.00	6883B 9.95
DAF96 1.00	EC99 1.10	ES179 0.80	M8225 3.50	QV07-40 32.00	U251 1.00	2C55 1.50	6A40 3.95	6H6T 1.95	12E14 38.00	6883B 9.95
DC70 1.75	EC99 1.10	ES180 0.80	M8225 3.50	QV07-40 32.00	U251 1.00	2C55 1.50	6A41 3.95	6H6T 1.95	12E14 38.00	6883B 9.95
DC96 1.25	EC99 1.10	ES181 0.80	M8225 3.50	QV07-40 32.00	U251 1.00	2C55 1.50	6A42 3.95	6H6T 1.95	12E14 38.00	6883B 9.95
DCX4-1000 12.00	EC99 1.10	ES182 0.80	M8225 3.50	QV07-40 32.00	U251 1.00	2C55 1.50	6A43 3.95	6H6T 1.95	12E14 38.00	6883B 9.95
DCX4-5000 25.00	EC99 1.10	ES183 0.80	M8225 3.50	QV07-40 32.00	U251 1.00	2C55 1.50	6A44 3.95	6H6T 1.95	12E14 38.00	6883B 9.95
DET18 25.50	EC99 1.10	ES184 0.80	M8225 3.50	QV07-40 32.00	U251 1.00	2C55 1.50	6A45 3.95	6H6T 1.95	12E14 38.00	6883B 9.95
DET18 25.50	EC99 1.10	ES185 0.80	M8225 3.50	QV07-40 32.00	U251 1.00	2C55 1.50	6A46 3.95	6H6T 1.95	12E14 38.00	6883B 9.95
DET23 39.00	EC99 1.10	ES186 0.80	M8225 3.50	QV07-40 32.00	U251 1.00	2C55 1.50	6A47 3.95	6H6T 1.95	12E14 38.00	6883B 9.95
DET24 39.00	EC99 1.10	ES187 0.80	M8225 3.50	QV07-40 32.00	U251 1.00	2C55 1.50	6A48 3.95	6H6T 1.95	12E14 38.00	6883B 9.95
DET25 22.00	EC99 1.10	ES188 0.80	M8225 3.50	QV07-40 32.00	U251 1.00	2C55 1.50	6A49 3.95	6H6T 1.95	12E14 38.00	6883B 9.95
DF91 0.70	EC99 1.10	ES189 0.80	M8225 3.50	QV07-40 32.00	U251 1.00	2C55 1.50	6A50 3.95	6H6T 1.95	12E14 38.00	6883B 9.95
DF92 0.80	EC99 1.10	ES190 0.80	M8225 3.50	QV07-40 32.00	U251 1.00	2C55 1.50	6A51 3.95	6H6T 1.95	12E14 38.00	6883B 9.95
DF92 0.80	EC99 1.10	ES191 0.80	M8225 3.50	QV07-40 32.00	U251 1.00	2C55 1.50	6A52 3.95	6H6T 1.95	12E14 38.00	6883B 9.95
DF97 1.00	EC99 1.10	ES192 0.80	M8225 3.50	QV07-40 32.00	U251 1.00	2C55 1.50	6A53 3.95	6H6T 1.95	12E14 38.00	6883B 9.95
DH63 1.20	EC99 1.10	ES193 0.80	M8225 3.50	QV07-40 32.00	U251 1.00	2C55 1.50	6A54 3.95	6H6T 1.95	12E14 38.00	6883B 9.95
DH77 0.90	EC99 1.10	ES194 0.80	M8225 3.50	QV07-40 32.00	U251 1.00	2C55 1.50	6A55 3.95	6H6T 1.95	12E14 38.00	6883B 9.95
DH79 0.80	EC99 1.10	ES195 0.80	M8225 3.50	QV07-40 32.00	U251 1.00	2C55 1.50	6A56 3.95	6H6T 1.95	12E14 38.00	6883B 9.95
DH149 2.50	EC99 1.10	ES196 0.80	M8225 3.50	QV07-40 32.00	U251 1.00	2C55 1.50	6A57 3.95	6H6T 1.95	12E14 38.00	6883B 9.95
DK92 1.20	EC99 1.10	ES197 0.80	M8225 3.50	QV07-40 32.00	U251 1.00	2C55 1.50	6A58 3.95	6H6T 1.95	12E14 38.00	6883B 9.95
DL35 2.50	EC99 1.10	ES198 0.80	M8225 3.50	QV07-40 32.00	U251 1.00	2C55 1.50	6A59 3.95	6H6T 1.95	12E14 38.00	6883B 9.95
DL83 1.00	EC99 1.10	ES199 0.80	M8225 3.50	QV07-40 32.00	U251 1.00	2C55 1.50	6A60 3.95	6H6T 1.95	12E14 38.00	6883B 9.95
DL70 2.50	EC99 1.10	ES200 0.80	M8225 3.50	QV07-40 32.00	U251 1.00	2C55 1.50	6A61 3.95	6H6T 1.95	12E14 38.00	

# L·E·T·T·E·R·S

## LAW AND ORDER

A reader has informed us of an incident which occurred while he was operating mobile, during which he was stopped and questioned by the police. The following letters tell the story and may help other readers if they find themselves in a similar situation.

Dear Sir (the Chief Constable of Central Scotland),

At about 4.30pm on Sunday 10 November 1985, whilst driving on the M9 motorway near Grangemouth, heading east, I was stopped by a patrol car. The constable approached me and asked if I was a CB operator when he saw I was using a head set and a boom microphone. I informed him that I was in fact a licensed radio amateur.

He told me I was breaking the law using the head set but I informed him that the audio was coming from the actual radio itself and not the ear piece, and that the head set was only for supporting the

microphone. It was not interfering with my driving or hearing capabilities.

The reason I fitted this piece of equipment was because I felt that using the hand microphone was dangerous as it meant I was driving using only one hand, but this way there is a switch fitted to the gear lever for transmit or receive so my hand is only off the steering wheel for as long as it takes to move the switch for transmit or receive.

The constable still insisted this was illegal so I immediately closed down the station I was operating and switched off the set.

The apparatus I use is factory built for this purpose and, as far as all amateur radio operators are aware, it is legal for use while travelling in a vehicle.

I would be grateful if you could clarify this point and I have also written to the Radio Society of Great Britain for their views on the matter.

**Anthony Constance  
GM10XE, West Lothian**



Ian Oliver, Q.P.M., LL.B., M.Phil.  
Chief Constable

## Central Scotland Police

Police Headquarters Randolphfield String FK8 2HD

Our Ref Traffic/S/10G

Your Ref -

Telephone 0786 73161

Date 18th November, 1985

Mr. Anthony Constance,  
8, Ladeside Road,  
Blackburn, West Lothian  
EH47 7JW

Dear Sir,

I am in receipt of your letter dated 12th November, 1985 in which you intimate that you were stopped by my Traffic Patrol Officers while driving on the M.9 Motorway near Grangemouth on 10th instant and that an officer informed you that an offence was being committed in respect of your use of Radio equipment fitted to your vehicle at that time.

I have interviewed the officer concerned who was apparently under the impression that the head set you were wearing would affect your hearing and this was his reason for the attitude adopted by him.

I would confirm that the equipment you were using in your vehicle is legal and I can assure you the officer concerned, who was acting in good faith, has been reprimanded for his actions on this occasion.

I trust the information given and the action taken will suffice, but should you have any further views on the matter please do not hesitate to contact me.

Yours faithfully,

Superintendent.

## DAFT DIMENSIONS

Please join the modern world. In your November issue there is an excellent article by G4ZVB on simple wire beam antennas. However, when giving dimensions the author consistently uses the medieval measuring system of feet and inches, although referring to the '20m' band and not the '65ft band'!

Would it not be a good idea to be consistent in metric values, not only in bands but also in dimensions like the rest of the world?

Thank you for an interesting magazine.

**Ragnar Otterstad OZ8RO,  
Denmark**

## POMPOUS CANT

As a long-time member and ex-official of the RSGB I can only say that I was somewhat amazed at the letter from 'a member' (December issue) or rather at the reason why he did not wish his name to be published. . . because the best place to influence things is from the inside.... and I want to stay there! What pompous cant!

Surely it is for the members to decide who represents them within the society, and I for one want to know what is the realistic perspective of candidates before I vote. I presume, therefore, that 'a member' has been elected on a false platform.

Is he/she afraid that if we ordinary members discover his/her true motives we might not re-elect him/her? Here we have someone arguing for a more open and representative society and he or she hasn't the guts to put a name to it. What contradiction! What humbug!

I am not in sympathy with Messrs Lundegard, Smith and Crosland's viewpoint but at least they have nailed their colours to the mast. The members, through elections, will decide whether or not they will represent us, either by voting or, through apathy, not.

Commenting on my eight years as elected representative and committee member I must say that at no time was I not treated with courtesy and

when I expressed the views of the members I represented, even when in a minority of one, those comments were listened to with patience and understanding and, I like to think, had influence. When I did resign, it was because the duty to my family did not permit the vast amount of time required. I did not resign through a fit of pique.

No society or club can possibly always reflect 100% the views of its membership. However, consider these points:

1. The radio amateur in this country compares favourably with other countries, eg release of new bands, retention of existing frequencies, licence limitations, etc;
2. A cracked kettle makes the most noise;
3. You only get what you deserve, so when you get the chance vote.

I understand any member can attend an AGM armed with proxy votes. Proxies are not confined to council members, or am I wrong about that as well? So if you want my proxy for an open society, 'a

member', you had better start with your name. I think, however, it might be in better hands if left in the name of the president.

**W A Ricalton G4ADD,  
Northumberland**

## CRITIC

I'd like to put forward my thoughts upon this letter for the month of December. EGM: If the so-called member wishes to stay inside the influence of the RSGB then he or she should refrain from inflammatory articles until documents and other hard evidence can be produced to support all accusations of the illegal or suggested illegal actions by council members.

Also, if this person or any RSGB member is totally dissatisfied with the way that the society is being run then he or she can resign and form an alternative society. If the majority support the open society suggested and reject the present structuring of the RSGB then the new society will be the power and the RSGB will founder.

**J Bolton G4XPP, Cheshire**

# L·E·T·T·E·R·S

## CENSORSHIP

A number of your readers will be aware that all is not well with the RSGB. One aspect which is particularly worrying is the way in which the council endeavours to keep members in the dark.

At the 1984 AGM of the RSGB the Secretary, G3OUF, stated that there had been no items notified for discussion under the heading of AOB. I challenged this statement since Mr Holmden G4KCC had submitted some resolutions. The members who were present did not seem happy with this.

I felt that the answers given by the Secretary were quite unsatisfactory and I therefore proposed a vote of no confidence in the Secretary and the council. This was seconded but the President, GW8HEZ, refused to allow a

vote on the matter. There was considerable dissent at this decision and the meeting was suspended so that a presentation could take place.

The purpose of the minutes is to present a factual report of what took place and I was therefore very surprised to read the September issue of *RadCom* to find no mention that the votes of no confidence had been tabled.

The implications are quite clear: if it is embarrassing we shall censor it. Your readers may ask what other items may also be censored, such as council proceedings. The reason that I raise this with your magazine is that the Potters Bar censor would obviously not allow it to be published.

**PL Crosland G6JNS, Worcester**

## HAM FLAVOUR

In response to Mr F Fenwick G0AOJ's letter in the September 1985 issue, I wholeheartedly agree with his sentiments.

I have been licensed for eight months, but prior to taking up my callsign I was involved with CB, both legal and pirate, for 5½ years. It gave me a taste of what radio was about.

Now, as far as I am concerned I am a radio amateur and fully intend to do

my utmost to show amateur radio in a good light to those who don't know what it is (are there still such people?). But don't forget, as Mr Fenwick says, 'It's only a hobby'.

**K Gosling G1LDE, Devon**

## WHO'S WHO?

As an RSGB member I am currently being asked to vote for five council members. There are fourteen candidates from which to choose.

## NO TO NOVICE

I've spent some time recently looking back through old radio magazines at letters and articles concerning the idea of a 'novice licence'.

It would seem that many countries operate some form of novice licence, with varying degrees of success. How this success is judged depends upon who is judging it. From a personal point of view, my vote is very, very firmly against any form of novice licence.

One of the main reasons given for the novice licence is to give potential operators an idea of how they should be operating, without just letting them loose on the air from day one. On this count my sympathies lie with Mr Abel

and his campaign. A quick tune around 2 metres will back up this point. It is riddled with poor operators, many of whom came from 27MHz CB and still think that they are there.

These people never let on that they are ex-CBers, although it sticks out like a sore thumb, and continue with their poor operating, blissfully ignorant of the fact that they have become the very same wallys that they used to spend their evenings moaning about.

It is at this point that the pro-novice licence argument falls down. The answer to this considerable problem is not to herd all these people together in one small part of the spectrum and let them get on with it; they will still remain

Against each candidate's particulars are brief details of ten nominators but not a word from the candidates. How much more useful it would be if each candidate wrote a précis of his aims and objectives if elected.

Finally, if in doubt, I am told it is better not to vote rather than risk voting for the wrong candidate!

**K A Fillmore (G14IBD)**

## STOP THIEF!

I attended the Red Rose Rally at the Pembroke Halls in

## CB AID

With reference to your letter headed *REACTION* (in the November issue), I am writing to tell you of THAMES (Traffic Help And Monitoring Emergency Service) CB group.

It is a totally voluntary organisation, dedicated to helping anyone who may find themselves in need of help, be it an accident; fire; breakdown; missing person; need of a late night chemist; traffic information; or local directions in a strange area.

We have provided additional manpower to organisations needing help with fêtes, car parking, carnival processions, night security and other fund-raising events, as well as assisting the disabled, elderly

blissfully ignorant of their ignorance, and their operating will probably deteriorate as quickly as their initial enthusiasm. The pro-novice campaign will argue that we amateurs will show them how to operate properly by operating in their part of the band.

I know this may seem selfish, but I couldn't think of a worse way of spending my time than speaking with or listening to these novices and potential wallys.

The root cause of the problem, and therefore its prevention, lies in the format of the RAE. Not enough time is spent on the practical aspects of amateur radio, ie how to operate in a useful and worthwhile manner.

Surely in these days

Walkden, Manchester on Sunday 24 November 1985.

During the course of the afternoon an item of equipment was stolen from my stand, a VHF FM transceiver TR3500 hand-held, with speaker/microphone. Serial no: 3041275/M4. If readers have any information, contact Little Hulton Police Station on 061-855 5382 or your local police station.

Your assistance in this matter will be greatly appreciated.

**A Kelly, Worcestershire**

and children. We also work with the local police, giving them any assistance they ask for.

We rely solely on donations and our own fund-raising events.

THAMES was initiated in the early 1980s and since then has grown to many thousands of members. Its purpose is to provide an efficient 24-hour monitoring service on Citizens Band radio for both the user and the whole community.

If you own a CB set and feel that you would like to help us in our work, please ring me, David, on Norwich 413445, Mrs Grey on Norwich 45871 or the Director of Public Relations, Mr Norman Raven on 01-690 2954.

**D Panks, Norwich**

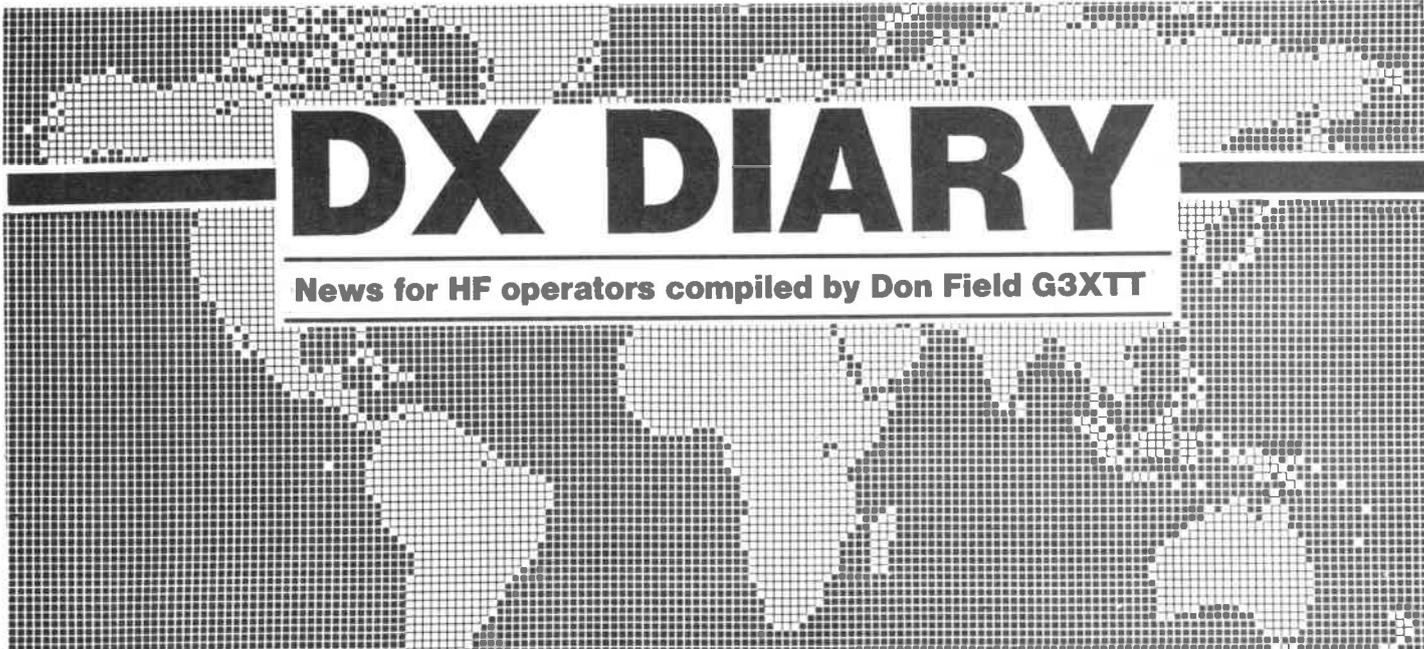
of black boxes and repair-merchants in abundance this is far more relevant than a detailed knowledge of every technical aspect.

If a newly licensed amateur buys a black box and it goes wrong they automatically take it to a dealer or repairer to have it fixed, despite the fact that they learnt, parrot fashion, precisely how and why a transceiver works in the Radio Amateur Examination syllabus.

So, perhaps less time spent on technical aspects and more time spent on the practical side would go some way towards alleviating this problem – a novice licence, I am sure, would not.

I look forward to comments and disagreements.

**David Goode G1MGV, Essex**



# DX DIARY

News for HF operators compiled by Don Field G3XTT

When photographs of HF stations appear in the amateur radio press there is very often little or no sign of any test equipment. Is this because they don't need any, because they don't have any, or because they keep it hidden in a cupboard to avoid the shack becoming untidy?

There is, of course, one piece of test equipment which appears in almost every HF station: the ubiquitous SWR meter. Having said this, it is probably true that the SWR meter remains one of the most misunderstood pieces of equipment in amateur radio use, despite the many thousands of words that have been written about SWR measurement.

## Unreliable

The cheap SWR meters cannot be relied upon to give an accurate indication of SWR, though if all that is required is a relative value for tuning purposes they will probably be adequate.

Even more misleading are cheap power meters which are notoriously inaccurate. In fact I would be surprised if many HF operators could do any more than guess at their output power, even though nowadays the licence stipulates power in terms of output rather than input.

I don't propose to go into a lot of detail in this column about the use and abuse of test equipment – that is the role of full length feature articles. However, I did want to provoke some more thought this month as to just what test gear has a place in the HF operator's shack, and

maybe my comments above have already set you thinking.

Aside from the measurement of SWR and power, what else might you want to do? For tuning up the transmitter, a field strength meter is popular with some operators. A small pick-up antenna, located as far as possible from your main antenna, feeds into a rectifier bridge (possibly via a tuned circuit) and from there to a meter. The idea is to tune your rig for maximum output on the meter.

Another useful device for tuning purposes is a noise bridge. Used in conjunction with your receiver, this permits the antenna to be tuned to resonance without radiating power into the ether (so avoiding upsetting other band users with your tuning signal). A noise bridge used in conjunction with a general coverage receiver is an ideal aid when experimenting with antenna systems.

A grid dip oscillator (GDO) is also a useful item to have around for checking the resonant frequency of tuned circuits. Its name derives from the dip in the grid current of a valve as the tuned oscillator, of which it forms a part, is brought into resonance with another tuned circuit placed nearby. The name remains with us although modern GDOs use bipolar transistors or, more usually, FETs.

Going back for a moment to power measurement and tuning up, a dummy load is a very useful item to have around. This presents a resistive match (usually of 50 ohms),

enabling the transmitter to be tuned before connection to the antenna. There may, of course, be some slight re-tuning required once the antenna itself is connected, because no antenna will present an ideal non-reactive load to the transmitter right across a band.

## Licence requirements

If your rig does not have a built-in frequency counter, then the licence requires that you have some means of measuring your frequency and demonstrating that you are operating within the assigned bands. The popular methods of doing this used to be by way of an ex-army absorption or heterodyne wavemeter.

Nowadays most amateurs would use a frequency counter of some sort. What a frequency counter does not do, of course, is tell you where else you are radiating your signals. The various wavemeters used to enable you to check whether you had any spurious emissions from your rig.

A simple check on this is to get someone with a general coverage receiver who lives close by to check on your behalf. A general coverage receiver is, in many ways, a handy piece of kit to have around the shack. Another of its many uses is to enable you to monitor your transmissions and check for audio quality, splatter, etc. Beware, though, that it isn't simply being overloaded by the proximity of the transmitting aerial.

The best way to check the linearity of your transmission

is to monitor it on an oscilloscope. A 'scope is one of the most expensive pieces of test gear to be found in the average shack, but can be put to many uses and gives you confidence that all is well.

I have mentioned many pieces of instrumentation which you might find of value, and there are others which I have omitted. You might think I have gone over the top. After all, not everyone who drives a car wants a rev counter or even a temperature gauge. I would suggest, however, that many amateurs drive their gear without even the HF equivalent of a fuel gauge or a speedo. SMC's reaction, when I asked them about test gear as I was preparing this column, endorsed this view. They used to carry a range of test gear for amateurs but found that sales, particularly of oscilloscopes, were very low. They have recently started to stock a low priced oscilloscope once again, but are not too optimistic about the level of sales.

I would be interested in readers' views on test gear in the HF amateur's shack.

## Contests

My mind is currently tuned into contests, having recently mailed the logs for our CQWW SSB activity from Jersey and dabbled in the RSGB 1.8MHz and CQWW CW events. This latter produced some interesting DX, with several G stations being surprised on 80 metres to have HSOA in Thailand answering their CQ calls. On 160 metres I was amazed to work two JT stations (Mongolia) just an hour

# DX DIARY

before the contest finished.

January sees the major 160 metre contest of the year. This is the CQWW 160 CW contest which starts at 2200GMT on 24 January and runs through to 1600GMT on the 26th. The contest exchange is RST plus state/province or country where this is not obvious from the prefix.

Contacts with one's own country score 2 pts, with other European countries 5 pts, and with other continents 10 pts. To arrive at the final score multiply this by the sum of US states, Canadian provinces and countries (other than the US and Canada) worked. Logs go to the 160 contest director, Don McLennon, N4IN, 3075 Florida Ave, Melbourne, FL 32904, USA, and should be mailed by 28 February.

The French CW contest takes place the same weekend, but starting at 0600GMT on the Saturday and finishing at 1800GMT on the Sunday.

The Hungarian DX contest takes place over the weekend of 18/19 January, for 24 hours starting at 2200GMT.

## DX news

After the excitement of the autumn contest season things tend to fall a bit flat at this time of the year. The Americans have done their contest 'thing' from the Caribbean and gone home. Lloyd and Iris Colvin should still, however, be busy from Africa. They moved to Lesotho (7P8) on 25 November and should have been there for about 1 month before moving on again.

From South Africa as W6KG/ZS they made 6500 contacts with 143 countries, before operating during October as ZS3/W6QL from Namibia. To date they have not been heard on the LF bands from their various African stops, but have been easy to work on 15 metres in particular, showing up as soon as the band opens in the morning either on SSB or around 21020kHz on CW.

## Qatar

Mike Smedal A71AD has been a beacon from Qatar during the last 6 years, with an enormous signal on all bands. Unfortunately his spell there is now at an end, and he had to surrender his logs to the authorities on leaving, so if

you failed to get your QSL while he was there you are too late.

He made 52,000 contacts during his stay, in the course of which he achieved 5-band DXCC, 5-band WAZ, and worked 304 countries. His next posting is to Cyprus. Several stations remain active from Qatar: A71AA, A71AM, A71BH, A71BJ, and A71BK.

## Peter 1st Island

Peter 1st Island, down in the Antarctic, is a DXCC country designate. In other words, it will be added to the DXCC list when someone operates from there. There is now a possibility that this may happen sooner than previously expected.

KD7P, who is in the US Navy and has recently been operational from Guam, is aboard a navy vessel which will be in the vicinity of Peter 1st Island some time in January. He hopes to be able to get ashore in the ship's helicopter and do some operating. This is certainly the best way to travel. Peter 1st is a desolate place, virtually inaccessible except to a professionally equipped party.

## South Orkney Island

AZ1A should now be active from South Orkney Island and is expecting to be there until March. The AZ prefix is used by Argentinians operating from the Argentinian base on the island and was last used by AZ5ZA operating from there a couple of years ago.

## Other islands

Rudi VK9NM/LH will continue to be active from Lord Howe Island until February/March. Rudi reports hearing European stations on 80 metres but is unable to make

himself heard in Europe.

Wire is prohibitively expensive on the island, which discourages experimentation with antennas.

Colin VI0CC was able to make a number of contacts during his spell on Heard Island, but the visit was cut short when the scientific team, of which he was a member, were 'rescued' from the island when their own support ship became trapped in the ice and was unable to reach them.

ZM8OY continues to be active from Kermadec Island and was even heard on 160 metres SSB in October, ragchewing with ZL2BT. He is most often to be found on 20 metres SSB between 0700 and 0800GMT. LA5VAA will be active from Bear Island as JW5VAA until May, when his place will be taken by JW6HAA. Bear Island counts as Svalbard for DXCC, but separately for the Islands on the Air awards.

## Software

As a follow up to my comments last month, readers may be interested to know that Radio Nederland produces a free publication to assist in programming your home computer for beam headings, sunrise and sunset times etc. Write to Jonathon Marks, Radio Nederland, PO Box 222, 1200 JG Hilversum, Netherlands.

## DXpeditions

*DX News Sheet* recently published the text of a New Zealand radio society paper presented at the IARU Region 3 conference in November. The paper argues that DXpeditions, rather than adding to the image and enjoyment of amateur radio, actually detract from it.

The prime motivation for DXpeditions, argues the paper, is to satisfy the egos of a small but vociferous minority of amateurs whose sole interest is collecting 'countries' for the DXCC award. These amateurs resort to bad operating practices and excessive power and, in doing so, give amateur radio a bad reputation in the eyes of the authorities.

