radio communication

May 1974

journal of the Radio Society of Great Britain

radio communication

Volume 50 No 5 **May 1974** Price 40p

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Radio Communication **is published by The Radio Society of Great Britain as its official journal on the first Tuesday of each month and is sent free and post paid to all members of the Society**

ABC
MEMBER OF THE AUDIT BUREAU OF CIRCULATIONS

17,513 copies per issue average circulation in 1973

Contributions and all correspondence concerning the **content** of *Radio Communication* should be addressed to: The Editor, *Radio Communication*, 35 Doughty Street, London WC1N 2AE. Tel 01-837 8688. (**Circulation** queries should be addressed to: The General Manager, RSGB.)

Closing date for contributions unless otherwise notified: 4th of month preceding month of publication.

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Crystal oscillator: 116MHz (zenered)
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Power supply: 35mA at 12 volts typ.
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I.F.s available ex-stock: 14-16, 18-20, 24-26, 27·7-29·7, 28-30MHz. Price inc VAT **£16.72**

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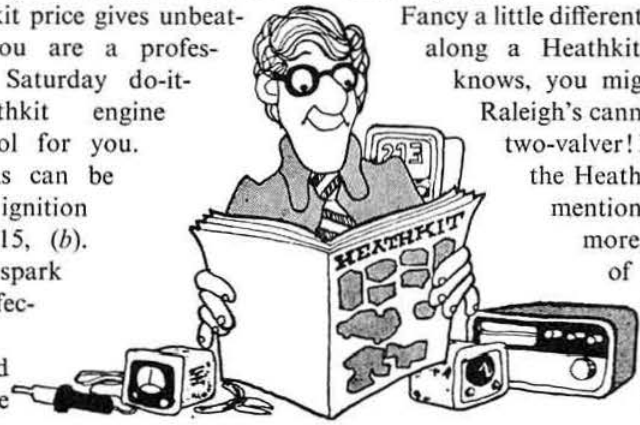

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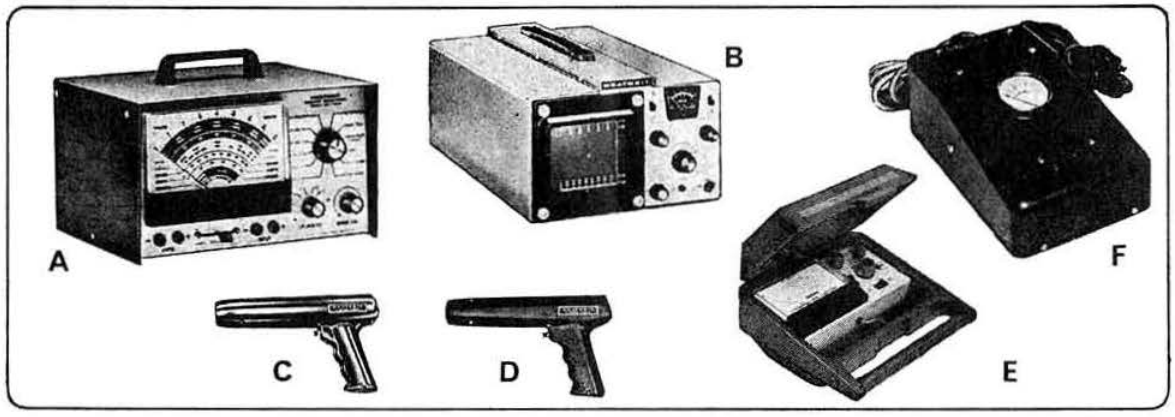

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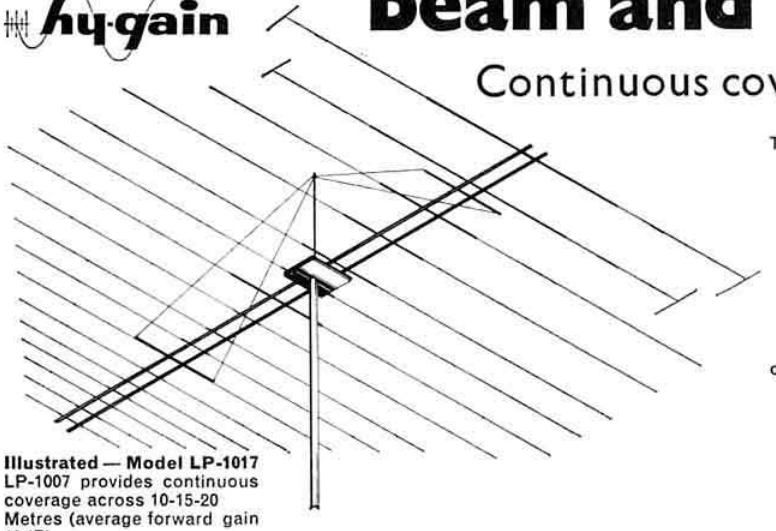

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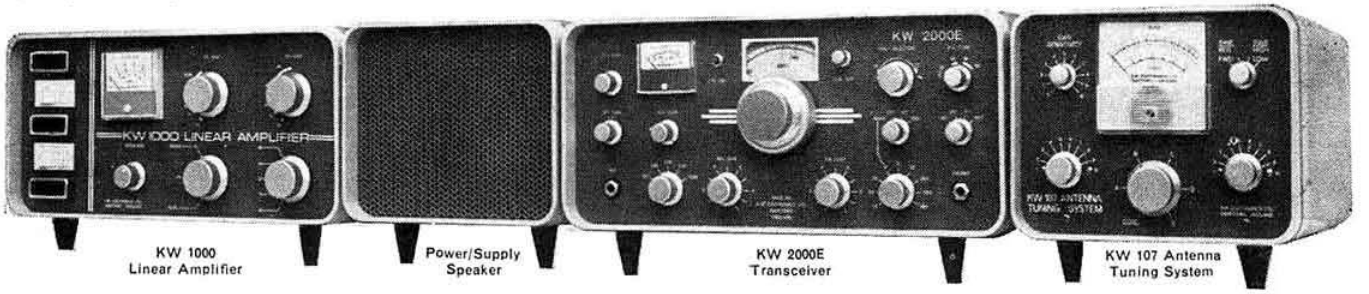

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QTC AMATEUR RADIO NEWS

"Radio Amateurs Handbook", 1974 edition

We regret that some four to six weeks' further delay is likely before copies of the paper-back version of the ARRL *Radio Amateurs Handbook* are in stock. No despatch date from the USA has yet been received for the hard-back version.

"Ham Radio Magazine"

A mail bag containing copies of *Ham Radio Magazine* for March 1974 has been damaged by sea-water. We have asked for replacement copies to be sent in bulk to RSGB HQ so if any member who has not received the March issue, or has received a damaged copy, will let HQ know, we will send a replacement as soon as received from the USA.

"CQ-DL" subscriptions

The German national society, DARC, will accept subscriptions to their journal, *CQ-DL*, at a cost of DM12 per year, including postage by surface mail. For subscribers in the UK the air mail surcharge will be DM12 annually. An amount of DM2 should be added to the remittance by money order or cheque to cover banking charges. With the present fluctuations in foreign exchange rates no firm sterling currency equivalent can be quoted, but at the present time £1 = DM6 approximately. Subscription orders should be sent to DARC, PO Box 1155, D-3501 Baunatal 1, Federal Republic of Germany.

Facts and figures

The MPT advises that the following numbers of amateur licences were in force at 28 February 1974:

Class A	14,964	Class B/M	1,224
Class B	4,499	Television	261
Class A/M	3,104		

The latest Callsign Record received from the MPT, dated 30 March, gives the latest callsigns issued in the G4 and G8 series as G4CXU and G8IQZ respectively.

At the end of March RSGB membership totalled 17,176, made up of 14,420 UK corporate, 1,077 UK associate members and 1,679 overseas members.

4U1ITU

The station of the International Amateur Radio Club located in the headquarters of the International Telecommunication Union in Geneva has been relocated on the third floor of the original building.

Following this move the opportunity has been taken to re-equip the station and this has been done with the co-operation of IARU Headquarters, IARU Region 1, ARRL and RSGB. The new furniture and equipment will be formally handed to the Secretary-General of the ITU, Monsieur M. Mili, at a reception to be held on 17 May 1974, which is the date of the 6th World Telecommunication Day.

Advance notice

Scottish VHF Convention and Region 10 ORM

28 September 1974

To be held in the Tower Building Lecture Theatre of Dundee University from 2pm to 5.30pm. It will be preceded by a meeting of RSGB Zone G Representatives at 10am, and followed by a dinner at the Angus Hotel, nearby, at 6.30pm.

Provisional prices: Convention only, 40p; dinner only, £2; convention and dinner, £2.25.

Further details will be published later.

Pocket calculators and the RAE

Candidates for the Radio Amateur's Examination are advised that the City and Guilds of London Institute has decided that, for the time being, the use of electronic calculators (pocket or otherwise) shall **NOT** be permitted in Institute examinations.

This is an interim decision arrived at after consideration and enquiry over a period of 12 to 18 months. Consideration of the matter continues and when a final decision is reached early notice will be given to colleges and examination centres.

Candidates for Institute examinations will continue to be able to use a slide rule whenever they wish and this instrument is quite adequate for any examination as currently presented.

A letter from the City Guilds of London Institute containing this information was received at RSGB HQ on 22 February 1974 and the Institute confirms that it is still applicable at the time of going to press.

GB2ITU

The period of operation of GB2ITU, from 21 to 27 March, resulted in a large number of contacts being made on all bands from 3·5 to 28MHz. Most of the dx was on 21MHz, but there

Kevin Woods, G8HAS, operating GB2ITU, with John Stuart, A8325, writing QSL cards and Tim Hughes looking on (*Photo: Timothy Trew*)

Advance notice

North-West Amateur Radio Convention

Lancaster University
14-15 September 1974

The convention will once again make use of the excellent facilities of the University, including full accommodation for those requiring it, with a dinner on the Saturday evening.

Attractions will include lectures and demonstrations on various subjects—hf to uhf, portable working, propagation, lunar studies, etc. There will also be a trade exhibition.

Prices are: Weekend, £7.50; Saturday, £3.50; Sunday, £2.50.

Full programme details will appear in July, meanwhile for reservations and further information please write to: The Secretary, Amateur Radio Society, The University, Lancaster LA1 4YQ.

were a number of highly successful QSOs on 28MHz. Members of Tonbridge School Radio Club operated the station, under the supervision of Tim Hughes, G3GVV. The equipment was all KW, used in conjunction with separate dipoles for 3·5 and 7MHz, and a TH3 for the higher frequencies. QSL cards for every successful contact were sent to the QSL Bureau on 28 March.

GB2ITU will be on the air again from 9 to 19 May in connection with World Telecommunication Day.

QSLs of the late GC4LI

Mrs M. Le Dain, widow of the late H. E. Le Dain, GC4LI, who died on 24 January, has kindly agreed to deal with requests from anyone awaiting a QSL from GC4LI. Her address is Erin Villa, Samares, St Clement, Jersey, CI.

Change of name for Wrekin ARS

The Wrekin Amateur Radio Society has been reconstituted as the Telford and District Amateur Radio Society. The secretary is Mr J. Allwood, G4AXZ, Old School House, Acton Burnell, Salop.

International visits

A French amateur, Etienne Cattiaux, F6BUE, seeks accommodation for approximately one month, July/August, for himself, his wife and two-year-old son, with an English family (preferably vhf minded) where he can improve his knowledge of English and learn something of vhf conditions in the UK. Any member who can help is asked to write to F6BUE at 15 Rue E. Verhaeren, 59-880, St Saulve, France.

An exchange visit is proposed by a 19-year-old Italian amateur, Franco Pizzingrilli, 16PZL, whose address is Via Rufo 13, 63100 Ascoli Piceno, Italy. He would like to stay with an English family where there is an amateur, for three to four weeks, and where a boy or girl of the family could spend a similar period with his family either before or afterwards. Similar arrangements for his 16-year-old brother are also suggested.

OBITUARIES

The Society records with regret the deaths of the following amateurs.

Mr E. J. Chipperfield, G3LKT
Ernest "Chips" Chipperfield, of Salisbury, died on 19 February, aged 48. He was a member of Salisbury RC and was well known with his guide dog Imber.

Mr H. Gannicot, G3VLV
Harry Gannicot died in early March. He had been off the air for a couple of years, after a period of Top Band and ssb dx interest, but was re-equipping for a return with a new interest in vhf.

Mr D. Calcott G3FTG
Doug Calcott, a former chairman of the Stratford-upon-Avon Radio Club, also died in early March. Although seldom heard on the air in recent years he could not resist a bargain at junk sales to add to his collection for future projects.

Mr W. Houghton, G3NCH
Bill Houghton, a member of the East Lancs Radio Club, died on 2 March at the age of 52. His voice was well known in East Lancashire and he was active on all bands. Until recently, home-constructed equipment was his special interest.

Sqdn/Ldr E. M. Kerr, G3HTY
E. Kerr, who was active on hf and vhf bands died in Kidderminster on 17 February aged 70.

Mr G. S. Morrison, G2ADJ
Geoff Morrison, a member of Wolverhampton ARS and a founder member of the original Walsall and DARC, died on 12 March. Popular and always ready to assist, he had many morse pupils over the years.

Mr M. F. Dai Williams, GW3RPR
Dai Williams died on 14 March at the age of 50. He was this year's secretary of the Pembroke & DARC, and was a hard worker for the hobby.

Practical 10GHz Gunn oscillators

by DAIN EVANS, G3RPE*

GUNN oscillators are an attractive means of generating useful amounts of power at 10GHz. Compared with klystrons, a widely used alternative rf source, they have the advantages of requiring a relatively simple power supply (typically up to 10V at 150mA for low power devices), they drift little on switching on, and can be tuned perhaps up to 500MHz by a single knob control. Like klystrons they are easily modulated to produce wide-band fm of highly acceptable quality, and can be readily fitted with an automatic frequency control. Most important, Gunn diodes, the low-power types only, are available on the surplus market at a moderate price. At present high power versions which generate typically 500mW do not yet seem to have percolated through to the surplus market.

The output power of the low-power types, of which the Mullard CXY11 series are examples, is in the range 5 to 15mW. This makes them ideal as local oscillators for receivers where the reserve power available, 10 to 15dB, makes possible a simple yet efficient method of oscillator injection. This level of power is also adequate for a transmitter: the potential range over line-of-sight paths to be expected varies from about 50 miles when using dishes 1ft in diameter to 1,000 miles when using dishes 3ft in diameter [1]. Practical experience supports these estimates: a UK record of 154km was first established using low-power Gunn oscillators in both transmitters—and there was 20dB in hand.

Many oscillators which have been built prove very difficult to get to work properly. Most problems appear when an attempt is made to tune them over a usefully wide range, when erratic tuning is observed. At its simplest, this may be due to poor mechanical design or bad engineering, and is easily rectified. A common fault is frequency jumping: as the tuning mechanism is operated, the frequency changes progressively and then jumps by perhaps a few megahertz or even hundreds, to continue tuning in a different mode. In other cases, the oscillator may stop oscillating, remain tuned to the same frequency—or even tune backwards. Other faults observed are the undue sensitivity of frequency to the match of the load or to the applied working voltage (which can raise problems in modulating), and the generation of spurious outputs.

These latter faults are rather difficult to understand as it is common experience that a particular Gunn diode behaves differently in a particular cavity: a "bad" diode in one cavity can give excellent results in another, even if this is of identical design. The "rule" of semiconductors, that if the circuit does not work then change the semiconductor first, seems to have even greater significance with these negative resistance devices. For this reason it is not possible to present a sure-fire design which will guarantee success with all diodes. What can be done, however, is to present various designs which individuals have found to work well, to point out the significant features of each type, and to make some general points on constructing these oscillators.

It must be emphasized that much of the so-called design is quite empirical and frequently depends on the individual's

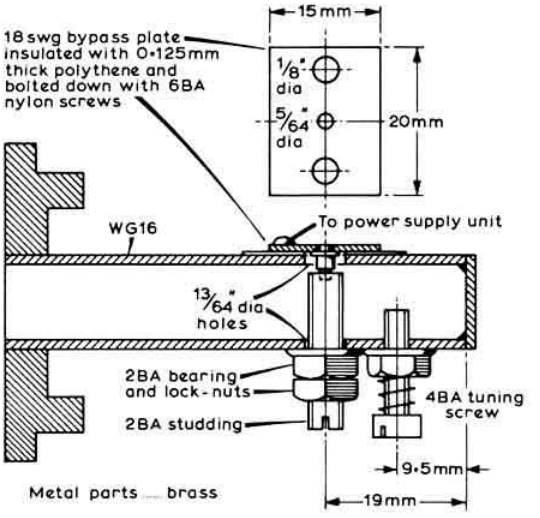


Fig 1. A simple Gunn oscillator by G2RY

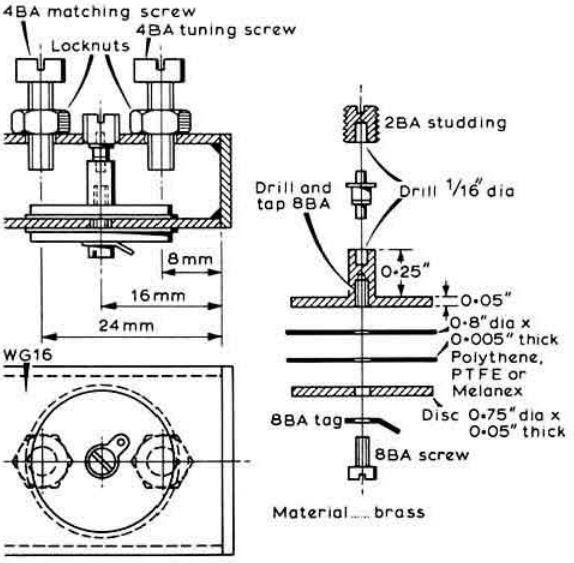


Fig 2. The GM8BKE design for a simple Gunn oscillator

* 4 Upper Sales, Chaulden, Hemel Hempstead, Herts.

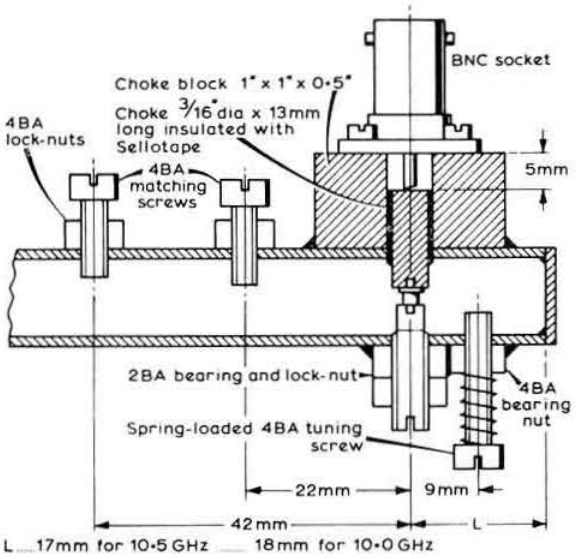


Fig 3. G8DEK design. Note the use of critically spaced matching screws

sense of engineering and components available. For example, the diameter of the choke feed in a number of designs is 0·375in. This started as being one person's view of what appeared to be about right, and grew by default into a "standard". There is no reason to believe that one 0·3 or 0·25in in diameter should not be used if this is more convenient. It is hoped, therefore, that people will be tempted to experiment with modified designs to suit their ideas and facilities, and that they will pass on the results of their experience.

Practical designs

Just how simple an oscillator can be is shown by Fig 1, due to G2RY. The design is based on an even simpler one contained in a Mullard pamphlet [2] which unfortunately is no longer in print. As mentioned above, many of the problems with Gunn oscillators result from trying to make them tunable. G2RY avoids this by using one oscillator as a transmitter preset in frequency, and a second as the fixed-frequency first local oscillator of a double superhet, the second i.f. at vhf being the one tuned.

The method of construction is evident from the figure. Note that in this design, and in the others described later, the Gunn diode is positioned centrally within the guide.

A similar design, due to GM8BKE, is shown in Fig 2. So far, six have been built and all have performed reliably. As with the G2RY device, the tuning screw is used to set the frequency of oscillation and is then fixed by the lock nut. Tuning the receiver again is done via a tunable i.f., in this case by a standard 110 to 170MHz fm receiver. With the dimensions given, the normal tuning range is 10·0 to 10·2GHz, although the maximum tuning range at reduced power output is 9·9 to 10·3GHz. The pillar and disc on which the diode is mounted may be made from separate pieces to be bolted together with the 8BA screw when the whole choke assembly is put together.

From what has been said earlier, rather more complicated designs are to be expected if the oscillator is to be tuned, and the one given in Fig 3, due to G8DEK, is an example of this. The rf choke is designed to have a low Q to reduce the tendency of the Gunn diode to resonate with it, and is larger in diameter than in some other designs to place extra capacitance across the diode. Another feature is the use of two matching screws which are critically spaced from the diode. A basically similar design by the author is shown in Fig 4. It was published some time ago [3] and about half of the oscillators made have worked well. The use of a wedge to ease the problem of matching the diode to the guide does not appear

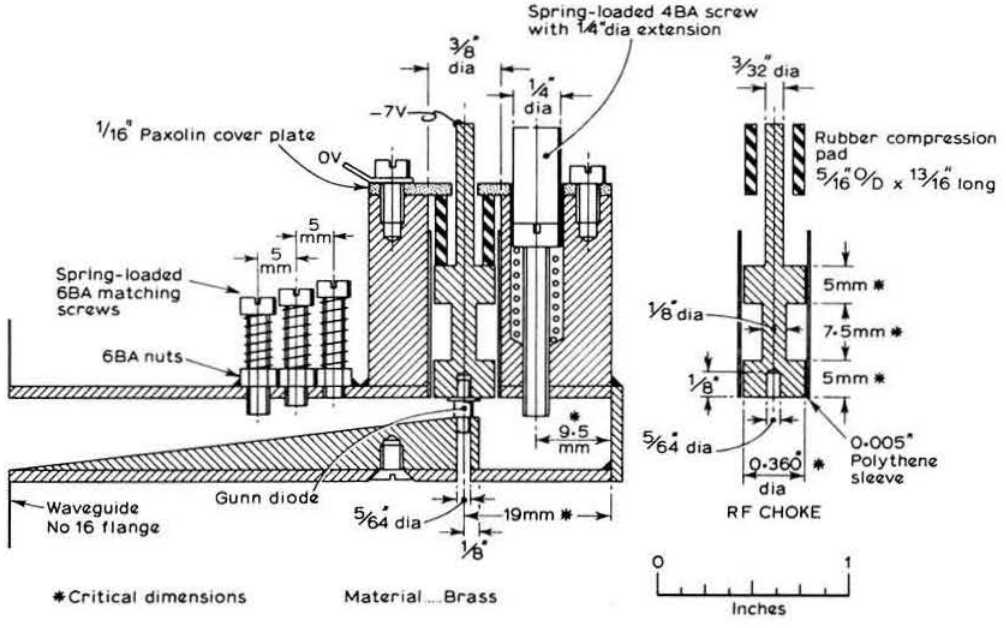


Fig 4. G3RPE design, illustrating a method of supporting the tuning screw

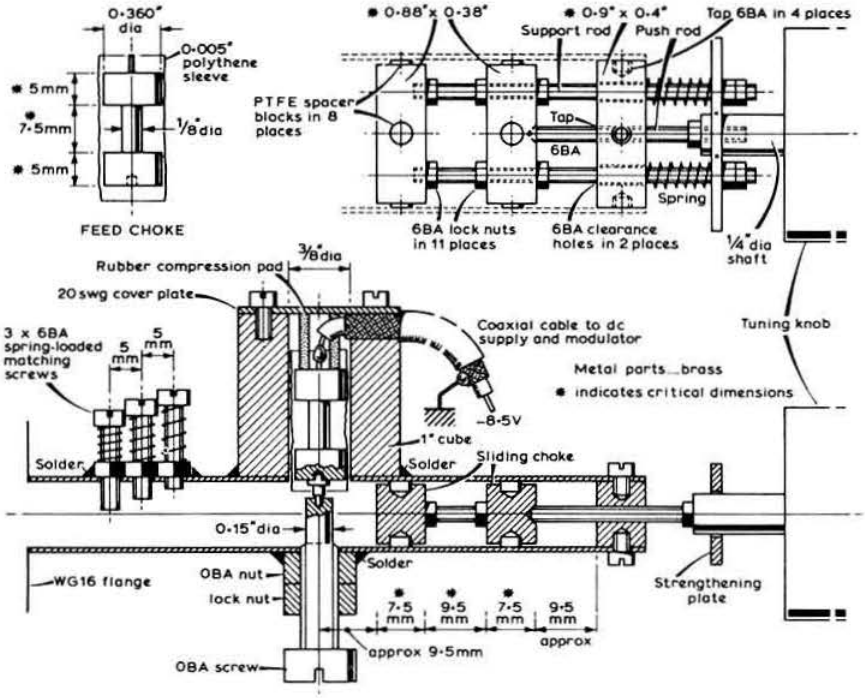


Fig 5a. G3ZGO design, using a sliding short for tuning

in the light of experience to justify the extra effort involved in its manufacture and fitting. However, the design is worth showing again to illustrate one method of engineering the tuning screw assembly which has proved reliable in use over the years. The ¼in diameter shaft is driven by a 6:1 reduction drive via a flexible coupler.