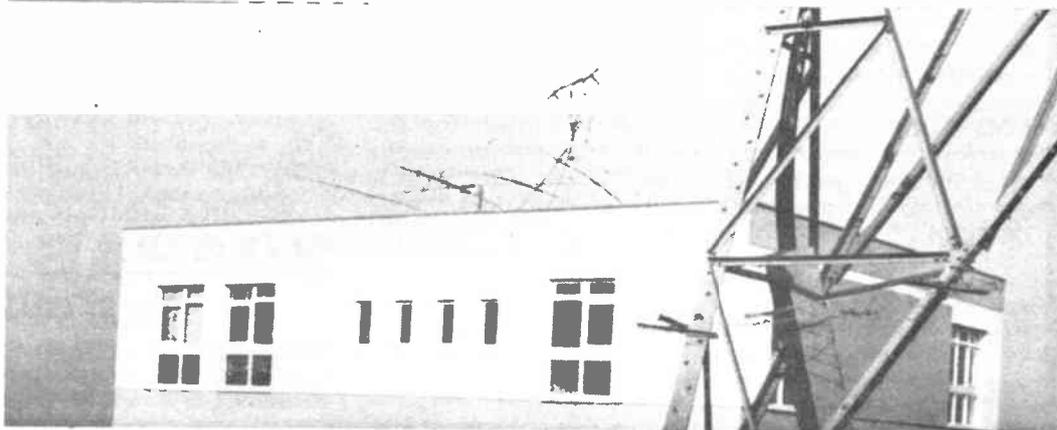
In addition, the paper argues, chasing DX puts enormous pressure on resident amateurs in 'rare' countries, because whenever they operate they are hounded across the bands by the DX chasers. Furthermore, the demands for QSL cards make unreasonable inroads into their time and money.

The New Zealand paper ends by proposing that the conference should make recommendations about minimising the effect of expeditions, and should encourage modifications of the DXCC award to be for 100 countries only, with no endorsements for additional countries worked.

## Your views?

Readers will not be surprised that I have strong views of my own about the paper. I feel many of the arguments used against DXpeditions could just as easily be turned right around, and G3XQU did just this in a letter to *DX News Sheet* the week after the New Zealand paper was published. Whatever the rights and wrongs, there is no doubting that DXpeditions have become a major feature of HF amateur radio and are of interest not to a minority but actually to a very large number of HF operators. I would be interested in readers' views.

*The GJ6UW contest site*



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To qualify for an award on one of these bands you have to fulfil each category

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Silver	14	35	40	800 Km
Gold	21	50	60	1200 Km
<b>432 MHz</b>				
Bronze	5	15	40	400 Km
Silver	10	15	30	600 Km
Gold	15	25	45	900 Km
<b>1296MHz</b>				
Bronze	3	10	10	300 Km
Silver	6	15	20	500 Km
Gold	9	20	30	700 Km

The opening date for the award was 1 January 1985

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# ANGUS MCKENZIE

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# TESTS

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In the December 1984 edition of this magazine I reviewed the Tau Systems SPC3000 ATU, and found it most fascinating in design. Just about the time the magazine was going to press I decided to purchase one of the units, and in the January 1985 edition I published some critical comments; of my production version, including the discovery of several dry joints and the fact that the SWR meter did not work properly.

## Metal chaff

The production sample was delivered to me with the bottom of the inside almost covered with bits of metal chaff, which all had to be cleaned out, and it was necessary to take the aerial tuning unit completely to pieces to fix the dry joints!

Just before December 1984 the designer, Tony Johnston G4OGP, left the company for personal reasons. Early in 1985 Tau Systems had to call in the receiver and ceased trading, although quite a number of SPC3000s were sold off cheaply to a few dealers who continued to market them.

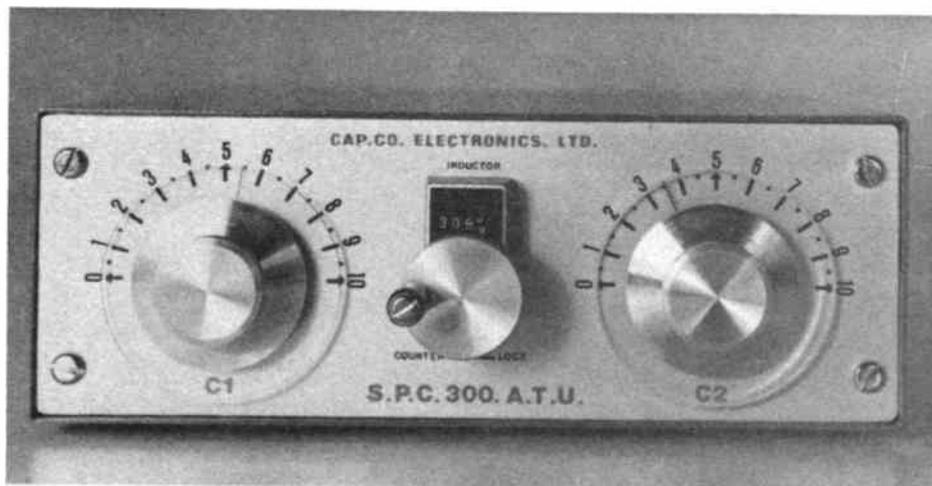
Looking back on the episode, I was disappointed that a product which was so promising ran into so much trouble, so I was particularly pleased to hear last summer that Tony Johnston had set up a new company, CAP Co, at 63 Hallcroft, Birch Green, Skelmersdale, Lancs WN8 6QB. He set up the company in order to continue with a modified version of the SPC3000, without meters and switches, and to introduce a smaller version, the SPC300, which is the subject of this review.

## Higher power claims

The basic circuitry and performance of the SPC300 should be identical to that of the 3000, with the exception that it is only rated officially at 300W PEP, although it is claimed that it should take quite a lot more power.

It is housed in a much smaller box, 310×260×93mm, excluding projections, and has SO239s for input and output with an additional earth wing nut and a press spring terminal for connection to long wire antennas. This terminal is directly connected to the inner of the antenna SO239 socket with a very short wire. It might be useful for you to note that a banana plug will actually make good contact with the inner of an SO239, and I have often used this configuration when I am in a hurry!

The circuitry is surprisingly simple, the transmitter feed passing through a 200pF 3kV working variable capacitor (C1) to a centre point. From the centre point to earth is a roller-coaster inductor, which can be varied in value from a maximum of 28μH down to a very low value. In parallel



## CAP Co ELECTRONICS

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### Aerial Tuning Unit

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with this inductance is one half of a ganged variable capacitor (C2B), this being a split stator with each half giving a maximum of 200pF at a peak working voltage of 3kV. The second half of this ganged capacitor (C2A), is in series with the feed to the antenna from the mid point. Thus all components have one end connected to the mid point.

Both C1 and C2 are driven from 6:1 reduction gears behind the front panel, whereas the roller-coaster is operated with a crank handle through 40 turns (earlier versions had a knob instead of the crank handle). Tony Johnston has made several improvements in the SPC300 recently including improved contacts between the pressure wheels and the inductance, and in the general presentation.

Both the capacitors are scaled 1 to 10 through a 180 degree angle, the control knobs rotating very smoothly. There is no bypass switch nor any form of metering included, in order to keep the price down. The ATU is designed to cover the range 1.8 to 29.7MHz and can match 50 ohms down to below 1.4MHz and up to well above 30MHz.

## Wide range

The SPC circuit allows an extremely wide range of resistances and reactances to be matched into a transmitter/receiver, and we have no trouble in the lab matching even the craziest of loads.

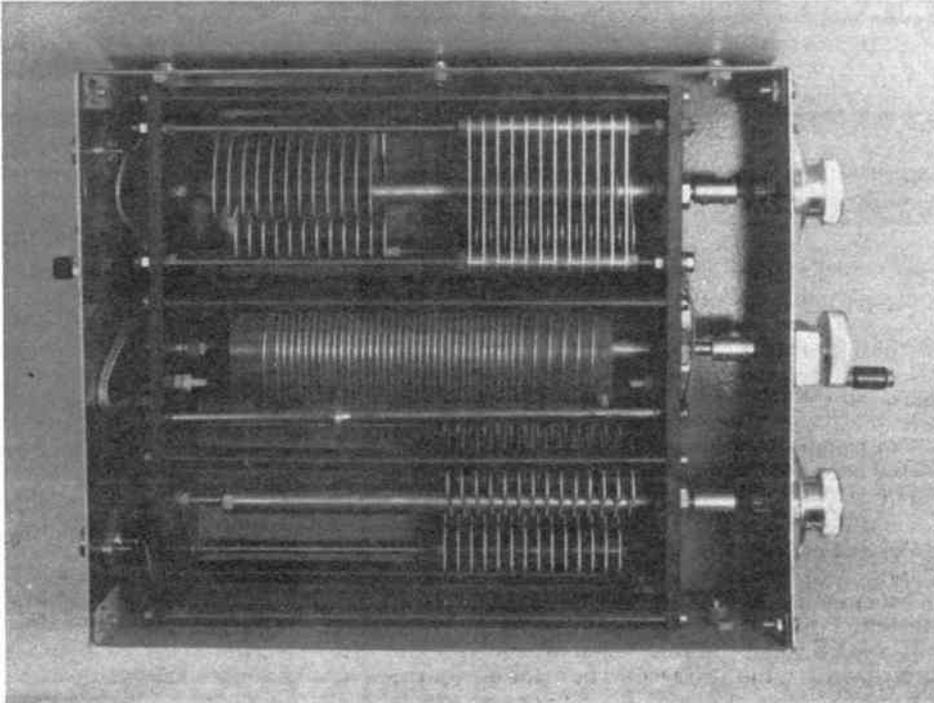
For some weird reason, my original SPC3000 didn't seem to match properly into 10MHz but was fine on all other bands, but this new ATU coped perfectly well with all bands on beams, trapped dipoles and various end-fed systems.

## Subjective tests

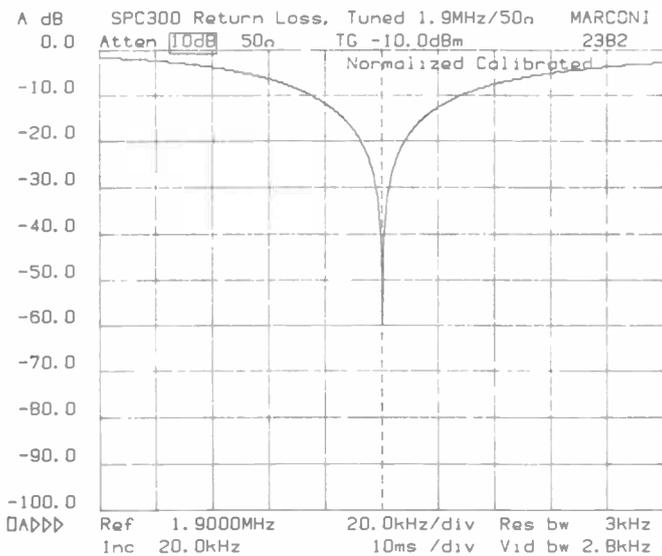
I tried out the SPC300 on all my antenna systems from 1.81 to 29.7MHz. The performance seemed identical to that of the old unit, except for the fact that 10MHz matched perfectly well. However, in trying some simple power loss tests on the original review sample, I noted with alarm a very considerable power loss on Top Band no matter how I tuned the unit, with the output connected to a 50 ohm dummy load. The original SPC3000 lost around 1dB, which is quite a lot, but the 300 gave up to 2dB loss which is unacceptable. Losses were somewhat smaller on the higher LF bands, falling to around 0.5dB at HF.

I tried the SPC300 with one or two receivers that had inadequate high pass filters below 1.8MHz, and which normally had blocking problems due to extremely high signal strengths being received from local medium wave stations (BBC Brookmans Park, and ILR Capital and LBC). Various intermodulation products developed across Top Band, and all these completely disappeared when I inserted the SPC300 with a 1:1 balun feed to my antenna system. I found it possible to get a very good SWR indeed and since there are excellent scales on both C1 and C2, and the roller-coaster includes a counter displaying up to 4000, it is easy enough to note down the settings for frequencies in regular use so that you can find them again quickly.

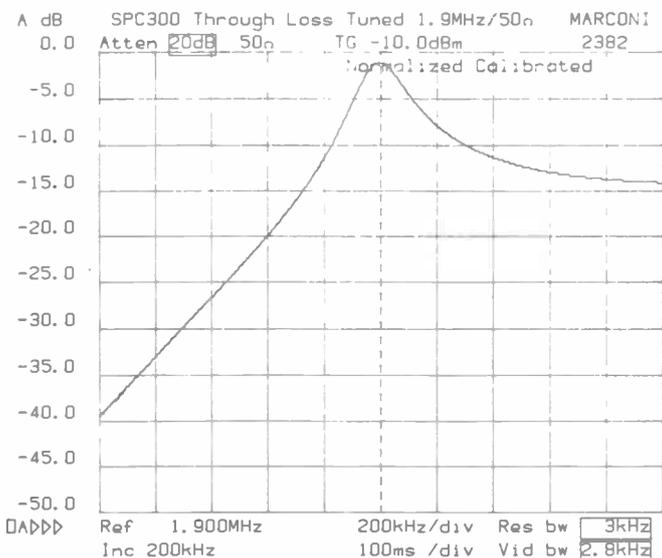
The SPC300 is beautifully built, and the workmanship is far superior to that of Tau Systems. Interconnection wiring internally is both much thicker and far better soldered, and the wires are also much shorter.



Inside the unit, showing the roller-coaster inductors



The return loss (SWR) introduced by the ATU when tuned at 1.9MHz into a 50 $\Omega$  dummy load. It is obviously necessary to retune if you change frequency on this band



The through-loss of the circuit is shown from 0.9 to 2MHz. The SPC300 is tuned into a dummy load of 50 $\Omega$ . Note the high-pass filter action which gives good medium wave rejection on Rx

I discussed the high losses on Top Band with Tony, who reacted very quickly by paying me an immediate visit from Merseyside the following morning. He agreed that the losses were too high and we both sat down and puzzled over what could have been the cause, eventually arriving at the conclusion that a heavy duty steel case does not give a good enough earth path for the earth returns of the capacitor and inductance.

Subsequently, Tony redesigned the interior to include an aluminium sheet, and also relocated the split stator capacitor feeds. The losses of the aluminium panel version were substantially reduced.

### Clear advantages

I very much like using this roller-coaster, and it offers some very clear advantages over more normal types of ATU which only provide a tapped coil as part of the circuit. The infinitely variable inductance allows the user to optimise the cue over the entire frequency range of the unit, and the effect of both the capacitors against the inductance allows an immense range of impedances to be transformed to 50 ohms resistive.

This type of circuit gives an extremely good high pass filter action at LF, which is particularly useful for reducing the apparent signal strengths received from medium wave stations when you are tuned up on 160m.

The improved construction of the SPC300 will, in almost all cases, give a degree of harmonic reduction, although this will not be as good as that given by other types of circuit. This is not so important though, as there are many good and efficient low pass filters available.

As the unit can be used at any frequency in its range it is an excellent product for purposes other than amateur radio, and it should be satisfactory for use on oil rig links and even military installations. It will also allow you to match almost any old length of wire quite satisfactorily into a short wave receiver, and this may make an appreciable difference compared with some of the rather lossy receive only ATUs that are available. You don't really need sensitivity below 10MHz though, but now that we are near the sunspot minimum you would find that the SPC300 can greatly improve the reception of weaker broadcast stations above 15MHz.

### Laboratory tests

In general, all the plots bear a close resemblance to those taken a year ago on the original SPC3000. However, we did obtain some interesting plots on the SPC300 which are highly relevant. We tuned the unit into a 50 ohm dummy load at 1.9MHz, and plot 1 shows the return loss in dB versus frequency.

Note that the return loss at the tuned frequency is 60dB, but with the frequency changed by  $\pm 23$ kHz the return loss reduces to 10dB, which represents an SWR of approximately 2:1.

# G3OSS TESTS

This means that you will have to retune the ATU even if your antenna has a fairly broad SWR characteristic for comparatively small shifts of the band. This is not unusual though, and is highly desirable in order to preserve the correct high pass filter action.

You may find that you will only have to alter the roller-coaster setting when you QSY, in order to obtain an adequate SWR.

After incredibly careful adjustment the minimum through loss at 1.9MHz was 1.5dB, and this represents the loss of 9W if you are peaking just over 31W output on 160m.

Plot 2 shows the response of the ATU when it is very carefully tuned at 1.9MHz into a 50 ohm load. Note that the loss at 1.5MHz is around 23dB, and in practice the attenuation at this frequency can be somewhat higher still when the ATU is tuned into a reactive load. This should give an adequate rejection of medium wave interference unless your receiver has a chronic problem!

Plot 3 shows the return loss of -62dB at 14.2MHz when tuned for best SWR. In this instance, the ATU matched the entire band from 14.0 to 14.35 with an SWR better than around 1.25:1 when tuned to 14.2MHz. In practice you will need to retune, however, in order to correct the match of your antenna at various frequencies.

Plot 4 shows the through response with the ATU tuned to 14.2MHz, from which you will see that the second and third harmonic rejections are each only around 7dB. Note that the response goes up again towards 50MHz, showing a slightly embarrassing leakage here. The rejection of LF frequencies can be seen to be remarkable, but there is a little pimple at just below 12MHz at -7dB.

Just before submitting this review to the Editor, Tony sent me another sample in which he had used aluminium panels instead of steel, and as with the second sample there were changes in the wiring routing to the split stator capacitor.

## Nearly fully meshed

We spent a considerable time testing the unit on 1.9MHz, and managed to obtain settings which gave a through loss of around 0.75dB, which is thus dramatically better than that of the earlier samples. The maximum power transfer, however, was not quite that of minimum input SWR, although this was still very good indeed. We found that the C1 capacitor had to be very nearly fully meshed, however, suggesting that perhaps its capacitance should be a little higher.

For a final test we thought we would do something really idiotic, by attempting to load up at 1.9MHz into an anglepoise lamp, including its mains lead. It was fitted with a 60W bulb, which of course changes resistance with voltage! After chasing our tail for a few minutes, we managed to get it down to almost 1:1 using 60W drive and found the losses remarkably small, with the bulb glowing

just about as brightly as it would do on normal mains voltage. On changing over to SSB, and talking through the system, the lamp performed quite spectacularly, to everyone's amusement. Earlier tests on the SPC3000 into very low impedances were equally successful, thus proving the flexibility of the SPC circuit.

## Conclusions

A through power loss on 160m of 0.75dB is not of any real consequence, and I suggest that the benefits given by the SPC circuit are sufficiently great that you should think quite carefully about purchasing an SPC300 instead of an expensive Japanese import, which would not be so flexible.

Once you have noted down the inductance settings for the different bands in your particular installation, you should be able to tune C1 and C2 very quickly, but of course you will need a good power/SWR meter to go with it.

I suspect that if the SPC300 had been designed with a larger case, with a wider spacing between the roller coaster and the casework, the LF losses would have been even lower, but what is 0.25dB or so extra loss compared with the conveni-

ence of having such a compact unit which can do so much?

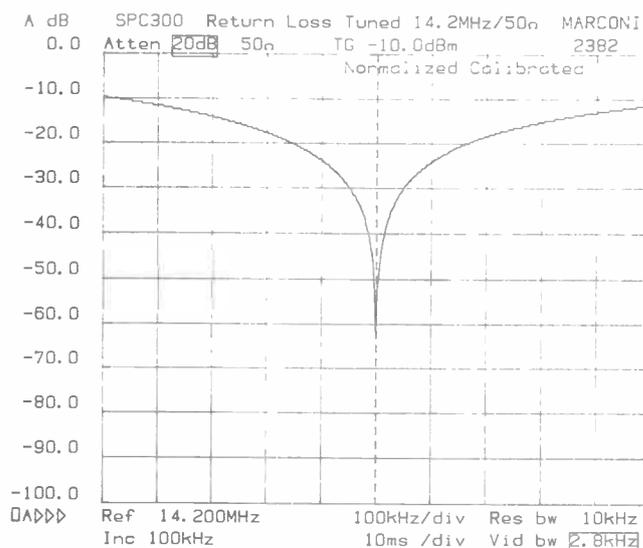
This product, then, is most worthwhile, and I feel I can recommend it as very good value for money, at £164 including VAT at the time of going to press.

The complete module excluding cabinet etc can be supplied for £89.64. The higher power rated SPC3000 now costs £214 complete, and £114.94 in modular form excluding cabinet. A 1:4 balun is £8.50 and a 1:1 is £7.45. I would not be surprised to see a lot of them selling for professional purposes, including marine and military. It is good to see a British product that is competitive with imports from the Far East.

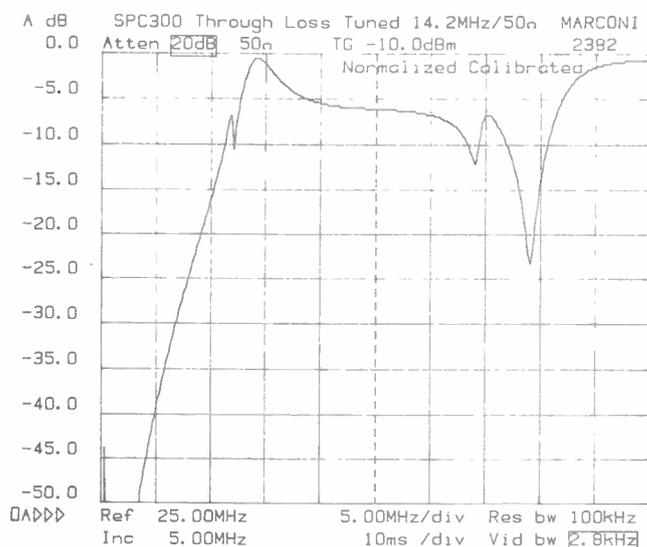
## Competition time

Many thanks to Tony Johnston for all his assistance and the donation of the SPC300 to our free to enter competition on page 11. This unit, along with a module of the SPC300 and numerous other prizes, can be won with just a little thought and a postage stamp. If you have read this review carefully, answering the questions should be a piece of cake and you may well win yourself on après xmas pressy. Go on - give it a bash.

*Showing the return loss with the ATU at 14.2MHz into 50Ω. Note the return loss curve is much broader and you would probably only have to retune to compensate for the antenna impedance variations.*



*Showing the through-loss characteristics from 0-50MHz including 2nd and 3rd harmonic rejections with the ATU tuned at 14.2MHz. Note relatively poor harmonic rejection but excellent LF rejection, especially below 7.5MHz.*





## AOR AR2002

### Communications receiver

I wrote a brief report about this new rig in the October issue of *Amateur Radio*, but promised to review it more fully once a production sample had arrived; hence this present review. Please see the original write-up for a description of the basic facilities.

The receiver can be switched to narrow or wide FM or AM, and channel spacings of 5, 12.5 and 25kHz are provided. The rig covers from 25 to 550MHz and 800 to 1300MHz. Although the circuitry is almost identical to that of the earlier AR2001, the manufacturers have added the new microwave range in quite a cunning way, although there are some unfortunate disadvantages.

Frequencies from 25 to 550MHz are mixed with a local oscillator running from 575 to 1300MHz. For the new range to be enabled the local oscillator runs from 755 to 1255MHz, the mixer output feeding directly into the 45MHz IF, thus unfortunately excluding the first IF. This means that there is an image 90MHz below the tuned frequency; if you tune to 935MHz, for example, you will be receiving 845MHz as well, with a sensitivity that is only a few dBs below that of the main required channel.

#### Lower IF

On the review sample the second IF is actually at 45.03MHz, so the image will be 90.06MHz lower than the dialled frequency. This means that the receiver will tune as much as 90MHz below 800MHz at reduced sensitivity by relying on the image response to become the required channel! The sensitivity at 710MHz is around 25dB worse than at 800MHz, while

750MHz was 16dB worse and 780MHz was 10dB worse.

This will also mean that if you are hunting around 1030MHz for a required signal you will be seriously disturbed when you find that you are receiving the cellular radio channels some 90MHz lower! There is a high pass filter below 800MHz and the general image response above 800MHz does appear to be a few dB down on the main one, but I suspect that this is possibly due to spurious effects in measurement.

#### Image responses

We decided to have a closer look at image responses generally, and as I had been rather critical of the Yaesu FRG9600 recently (August issue), it was only fair to investigate for snags in the AOR2002, of which there are a few. The main band from 25 to 550MHz also receives an image 90.06MHz higher, which is between 60 and 65dB down. This will not normally be a nuisance, but very strong signals on an image frequency would break through if you were receiving a very weak signal. If you tune to 145MHz, for example, a strong signal on 235.06MHz could cause interference. We also checked the image response caused by the 455kHz IF, and this averaged out at -78dB, the image frequency being 910kHz above the tuned frequency, ie an incredibly strong signal on 145MHz could be received by tuning the set to 144.09MHz.

Although there were a few crystal harmonics across the general tuning range, there were not too many of them, and in general use I didn't find them too

disturbing. However, the RFIM performance was not too good, the RF input intercept point averaging at around -22dBm. This is up to 8dB better than that of many 2m hand-helds and appreciably better than that of the Yaesu, but you should bear in mind that as the front-end is very broad, you may well get problems if you use a broad band antenna such as a discone in an area very close to strong VHF transmitters.

The RF sensitivity was surprisingly constant over the entire range of the receiver, figures varying from around 0.18 to 0.25 $\mu$ V for 12dB sinad on NBFM. On wide band FM the sensitivity was of course worse, but compared reasonably well with that of average FM radio. AM sensitivity also corresponded. Thus the sensitivity up to 200MHz averages slightly better than that of the Yaesu, although this was good on 2m, but above 300MHz the Yaesu seemed to collapse while the AR2002, even above 1000MHz, was excellent.

#### Marginally better . . .

The AOR wireless only has FM and AM, while the Yaesu rig did include SSB. However, reciprocal mixing measurements taken on FM on the AOR at similar spacings showed it to be equal to, or only very marginally better than, the Yaesu on the 2m band. However, whereas I complained bitterly about the reciprocal mixing performance of the Yaesu becoming particularly poor as the received frequency was increased up to its top limit of 905MHz, the AOR did not show any degradation right up to the highest frequency we tested, at 935MHz, and thus UHF signals sounded a lot cleaner on the AOR.

The selectivity on NBFM was sufficient to separate 12.5kHz channelled stations quite well, and was as good as the average modern FM mobile rig; AM selectivity was also quite adequate. The bar graph signal strength indicator, using the usual lemons and cherries, required a signal of just over 0.5 $\mu$ V to light up the first indicator, while the top light came on at around 11 $\mu$ V. This is not a very wide signal variation, and so most strong signals would light up the whole bar graph.

Distortion on NBFM was just adequate, averaging around 5% for 3kHz deviation, but reducing to 2.8% under the most favourable circumstances when the 12.5kHz channelling was selected. We noted a high pitched whistle coming in, especially when the 5 or 25kHz channelling was used, but it was not really noticeable with 12.5kHz channelling selected.

We investigated this whistle and found it to be at around -43dB ref, 3kHz deviation, the frequency being 2.5kHz. With 12.5kHz channelling selected, the whistle was so high pitched that its apparent level was way down and it was never noticed in practice.

Surprisingly, the 2.5kHz whistle was noted behind many lower deviation FM transmissions, and when compared with

# G3OSS TESTS

equivalent settings on the AR2001 was found to be somewhat poorer.

The signal-to-noise ratio on NBFM was not quite good enough, although adequate for communication purposes, the main constituent being the 2.5kHz whistle. On wide band FM a ratio of 58.5dB was achieved, some 20dB better than that of NBFM. On AM 51dB s/n was achieved on strong signals, which is quite good.

## Wide band distortion

We looked at the distortion of wide band FM, and while it was good for 25kHz deviation, the full 75kHz deviation used on Band II, for example, produced 7.3%, which is very high. Distortion on AM, even at full modulation, was about the same as on NBFM, and thus actually better than AM distortion is on many a Japanese receiver!