These last two designs also indicate a difference in philosophy with regard to terminating the dc feed. The first uses a conventional coaxial socket which gives improved screening and is neater and safer. The second has the end exposed so that it can be more easily checked that it is "cold" to rf, or if not, something can more easily be done about it.

In these three designs, the maximum frequency of oscillation is set mainly by the length of the cavity formed between the diode and the closed end of the waveguide. Inserting the tuning screw lowers the frequency. The cavity is electrically $\lambda/2$ long. Its physical length approximates to $\lambda_g/2$, where λ_g is the wavelength in the waveguide in use. For waveguide 16 usually employed (inside dimensions 0·4in × 0·9in), λ_g is equal to 39·70, 39·02 and 38·37mm respectively at 10·0, 10·1 and 10·2GHz. These figures also give a guide to the degree of accuracy required in construction: a difference in length of 1mm corresponds to approximately 300MHz. To achieve the required level of accuracy in manufacturing, the author has found it easier to first define the position of the diode by drilling a pilot hole through both walls of the guide, and then carefully trimming to the necessary length, rather than trying to drill the hole a precise distance from the end. A convenient method of measuring the length is to reinsert the drill in the holes and measure the length between the end of the guide and the outer face of the drill, and then, of course, subtract half the diameter of the drill. A second approach which can also be recommended is to close the guide with a fairly tight fitting brass block, and firmly clamp it in place with several screws after its position has been adjusted.

The G3ZGO design given in Fig 5a is similar to those above. the essential difference being that the tuning is done by varying the effective length of the cavity directly rather than by a tuning screw. Because the tuning rate is very high (hundreds of megahertz per mm), precision in the manufacture of the drive mechanism must be of a high level if smooth tuning is to result. That this can be achieved by nominally unskilled amateurs with limited facilities (no offence intended) is one of the more surprising aspects of this type of activity; that it can be achieved using unsophisticated components is a feature of this particular design.

A more complex drive is shown in Fig 5b in which the mechanics for aligning the sliding choke accurately are separated from those for moving it. Any free movement in the rear bearing has a reduced effect because of the long lever used. The drive mechanism shown uses a micrometer head which produces a backlash-free drive and which also provides an accurate calibrating facility. Alternatively, an ordinary screw can be used. In both cases a reduction drive is necessary.

It is also important that the sliding choke is a good fit in the guide so that it cannot wobble, and that it either makes excellent electrical contact with the guide or that it is reliably insulated: partial contact results in erratic tuning. In the designs shown in Figs 5a and 5b, the choke is "floated" on pips of dielectric protruding about 0·010in. The method used by G3ZGO to make an accurate insert is to drill a ⅛in diameter hole about ⅛in deep in the choke, and to press in a suitable piece of dielectric: the body of a standard ptfe feedthrough insulator is ideal. The ptfe is cut off flush with the surface and the insert is removed with a needle. The bottom

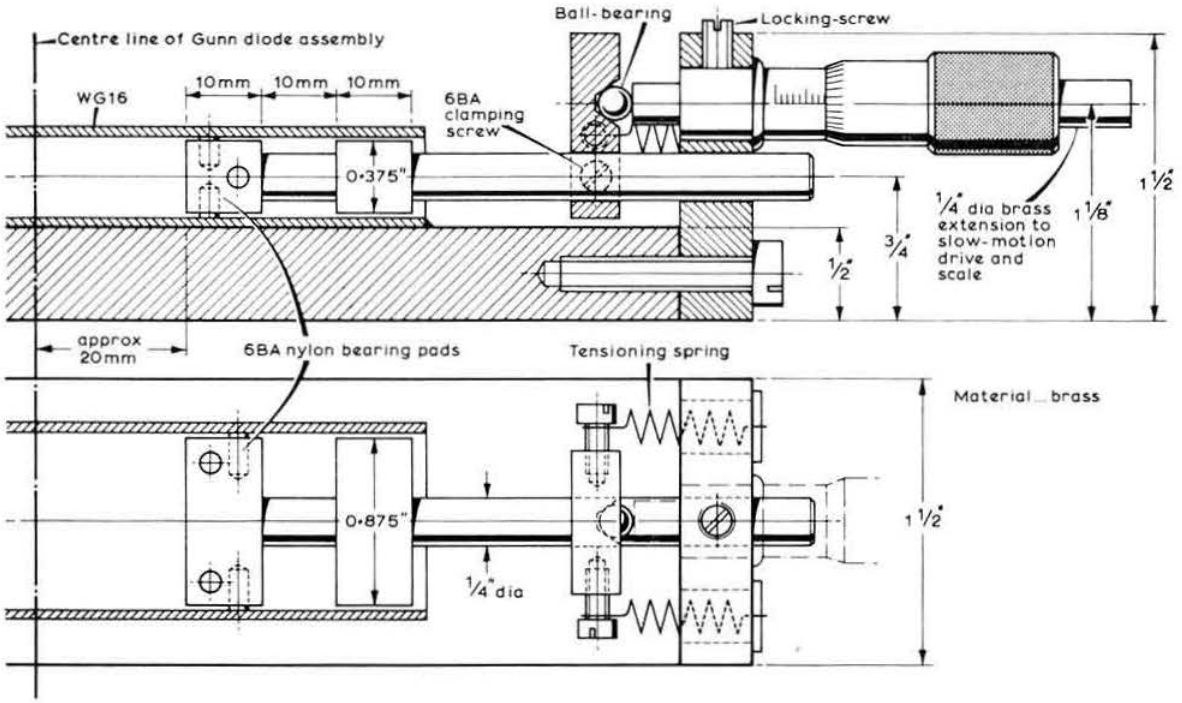


Fig 5b. Alternative drive mechanism

of the hole is then packed with material of thickness equal to half the difference between the size of the choke and the dimension to be fitted, and the insert is finally replaced.

The method used by the author is to drill a 6BA tapping hole in the choke and tap a thread just sufficient to take a 6BA screw. A nylon screw is screwed in, tightened and cut roughly to length. Using silicon carbide paper, the insert is progressively trimmed until the total thickness as measured with a micrometer is, for example, 0·3875in (0·375 + 0·0125). This is repeated with the opposite insert and trimmed until the total thickness is 0·400in. When all the inserts are fitted, they are gently rubbed down so the choke is a smooth sliding fit in the piece of waveguide to be used. By means such as these it is quite easy to work within fractions of a thousandth of an inch, and thus effectively eliminate play.

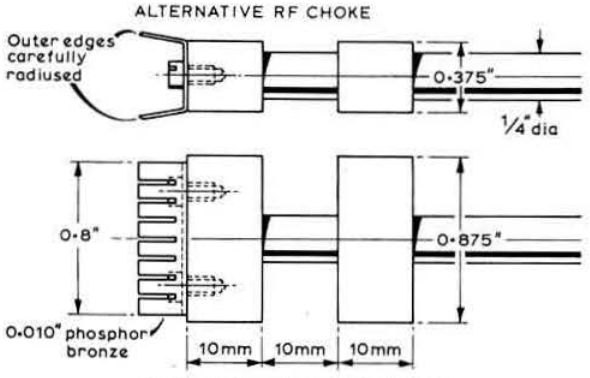


Fig 5c. Alternative choke design

In the alternative method of making chokes shown in Fig 5c, good electrical contact is ensured by using fingering. The ends of the fingers should be carefully radiused with fine

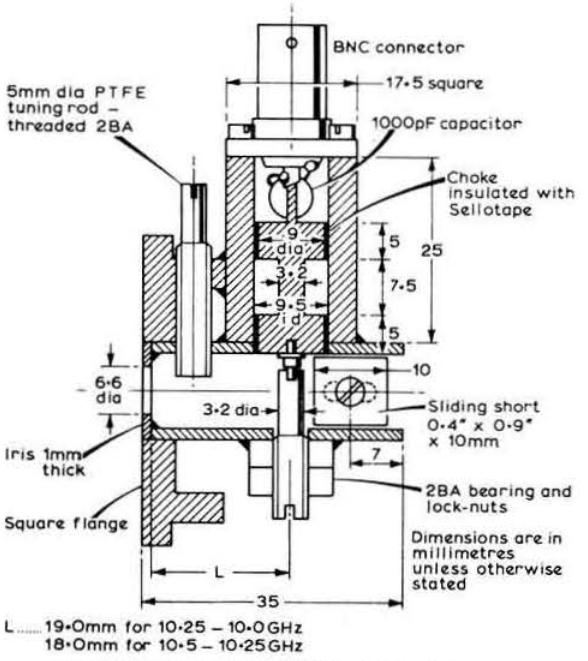


Fig 6. G3WJG design with dielectric tuning screw

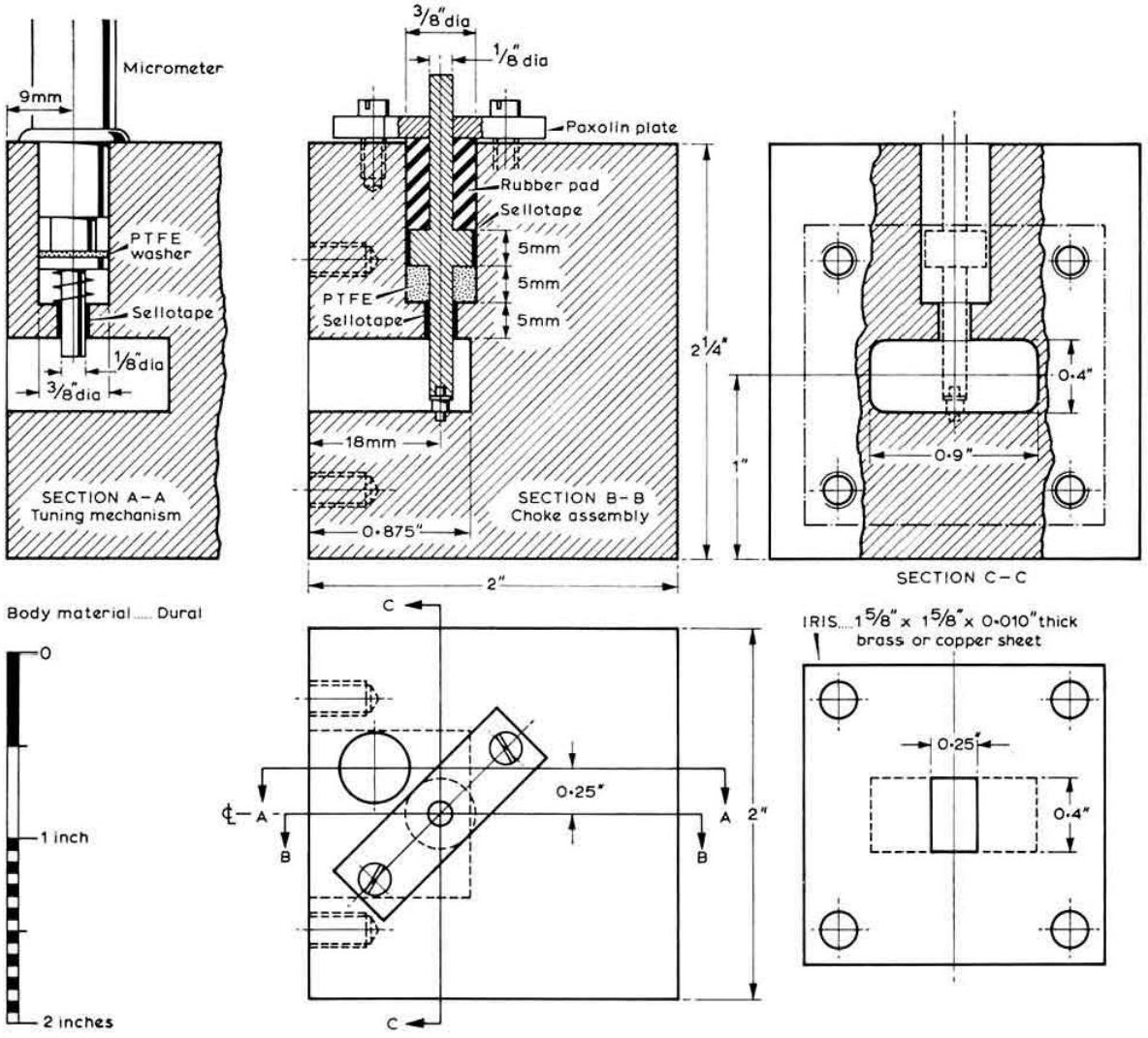


Fig 7. G8APP design. Note the use of an external iris plate and choked tuning screw

silicon carbide paper so that adequate contact pressure can be used without scoring the walls of the waveguide.

The designs given in Figs 6 and 7, due repectively to G3WJG and G8APP, show the different realizations of the same basic design: a sketch is given in "Gunn Diode Application Notes" by Microwave Associates. In these oscillators the upper frequency is set mainly by the length between the diode and the iris: the length between the diode and the rf short is uncritical and is optimized for maximum power output. A significant feature of the G3WJG design is the use of a dielectric tuning screw which tunes about 250MHz for eight turns. With this oscillator care must be taken to prevent a short circuit between the rf choke and the sliding short.

The design by G8APP has a number of notable features: the use of a massive dural block to provide a large thermal mass; the tuning screw mechanism itself and the fact that it is offset to reduce the rate of tuning; and the use of a separate iris which is clamped between the body of the oscillator and the flange terminating the external circuit. The latter feature has two advantages. Firstly, the size of the hole is quite critical: if too large, the frequency of oscillation is unduly affected by the external circuitry, and if too small, the power output is limited: ease of changing the iris is a useful facility. The second advantage is that it allows the length of the cavity to be adjusted, which is valuable as there is always some uncertainty about the precise frequency a particular cavity will tune.

The design given in Fig 8 is an attempt by the author to combine the best features of the G8APP and G3WJG designs: it uses both the general method of construction and the dielectric tuning of the latter design, and the choke and externally fitted iris of the G8APP design. Four oscillators

have so far been made, and all have been reliable even when using diodes which have behaved erratically in other cavities. The only setting up that has been used was to increase the voltage applied until oscillation was reliable both in starting and running, and to adjust the position of the rf short to maximize the output.

The dielectric tuning mechanism has been found to work most smoothly over a tuning range of at least 300MHz, the tuning rate being about 30MHz per turn. A nylon screw also works well, producing a faster tuning rate, but is probably more prone to loss. The positions of the band-set and the tuning screw may of course be interchanged.

The only critical dimension in its design is the length of the cavity from the centre line of the diode to the face of the flange: the frequency of oscillation varies by about 300MHz/mm. However, it is quite practical to raise the maximum frequency of oscillation of a cavity significantly by machining off the appropriate thickness of metal from the face of the flange, even without dismantling the cavity! It would probably be satisfactory to lower this frequency by fitting a spacer between the flange and the iris plate.

The method of constructing the body of the oscillator can be as follows:

(*a*) Drill a hole (No 52 drill or similar) through both broad faces of the waveguide about 20mm from the flange end.
(*b*) Drill the choke plug initially with this drill.
(*c*) Drill a 5/16in diameter hole in the choke block off centre so that the dimension *x*, as given in Fig 8, plus the thickness of the flange to be used is equal to the length of cavity required.
(*d*) To jig for soldering, fit the drill in the holes in the waveguide, slip on the choke plug, fit the choke block and slide on the flange until it meets the choke block. After soldering, open out the hole in the plug to 9/64in diameter.

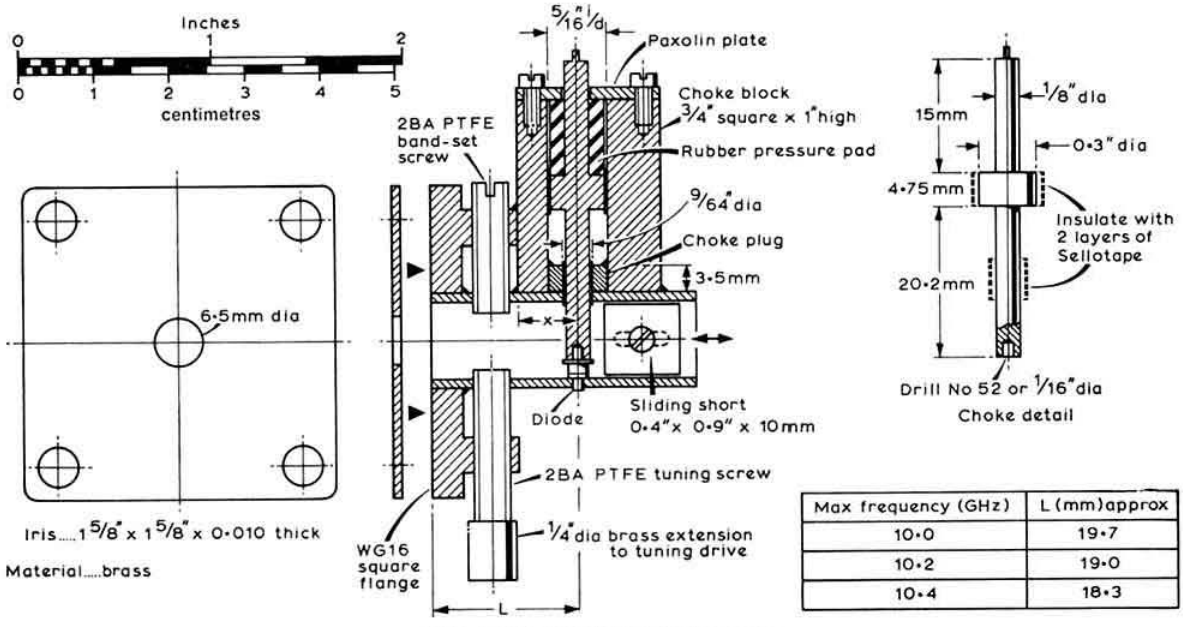
The tuning of Gunn oscillators

Although Gunn oscillators can be tuned by varactors, amateurs do not seem to have explored this technique, presumably because suitable varactors are not yet available at amateur prices: as has been illustrated above, mechanical tuning methods have been preferred. Some important points with regard to sliding shorts have been made earlier: the following makes points about tuning screws and of improving their reliability of operation.

The tuning rate of a metal screw depends on the degree of penetration, and ranges from a few megahertz per turn as it just enters the guide up to tens of megahertz per turn when several millimetres are inserted. It is desirable, therefore, that the tuning screw should be operated with the minimum penetration for the most reliable operation. This implies that the highest frequency required should be set by other means: for example by adjustment of the physical length of the cavity, or by a second tuning screw which is firmly locked in position after setting; the length of the screw inserted being clearly well defined. With a metal tuning screw there should be reliable electrical contact between the screw and the thread in which it runs. This is aided by limiting the number of threads in contact to three or four, tapping the thread only sufficiently to clear the screw, and the use of an adequate spring to eliminate backlash.

The tuning screw itself should be well supported so that it cannot wobble (see Fig 4), and care must be taken not to unduly load it by the external drive mechanism. Note that if one screw is a little loose in its thread, there is usually sufficient variation in a selection of screws to enable a better fitting one to be found. Gold plating of the contact surfaces would probably be an advantage, although this has not been tried by amateurs as far as is known.

An attractive method of avoiding contact problems is to use a dielectric tuning screw, which is a feature of the designs shown in Figs 6 and 8. It needs to be of a larger diameter than



Max frequency (GHz)	L (mm) approx
10·0	19·7
10·2	19·0
10·4	18·3

Fig 8. Modified G3WJG/G8APP design

the corresponding metal screw. Ptfe appears to be an ideal material, although a sharp die is necessary to cut a clean thread. As noted above, the tuning rate for a 2BA screw is about 30MHz per turn: if this rate is inconveniently low it may be practical to use a screw of larger diameter or possibly one of a material such as nylon if the extra loss can be tolerated.

A second method of avoiding contact problems is shown in Fig 7, in which the "cold" end of the tuning screw is defined electrically rather than mechanically by a $\lambda/4$ choke. A variation on this technique would be to use the micrometer shaft itself as the tuning element in a way similar to that described for an absorption wavemeter [4]. To reduce the high tuning rate to be expected, the micrometer shaft should be as small in diameter as is available, and should be offset from the centre of the guide.

Finally, as much care should be lavished on the design and construction of the tuning drive and scale as that at lower frequencies. After all, the demands on precision, at least one part in a thousand, are of the same order.

Precautions with Gunn diodes

Gunn diodes are relatively indestructible devices: being quite small (see Fig 9 for typical dimensions), probably as many have been lost by dropping as by overloading. However, there are a number of precautions which should be observed in their use:

(*a*) With low power diodes there is no major heat-sinking problem. Diodes may therefore be used either end up to suit the polarity of the rest of the equipment, although their thermal stability will be improved if the heat sink end is connected to the body of the cavity rather than to the choke system. To improve heat-sinking, the heat-sink end of the diode should be a tight fit in its mount and the contact area should be maximized by removing burrs. A trace of heat conducting grease may be applied to this connection. Although the encapsulation is quite strong in pure compression, shear forces should be kept very small. The flanged end of the diode should therefore be a loose mechanical fit in its mount to allow for any misalignment.

(*b*) The diode must never be operated with reversed polarity. They require 7 to 10V at 140mA under normal operating conditions. At lower applied voltages a much higher current is drawn, so the full working voltage should be applied directly.

(*c*) Being negative resistance devices, the diodes will tend to oscillate with any stray inductances. They are particularly prone to produce spurii at vhf and to prevent this Microwave Associates suggest a suppressor consisting of a 10 to 100Ω resistor in series with a 0·01μF capacitor fitted at the cold end of the rf choke feeding the dc. The author has heard of two failures which were attributed to parasitic oscillations at *audio* frequency due to the diode being operated via the secondary of a modulation transformer, the primary being undamped. It is also worth fitting a zener diode at the cold end of the rf choke to eliminate voltage spikes. It should be rated at about 0·5V above the maximum working voltage, including modulation and afc voltages.

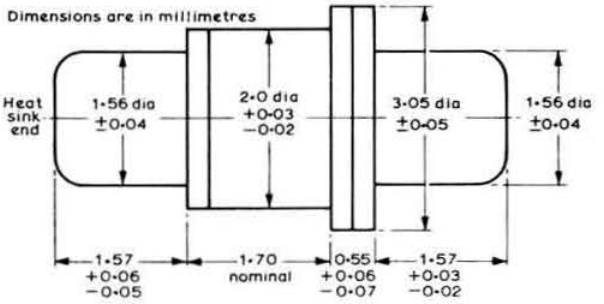


Fig 9. The outline dimensions of a typical low power Gunn diode encapsulation

(*d*) With more powerful diodes there is the risk that the power density at the end of the waveguide may exceed the maximum safe level of 10mW/cm². The density falls to a much lower level even at a few inches away from the end of the guide, but nevertheless care should be taken at all times.

Setting up and operating

Wide-band operation in the UK is firmly established in the range 10·0 to 10·1GHz, with preferred operating frequencies at 10,035 and 10,065MHz, and the oscillators should be set up with these frequencies in mind. A psu, wavemeter and some means of indicating relative power levels are the minimum necessary equipment. The latter could conveniently be a mixer/detector, but if fed directly it should be via an attenuator of at least 5 to 10dB to prevent damage to the mixer diode and to provide a reasonably well matched load for the oscillator. Alternatively, a convenient test unit can be the transmitter or receiver with which the oscillator is to be used, an example of one configuration of which is given in an earlier article [5]. This article also gives references to the design of components which may be used.

The psu should be stabilized, but not necessarily to the highest standards as the frequency sensitivity to voltage is usually less than 20MHz/V, depending on the Q of the cavity and the applied voltage. It should be adjustable over the range at least 7 to 10V, and to be able to supply up to about 200mA. Before use it should be checked that it is free from parasitic oscillations, as many are vulnerable in this respect. A suitable psu/modulator and its associated afc unit have been described earlier [6, 7].

Setting up is largely a matter of systematic adjustment of the applied voltage, and of matching screws, iris dimensions and preset tuning controls as fitted, until smooth tuning over the frequency range required is achieved with an acceptable power output. This process may take a matter of minutes or many hours. Usually it will be found that a basically stable oscillator will respond smoothly to any adjustment. On the other hand, an oscillator which is over-sensitive to the applied voltage, for example, will also probably be strongly dependent on the position of matching screws. Generally it is unwise to try to extract the maximum power possible, since this may involve a heavy price in terms of stability, as the difference in performance obtained when operating at, say, half power is only rarely detectable in use.

Initially about 7V should be applied and the voltage increased only sufficiently to start oscillation to achieve the objectives required. A working voltage of 9V is not untypical. In the absence of more elaborate test equipment, a good indicator of performance is the output power: if the oscillator is working well, this should vary smoothly on tuning with perhaps less than 20 per cent change over a 500MHz range. If the power output changes abruptly, this may indicate that the oscillator has changed its mode of oscillation, which can be checked by taking systematic frequency measurements. It may also indicate that the oscillator is generating spurious frequencies. If the oscillator is used as the local oscillator of a receiver, this may be heard as sudden increase in noise level, and a transmitter tuned over the widest range possible may produce extra responses other than the image response. If the cold end of the rf choke feed is accessible, and found to be "hot", the appropriate measures can be taken.

It is usual to tone modulate the receiver local oscillator (as well as the transmitter) so that cw transmissions, for example from crystal-controlled calibrating sources, can be detected, and this is normally done by modulating the applied voltage. In these cases it is desirable to determine the frequency/voltage relationships of the particular oscillator to determine its optimum working voltage, as well as to check that the frequency varies smoothly over the range required, which is equivalent to about $\pm 0{\cdot}5$V. This, of course, should be done at both ends of the tuning range. As a rough guide the voltage should be adjusted for maximum output and then reduced until the output power falls by about 30 per cent.

References

[1] *Radio Communication*, Vol 48, July 1972, p442.
[2] "A Gunn device transmitter (10GHz)", Mullard.
[3] *Radio Communication*, Vol 47, April 1971, p271.
[4] *Radio Communication*, Vol 49, February 1973, p106.
[5] *Radio Communication*, Vol 49, October 1973, p692.
[6] *Radio Communication*, Vol 48, March 1972, p158.
[7] *Radio Communication*, Vol 49, March 1973, p193.

Downward modulation and business mobile transmitters

by B. PRIESTLEY, G3JGO

MANY amateurs start their careers with a converted ex-business mobile transmitter on either 4 or 2m. Often the results are not as good as the equipment is capable of, but the new licensee is understandably a little hesitant about diagnosing the fault and rectifying it. The following notes are designed to help with one commonly-found problem.

On the vhf bands a large depth of modulation is particularly desirable since a signal can be quite weak and yet free of QRM. Under these circumstances the receiver noise level will limit readability by making the level of modulation seem less than it actually is, ie the detector is "captured" by noise. Thus it is essential to have the maximum amount of undistorted modulation on the carrier.

Unfortunately, if grid drive is lacking the transmitter power amplifier may have a very poor upward modulation capability, ie the modulating power applied to its anode and screen may not produce a proportional rise in rf output (see Fig 1). In fact, this situation seemed to be so prevalent on the 2m band that the author was reduced to tuning in the BBC to make sure that the receiver and scope did not suffer from some form of distortion!

The results of this "downward modulation", so called because the rf output decreases on modulating, are:

(1) reduced communications effectiveness;
(2) increased valve dissipation and reduced life;
(3) splatter—possibly with enhanced tvi and certainly unpopularity among local amateurs.

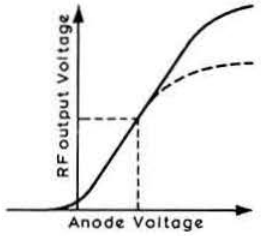


Fig 1.

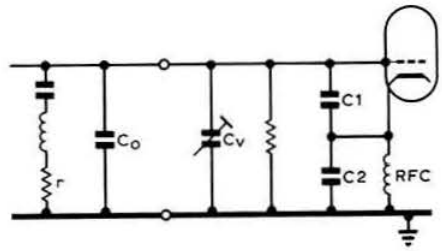


Fig 2.

Since a well-designed transmitter could be expected to have a distortion of, say, five per cent at 80 per cent modulation, an observed upward modulation capability of no more than 40 per cent with a considerable amount of distortion indicates something seriously wrong—probably shortage of drive. This may not show up without modulation but remember that a 10W pa is running at 40W input on modulation peaks and requires drive appropriate to a 40W cw stage. Assuming that the driver stages are correctly tuned up and the valves are not failing, the most likely cause is the use of unsuitable quartz crystals.

Most business mobile sets are designed for modern miniature crystals such as the HC6/U. Substitution of a 10XS or FT243 will result in less oscillator excitation and thus less pa grid drive. Compared with the HC6/U the older crystals show higher Co and r, both of which will reduce the excitation (see Fig 2). Removing Cv will help, but it may be necessary to reduce C1 and/or C2 as well. If even this does not suffice, due to the low gm of the valve in use, then there are two choices, either substitute another valve, or convert the stage to a buffer amplifier driven by a transistor oscillator perhaps on the lines of the circuit by G3SBA[1].

When the transmitter is modulating correctly the rf output will show a slight rise and the anode current will remain almost constant. It now remains to reset the modulation and clip level controls and see who is the first to tell you how much better the signal is!

[1] "Put a transistor in your cathode". *Radio Communication* May 1970, p 299.

EQUIPMENT REVIEWS

The Heathkit CM-1050 engine analyser

by RICHARD J. BAKER, G3USB*

READERS may well query the reason for publishing a review on a piece of equipment that might at first sight appear to be better suited to one of the multitude of car enthusiast magazines. However, it is extremely important when undertaking the installation of a mobile transceiver in a vehicle to ensure that the electrical system is up to standard. Only when it is operating as intended can serious attempts be made to reduce electrical noise generated from it. This type of test equipment could therefore be very useful to the radio amateur in the pursuance of his hobby.

In addition, its use is particularly relevant to today's need to ensure that petrol is burnt with maximum efficiency.

Description

The analyser will test the following automotive components:
(*a*) ignition system; either conventional contact breaker, transistor or magneto;
(*b*) battery;
(*c*) generator/alternator;
(*d*) regulator;
(*e*) starter motor;
(*f*) all electrical circuits (voltage/current/resistance);
(*g*) tachometer.

It is powered by three SP11-type batteries and supplied with all the necessary test leads, clips, external resistors and shunts required to test the above-mentioned components. The manufacturer's specification is shown in the table.

The kit is made in the USA and includes registration, warranty and spares cards mainly intended for that country. However, a mailing address is given for the acquisition of spares by an overseas customer, so it would appear that the UK purchaser has no problems. As usual, the kit is supplied with a very comprehensive assembly manual plus a *Kit Builder's Guide* booklet. Also supplied is an operation handbook which is printed on thick, semi-gloss paper which should resist oil, water and petrol. A less useful book supplied with the kit, at least for owners of European cars, is a book containing the engine details of American cars and light trucks manufactured in the period 1966–73.†

SPECIFICATIONS

ELECTRICAL	
Voltmeter ranges	0–3·2V dc, ±3% of full scale. 0–16V dc, ±3% of full scale. 0–32V dc, ±3% of full scale.
Ohmmeter ranges	R × 1 (100Ω centre scale), ±3° arc. R × 100 (10kΩ centre scale), ±3° arc
Tachometer ranges	0–1,200 rpm, ±3% of full scale. 0–6,000 rpm, ±3% of full scale.
Dwell meter ranges	0–45° (on 0–60° scale), ±3% of full scale. 0–60°, ±3% of full scale.
Amps	−5 to + 90A dc, ±3% of full scale
Spark output	0–50.
Point resistance	Good/Bad.
Alternator	Good/Bad.
Capacitor	0·22μF, 10%.
Temperature coefficient (Tref = 77°F)	Change less than ±5% of full scale over the temperature range of 32°–120°F(except Alternator–65°–83°F).
Operating temperature range	
RPM and Dwell	0°–140°F with alkaline batteries. 32°–140° with zinc-carbon batteries.
All other functions	0–140°F.
Battery life	100 hours average (with intermittent use of Low Ohms function).
GENERAL	
Meter	6in, 200μA, 105° movement.
Cables supplied	Two 8ft two-conductor test cables. One 2ft alligator to alligator lead. One 2ft alligator to push-on connector lead. One calibration cable.
Accessories supplied	90A shunt. 0·25Ω resistor assembly. One insulation-piercing alligator clip. Two No 10 solder lugs.
Storage	Compartment for cables and accessories.
Batteries required	
For use to 32°F	Three 1·5V, C-cell, zinc-carbon batteries.
For use to 0°F	Three 1·5V, C-cell, alkaline batteries
Dimensions (overall)	10½in wide by 7½in high by 8¾in deep.
Weight (including batteries, cables and accessories)	7lb approximately.
Price	£38.50 in kit form, including VAT, plus 55p carriage and packing.
Obtainable from	Heath (Gloucester) Ltd, Bristol Road, Gloucester GL2 6EE.

The unit comprises one large printed circuit board and a preformed cable harness connecting the various front panel components to it. A large easy-to-read meter provides read-out and is mounted on a light-blue front panel. The top and sides of the unit are formed by a U-shaped pressing finished in a fine dark-green crackle. Connection from the analyser to the vehicle is made by two pairs of heavy duty test leads terminated by banana plugs at the unit end and by partially shrouded bulldog clips at the other.

External components supplied are:
(*a*) a high-wattage 0·25Ω resistor to isolate the battery from the voltage regulator when checking the battery charging voltage. This resistor is mounted on two substantial aluminium brackets allowing it to be fixed directly on to one of the battery terminals;
(*b*) also on this bracket is mounted a shunt allowing current measurements up to 90A;
(*c*) a shorting bar allows the starter motor to be energized with the shunts described in (*a*) and (*b*) in situ.

* 18 Everton Road, Potton, Sandy, Beds.

† Heath (Gloucester) Ltd advise that they can supply the information for most UK and European cars, which is necessary to use the CM-1050, based on individual owners' requirements, by request to their Technical Services Dept at Gloucester.

Construction

This presented no problems and was completed in eight hours total assembly time. As always it pays to follow the very explicit instructions and by doing this the reviewer was able to complete the unit without any wiring or component placement errors. However, on switch-on there was a fault on a number of ranges. This defied fault-finding for some time and was eventually traced to a contact on the "Function" wafer switch being shifted one place round from its correct position. This was a manufacturer's error and, it is hoped, was a rarity. Builders of this kit should check that the contact in position 7 on the first wafer of S1 is not in position 6 as on the review kit. The fault was cured by carefully removing the rivet holding the contact and then fixing it in the correct position.

Test and adjustment

The meter is part of a circuit which provides temperature compensation and protection for the meter movement; having inserted three new batteries, calibration of this circuit is the first adjustment. The second adjustment is to the "Dwell" circuit. Finally, connection to the 50Hz mains supply through a suitable resistor provides the calibration source for the tachometer test function.

Use of the analyser

Most of the functions described in the operation handbook were checked by the reviewer and all were found to perform as expected. Particularly useful in practice is the check on the condition of the vehicle contact-breaker points. When using the analyser it is not necessary to remove the distributor cap: corrosion is checked by measuring the voltage drop across the points when closed; the gap is checked by measuring the on/off ratio (Dwell) with the engine running. Using the rpm function, the reviewer was able to check his tachometer after inadvertently damaging it while fitting a home-built transistor ignition system.

Conclusion

A very useful automotive product of particular use to the radio amateur.

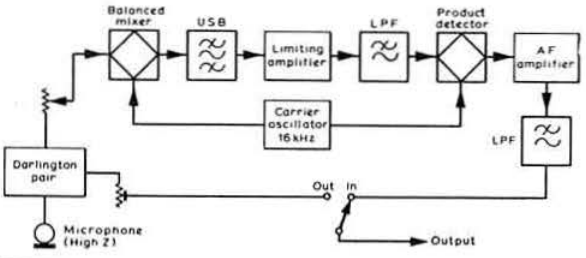
The Comdel CSP-11 speech processor

by P. J. HORWOOD, Tech (CEI), MSERT, G3FRB*

THE advantages of speech processing and, in particular, clipping at rf rather than at af as a means of increasing "talk power" have been much extolled in recent years. It is generally agreed that rf clipping is the only method that can be used for ssb, giving worthwhile mean power improvement with minimum attendant distortion.

It is, however, important to remember that the apparent gain is in mean power, rather than p.e.p., in view of some extravagant claims that have been made. Even so, the sideband which has been derived from a clipped signal has a mean power which is equivalent to that of an *unclipped* signal produced by a transmitter operating at a considerably higher p.e.p.

Several constructional articles have been published showing how rf clipping can be incorporated in an ssb transmitter. They require considerable modification to the equipment and are probably unattractive to owners of commercial transmitters who may be loath to reduce the resale value by "unofficial mods". Because of this the reviewer welcomed the opportunity to test the Comdel CSP-11 speech processor, which confers all the advantages of rf clipping without the need to carry out any modifications whatever.



The CSP-11 converts the microphone signal to an upper sideband with a nominal carrier frequency of 16kHz. Thus if the audio spectrum required for good communication quality is taken as 300–3,000Hz, this will be converted to 16,300–19,000Hz. Clipping produces prolific harmonics: for the frequencies quoted the second harmonics will range from 32,600–38,000Hz. These can be readily removed by a low-pass filter with a cut-off above 19,000Hz.

A distorted signal infers the presence of harmonics; if they are removed the signal is undistorted, even though the mean level has been improved in the process.

Anyone who has fed a square wave through a suitable low-pass filter and viewed the resultant clean sine-wave output will probably retain a certain child-like wonder that theory is so convincingly borne out in practice. This then, is the basis of operation of the CSP-11.

Connecting the processor to a typical transceiver requires only the provision of an output lead terminated with a three-circuit jack plug, giving an audio line, t/r (pressel) line and a common earth. The existing microphone is plugged in to the front panel of the processor.

TECHNICAL DATA

Peak input level at limiting point	10mV
Peak output level at limiting point	40mV
Input impedance	0·5MΩ
Power requirements	9V dc, 18mA
Battery life	300h
Dimensions	5½ × 3½ × 7¼in
Weight, less batteries	28oz
Price	£60 inc p/p and VAT

Obtainable from: Interface International, 29 Market Street, Crewkerne, Somerset.

Continued on page 301

* 14 Main Road, Hextable, Swanley, Kent.

Loop aerials close to ground

by L. V. MAYHEAD, G3AQC*

THE cubical quad aerial has been used by amateurs on the higher frequency bands since the second world war with great success. It exhibits lower angle radiation at the same height compared with a dipole, and has other advantages including greater bandwidth. The quad is a form of loop aerial and can be used without a resonant reflector as a bi-directional radiator with a gain slightly in excess of a dipole.

Loop aerials, sometimes known as magnetic dipoles, have been used for many years—a frame aerial is in fact a multi-turn loop. The shape of the loop is not of great importance although its efficiency is proportional to its area. Both the square (quad) and triangular delta shapes have maximum areas when the sides are of equal length. In practical situations it is possible to modify this requirement but the efficiency will decrease and the aerial will become more frequency conscious. The delta loop aerial, like the quad, exhibits bi-directional properties and if erected at a great reasonable, locating the centre of a 3·8MHz quad $\frac{1}{4}\lambda$ above ground would mean that the top would be at a height of 90 to 100ft, clearly impossible for most people.

In an attempt to lower the angle of radiation still further, W6DL suggested the delta configuration. His triangle was equi-sided and had the base above the apex. This configuration tends to raise the effective height of the aerial since the centre of area of a triangle is higher than that of a square. In June 1971 G6LX reported his findings using a number of loop configurations including quad, oblong and triangle shapes [2], all of which produced good dx results on 80m at the G6LX location.

A stretched quad (oblong) aerial which the author erected for use during the winter of 1971 was changed to the inverted loop configuration with the base uppermost, and improved results were obtained. However, it was felt that in comparison with other stations better performance ought to be possible.

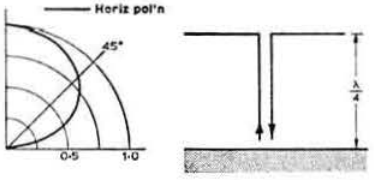


Fig 1. Horizontal dipole at $\frac{1}{4}\lambda$

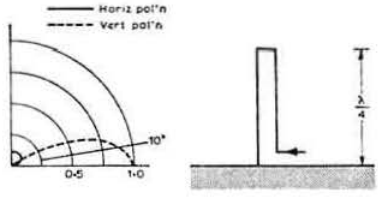


Fig 2. Vertical folded $\frac{1}{4}\lambda$ high

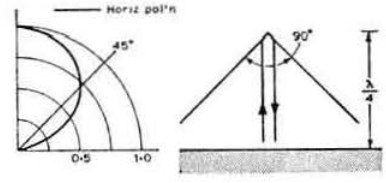


Fig 3. Inverted-V at $\frac{1}{4}\lambda$

enough height will show well-defined minima in the direction of the wire. The Bellini-Tosi direction-finding system makes use of this property of the loop aerial.

On the higher frequency amateur bands, 14, 21 and 28MHz, the height of an aerial is very rarely less than $\frac{1}{2}\lambda$. At this height a loop can be fed at any point and the feed point becomes a current maximum. If a quad is fed at the centre of one vertical side the resulting radiation is vertically polarized, if fed at the centre of a horizontal side the radiation is horizontally polarized.

If the aerial could be suspended in free space, radiation perpendicular to the plane of the aerial would have a circular distribution. However, when erected close to the ground the radiation pattern is modified and the field at a distant point is made up of both direct radiation and radiation reflected from the ground. W. I. Orr states in his book about quad aerials [1] that at a height of $\frac{1}{4}\lambda$ the main lobe is at an angle of 26° to the horizontal, compared with 30° for a dipole at the same height. However, as the aerial approaches closer to the ground the angle of radiation becomes lower than that of a dipole, so that at $\frac{1}{4}\lambda$ the main lobe is at 40° compared with 90° for a dipole. Thus the quad is a most satisfactory aerial when used at these heights. However, if the effective height is measured from the centre of area of the loop, as seems

* 11 Elsenwood Crescent, Camberley, Surrey.

The aerial appeared to put out an extremely good signal up to 1,000 miles but beyond this range performance fell off. The feed point was shifted to one corner and the strength of local signals fell very considerably. Discussions on the air with other amateurs led the author to believe that little was known about the radiation pattern of loop aerials with respect to the feed point and closeness to ground.

It was therefore decided to carry out tests on model aerials at 470MHz, since this resulted in a wavelength of approximately 24in and equipment was available in the form of a tv field-strength meter. At this frequency a reasonable ground plane could be established using a 6ft by 4ft sheet of aluminium. Both triangle and quad aerials were constructed and these were compared with dipole and vertical aerials.

Test results

The aerials were erected at scale height above a perfect ground consisting of an aluminium sheet approximately 3λ by 2λ. While it is admitted that the use of such a good ground system is not representative of actual conditions, it does make a good starting point to eliminate the effect of poor ground conductivity and to investigate radiation angles in both vertical and horizontal (azimuth) planes.

The aerials were fed from an oscillator located below the ground plane with the shortest possible feed line to eliminate radiation from the feeder, which would not be matched and

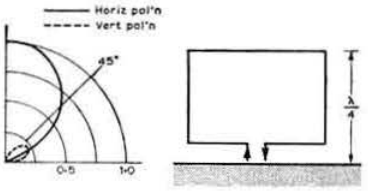


Fig 4. Quad at $\frac{1}{2}\lambda$, base feed

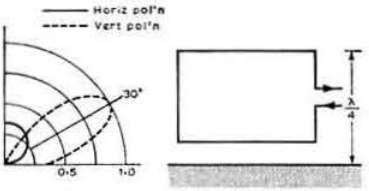


Fig 5. Quad at $\frac{1}{2}\lambda$, side feed

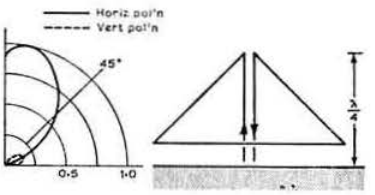


Fig 6. Delta loop at $\frac{1}{2}\lambda$, apex feed

which would probably have quite a high swr. No attempt was made to match the aerials to the oscillator since the purpose of the experiment was not to determine radiation efficiency as such but to investigate radiation patterns. The receiving aerial was a simple $\frac{1}{2}\lambda$ dipole which could be rotated so as to respond to either vertically or horizontally polarized radiation.

Tests were carried out for radiation in the vertical plane, with the receiving aerial located approximately 5λ from the transmitting aerial and at the point of maximum radiation in the horizontal plane. Checks were carried out for both horizontal and vertical polarization, and diagrams showing the relative signal strength for various vertical angles were drawn.

Fig 1 shows a horizontal dipole with its top at $\frac{1}{4}\lambda$. The angle of the lobe corresponds with that given in the ARRL *Antenna Book* [3] for a dipole at $\frac{1}{4}\lambda$. Note that the radiation was entirely horizontally polarized. The second aerial configuration checked was a vertical, folded to increase its impedance, and this was made $\frac{1}{4}\lambda$ high since it is the maximum height at which amateurs are likely to be able to erect an 80m aerial. This is shown in Fig 2 and it will be seen that there is a very low angle vertically-polarized lobe and a very small horizontal lobe, which was probably due to the folded construction since the separation between the elements was relatively large compared to the wavelength.

The next aerial checked was the inverted-V configuration (Fig 3), and this is of interest since it indicates that no advantage is obtained over a flat-topped $\frac{1}{2}\lambda$ dipole, except of course that it is much easier to erect, needing only one support. Up to the point where the efficiency falls off (90°) the angle between the legs is not important and appears only to affect the drive impedance. In Fig 4 the radiation obtained from a quad is shown. Note that the feed point is at the centre of the horizontal base. This aerial appears to produce mainly horizontally polarized radiation with a very small vertical lobe. Note also the relatively high angle which is consistent with horizontal aerials close to ground. Fig 5 shows the improvement obtained by feeding in a vertical side. There is a good vertically polarized lobe at 30°, and a quite good horizontal lobe which might cause trouble on reception from local signals putting in a high-angle signal.

Having established a degree of confidence in respect of known aerial configurations, the loops were next investigated. In Fig 6 is shown a delta loop fed at the apex—this aerial is basically a modified inverted-V, the idea being that it might be possible to switch from the V to loop configuration and thus alter the aerial radiation pattern. However, as the figure shows, the radiation is again high angle and horizontally polarized. In Fig 7 a most interesting configuration is shown: the expected horizontal lobe appears, but in addition a large vertical lobe at quite a low angle. This configuration was checked at harmonic frequencies and forms the basis of a useful multiband dx aerial which will be described later.

To continue with the delta configuration, in Fig 8 the feed was shifted to base but the results were rather disappointing. However, when the feed was shifted to a corner the radiation angles which had been suspected from the full scale aerial were immediately apparent; Fig 9 illustrates the very low vertical lobe and a smaller horizontally polarized lobe. During discussions on the air, G3TZH reported obtaining very good results from a loop aerial feed at one corner as shown in Fig 10—this configuration exhibits very similar radiation angles to that of Fig 9 and has the advantage that only one support is required. The slightly higher radiation angle of the vertical lobe is probably due to the greater effective height of the Fig 9 configuration.