The received frequency response on NBFM of a 750µS pre-emphasised transmission showed a heavy LF roll-off below 500Hz, although HF rolled off only gradually up to 5kHz. Wide band FM proved to be rather odd, only slight LF cut being introduced at 100Hz, although lower frequencies were quite considerably attenuated.

The WFM plot shown was taken from a non pre-emphasised source, and approximately follows a warped 75µS response. However, once again I have to comment that the Japanese seem to be unaware that this mode in Europe requires 50µS pre-emphasis, with just the change of one component value for our markets! The AM response again shows an extremely steep roll-off below 200Hz, while the HF extends to around 2kHz, above which it rolls off gently at first, then virtually over a cliff above 5kHz. The NBFM and AM responses are reasonably good for speech communication purposes, whilst WFM is actually fair enough for music, but you must certainly not expect hi-fi from this unit!

The AR2002 could just about manage 1W into an external 8 ohm speaker, but did give 1.6W into 4 ohms, and I would recommend the latter if you want to use the rig in a car.

## Subjective tests

I have had a good play with this rig over a period of some weeks, and it is clearly far superior ergonomically to the earlier AR2001. The push-buttons are eminently sensible, and thank goodness AOR got away from their dreaded membrane touch pad! The additional tuning knob allows one to search manually far quicker than using the up and down push-buttons, and all the operations are far more positive.

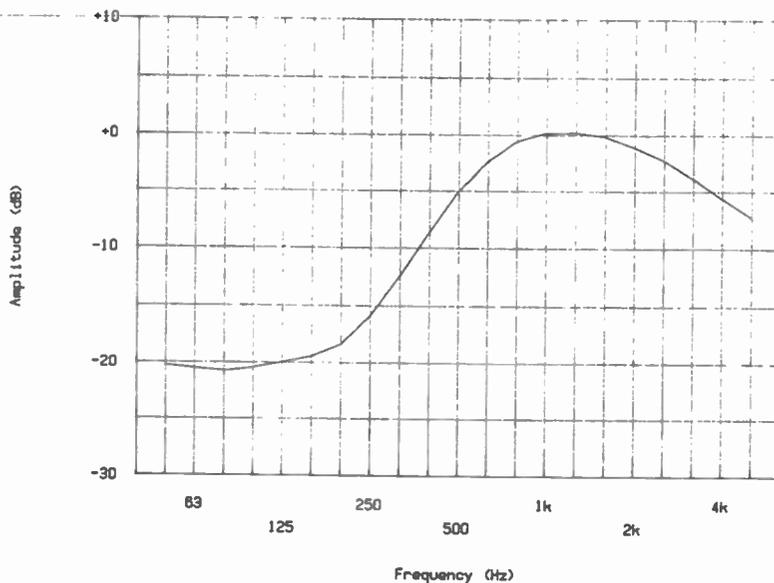
The excellent overall sensitivity allows one to receive far more stations above 200MHz than the Yaesu FRG9600, and there seem to be fewer sprogs and intermodulation products around. However, the Yaesu rig's ergonomics are far better thought out, and I found myself regretting that we could not have had the Yaesu styling, ergonomics and functions with the AOR electronics! I did have a lot

of fun scanning around various bands, and I still feel that it is the best scanner so far available. It would probably be quite useful in some professional areas as well as for general fun listening.

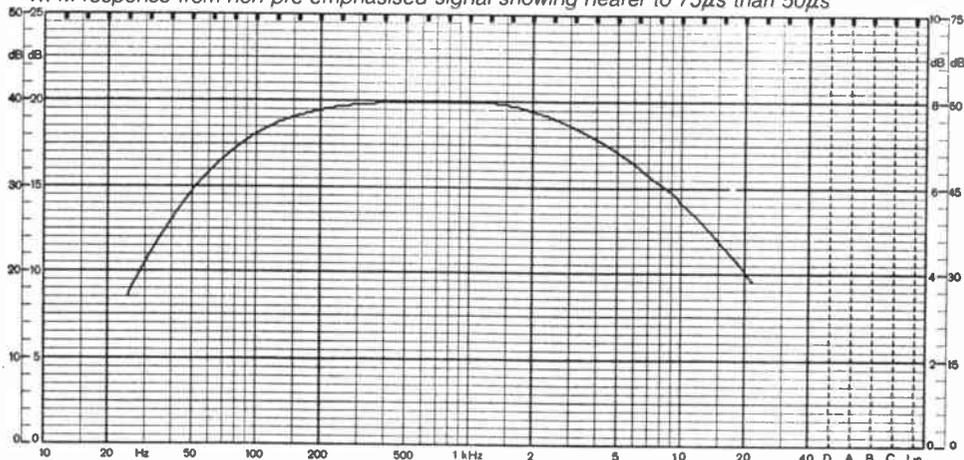
However, if you wish to take VHF, UHF and lower microwave listening seriously, I feel you would be well advised to wait

for the Icom ICR7000, which was first shown at the Leicester amateur radio show in October and which I hope to review shortly. This receiver covers the band 25 to 20000MHz and includes multimode and almost every conceivable channel spacing. Its cost, however, will be around two and a half times that of the

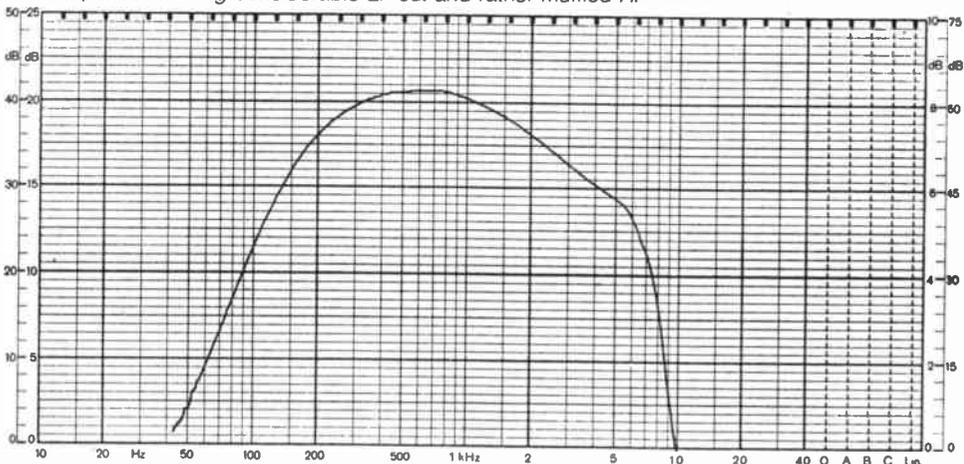
AOR AR2002 FM received audio response (750µS pre-emphasis) showing steep LF cut but extended HF response

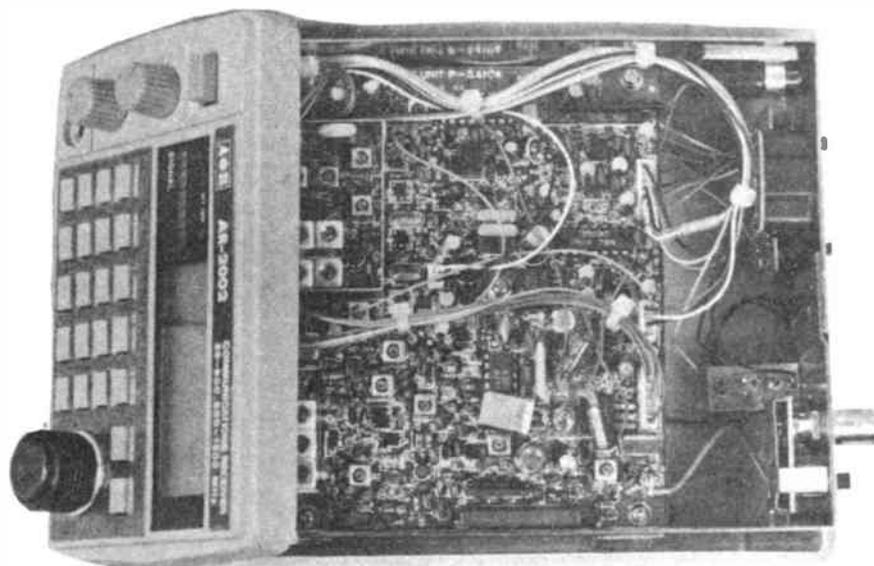


WFM response from non pre-emphasised signal showing nearer to 75µs than 50µs



AM response showing considerable LF cut and rather muffled HF





2002, so it is clearly in a more professional class.

The AR2002 is a commendable scanner which should give a lot of pleasure, but looking at it as closely as I have has made me realise that it could have been quite a lot better if a little more work had been put into it (which would probably have increased its price somewhat). It will be fascinating to see when and if Yaesu introduce a Mk II version of their 9600, and whether they would then correct the serious design deficiencies in its front end.

In the meantime my top recommendation goes to the AR2002. It can be

interconnected with a computer and is supplied with a mains unit and telescopic whip, the antenna input being 50 ohm BNC.

I would like to thank Lowe Electronics for the loan of the review sample which has proved so fascinating, and Nigel G1LSA for helping me with many of the measurements.

#### Important note

Fairly recently I have heard about a new act of parliament entitled 'The Interception of Communications Act 1985'. I understand that the section of this act relating to telecommunications

comes into force on 1 January 1986 and makes it a criminal offence to listen to any form of telephonic communication carried out at radio frequencies, which probably includes forms of private mobile radio. At the moment the Wireless Telegraphy Act makes it an offence to act on or pass on information gleaned from listening to frequencies other than those to which you are entitled.

There is some vagueness at the moment in the WTA, but you should bear this and the new act in mind if you are contemplating regular use of scanning receivers. My personal opinion is that telephonic communications available for public use which use radio frequencies should have been digitally encoded in order to discourage listening. It is an area which is worth watching, and I am personally rather appalled that cellular radio communications are far too easy for anyone to pick up. It should be impressed upon telephone users that their calls from cars might not be as private as they imagine them to be.

For the benefit of readers, clause 5B of the WTA reads as follows:

'Any person who otherwise than under the authority of the Postmaster General or in the course of his duty as a servant of the Crown . . . uses any wireless telegraphy apparatus with intent to obtain information as to the contents, sender or addressee of any message (whether sent by means of wireless telegraphy or not) which neither the person using the apparatus nor any person on whose behalf he is acting is authorised by the Postmaster General to receive . . . shall be guilty of an offence under this Act.'

## WOOD and DOUGLAS 70PA2/S and the MUTEK GLNA433e

### 70cm pre-amps

The average 70cm rig is not as sensitive as is desirable, and since cable losses are more marked on 70cms than on lower bands a good masthead pre-amp is almost a necessity.

An average 70cm rig would have a noise figure of around 5dB, and with a cable loss of say 3dB the total system noise figure could be as high as 8dB at the antenna. A good masthead pre-amp can reduce this to around 1.5dB in practice, and a 6.5dB improvement in system sensitivity can make an enormous difference as it can allow you to work very much weaker signals than you otherwise could.

This month I had a look at two interesting pre-amps, the Wood and Douglas being extremely reasonably priced and having a good overall performance, whereas the muTek model has a better performance but costs more.

#### The Wood and Douglas 70PA2/S

This model is available in various forms, the cheapest of which is a kit version which excludes pin diode switches and RF sensing, costing only £6.85 including VAT. If you are not too hot on soldering, then you can buy it ready made on a circuit board for £8.95 including VAT. The RF sensed version includes pin diode switching, and costs £16.25 including VAT in kit form and £26.30 assembled and tested. Wood and Douglas do not supply an outer case/sockets for it, but it is easy enough to obtain a waterproof box from your dealer. The review sample, however, was mounted in a box for us by the suppliers, and fitted with N type sockets to make it easy for us to test.

The maximum allowable throughput power is 30W, which is ideal for coping with the latest high powered 70cm

mobiles rated at 25W. If you have 2dB loss in your co-ax, then you could send 50W up the cable and get away with it. The circuit employs RF sensing and pin diode switching. The design also incorporates two forms of PTT, allowing change-over to Tx when one pin is earthed, or when 12V dc is put on to another pin. The pre-amp requires around 12V dc for operation, although it will work satisfactorily between 9 and 15V.

I tried the unit in front of my Trio TW4000A and found that it worked very well, an improvement being noted when the pre-amp was switched on. Further investigation showed that there was an insertion loss of around 1dB, however, and although the pre-amp made this up you will still notice the loss on Tx.

The input noise figure is approximately 2.5dB, and I noted around 1dB improvement in FM sinad as compared with a direct interconnection with the TW4000A. The gain from input to output averaged at 13.5dB, the pre-amp itself having 14.5dB gain. We checked the Rx bandwidth and found it to be rather wide, the gain reducing by 3dB at 411/445MHz, by 10dB at 371/476MHz and by 15dB at 340/496MHz.

You are not likely to be troubled by strong signals below the 70cm band in normal circumstances, but there are very

many PMR stations all over the country above our band, and strong TV video signals on the lower channels might possibly present a problem.

The input intercept point was utterly remarkable at +12.5dBm, proving it to be the best in this parameter of any model tested so far. The device used is a noise matched NPN transistor, an NE21936, although a 21937 is also referred to in the instructions. Although most users would probably power the pre-amp with a separate 13V dc lead, an additional choke can be supplied which can switch the pre-amp to Rx with 13V dc on the co-ax, the pre-amp switching to the Tx straight through path when the voltage is withdrawn.

If you buy the pre-amp as a kit, there are three adjustments that you will have to make on small capacitor trimmers, the first one adjusting the minimum Tx through path loss, while the other two adjust the input and output matching.

The best way to set the pre-amp up is to tune in, say, a weak repeater, and first peak the output trimmer for maximum S-meter reading on the rig. You should then peak the input trimmer for the lowest possible background noise, ie for best quieting. Having done this, you may note a decrease of gain, and you should check that the output trimmer is set for maximum gain.

Finally, re-peak the input trimmer for best quieting, noting that the best signal-to-noise performance will not necessarily be at maximum gain in your installation. The through loss trimmer should be adjusted for 'maximum smoke' into the aerial.

## Not state of the art

Although this little pre-amp offers a noise figure which is by no means state of the art, it should be more than good enough for making an appreciable improvement to an FM or SSB system if it is placed at the masthead.

If making your own masthead waterproof box, do bear in mind that you should apply some form of gasket sealant in between the lid and the box and around all the connectors. You should have a small hole facing downwards to allow air to circulate, which will prevent long term condensation. I have seen the odd masthead pre-amp become waterlogged, when it has apparently been very well waterproofed, because of moisture very slowly creeping into the box over the period of a year or two. A small air hole underneath obviates this problem.

This is a surprisingly good little pre-amp for its price, and one which I can strongly recommend for an average installation. It will not make very much difference if you use it in the shack, unless you have a very deaf rig, and similarly it may not make much difference in a mobile installation. At masthead, however, you should hear repeaters and simplex stations perfectly Q5 that would otherwise be barely audible.

A strong recommendation, then, and

many thanks to Wood & Douglas for submitting the product for review, and subsequently donating it to the RAIBC - a most generous gesture.

## The muTek GLNA433e

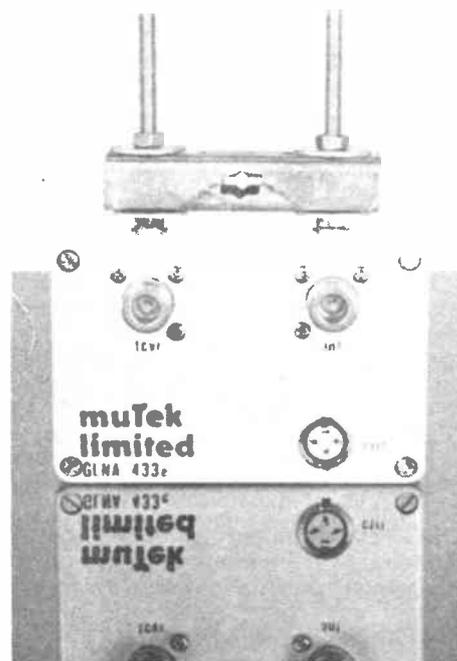
This model is the bottom of muTek's range for the band and is mounted in a plastic waterproof box fitted with heavy bolts projecting from the side, with clamps allowing it to be fitted around a pole of up to 5.5cm diameter. The RF connectors are 50 ohm N types, whilst the power connector is a three pin DIN type with a locking ring.

The design incorporates a GaAsFET, Mitsubishi type 1202, which is very similar to the 1402 with a different packaging, and change-over is either RF sensed or with PTT, one of the power socket pins pulling the pre-amp over to Tx when shorted to deck. The maximum gain in midband is 13.5dB, with 3dB down points at 423/444.5MHz and 10dB down at 418/455.5MHz.

The through loss on Tx is just over 0.6dB but we also noted that on Rx, with the pre-amp switched out, the review sample degraded the system noise figure by around 1dB. However, when the pre-amp was switched on, the pre-amp noise figure of around 1dB gave a marked improvement to the Trio TW4000A, its apparent sensitivity improving by just over 2dB.

If the pre-amp is mounted at masthead, this will give quite a spectacular improvement to an average system. The maximum through power rating is 50W, so you could use 100W in the shack provided you have at least a 3dB cable loss.

The RF passband of the pre-amp is decidedly sharper than on the Wood & Douglas model, and the lowest TV channels are far better attenuated. The RF input intercept point measured out at -1dBm, which is easily good enough for the best installations, unless you really are in trouble! The RF sensing circuit requires at least 100mW to pull the pre-amp over to Tx. An internal link can be cut to give an almost instantaneous



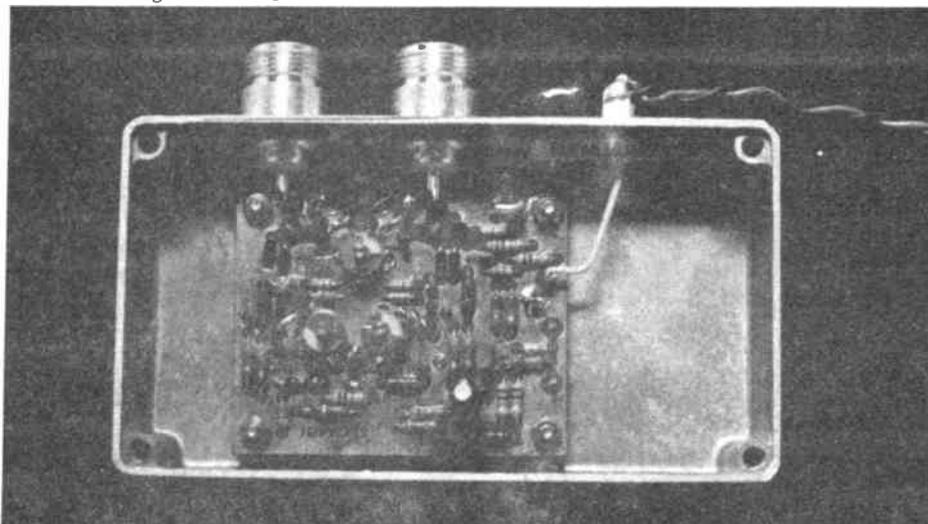
muTek GLNA433e

Tx/Rx change-over, the normal delay however being around 1S, which I would have preferred to be a little longer. I would strongly advise hard PTT switching wherever possible.

I strongly recommend this unit if you want to take the band very seriously, but if you require up to 250W throughput then I would recommend the senior model GLNA432 which operates with a control unit in the shack, and can permit RF sensing or virtually any form of PTT operation. The control unit would normally be placed in between the main rig and the linear and requires three wires for interconnection, including earth, although this could be through the screen of the co-ax.

The GLNA433e costs £79.90 including VAT, and is supplied with plugs and dc power connector. Very many thanks to muTek Ltd for the loan of the review sample.

Wood and Douglas 70PA2/S



# SHORT WAVE LISTENER

TREVOR MORGAN GW40XB

Hello again... and a very prosperous New Year to all of you!

Well, 1985 saw the introduction of the *Amateur Radio* Prefix Award scheme which was to be more popular than I imagined. Despite some terrible reception conditions during the year, over sixty claims were submitted and it gave me great pleasure to verify the awards.

We also opened up the Listeners' Information Exchange, which began in a quiet way but gathered momentum, and a large number of letters have been passed on. I would be grateful if interested listeners would return the coupon at the end of this article as soon as possible, so that a complete update can be made on the lists.

## Free exchange

For those who do not know the set-up, the idea is to encourage the free exchange of ideas and information between listeners without the need to join a club. A list of the interested listeners is distributed but the addresses are withheld so that letters between participants pass through the bureau and are forwarded on. So far quite a few listeners have been able to help each other out with advice on receivers, antenna tuners and antennas etc.

If you want to join in, there's no charge. Just send the coupon (or a copy) to me, *direct* please, and a full list will be distributed as soon as possible. Present members please send the slip in to renew your place on the list.

At the moment I am wading through the entries to the WFF awards. Meanwhile, may I thank all of you for your support. Despite the conditions over the JOTA weekend, the entries showed that listeners were well into the pile-ups to make up their scores. No clues to the winners... you'll have to wait until the next issue of *Amateur Radio*!

So to the Prefix Awards. They are a bit thin this month,

but this is not really surprising as many listeners are after Silver or Gold and the going is tougher, especially as DX is harder to hear.

Only a few weeks after claiming the Silver, Peter Cardwell sent in a very fine list neatly compiled on his computer to claim the Gold. Poor Peter has been suffering health-wise lately so we wish him a speedy recovery. Anyhow, the time at home was well-spent and 1,096 prefixes more than qualified for the award.

Peter found the bands most peculiar, yet in one hour of listening managed to log such calls as VP2, two VIs, a VK9 on Lord Howe Island and a VK0 on Maguire Island; good catches at any time!

His station set-up consists of a Trio R2000, a Mizuho KX3 ATU, a Datong FL3 filter and a newly acquired old-timer: a Hammarlund Superpro with original PSU in good working condition!

On the computer side he has the Sharp MZ700 plus a Spectrum, so he is now into the data modes. I look forward to receiving claims for these modes before long!

## Still listening

A newcomer to the award lists is Malcolm Gregg G6VTM, who is still in the listening game despite the callsign (amazing how many are!). Malcolm uses the little Sony ICF7600D to good effect with the supplied wire aerial and has offered VP2, VK9, YZ4, AA2, LU5, PY7, plus a mass of Europeans and Americans to make up the score.

For those who have one of these nice little receivers, try an ATU (a simple 'L' match will suffice and not spoil the portability) and you'll be surprised at the difference.

Most of the mailbag this month consisted of claims for my own QSL card (!) and QSLs for GB2ML, GB0SWA and GB2WFF, all of which I helped to operate recently. My thanks to all who sent in reports and to those amateurs who gave me encouragement while I was operating with a

bad dose of the flu, especially the certain person who made the comment about me being a professional special event operator!

Another very nice letter from our old mate Goff Curtis BRS20104, mentioning the novice band proposals (I'm keeping out of that one, Goff!) and the lack of space given to listeners in the press - something that can't be levelled at *Amateur Radio*.

However, looking at the problem from the inside, I can understand it, writing a column is not something everyone has a mind to do. There are problems to be overcome, such as updating one's references and keeping up with current trends in the hobby, researching and replying to enquiries, answering letters and planning the next issue, etc.

## Costly business

I need to take all the current magazines (which is quite costly) to keep up with the news and product developments that may be interesting to readers of this column. Writers also rely very much on the feedback from their articles in the way of letters to them personally, or to the magazine. Not everyone has enough time to spare to cope with this sort of workload.

Next through the mailbox comes the threatened Silver award claim from Charles Morgan RS52481, of Croydon. A71, CP5, HH7, J37, J88, T12, XT2, 3V8 and 5B4 were featured in the list, which was received using the faithful old Eddystone 840c. With a Trio 2000 in the offing, Charles has promised a further claim very soon (the engraver has been warned, mate!).

His favourite catch, after a long enforced lay-off, was J88BK who was floating around eighty metres when Charles hooked him. His listing is done with the Spectrum using the 'Address Manager' program. I wonder who's getting a printer in the New Year?

I am feeling a bit sorry for Don Pye of Edgware, who is

having a hard time with the necessary maths for the RAE. It's not all that easy for us older folk, who have forgotten such things as algebra and trigonometry, and the brain cells don't seem to soak up the bits other (younger) cells reach. His tutor is giving him plenty of encouragement, however, so he's still hoping to make it in the New Year. As Don says, it's funny how the choice DX is always on at the same time as the XYL decides to go shopping, or it's bed time, or the old tum is groaning etc!

Leslie Goddard RS44903, from Whetstone, is the latest listener to join our happy band. Leslie uses the Trio R2000 with a VHF converter for two metres. With an ended for HF and a  $\frac{5}{8}$  vertical for two, the hunt is on for the prefixes, with a dabble into the world of RTTY using an ST5 terminal, which is also on the menu. Welcome aboard, Leslie!

The annual Blackwood Rally found me digging in the bargain boxes again for those items I missed last time (still no Eddystone dial). However, it also gave me the chance to shake hands with a few more of our readers who took the trouble to find me in the usual heavy crowds.

I also stopped for a chat with G4OIK and G4OIL about their RTTY programs. I will be reviewing the Spectrum version next month.

## Whip-free

Another stall which attracted my attention was the Barenco mast support company with whom I discussed the aerial mast that I gave the design for in these columns some time ago, and I hope to be able to arrange for some special spreaders for those who would like to use this whip-free arrangement. I'll give full details next month.

This month's featured listener is Sue Squibb BRS47568, who hails from Teynham, Kent. She started her listening after a visit to the West Kent RS open even-

ing in 1981. Encouraged by her husband, who went on to become G4MPA, Sue got well into the hobby, and currently uses the FT902/FC902 set-up with a vertical antenna in the garden.

Becoming disabled some ten years ago means that Sue gives her hobby more than average enthusiasm, and to quote her:

'Real loneliness is not possible with this hobby. I can't think of a better way of making friends and keeping up to date with world affairs, and it's impossible to become bored with all the aspects of the hobby.'

**In with the gossip**

Just to prove the enthusiasm that Sue puts into her listening, she has gained over 45 awards and has a collection of over 6,000 QSL cards. She is into RTTY with a Sharp computer and a home-brew ST5 terminal, and tunes into the VHF bands to keep up with the local gossip. I'm sure we all wish her many years of happy listening.

Well, for listeners and operators alike, conditions are steadily getting worse on the bands. Reports say that zero sunspot readings have occurred more than once during 1985 and there are two years to go before we reach the bottom end of the cycle.

One can only surmise just what the coming years will present us with, but I don't fancy swapping 5/5 reports with fellow British stations or staying up all night to work into Europe!

A question frequently asked is which aerial is best suited to listening for DX? Should it be a beam, a vertical, or a long wire? Well,

it's pretty obvious that a beam with a gain of, on average, 8dB or more operated at a good height with the advantage of a good front to back ratio will be able to pick up those hard to get stations when things are difficult all round. However, there are very many listeners and operators who have never used a beam, yet still manage to work the DX while others complain about the lack of it.

Let's look at the beam in perspective for a moment. It is usually an expensive beast and not easily home-brewed. It also requires a pretty substantial tower or mast, as well as a good quality rotator. We're talking about the £500 bracket for a tri-bandner.

So let's have a look at verticals. Usually available as five band trapped systems, they are also large and require a first class radial and earthing system to be really efficient. The vertical antenna has good low angle reception capabilities but is sensitive to surrounding objects such as trees and buildings, etc. The cost for a good one can be well over £150, plus the cost of installing a good radial system.