Full scale tests were carried out with the Fig 9 configuration, with arrangements to switch to the Fig 7 configurations, and a drop of 15 to 20dB was obtained on local signals. Note that by "local" is meant signals beyond ground wave range which were being received from the ionosphere, ie 100 miles in daylight.

Further checks have shown that the corner-fed aerial has similar radiation properties to the vertically polarized voltage fed element described by W8JK and reported by G3VA in *TT* [4]. It closely resembles a pair of phased verticals at $\frac{1}{4}\lambda$ spacing and has the great advantage that it is much easier to feed and does not require a low resistance local ground in order to obtain maximum radiation efficiency. However, in order to exploit the aerial's low angle properties a good ground extending several wavelengths around it is required, which is true of any aerial relying on the interference of the direct and reflected rays. (With the exception of the Beverage receiving aerial, of course).

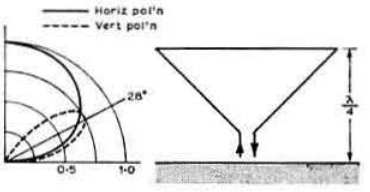


Fig 7. Inverted delta loop at $\frac{1}{2}\lambda$, apex down feed.

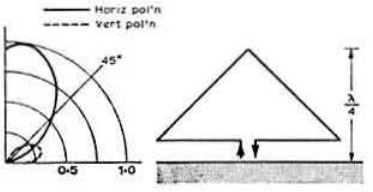


Fig 8. Delta loop at $\frac{1}{2}\lambda$, base feed

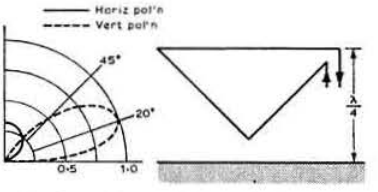


Fig 9. Inverted delta loop at $\frac{1}{2}\lambda$, corner-up feed

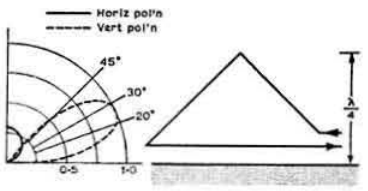


Fig 10. Delta loop at $\frac{1}{4}\lambda$, corner-down feed

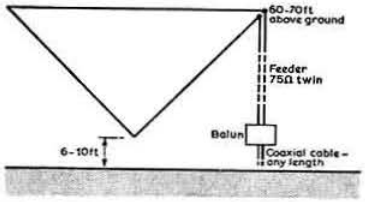


Fig 15. Delta loop of Fig 9 (similar dimensions for Fig 10 configuration, base 10ft, height 12ft). Dimensions for 3·8MHz, 1λ approximately 270ft. Single band. Radiation resistance 60Ω.

Bandwidth			
Freq	SWR	Freq	SWR
3·750	1·40:1	3·825	1·20:1
3·775	1·20:1	3·850	1·40:1
3·800	1·15:1		

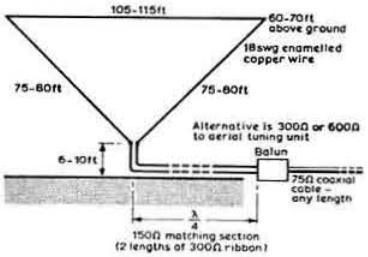


Fig 16. Inverted delta loop of Fig 7. Dimensions for 3·8MHz, 1λ approximately 270ft. Can be used on other bands. Radiation resistance 180Ω.

Multiband		Bandwidth	
Freq	SWR	Freq	SWR
3·800	1·10:1	3·750	1·20:1
7·100	1·00:1	3·775	1·15:1
7·000	1·05:1	3·800	1·10:1
14·100	1·15:1	3·825	1·15:1
14·350	1·45:1	3·850	1·25:1
21·100	2·00:1		
21·450	2·50:1		

Results

Two aerials have been constructed as a result of this work. The first is a single-band low-angle aerial of the Fig 9 configuration, and details are given in Fig 15. Note that the radiation resistance is approximatey 60Ω and thus a reasonable match can be obtained using either 50Ω or 75Ω cable. In the author's case the section between the aerial and balun was made approximately $\frac{1}{4}\lambda$ and the length adjusted to produce the best swr. This aerial can be erected on a single support as in Fig 10; the effective height is slightly lower, but the dimensions will be similar. Coaxial 50Ω or 75Ω feeder can be used and the outer sheath should be connected to the lower horizontal wire, which should be at a minimum height of 10 to 12ft. The wire used does not have to be very heavy gauge—18swg is quite light and produces a reasonable bandwidth.

The second aerial used by the author is the Fig 7 configuration, described in Fig 16. This has a useful low angle lobe as well as a good horizontally polarized lobe and makes a good general purpose aerial which can also be used on other bands where it will exhibit multi-lobe radiation. The radiation resistance is approximately 180Ω and the aerial can be fed by 300Ω ribbon or 600Ω open line via a simple atu. Alternatively the author has used a $\frac{1}{4}\lambda$ matching section, consisting of two parallel lengths of 300Ω ribbon.

In order that the radiation patterns shown may be obtained in practice, it is necessary to use a balun between the feeder and the unbalanced output of the transmitter/receiver. The aerials of Figs 9 and 10 are unbalanced with respect to ground and should be fed via a balance to unbalance transformer in order to avoid cross polarization.

During the model experiments quite large horizontal lobes were obtained from these aerials before this effect was discovered and eliminated by means of a coaxial balun. The configuration of Fig 7 is balanced with respect to ground and this balance should be maintained in order that the vertical radiation pattern should not be disturbed (Marconi effect). Several amateurs have obtained good results with the Fig 9 aerial by feeding directly with 50 or 75Ω coaxial, in which case the disturbance is minimized by connecting the outer screen of the coaxial to the horizontal wire of the loop.

Both these loop aerials can be adjusted for optimum performance on a particular frequency as follows. Start with approximately 275ft of wire (for an 80m loop) and erect this in the desired configuration. Feed the aerial with a short length of feeder or a feeder which is a multiple of $\frac{1}{2}\lambda$ and plot the swr across the band (the lowest swr will indicate the resonant frequency) and shorten the aerial until the lowest swr is obtained at the desired operating frequency. It is then only necessary to adjust the matching section to obtain the lowest swr, at this frequency, and the aerial is optimized. Both aerials were adjusted to resonance and very low swr by means of the $\frac{1}{4}\lambda$ sections described—in the case of the corner fed aerials of Figs 9 and 10 the radiation resistance is so close to either 50Ω or 75Ω that it may not be considered necessary to match more accurately. However, by using a $\frac{1}{4}\lambda$ length of 75Ω feeder an almost perfect match can be obtained. The feeder is made rather long and then shortened until the lowest swr is obtained. This technique can also be used on any aerial.

Conclusion

To complete the work on radiation patterns some of the aerials were checked in the horizontal plane, since the familiar figure-of-8 pattern for a dipole is only obtained when an aerial is erected in free space. Figs 11 to 14 show azimuth patterns obtained: note that a $\frac{1}{2}\lambda$ dipole at $\frac{1}{4}\lambda$ height had a 6 to 8dB front-to-side ratio—when the height was increased to $0{\cdot}3\lambda$ this increased to approx 20dB. The two delta loop configurations produced similar results—the horizontal component producing a side/front ratio of 5 to 6dB, while the vertical mode produced a ratio of only 2 to 4dB. This is similar to the ratio for the Fig 9 loop configuration shown in Fig 14. Fig 13 shows definite multi-lobe properties for the inverted delta loop of Fig 7, when the length is 2λ, ie an 80m loop operated on 40m. More lobes would no doubt appear on 14 and 21MHz.

Further work remains to be done on these azimuth patterns, particularly in relation to the vertical angle at which the pattern is taken. This must wait, however, until more time is available.

The predominantly vertically polarized configurations of Figs 9 and 10 may not produce the expected large increase in signal strength in some situations. This may be due to (*a*) poor soil conductivity preventing the re-inforcement of the low angle signal, and/or (*b*) local obstructions such as trees, houses etc which attenuate the low angle radiation directed at them. At the G3AQC location the author is able to switch

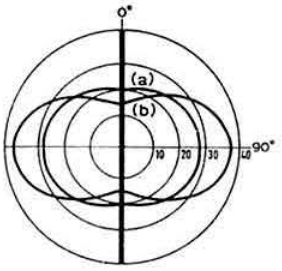


Fig 11. Dipole at (a) 0·25λ (b) 0·30λ. Horizontal radiation at 30°. Direction of aerial wire 0-180°

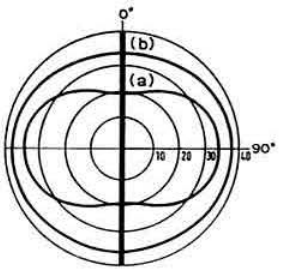


Fig 12. Inverted delta loop of Fig 7. Top at 0·25λ. (a) Horizontal at 30°. (b) Vertical at 15°. Direction of aerial wire 0—180°

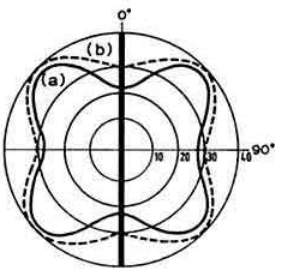


Fig 13. Inverted delta loop of Fig 7. Length = 2λ. Height = ½λ. (a) Elevation 30°, horizontal polarization. (b) Elevation 15°, vertical polarization. Direction of aerial wire 0—180°

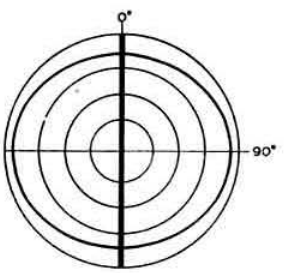


Fig 14. Delta loop of Fig 9. Top at 0·25λ. Elevation 15°. Vertical polarization. Direction of aerial wire 0—180°

between three aerials, a G5RV used as a control aerial, an inverted loop as Fig 7 and a Fig 9 loop fed in the manner described in [4]. Considerable checking to date on paths to Canada, the USA and long path to New Zealand on 80m indicates that the Fig 7 loop is 5 to 10dB up on the G5RV, but that there is no further advantage from the Fig 9 aerial. However, the G3AQC location is quite poor; the soil is sand/gravel and 80ft trees are within a few feet of the aerial. When erected by G3TZH in an ideal situation—a very flat area with gravel pits and a water table only 18in deep — quite remarkable results were obtained for the Fig 10 configuration. Belgian amateur ON4UN also reports a gain of 5dB from this aerial.

It is hoped that the measurements made will help to clear up some of the doubts about loop configuration and that the designs described will enable many amateurs to enjoy improved performance, particularly in relation to dx working on the lower frequency bands. The author would be pleased to hear from any amateur who has any of the loop configurations described.

References

[1] *Quad antennas*, W. I. Orr Radio Publications, USA.
[2] "Odd shaped antennae", R. L. Glaisher, G6LX. *SWM* June 1971.
[3] *Antenna Handbook*, ARRL.
[4] "Technical Topics", Pat Hawker, G3VA. *Radio Communication* April 1973.

The Comdel CSP-11 speech processor — Continued from page 297

The input impedance is high, suiting many popular microphones, and the output requires a medium to high impedance load. Front panel controls consist of an on-off switch, a processor in-out switch and a gain control. The latter adjusts the level subsequently fed to the clipping stage, the point at which clipping commences being fixed. As the control is advanced beyond this threshold the degree of clipping will be increased.

Measurements made by the reviewer suggest that about 15dB of clipping is an optimum setting. Without test gear an operator should seek on-the-air reports for various settings, adjusting for increased "punch" without an excessively clipped-sounding speech quality.

The in-out switch allows comparison to be made between processed and unprocessed speech, and here the reviewer has one criticism. When switched "out" the CSP-11 has approximately unity gain, whereas in the "in" position the unit has about 10dB overall gain. This can falsify comparisons in favour of the latter position unless a compensating adjustment is made to the transceiver's microphone gain control. Unity gain at clipping threshold would have been preferable.

Six internal HP2 cells render the unit entirely self-powered, and should last for several hundred hours. Alternatively, an external supply may be taken from the transceiver. Dependant on the voltage available, a suitable dropping resistor may have to be fitted; with a 9V supply only 18mA is required.

The CSP-11 on the air

The processor was used daily over a period of two weeks at the Redifon Amateur Radio Club station, G4BFW, in Crawley, Sussex. At the time the club's 400W linear was off the air and a 100W solid-state amplifier was in use. The aerial was a TH6DXX on a 60ft Versatower.

Reports from stations worked varied from "no difference between in and out" to "an improvement of two S-points". Surprisingly an improvement in speech quality was frequently remarked upon.

In theory an S-meter should not show an increased peak reading when receiving a clipped signal, but a higher average deflection will occur. Certainly the collector-current meter on the pa spent a greater time nearer maximum with the clipper in circuit.

In the opinion of the reviewer and other operators at G4BFW, the CSP-11 more than made up for the 6dB difference between the 100W and 400W amplifiers. With reports of 5 and 9 from VK, ZL and the Pacific there seemed little necessity to exceed 100W p.e.p.

For the expenditure of less than half the cost of a linear, owners of 100W transceivers can achieve a similar improvement in talk-power. Some tv deflector-valve PAs may not take kindly to the higher average power, but those with blowers should survive.

The reviewer is indebted to Interface International for the loan of the CSP-11, he was sorry to have to return it.

A transistor linear amplifier for 160m mobile

by B. A. POPE, G3UEW*

HAVING built a transceiver for mobile operation on 160m with a power output of 0·5W p.e.p., the author decided that the next step was to construct a linear amplifier to produce something near the maximum permitted output of 26W. As transistors like the BD123 proved to be inefficient and limited in power output when operated on 12V, a proper rf power transistor intended for 12V operation seemed necessary. A 2N5591 with 20W minimum output was eventually purchased for about £15: although the cost may seem high it was competitive with that of an inverter power supply and 6146, and the result was neater. Other suitable transistors have been introduced since this project was started, in particular the BLY89A has become available for about £6.

Circuit description

This is basically a straight Class B amplifier with series-tuned T-networks on the input and output. The networks were originally calculated [1] on the basis of estimated figures (the 2N5591 is intended for vhf operation and the data sheet only covers 50 to 150MHz) but the circuits proved to have very low Q. The author admitted defeat with theory and the values given were arrived at from past experience and experiment to give satisfactory tuning.

Starting with C17 enmeshed, the output is peaked with C16. C17 is then reduced and C16 repeaked. This process is repeated until the optimum conditions are reached. It will be found that the collector current increases slightly at resonance but depends mainly on the drive level. Final tuning can be carried out at full power as the transistor is rated to handle this continuously. The input circuit is left at the low Q and uses fixed value components.

Components List

C1	270pF silver mica
C2	1200pF silver mica
C3, 4, 14, 18	0·05μF 30V disc ceramic
C5	0·001μF feedthrough capacitor
C6	0·01μF 30V disc ceramic
C7, 8, 10	0·001μF 30V disc ceramic
C9	0·01μF 125V polystyrene
C11	0·22μF 30V disc ceramic
C12	0·47μF 68V polyester
C13, 15	25μF 25V electrolytic
C16	150pF Jackson Type O
C17	2-gang 400pF Jackson Type OO or similar
D1, 2, 3, 4	IN914, OA200 or similar
L1	4μH. 4 turns pvc-covered connecting wire on a pair of FX1588 toroids
L2	16μH. 23 turns 18swg enamelled copper on 1⅛in diameter former
M1	5A
R1, 2	5·6Ω ½W carbon composition
R3	3·9kΩ ½W
R4	1kΩ ½W
R5	1kΩ linear preset potentiometer
RFC1, 2	see text
TR1	2N5591 (Motorola)
TR2	2N706 or similar
TR3	40392 or 2N3053

Because the 2N5591 is intended for vhf use it is necessary to add capacitors from base and collector to the emitter to stop parasitic oscillation. These capacitors are the low impedance transistor analogy of the small series inductances used with valves. At 2MHz the impedance of the capacitors is high compared with that of the transistor. It is most important that the inductance of the capacitor connections is kept very small. The 0·01μF capacitor on the output must be polystyrene because of the power involved, but the other capacitors are disc ceramics.

The emitter is decoupled to earth with several capacitors in parallel. These have a range of values to distribute resonances and to ensure the emitter is bypassed at all frequencies.

In order to avoid cross-over distortion, the pa is set to a standing current of 20mA. Because the base current is high and varies with the modulation, the bias supply is of low impedance from a Darlington pair. Diodes D1-4 stabilize against supply voltage variations and give temperature compensation for the variation in V_{be} of the transistors. It has

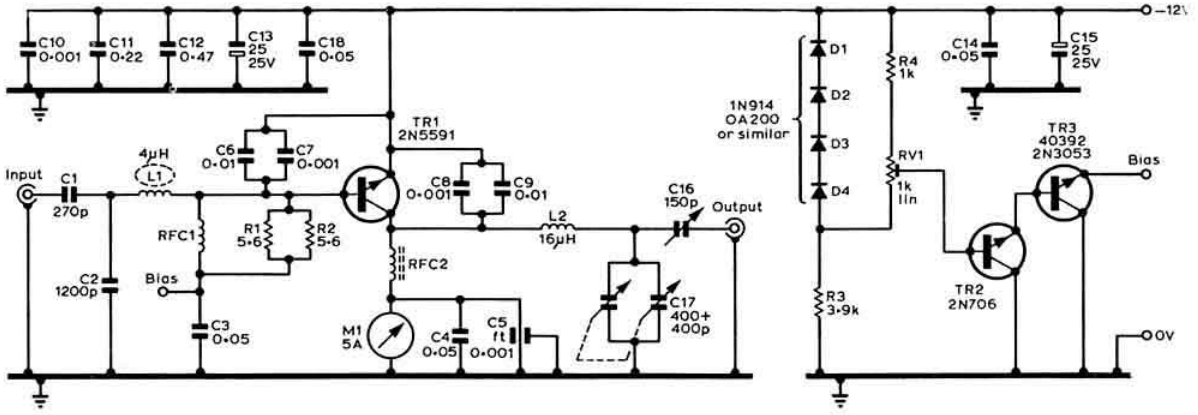


Fig 1. Circuit diagram

*17 Southbrook Street, Swindon, Wiltshire.

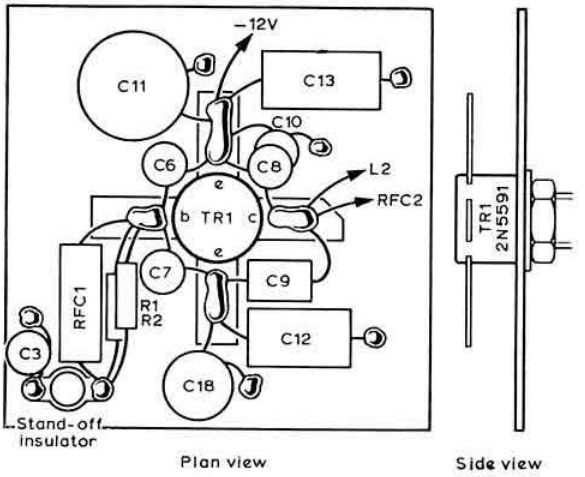


Fig 2. PA assembly (actual size)

been suggested that D1 should be in thermal contact with TR1 to allow for the temperature rise due to its power dissipation. With good heatsinking as in the original, this has not been found necessary. During receive the amplifier is switched off by lifting the earth connection to R3.

The capacitor C15 is not essential but was added for use with a mains power supply.

Construction

The power transistor is bolted to a piece of 16swg copper and the anti-parasitic capacitors are soldered with almost zero lead length as close to the transistor body as possible. The decoupling capacitors are then soldered from the transistor to the copper, the latter connection requiring a high power iron. The nut is then taken off the transistor stud and the assembly is bolted to the L-shaped aluminium chassis.

The output tuning capacitor C16 must be isolated from earth. In the original it is mounted on a piece of Perspex attached to C17 and it rests on its own ceramic pillars on the underside. The rotor and frame is made the output side as the junction of the coil and capacitors is of high impedance. Hand capacitance effects when adjusting the tuning are not noticeable and the capacitor spindle is taken through a large hole in the front panel. The Jackson Type "O" tuning capacitors are just about adequate to withstand the rf voltage and have the advantage of small size.

The rf choke RFC2 on the output consists of 23 turns of 18swg enamelled copper wire wound on a $\frac{3}{8}$in diameter ferrite rod 2in long, and is mounted between the transistor collector and a 0·001μF feedthrough capacitor on the central aluminium screen. A 0·05μF disc ceramic is connected in parallel with the feedthrough, and a screened lead connects to the 5A meter mounted on the front panel.

The base choke RFC1 is 60 turns of 36swg wound on a 2W 150Ω carbon resistor. The exact values of the resistors used as rf choke formers are not critical but they are kept low to damp possible resonances.

In the original a 40392 transistor is used in the output of the bias supply. This is a 2N3053 with an attached mounting flange on the collector. A 2N3053 with a small heatsink would be perfectly satisfactory and could be mounted on the small piece of Veroboard used for the rest of the bias network.

Results

The amplifier gives 20W single-tone output with a 12V supply at 4A collector current. Under normal speech conditions the collector current peaks about 1·5A. Local reports on speech quality have been good. The 2N5591 has been found to be reliable and rugged. It has been operated with the output inadvertantly short circuited; the tuning capacitor arced over but no harm was done to the transistor.

Reference

[1] "Design of T-networks for series-tuned transistor power amplifiers". M. Bibby, G3NJY. *Radio Communication* February 1968, p96.

Product News

Soldering irons

The **Superspeed** soldering iron is unusual in that, although having a rating equivalent to a 90W iron, no current is consumed when the iron is not in use yet is instantly available by operating the ring switch on the iron handle. Temperature for soldering is attained in six to ten seconds from operating the switch. The iron will operate from ac or dc voltages between 2·5 and 6·3 with 4V (supplied by an optional transformer) as the standard voltage. All parts can be replaced without expert knowledge or tools, and replacement bits and elements are available from the distributors. The **Miniscope** iron operates on similar principles and has a heating time from cold of five seconds. Power is applied by a lever compared to the ring switch of the **Superspeed.**

Spare parts are always available and can be readily fitted by the user. Further information can be obtained from EGM Solders Ltd, 3 United Road, Manchester MI6 ORJ.

Catalogue received

E. F. Johnson Company of America

The component range of the E. F. Johnson Company is now available from Vero Electronics Ltd, who have been appointed exclusive UK and European agents. The range of Johnson components includes many air spaced and ceramic trimmer capacitors, and both standard and special variable inductors. There is also a large variety of circuit board and front panel hardware. These items are not generally available through the Vero Electronics retail distribution system but the suppliers will deal with retail customers on a cash with order basis.

Full details of the Johnson range are available from Vero Electronics Ltd, Industrial Estate, Chandler's Ford, Eastleigh, Hants SO5 3ZR.

TECHNICAL TOPICS

by PAT HAWKER, G3VA

SOME amateurs and enthusiasts seem to find their main technical interest in circuits and hardware; others in the mechanisms and oddities of hf and vhf electromagnetic wave propagation, and in aerials as the means of launching such signals. All these diverse interests are reflected in this month's topics.

6V to 12V converter

In *Electronics Australia* (February 1974), Leo Simpson describes a compact and simple unit that allows 12V equipment to be operated from 6V supplies: Fig 1. While admittedly the number of 6V car electrics is today very small, there are still a few around and also quite a lot of 6V motor cycle batteries: further, the approach could be of interest to those seeking some way of using the higher-voltage rf power transistors in mobile applications.

The *EA* unit provides an output of 12V at up to 750mA with 6V, 1·8A input and places no load on the battery when no current is drawn from it. Unfortunately no details are given of the inverter transformer (Ferguson TRD277) but this would appear to be roughly 1 : 1 with two centre-tapped windings capable of carrying the required currents. The unit is self-rectifying (based on a Japanese design) and the basic components consist of just the transformer with two power transistors, but Leo Simpson also includes two diodes to protect the transistors and prevent spurious operation in the absence of a load, plus electrolytics to reduce ripple and hash. Basically the two transistors function as a transformer-coupled multivibrator in a self-rectifying arrangement. For some applications the unit as shown may have too high residual hash and a further LC network may be needed to filter this out; if so the inductor can consist of a solenoid winding on a ferrite rod plus a further electrolytic. The *EA* unit is built in a standard diecast box (120 by 95 by 55mm) with the two transistors mounted externally using mica washers and plastic bushes so that the box forms a modest heat sink. It should be noted that the unit does not function in the absence of a load.

If it were desired to use with 12V input, 24V output, some modification might be necessary. Leo Simpson notes that his model can be run at 12V input but that losses are higher and heat-sinking becomes more critical. Since one of the main sources of heat is stated to be the transformer, it might be better to use a more efficient toroid inverter transformer in place of what appears to be a standard type of mains/audio unit.

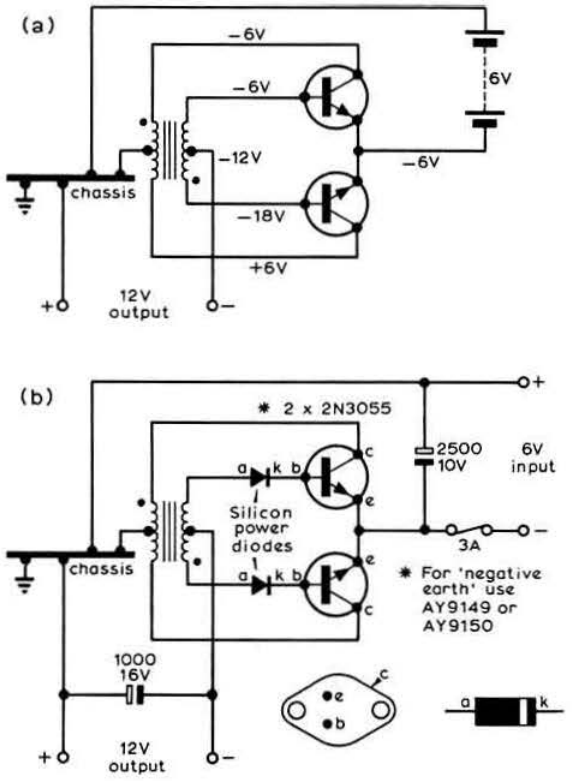


Fig 1. (a) Basic arrangement of 6 to 12V converter showing dc voltages. (b) Practical arrangement used by "Electronics Australia"

Linearized fet attenuator

The use of a fet to form a voltage-controlled resistor has become well-established; it is often found in agc circuits, level controls and particularly for gain controls operated remotely by means of a dc bias, etc. The drain-source resistance of a typical fet can be varied from a few hundred ohms to tens of megohms. But generally the FETs have to be arranged to operate at very low levels.

An article in *Break-in* (May 1973) by A. C. Corney, ZL2BBJ, points out that this limitation arises because the drain-source resistance is non-linear; this means that an alternating voltage across this resistance needs to be kept below about 50 or 100mV in order to avoid serious distortion of the controlled waveform. But he reminds us that a technique for linearizing the fet resistance, and so removing this limitation, was described as long ago as 1966 by A. Bilotti (*Proc IEEE*, Vol 54, pp1093–1094) although it "has somewhat surprisingly remained in obscurity". Briefly it involves only the addition of two equal high-value resistors as a two-to-one drain-to-gate feedback network: see Fig 2(b). Checks by ZL2BBJ indicate that whereas a typical non-linearized fet attenuator used for audio gain control begins to distort as the input af voltage approaches 100mV (for a 2 : 1 minimum attenuation) the use of a linearized fet makes it possible to apply up to 1·2V peak-to-peak (ie with 600mV p-p output at 2 : 1 attentuation) for similar degree of distortion. He suggests that "at least 10 times and probably

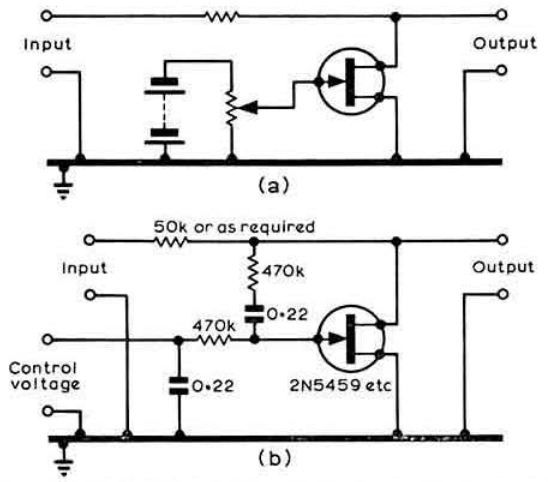


Fig 2. The linearized fet attenuator. (a) Basic voltage controlled fet attenuator. (b) Linearized voltage controlled attenuator for audio use

nearer 20 times the voltage can be applied to a linearized attentuator than can be applied to the standard attenuator for the same level of distortion and that this sometimes makes possible an application which would otherwise be distinctly marginal."

Fig 2(b) shows a linearized voltage controlled attenuator suggested by ZL2BBJ for af applications. Where the attenuator is required to handle only ac waveforms, the blocking capacitor is interposed between the drain and its feedback resistor, the capacitor should have an impedance about 100 times less than the feedback resistors at the lowest frequency of operation.

Digital logic

In the fourth edition of *Amateur Radio Techniques* I attempted to set down some of the basic differences between and applications of the popular digital logic integrated-circuit "families" such as ttl, ecl, dtl, cmos and the like as part of a "Quick guide to digital electronics". However, in the past couple of years the logic families seem to have gone through several generations with all sorts of marriages and grandchildren turning up to blur the divisions between the basic families. Now there are the special "low power" and "Schottky" subdivisions and new t^3l and i^2l devices starting to appear. The following notes represent an attempt to try and bring the story reasonably up to date.

TTL (transistor-transistor-logic). Very many of the digital frequency-meters and other amateur equipment are firmly based on standard ttl devices which often have type numbers in the 7400 series. But for some applications designers need devices which have either higher speed (ie lower propagation delays) or operate with lower power, and a number of different categories have been developed. Currently, average propagation delays range from about 33ns for the "74L" low power series; 10ns for the "74SL" series of Schottky low power devices and for the standard "74" series; 8ns for the Fairchild 9000 series; 6ns for the 74H high-speed series; and down to about 3ns for the "74SH" Schottky high-speed series. This means that, for example, a 74S type of device could be used up to about 10 times the frequency possible with a 74L low power device. Generally it will be noticed that increased speed is achieved at the cost of consuming additional power, and designers often use as a "figure of merit" the product of gate delay and power: the lower the product the "better" the device. Schottky-type devices usually show an advantage in this respect to those using conventional techniques (but this will generally be reflected in the price).

TTL family	Average propagation delay	Average power dissipation per gate	Product
Low power 74L	33ns	1mW	33
Schottky low power 74SL	10ns	2mW	20
Standard 74	10ns	10mW	100
Fairchild 9000	8ns	11mW	88
High speed 74H	6ns	23mW	138
Schottky high speed 74SH	3ns	19mW	57

It should be noted that with the standard 74 series the propagation delay for a 0 to 1 transition is appreciably longer than for 1 to 0. In general the fastest ttl devices are almost as fast as ecl, and all forms of ttl are compatible with each other and also with most storage devices. They operate from 5V power supplies which usually need to be within 10 per cent of this figure.

CMOS devices. These are all devices based on integrated circuit complementary MOSFETS rather than bipolar transistors and have grown significantly in popularity. The major limitation is speed, and at present they are of restricted use at frequencies above about 10MHz. A major advantage is that they are very tolerant of power supply voltage and can usually be run at any potential between about 3 and 18V. Furthermore the power consumption depends upon the operating speed of the device and in a standby condition (that is when the states are not changing) consumes virtually no power. As a rough guide a typical cmos gate operating continuously at 2MHz from 5V supply consumes about the same power as an equivalent low power 74L ttl gate.

Advantages of cmos logic arrangements include the very simple circuit configurations since the MOSFETS are direct coupled and normally no resistors or capacitors are needed within the ic. They provide sharp transfer characteristics which result in good immunity from "noise" amounting to about 40 per cent of the power supply voltage (ie a 4V noise immunity for 10V operation). The disadvantage is primarily the restriction on high speed operation. There are currently some *linear* cmos devices such as the RCA 3600E.

Some of the other recent developments in digital logic has formed the basis of a series of recent articles in *Electronics*. These underline how much more complicated the picture has become with such techniques as oxide-isolated ecl (oxim), cmos on silicon-on-sapphire (cmos-on-sos) operating at sub-nanosecond speeds with ultra-low power dissipation, t^3l with its extra transistor (tttl) per gate in order to achieve cmos noise immunity while retaining ttl speed, and the latest wonder-child i^2l (integrated injection logic) using devices which are basically npn transistors but having an additional source of base current and which, it is stated, can have speed-power products 1,000 times better than standard ttl logic. One comes across abbreviations such as mos/mgt (metal over semiconductor/metal gate technology), mos/sgt (metal over

semiconductor/silicon gate technology), ssi (small scale integration), msi (medium scale integration), lsi (large scale integration) and so on.

But it should be emphasised that most of the current amateur designs tend to concentrate on the low-cost standard ttl devices with ecl (emitter coupled logic) for high speed applications.

VHF/UHF receiver development

Two recent articles in *RCA Engineering* (Vol 19, No 3, Oct/Nov 1973) report some of the findings of a long-term research and development programme aimed at improving the front ends used in military receivers: one for the 30–80MHz tactical range where mobile units may require to contact fairly weak base stations in close proximity to other mobile or base transmitters; the other for 225 to 400MHz, presumably for airborne units. In both projects particular emphasis was placed on achieving good dynamic range. The final configurations differed considerably and the reasons for these differences are clearly of considerable interest to vhf/uhf enthusiasts.

For the vhf tactical band the front end as now developed consists of a double-balanced mosfet switching mixer (ie along the lines of the Rafuse mixer discussed in *TT* on a number of occasions) with *no* rf amplifier. It is stated that this type of mixer (Fig 3) has displayed a dynamic range 30dB higher than any bipolar or fet active amplifier front end circuit requiring less than 200mW of dc power.

The article says: "To achieve maximum dynamic range, the receiver front end has been based on a mixer input configuration since use of an rf amplifier would limit the dynamic range of the receiver. With a mixer input, however, noise figure becomes a problem. Normally a doubly balanced mixing switching mixer would display 6dB of conversion loss which when added to the preselector loss and i.f. amplifier noise figure would give unsatisfactory receiver sensitivity. Since typical noise figure requirements for vhf receivers are 8dB or better, some improvement must be obtained."

The article shows that by properly terminating unwanted frequencies generated in the mixing process, the conversion loss of a switching mixer can be theoretically reduced to 0dB. Using reactive termination for these unwanted frequencies will reduce the bandwidth of the passive mixer, but by making the proper trade-offs between bandwidth and conversion loss and by allowing for non-ideal switching by the fet devices, a conversion loss of 4·5dB or less can be maintained for a 30 per cent bandwidth. This is an interesting point for amateur receivers/converters since usually wideband mixers are not required (where they are, there seems to be a good case for going to the double-balanced Siliconix-type active fet mixer which we have discussed before).

The RCA receiver has a measured overall noise figure of 7 to 9·6dB with pre-mixer selectivity provided by a series of bandpass filters. The quad-mixer device is given as the TA7800, presumably an RCA development type. The mixer is followed immediately by a crystal filter having an insertion loss of only 0·6dB and then a low-noise fet cascode amplifier with a 1dB noise figure. The dc power for the entire front end is 192 to 285mW, including 44mW for the i.f. amplifier, 35 to 45mW for the voltage-controlled-oscillator and 112 to 200mW for the Class B tuned buffer amplifier which provides sufficient switching drive for the mixer.

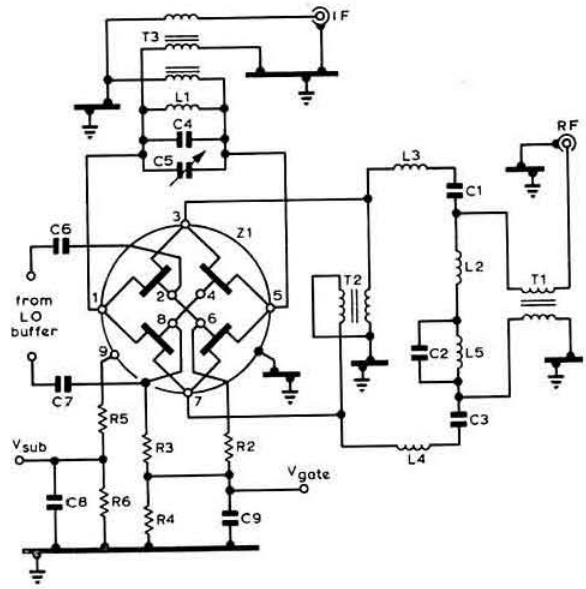


Fig 3. The mos-quad switching mixer used in the RCA advanced military receiver. Oscillator switching potentials come from a Class B tuned buffer amplifier and electronically tuned oscillator. In practice three separate mixers are used each in conjunction with two 8MHz front end filters to provide six bands from 30 to 80MHz. Mixer device is TA7800. L1/C4/C5 resonates at the i.f. of 17MHz and the elements are chosen so that the LC ratio is made to present a load impedance for the sum frequency which is much less than the load impedance at the desired frequency. The open circuit at the sum frequency in the input port is achieved by the series tuned circuit formed by C1/L3/C3/L4 (which must series resonate at the centre of the rf band and present a much higher source impedance at the sum frequency). Measured conversion loss was 3·7dB

These figures seem more realistic than the "50mW" mentioned for a similar project in the Fort Monmouth *Electronic Design* article to which we referred last month (in fact we strongly suspect that the two projects are one and the same, at least as far as the mixer and buffer amplifier are concerned).

Operation of this mixer above 100MHz is stated to be limited by mos device technology (although Ed Oxner has shown that active fet double balanced mixers using the U310 can go to 250MHz). In fact, significant differences are found in the 225 to 400MHz front end. This has an electronically tuned rf amplifier (TA7801 device) and a double-balanced mixer using a Schottky diode quad. This provides overall noise figures of 4 to 6dB and dynamic range of 90dB or better. The special rf amplifier device is an improved bipolar transistor using distributed geometry techniques. Several recent transistors and the 3N200 dual-gate mosfet were thoroughly evaluated. The TA7801, incidentally, operates with collector currents up to about 20mA.

Huff and puff stabilizer correction

One of the very real problems with so many different digital ic devices in use is that of trying to ensure that circuit diagrams and ic connections are correctly shown and apply to different devices. I am afraid that there were in fact some errors in the circuit diagram for the improved "huff and

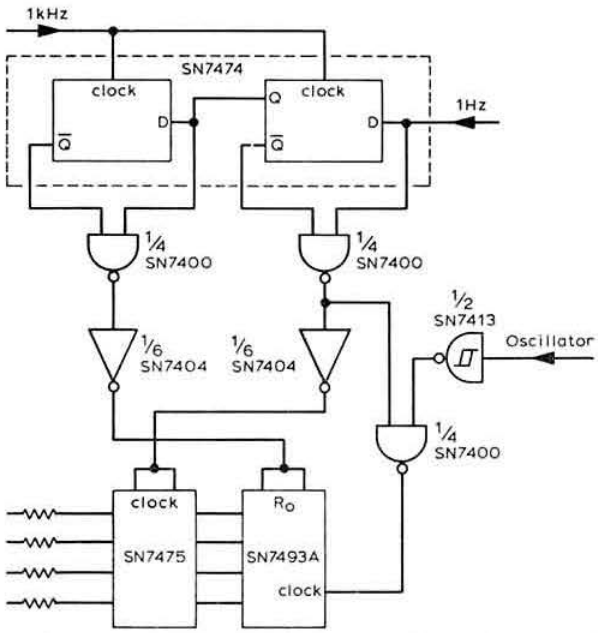


Fig 4. The corrections suggested by G3YAC for the huff and puff vfo stabilizer arrangement described in the March "Technical Topics"

puff vfo stabilizer" developed by A. K. Forrest, BRS34402, and described in *TT* March 1974 (Fig 6, p 163).

P. A. Howarth, G3YAC, points out that the SN7493 does not have a "clear" input, the function being provided by R_0 (pins 2, 3), and that the logic polarities are incorrect since the 7493 is reset by a logic "1" and the gates provide a 1ms logic "0" pulse. The SN7475 samples with a "1" input to the clock terminals, which are pins 13,4 and not 12,4. Fig 4 shows the modifications suggested by G3YAC.

BRS34402 agrees fully with these comments and regrets that these errors were carried through from an earlier circuit which used a combination of nor and nand gates.

In writing, G3YAC raises the question as to whether the system could not be extended to include all significant digits to make the convergence point of the iteration unique and then combined with extra logic and thumbhead switches to provide a huff and puff synthesizer. But BRS34402 feels that the circuit gets very uneconomic if it is extended to more than four bits. He has an alternative idea for an economic synthesizer which we will try and include another time.

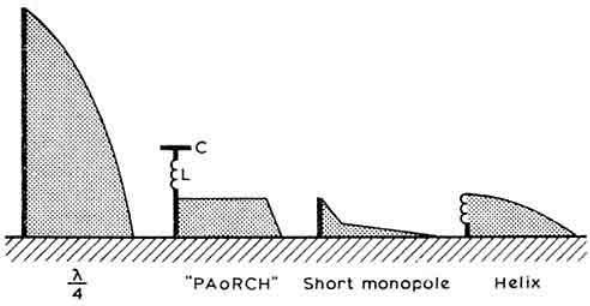


Fig 5. Current distribution in various short vertical aerials compared with that of full-length quarter-wave monopole

PA0RCH short vertical for 1·8MHz

In *Electron* (February 1974)—and incidentally this is the journal of the Dutch society VERON and not the British publication of the same name—R. Cornet, PA0RCH, presents a detailed account of his development of a short vertical aerial suitable for 1·8MHz (and 3·5MHz). This started out, apparently, as a helix wound vertical using an 8m length of plastic drain pipe but subsequently developed into a vertical with top LC loading. He shows that this form of LC loading offers substantial advantages over an unloaded monopole of similar height and also has some advantage over the helical wound vertical, although the helix itself also gives substantially more power radiation than the plain monopole.

In effect the PA0RCH aerial provides a vertically polarized signal along the lines of the G8ON aerial where a maximum current section of a long wire aerial is arranged vertically. A basically similar effect is also achieved with the arrangement described recently by A. P. A. Ashton, G3XAP, in his "160m dx from suburban sites" article (*Radio Communication* December 1973, pp842–844). The difference with the PA0RCH is that the 130ft or so of loading wire of the G3XAP aerial is concentrated into an LC "top hat" mounted directly at the top of the vertical section. This would reduce the amount of horizontally polarized radiation but more importantly does not require the space needed for wire loading: the PA0RCH aerial could be erected on many sites where a G3XAP or G8ON type of aerial would be impossible.

The LC loading section consists of 64 turns of wire at the top of the 2½in diameter pipe (about 64μH) for the "L", with a capacitance hat in the form of a five-spoke wire "wheel" surmounted by a tripod wire structure: see Fig 6. The details given by PA0RCH indicate that such an aerial will tend to have a fairly narrow bandwidth (about 50kHz at 1,840kHz) for an swr of under 2.

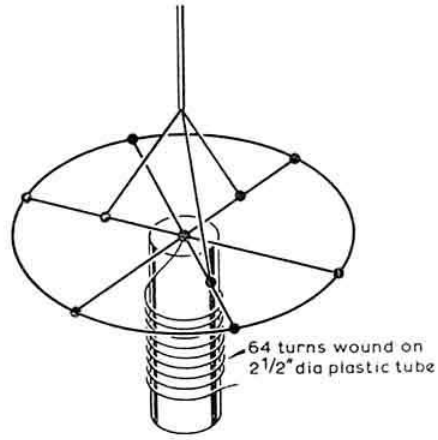


Fig 6. The top LC loading arrangements for the PA0RCH aerial. Diameter of the "wheel" is 110cm and the tripod is 1·5m high all formed with 6mm wire. Total capacitance is about 50pF and the resonate frequency of the LC is about 2·85MHz (for 3·5MHz this is made about 4MHz)

Inductive loading of short aerials

The PA0RCH aerial is an interesting example of how a short aerial can be improved by means of top loading, but it does appear that quite a number of amateurs are still a bit hazy about when and where it is possible to use the more conventional loading coils in conjunction with short aerials, despite the many designs, including mini-beams, that have been published. There is clearly rather more to this whole question than just sticking in an inductor of the right value and making sure with a gdo that the whole thing resonates.

Some of the important factors are well indicated in a contribution by R. C. Hansen, "Efficiency transition point for inductively loaded monopole" in *Electronic Letters* (Vol 9, No 5, 8 March 1973). The author notes that "whip or monopole antennas less than a quarter-wave long can be significantly improved through series inductive loading in the antenna wire provided that the coil losses are less than the improved radiation resistance . . . however *if the antenna is too short or the coil too lossy the performance may degrade instead of improve* . . . the combination of antenna length, radius, and coil Q for which the efficiency is 50 per cent is an important design guide . . . this transition point varies as $Q^{\frac{1}{2}}$ and even more slowly with length to radius ratio. For Q equal to 300, the transition point occurs for monopole lengths between 0·05 and 0·07 wavelength."

Hansen refers to earlier work by Bulgerin and Walters which indicates that optimum efficiency is obtained with the loading inductor roughly *two-thirds* of the aerial length towards the end. This is in line with the positioning of the loading inductors in some mini-beams although rather different from normal practice in mobile operation.

He presents the results of a number of computer studies which give guidance on the various combinations of aerial length, aerial radius and coil Q for which the system efficiency is 50 per cent, noting that this figure is a useful guide since efficiency will fall away very rapidly below this.

In the following table, taken from this source, h and a are the monopole length and radius, λ is wavelength and Q is inductor Q.

TRANSITION LENGTHS

h/a	$Q^{\frac{1}{2}} \times h/\lambda$	h/λ Q = 300	h/λ Q = 100
50	0·307	0·046	0·066
500	0·379	0·057	0·082
5,000	0·435	0·065	0·094

This table shows a number of interesting features: for instance that inductive loading can be usefully employed with a thin-wire monopole (h/a = 5,000) when the monopole exceeds 0·09λ but with stubbier monopoles and higher-Q inductors the transition point is reduced to just below 0·05λ. Since, for example, at 1,900kHz, 0·05λ represents roughly 26ft whereas 0·09λ is round about 47ft, it becomes clear that the use of a high quality loading coil and the form of the element have a very important bearing on the results likely to be achieved with an inductively loaded aerial.

On the general subject of short aerials, the February 1974 issue of *QST* has a clutch of articles on various forms of helical wound systems, including a 7MHz micro beam, with two 18ft elements and 15ft 8in spacing, an item on the construction and use of long helical coils for aerial loading and a review of the Teletron "Slinky Dipole" which can be stretched to between 12 and 35ft span for 7MHz and 24 to 70ft span for 3·5MHz (and which reminds me a bit of the old indoor broadcast aerials which used to be sold at Woolworth's for 6d in the 'thirties!).

Constructing diode matrices

For amateurs who wish to use a diode matrix, K. G. Richens, G3ZGU, mentions that he is averse to using the G3ZSS method of constructing the matrix since "in effect the programme was dictated by the soldering iron". Instead he uses a relatively cheap and simple system of programming that has all the advantages of a conventional but expensive pinboard.

The basic system consists of "x" number of Veroboard edge connectors with a quantity of suitable polarizing keys, and "y" number of pins: the diagram of Fig 7 is self-explanatory.