**Appreciable difference**

This brings us to the wire beam. Those of you who read Bill Mantovani's article, *Simple Wire Beam for 20m*, in the November issue will appreciate the difference in cost of his design compared with a ready-made beam. It can also be made as a multi band or a single band antenna.

However, an effective beam can be constructed by placing reflectors about 6 feet above ground level beneath a dipole. With one reflector

running down each side of the garden, bi-directional reception with about 2-3dB gain is possible.

**Out of the question**

Under conditions where a rotatable beam is out of the question, and the length of the garden precludes the use of very long wires, the quad or delta loop configurations are an excellent means of acquiring gain at little cost. The quad or delta loop is simply a full wavelength of copper wire fed at the centre of the base with 50 ohm co-ax. If the loop is cut for fifteen metres I have found it usable right through the bands from ten to forty with some reasonable gain, and even eighty metres for a little less.

**Awkward conditions**

But the straightforward 'multiband' wire antenna, be it trapped dipole, G5RV, random length end-fed or windom, can prove its worth under even the most awkward

of conditions. It never ceases to amaze me how, under contest or special event conditions, many stations work hundreds of stations using their meagre wires.

**Stealing gain**

Of course, a bit of 'stealing' of gain is done from the transmitting station's beam, but there are many occasions when I have heard, and experienced, stations being contacted using wires at both ends and very low power when others have been complaining about conditions being below par.

Remember, a good ATU and a good listening technique can save you a lot of money!

**That's it**

Well, that's it for another month. In the next issue we'll be looking at RTTY, revamping the 4OXB mast and congratulating (and thanking) some nice readers. Meanwhile, good hunting and clean listening!

**Listeners' Information Exchange**

If you would like to take part in the Listeners' Information Exchange, just complete the form below and forward it to Trevor Morgan GW40XB, at 1 Jersey St, Hafod, Swansea SA1 2HF

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 Address.....  
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14 to 30	9.09	5.20	2.93	1.97
<b>TINNED COPPER WIRE</b>				
14 to 30	3.97	2.41	1.39	0.94
Fluxcore				
Solder	5.90	3.25	1.82	0.94

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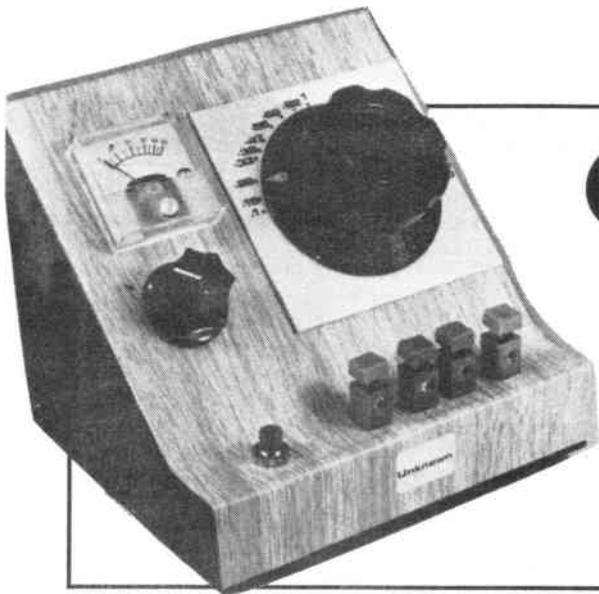
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# CAPACITANCE DIP METER

Do you have a box full of capacitors  
of unknown values? You do!  
Tony Smith G4FAI solves the problem.

There is sometimes a need to identify capacitors, both fixed and variable, found in the junk box, or bought in 'mystery bags', having strange, blurred, or no markings at all. Sometimes it is helpful to be able to check that a capacitor in a circuit has not drastically changed its capacity from that originally specified. This simple unit will identify unknown values from less than 10pF to 100,000pF (0.1MFD or 100nF), or enable two capacitors to be matched within the same range.

## Visually

This type of circuit usually employs a crystal earpiece through which a null in an audio tone indicates the balance between a known and an unknown capacitor, enabling the value of the unknown to be identified. For this version it was decided to use an inexpensive meter to identify the null visually rather than audibly. If a multi-meter is available, M1 could be replaced by output sockets to suit the meter leads, the appropriate dc voltage or current ranges selected to suit the capacitors under test.

Some published circuits have suggested that it should be possible to measure capacitors of much higher value than mentioned here. In fact, the null or dip obtained becomes rather broad, making it difficult to obtain reasonably accurate measurements at higher values.

## The circuit

An NE555 IC is used in the astable mode to act as an audio oscillator, with a variable frequency controlled by VR1. This control has a dual purpose, providing various frequencies suitable for the capacitor under test, and acting as a meter sensitivity control.

The signal is fed via C2 to the low impedance side of an audio transformer, T1, the secondary of which provides an output across VR2. If an unknown capacitor is placed in circuit as shown, in conjunction with a capacitor of known value, a bridge circuit is formed with its output rectified to dc by D1, and indicated by a 50µA meter, M1.

If the known and unknown capacitors have identical values, the bridge is balanced when the slider of VR2 is at mid-range. There is no signal to be

rectified by D1 and the needle of the meter dips to zero. If the unknown is larger or smaller than the known capacitor, VR2 needs to be re-aligned to find the new point of balance. The pointer on the control knob of VR2 is used to read off the various ratios indicated when the meter dips.

To conserve battery life, a non-locking switch is provided so that current is drawn for only a few seconds whilst a capacitor is being checked.

## Construction

The components are mounted on a standard size stripboard as shown. The breaks in the copper strip should be made by a spot-cutter or a hand-held 1/4in twist drill. The press terminals, used for holding the capacitors under test, are mounted at the end of the board and connected to the circuit by tags soldered to the strips as indicated. The leads to VR2 should be of the same length to preserve the balance of the bridge. If the transformer used has a centre tap this is ignored.

A simple case of wood and hardboard can be made to suit the constructor's requirements. In the prototype shown, the circuit board is held in place entirely by the fixing screws of the press terminals.

## Calibration

Close tolerance capacitors (preferably 1%) should be used to calibrate the front panel. The actual range is unimportant, since it is the ratio of one to another which is to be noted. For example, 2 × 1000pF put in circuit will give a central reading to be calibrated '1'. Leaving one of these as the known capacitor, a 10nF will indicate a point to be marked '10', and a 100pF will indicate '1'. Other points on the scale can be similarly marked using other values, and the same ratios will then apply to any capacitors measured within the range of the instrument.

## Use

It is preferable to keep a few close tolerance capacitors available, to use as known capacitors. The leads of smaller components will tend to bend, and eventually break after being used a few times, and it is helpful to mount them in holders with more substantial leads. A suggested method is illustrated. Suit-

able values to keep on hand are 10pF, 100pF, 1000pF and 10,000pF (10nF).

Before checking any capacitor, VR1 should be turned to minimum (anti-clockwise) to avoid overloading the meter, and subsequently adjusted to give a full-scale reading when VR2 is set to an anti-null. When checking very small capacitors the meter will not register full-scale at maximum sensitivity, but will still provide a dip.

The leads of all capacitors under test should be cleaned to ensure good electrical contact with the terminals. In the final measurement of any capacitor there should be as little difference as possible between the values of the known and the unknown. As an example, there will be a more accurate measurement of an 'unknown' 150pF capacitor against a 100pF 'known' than against a 1000pF component.

As many capacitors have 20% tolerance or more, it will be quite common for those tested to give off-scale readings. In most cases, unless high accuracy is specified the value can be taken as the nearest calibrated point on the scale.

## COMPONENTS

### Resistors

R1 330 ohms  
R2 2.2K  
Both 1/4 watt carbon 5%

### Capacitors

C1 0.1µF polycarbonate  
C2 0.47µF polycarbonate

### Semiconductor

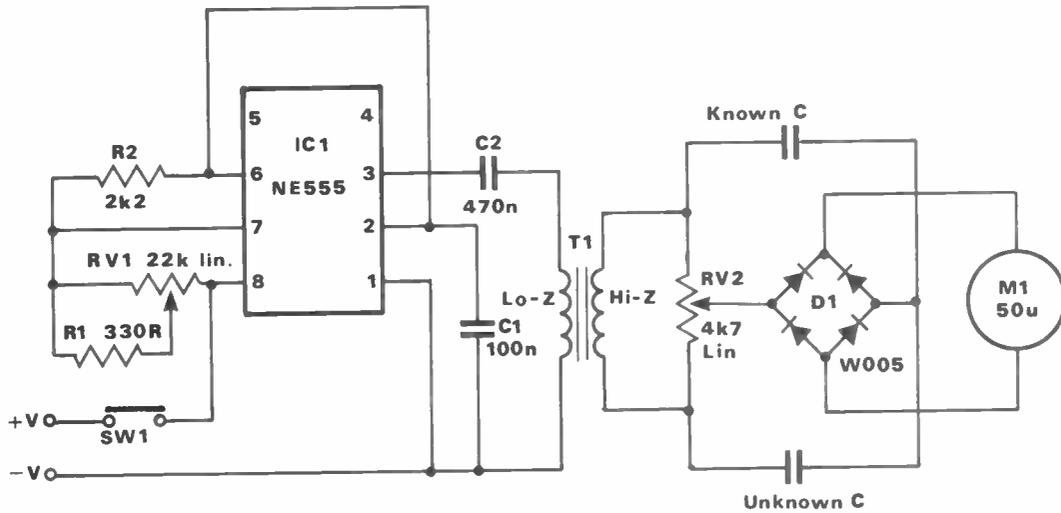
IC1 NE555 timer

### Miscellaneous

T1 Transformer LT700 or LT800  
VR1 22K lin potentiometer  
VR2 4.7K lin potentiometer  
S1 Push-to-make, non-locking  
D1 Bridge rectifier W005  
M1 50µA, Quick-fit (Maplin)

Stripboard, 0.1in matrix, 24 strips × 37 holes; 8 pin DIL holder; press terminals, red (2), black (2); control knobs (2); battery, PP3; battery connector; close-tolerance 'known' capacitors (see text); connecting wire; case to constructor's choice (see text)

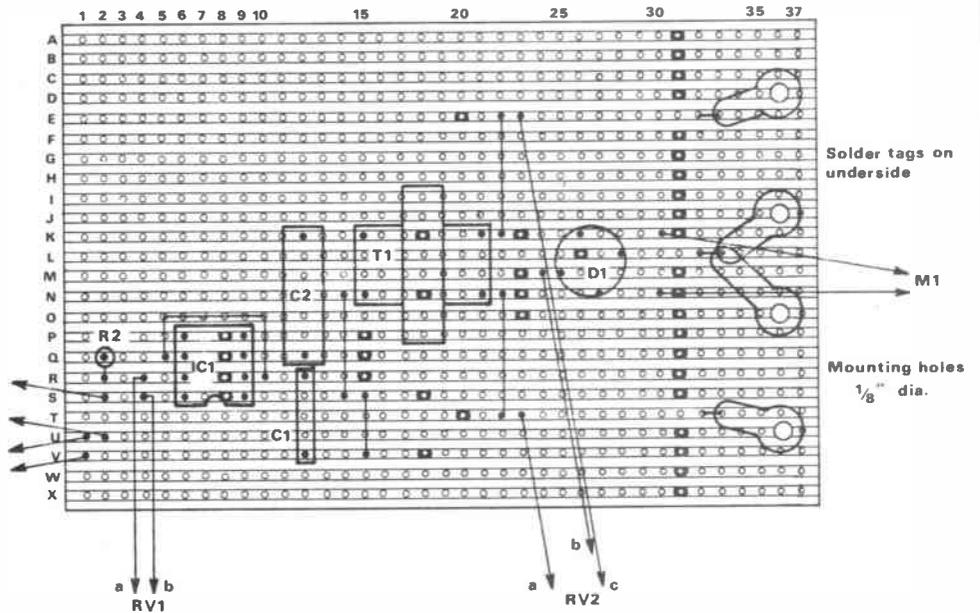
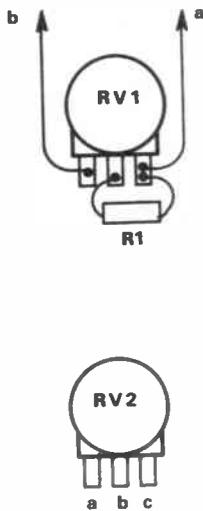
# CAPACITANCE DIP METER



**Above:** Capacitance dip meter circuit diagram.

**Below:** Connections to potentiometers shown from rear

Capacitance dip meter stripboard showing component side and under side



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AR 12 BLOCK CAPS PLEASE

At the beginning of the year, my wife and I started planning a visit to the US during which we would be spending the majority of our stay with W0QM, Dick Grubb, in Boulder, Colorado. One of the most important aspects of the trip concerned the procurement of a temporary US amateur radio licence, which was comparatively simple.

#### Obtaining the US licence

If you write to the American Amateur Radio Relay League, 225 Main Street, Newington, Connecticut 06111, stating that you wish to obtain a temporary US licence, they will send you back an application form, supplied by the FCC, No 610A, which details everything that you have to do.

You will have to fill in answers to various questions, including the dates you wish to cover, and you will need to send a copy of your UK amateur radio licence, which must be a current one but which may be a photostat. You will then have to send the filled in form and licence to the FCC in Gettysburg. You should obtain your licence within two months of sending in your form. In my case, I stipulated W0QM's QTH as my US address and the licence actually arrived in about a month.

#### Operation on 2m

I had to choose a handy-talky which would be as small as possible, as well as being effective and simple to interface with additional batteries and external

# A VISIT TO

Angus McKenzie G3OSS writes on

antennas. I chose the Trio TH21E, and extended its coverage up to 148MHz by clipping out diode D6. I reviewed this model in the January '85 issue and found it an excellent little rig.

As well as taking the mini helical antenna, I also took a telescopic  $\frac{5}{8}$  whip from Waters & Stanton, which gave quite an appreciable gain and which I highly recommend, the special but rather expensive Trio BNC/screw phono adaptor being virtually essential here. I also took an external large battery pack and a spare nicad battery, and to keep the weight down we made an auto transformer out of a 6W mains transformer to feed the trickle charger by using just the primary for 110/240V. I purchased a  $\frac{5}{8}$  gutter mount antenna from an amateur radio shop in Denver, and clipped this onto the various cars which we used.

In the US, most of the repeaters have outputs in the band 146.6-147.4MHz, although there are many repeaters just above 145MHz. They have a rather strange offset situation, for repeaters with outputs below 147MHz require a downshift on Tx of 600kHz, whereas above 147MHz they require an upshift of the same amount. In the case of the TH21E, this means that you have to select reverse repeater if you are above 147MHz, and then dial the input rather than the output frequency. The repeater spacings are normally 30kHz, but there are a few tucked in between channels at 15kHz spacing, which requires you to switch in the 5kHz up button.

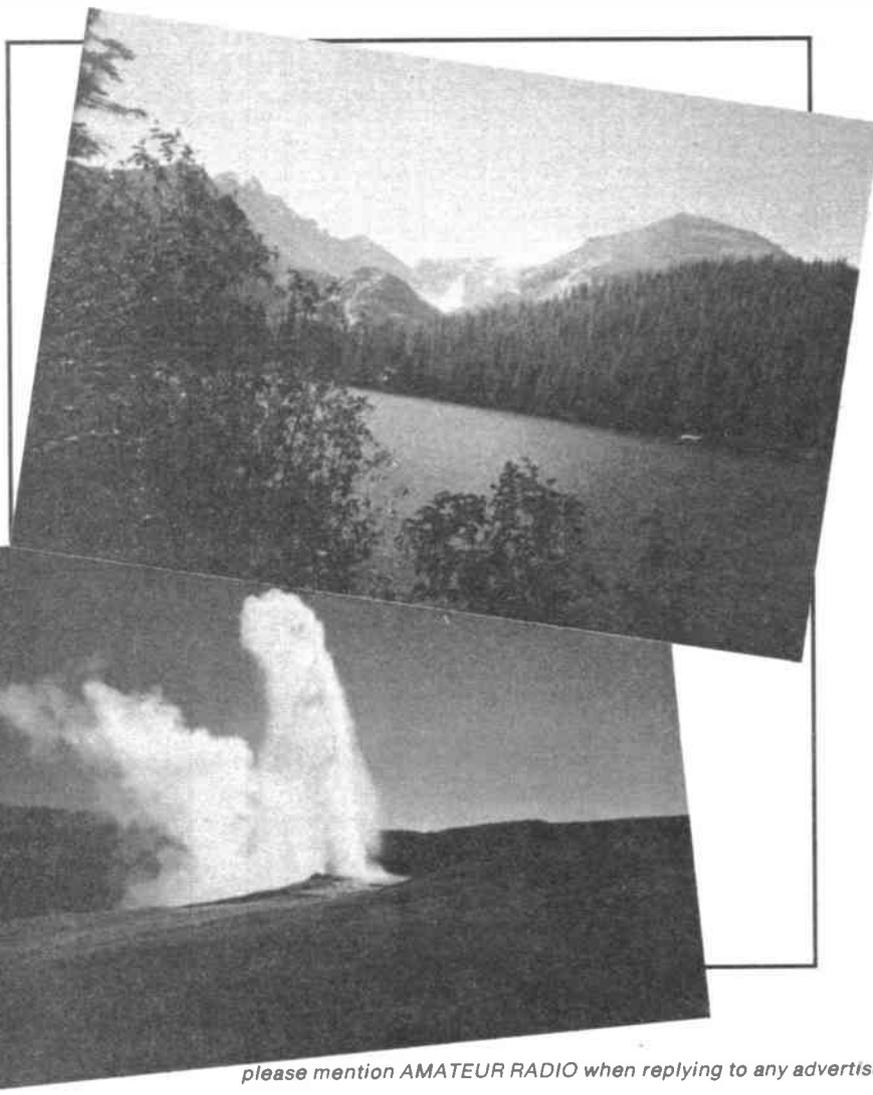
In Colorado, I used the callsign G3OSS/mobile W0, or portable W0 as appropriate, but when in Arizona and Wyoming I of course changed the suffix to W7. Despite the little Trio rig having a limited power of no more than 2W or so, I found most surprisingly that I could not only access several repeaters from inside a house on the ground floor using just the helical, but when out of doors with the  $\frac{5}{8}$  whip, or when mobile, I found myself accessing and using repeaters that were 100 miles away! At first I found this baffling as it seemed to defy the laws of physics, but it was pointed out to me that many of the repeaters in Colorado and Wyoming were 10,000ft or higher above sea level.

#### The mile high state

Colorado is known affectionately as the 'mile high state', and it is difficult to find a location below 5,500ft asl. Thus, repeaters tended to be up to 5,000ft above many of the band users. Not only did I find 2W quite sufficient, but in many cases, even with repeaters 30 miles away, I dropped power to 350mW to preserve battery life.

The rig gave me a useful indication of when the batteries were just about exhausted for Tx, which I had not noticed before. The squelch control ceases to work at about the time that modulation is disappearing rapidly on Tx and the power output is beginning to collapse.

I was not really surprised to find that there was a total absence of jamming or misuse of any of the repeaters heard in the three states. Everybody used their callsigns properly, and overs tended to be much shorter than in the UK, amateurs going to and fro sometimes every ten seconds. Usually, a break of 1 second or so was strictly adhered to,



# THE USA

his visit to the States last September

and many of the repeaters had both a 'T' and a time-out which was sometimes as short as 45 seconds.

Everybody was extremely helpful to us, particularly when we got lost in the Rockies, and nobody ever seemed to mind if I briefly broke into a QSO, indeed I always received a most sincere welcome. Many amateurs had their own private repeaters, but never seemed to mind if you called in on them.

## 'Old junk'

One such amateur was K00J, with the wonderful name 'Old Junk'. He lives fairly close to Boulder and he seemed to monitor both his and the main Boulder repeater (146.76MHz) nearly all the time and was always ready to give me a hand.

One repeater well south from Boulder, on 146.94MHz, is often used for coping with emergencies in the southern end of the Rockies, and I heard such an event when one climber with a rig well up a mountain was slightly injured. Amateurs soon called in a rescue party, who were also equipped with rigs, and they were able to find him remarkably quickly.

Many of the repeaters are equipped to run as much as 100W ERP, and consequently their signals are very strong indeed, even at a great distance. It is not unusual for mobiles running high power on FM to access the repeaters from 150 or even 200 miles. Many of the repeaters are fitted with an auto phone patch facility which I heard work very well indeed. These require you to have a tone pad on the rig, and you also have to know the repeater's entry number.

Local calls are free in the States, and the patches are normally only designed to be capable of making local calls. Many of them are also designed to cut the phone connection after about a minute, which thus encourages you to make only short calls.

Although I was not particularly active in Arizona, as there were so many wonderful places to visit, I did switch on the Trio in our motel bedroom in Flagstaff and soon found a repeater and had a QSO with someone living on the outskirts of the town. He told me that there were two other repeaters and I accessed both of them, having more pleasant QSOs, one amateur giving us much information about the state. Bearing in mind that Flagstaff is only a fairly large town, I was quite surprised that there was so much activity.

When we were motoring through

Wyoming, we found that we could access one repeater or another around 65% of the time, even including when we were in a valley surrounded by the Rockies. At one time we were just south of Jenny Lake, west of Signal Mountain, and I had a short but delightful QSO with a commercial airline pilot who was holding up his hand-held to the front window of his cockpit! He was just as surprised to make a QSO with a G prefix as I was to work an aircraft!

I had one QSO with another mobile who was on the other side of the Rockies driving down to Salt Lake City in Utah, whilst we were driving south-east near Jackson. We were still in contact with one another with about 200 miles between us.

One thing did strike me about the amateurs in the mid west; there were

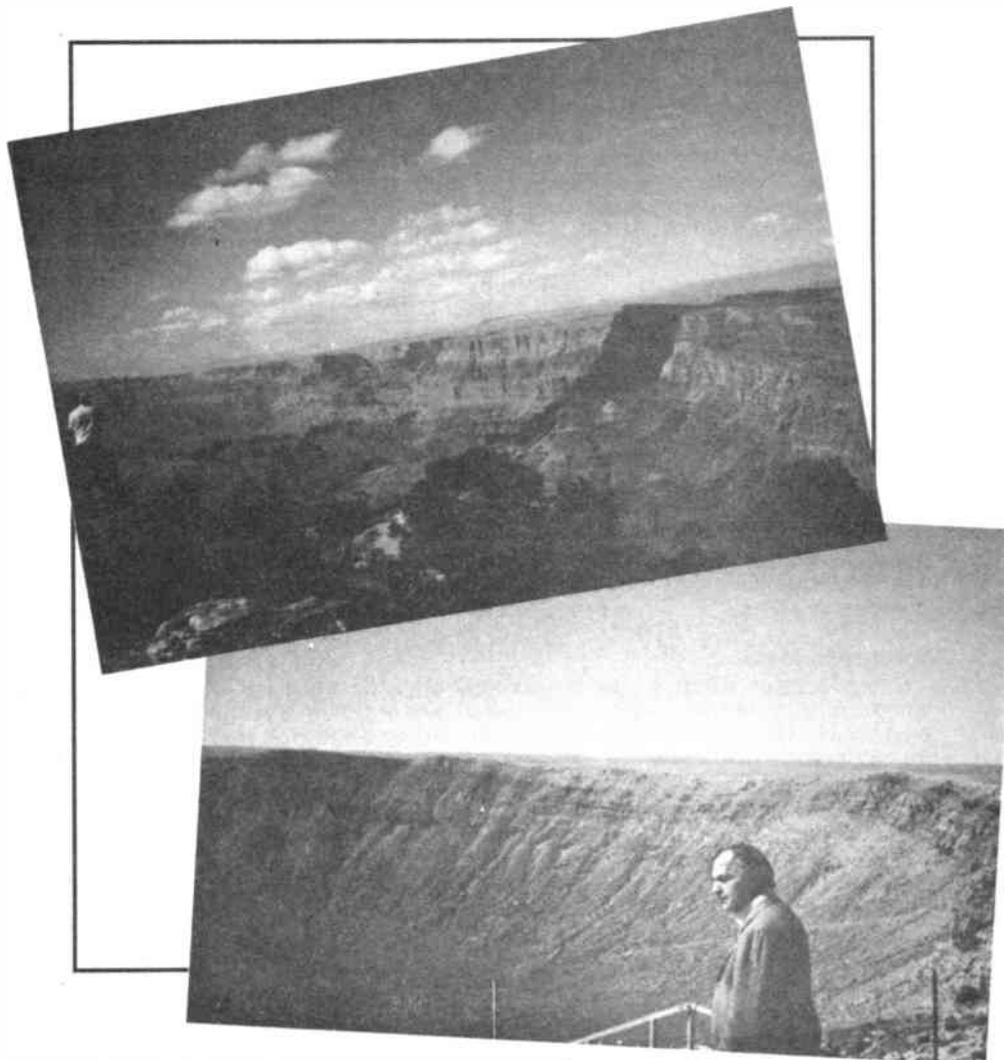
very few of them indeed who were less than around 30 years old, and I brought up this matter with many of the amateurs that I met at the Estes Park Microwave Convention, around 40 miles north-west of Boulder.

About 75 microwave enthusiasts, many with their wives or YLs, had collected together for the conference at the Holiday Inn. The organiser was Don Hilliard W0PW, a friend of Dick's in Boulder, and the event turned out to be one of the most interesting ones I have attended.

Lectures were given on transponder intermodulation (in which the IM performance of Oscar satellites was discussed in great detail), getting started on 23/13cm (given by Joe Reiser W1JR, of *Ham Radio*), monolithic ICs for microwave use up to 3.4GHz (including a free sample of one giving 0.7W output on 3.4GHz), clean local oscillators, 13/23cm in the new Amsat phase 3 programme by Bill McCaa K0RZ, the care and feeding of dish antennas, designing loop Yagis for microwave, and one that I gave on 23/13cm activity in the UK.

## Experimenters

I was somewhat surprised by the reaction of the US amateurs when I stated that system RF intercept point was most important in the UK, as sometimes there were so many stations on that severe QRM could result, especially in a tropospheric duct opening. Many told me that almost all the US microwave



## A VISIT TO THE US

activity was between experimenters working from one hilltop to another, or across a city with only a handful of amateurs equipped for the band, or alternatively EME operation.

I have to admit that I was very jealous of some incredible installations described to me, typified by 3m dishes and even larger ones coupled to computer driven motors and extremely high powered water cooled PAs with massive thick coaxial cables.

I did, however, surprise them a little when I played the piece of cassette tape kindly loaned to me by Charles Suckling G3WDG of a QSO between PA0SSB and SK2QJ, the latter station using around a 30m professional radio astronomy dish. SK2QJ gave Jan a report of 5/7 on SSB, which must have been one of the most stunning EME reports ever!

### Water cooled linears

I was most impressed with an exhibition of microwave equipment that was on show, many of the linear amplifiers being water cooled and home-made. VE3CRU, Hans Peters, is the representative in Toronto for many European manufacturers, including SSB Products and EME, and he was showing some superb water cooling adaptors at only 10 dollars each which screw on the top of a 2C39 valve in place of the air cooling heatsink. He explained to me that microwave was also far less popular in Canada than in the UK, and everyone in fact was quite envious of our activity.

Many of those present were also active 6m enthusiasts, and quite a few had worked UK amateurs, either direct or crossband, including G3COJ, G4DGU and G5KW. Everyone looked forward to working more Gs once we all have the band.