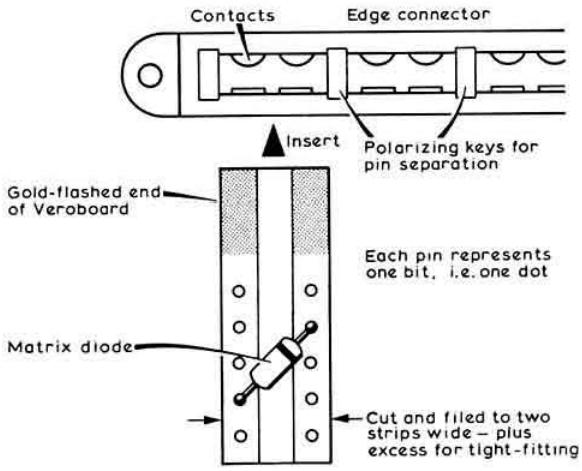


Fig 7. G3ZGU suggests this system for constructing diode matrices as used in morse code generators etc

G3ZGU suggests that the advantages of his method are: (1) the morse output can be programmed by hand to suit personal requirements; (2) the system requires a minimum number of diodes for any programme; (3) output character sequence is easily recognizable by pin status.

Propagation oddities

One of the continuing fascinations of amateur operation on virtually all bands from hf to microwaves are those unexplained oddities of propagation. Some may never amount to anything of real significance to professional communicators or broadcasters, but there is always the feeling that what we notice just as an occasional unexpected quirk may once in a while turn out to be the tip of some phenomenon of real importance; certainly history supports this view.

One oddity that most of us have experienced from time to time, but is very difficult to pin down, is that of apparent one-way or non-reciprocal propagation. On this subject Ian Davies, G3KZR, writes:

"I have frequently been puzzled, and frustrated, by what appear to be one-way propagation conditions. As far as I am concerned these occur most frequently in the late evenings

on 14 and 7MHz. The effect is that incoming signals are of moderately good strength but my own signal often seems barely audible. This situation causes anxiety that my aerial may have come apart—and of course during contests is extremely annoying.

"Until recently I have dismissed the phenomenon as being a quirk of my own, although other dxing amateurs have stated that they feel that there is such a condition. Now, however, events during the first leg of the ARRL cw contest on 16-17 February have convinced me that there is more involved than any peculiarities of my rig. On the evening of 16 February, about 2000 gmt, on 7MHz the American stations were seeping through weakly into North Europe but apparently much better into South Europe. Between 2025 and 2115 I worked several stations, giving S6-7 and getting between S5 and S9. The signals from the USA had not then peaked, but although they were soon reaching over S9 for the next hour or so before dropping down again around 2300, I did not succeed in raising another North American! The cause was not QRM nor competition, since the Americans were often calling CQ repeatedly on the same frequency without any contacts; the majority of contacts they did get were to the southern countries of Europe.

"Needless to say my rig still works and I am left believing that one-way conditions do exist and may also be fairly selective as to the area they affect. This conclusion may be highly unoriginal but I have not come across any published observations on the subject and am wondering what is known about 'one-way propagation'?"

One-way propagation

I can assure G3KZR that these frustrating conditions are known to others. Indeed the idea that "if I can hear him, he can hear me" has received many knocks over the years, and some of these have been documented by both professionals and amateurs. For example, T. W. Bennington wrote an article "Is radio propagation always two-way?" in *Wireless World* in January 1957 drawing attention to two earlier papers on this subject. One was by F. J. M. Lever and H. Stanesby "An experimental test of reciprocal transmission over two long-distance hf radio circuits" *Proc IEE*, 1956, Vol 103, Part B, No 8; the other by A. M. Humby and C. M. Minnis "Assymmetry in the performance of hf radio telegraph circuits" *Proc IEE*, 1956, Vol 103, Part B, No 10. These papers were based on detailed traffic records and pretty carefully controlled experimental work. To quote Lever and Stanesby: "The test results indicate that appreciable differences in transmission loss occur for hf signals propagated in opposite directions over the same long-distance radio path. These differences appear to persist over periods of a few hours or a few days, and to occur quite frequently . . . it appears that there is room for considerably more experimental and theoretical work on this subject . . . the subject of reciprocity is a strange one for we tend to feel, almost instinctively, that reciprocity is right and natural, and to look for alternative explanations when it is called into question . . . it is worth remembering that not all natural phenomena are reciprocal, as Faraday rotation plainly shows." These Post Office tests suggested a tendency for more path loss on signals going from the UK to Australia and the USA than on incoming signals, at times amounting to 5 or even 10dB difference at frequencies between 11 and 14MHz.

Of course there could be explanations other than differences in path loss. For example, changes in signal-to-noise ratio due to differences in local atmospheric and site noise at different times of the day, associated with the westerly movement of regions of high thunderstorm activity or extra-terrestrial radiation, etc. Or because of the effects of ground conductivity, an aerial may sometimes receive signals at lower vertical angles than those at which it transmits significant power. Still I think that there is no doubt whatsoever that there really can be—and often are—times when you hear the dx better than the dx hears you!

High-angle propagation modes

Another interesting observation on propagation turned up in W1BE's *160 metre DX Bulletin* of 31 January 1974 in the form of a note from Dud Charman, G6CJ. He wrote: "In *Wireless Pioneer* in 1926 when I was a boy I wrote an article on propagation with a wild theory about what happens in the ionosphere just about sunrise and sunset. I believe that at these times the ionosphere is changing; it can produce an effect as if it *sloped* from lower (day) height to the higher (night) level and in this way can produce a focusing effect so that for a short while the waves come in from a higher angle. During normal periods only, the long-wire systems such as Beverage aerials can pull in the low-angle low-distance signals. But when the sunrise/sunset effect is on, the smaller aerials which prefer the higher angles get a chance. This is not only a Top Band effect. I have used long-wires on hf bands all my life and notice it there—definitely! The long-wires go on working for long periods but during the critical sunrise/sunset periods the quads and Yagis often do better—but the condition does not last long. I found that during contests I could hold my own against the quads and Yagis for long periods, but when the peak came they had the field for a time."

Here again I can recall previous observations (for example, in the old *T & R Bulletin* in the mid-'thirties) when writers have suggested that there are times when high-angle rather than low-angle radiation can be more effective for dx. And despite all the recent work on ionospheric tilts and ionospheric focusing I would hazard the guess that both these phenomena still remain to be fully explained—and that the explanations when they come may prove to be of more than passing interest!

Final point on propagation. Forecasting just when we will reach the end of any sunspot cycle is a risky business—it is very easy to be one or two years out. But I recently came across a forecast made in the early 'sixties which gave mid-1974, so maybe it will not be so long before 28MHz is perking up again (and even now one gathers that there are occasional short openings).

Here and there

D. Byrne, G3KPO, points out that many amateurs experience difficulties when the mains voltage is cut by six per cent, and reminds us that Variacs intended to reduce the mains can provide a boost if connected back to front (ie input wired to output terminals and vice versa); but fuses should be used and some means incorporated to prevent excessive "boosting", for instance by limiting travel of the control knob. Keep a voltmeter permanently wired across the output, he adds. Another technique is to use heater transformers in such a way as to add to the mains voltages an additional 6·3 or 12·6V (this can be done with quite low wattage units).

Building blocks for the novice

by SVEN WEBER, G8ACC*

Diodes, diodes and diodes — and some experiments with them

(Part 2)

Static curve interpretation. The graphs of diode voltage against diode current and static dc resistance (Part 1) can be put to some use now. Any resistance will dissipate power when current flows through it and diodes are no exception: take Fig 6 (Part 1) and the points marked on it and work out the power dissipated at these points. Plot them on log/log paper and extend the graph, assuming it goes on in the same way, to get some projective power figures for higher currents (Figs 9 and 9a). The dissipation rises to quite an alarming figure at high currents, and for this reason power diodes are bulky and often need heat sinkage. Silicon junction diodes can stand getting hot, up to a reasonable figure like 100°C, or even higher depending on package material and heat sinkage, but it is rather dangerous as even a small increase in current can burn the diode out. (Germanium diodes have a comparatively low reverse resistance and have to be kept cool or the reverse current increases alarmingly, doubling every 10°C. Silicon diodes have a far greater reverse resistance than germanium types and often this cannot be measured on ordinary test instruments).

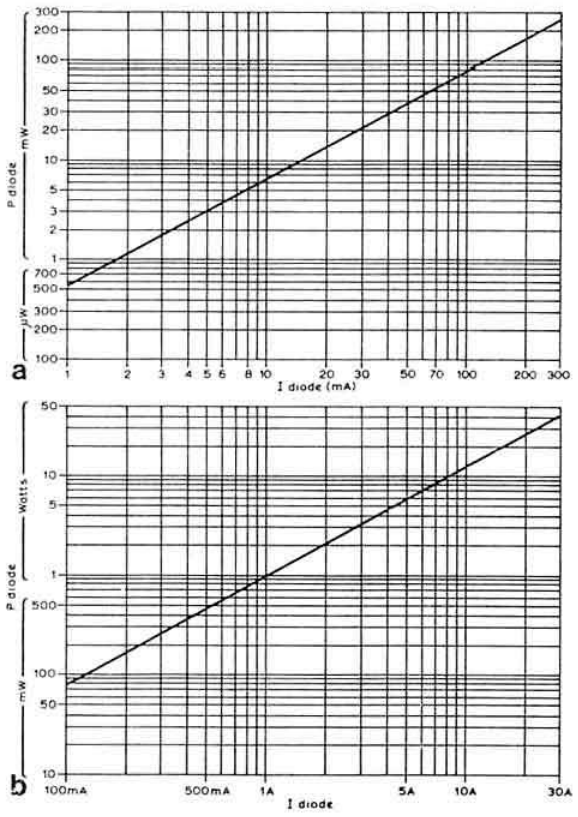


Fig 9. Power dissipation in a 1N4001 diode

Going back to the first circuit (Fig 2), it is obvious that only part of the battery voltage is developed across the resistor and meter (that is, the load). This is worthwhile investigating. It can be shown in two ways, either measuring the voltage across the load and across the diode or measuring current and using Ohm's Law through Figs 7 and 8. It comes to the same thing in the end. The proportion of voltage across the load will be $\frac{V_{source} - V_{diode}}{V_{source}} \times 100$ per cent, and in the case of Fig 2, only some 55 per cent. Now the voltage across the diode is generally under 1V, so the higher the source voltage, the higher the efficiency. In the case of varying the load resistance it is not quite so clear. Figs 5 and 6 can be adapted to give some efficiency figures. Assume a constant 6V battery and subtract the diode voltage at the various currents from six, which will give the voltage across the load (Fig 10). Now work out the load resistance corresponding to each current point; calculate the efficiency and draw a graph on log/linear paper, and it should look like Fig 11. Here semiconductor diodes differ considerably compared with valves.

Only direct currents have been discussed so far. Returning to Fig 5, the linear graph of diode voltage against current, estimate a few tangents at various currents. This will give the resistance to change of current at any point. To do this, place a ruler along the curve to touch it at the various points; draw a straight line through these points, take convenient ranges of current along these straight lines and divide them into the corresponding voltages. Alternatively, from Fig 6, estimate the mathematical equation and differentiate it. This would be

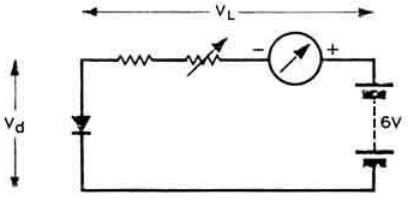


Fig 10. Circuit for measuring efficiency

* 132 Murray Road, Rugby, Warwickshire.

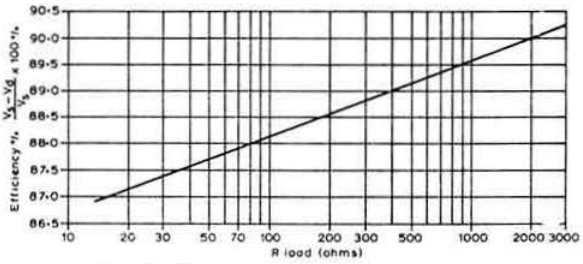


Fig 11. Efficiency against load resistance

approximately $V = 0{\cdot}09 \log_{10} I + 0{\cdot}835$ and the slope would be $0{\cdot}039/I$. Having done this, all that remains is to draw a graph of it on log/log paper. This gives the ac resistance of the diode and is again not constant (whereas it is, in part, for valve diodes), dropping when the current increases, and, except for very low currents, it can be seen to be pretty small. This concept has a number of uses which will be discussed later (Fig 12).

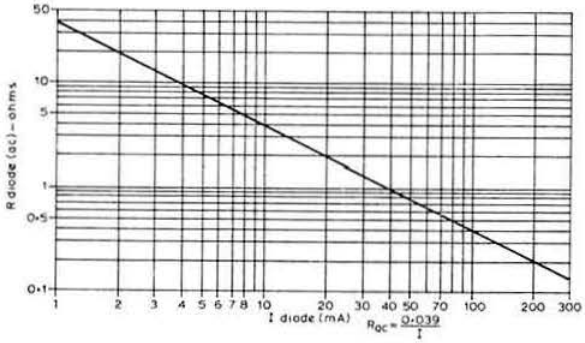


Fig 12. AC resistance of diode $\left(R_{ac} = \frac{0.039}{I}\right)$

A change of tack now for another experiment: investigating the reverse characteristics. A dc supply of some 250V is necessary, as is a vvm reading up to that value (or an ordinary voltmeter at least 50kΩ per volt). *CAUTION: anything over 50V can be dangerous, even lethal.* Arrange the circuit as in Fig 13 with the variable resistor set at the bottom end. If the vvm has a reasonable internal resistance (say, 10-plus MΩ), it should not load the circuit too much. Switch on and slowly increase the resistance; if the diode is a good one and the potentiometer is linear, the voltage should go up steadily. Dependant on the sample of diode used, there will come a point where the voltage stays steady. This is the turnover point or break-down voltage and should be at least twice the 50V quoted as maximum peak inverse voltage (piv) for the 1N4001. A range of diodes turned over between 140 and 180V when the author carried out this experiment recently. The diode is acting as a voltage stabilizer; a topic dealt with in more detail later.

The point is that in this circuit the dissipation of the diode has been limited to a very small value by having at least a 1MΩ load. In practical circuits, especially power circuits, the load may be only a few ohms and the source resistance may well be less, with the result that if the reverse voltage across the diode is greater than the breakdown voltage several tens or even hundreds of watts are dissipated across the diode,

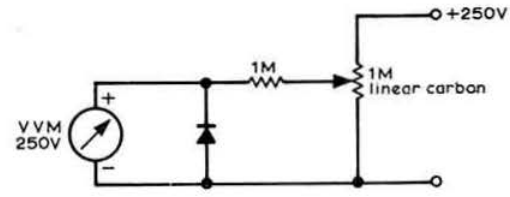


Fig 13. Circuit for measuring reverse characteristics

which will promptly fail. For instance, even 150V at 8mA comes to 1W. Although the diode may not cost much, the components associated with it may do and these will be affected if the diode breaks down.

A few words about temperature effects. The continuous forward current (I_F) that a diode is rated at is normally the value of mean forward current (at V_{source} being piv) with a sine wave input, and is about 3½ times less than what is called the "recurrent peak current" with a rectifier diode. So it seems that a diode can safely pass more than its rated current, but intermittently, leaving the diode time to get rid of the power/heat dissipated in it. Obviously, a matter of averaging short peaks of power, and an outline graph is given in Fig 14. Incidentally the voltage developed across the diode goes down by about 10 per cent if the temperature is raised from 25 to 100°C.

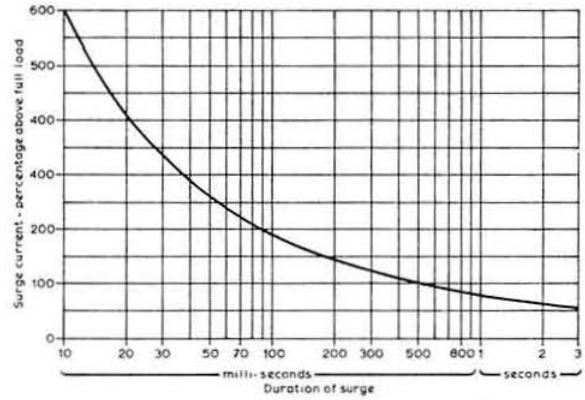


Fig 14. Surge current ratings of small diodes

Although the diode junction itself can stand being heated up to some 150-200°C, the housing often cannot and the permissible dissipation drops off sharply to zero at about 80° (epoxy housing) to 150°C (glass/metal housing). These of course are ambient temperatures, but also, to some extent, body temperatures. Try passing the full rated current at maximum temperature and the diode will soon depart this life. After all, the diode junction area, say in a 1N4001, is only about 1mm², and so small an area cannot get rid of the excess heat in spite of thick silver-plated copper wire headers.

As was mentioned earlier, the reverse current increases with rise in temperature but, generally speaking, for silicon types it is not serious. For germanium diodes, however, the reverse current can contribute substantially to the heating and, if precautions are not taken, burn the diode out. So for high-power rectifier diodes, especially germanium types, adequate heat sinkage is essential.

Diode circuits will be considered in Part 3.

MICROWAVES—1,000MHz and up

by DAIN EVANS, G3RPE*

French allocations

The news from France is bad. They have recently lost the use of the 1,215–1,220MHz and 1,260–1,300MHz parts of the 23cm band. The latter of course includes the internationally accepted 1,296–1,298MHz sub-band for narrow-band working. The allocation 433–434·5MHz has also been withdrawn. Operation in the whole of the 13cm band from 2,300–2,450MHz is no longer permitted except with special authorization, and then only from specified sites. There are also geographical limitations on the use of the 5,750–5,770MHz sub-band. These restrictions will obviously have a widespread effect, not just in France.

It is not known if they will be permitted to listen on 1,296MHz. In principle, 1,296MHz converters which have an i.f. in the 30MHz region and which have the oscillator on the low side of the signal could be made to tune just below 1,250MHz on the second channel. For example, if the commonly-used tunable i.f. at 28-30MHz were generally adopted, then the obvious place for the French 23cm sub-band would be 1,238–1,240MHz. Presumably, the French are thinking along these lines.

PA0 and D on 13cm

Belatedly we have caught up with the 13cm activities of G3LQR (Suffolk). On 17 December 1972 he worked PA0DBQ over a 140-mile path to make what is probably the first contact between the two countries. He used about 1W to a dish 2½ft in diameter, and the reports were 589 both ways.

On 20 January this year he worked DJ2HF/P, which also may be a first. His equipment produced 15W p.e.p. and fed a dish 5ft in diameter. Signal strengths over this approximately 250-mile path (a new record?) were 59. He has also heard DL3NQ and DL9LU recently and wonders if winter is the best time for tropo openings at these higher frequencies.

G3LQR has since developed his equipment so that both 23cm and 13cm are immediately available: he is using his 5ft dish for both bands with a log periodic feed designed by PA0HVA. With all this international activity beginning to blossom, the news from France is especially disappointing.

As for the future, G3LQR is setting up equipment for both 9cm and 10,368MHz, and he reports that G3PRQ and G3ZEZ are also building for the latter band.

GM/G and GC/G on 10GHz

On 10 March GM3OXX and GM3DXJ braved the elements and journeyed south to make the first GM/G contact on this band, or so they thought. The few-kilometre path was from near Coldstream to Cornhill-on-Tweed. However, GM3FYB and GM8HEY apparently had got wind of this attempt and made a similar journey to beat them to it by a couple of hours! With friends like that . . . Anyway, congratulations to all.

While admiring such energy and enthusiasm, this competitiveness does not fit in with the picture one had of operation on this frequency. One had hoped for a leisurely lazy attitude with contacts limited to fine days in summer, at rates measured in hours or even days per contact rather than contacts per hour, and certainly not all this charging up and around mountains in the middle of winter.

A much more proper attitude was shown by G3WJG, and G3RPE with G3YLV, who found themselves on a warm sunny day on 30 March respectively on Guernsey and on Prawle Point near Plymouth separated by a 113km very non-optical path over a calm sea. Colossal signals were exchanged within minutes of setting up the 3cm equipment at about 11am. G3RPE was the more surprised because his receiver was still being built the previous evening. The signals were of fairly constant strength, with only about 10dB of fading. However, as the tests were continued throughout the afternoon the depth of fading increased and became more prolonged until by 4pm only a very weak but constant signal could be heard by G3WJG. At this stage the signal appears to have been due to tropospheric scatter, perhaps the first time that this mode of propagation has been noted.

The broad-band equipment used was quite large by current standards: G3WJG used 30mW to a dish 4ft in diameter sited about 200ft asl, and G3RPE about 600mW to a 3ft dish about 100ft asl.

The following day's efforts were even more interesting. G3KSU/P on St Catherine's Point on the Isle of Wight (726ft asl) and using much smaller equipment, a mere 5mW Gunn oscillator to a 27dB horn, exchanged similarly strong signals with G3WJG. Measurements by G3KSU indicated signals at least 18dB above noise before his attentuator ran out of decibels. As the path length exceeded 150km, both operators can now claim their Microwave Awards—perhaps a special one for being the first to do it over a non-optical path.

Immediately afterwards, G3RPE now /P on Start Point, failed to work either station, which was a little surprising since a check showed that G3KSU and G3WJG could repeat their earlier contact. Unfortunately, G3KSU had to go home at that point. The tests continued between G3RPE and and G3WJG, and eventually a faint signal lasting about a second was heard. Nothing was touched and during the next half-hour the signals came up in strength to reach the same level as on the previous day, and remained there until both stations had to close down an hour later at about 3pm.

There seems little doubt at this stage that the considerable signal enhancement observed was due to superdiffraction, the weather conditions for which were near ideal besides being good for sun-bathing. When G3WJG returns it will be possible to look into these most interesting results in a quantitative way.

10GHz expedition

GM3OXX intends to operate /P from the Isle of Man on 29 May, and is looking for schedules. Other members of this very active Edinburgh group will operate from Kirkcudbrightshire and Cumberland in an attempt to make the first GD-G and GD-GM contacts on this band.

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SWL NEWS

by BOB TREACHER, BRS32525*

WELCOME back to *SWL News*. The non-appearance of the feature for a couple of issues was caused by a number of reasons, but the main one was lack of comment from readers; it is difficult to write a reasonable and varied piece if copy is not to hand. Your scribe cannot contribute *and* write it, and information which has been stored for a while becomes dated and has to be passed over. Following the note in " QTC " in March quite a few newcomers as well as some of the former regulars have come to the rescue and as a result *SWL News* reappears. Keep the news and comment coming and thus ensure a regular feature. Black and white photographs suitable for reproduction in this section are also welcome as they will add to the variety.

Postbag

Stanley Sharred, A8313, is a 160m addict. Recently he has heard YV and 4U1 for two all-time new countries on the band. This takes his total to 24. Recent verifications from stations heard on that band include GD5DZ and DK3BJ. Also received was a QSL from EP2BQ who returned a card direct; as Stanley reflects, he must have been thankful for it! 15m is his next favourite band and quite a few dx stations have been heard this year during patchy conditions.

Main comments of Keith Kerr, A8482, centres around the sporadic openings on 10m. During March the band was open on numerous occasions and the dx was there to be heard. The openings occurred mainly during late afternoon with stations from the southern hemisphere being audible. A selection of prefixes heard on the band include A2, CR6, CR7, CN8, FY7, TR8, 5U7, ZP, CX, ZD9, VP8 (VP8HZ was 20dB over 9 at this QTH on several days) KZ5, TI and 9Y4. For Keith, the pick of stations heard on 15m was CR8AB, while 20m produced 9M8, XV5 and ZK1. He comments on the 20dB over 9 signal from AC4NC on 80m and the pile-up which ensued: it is strange that people should waste good time calling such stations which are obviously jokers.

Richard Newstead, A8390, writes from Norfolk. He has a JR500S into a 240ft long wire aerial. When the summer arrives he hopes to put up a trap dipole for the hf bands and retain the wire for the lower frequency bands.

Another newcomer is David Sharred, A8312, (any relation to Stanley?). He uses a CR100 and a ½λ inverted-V dipole for 80m. EA9AQ is located in Mellila. The only stations in Spanish Sahara are EA9DE and EA9EJ. Your scribe believes that the latter is the only station now active from this rare spot.

Chris Henderson, A7460, reports generally poor conditions but has been able to locate the occasional new one. Chris now has 105 countries confirmed and will be claiming the Listeners' Century Award soon. The QSL return at his QTH has been good of late; the best cards being from KH6HDB, VS5MC, ZD9BM and 3D6AW. Chris also entered the WAB If phone contest and seems to have amassed a huge score which it will be difficult for anyone to better.

John Hesman's interest in radio has been rekindled due to the early close-down of television which was forced upon us during the early part of the year. John uses a JR500S into a 150ft long wire around the loft. However, he is considering the purchase of a commercial aerial and an atu which he hopes will improve his set-up even more.

An FR50-B and loop aerial are in use at the QTH of Mike Gibbs, A8112, in Poulton-le-Fylde, Lancashire. He thanks local amateur G3YWH for this. Mike has recently become interested in Oscar 6 and has confirmation already from DC6, DL7 and VE3. His listening time has been curtailed of late due to studies and work, but VKs etc still find their way into Mike's log.

A very interesting letter was received from BRS33179. George Thompson's Birmingham QTH is equipped with an FTdx 400 and a 10-80m vertical. George has plans for siting another a ¼λ from this one. A good idea this if you have the room, and one which will improve the directivity of the aerial system if fed the correct way. George comments on hf conditions and also that during a recent 2m contest he logged 30 GW stations in half an hour.

Prefixes

Since our last appearance several new and many special contest prefixes have been aired. As a guide to the stations' whereabouts the following may be of use:

A7—New prefix for Qatar. A7XA is the only licence issued so far.

CF3—Special Canadian prefix to commemorate the first telephone call by Alexander Graham Bell.

CO6, XX6—Both originate from Angola.

YY5MM—Was active from Venezuela during the CQ Contest in March. Also active during this event was CV2T from Uruguay.

CT7—Special contest prefix for CT1.

PS—Contest prefixes for Brazillian stations.

SQ5Z—Special call used by a group of Polish amateurs to commemorate the construction of a Polish castle.

HG8U—Contest prefix for Hungary.

The table

When sending in entries for the table it is *not* necessary to write out a list showing all the stations heard. All that is required are figures in a tabular form as shown in the table itself. Simply keep a list of countries heard on each band during the year and when the " deadline " appears simply add the countries together and let the writer have the totals for each band. The deadline for the July *SWL News* is 3 June; scores received after this date will miss the issue.

The winner of the 1973 table was Les Poole, BRS33558, who amassed a total of 830.

1974 HF Countries Table

		10	15	20	40	80	160	Total	
1.	A8482	42	146	190	110	130	–	618	ssb
2.	A8320	–	56	122	59	70	6	313	ssb
3.	A8312	2	48	94	63	71	19	297	ssb/cw
4.	A8313	3	57	64	46	65	18	253	ssb/cw
5.	A8606	–	35	103	27	75	2	242	ssb
6.	A8313	7	23	43	70	27	5	125	ssb

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FOUR METRES AND DOWN

by JACK HUM, G5UM*

VHF Convention 20

". . . contribute technically, scientifically and socially to the world at large"—G3FZL

FIRST, the facts-in-figures about VHF Convention No 20 held during the weekend of 6–7 April: at the afternoon sessions (lectures, trade shows, construction competition and just sheer enjoyable conversation) 676 people booked in, a 20 per cent increase over last year. The floor area this year was doubled by taking over the hall of a nearby school for the lecture sessions, but even this barely contained the crowd which thronged for the 2pm opening—they were standing along the sides several deep. At the " Winning Post " more trade exhibitors than ever were accommodated, and browsers had more elbow room to examine their offerings.

VHF Manager Geoff Stone, G3FZL, opened the Saturday afternoon proceedings with a review of the metre-wave scene. Here are spotlights on some of the ground he covered:

New bandplan: smooth transition proceeding; the majority of people, mainly sidebanders, will probably get themselves recrystallized by the end of the year.

Repeaters: RSGB policy is to aim for orderly growth. Repeater documentation typically takes 6–12 months to be processed. Crystal Palace (London) repeater now authorized by MPT subject to two small mods. A few others are at the embryo stage—but the real need now is for repeater schemes on 70cm.

President G. R. Jessop, G6JP, and Ray Hills, G3HRH, examine one of the entries in the Constructors Competition

Brian Horning, G8DTH, of Racal, giving an rtty demonstration

Threat to vhf bands: laying particular emphasis on the situation of amateur radio vis-à-vis the 1979 ITU conference, he commented on the serious anti-amateur moves already evident in some countries, eg the action of the French in curtailing amateur use of microwaves and in putting their military into our 144–146MHz band; of the withdrawal of the whole of 2m by some Far East countries; of the danger that enough small countries could get together to constitute a power bloc to torpedo the amateur movement ("Britain has only one vote at the ITU just as they have").

He hammered home the point stressed frequently in *FMD* that " . . . everything heard in the amateur radio bands shall be a credit to the movement". And his final sentence should be heeded by every licensed amateur, particularly by those outside the RSGB and those to whom amateur radio is little more than a fun thing of the moment: " It is of vital importance that all of us in the amateur movement shall do our best to contribute technically, scientifically and socially to the world at large."

Forward thinking in the lecture session

The extent to which metre-wave men can indeed contribute in the way Geoff Stone outlined frequently became evident in the lecture session which followed his opening address.

Take 24GHz (the microwave man's top band in frequency terms): could it be that the amateurs have been given this assignment (its release is still pending incidentally) because

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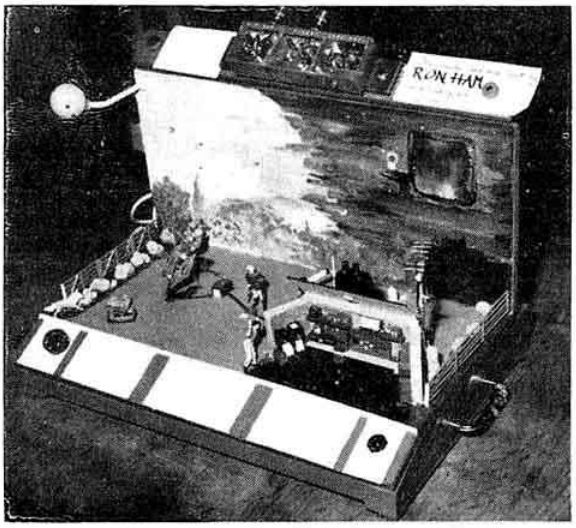
Brian Comer, G3ZVC, holding receiver, who gave the lecture on using Plessey SL600 series ICs, explains points to visitors

the professionals cannot get on with its awkward propagation propensities? The challenge to the amateur in this area is obvious in spite of problems of finding adequate decibels to overcome path loss and water vapour attenuation as Heath Rees, G3HWR, told in his lecture.

Just before this, more new horizons (almost literally) were indicated by that dedicated non-professional, Ron Ham, BRS15744, who described how use may be made of auroral events and the RSGB beacon chain in assessing propagation possibilities. His lecture was backed up at "The Winning Post" with a scale model of his garden at Storrington, complete with tiny sky searching arrays, and with Mrs Joan Ham an enthusiastic expounder.

Sophisticated hardware which the metre-wave operator is using increasingly was described by Brian Comer, G3ZVC,



Ron Ham's model of his solar observatory which aroused great interest

who outlined several designs that embody the SL600 series of integrated circuits. Circuit diagrams full of triangles and hardly a circular semiconductor symbol in sight represented the amateur ssb/cw transceivers of the future.

After the designs, the applications. If you go for fm it is useful to know how to generate it properly, and keep it clean: G3OOU showed how. If you go /M you need to know those tricks of vehicle suppression that make all the difference between enjoyable and barely-endurable mobile operation: a Lucas lecture told how. If your bent is to go out solo-portable to prime sites you could learn from the highly successful experiences of Graham Knight, GM8FFX, what some of the problems are.

Winner of the Constructors Competition, C. E. Saveker, G8AMU, with the 1962 Committee Cup

Or if you throw in your lot with an enthusiastic group to essay some of the rigours of RSGB portable contests there was valuable advice to be given by G3VPK and G3LTF from the Mid-Essex Contest Group in an hour-long dissertation called "How to win vhf contests: get your priorities right". Some of these priorities were: a good team (dedication is essential), a good site, reliable equipment, modern operating techniques (co-channel cw and ssb even on 1,296MHz). Said 'VPK (inter alia): tune the receiver with a phase locked lo rather than go the conventional converter-into-rx route, design for 15dB front end gain, 4dB noise factor and as much as 100dB dynamic range, remembering there may be another very potent portable on the next hill; aim for a scoring rate of 20/h on 2m and 5/h on 4m: " If you don't achieve this, change the operator. And anyway don't keep him on for more than four hours at a stretch".

Then Peter Blair dealt with the uhf side of contest deployment: "Shake the gear before the day: it may never have been in a car before" was one of 13 priority pointers he offered. Another: "*Think* yourself into the other operator's situation: why does he have difficulty with your signal?" Another: "Varactors should always be tuned up at home, never on the portable site", a valuable piece of anti-pollution advice. Yet another: "Measure what your equipment is giving: never guess at it", followed by a description of an ingenious calorimeter method of measuring microwave output: you just poured the rf into a bucket of water!

And on the succeeding day . . .

The lecture programme was continued on the Sunday morning with G8AGU on the use of A3J on 432MHz. This was particularly topical: Paul Widger's head-of-the-table success in the first-ever 70cm ssb contest (86 stations worked, 54 of them outside the UK, from his portable site on Exmoor) had just been published. He made light of it: his emphases in a lecture loaded with practical design criteria were on the need to ensure equipment reliability before going out /P, and the choice of appropriate mixing frequencies for the transverter process. On this second point he displayed some horrific figures of unwanted products generated if an existing 144MHz ssb rig is used as signal source for 432MHz. A more hopeful approach seemed to be to start on 70MHz, and this was the consensus of opinion voiced in the subsequent question and answer period.

New e-m-e record by G3LTF-VK2AMW

On 30/31 March G3LTF near Chelmsford worked VK2AMW south of Sydney on an earth-moon-earth path on frequencies of 432·002 and 432·000MHz respectively, using cw, thus raising the existing K2UYH-VK2AMW record by about 1,000 miles. The Australian signals peaked at 10dB in a 200Hz bandwidth at the Chelmsford end.

At G3LTF a 15ft dish and a 750W transmitter were used, and at VK2AMW a 30ft dish and 500W. The receiver at each end used MT4578 transistors in the front end.

This success crowns a series of carefully prepared tests arranged by two leading exponents of e-m-e techniques.

Paul Widger's talk pointed the way to the use by the amateur of advanced design and communication techniques at uhf. It was good to have G3IOR do the same in a subsequent talk in respect of Oscar, for there is no doubt that an effective through-satellite tradition built up well before ITU 1979 is upon us will be a further rebuff to those who seek chinks in our technical armour in attempts to decry the value of the amateur movement.

Dinner and presentations

The evening before, at the VHF Convention Dinner, RSGB President George Jessop, G6JP, also had something to say about the protection of the amateur's privileges. Replying to the toast of "The Society" proposed by Ray Hills, G3HRH, (Chief engineer, transmitters, for IBA) he spoke of the need for a large and united RSGB that would be capable of standing up to future attacks upon us.

Ray Hills had led up to this in his own speech: "I am absolutely convinced that a strong RSGB is vital if our affairs are to be handled effectively on the international scene in the future." He charted the course of the annual VHF Convention from the days when it cost 3s 6d for the afternoon and 27s 6d including the dinner, through 1964 when G3FZL was RSGB President, right up to the metre-wave growth period of the 'seventies. "Who in the earlier days could dare imagine that VHF NFD would become the major Society contest and the VHF Convention its major social event?"

Then it was time for the presentation of Society trophies. Most happily, this was linked with a highly topical occurrence marking another advance in the history of amateur radio communication: only the previous weekend G3LTF had succeeded in working Australian VK2AMW via the moon on the 70cm band, to exceed the existing record by about 1,000 miles. Details are given in the panel. Peter Blair was due, in any event, to be presented with the Fraser Shepherd Prize for microwave progress; this latest feat made the award unusually appropriate.

The President presents the Fraser Shepherd Prize for microwave work to Peter Blair, G3LTF.
(All photographs by Paul Fletcher)

The 1962 Committee Cup for what was adjudged by G6JP and G3HRH to be the best exhibit in the Home Constructors Competition went to G8AMU for a state-of-the-art transceiver for 427-plus-23cm; and for the Mitchell-Milling Trophy won by the GM3BA/P group on the Mull of Galloway in last May's portable contest, Tom Douglas came forward on behalf of the team.

Lucky programme numbers brought a J-Beam voucher to G3YHM and a Burns Electronics voucher to G8AAY. Appropriate prizes, also, went to the ladies, of whom this year there seemed to be more present than ever before in a record dinner attendance of 225.

Records all the way down the line, then, for VHF Convention 20 of 1974; and may this growth rate be continued not just until but well beyond the Silver Jubilee VHF Convention which will take place in ITU Conference year 1979.

Erosion

The VHF Committee was gratified to learn at its March meeting that the aeronautical channels on 2m were to be deleted from the licence, though the news that the French authorities had withdrawn the whole of the 13cm band and a large part of the 23cm band from the F-men's licence was received with foreboding. Coming on top of the disclosure (p 142) that the French proposed to put military stations into the exclusive 144-146MHz amateur band it was bad news indeed.

A few days after the meeting your conductor received a letter from James Pershouse, 9M2DQ, of Penang, saying that since last October the 9M2 men had lost the whole of the 2m band, an action apparently the work of a combined Brunei-Malaysia-Singapore frequency allocation board. It seems that the former allocation of 144-148MHz will be handed over to the military and police.

As '9DQ remarks: "When advanced 'developing countries' like this do this sort of thing it augurs ill for the international amateur movement and the next ITU conference. Without outside help we can do nothing. In this area amateur radio is grudgingly tolerated and certainly not encouraged."

At any moment further news of similar erosion of amateur facilities in other countries may be on the way. The intolerance/suspicion/lack of faith (call it what you will) which many governments harbour for amateur radio is something we in the UK may find hard to understand in the light of our own excellent relationship with the British licensing authority. It is especially hard for metre-wave men to understand: they tend not to be internationally minded by the very nature of their craft, and may assume, listening to the thriving activity on 4m and down, that "all's right with the world".

Outside, it is not. In many countries the image of amateur radio is becoming blurred if not tarnished. Its frequencies are coveted to an extent that the next ITU telecoms conference will be a serious testing time for amateur radio. In anticipation of that conference, your VHF Committee has been charged with preparing papers for the 1975 IARU meeting that will precede the next professional ITU one.

It is obvious to most of us that a strong national society helps preserve and extend the radio amateur's privileges; but if this is less obvious to the newly licensed amateur whose major purpose is to work the next town with his fine new 2m sender, then some of his locals ought to tell him. They should remind him that though it may be difficult for him, after buying new licence and sender, to stump up a further £5.50 for his RSGB sub, he will be getting a great deal more than the monthly journal for his money.

What must also be emphasized is that our spoken words will tell the unseen "them" what kind of people we are, and how deserving of the privileges we hold today.

The new counties

Almost until midnight on Sunday 31 March, when England's smallest county, Rutland, disappeared into Leicestershire under the reorganization plan, stations were queuing on 144·2MHz to work GB3RUT, the special activity station put on to "427" plus 23cm to commemorate the passing of one of the UKs most sought after places. Earlier, their companion station, G3AFT/P, gave Rutland for the last time to participants in the 70cm contest which had finished at 5pm that day. A few miles away G8DLX/P also joined in from a site near Uppingham to help the cause.

An octet of operators from the Havering and Grafton clubs who manned GB3RUT before Rutland disappeared into Leicestershire at midnight on 31 March 1974 (*Photo: G5UM*)

Across the width of the land expeditionaries on 70cm into Montgomery provided another "last fling" before that county metamorphosed into Powys.

What happens next? This question will be in the minds of all who collect towards an FMD award. Part of the answer is on p36 of the January issue of *Radio Communication:* "Although county boundaries and names of counties are to be changed in April this year, for the purposes of contests in 1974 stations should use the county boundaries as at 1 January throughout the year". This is the wording of the footnote to County Code Letters for RSGB contests.

This keeps the 1974 contest situation tidy. In respect of the FMD awards situation, claimants will no doubt continue to receive cards verifying contacts made with the old counties until 31 March. Members who find themselves in new counties *after* that date should mark the name of the new county on their QSLs before they send them off.

On the subject of FMD claims, RSGB HQ still receives regular enquiries which need not go to 35 Doughty Street at all, for most of the answers are to be found on the Four Metres and Down Claim Form, a copy of which may be had from the Hon VHF Awards Manager if you send him an sae to the address on page 285. Here are some of the queries which have been raised, with their answers:

For fixed stations do all contacts have to be made from the same address or is there any tolerance, eg a one-mile radius? From fixed location only.

Can contacts be made from more than one alternative address? Yes: it is in effect a substitute for a fixed address.

Where the alternative address has become the fixed station address can the contacts be grouped together? Yes: but please make the fact plain otherwise the Hon VHF Awards Manager will query the claim.

May contacts from any portable location be grouped together? Yes: some portable operators have turned in an intriguing assortment of G, GM and GW prefixes during their wanderings. As long as one callsign is used, all rate as one station.

And mobile? Same again: any location counts.

Do French counties or departments count? No: nor do counties in the Republic of Ireland. In other words, only counties in the UK rate for the FMD award, otherwise where do you stop?

More Oscar currencies

With the approach of the launch date of Oscar 7, some comments provided by DK2ZF are worth storing for future reference.

He reminds intending users that the first device to go on the air once Oscar 7 is up will be the 435MHz beacon. This should *not* be the signal to try to access the satellite forthwith: neither of the repeater communication channels will open up until 24 hours later. When they do it is important to remember that when triggering the 70cm receiver with an A3J transmission the emission will be reversed to lower sideband when it emerges on 2m. This provision is to be applied in order to reduce Doppler shift at a distance. It is anticipated that 100W erp on 70cm will be ample to trigger the device.

Of the other talk-channel, 2m up and 10m down, techniques are well established from Oscar 6 experience: but DK2ZF does suggest that the improved aerial system and larger erp (2W) at the satellite will enhance performance.

The canted turnstile aerial on Oscar 7 will receive on 70cm in the $\frac{3}{4}\lambda$ mode and send on 2m in the $\frac{1}{4}\lambda$ mode. It will also be used for 2m reception. For most effective triggering he suggests the use of a circular-polarized beam.

For further information about Oscar 7 see "Oscar 7 and its capabilities" by G3ZCZ and W3GEY in November 1973 *Radio Communication*.

As for Oscar 6, congratulations to G2BVN for securing Certificate No 200 in the "1,000 Satellite Award" series. Yes, he does get on the air sometimes in spite of his many activities for RSGB and his secretaryship of IARU Region 1.

To G6CJ came an ingenious Oscar QSL card produced by OH2RK, whom he worked 29MHz down, 145MHz up. It carries a Great Circle map of the world centred on the North Pole and a rotating plastic cursor complete with a red Oscar track line and the words "Dayside" and "Nightside" to show what orbits may be expected and when. Passed to the G3IOR/G3WPO team for further circulation via their Oscar newsletter.

"Tone A"

No cosy pre-teatime local Saturday evening chats on 2m on 16 March: there was an aurora on. The bottom 100kHz of the band was filled with spreading raspy Tone-A notes from telegraphists, the next 150kHz with the characteristic hollow sound of auroral-bounced A3J.

"How do they all know?", many newcomers must have asked themselves as they heard the band come alive. There are three answers: the sheer luck of switching on when Ar is about; or more scientifically the instinct which tells the experienced metre-wave man that the spring and autumn equinoxes are the times to lie in wait for it; or notification via GB2RS or Ron Ham's observation post that solar disturbance is on. To some, none of these answers applied: "Old-so-and-so telephoned me and told me all about it . . . bless him, I got a couple of Scandinavians as a result".

As always, the redoubtable GM3UAG was there working them in droves. A little further south GM8FFX logged G8AGU as the most distant UK station among pages-full worked on 144·2MHz ("All of them were on that frequency, and the new band plan seemed to be working well", added Graham Knight). With him the drop-out moment was 1930gmt, and there was no second phase.

Far to the south G3WZT gave 1905gmt as the stop-time: he just managed to complete a contact with GI3GXP by then. Interestingly, John Matthews worked no Continentals but heard many UK men further north doing so. He gave optimum beam heading as 10 to 30°, with considerable loss of strength in the due north position. Curiously, 130 miles to the west GW3ZTH gave 340° as the optimum; both Joe Ludlow and nearby GW3REQ give 1900gmt as stop-time, with GI3GXP as last man in (or out). Start-time with the South Wales watchers was 1630gmt, and with them, too, Continentals were sparse. In Slough, though, Les Coote caught one almost on the first call when OZ6OL came back to a quick co-channel blip on A1 from G3AHB . . . but the mass of echoing sideband from GM-land was difficult to resolve.

In such conditions it is worth checking to see if 70cm also is Ar-affected. Devon's G8AGU did so in conjunction with Sheffield's G8EPG: they set up what was probably the first A3J two-way on 432MHz via aurora.

Coming back to GM3UAG, at Ellon in Aberdeenshire, Jim Davidson sometimes gets a visual sighting of an auroral display in his high latitudes: this does not necessarily indicate a good radio opening, and that on 20 March, though bright in the sky, was poor on the air. Next day was almost up to the 16 March standard and produced five SMs, two LAs, one DL and a flock of UKs; four countries worked Tone A compared with seven on the previous Saturday (this with 90W to a good old 829B and a 5-el Yagi).

Contest commentary

Coming up fast is the annual Region 1 (RSGB) VHF contest organized by the Ainsdale Radio Club of Southport: the date this year will be Sunday 23 June. A copy of the rules may be had by sending an sae to G2CUZ, the club's contests and trophies manager. Norman Horrocks tells *FMD* that the revised rules make the contest more attractive to single stations now that there is to be a separate section for the multi-operator club entrants. There is a 10-point bonus for inter-Region 1 contacts, and a certificate for the best entry from outside the region. G2CUZ is at 34 Sandbrook Rd, Ainsdale, Southport PR8 3JE.

Exit the spring 432MHz Cumulatives on Monday 25 March (did you remember to record your opinion, on the back of the log sheet, about the longer 150min time span?), and enter the 432MHz Open at the end of the same week. There were those who foresaw a 24-hour event as being too long for the available people to work on 70cm: however, the misgiving was unfounded, for this event, like the first ever "432 A3J" one in January, was blessed with such good conditions that three-figure serial numbers were being returned by mid-morning on the Sunday—and to work over 100 stations on 70cm from a home site is *some* going by anybody's reckoning. This fact, and the huge increase in ssb use, demonstrated once again how well ahead in the state-of-the-art stakes this band now is.

Regrettably, pollution is with us on "70": just one or two portables on prime sites with poor transmitters can plague the enjoyment of the majority—and on 30–31 March they did. It is to be hoped that this month's similar event (432MHz Open on 26 May) will be free from frying noises over half the band caused by ill-adjusted senders. For that matter, the same goes for the 144MHz Open of 4–5 May, where the greater carrying power of 2m compared with 70cm, and the heavy occupancy, mean that more annoyance can be caused to more people from such sources.

"Stand by while I brush my hair"

Visiting inspectors from the MPT have an awkward habit of asking to see the station's dummy load. If one cannot be produced the disarming question follows: "How do you tune up your transmitter?" A score of locals could give the answer: "He tunes it up on the air, worse luck".

Of course, the MPT inspector (particularly if he is a licensed amateur himself and uses vhf, as many are and do) will know this already. Perhaps that was why he arranged the station inspection.

Metre-wave transmitters, being inherently broad band, rarely need tuning up on the air. Once set up they should stay put for months just as professional base stations do. "Stand by while I tune up" tries the patience of many a QSO-partner. It should have been done off-air. Even more trying are those self-preening "testing testing" microphone sessions that smack more of broadcasting than amateur communication.

Information on dummy loads? See p7.51 of the *Radio Communication Handbook* and/or p10.13 of the *VHF/UHF Manual*.

Front-end uhf filter

In designing a telemetry receiver for ecg work, the Medical Electronics Division at Hewlett-Packard needed a filter that would remove an image frequency of 423MHz without unduly attenuating the carrier at 467MHz, the local oscillator being at 445MHz to produce an i.f. of 22MHz.