On a Sunday morning W0QM took me to the local Boulder Amateur Radio Club flea market, and I expected perhaps the equivalent of a school class-room full of junk with around 20 amateurs present. I was very surprised to find the entire ground floor of a huge building taken up by around 500 amateurs, and table after table of everything that you can imagine being sold, both new and secondhand. W0QM had been so enthusiastic about my little Trio rig that he bought the American equivalent, the TH21AT, which has a tone pad on the front and  $\pm$  repeater shifts.

### Brought to tears

I nearly wept when I saw so much wonderful gear selling at very low prices, but I realised that I could not bring it back home because of the weight problem. I saw, in perfect condition, a Yaesu FT101E for 200 dollars, a Drake R4C/T4C combination for 400 dollars, a mint Collins 32S1/75S3 set-up for 400 dollars and, the Granny of them all, a pre-war HRO with all its coil packs, power supply and instruction book in beautiful working order and condition, for only 100 dollars.

It strikes me that UK amateurs might well consider a trip to the States to visit a

ham convention, just to buy up a second-hand rig and have a holiday at the same time! There were also many pre-war microphones and other old accessories. W0QM picked up a wartime Westrex broadcasting mixer with 4 channels, meter and faders for only 2 dollars! I gave in by paying 5 dollars for a superb N-type double coaxial relay switch, which can switch a linear into an antenna feed with 12V dc operation.

At this flea market I was yet again surprised by the absence of younger amateurs, and the US amateurs are now becoming very concerned about the lack of interest in the hobby from younger folk. I am slightly concerned that we are beginning to see the same tendency in the UK, so we must all try and interest teenagers in the hobby.

Dick has been keeping a sked with me on Sunday afternoons, usually on 20m, for the last 18 years or so, and it has always been a pleasure to use his station with my callsign when I visit him. He has a Drake TR3 and massive linear, which puts out up to 1.5kW into his TA36 beam on a tower in his 'back yard'.

I was delighted to work G4DWZ, Peter, who was using my own equipment in my Finchley home, so I could hear just how punchy my Trio TS940S is.

### A difficult path

Colorado to London is normally a difficult path as it passes through the auroral zone over the North magnetic pole, but on this occasion we both managed quite well on SSB. When you visit US amateurs you will always find them very willing to let you use their rigs, with their callsign if necessary under supervision, for this is allowed by the FCC. It was rather thrilling to be using 1.5kW, and I can quite understand the US amateurs' love of using enormous power when they are on the DX bands!

What was fascinating was to hear the American 75m band from a shack in the Rockies in north-west Colorado. Joe KB5EJ is one of the stations reporting rainfall and wind velocity to a central station in the US in order to assist with all the weather forecasts. In tuning across the 75m band I was stunned by the absence of all the QRM that we hear in Europe, and the number of stations using the band, both day and evening, for nattering.

Joe has kept his old Collins KWM2 in mint condition, for he used to work for Collins before he retired, and the receiver seemed just as good, if not better, than anything available today, despite being 20 years old. He also had a 2m rig permanently monitoring the local repeater very quietly, which is normal practice even in many HF operator shacks. He is always there to help in giving directions to tourists such as us, but we did have a problem some minutes after leaving him in our rented Toyota microprocessor controlled car!

We were driving at a modest speed along the highway and, just as we turned a bend on the mountain road, Dick, who

was driving on this occasion, saw a cow in the middle of the road which we were totally unable to miss. There was an ominous bang followed by almost total destruction of the right wing mirror. Consequently we had to write 'hit a cow' and 'cow walked away with a slightly sore head' when we filled in the insurance form! The rental car company were perhaps slightly surprised and amused when they saw Dick's drawing of the scene of the accident, but there was one good thing – the gutter mount antenna was undamaged.

### Unusual G

A G station in the mid west is rare enough, but one occurrence on a previous visit in 1979 was quite unusual. Dick, his family, my wife and I were in a camper and I was using the 2m mobile rig when we were around 50 miles from Durango in the extreme south west of Colorado. We were pleasantly surprised to receive an invitation to visit the chairman of the local club, and after we had dined we were chatting away in his lounge when I heard his 2m rig open up, and another G call through the Durango repeater. I ran to his rig, grabbed the mic and gave my callsign. The mobile G was on the Interstate, travelling to the Grand Canyon in Arizona, and apparently nearly drove off the road with surprise, for he had worked me in London only two months earlier.

The Durango station said that it is rare enough to hear one G in a year, but to hear two in 5 minutes was ridiculous! It is such friendliness offered by so many US amateurs, combined with almost non-stop invitations to visit them, that typifies their attitude to life and to the hobby. So if you do plan a visit to the States, it is worthwhile obtaining a US ticket and you will find that your family will get almost as much out of the visits as you do.

### No aggro

There is no charge for the licence, almost no aggro getting it, and never once was I asked if it was CB! Amateur radio as a hobby in the States has a very high reputation and awareness factor, and so the public reaction was always most favourable.

When I was at Lowell Astronomy Observatory near Flagstaff, Arizona, I was wearing my RSGB badge. This produced an instant friendly reaction from Rick Oliver KC9GQ, who is the senior electronics engineer at the observatory. We chatted about astronomy and amateur radio for about an hour at lunch-time, and after an interesting lecture given by one of the astronomers we were then privileged to be able to attend a cheese and wine party, followed by an informal meeting with 5 shuttle astronauts who were giving a talk on an earlier shuttle mission and a future mission involving some astronomical research. If I had not been wearing my RSGB badge Fiona and I might only have been attending a single one hour lecture!

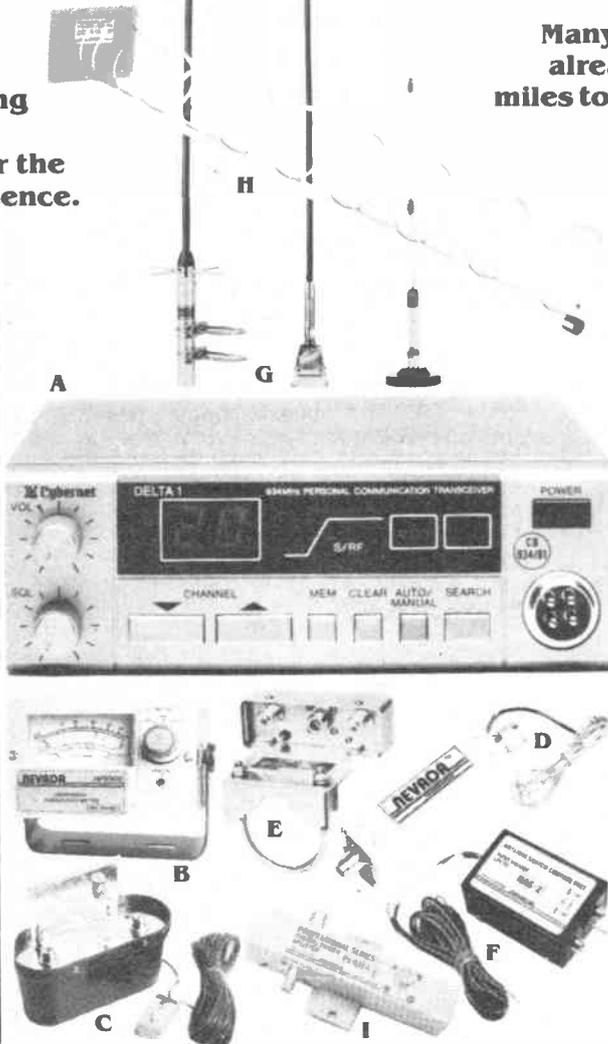
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Many of you will have just recovered from fighting your way through the RAE only to be faced with another battle – the Morse test. Stan Crabtree G3OXC offers a few combat techniques for

# MASTERING MORSE

Certain sources these days submit that the passing of the Morse test should not be obligatory before sallying forth on the amateur airways. Their point is that Morse is an unnecessary hurdle and will probably be forgotten the instant the newly licensed operator gets his hand on a microphone.

## Compulsive ritual

The other camp insist that it is part of the training experience which is the reason for the granting of the licence in the first place. They exhort the merits of Morse and quite possibly fail to see why the new generation of enthusiasts should be spared the ritual they had to undergo. I make no plea for either side. Each has a point. My point is that as legislation stands it is necessary to pass the Morse test and I hope to suggest an approach that may make the task easier.

The first requirement for tackling the

Morse code is a companion. To attempt to learn and master the code on your own, even with the necessary equipment, is a formidable task. If you recruit at least one fellow enthusiast the job ahead takes on a new light. Apart from the competitive spirit you will move forward at a comparable rate, certainly in the early stages. Your combined aim will be to progress as quickly as possible and it is suggested you draw up a schedule of meetings. These should be as close as your business and social commitments will allow. Your initial impetus should be maintained as long as possible; certainly until you have half the code memorised.

With a minimum of two persons, one will send for a few minutes and then take up the pencil to copy the other's efforts. After a few sessions you may feel like tuning through the amateur bands, and this again can be done in company. This does not mean you should not spend time listening on your own. All practice is useful but working alongside a similar minded colleague can make the whole operation more enjoyable.

## Equipment

The minimum requirement is of course for a key, buzzer and battery. During the early days a buzzer will be adequate in helping you to formulate the Morse characters. However, serious minded students would do well to acquire or build an audio oscillator. This need not be expensive. One suitable circuit utilises a Signetics NE555 timer IC and is

shown in the opening pages of some ARRL radio amateur handbooks (see *Figure 1*). It incorporates a tone control which enables the user to alter the pitch of the note if required. The components can be assembled on a small piece of Veroboard and mounted inside the speaker cabinet, which may be wood or metal.

## Parallel key sockets

It could be worthwhile wiring in two key sockets in parallel as this will serve to accept two Morse keys which could be used to simulate operational working when you are at a more advanced stage of learning.

The Morse key need not necessarily be expensive. If you do wish to continue working in Morse once your ticket has been obtained you will inevitably move on to either the semi-automatic (bug) or a fully electronic keyer complete with paddle. The hand key will probably work its way to the bottom of the junk box only to be rescued for the SKE (straight key evening).

The key must be rigid – some of the more expensive ones are balanced and can be used on their own base, but the cheaper type may well need screwing to a flat piece of wood and this may need fixing to the table top with a 'G' clamp. Do not rely on your other hand to hold the key steady.

## Getting started

You've got the gear. You've got a friend. You're ready to go!

On a piece of notepaper (of which you're going to need reams) write down the first 6 characters of the alphabet with the equivalent Morse symbols alongside (see *Table 1*). Six is sufficient at this stage because you need to give yourself a bit of confidence.

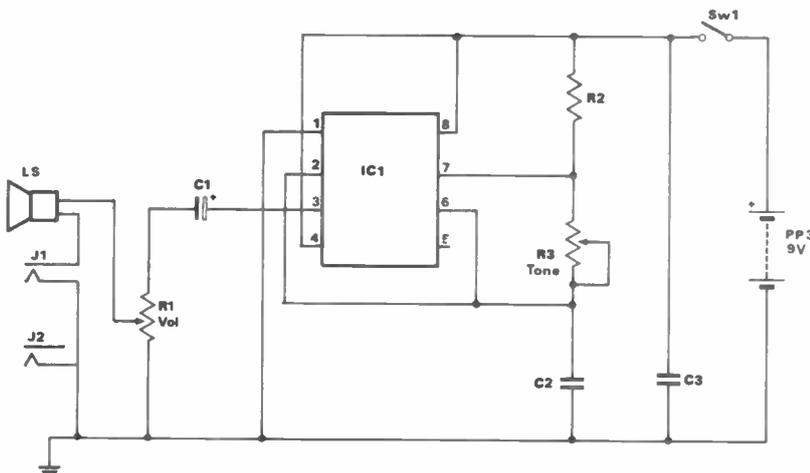
Study them for a moment. When you look at the Morse symbol for A you should start now to think of it as 'di dah' – not dot dash.

You're going to recognise the sound or rhythm of the letter in the future and nothing else. A period of forming the Morse sounds of the letters you read is a very useful way of consolidating the characters you have learnt the night before.

Holding the key is the next process. The textbooks will tell you to hold the knob of the key with the thumb and two fingers and use a wrist movement to

Components list	
R1	10kΩ log
R2	2kΩ
R3	100kΩ lin
C1	25mF/25V electrolytic
C2	.02mF
C3	.1mF disc ceramic
S1	Miniature single pole switch
J1, J2	Phone jacks for key plugs
LS	Loudspeaker – any impedance
U1	Signetics NE555 timer IC

**Fig 1** A suggested circuit for an audio oscillator suitable for Morse code practice. It may be advisable to substitute a small 9V power supply in place of the battery



# MASTERING MORSE

obtain the formation of a character. I do not dispute this, but would suggest a less stringent approach. The key should be gripped in a way that is *most comfortable to you*. It is really too early to develop a stance at this stage. However, when you've learnt a few letters you will be able to decide which position you feel most at home with. There is no need to rigidly force yourself to grip the knob as the textbooks decree. I've known first class operators produce beautiful Morse with just two fingers resting on the top of the knob.

The adjustment of the key will contribute to the way you hold it. Initially it can be useful to have a relatively wide gap between the contacts and this will usually be associated with a fairly high pressure on the spring keeping the contacts apart. When you have spent a few sessions in practice and feel more familiar you will probably consider reducing the gap and the pressure. The choice is yours. Do not persist with an uncomfortable adjustment. It should be possible to set up even the cheapest Morse key to meet your individual requirements.

## 'Di dah'

With the circuit switched on, key the first letter 'A' di dah. The key should be pressed momentarily for the dot and then again, longer for the dash. In theory the dash should be three times longer than the dot. Don't rush the characters leaving long spaces between them. Key them slowly. At this stage you are concentrating on forming the characters and not speed. Always ensure that your dashes are long enough – to skimp on the length of a dash in order to increase your speed at whatever stage you've reached is futile. Your dashes must be sufficiently long so that there is no chance of them being confused with a dot.

This may sound obvious but it is surprising how many operators sacrifice formation for speed. One character to be aware of is 'C': it is far better for the first dash of this formation to be even longer than normal than to risk the chance of it being mistakenly copied as an 'F'. At the back of your mind must remain the fact that you will eventually be keying a message to someone who is actually copying it!

Familiarise yourself with the first six characters and then hand over to your companion and copy his rendering. When you feel more confident you can make the process more interesting by forming words:

CAB, ACE, BAD, FAB, FACE, DEAF, BEEF, FEED, BADE, FADE, CAFE.

If you can master the above in the first session of study you're on the way!

## Take more on board

You are now ready to increase your vocabulary. Write down: G, H, I, J, K, L and also T with the Morse equivalent alongside. The introduction of 'T' will enable you to recognise 'THE' and the third vowel will provide the facility of being

## MORSE ALPHABET

A . _ _	J . _ _ _ _	S . . .
B _ . . .	K _ . _ _	T _
C _ . . . .	L . . . .	U . . _
D _ . .	M _ _ _	V . . . _
E .	N _ .	W _ . _ _
F . . . .	O _ _ _ _	X _ . . . .
G _ . . .	P . . . .	Y _ . . . .
H . . . .	Q _ . . . .	Z _ . . . .
I . .	R . . _	

Table 1

able to send short sentences. However, until you're able to recognise the character fairly quickly you should concentrate on random arrangements, preferably in 5 letter groups.

You will soon realise the advantage of a companion to share your commitment. When you start to measure your attempts in the form of words per minute (5 characters count as one word) you will find that, inevitably, you will always be able to send faster than you can receive. This will continue right up to the upper 20s when you will suddenly find you can copy virtually anything that is correctly sent but your sending will be restricted to your natural limit.

This works well in company because, assuming two people have reasonably similar standards of progression, one will send just a little faster than the other is able to receive. This is good as it is in attempting to copy Morse at a higher speed that will enable you to progress at all.

## Capital

You should start by recording the characters in capital letters – even the plain language. Occasionally, when you cannot recall a character you will be tempted to write down the dot dash equivalent of what you think you heard. This habit will disappear by itself once you have memorised a few letters. If you find you can't remember a character that is sent try to train yourself to ignore it and pass on to the next one coming up. Although you are thinking in seconds you must develop the art of knowing when you've missed a letter and not waste too long on it to the detriment of the copy that is continuing.

At this stage in the proceedings you should not attempt to even look at an electronic key, let alone handle it. If you have been optimistic enough to have bought one for the future keep it out of the way. You cannot use this in the official Morse test and in any case you *must* have a thoroughly established background on a hand key before you can even hope to feel your way around an electronic one – even at slow speeds. Like many other trades and professions you must serve your apprenticeship.

When the first 13 letters have been memorised the characters M N O P Q R S

## MORSE NUMERALS

1 . _ _ _ _	6 _ . . . .
2 . . _ _ _	7 _ _ . . .
3 . . . _ _	8 _ _ . . .
4 . . . . _	9 _ _ . . . .
5 . . . . .	0 _ _ _ _ _

Table 2

and finally U V W X Y Z should be introduced in two separate sequences. The earlier characters should be continually interspersed with these newer ones to ensure that you keep up your overall knowledge. You will now be at a very vulnerable stage of the learning process. Your enthusiasm may have waned and the difficulty of mastering the final letters of the alphabet may possibly appear too much to handle.

Now is the time to spend more time on the amateur bands, both in a group and on your own. Callsigns should be the target. Callsigns can of course consist of a mixture of any alpha and numerical character and this is what you need – a consistent barrage of random signals. Tune in to a station calling 'CQ', wait for the 'de' and then copy the callsign. This will be sent at least three times. Your aim is to copy it before the transmission ends.

## Morse by numbers

At this time you should have by your side the numerals 1 to 0 with the Morse symbols alongside (see Table 2). Refer to this often and you will soon find yourself recognising the figures fairly quickly. To consolidate your retention of numerals spend a session on the key sending random numbers in 5 figure groups and ending up with some of the callsigns you have previously written down.

With a little sustained effort during this difficult period you can master once and for all the complete alphabet and numbers 1 to 0. Up to now you have been concentrating on forming and memorising the characters. Now is the time to check up on speed.

Have some timepiece that indicates the time in seconds conveniently at hand. Select a piece of plain language and taking care with the formation of the characters send for one minute. After the

# MASTERING MORSE

minute is up do your calculations using 5 letters to a word and ignoring spaces. With any luck your speed should be approaching 8 words per minute. If it isn't, it indicates that you are taking too long to think up the formation of certain letters and you should concentrate on this until they are clear in your mind. Continue with the sending, gradually quickening the rate but not at the expense of correct formation.

## Confident?

Once you are really confident in the sending of all the Morse characters you are ready to build up your receiving speed. You may have purchased records or cassettes with set programmes designed to help you in this. However, remember also that the HF bands contain a wealth of original Morse signals all available and waiting to be extracted via your communication receiver! The lower section of the amateur bands are confined to CW use and Morse signals of varying speeds will be heard on at least two bands at some time of the day or night.

The USA 'novice' section of the 15 metre band stretches from 21m 100kHz to 21m 200kHz and many other countries also use this section for novice transmissions. Slow Morse transmissions are regularly sent by UK hams at scheduled times throughout the day and evening. Using the CW section of the 2m, 80m and

160m bands virtually the whole of the UK is covered by these volunteer operators in various locations. Details of times and actual frequencies are published in *RadCom*.

## Polishing up

To really polish up your receiving capabilities, government press transmissions are thoroughly recommended. One of the easiest to locate is RVW Tass Radio in the USSR. Transmissions can be heard at considerable strength on various frequencies at different times. News and comment in plain language is sent by automatic Morse at speeds in excess of 20wpm. If you can settle yourself down with plenty of paper on hand, copying the output of these stations can be excellent training. By checking over the copy later you will be able to assess your progress. An obviously wrong letter in an otherwise intelligible sentence will indicate any letters you may have failed to master.

Now comes a rule that on the surface is obvious but in practice often difficult to follow. Never guess. Never assume you know the characters coming up when you think you have reached the middle of a word. This needs strict discipline at the outset but ignoring it can be fatal. One way of avoiding this temptation is to 'read behind'. Many experienced operators write down their copy a few characters and often whole words in arrears. At first

this seems risky. If you know the character why not write it down instantly? In practice it will serve you well and assist you when copying signals affected by interference.

Once you attain the sought after speed of 12wpm you must still continue. To take the test at this stage is taking too great a chance. You will probably be nervous and there will be no margin for errors. You should therefore press on and aim for 14-15wpm. If you can effectively send and receive at this speed you will enter the examination with more confidence, knowing you can drop your sending slightly from this rate in order to concentrate more on your character formation.

## Never forgotten

The aim of this article has been to suggest a realistic approach to learning the code. Once learnt and used only occasionally it will never be forgotten. To be an operator in the true sense of the word takes a little longer as you will undoubtedly realise when you finally get on the bands. Apart from the 'Q' code there are other abbreviations and signals that can substantially reduce the time taken to convey information. Even the way a closing 'di di' is sent can infer a certain mood! There is no doubt that CW operators do get a certain satisfaction in practising their art. Why not take the plunge and join the 'chosen few'?

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Take the sting out of learning Morse by trying out this simple

# MORSE CODE GENERATING PROGRAM

by A P Grigg G0BRN

This article is based around a random Morse code generating program for the Amstrad CPC464 and CPC664 computers. It has gone through several revisions, having originated on a Nascom 2. The program can in all probability be improved in several areas, but it works well enough for me. If you want to improve/change it feel free. I used this program and some of the local slow Morse transmissions to learn Morse code and pass the test.

### Not time consuming

The program is fairly short and shouldn't take too long to type in. It generates random Morse code at any speed from 5 to 12 words per minute. The Morse is generated in five letter groups and is selectable to consist of either letters or numbers or both. When the program is run you are asked for a word speed and an internal character speed.

The word speed governs the overall speed of the Morse and is in words per minute (approximate). The internal character speed can either be derived

from the word speed by pressing the RETURN key without entering a number, or the internal character speed can be set. Ideally the internal character speed should be set at about 12wpm and the word speed brought up to 12, but you may prefer to slow the characters down a little to start with. The frequency of the tone produced should be fairly close to 800Hz.

The numbers entered for word and internal speeds are not, unfortunately, in words per minute. But I have approximately calibrated some of the inputs: an input of 4 corresponds to 6 words per minute; 5-7; 6-8; 7-10; 8-12. Other numbers can be tried to give other speeds.

### Always valid

I don't really want to reiterate all that G3OXC has said about learning Morse, but this principal point is always valid. Learn the sound of the letters, don't think of the order of the individual dots and dashes, and don't think of letters in terms of opposites, eg a and n, r and k.

This program will help increase your

copying speed, but it is not enough alone to allow you to pass the dreaded test. The only part of the Morse test which contains random characters is the number section. So when you have a good speed on the random word groups, you must start listening to plain language.

### If at first . . .

At first you will find it difficult because you will try to look back at the sentence or you will try to anticipate words, in your head if not on the paper, which means you will miss a few letters. But after a while you will be able to copy plain language as well as the random groups. Always try and copy at a speed above that which you are comfortable with. If you are not missing letters then it is too slow.

I used this method to learn Morse; this was fairly recent as you can see from the call sign, so I can still remember all the trials and tribulations. I found that learning a little but often was the best way. And finally there is nothing to hone the concentration like the looming approach of a booked test date.

Morse code generating program for the Amstrad CPC464 and CPC664 computers

```

10 REM
20 REM MORSE CODE GENERATING PROGRAM
30 REM
40 REM WRITTEN BY A P GRIGG G0BRN
50 REM
60 CLS
70 CLEAR
80 PRINT "RANDOM MORSE CODE GENERATION"
90 PRINT "....."
100 PRINT
110 PRINT
120 INPUT "Letters, Numbers, or Both (L/N/B)";TYP$
130 PRINT
140 IF TYP$ = "L" OR TYP$ = "I" THEN ST=1 : FI=26
150 IF TYP$ = "N" OR TYP$ = "n" THEN ST=27 : FI=36
160 IF TYP$ = "B" OR TYP$ = "b" THEN ST=1 : FI=36
170 IF TYP$ <> "N" AND TYP$ <> "n" AND TYP$ <> "L" AND
    TYP$ <> "I" AND TYP$ <> "B" AND TYP$ <> "b" THEN
120
180 PRINT
190 INPUT "ENTER WORD SPEED";SP
200 REM
210 PRINT
220 INPUT "ENTER INTERNAL SPEED";IS
225 REM CALCULATE PERIOD BETWEEN LETTERS
230 TIMO=7*(14-SP)
240 IF IS=0 THEN LT = INT (TIMO/7) ELSE LT=(14-IS)
250 PRINT:INPUT "ENTER RANDOMISATION SEED";RDN
260 RANDOMIZE RDN
270 DIM A$(36)
280 DATA "01", "1000", "1010", "100", "0", "0010", "110", "0000",
    "00", "0111", "101", "0100", "11", "10", "111"
290 DATA "0110", "1101", "010", "000", "1", "001", "0001", "011",
    "1001", "1011", "1100"
300 DATA "01111", "00111", "00011", "00001"
310 DATA "00000", "10000", "11000", "11100", "11110", "11111"
330 REM READ THE DATA INTO ARRAY A$
340 FOR Q=1 TO 36
350 READ A$(Q)
360 NEXT Q
370 FIVES = 0 : REM INITIALISE GROUPING COUNT
380 REM GET RANDOM NUMBER
390 R=INT(RND*37)
400 IF R<ST OR R>FI THEN 390 : REM OUT OF LIMIT
410 DON = R
420 GOSUB 480 : REM SOUND MORSE CHARACTER
430 REM WAIT
440 SOUND 1,0,TIMO,0
450 FIVES = FIVES + 1
460 IF FIVES = 5 THEN FIVES = 0 : SOUND 1,0,2*TIMO,0
470 GOTO 390 : REM LOOP BACK FOR NEXT CHARACTER
480 REM SOUND MORSE CHARACTER
490 FOR LQ = 1 TO LEN(A$(DON))
500 IF MID$(A$(DON),LQ,1) = "0" THEN GOSUB 530 ELSE
    GOSUB 570
510 NEXT LQ
515 RETURN
520 REM SOUND DIT
530 SOUND 1,156,LT,7
540 SOUND 1,0,LT,0
550 RETURN
560 REM
570 REM SOUND DAH
580 SOUND 1,156,LT*3,7
590 SOUND 1,0,LT,0
600 RETURN

```

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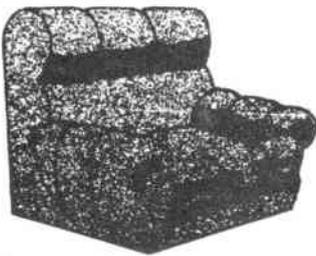
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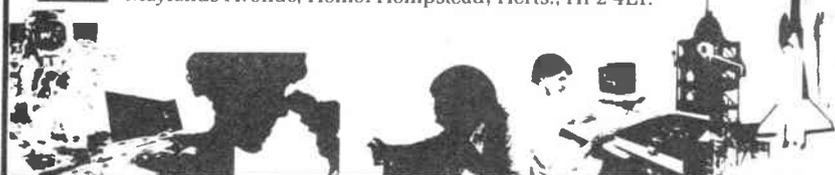
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# LEARNING TO LOVE THE RAE

Val Rogers is coming to terms with being a radio amateur 'widow'



Back in the dim distant past, when life was good, the sun was always shining and I was young and innocent, I had never heard of amateur radio and I thought (if I thought about it at all) that the initials RAE probably stood for the Royal Academy of Enlightenment (of which I soon became a member).

Enlightenment, indeed, came all too soon when my husband suffered his great catastrophe. He was bitten by the amateur radio bug, a hideous monster about 2 metres long, bristling with antennas and cats' whiskers. The effects of the bite seem quite incurable...at least nothing has managed to cure him yet, and it hasn't been for the want of trying, so it looks as if we're stuck with it for life.

## Hamophilia

The disease is called *Hamophilia*, and the symptoms seem to be:

1. A desperate desire to phone his friends for help; the phone bill has rocketed!
2. A never-ending desire to be (as he calls it) 'tested': 'Go on, ask me about propagation (heaven help us, we've got three kids already) or tuned circuits (into pop music now, are we?), or A-B-C class amplifiers (I thought he left school years ago).'
3. A frequent shedding of little whiskery bits, later recovered with cries of 'that's the resistor (or capacitor or transistor) I thought I'd lost'.

Give him his due, he does attend a clinic for treatment one night a week. It's called 'the Tech', and there he meets other sufferers and they share their problems in a group therapy session.

This appears to do him a lot of good, because he begins the evening at home with a worried frown on his face, flipping through his notes, pacing up and down and muttering to himself. As the fatal hour approaches he begins to bite his nails, gnash his teeth and say out loud the passwords they have taught him, such as 'band pass filter' and 'grid dip oscillator'.

To hell with the grid dip oscillator, say I. Down with the fearful band pass filter. How can a normal loving family man be reduced by this Hamophilia to a frantic wretch with no time to notice his children and hardly a goodbye kiss for his loving wife?

However...off he goes at last, and on a

good night if the treatment, whatever it is, has worked he comes home happy and smiling, at peace with all mankind and even speaking to his family again. He refers laughingly to 'a hundred puff' (have they been smoking pot or playing trains?); 'chip capacitors' (he didn't bring any for us. We had to get our own supper); or 'sprogies' (the mind boggles!).

Unfortunately as the days go by the old symptoms surface again. The phone calls resume thick and fast and the worried frown comes back. Why is it he can understand 'parallel tuned circuit' immediately after an evening at the Tech but not later in the week? What can this mysterious new language mean? If I could understand it myself I'd help him, but when he tries to explain to me the difference between 'reactance' and 'inductance' I somehow can't quite grasp the meaning. Neither can he!

Things have been going downhill even faster since somebody sold him a 2m receiver and he was raised to the dignity of SWL. At least I know what that means: short wave listener. I'm coming on, you see!

## Aerial party

It seemed that this new rise in status required some form of celebration, and by judicious eavesdropping on his telephone conversations I got wind of this secret 'aerial party' that he was arranging. I thought that an in-flight celebration was perhaps a bit excessive, but I certainly wasn't going to turn it down. I even bought a new dress!



I haven't worn it yet, though, because when I found out what an aerial party really is I soon came down to earth with a bump...as did one of his friends when he fell off the ladder. The high spot of the party for me!

## Long, lonely nights

I think the evenings are the worst. The first thing he does when he gets home from work is switch on his new pride and joy, and that's the last we hear from him for an hour or two. Then it's head down to study for this awful RAE, with only the occasional demand for another can of beer and some sandwiches, until around eleven o'clock. Then it's time to switch on again, only this time he brings the wretched receiver up to bed with him. Do many of you sit up in bed till 2 o'clock and later talking over the airwaves? What am I asking? I know you do. I have to listen to you. And they say women talk! How these radio amateurs can keep nattering on like this beats me.

Even when he finally summons up the will-power to switch off he can't sleep. We have to go all through the 'go on, ask me' routine again. By the small hours I can't even remember the questions, and neither of us knows the answers.

Of course we do get to sleep eventually, but it seems that almost immediately the alarm goes off. He's developed this amazing technique of switching the alarm off and the radio on in the same movement, and here we go again!

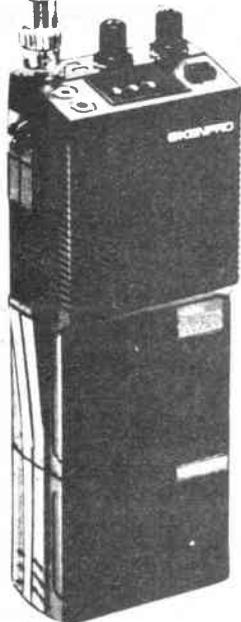
To be honest I'm starting to get the hang of some of this stuff, I can even recognise a circuit diagram when it's thrust under my nose. I admit I can't understand it and it looks rather like a maze with obstacles along the paths. It might be quite an exciting game if I could understand the rules, but he won't let me play.

However, would you believe it? The end may be in sight. I'm told that the all important Radio Amateur's Exam (I do know what it means, now) is coming up in a few months time. Does this mean that he'll be normal again? Will he be licensed instead of certifiable? Will he speak to me in English once more? And most of all... will he pass?

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# SUPPRESSING VEHICLE INTERFERENCE

PART II – by Roger Alban GW3SPA

## Voltage regulators

The modern car can incorporate a number of voltage regulators within the electrical system, besides the one you will find associated with the alternator or dc generator. If the vehicle's instrumentation is to give a stable indication under all operating conditions a voltage regulator must be used to produce a stabilised voltage supply to all the electrically operated instruments, ie fuel gauge, engine temperature gauge, etc.

This simple form of voltage regulator contains relay contacts which jitter open or closed when the supply voltage varies. The resulting interfering noise sounds like a ragged 'hashy' sound in the receiver. The interference can be cured by connecting an LC low pass filter at the feed side to the regulator, as well as to the supply side which feeds the various instruments ( *Figure 1* ). A  $1\mu\text{F}$  capacitor is connected between the terminal marked B and earth, and between the terminal marked I and earth.  $10\mu\text{H}$  chokes are connected close to the regulator in both the supply and feed cables.

## Electrical tachometer

A number of vehicles are fitted with electronic rev meters, which electronically count the electrical pulses generated by the ignition circuit. The cable connecting the meter to the ignition coil can act as an aerial and radiate interference. If you think that you suffer from this type of interference, disconnect the rev counter lead from the ignition coil and see whether the interference level is reduced or ceases to exist.

Having confirmed that the rev counter lead is the cause of the trouble, you will find that you cannot construct an LC low pass filter to cure the problem as this will filter out the pulses required by the tachometer to operate correctly. The only successful way to cure this problem is to remove the existing cable connecting the rev counter to the ignition coil and replace it with screened cable. However, due to the capacitance of the screen, some tachometers will not give an accurate reading.

## The ignition system

On a vehicle propelled by a petrol engine, the major source of electrical interference is the ignition system. For the engine to work it is necessary for the

petrol vapour to be ignited at a predetermined time. This is achieved by causing electricity to jump across an air gap of approximately 0.64mm, causing a spark which will ignite the petrol vapour. The engine designer uses a sparking plug which is connected to a timing device called the distributor, which in turn is connected to a high voltage generator usually in the form of an ignition coil.

To successfully obtain a reliable hot spark to ignite the petrol vapour, it is necessary to develop a voltage of between 10 and 25 thousand volts across the air gap. This is achieved by using an auto transformer, as shown in *Figure 2*. The contact points, at a predetermined time, connect one terminal of the auto transformer to ground. The vehicle supply is fed to a tapped connection only a few coil turns away from the terminal connected to the contact points.

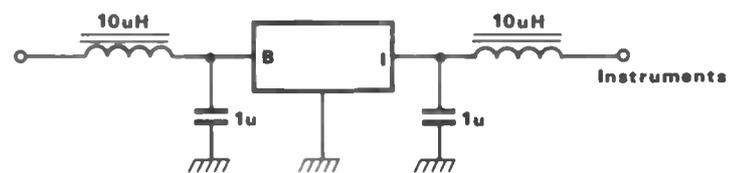
When the contact points close a large current flows in the lower half of the coil containing only a small number of turns. The magnetic flux produced by this high current cuts the larger number of turns contained in the upper part of the coil, producing a voltage which is proportion-

al to the turns ratio between the tapped terminal and the two outer terminals. The high voltage is distributed to each individual spark plug by means of a rotor arm contained within the distributor, which is rotated by the engine to cause the correct plug in conjunction with the contact points to spark at the correct time.

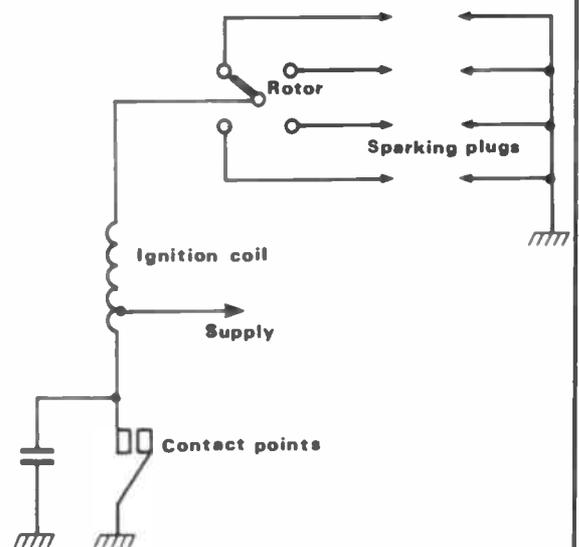
## Natural capacitance

Energy is stored within the large number of turns of the ignition coil which contains a natural capacitance between the turns of approximately  $100\text{pF}$ . Each time a plug and the air gap between the rotor arm and fixed terminal on the top of the distributor sparks, the energy discharges in an oscillatory manner as a result of the resonance of the ignition coil.

The resulting electromagnetic field set up will cause serious interference to radio communication equipment over a wide frequency range. The RF energy is radiated from the high tension circuit and the low tension side of the ignition circuitry. The wires leading to the spark plugs, distributor and ignition coil will



*Fig 1* Suppression circuit for instrument voltage regulators



*Fig 2* Circuit configuration of ignition system

# SUPPRESSING VEHICLE INTERFERENCE

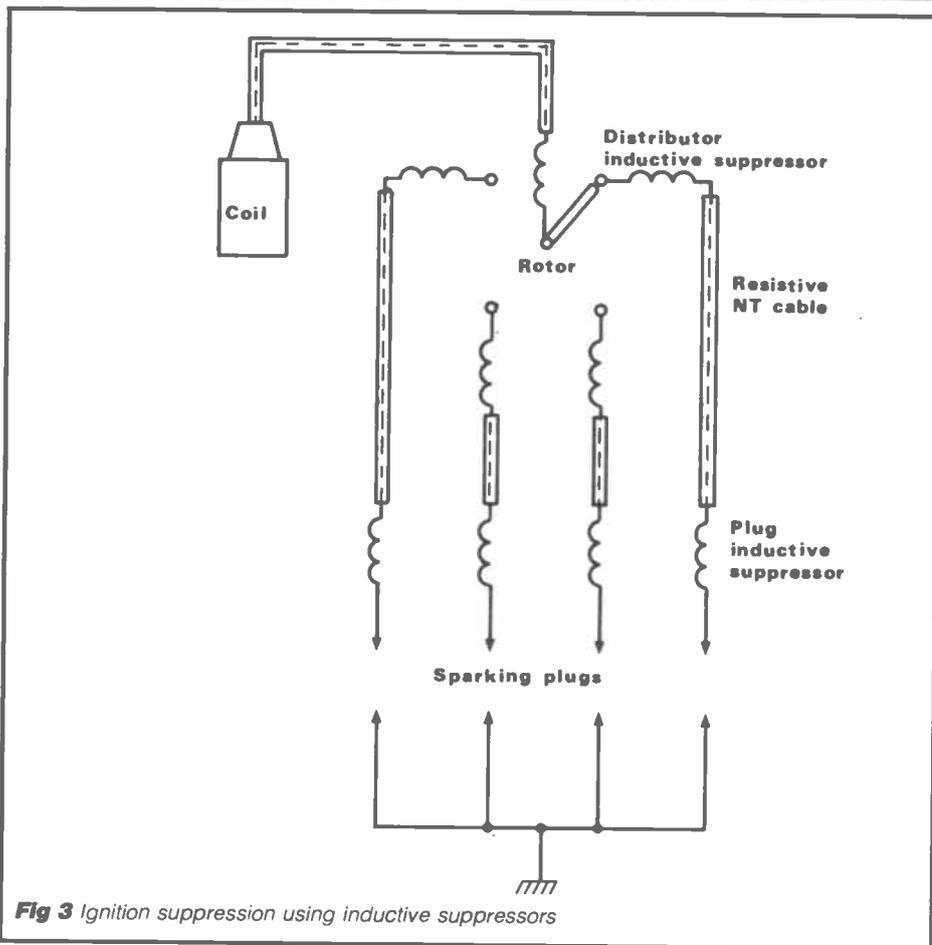


Fig 3 Ignition suppression using inductive suppressors

behave like an aerial. Various methods have been proposed to reduce the interference, but thorough shielding of the whole ignition system is the most effective method of minimising ignition noise. This, however, is impractical and consequently a method seldom used.

## Resistive suppression

For car manufacturers to comply with the EEC regulations concerning the suppression level for motor car ignition systems, carbon high-resistance leads are used in conjunction with resistive plug caps. The high value of resistance dissipates a large amount of the unwanted high frequency element caused by the spark without affecting the performance of the ignition system.

Thus, the larger the value of resistance used, the more effective this method of noise suppression becomes. However, the larger the resistance value the more likely it is to reduce the energy available to create a satisfactory spark, and this in turn will affect the efficiency of the engine and make the vehicle harder to start, especially on a cold morning.

## Inductive suppression

A more effective way of suppressing the ignition system is to use in-line chokes close to the sparking plugs and distributor, as shown in Figure 3. The dc resistance of the choke is only a few ohms, so no loss in spark is encountered under normal operation although the inductive reactance of the choke

increases proportionally with frequency.

Therefore, at the unwanted frequencies the reactance of the choke will be in excess of the normal high resistance value of the existing high tension leads, and will therefore suppress more effectively than just having high resistance in the high tension leads.

To determine whether your installation is suffering from this form of interference, re-connect the aerial and switch on the engine. If a loud ticking noise is heard from the speaker, the frequency of which is proportional to the revs of the engine, then you are suffering from ignition noise.

## Choke suppressors

Fit the in-line choke suppressors to the plugs and distributor cap and observe if the problem has been cured. If ignition noise is still evident, lift the bonnet of the engine compartment and observe if the noise becomes louder. The bonnet lid should act as a metal screen, partially screening the engine within the engine compartment.

However, the mechanical hinges on the bonnet may not be a good electrical connection at high frequencies. If the interference level does not appear to alter when the bonnet lid is opened, connect a stranded wire, or copper braiding from a length of coaxial cable, between the bonnet and vehicle body at each hinge point. The ignition interference noise should now be reduced when the bonnet is closed.

## Re-radiation

If you can still hear the ignition interference, try connecting an earthing strap between the vehicle body and the engine, exhaust system, front suspension, steering column and gear stick. It is possible for one or more of these items to re-radiate the interference.

It has been found that on some French and Italian vehicles the gear lever and steering column may radiate interference to the vehicle. The offending components must be bonded to earth using heavy braided cable.

## Ignition coil

The ignition coil can also be a source of trouble. If the ignition coil is contained within a painted can, all the paint must be removed from underneath the saddle clamp so that the clamp makes a good metal-to-metal contact with the coil.

## Imported vehicles

In some imported vehicles the ignition coil is contained within a plastic or open body which cannot be easily screened. The only solution available is to replace the ignition coil for a well-known coil enclosed within an aluminium can. Again, some imported vehicles have wire cored high tension cable or poor quality resistive high tension cable.

If you are unlucky enough to own such a vehicle then the high tension cable will need to be replaced with good quality carbon resistance high tension cable obtainable from a variety of motoring discount shops, made up to the required lengths to fit your make of vehicle. At the same time it will be worthwhile considering fitting resistive spark plug caps to replace the standard versions fitted.

The author's ignition interference problems had been made worse because an electronic ignition system had been fitted to the vehicle to improve the engine performance. The interference from the ignition system was S9 plus 10dB with the bonnet open. Fitting in-line choke suppressors at the plug caps and at the terminals on the distributor cap completely solved the problem, to such an extent that the ignition interference was no longer audible.

## Lucas parts

If you don't mind spending a little money, Lucas sell a range of suppression equipment designed for solving vehicle electrical interference problems (see Figure 4). The plug and distributor suppressors make a neat job of suppressing the ignition system. These parts are available at most Lucas branches listed in the Yellow Pages.

## Equipment installation

If you have not yet set about the installation of the aerial and equipment in the car, thought should be given to the location of the radio equipment within the vehicle to minimise the level of radio interference. The actual position of the aerial on the vehicle body, and the route taken by the feeder cable, should be

# SUPPRESSING VEHICLE INTERFERENCE

arranged in a way that will ensure that the cable is kept clear of known sources of interference, such as ignition and generator noise. Try and keep the position of the aerial well away from the engine compartment. Also, where possible, avoid running the aerial feeder cable for long lengths parallel with the vehicle cable harness.

A good earth connection at the aerial base is essential to ensure that the feeder screen is earthed to the vehicle chassis. If the earth connection is poor the result will be interference to the receiver from most electrical items of ancillary equipment. If you have an installation that has worked satisfactorily for a period of time, then the performance has deteriorated with increasing levels of interference, it is likely that the earth bond at the base of the aerial has deteriorated. This can be caused by metal corrosion of the vehicle bodywork.

## Power feed

The power feed to the mobile radio equipment should be taken from a point on the vehicle supply that has a low noise potential. Avoid taking power from branches of the supply which feed noise producing equipment. An ideal point of low noise potential would be the battery terminals. If you do decide to take the feed directly from the battery terminals, remember to insert an in-line fuse at the battery to protect not only the radio equipment but also the feed cable.

To reduce the possibilities of noise pick-up on the feed cable of low power radio equipment, it is advisable to use coaxial cable with the braid connected to the vehicle body. In certain noisy situations it may be advisable to install a low pass filter close to the feed point of the radio equipment.

## Other causes of interference

The vehicle metal body is insulated from ground by the rubber tyres. Electrical charge can accumulate on the body of the vehicle and on the mobile aerial. These charges build up because the vehicle body is insulated from ground. When the charges reach a high enough value, they discharge through the receiver causing a clicking or crashing noise.

The amount of static that accumulates is dependent upon weather conditions; minimum static accumulates when the air is dry and clean. As the air fills with dust, smoke, or moisture, static electricity builds up on the aerial which results in the static being discharged to the body of the vehicle causing the interference. In addition, the charge can discharge through the vehicle tyres.

When the vehicle is on the move, an electrical charge can also be produced by the tyres rubbing and gripping the dry road surface. Tyre static has a ragged sound and can be detected when driving on dry, rough highway surfaces.

If the noise does not appear when driving on dirty, wet roads, it will be a

positive indication that tyre static exists. The problem can be reduced by injecting anti-static carbon powder inside each tyre, which is obtainable from some of the larger car accessory factors. Wheel static discharge can be suppressed by installing a spring wiping device inside the hub cap which makes good electrical contact between the wheels and the axle.

## Conclusions

In the experience of the author in reducing the level of interference, it is advisable to give thought to possible interference problems before starting to install the radio equipment. Thought should be given to the position of the aerial, as previously discussed, together with the location of the radio equipment to aid safe driving. The last thing you want is the microphone cord wrapped around the steering wheel when turning corners!

Approach the tracking down of each individual interference noise in a logical sequence, and with order. Start by solving the problem of ignition noise, which is likely to produce the greatest

interference, then consider curing the interference produced by the electrical accessories, such as voltage regulators, electric fuel pumps, electrical windscreen wipers etc. Finally, give consideration to driving safety; remember that in the event of an accident caused indirectly from the use of mobile radio equipment, you would not be able to present a valid defence.

To avoid trailing microphone leads which can wrap themselves around steering wheels, why not install a fixed mobile installation that consists of a lightweight head set connected to a thin length of flexible tubing, with the press to talk switch connected to the gearshift lever. This type of installation will leave both hands free to drive the vehicle, and must improve driving safety.

Do not attempt to tune or adjust the radio equipment while on the move, as this will divert your eyes and mind from the task of driving. The author uses his mobile installation for the purpose of portable operation from vantage points with the vehicle stationary, and now enjoys many hours of interference-free operating.

Fig 4 Lucas range of suppressors (courtesy of Lucas Electrical Ltd)

LS No.	Part No.	Description	LS No.	Part No.	Description
LS627	60600385	1 $\mu$ F Capacitor with connector, for Ignition	LS641	60670378	7 A Choke Assembly for 14-15-16W Wiper Motors.
LS628	60600386	1 $\mu$ F Capacitor with connector, for Generator	LS642	60670350	General Purpose Bonding Strap.
LS720	60460741	3 $\mu$ F Capacitor with connector, for Generator	LS646	60460665	In-line Resistor for Wire HT Cables
LS629	54200297	3 $\mu$ F Capacitor for internal mounting on 15-16-17-18 ACR Alternators	LS648	60460666	Right Angled Plug Suppressor, with shroud
LS630	60460085	In-line Choke	LS673	54200423	3 $\mu$ F Capacitor for internal mounting on 23-25 ACR Alternators.
LS632	54421964	Straight VHF Plug Suppressor	LS680	78139	1 $\mu$ F Capacitor with Dual Connectors
LS634	54422760	Right Angled VHF Plug Suppressor	LS682	54201329	3 $\mu$ F Capacitor for internal mounting on 20 ACR Alternators
LS636	54421441	Straight VHF Distributor Suppressor.	LS683	54418559	Screening Can for 23-250 Distributors.
LS638	54423567	Right Angled Distributor Suppressor.	LS684	60150114	Dynamo Feed through Capacitor
LS639	60150093	7 A In-line Choke			
LS640	60150094	3 A In-line Choke			



## News and comment from Glen Ross G8MWR

This is the time of the year when there is not usually a tremendous amount happening of interest on the metrewave front, so it is a good time to look back over the past year to remind ourselves of some of the more interesting events. At the same time we can give ourselves something to dream about while we wait for the better weather to arrive.

The class B Morse 'letter of variation' came into being this year and, although it does not seem to have had as much use as it might have done, it has certainly provided a facility which should have been available years ago. Whether it gets permanently written into the licence is anyone's guess, but it does not seem to have caused any problems so there must be a good case for retaining it.

### 50MHz

This has to be *the* story of 1985 with the release to us of a small section of the band. We still do not know exactly how and when but at least we are in there! A further push was received a little later in the year with the news that the Norwegian authority had granted a few permits along similar lines to ours.

The RSGB beacon, GB3NHQ, has been heard over most of the country and reports have been received of reception on the other side of the Atlantic. The major surprise came in early July when several American stations were worked mainly in call areas W1,2,3,4,5 and 8. Also Canadian stations VE1YX and VO1MP in Newfoundland were active.

### 70MHz

This is a band which has had a tremendous amount of pushing by its enthusiasts in the last year. This has culminated in the new award for the band, details of which will soon be announced. Remember that as well as the G countries the band is also available to Cyprus and Gibraltar and it is thought that the Norwegians may soon get an allocation.

### 144MHz

The band that takes most of the work has not been very brilliant this year, with a dearth of aurora and very few sporadic openings. However, one of those was a tremendous affair, and some of the countries reported as having been

worked were: OE, OK, HG, YU, SP, UQ2, UR2, YO, HA, ZB2, EA9, UB5, I, EA, EA6, DL, CN8, UA3, IT9, 9H1, SV, LZ and F.

You can add to these the countries that were worked in tropo openings such as OY, T77, EA8, HB9, Y22, EI, LA, OZ, EI, SM, PA, ON, LX and, of course, all the G countries. If you had caught them all you would now have a country score of well over 30.

### 432MHz

This was the band that received a lot of publicity at the start of the year with a view to getting people away from the mad rush on two metres to enjoy some sane operating. The increase in popularity has been steady rather than spectacular, but most of those who arrive tend to stay.

There is a belief that openings start on two and work up, but this is far from true and it is not unusual for 70cms operators to be working into the Continent when two seems to be dead. Operating ranges tend to be about equal to those on two because, although the losses are greater on 70, the aerial gains used more than compensate.

To show what can be done, G4FHO managed a nice contact with EA8XS in the Canary Islands, getting 5 and 9 reports even on FM. The aeriels are even smaller and less likely to provoke your neighbours than the usual two metre versions would be. Another big boost to the band came with the RSGB Monday Night Award. Some stations now have over 100 squares confirmed on the band. If you are waiting for cards don't give up; I have recently received an LA card for a contact of 7 years ago and a card from LX1BD to GJ4ICD took 5 years to arrive.

### 1296MHz

The remarks in the previous section with regard to ranges and aerial sizes are even more true on this band; an eighteen element yagi is around 4.5 inches across and some two feet long – in fact much smaller than a normal TV aerial.

Some remarkable contacts have been made this year, the best being on 27 June when G6LEU (XK) contacted EA8XS (SO) over a distance of 2,620kms which is the region 1 record on the band. The world record is held by KH6HME with a distance of 3,977kms, set a year ago.

As was the case last year, 10GHz has seen a dramatic increase in activity this year with over 200 stations known to be active rather than just owning gear. The move from 10.1 to 10.4GHz has worked very well except for a few people in the south-east who are hanging on to the old spot on the grounds of working into France. If the French found that they could not get contacts without coming up to 10.4 they would soon change frequency.

There has been an increase in home to home working, particularly for data transmission, and amateur TV has also had a lot more use. One disappointing area has been the very slow growth in SSB activity. This can produce some spectacular results, as can be seen from the results obtained by G3LQR, who has managed contacts with DL7QY at 488kms, DC8UG at 492kms, DC9XO at 500kms, DC9XG at 545kms and, to really set the seal on a great year's operating, a contact with DF9LN at 620kms. There are plenty of people who would like those contacts on 70cms, let alone 10GHz.

### 24GHz

This band has become a little more active this year, mainly due to the availability of some 'in-line' heads at reasonable prices. About twenty new stations are known to be on the band and this has produced more interest. The best British contact reported this year has been just over 100kms, using about 5 milliwatts of FM.

### 47GHz

This band is at present very sparsely populated in this country, but news arrived of a new world record distance of 53kms which was set up by HB9AMH and HB9MIN. As if to make sure it was done the hard way they used 24GHz for dish alignment and talk-back.

### Repeaters

The repeater scene goes marching onwards and no matter what your interest there is a repeater somewhere that will extend your range, be it FM, ATV, Data or whatever. The fact that the vast majority of these (except those on two metres) are generally only sending a call sign seems to be of no importance.

The Sheffield 145MHz SSB repeater seems to have died a death: at the last count it was estimated that less than ten people had used it in nearly a year of operation. This must be due to the absurd requirement for a small pilot carrier, meaning you have to dig inside your rig and unbalance a circuit that the manufacturers spent a lot of time setting up to kill the carrier.

The biggest shout came with the news that several repeaters were going to have to move so as to accommodate a repeater for the Isle of Man. Already there are mutterings about repeaters on 50MHz, and we have not even got the band yet.

### Space

The final frontier has been truly squashed with several amateurs operating from the space shuttle. The first time

## ON THE BEAM

this was tried it resulted in chaos, but the recent effort was more satisfactory. Although normal operating had been envisaged, in the event there was practically none. A useful ploy was not telling anyone what frequency they were using, leaving you to take your choice from several that had been previously publicised. It certainly worked as there was very little of the idiot fringe in evidence.

### Locators

The biggest yawn of the year must be the introduction of the Maidenhead locator system. Very few wanted it, very few use it and it is rapidly being ignored. There are good reasons for its use but they are not of interest to most VHF users.

The argument goes that once we get openings into America on 50MHz it will come into its own. I doubt it: distances to the States can be easily measured on a map to within a few tens of miles, and if you have worked a station at around 3000 miles are you really interested in knowing about the last 100 yards?

Most class 'B' people strive to get on the HF bands (you won't find locators down there) and yet the distances worked are far greater than we are likely to achieve. The whole locator thing is getting us tied up on distance; perhaps we ought to get more interested in talking to people again?

Apart from the shuttle flights, the normal satellite traffic has continued with great success. Six amateurs have achieved the ARRL SatDXCC, taking up to eight years to achieve it. Now that the rules have been relaxed the award is easier to obtain but has certainly been devalued. Another interesting milestone was the reception of SSTV pictures from the Challenger space mission.

### General

To give some idea as to what can be achieved, G4TWD has worked over 500 CW stations on two in 1985. Various operators have achieved the following countries per band in the same time: 70MHz-6; 144MHz-34; 432MHz-16 and 1296MHz-10.

The pressure on space, particularly on two, should have prompted more people to use 12.5kHz spacing but it does not seem to have happened; people just go on complaining about lack of space.

The ever present pressure for a novice licence has continued, still with little chance of gaining any real foothold. The general feeling seems to be that the present system is fair and not too difficult. An intermediate licence could only be sensibly achieved by lowering the requirement for the class 'B' and extending the requirement for the 'A'. There is really no point in it otherwise, as any two classes would end up being too similar in the required pass standards.

The certificates which we introduced at the start of the year have found increasing popularity, particularly after the sporadic openings. Many people have commented on the fact that they enjoyed chasing the contacts, and the format of needing squares, counties, countries and a minimum distance has been welcomed. We have now issued certificates for all three bands with Gold awards issued for two and seventy.

If you want full details please send an SAE to the address at the end of the article, but just to get you started the requirements for a two metre Bronze award are: 7 countries, 20 counties, 20 squares and a distance of 500kms. One station can count for several categories and you do not need QSL cards, just get your duplicate signed by one other amateur. Contacts via repeaters and satellites do not count and all contacts must have been made since 1 January 1985.

### Close-down

And me? Well I said I was going to get on a new band and in midsummer I arrived on 24GHz. This year I have not made up my mind but there is always something new to try at this end of the spectrum. Please keep your comments and information coming to me at 81 Ringwood Highway, Coventry, or on Prestel 203616941. May this year be the best yet for you.

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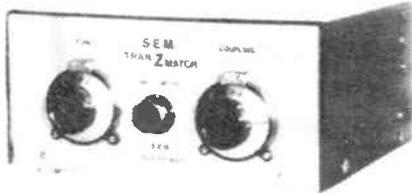
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# SECONDHAND EQUIPMENT GUIDE

by Hugh Allison G3XSE

This learned column has, over the years, covered prices and repair of HF receivers (both amateur bands only and general coverage), HF transceivers and VHF/UHF rigs. Well now, as the saying goes, for something completely different microwaves – and cheap ones at that.

## Freely available

The basic microwave 'heads' are now freely available on the secondhand market at unbelievably low prices, nearly always below a tenner and often as low as a fiver.

They have been used for a variety of purposes – motion detectors, automatic door opening devices, burglar alarms etc – and the really good news is that a lot of the ones coming onto the secondhand market are designed to work on 10.689GHz. Three to four turns of the frequency set screw puts them into the 10GHz amateur band.

Before I go any further in this article I must admit that I am *not* a microwave expert, all of the following has been gained in the true amateur tradition of buying something cheap and teaching yourself what to do with it. I am merely trying to whet the appetite of other enthusiasts. Surely it's worth a fiver just to put a contact on a new band in the log book, isn't it?

## Microwave heads

These appear to be available on the secondhand market at the moment in two basic types: Tx and Rx sharing the same horn and Tx and Rx having their own horns. More of this in a moment.

The basic concept of these heads is simple – a certain Mr Gunn designed a diode that, when placed in a resonant cavity, can produce useful amounts of microwave RF energy when a dc potential is placed across it. Most of the surplus units need 6 to 7 volts across them at about 120mA and will chuck out, using a crude powermeter (my measurements, typically 15 to 20mW).

This may seem an almost insignificant amount of power, but the horn attached to the cavity gives about 10/12dB gain (again my own crude measurements), so we are talking about a couple of hundred milliwatts of effective radiated power, and I was amazed at what you can do with this sort of power at these frequencies.

Note that most, but unfortunately not all, of the various types of heads I've recently bought and played with are *positive* earth. Fortunately the diodes are easy to reverse in their holders, but be warned they are extremely static

sensitive so be well earthed when doing the reversal. New gunn diodes are available, but they cost more than the complete secondhand assemblies. Incidentally, I've bought ten heads of varying designs and every one has worked perfectly first time. Maybe I was born lucky, but it indicates a degree of reliability.

## Frequency stability

The frequency stability of a gunn diode is determined, among other things, by temperature and voltage changes. As a very rough guide the frequency drift of a 'raw' head is about 1MHz per 5°C temperature change. All the heads I've bought have, however, come with a thermistor attached, which brings the stability down to acceptable proportions over normal temperature ranges. The moral here is, don't snip off and throw away the black thing that looks like a 0.1µF capacitor!

Voltage wise you can expect about 10MHz/volt. Consequently you need a reasonably stable supply voltage – normally a zener and a single transistor will suffice. Modulation for FM is achieved by a small amount of audio voltage superimposed onto the gunn supply. Since 1 volt gives 10MHz shift, 50mV change gives 500kHz deviation. You don't need much!

## The receive side

This is simply a diode in a resonant cavity, biased with a small amount of RF energy. On receive the gunn is not modulated and acts purely as the local oscillator injection.

Herein lies the reason for my emphasising the point that there *appear* to be two types of head. In the type where the receive diode and the gunn 'share' the same cavity, the amount of energy given to the receive diode from the oscillator is fixed by the design of the metalwork and cannot be altered.

The separate cavities for Tx and Rx types have caught out a lot of amateurs who have achieved disappointing results and given up with them. What is not realised is that the head assembly is bolted to something else, and it is this 'something else' which is not normally provided with the head assembly when bought on the secondhand market.

Have a careful look at the faceplate of the head. If it is machined fairly flat look inside the cavities. If there is a hole drilled through between the two, with or without a wire apparently unconnected, then this will provide the local oscillator

injection to the receive diode and no further work is required.

Other variants with the flat faceplate and no inter-cavity coupling probably had a 'raydome' across the front which was a bit lossy and thus provided some coupling between the two.

These will give disappointing results unless a little RF is fed from one cavity to another. I've got some disgusting habits, and microwave engineers will probably die laughing, but a one inch length of fairly stout wire held ¼ of an inch in front of the mouths of the cavities (by Plasticine!) works a treat – snip the length required and adjust spacing for best results. If anyone has a better idea, please pass it on. I've tried perspex with no luck.

## Too much RF

The third type of head I've come across, which seems by far the most common, might suffer from too much RF injection into the diode. The faceplate of this has a channel formed into the face of the assembly and was intended to be bolted onto a metal baffle plate. Any suitable metal plate with two 38×29mm rectangular holes 15mm apart should be bolted to the front.

These dimensions were obtained from one that was spotted in use on a door opening sensor in a shopping centre. If anyone can provide more accurate dimensions, again, please pass them on. It's not too easy to take accurate measurements while standing on a chair with a curious security guard approaching! Fitting this baffle dramatically increases range.

## Doppler use

Simple experiments can be made with a dc supply to the gunn and the receive diode terminated in, say, 10K to the chassis. A scope across the resistor on 5mV/cm will detect an object a foot high moving at slow speed at about 100 feet away. Commercial circuits are available to make more sophisticated devices, and, indeed, some heads have come with a handful of circuit ideas.

## Simple 'homodyne' transceiver

I'm a bit mystified by this. Take a gunn diode fed with stable dc supply onto which is superimposed a small ac voltage (your modulation). Your friend is receiving you on his assembly which has a stable dc supply and a receiver diode terminated in 10K then fed into high gain audio amplifier. Sure, you can tweak one oscillator to be exactly on the frequency

## SECONDHAND

of the other, and you will then have a bona fide homodyne set up.

The funny thing is, as the oscillators drift apart, which they will surely do, the system keeps on working. The range will be about a quarter to half a mile. For you to receive your friend you will need to cut your mod while he increases his.

### Superhet operation

If there are only two of you, the simplest way is to set your oscillators about 90MHz apart and use FM radios as the IFs. Range: two or three miles over unobstructed paths. If you must be flash and use simplex, by cutting down your IF

to 20MHz or less (the electrical tuning range of the gunns) simple Tx/Rx frequency changing can take place by varying the gunns' dc voltage.

### Drive boards available

Note that there are proper drive boards available to use these heads as transceivers, and one of the cheaper suppliers sends a fair bit of information with the heads. What I have tried to do is explain the differences between the cheap surplus heads currently available, give a few ideas for their use and the results that can be expected. It's cheap and it's fun.

### Better safe than sorry

Finally, a warning. It's probably unlikely that the small amounts of RF energy available from these units will do you any harm, after all you can walk under them in shopping centres etc, but I tend to err on the side of caution. I would suggest that you don't look down them, or put any part of your body in front of them when they are running. After all it is better to be safe than sorry in these sort of situations.

I'd like to take this opportunity to wish all the readers of *Amateur Radio* a very Merry Christmas, and an active New Year on the air. 73s G3XSE.

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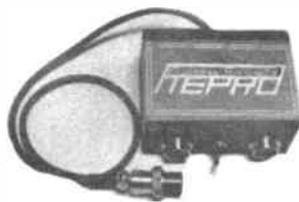
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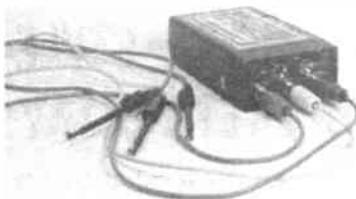
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Products reviewed for **Amateur Radio** by Angus McKenzie G3OSS in 1984

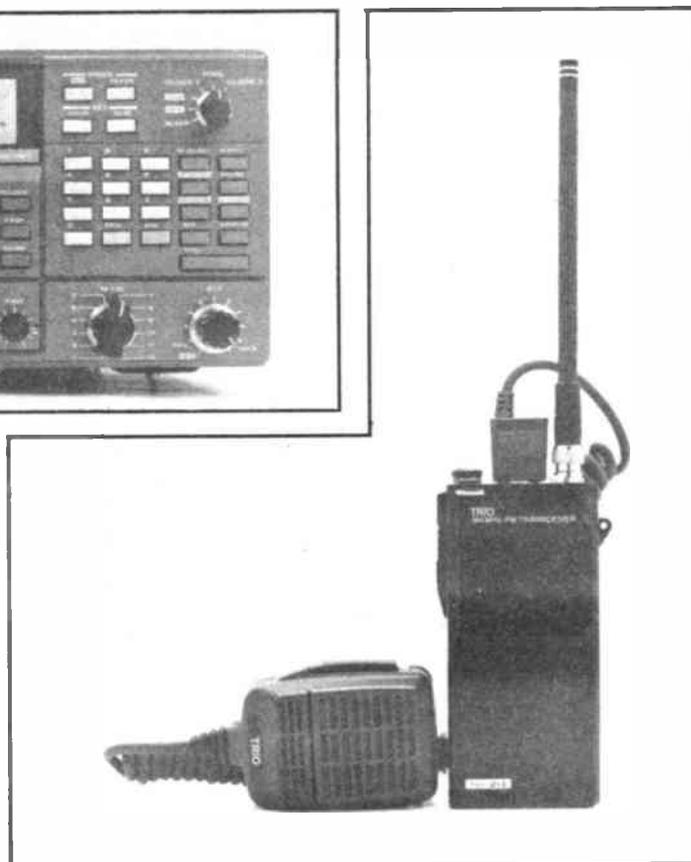
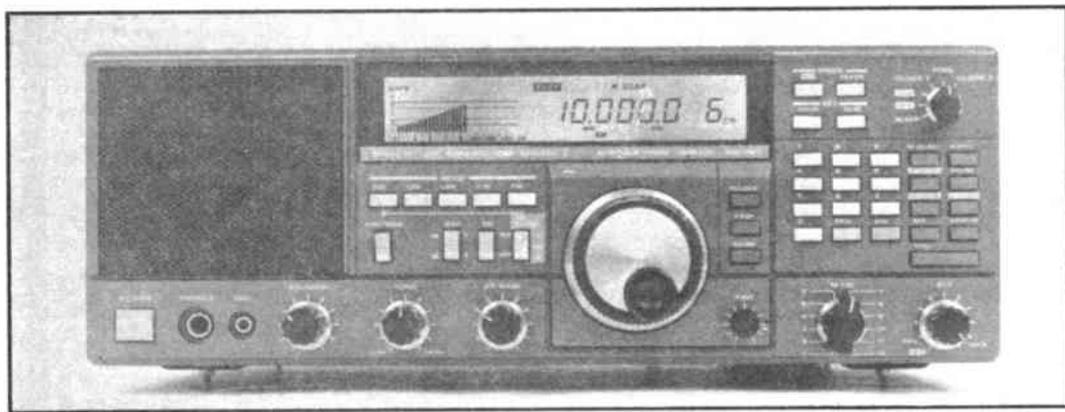
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## ELMASET INSTRUMENT CASE

300x133x217mm deep ..... £10.00 ea (£1.50)

## REGULATORS

LM317T Plastic T0220 variable ..... £1.00  
 LM317 Metal ..... £2.20  
 7812 Metal 12v 1A ..... £1.00  
 7805/12/15/24 plastic ..... 50p  
 7905/12/15/24 plastic ..... 50p  
 CA3085 T099 Variable regulator ..... £1.00

## COMPUTER ICs

Used Eproms are erased and verified  
 27128-300nS ..... New £3.50 10+£3 Used £2.50  
 2764 Intel/Fujitsu 300nS ..... £2.50 Used £1.50  
 2716 EX EQPT ..... £2 100+£1  
 2732 EX EQPT ..... £2.50  
 2114 EX EQPT 60p 4116 EX EQPT ..... 70p  
 6264LP158K static ram ..... £4  
 6116 LP-2 (TC5517APL-2) ..... £2.50  
 6116-2 (TC5517AP-2) ..... £2.20

## POWER TRANSISTORS

TIP141, 142, 147 £1 ea, TIP112, 125, 42B ..... 2/£1.00  
 TIP35B £1.30 TIP35C ..... £1.50  
 SE9302 100V 10A DARL SIM TIP121 ..... 2/£1.00  
 2N3055 Ex eqpt tested ..... 4/£1.00  
 Plastic 3055 or 2955 equiv 50p ..... 100/£30.00  
 2N3773 NPN 25A 160V £1.80 ..... 10/£16.00

## DISPLAYS

Futaba 4 digit clock, fluorescent display 5-LT 16 ..... £1.50  
 Futaba 8 digit calculator, fluorescent display 9CT-01-3L ..... £1.50  
 LCD Clock display 0.7" digits ..... £3.00  
 Large LCD Clock display 1" digits ..... £3.00  
 7 seg 0.3" display comm cathode ..... 2/£1.00

## QUARTZ HALOGEN LAMPS

A1/216 24v 150w ..... £2.25  
 H1 12v 55w (car spot) ..... £1.25

## MISCELLANEOUS

Modem line transformer ..... £1.50 100+80p  
 Coax plugs ..... 5/£1  
 4x4 MEMBRANE KEYBOARD ..... £1.50  
 INDUCTOR 20µH 1.5A ..... 5/£1.00  
 COAX PLUGS ..... 5/£1.00  
 15,000µF 40v ..... £3 (1.50)  
 NEW BRITISH TELECOM PLUG+ LEAD ..... £1.50  
 1.25" Panel Fuseholders ..... 5/£1.00  
 MAINS ROCKER SWITCHES 6A SPST ..... 5/£1  
 STAINLESS STEEL HINGES 14.5" BY 1" OPEN £1.00 each ..... 10/£7.00  
 MAINS TRANSIENT SUPPRESSORS 245v ..... 3/£1.00  
 TOK KEY SWITCH 2 POLE 3 KEYS - ideal for car/home alarms ..... £3 £100+ £2.00  
 12v 1.2w small wire ended lamps fit AUDI/VW TR7 VOLVO SAAB ..... 10/£1.00  
 PTFE sleeving pack asstd colours ..... £1.00  
 250 mixed res diodes, zeners ..... £1.00  
 Mixed electrolytic caps ..... 100/£2.00  
 Stereo cass R/P head ..... £2.50  
 Mono head £1, Erase head ..... 50p  
 Thermal cut-outs 50', 77', 85', 120'C ..... 80p  
 Thermal fuse 121'C 240v 15A ..... 5/£1.00  
 Vero pins fit 0.1" Vero ..... 200/£1.00  
 T0220 Micas + bushes 10/50p ..... 100/£2.00  
 T03 Micas + bushes ..... 20/£1

RELAYS 240v AC coil PCB mounting 2 pole changeover £1 3 pole c/o ..... £1.00  
 Fig. 8 mains cassette leads ..... 3/£1.00  
 KYNAR wire wrapping wire 2oz reel ..... £1.00  
 PTFE min. screened cable ..... 10m/£1.00  
 TOKIN MAINS RFI FILTER 250v 15A ..... £3.00  
 IEC Chassis plug/rfi filter 10A ..... £3.00  
 Mercury tilt switch small ..... £1.00  
 Min. rotary sw. 4p c/o 1/8" shaft ..... 2/£1.00  
 Thorn 9000 TV audio o/p stage ..... 2/£1.00  
 10m7 CERAMIC FILTER 50p ..... 100/£20.00  
 6m or 9m CERAMIC FILTER 50p ..... 100/£25.00  
 240v AC FAN 4.6" SQUARE NEW ..... £5.50 (£1.60)  
 240/115v AC FAN 4.6" SQ NEW ..... £7.00 (£1.60)  
 BELLING-LEE 12-way block L1469 ..... 4/£1.00  
 POTENTIOMETERS short spindle  
 2k5 10k 25K 1M Lin ..... 5/£1  
 500k lin 500k log long spindle ..... 4/£1  
 40KHZ ULTRASONIC TRANSDUCERS EX-EQPT. NO DATA ..... PAIR/£1.00  
 STICK-ON CABINET FEET ..... 30/£1.00  
 T03 TRANSISTOR COVERS ..... 10/£1.00  
 TRANSISTOR MOUNTING PADS T05/T018 £3/1K DIL REED RELAY 2 POLE N/O CONTACTS ..... £1.00  
 ZETTLER 24V 2 POLE c/o relay 30x20x12mm sim RS 348-649 ..... £1.50 100+£1

## RECTIFIERS

120v 35A stud ..... 65p  
 12FR400 12A 400v small stud ..... 4/£1.50  
 BY127 1200V 1.2A ..... 10/£1.00  
 BY254 800v 3A ..... 8/£1.00  
 BY255 1300v 3A ..... 6/£1.00  
 1A 800v bridge rectifier ..... 4/£1.00  
 6A 100v bridge ..... 50p  
 10A 600v bridge ..... £1.50  
 15A 100v bridge ..... £1.50  
 25A 200v bridge £2.00 ea ..... 10/£18.00  
 25A 400v bridge £2.50 ..... 10/£22.00

## SCRs

MCR72-6 400v ..... £1  
 35A 600v stud ..... £2.00  
 2N5061 800mA 60V T092 ..... 4/£1.00  
 TICV106D .8A 400v T092 3/£1 ..... 100/£15.00  
 MEU21 Prog. unijunction ..... 3/£1.00

## TRIACS

TXAL225 8A 400V 5mA gate 2/£1.00 ..... 100/£35.00

## CONNECTORS (EX EQPT. price per pair)

'D' 9-way £1; 15-way £1.50; 25-way ..... £2.00  
 37-way £2; 50-way £3.50; covers 50p ea

## WIRE WOUND RESISTORS

W21 or sim 2.5W 10 OF ONE VALUE FOR ..... £1.00  
 R47 1R0 2R0 2R7 3R9 5R0 10R 12R 15R 18R 20R 27R 33R 36R 47R 120R 180R 200R 330R 390R 470R 560R 680R 820R 910R  
 1K 1K15 1K2 1K3 1K5 1K8 2K4 2K7 3K3 10K  
 R05 (50milli-ohm) 1% 3watt ..... 4 for £1  
 W22 or sim 6 watt 7 OF ONE VALUE FOR ..... £1.00  
 R47 1R5 9R1 10R 12R 20R 33R 51R 56R 62R 120R 180 270R 390R R47 560R 620R 1K 1K2 2K2 3K3 3K9 10K  
 W23 or sim 9 watt 6 OF ONE VALUE FOR ..... £1.00  
 R22 R47 1R0 3R0 6R8 56R 62R 100R 220R 270R 390R 680R 1K 1K8 10K  
 W24/ sim. 12 watt 4 OF ONE VALUE FOR ..... £1.00  
 R50 2R0 10R 18R 47R 68R 75R 82R 150R 180R 200R

270R 400R 620R 820R 1K

## PHOTO DEVICES

Slotted opto-switch OPCOA OPB815 ..... £1.30  
 2N5777 50p ..... 100/£26.00  
 TIL81 T018 Photo transistor ..... £1.00  
 TIL38 Infra red LED ..... 2/50p  
 OPI2252 Opto isolator ..... 50p  
 Photo diode 50p ..... 6/£2.00  
 MEL12 (Photo darlington base n/c) ..... 50p  
 RPY58A LDR 50p ORP12 LDR ..... 85p  
 LEDs RED 3mm or 5mm 12/£1 ..... 100/£6.00  
 GREEN or YELLOW 3 or 5mm 10/£1 ..... 100/£6.50  
 FLASHING RED 5mm 50p ..... 100/£30.00

## DIODES

1N4148 ..... 100/£1.50  
 1S3740 Germanium ..... 100/£2.00  
 1N4004 or SD4 1A 300v ..... 100/£3.00  
 1N5401 3A 100V ..... 10/£1.00  
 BA157 1A 400V Fast recovery ..... 100/£2.50  
 BA159 1A 1000V Fast recovery ..... 100/£4.00

## MULTI TURN PRESETS

10R 20R 100R 200R 500R ..... 50p  
 2K 5K 22K 50K 100K 200K

## IC SOCKETS

6-pin 15/£1 8-pin 12/£1; 14-pin 10/£1.00; 18/20-pin 7/£1; 100/£12; 1k/£50; 22/28-pin 25p; 24-pin 25p; 100/£20; 1k/£100; 40-pin 30p; 16-pin 12/£1; 100/£6

## TRIMMER CAPACITORS small

GREY 1.5-6.4pF GREEN 2-22pF ..... 5 for 50p  
 GREY larger type 2-25pF ..... 5 for 50p

## SOLID STATE RELAYS NEW 10A 250v AC

Zero voltage switching  
 Control voltage 8-28v DC ..... £2.50  
 VARIAC 0 to 130v 6A new uncased ..... £6.00 (£2)

## POLYESTER/POLYCARB CAPS

1n/3n/5n/6n/8n/2/10n 1% 63v 10mm ..... 100/£6  
 10n/15n/22n/33/47n/68n 10mm rad ..... 100/£3.00  
 100N 250V radial 10mm 100/£3  
 1u5 P/carb 15mm rad ..... 100/£7.00 (£1)  
 2u2 160v rad 22mm ..... 100/£10.00 (£1.50)  
 470n 250v AC X rated rad ..... 4/£1.00  
 33n/47n 250v AC X rated rad 15mm ..... 10/£1.00  
 10n 250v AC X rated rad 10mm ..... 10/£1.00  
 100n 600V SPRAGUE axial 10/£1 ..... 100/£6.00 (£1)

## BEAD THERMISTORS

GLASS BEAD NTC Res @ 20'C ..... 80p  
 250R 1K2 50K 220K 1M4  
 R53 THERMISTOR ..... £2.00

## BEAD TANTALUM CAPS

8 25V 47u 3V 12/£1 ..... 100/£6.00  
 2u2 20V 8/£1 ..... 100/£8.00

## MONOLITHIC CERAMIC CAPS

100N 50V axial Shortleads ..... 100/£3.00  
 10N 50V ..... 100/£3.00  
 470N 50V 100/£7 1µF 50V ..... 100/£14  
 10N 50v dil package 0.3" rad. £4/100 ..... £35/1k

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- FRG7700 plus 12 channel memory, less than a year old, little used and absolutely mint, as any exam would show, £300 ono. Or exchange for quality self-contained Rx. E Lane, 19 Smuggler's Way, Birchington, Kent. Tel: Thanet 45561.
- Wartime 1155 aircraft radio receiver, good working condition with spare valves, power supply for mains and instruction details, £75. Tel: (0622) 861998.
- 48K Spectrum in stonechip keyboard plus interface, 1 + 1 microdrive + Alphacom 32 printer plus 5 rolls paper, tape recorder, joystick interface and quick shot II, plus eight cartridges and interface to transfer any program to microdrive. Box full of programs, info sheets and RTTY prog, Morse Rx and tutor progs, £300. Tel: York 796922 after 6pm.
- Ham Major M588 FM/AM SSB transceiver, 26.515, 27.855 with 40 channel fitted, perfect condition, £80 ono. CTE int valved linear, 500 watts FM/AM, 1000 watts SSB with pre-amp, £150 ono. Spectrum+ with games, books, mags, joystick, tape player, interfaces, all boxed, £230 ono. ZX expansion system with int3 plus carts, £90 ono. D Wright, Alma Cilcennin, Lampeter, Dyfed, Wales SA48 8RH. Tel: (0570) 470 362.
- Andrew LDF4-50 helix coaxial cable, 70 feet long with N type connectors, tested H100 connector, £55 ono. Buyer collects. 1 Ceri Road, Rhoose, Barry, South Glamorgan CF6 9HF.
- AR88LF £30, Eddystone 940 requires attention, £25. Frequency meter BC221, £15, advance signal generator type P model, £10. Buyer collects. Tel: Staines 59331.
- Panasonic DRQ63 receiver, £100. Phillips D2924 scanning receiver, £50. Sony 7600 scanning receiver, £95. All excellent condition. Yaesu 208 hand transceiver with base charger and speaker mike, £150. Trio micro hand transceiver, £130. Tel: (0277) 823434 evenings. Brentwood, Essex.
- Yaesu FT290R with muTek, mint condition. New March 1985, 25 watt linear needs boxing for completion, twin meter, SWR/power meter, 5 ele crossed yagi, folded J omni, £330. SAE for replies please. D Spooner, 25 Wapshott Road, Staines, Middx TW18 3HB.
- Burns electronics FMD-7 FM detector unit for FRG/7000 series receivers. Also suitable for Rxs with 455.1F. Instruction book and circuit supplied. £10.00 cost £26.88. Reason for selling, obtained Tx-Rx fitted with FM. Mr Burrell, 139 Hewitt Ave, London N22 6QE. Tel: 01-889 4431.
- Rascal RA17 beautiful stable general coverage receiver with case, £250. SAIT general coverage receiver, digital readout, includes VLF, £375. These are professional receivers. Marine transmitter receiver 2182kHz crystal controlled fixed frequency, £75. Interesting alternatives: Moto guzzi V750S, Jawa ISDT350, both little used, no time, £1,250 and £725 respectively. Condor catamaran, also little used, £850 inc trailers. Tel: (Purley) 01-660 0794.
- Lowrey pageant MT155S spinet organ. Twin manual, pedals, rhythm, auto-chord accomp, 12 solo voices, ideal for beginner. 2 years old, £350. Buyer collects. Mike, G1JJI, QThr. Tel: 01-422 9108, anytime.
- TR9130 complete with original packing, mobile mounting bracket, gutter mount and whip, £375.00. Will sell without whip etc for £350.00. Tel: Dave G6UDM. Tel: (0902) 783338.
- Datong 270 active HF (Rx) indoor antenna, two sets of elements, £20 plus postage. Dave Howes, 149 Warren Wood Rd, Rochester, Kent ME1 2XG. Tel: (0634) 404096.
- FT203 swap for 70cm mobile FM rig, 203 cm with spare batt, spkr mic, and charger. Or WHY in the way of 70cm Txs. Tel: (0732) 458800 - daytime. Ask for Bob (Sevenoaks, Kent).
- Yaesu 901DM HF transceiver, VOX, FM, Curtis keyer, voice processor, 12V dc power supply, all built in, mint, boxed, £550. Kenwood AT200 ATU mint, £100. Tel: (0705) 370576. G4ZPA.
- Yaesu FT790R 70cms multimode, carrying case, nicads, charger, two whip antennas, £235. Wood and Douglas 10W 70cms linear, £30. Puma 70cms 10W pa, £20. SMC 12V 8 amp PSU, £30. Mobile mike, £10. Young. Tel: Hull (0482) 509404.
- Icom IC-720A transceiver, Icom IC-PS15 power supply, new in boxes, never used. IC-SM5 desk mic, electret condenser microphone, Morse key, very good buy for £650.00. P H C Dobson, 16 Glemair Avenue, Parkstone, Poole, Dorset BH14 8AD. Tel: (0202) 731265.
- Yaesu FRG7 receiver unmodified, £125. Also Yaesu FRT7700 tuner, £30. Realistic PRO2008 UHF/VHF scanning receiver with discone antenna plus co-ax cable, £115 ono. Everything in mint condition, boxed, and with full instructions. Tel: (0732) 882982 after six pm please.
- Selling property of silent key G8EPT. FT221R with muTek front end and matching Yaesu extension speaker, complete with mike and manual. Log book shows less than 20 hours use from new. Excellent performance and physical looks. Must sell urgently for his widow, hence only £275. Six element quad for 2 metres which never got put outside, as new, £25. Lunar 2 metre pre-amp; no transmit switching so use in Rx line only, £7. Microwave Modules receive-only converter, 70cm in - 2 metres out, very good condition, £12. Wier Electronics dual gate MosFET VHF converter, 144MHz in - believe 4/6MHz out, but not checked as no HF gear available. Take a chance for £6. AVO No 1 portable signal generator, date unknown, but suspect '60s. Appears in very good condition, but not checked. Covers 50kHz to 80MHz. Currently showing at up to £25 in Radcom, £12. Truvox reel to reel tape recorder, old, but believed working. Collect only as too big to send, £5. Collectors' item - Siemens & Halska 450V voltmeter in original cabinet, bearing original manufacturers plate showing date as 1917 - therefore 88 years old. In extremely good condition, offers? Various other odds and ends for callers, such as chokes, switches, transformers etc. Contact Phil Hodson G8RBY, 43 Thorpe Road, Melton Mowbray, Leicestershire. Tel: (0664) 500565.
- Icom 25H 2m 45W transceiver, as new with original carton and manual etc, £245. Also Cobra 148GTL DX, fully converted UK legal freq, £100. Either item p/x for 2m multimode with pre-amp/linear in similar condition, with cash adjustment. Tel: (061) 480 6959.
- Jaybeam 14 element parabeam for 144MHz, £35. Andy G0CCX, QThr as G1ICE. Tel: (0273) 516517.
- Complete HF station, mint condition, only four months careful usage. Trio TS530S, remote VFO 240, ATU 230, matching 230 speaker and filters, mike 35S, Hokushing HF5 vertical antenna, £650. Will exchange for 2 metre equipment. Cash adjustment if necessary. Jeff. Tel: (0484) 846631.
- Datong D70 Morse tutor, £35. Lowe TX40 10m FM rig, £35. Lloytron comms Rx 1.5-30MHz, BFO air band 2m band, £40. Ray G0CGQ not QThr. Wilmslow (Cheshire). Tel: (0625) 529713.
- FT707 100W HF rig, FP707 power supply, FC707 antenna tuner, FV707DM remote VFO with memories and scanner, £590 ono. Datong auto speech processor, £58 ono. LCL 10 metre FM rig, perfect, £30. G4OFR, QThr. Tel: Plymouth (0752) 880784.
- Old brass Morse key on wood plinth, offers? Four old copies PW 1943, 1944, offers. Tel: 01-200 3825.
- Cobra 148 27MHz CB multi-mode plus CW in gwo, £65 ovno. Swap for 2m Rx, Tcvr, h/held or WHY. Peter Hunter, 2 Huxley Close, Norwich, Norfolk NR1 2JS.
- Yaesu FR101 receiver, complete with two metre converter and home-brew digital readout, excellent condition, £170. Also Yaesu FRG7 general coverage receiver, supreme condition. £125. Tel: Duncan on Wrexham 357612.
- Manual for Eddystone model 880/4, original or copy. Write stating price required to G3DAM, 71 Lichfield Avenue, Evesham, Worcs.
- Yaesu FRG7000 receiver, G2DYM trap dipole aerial, with balun/matching unit; £200 the lot, despatch included. Tel: Jon Kempster BRS45205, 01-341 9053.
- Azden PCS3000 142MHz 149MHz FM trans receiver 8 channel memory scan 25W to 5W as new in box £190. Jack Wingrove, 114 Wakehurst Road, Battersea, London. Tel: 01-228 4835.
- AOR 2001 scanning receiver 25/550MHz, as new condition, inc manual and power pack, very sensitive, £300.00. Price to include discone aerial and low loss cable. Mr Bruce, 127 Hankinson Rd, Bournemouth. Tel: (0202) 533278.
- Spectrum 48K plus microdrive, low profile keyboard, ZX printer, Kemtronics cent interface, RTTY prog, plus interface, logging prog, Tasword two WP, QRA, ATV progs etc. £220, carriage extra. Tel: (0376) 510664 after 6pm.
- Icom 290E 2m multimode transceiver, 18 months old, £280. MML144/50S linear amp, 12 months old, £68, or will swap all for FT290R with muTek & MML144/30S linear + cash, or straight swop for FT290R + muTek and MML144/100S. Terry G4OXD. Tel: (0462) 35248 after 6pm.
- Icom IC730, mint, CW filter and transverter board fitted, £420. Standard C8900 10W FM mobile, mint, £165. All boxed and with manuals. Tektronic scope model 567 large, £45. Tel: Welwyn Garden City 320741, G4FPU.
- FT480R 2 metre multimode transceiver very good condition, £275. Linear amp 10W in 50W out, also very good condition, adjustable pre-amp, £65. M W Sayers, 4 Clifton Drive, Ashby, Leics. Tel: (0530) 416128, 24hrs.
- Trio 9R59DS short wave receiver 0.5-30MHz, £50.00. Wood & Douglas 70cm Tx/Rx 600mW output, xtald on RB6, £45.00. Tel: (0273) 516801.
- Fidelity 3000 FM CB base, £45. Or exchange for Trio 9R59DS or any HF receiver. Tel: Londonderry 46871 after 7pm.
- Yaesu FT209RH 5W handheld, 4 months old with two made-up nicad packs as old as the rig. One Yaesu slow charger and one Yaesu headphone and boom mic. As new, in its own soft case with rubber ¼W and plus mains 3A 13.8V PSU, leads for nicads and PSU, £250. Alan Richardson, 171 Carr Lane, Acomb Road, York YO2 5HQ. Tel: York 796922.
- Yaesu FRJ7700D converter, 2 metres and air bands included £35. Datong 2 metre converter complete with mains power unit, £32. All good condition and post paid, letters only please. Moore, 76 High Street, Ide, Exeter, Devon EX2 9RW.
- CB handheld £25. Two metre receiver, £45. Leak stereo amp 30 watts rms per channel, £60. Portable colour TV, £65. CB 40 channels, £25. Commtron CB legal FM USA, AM USA, AM+40, £35. Two CB SWR meters, £3 each. Various eight track cartridges, £1.50 each. Cartridge player, £12. Pre-amp 2-30MHz, £10. Cassette tapes pre-recorded, £2 each. 44MHz xtals, £1.50. Mike, 14 Doverfield Road, Brixton, London SW2 5NB. Tel: 01-674 0513, pm.
- Mullard high-speed valve tester with cards. Taylor valve tester with data book. Various military receivers, transceivers, control units etc. HRO, National NC33, Hallcrafters, Eddystone receivers. Large amount of surplus spares, valves, components, headphones, crystals, projector lamps etc. Please write: John Baker, 57 Birkenhead Street, London WC1H 8BB. Tel: 01-833 3008.

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■ Must sell urgently (no licence), pair brand new Yaesu FT209R handles, plus extras. Cost £600, still untouched, accept £500 or best offer. Tel: Tahir (0274) 306551 evenings or weekends.

■ Marconi Marine, semi-working order, suit enthusiast, £5. Tel: Titchfield (0329) 41867, ask for Philip.

■ CB transceiver, ST9, DX, FM, AM, LSB, USB, good condition, £100. Hitachi stereo radio cassette recorder, four bands, boxed, good condition. £110. Tel: 01-207 0706 or 207 2326.

■ Icom IC210 home base 2m FM transceiver in top condition. Reason for sale, new multimode. Swap for mint FRG7 and FRT7700 or WHY similar? Or sell £160. No offers. Tel: Brightlingsea (0206) 30 4544.

■ Leson DT251 base mike, as new, £19. Trio R300 comm receiver, excellent condition, £70. NR 56VF1 144MHz receiver, VFO tuning and 12 position switch for crystals, excellent condition, £29. Peter Gillman, 8 Barrow Avenue, Carshalton, Surrey SM5 4NY. Tel: 01-643 5063.

■ Exchange FT290R, excellent condition, nicads, charger, case, Alinco 30 watt linear with pre-amp, in boxes. For FT221, TS700, IC211E or similar. Small cash adjustment if needed. Please write: Alan, 1 Manor Terrace, Terrington Street, Clement, Norfolk PE34 4NF, or tel: Kings Lynn 829075.

■ Microdot RTTY CW terminal unit with built-in monitor, as new, will p/ex for TS130V with cash adjustment. Tel: Stuart G400K (0642) 211685, anytime, QTHR.

■ Trio Kenwood TW4000A, £389 or swap 2 metre multimode base or mobile plus cash. C/o 19 Fox Grove, Godmanchester, Cambs.

■ SR9 VHF monitor, £20. Vega VEF206 SW, MW, LW, 6 band radio, £10. Both in good working order. JD Mendham, 12 Henton Road, Edinstowe, Notts. Tel: Mansfield 823001.

■ Tristar 747, ideal to convert to 10m, £60. Crystals for Yaesu 10m to 11m, £25. SSB filter for 901/902 or 101m £15. HF linear 10W in, minimum 500W out, inc PSU, offers. Martyn. Tel: (0924) 495916.

■ One copy *Amateur Radio Techniques*, £4. *Amateur Antenna Test and Measurements*, £4. *Single Side Band for the Radio Amateur*, £4. *Understanding Amateur Radio*, £4. Test Equipment for the Radio Amateur, hardback book, £6. 1980-1984 *Radio Communications*, £4 per year. 1981-1984 73 magazines, £6 per year. 1980-1984 *Short Wave* magazines, £3 per year. Alf Brimming, 43 Atwood Drive, Lawrence Weston, Bristol BS11 0SR. Tel: Bristol 828586, anytime.

■ TW4000A in excellent condition and with the original packing is still for sale due to G4????. The world's biggest time waster! This is the ideal mobile rig. Due to the need for HF gear, offers around £360 would be appreciated. Tel: G6JNS on (0905) 620041.

■ Yaesu FRG7000 communication receiver 0.25-30MHz, £200. Yaesu FRT7700 antenna tuner, £35. Tel: Harpenden 5934.

■ Drake 2B receiver, one of Ken Williams' classic receivers, see *Amateur Radio Sept '83*, c/w/with PSU, QA2 Q multiplier, ex speaker, mint condition, re-valved, re-condensered, re-aligned. Swap for Eddystone 770R receiver in good order, or sell for £150. Buyer collects or pays carriage. F Eyles, 41 Bredon Grove, Poolbrook, Malvern, Worcs WR14 3JS. Tel: Malvern 62385.

■ Sony ICF2001 scanning Rx, £132. Microwave Modules 144/28MHz converter, £15. 6JS6C valves, £8/pr. All prices Irish pounds. Ron, 16 St Mary's Cres, West Port, Co Mayo, Eire.

■ SX200N scanner receiver - immaculate condition in original packing complete with handbook, etc. Will accept £150 cash for quick sale, uprating on HF. Tel: 01-299 0544, evenings. Dulwich, SE London.

■ Stereo music system HMP70, + speakers, SS5177, requires bearing on spindle, offers. Bell Howell super 8 sound camera + case, Halina manual, editor, splicer + tripod, never used. 1000 watt movie light - make me an offer or part exchange for radio equipment. G Norman, G1FLT, QTHR. Tel: Norwich (0603) 744573.

■ Sanyo beta video recorder, soft touch control, VHF UHF tuner, PAL, Secam, NTSC selection, camera input, remote control input, video in/out sockets. National colour 19in TV, VHF UHF tuner, video in/out sockets, 8 channel selector, PAL, Secam, NTSC selection. Both TV and video in very

good condition, ideal opportunity not to be missed. £300 for complete system. Mick O'Donnell. Tel: Milton Keynes (0908) 316052.

■ Trio TS711E and TS811E, as new condition, never used on full power. Purchased from Lowe listed dealer. Genuine reason for sale of these superb transceivers. TS711E £720, TS811E £830, or both £1500. Also AT230 antenna tuner, £120. G1EUG, QTHR. Tel: Wellingboro' 226009.

■ Home built 4 band Tx/Rx, RadCom 1984 article by Lorin Knight, all PCBs, plans, Xtals etc, 14 and 21MHz fitted. Spare PCBs for other bands. Needs tuning/setting up. Nearly complete, cost £150 for parts/case, accept £90 on, or exchange for 2m handle or 2m Tx/Rx cash adj possible. Ideally suited to re-vamp or for spares, this is an abandoned project and would like to sell. G1NGR, RW Sharman, 58 Lancaster House, Oxford Street, Preston, Lancs PR1 3RY.

■ Yaesu FT102 with FM board (not fitted) as new condition, £595. P Chamberlain, 9 Goffs Close, Crawley, Sussex RH11 8QB. Tel: Crawley 5152010

■ Yaesu FRG7700 Rx, Yaesu FRT ATU plus Yaesu FRV VHF converter discone Rx ant. Ex condition, buyer collects, £280 on or exchange for 934 equip. Dave Howes, 149 Warren Wood Road, Rochester, Kent. Tel: (0634) 404096.

■ New IC271E, boxed, unused, £550, or take in part exchange, FRG7700 etc, scanner, FT7B, 2m multimode mobile, all offers considered. Also for sale: FDK 700AX 5, 10, 100kHz steps, 144-148MHz with MARS sat band, boxed, £145. Belcom LS102 checked and serviced by R Withers, boxed £180. Mr T Waters, 42 Tregundy Road, Perran Porth, Cornwall TR6 0EF.

■ Yaesu FT101 160m to 10m including 11m bands transceiver, AM, CW, USB, LSB, ac mains and built in 12V dc unit. Microphone, LLL's RF clipper handbook and two new spare 6JS6C Jap PA valves. Fan fitted, super cond, £300 or swap for Yaesu 7700. G3EAY. Tel: (0799) 30763.

■ Trio R2000 receiver, fitted with VC10 VHF converter, two months old, £375. Apply 54 Coronation Avenue, Moordown, Bournemouth, BH9 1TW.

■ Yaesu FR101 receiver, complete with two metre and home brew digital frequency counter, £175.00. Also Yaesu FRG7 general coverage receiver, superb condition, £125. Tel: Wrexham 357612.

■ Sony 2001 receiver, state of the art. As new with PSU £75. HFSV 10-80 vertical with radial kit, 3 months in open, £50. Tel: 01-764 6767 evenings.

■ Duplicator, Gestetner 460S, automatic electric, in good working order, suitable for a club, £175 or exchange for a fairly modern two metre mobile or handheld. Tel: evenings, Chichester 779479 (long ring please).

■ Spectrum 48K complete system including interface I and microdrive, £138. Handles slow scan TV, RTTY, CW, log book, satellite etc. Also Multiface I, £37.50. Tel: 01-953 6921 (home) 01-953 9021 (work).

■ Eddystone 750 double super, 500kHz, 32MHz, 4 bands, £60. Woodson C50 Rx, 150kHz-4MHz, 14 transistors, 30 diodes, slide rule dial, S meter, BFO, £40. HRO with 3 band spread coils, power supply and LS, built in one cabinet, £35. All Rxs in very good condition, electrical and mechanical. Buyer collect and inspect. Mr H V Rayment, 5 Oakwood Drive, Bletchley, Milton Keynes, Bucks MK2 2JCT.

■ FT101ZD MK3, mint condition, incl book. Also FV901DM external VFO with 40 memories and auto scan. £500 the pair. Tel: (0227) 455725 evenings or w/ends, ask for Joe.

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■ Canon AE1/50mm, 28mm, 135mm f2.8, all boxed very good to mint, £210 or exchange for FT290R, TM201A, IC02E, any other 2 metre handheld or mobile considered, cash adjustment either way. P Gabel, 30 Showsley Road, Shutlanger, Towcester, Northants NN12 7RW.

■ Welz CP5 5 band vertical antenna, £65. Sanyo

DM8112CX 12 inch green screen monitor, £50. Olympus OM-1 SLR camera Zuiko f1.8 50mm lens, plus Paragon auto 2X converter lens, plus Rollei 121BC flash, £80. G3ZNE, QTHR. Tel: (0822) 66867.

■ Microwave Modules MMT 28MHz to 144MHz linear transverter as new, £65 carriage paid. John G3XKN, Toddington, Bedfordshire. Tel: (05255) 2207.

■ Winch, hand operated 2 speed with forward and reverse ratchet and 15 metres of stainless steel rope, never been used. Ideal for wind up and down towers, etc. £35 or will exchange for receiving ATU to cover HF amateur radio bands or WHY? Mike, 205 Moss Lane, Burscough, Nr Ormskirk, Lancs. Tel: (0704) 892088.

■ Shack clearance XF-9B filter plus USB/LSB xtals, £30. Shinwa LPF 1000W, £20. Heathkit HD-20 100kHz xtal calibrator, £6. 100kHz xtal oscillator modules, 5V supply, £5. 4.5-20pF small ceramic trimmers £1/20. 1mH chokes £1/20. 14 pin DIL sockets £1/10. Transformers 240V in 12-0-12 at 50mA out with screen £1. 100µA meters 59mm x 45mm £3.50. IN4004 £1/30. 5.1V zeners £1/20. P Smith, 3 Raven Avenue, Tibshelf, Derbyshire DE5 5NR. Tel: Ripley 874768.

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■ Yaesu FRG7700 HF receiver with FRT7700 ATU and FRV7700 converter, giving 140-150MHz, 50-59MHz and 118-130MHz. Boxed, good condition, £275. Tel: Daventry 76034.

■ Uniden CR2021 comms receiver plus Scarab decoder with software and lead. Interfaces with BBC B for RTTY. Both virtually unused. Sell together £199, (+£6 P&P) or split: receiver £145, (+£5 P&P), decoder £55, (+£3 P&P). Tel: Ian Crawford, Banbury (0295) 720812 or write: 3, Schofields Way, Bloxham, Banbury, Oxon OX15 4NS.

■ Multi MOD2 all channels, £80. Hygani 5 all channels, £60 ovno. Slim Jim aerial offers. SMC transverter 0-160MHz, £40. Tel: (0283) 221870.

■ Grundig Oceanboy 820 6W power SW Rx. Datong -AD370 + power supply Grundig C6000 mono R/c recorder. General CVRG Rx, lafayette HE30 0.5-30MHz, CW, SSB, offers please, buyer collect. Tel: (061 743) 1570.

## WANTED

■ General coverage HF receiver, Trio R600 or similar, must have SSB and digital frequency readout. Details and price to: G Miles, 7 Dobbin Close, Rawtenstall, Rossendale, Lancs BB4 7TH, Tel: Rossendale (0706) 220344.

■ FT707, FP707 PSU, FC700 ATU mic, etc, must be mint condition with manuals. Good price paid. Tel: (0282) 59320 after 5pm.

■ Trio R300 receiver, please write with price and details to Ted Kimber, Moorlands, Bishops Lydeard, Taunton TA4 3PG.

■ Yaesu FT480R multimode transceiver, no modifications. Must be in good condition. Cash. 3A Chapel Lane, Lathom, Nr Ormskirk, Lancashire L40 7RA. Tel: Burscough 894860.

■ Tencet argonaut, Trio TS120V or FT707. G4FUY QTHR. Tel: Reading 733633.

■ Rascal RA117 (with SSB adaptor and VLF converter if possible). Tel: Mr Robbins, Lymington 22979 (Hants). Will collect if not too far.

■ Yaesu FR50B Rx, FV50B VFO, any condition, prefer working. Also wanted, 2m transverter, 2m from 10m, willing to exchange a Cobra GTL-DX 27MHz multi-mode, AM, FM, USB, LSB, CW rig, working for either/both above, with a cash balance if required. All letters/cards will be answered. Urgent, any software for ZX81. Peter Hunter, 2 Huxley Close, Norwich, Norfolk NR1 2JS.

■ Matching companion Tx for my Drake 2B Rx. Must be Drake of the same era, CW + SSB QRP considered. Also wanted, any AR software for my Sinclair ZX81 and an Xtal calibrator for my Drake 2B Rx. Peter Hunter, 2 Huxley Close, Norwich, Norfolk NR1 2JS.

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<b>Dewsbury .....60</b>	<b>Sandpiper .....46</b>
<b>Edwardschild .....27</b>	<b>Scarab Systems.....18</b>
<b>Executive Recruitment.....38</b>	<b>Scientific Wire Co .....27</b>
<b>Hi-Tec World Wide .....40</b>	<b>Selectronic .....46</b>
<b>Keytronics .....52</b>	<b>SEM .....46</b>
<b>Marco Trading .....59</b>	<b>Technical Software .....29</b>
<b>Midland Radio Centre .....45</b>	<b>Telecoms.....33</b>
<b>Number One Systems .....40</b>	<b>Thanet Electronics .....4,5</b>
	<b>Reg Ward .....40</b>
	<b>R Withers .....2</b>
	<b>Wood &amp; Douglas.....18</b>

## Amateur RADIO

## ADVERTISING RATES & INFORMATION

DISPLAY AD RATES		series rates for consecutive insertions			
depth mm x width mm	ad space	1 issue	3 issues	6 issues	12 issues
61 x 90	1/8 page	£66.00	£62.00	£59.00	£53.00
128 x 90 or 61 x 186	1/4 page	£115.00	£110.00	£105.00	£92.00
128 x 186 or 263 x 90	1/2 page	£225.00	£210.00	£200.00	£180.00
263 x 186	1 page	£430.00	£405.00	£385.00	£345.00
263 x 394	double page	£830.00	£780.00	£740.00	£660.00

COLOUR AD RATES		series rates for consecutive insertions			
depth mm x width mm	ad space	1 issue	3 issues	6 issues	12 issues
128 x 186 or 263 x 90	1/2 page	£305.00	£290.00	£275.00	£245.00
263 x 186	1 page	£590.00	£550.00	£530.00	£470.00
263 x 394	double page	£1,130.00	£1,070.00	£1,010.00	£900.00

SPECIAL POSITIONS	Covers: Bleed: Facing Matter:	Outside back cover 20% extra, inside covers 10% extra 10% extra (Bleed area = 307 x 220) 15% extra
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DEADLINES		*Dates affected by public holidays			
issue	colour & mono proof ad	mono no proof & small ad	mono artwork	on sale thurs	
Jan 85	28 Nov 85	4 Dec 85	6 Dec 85	26 Dec 85	
Feb 86	2 Jan 86	8 Jan 86	10 Jan 86	30 Jan 86	
Mar 86	30 Jan 86	5 Feb 86	7 Feb 86	27 Feb 86	
Apr 86	27 Feb 86	5 Mar 86	7 Mar 86	27 Mar 86	

CONDITIONS & INFORMATION			
<p><b>SERIES RATES</b> Series rates also apply when larger or additional space to that initially booked is taken. An ad of at least the minimum space must appear in consecutive issues to qualify for series rates. Previous copy will automatically be repeated if no further copy is received. A 'hold ad' is acceptable for maintaining your series rate contract. This will automatically be inserted if no further copy is received. Display Ad and Small Ad series rate contracts are not interchangeable.</p>	<p>If series rate contract is cancelled, the advertiser will be liable to pay the unearned series discount already taken. <b>COPY</b> Except for County Guides copy may be changed monthly. No additional charges for typesetting or illustrations (except for colour separations). For illustrations just send photograph or artwork. Colour Ad rates do not include the cost of separations.</p>	<p>Printed — web-offset. <b>PAYMENT</b> All single insertion ads are accepted on a pre-payment basis only, unless an account is held. Accounts will be opened for series rate advertisers subject to satisfactory credit references. Accounts are strictly net and must be settled by the publication date. Overseas payments by International Money Order or credit card. <b>FOR FURTHER INFORMATION CONTACT</b> Amateur Radio, Sovereign House, Brentwood, Essex CM14 4SE. (0277) 219876</p>	<p>Commission to approved advertising agencies is 10%. <b>CONDITIONS</b> 10% discount if advertising in both Amateur Radio and Radio &amp; Electronics World. A voucher copy will be sent to Display and Colour advertisers only. Ads accepted subject to our standard conditions, available on request.</p>



# DEWSBURY



# ELECTRONICS



**FRG 8800 £475**



**TRIO R600 £299**



**NRD 515 £965**

## IF IT'S TRIO IT MUST BE DEWSBURY

A FULL RANGE ALWAYS IN STOCK

APPROVED  
**TRIO**  
DEALER



**TRIO R2000 £479**

APPROVED  
**TRIO**  
DEALER



**IC - R 71E £699**

### NEW PRODUCT NEWS

**IF YOU'RE THINKING ABOUT CW  
YOU MUST READ THIS!**

- ★ Iambic Keyer ★ Dash/Dot Memory
- ★ Keying Speed 1 - 55 wpm ★ Built in Side Tone Oscillator And Speaker
- ★ Headphone Socket ★ Variable Weight Control
- ★ Side Tone Volume and Pitch Control
- ★ Switchable Automatic/Semi Automatic Keying/Tune Control
- ★ Operation from Internal Batteries or 9 - 15v. External Supply ★ Low Current Drain
- ★ British Made
- ★ Selectable Positives or Negative Keying

**5 YEAR GUARANTEE**

Only £49.95 + £3.00 p&p to include External Power Leads and Plugs

**NEW AFR1000**  
now available, fully automatic  
decoding of RTTY CW AMTOR/  
SITOR and ASCII  
now available from £265

**SAE for Full Details**



**STAR MASTER - KEYER**

Stockists of DAIWA — MET ANTENNAS — MUTEK — WOOD & DOUGLAS — TASCOS TELEREADERS —  
MICROWAVE MODULES — ICs AMTOR — AEA PRODUCTS — DRAE

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

**Telephone: Stourbridge (0384) 390063/371228**

**Telex: 337675 TELPES G**



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