Several bandpass filters in series to provide the required rejection would, it was felt, introduce unacceptable loss. The problem was solved by using a transmission line filter in two sections that formed a series resonant trap for the image frequency and a parallel resonant passband for the carrier. One filter at the aerial input and another at the output of a two-stage tuned rf amplifier gave an image rejection of more than 100dB.

Coaxial cable filter? No, an ingenious mechanical arrangement of bar-and-box functioning as a line.

For details see *Hewlett-Packard Journal* for February, probably at your local technical college or the public library. Thanks, G3SBA, for info on this one.

Here and there

Ignore any calls you hear on 2m from "G8EDT". The original owner has long since been G4AUY.

Crystal on offer: one 10X type delivering 145·65 from 8MHz. Will exchange for any 8MHz crystal giving 145·08 from 8,060kHz. Mike Banahan, G4BUH, 8 Trinity Rd, Narborough, Leicester.

A hint to Liner 2 mobile users from G3ZOD/G8IQJ/M: a piece of cardboard fastened beneath the transceiver at 45° will deflect the audio output towards the operator instead of the carpet, and considerably improve the intelligibility.

The South Africans have introduced an equivalent to the British Class B licence: phone operation on 144MHz and up. A distinctive prefix, ZR, has been allocated.

Browsing through volumes in a secondhand bookshop, G3KPO came upon one called "The Liner Wireless Telegraph Set. Receives messages up to 150 miles. Sends up to five miles. Two stations from 16/-". A bargain? Not really. The book was dated 1913 and the "stations" were for spark and coherer, worlds away from today's Liners on A3J.

European repeater development

Two new repeater beacons have been established in Austria, both sited several thousand feet asl. In Carinthia OE8MXK gives on 145·8MHz and gets on 145·2, and in Upper Austria OE5XKL is on 145·825, receiving on 145·225, both with 16W of F3.

In Norway eight repeaters are in operation and another three planned. Several share common frequencies, eg four of them will be on R6, which does not matter at all in the mountainous topography of LA-land where none can "see" the next one. All of these, like the Austrians', conform to IARU 600kHz separation, as does GB3PI. But if you are thinking of trying to access them during motoring holidays this year, remember to take a flock of crystals both for send and receive.

Writing of holidays reminds us of two things we had intended to say . . .

. . . about the "Call book"

If when on vacation you intend to make amateur radio calls, either in person or over the air (or both), an essential item of kit is the *RSGB Amateur Radio Call Book*. A good investment is 75p spent on a second copy to be kept in the vehicle . . . something less to remember when doing the holiday packing.

If your callsign is not yet in the book take special care to identify your location frequently over the air. Sideband's increasing use makes this more imperative than ever: weak spurts of signal on A3J give no help to a distant listener trying to orientate his aerial on to the source where with a.m. or fm the steady carrier makes beam twiddling easy.

Even if you are not on sideband remember that if you have a new G8I – – or G8J – – callsign no one except your immediate friends will know where or who you are until the next edition appears. It is common courtesy to let them know during your CQ calls.

What they say

"It is a pity that the 70MHz portable contest clashes with HF NFD. Anybody who can wield a morse key is likely to be press-ganged on to NFD at the expense of the 4m event. Maybe the VHF Contests Committee will have this in mind in preparing their commentary on the latter"—G3SHY.

"Going out portable in the 432MHz March contest, G3WDG and I using rockbound a.m. decided on the tactic 'CQ, listening this channel for *any* mode, then tuning low to high.' The ssb users caught on very quickly and 25 out of our 90 stations worked were ssb co-channel"—G5HD.

"Repeaters are of more value on 70cm than on 2m because 2m can support mobile activity without using them. If they must be on 2m they need use only three channels geographically spaced to avoid mutual QRM"—G3LVP/G3OIT.

25 YEARS BACK

"The First Two-Metre Contest: G5TP the winner. More than 120 stations took part in the first two-metre contest held on April 2-3, 1949 . . . a remarkable indication of the widespread interest in this comparatively recent amateur allocation . . . no fewer than 29 contacts were recorded over distances exceeding 100 miles".

RSGB Bulletin, **May 1949**

THE MONTH ON THE AIR

by JOHN ALLAWAY, G3FKM*

AN increasingly common complaint found in letters received from listener correspondents is that difficulty is experienced in reading some callsigns due to the fact that they are given so quickly and without clarity. As far as British amateurs are concerned licence terms require identification to be made at the beginning and end of each transmission or at fifteen minute intervals in the event of long transmissions. There seems to be little point in identifying unless the callsign given can be understood by anyone monitoring.

A reminder that photographs of interest for use in *MOTA* are always welcome and will be returned whenever possible if requested although no absolute guarantee can be given.

DX news

It seems that the Kamaran Is (VS9K) have been occupied by forces from Yemen—this may result in the deletion of VS9K from the DXCC countries list. There is a possibility that no genuine activity has taken place from Zaire since 29 July 1972. Contrary to information given in an earlier *MOTA* A6XB can still be heard asking for QSLs to be sent to him via K1DRN.

VE3AII/SU left Egypt on 6 March and his place has been taken by VE6CBJ/SU who has a KWM2, linear amplifier and 204BA beam. This station seems to be active around 14,175kHz between 1330 and 1500 most days. QSLs should be sent to VE1AL accompanied by sae and two IRCs.

VQ9JPH is newly active from the Seychelles Is and is K7UKP who was also ET3JH at one time. VS5JS has been heard and worked on 14MHz ssb and often joins the Royal Signals Net on 14,275kHz.

WB4SPG has ceased to act as QSL manager for TU2BB and FL8DS as he has not received logs. He still functions on behalf of FM7AQ, JA3IG and TU2DQ.

KJ6DI will be on Johnston Is for a year or so and has been reported on 14,040kHz cw and 14,290kHz ssb. QSLs go via W6JYT and four IRCs are requested. KH6HDB is on Kure Is and should be there until June; he has been heard in the Pacific DX Net on Tuesdays and Fridays. A new Campbell Is station is ZM4FY/A who is called Maurice and works at the weather station on the island. He expects to be there until October and was noted on 14,200kHz at 0600.

A second "authorized" station in the Khmer Republic should be on the air now. This is XU1DX which operates from the USA Embassy in Phnom Penh. Increased activity from the Andaman Is is forecast by *West Coast DX Bulletin* which mentions the formation of the Radio Amateurs of Andaman/Nicobar Islands with VU2ANI and VU7GV as officers. Up to 10 amateurs and listeners may become active. There is a report that an Australian amateur is going to the Cocos-Keeling Is to work on a commercial radio installation.

Unusual prefixes heard during the WPX Contest included CQ6 and XX6 (Angola), CV (Uruguay), PS (Brazil) and YY (Venezuela). W2GHK is due to operate as KD4ITU from 11 to 19 May to celebrate World Telecommunication Day.

Anyone still without a QSL to confirm a contact with ZL3KK/C during the period 6 September 1972 to 13 March 1973 is invited to apply to ZL4NH (Pat McRodden, 18 Fraser St, Sawyers Bay, New Zealand) enclosing sae and IRCs.

A new station is on the air from Tonga. This is A35KI, who used to be JR1ATU, and he is said to favour 21MHz. A new holder of the callsign CR8AB has been active. He gives his name as Rios and has an FT200 and two-element cubical quad aerial. He looks for European contacts (especially with CT and EA) from 1000 between 21,180 and 21,200kHz, and after 1600 between 14,250 and 14,300kHz.

VK0DM, Macquarie Is, now looks for European contacts between 0750 and 0800 on 14,255kHz. VK4UC has been heard assisting him. ZS1AMB is a new station in Queen Maud Land, located at the Antarctic Mountain Base. His name is Farnie and he has been heard on 14MHz ssb. ZS1ANT is still active and has a new QSL manager (see *QTH Corner*).

3D6AE/A is newly active from Swaziland and has a DX6OB and JR5OOS. He may also operate from the University of Witwatersrand.

VP8MS was scheduled to be on the air from S Shetland Is in early April, followed by a few days activity from S Orkney and then S Georgia towards the end of the month. At the time of writing, this schedule was delayed by bad weather so some of it may still not have taken place by the time this is being read. QSLs for this operation go to K2KGB.

VP8NP ex-G3ZKH

This station is operating with the British Antarctic Expedition based on Argentine Island and is now fully operational on 160m, 80m and 20m. On 1,805MHz, calls will be made at 2300gmt every Friday, Saturday and Sunday, listening in the 160m dx window. Transmission in the top 10kHz of the 80m band will only be made if propagation is good, while on 20m VP8NP will transmit on 14,186kHz approximately at 2000gmt. He will be using either a "ring" aerial or a dipole. Transmissions will cease for five minutes in every quarter of an hour so if contact is lost the frequency should be monitored for five minutes. QSL manager is Frank Hogg, G4BNH, 26 Dene Hill, West Lane, Baildon, Shipley, Yorkshire.

The 1973 JOTA

Some 270 stations took part in the UK and between them they were in contact with about 370 overseas JOTA stations in 55 countries, and at least 10,000 Scouts and Guides were involved. This is a fall on last year's figures but the participation was better than might have been expected in the poor conditions. Short skip was much in evidence and more inter-European contacts were made than previously. The 1974 event will take place over the weekend of 19–20 October. A reminder that there are Scout nets for the UK every Saturday

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at 0900 on 3,740kHz, for Europe every Saturday at 0930 on 14,290kHz, for Australia on the fourth Saturday in each month from 2300 on 14,290kHz, and for SE Asia on Fridays at 1130 on 14,340kHz.

News from overseas

G4AFJ reports that VP8NO now has a V-beam aerial 315ft long in each leg pointed at the UK, as well as his 14AVQ. Europeans have been heard on 3·5MHz and an aerial for the band is being planned. The RRS *Bransfield* has left, and 8NO's logs should be in this country by now and QSLs will be en route via the bureaux. VP8KF returns home soon and is taking up a new post in London, but there are two new licensees—VP8NP (Ian) on Argentine Is, and VP8NN (Ken) at Halley Bay.

Dxpeditions

Very little information concerning special expeditions seems to be available at this stage in the sunspot cycle. In the rumour category is a pending visit to Mount Athos by Martin, OH2BH. However, in view of the doubts being raised in some quarters concerning previous Mt Athos activity this one must be considered as a likely non-starter.

The USA-CA Award

In the details given in March *MOTA* the cost of the record book needed for the original application for this award was given as $1·25 or 11 IRCs. Information freshly received from W2GT is that this has now been reduced to $1 or eight IRCs. Gold seals and ribbons for each additional 500 counties cost 25c or three IRCs.

DXCC

March *QST* carried the latest DXCC Honour Roll listing. Top possible score of currently valid "countries" is 321 and UK stations mentioned include G3FKM, G5VT (321), G8KS, GW3AHN (319), G3FXB, G4MJ, G6TA (318), G2BOZ, G2BVN, G3HCT, GI3IVJ, GI3JIM (317), G3AAE (316), G3DO (313), G3JEC and G6XL (312). In the telephony only list are G5VT (320), G3FKM, G6TA, G8KS (318), GI3IVJ (317), G3DO and G3JEC (312).

Contests

Results of the Sully & District SWC Welsh 80m Contest are as follows: **Morning section:** GW4BVJ (125 points), GW4COP (123), G3DIB (120), G3VLX (116), GW4BLE (98), G3XFW (90), GW4BCB (90), GW6TM (84), G4CDU (49), G3PTO and GM3RVF (23) and G4AYS (15). Receiving: BRS32525 (128), A7511 (115), G4679 (107), A8066 (97) and J. Lemay (83). In the **evening section:** G4BLX (175), G4ACQ (111), G3PPG (106), G3SWX (101), GW3ZQN (100), GI6YM/A (90), SM5CNQ (40) and GW3WSU (10). Receiving: A7460 (140), G14241 (122) BRS19682 (114), A8560 (81), BRS34523 (49), A8398 (40).

World Telecommunication Day Contest
0000 to 2400 11 May (cw).
0000 to 2400 18 May (phone).
1·8 to 28MHz. Exchange RS/T and ITU zone (UK is 27). No points for contact with own country. Contacts with other countries in same zone 7–28MHz = one point, 1·8 and 3·5MHz two points. With other zones on same continent 14, 21, 28MHz one point, 7MHz three points, 3·5 and 1·8MHz four points. With other continents three, five and six points respectively. Final score is total QSO points multiplied by the number of different ITU zones worked. The ITU Trophy will be awarded to the country whose top five entrants total the highest score. Gold, silver and bronze medals will be given to the world's top three entries, and diplomas to the top three in each country. Post logs before 30 June to: Ministerio das Communicacoes, DENTEL, Brasilia DF, Brazil.

The USSR CW DX Contest
2100 11 May to 2100 12 May.
All bands 3·5 to 28MHz. Single-operator (single- or multi-band) and multi-operator single transmitter categories. Listeners may also enter. Exchanges consist of RST plus serial QSO number (from 001). Contacts with own continent count one point, with other continents three points. Contacts with own country count only for multiplier. Stations may be worked on each band but multipliers count once only. Listeners score one point if one station is logged, and three if both stations are logged. The multiplier is derived from the "R-150-S" list, with the addition of Oblasts 02, 13, 14, 56, 84, 85, 86, 87, 89–98, 105, 128, 138, 139, 153 and 159. Post logs to the Radio Sports Federation, PO Box 88, Moscow, USSR, by 1 July. A minimum of six hours participation is required to earn a country award and 12 to be a continental leader. Contest QSOs may be used in lieu of QSLs when applying for the various USSR awards. (Complete Oblasts and "R-150-S" lists will be found in *Amateur Radio Awards*).

The results of the **DL/AGCW Winter QRP Contest** show an increase of 50 per cent in logs received, which came from 11 European countries, five USA call areas, and Japan. DJ7HZ was the overall winner with 8W and an extensive aerial "farm", and DL7DO/P achieved second place with 2W input. Leading non-European was W6BH who occupied 13th place using 8W—thus proving that you can do well from California without a kilowatt! UK entries were received from G8PG (21st), G3DNF (28th), G4AYS (33rd), G3VDW (39th) and G3JVJ (40th). The new QRO section was won by DK4EX. The **Summer 1974 Contest** will be held on 6 and 7 July, the rules being the same as those published on page 32 of January 1974 *Radio Communication* except that bands to be used are 3·5 to 28MHz inclusive. Entries should reach G8PG by 25 July, and he will be pleased to answer any queries. A welcome sign in this contest is that over half the entrants were using home-built transmitters.

In the **1973 WW WPX SSB Contest, G3ZXX** was listed as world third on 7MHz, and **G4AYL/A** world third on 3·8MHz. Other UK scores were as follows:

Callsign	Band	Points	Callsign	Band	Points
G3SEM	All	211,562	**G3NSY**	14MHz	154,500
G3YBH	All	128,355	G4ALG	14MHz	41,088
G3HTA	All	126,776	**GW4AMV**	14MHz	27,000
G2FNK	All	68,980	**G3ZXX**	7MHz	130,720
G2AJB	All	36,960	G4ACQ	7MHz	39,592
GM5AXO	All	30,393	**G4AYL/A**	3·5MHz	119,196
G4AYA	All	12,240	G5AHE	3.5MHz	31,680
G3WJN	21MHz	24,564	**GC3YIZ**	3·5MHz	13,764

Congratulations to certificate winners (listed in bold type). In the multi-operator section **G3RCV** (341,690), G3EKW (52,515) and **GM4AXE/A** (41,788 points) were also listed.

QTH corner

A35KI	via JA1SWL, 2-1-14 Tamagawa-Denenchofu, Setagaya, Tokyo 158, Japan.
CR8AB	PO Box 177, Dili, Portuguese Timor.
CT2BL	via W1FXD, 11 Tetreault Av, Norwich, Conn, 06360, USA.
CT7UA	via W3HNK, Box 14, Norwood, Pa, 19074, USA.
FG0AZZ **FM0AZZ**	via F9MD, M. Pouchoux, 30 Villa Du Belvedere, 94 Villejuif, France.
HK0AB	via SM3CXS, J. Svensson, Berghemsvegen 11, 86021 Sundsbruk, Sweden.
HR6SWA	Box 120, Grand Cayman, Cayman Is, BWI.
KD4ITU	via W2GHK, PO Box 7388, Newark, NJ, 07107, USA.
KH6HDB	via WA3HUP, Mary Crider, 212 Clark St, Lemoyne, 17043, Pa, USA.
KJ6DI	via W6JYT, 411 Lewis Rd-426, San Jose, Cal, 95111, USA.
M1DX	DJ9ID, Ramdohrstr 51, 2800 Bremen, Germany.
TU4AH	via F2QO, Domaine du Petit Beaurerard 14, Bat 9, 78 La Celle St Cloud, France.
TZ2A	HB9TZ, L. Stutz, 5 Chem Fauvette, CH1012 Lausanne, VD, Switzerland.
VE6CBJ/SU	via VE1AL, 846 George St, Sydney, NS, Canada.
VP5CW	via W4ORT, 1045 Le Brun Drive, Jacksonville, Fla, 32205, USA.
VP5WW	via WB4EYX, 62 Coquina Av, St Augustine, Fla, 32084, USA.
VR1PB	via K9KXA, Mas Sep, 6430 N Lakewood Av, Chicago, Ill, 60626, USA.
VR4AA	via ZL4BL, W. F. Wilson, 4 Wynward St, Dunedin, New Zealand.
W2 QSL Bureau	NJDXA, PO Box 8160, Haledon, NJ, 07508, USA.
W6GSK/KW6	PO Box 335,Wake Is.
XU1DX	via W1YRC, 30 Rocky Crest Rd, Cumberland, RI, 02864, USA.
XW8FY **XW8GA**	BP 454, Vientiane, Laos.
YB5BD	PO Box 2761, Djakarta, Indonesia.
ZD9GD	via ZS6AO, Selbornelaan 261, Lytteleton, Verwoerdburg, TVL, South Africa.
ZF1AL	WA4SVH, 718 Magnolia Dr, Lake Park, Fla, 33403, USA.
ZF1AO	W2JNO, 620 Macon Pl, Uniondale, NY, 11553, USA.
ZS1ANT	P. J. Els, PO Box 92, Winklespruit, Natal, South Africa.
5N2ESH	via WA5ZWC, 5027, Braesheather, Houston, Texas, 77035, USA.
9M8NK	via JH1FWB, c/o JARL, Box 377, Tokyo, Japan.

RSGB QSL Bureau, G2MI, Bromley, Kent BR2 7NH.

Awards

The Five Band WAC Award

IARU has announced the availability of five- and six-band Worked All Continents Awards. The basic award will be for five bands and an endorsement will be available for those who have confirmed contacts with each of the six continents —N America, S America, Europe, Africa, Asia and Oceania. Contacts must have been made on or after 1 January 1974, and they may have been made on any modes. QSL cards accompanied by detailed claim list should be sent to the awards manager of the applicant's national society for certification and the award will be sent direct from IARU free of charge. RSGB members should apply through G5GH (C. Emary, Westbury End, Finmere, Buckingham).

Worked All Birmingham Postal Districts

Issued by the S Birmingham Radio Society to those who have proof of contact on any mode with 25 Birmingham postal district areas on or after 1 March 1974. Only contacts with fixed stations count and only those made on 1·8, 3·5, 70, 144 and 432MHz. Applicants should send QSLs to Mr R. Thompson, 23 Fox Hill, Birmingham 29, enclosing 25p. Listeners may also apply on a "heard" basis.

The Maple Leaf Award

An attractive flag pennant awarded for working or hearing and confirming Canadian prefixes (CF, CI, VA, VB, VE, VO, 3B, 3C etc) after 1 January 1965. Class III requires 15 different, Class II 25, and Class I 30 different. Endorsements for bands and modes are available. Certified lists of QSLs held plus 14 IRCs should be sent to VE3GCO, Mr Garry Hammond, Geography Dept, LDSS, 155 Maitland Av S, Listowel, Ont, Canada. (The award is issued by VE3LSS—the Listowel District Secondary School ARC).

Odds and ends

Brian King, 7P8AM, has recently received QSLs from Europe for contacts he has allegedly made on 3·5MHz. They were made on days when he was not on the air and his name is not Egler. In view of the signal strengths reported, the pirate would seem to have been located in Europe.

The impressive line-up of equipment used by G3WW for his sstv contacts (see text) *(Photo: Peter Cook)*

Congratulations to G3WW who has received his WAC certificate from IARU endorsed for sstv and dated 31 January 1974. It is believed that this is the first such certificate issued to a UK amateur. A new country on sstv for G3WW was VQ9R in the Seychelles Is and a total of 45 countries have now been worked.

Band reports

The period under review included a surprising opening on 28MHz between 1830 and 2030 when stations in all USA districts were contacted by G3MXJ who reports that signals were peaking from the SW. He suggests that the phenomenon could have been due to a large area of sporadic-E over S America. At the time of writing, a few Pacific stations had begun to be heard in the early morning on 14MHz with their signals arriving over the North Pole.

Many thanks are due to the following for providing information from which this section was prepared: G2CIL, G2HKU, G4RZ, G5JL, G6GH, G3GVV, G3IZJ, G3NKQ, G3UOL, G3ZDF, G4AYL, G4BXN, GW4BLE, BRSs 17567, 17991, 25429, 31301, 34507 and 34775, ORS 31026, As 7056, 7511, 7785, 8306, 8312 and 8428.

Stations listed in italics were using cw, the others ssb.

1·8MHz. 0400 *W1BB, W2LWI, W2UEZ.* **0500** *W1HGH, WB8APH, W0APD* (?). **1900** *TA2E.*

3·5MHz. 0000 AF2AD, M1C, PY7BZD, VP2LL, 9L1JT. **0200** CO2FA, KZ5BC, 6Y5BH. **0300** PJ9JR, VP5CW. **0400** HC2TV, TI2CF, ZB2WPX. **0500** CN8BO, HP1DV, LU2FCB. **0600** CR3WB, *EA8CG*, OX3LW, ZL2BT. **0700** *YV1AD, ZLs.* **1800** A4XFE, EP2VJ, HZ1AB, JY3ZH, ZL2BT, 4W1GM. **1900** 4X4NJ. **2000** EA9EP. **2100** EP2JV, UA0AAL, UI8LAG, 5Z4LW. **2200** *UW9SG*, VP9AD, XT2AJ, DL4GW/YV5, 7X3OM. **2300** OZ1LO/CT3, *CX9BT*, HZ1AB, W1TAT, 5U7BA.

7MHz. 0000 CQ6LF, YV6AW, SV1GA/5B4. **0100** CT2AK, VP5CW, 5Z4OY/A. **0200** PJ9JR, TU4AH. **0300** OD5BA, VP2GGG, VP2SG. **0400** ZB2WPX, ZS6DW, 9Y4VU. **0600** CP2BRS, HK0AB, OA4OS. **0700** HC2TV, OJ0AM, VKs, ZLs. **0800** *LU2ACD, W7YTN.* **0900** M1C. **2200** *VQ9M.* **2300** *FG7TG, MP4BJR*, PYs, YVs.

14MHz. 0600 ZK1DX. **0700** KL7s, KX6GS, VR6TC. **0800** ZD7SD. **0900** *FC2CL*, WA6TXT/KC4 (McMurdo), KW6HF, *UA0YAE*. VKs, ZLs. **1000** HV3SJ, 4J0DI. **1100** VQ9MC. **1200** AP2ZR, *JT1AP*, VK6s, 5T5DY. **1300** *KL7MF*, TZ2A, ZL5BC, 9V1RA. **1400** P29FD, YB0ARN, **1500** KG6RA, SM2DMH/S2, *VU7GV*, XU1DX. **1600** A2CJP, A6XG, *VP5WW*, VQ9NEW, VQ9W, *VS5MC*, VS9UA, 4S7ZW, 4W1GM, 9M2. **1700** CR8AB, *FR7ZW*, TU4AH, 3D6AO, 8Q6AC, 9M8NK. **1800** ET3ZU, ZD9GD, 9X5s. **1900** CR3WB, KC4AAC (Anvers Is), *FM7WH*, TJ1BC (QSL via EL4D), VE0NEA, VP1MT, VQ9D, 5H3JR (QSL via W2SNM). **2000** HK0BKX, VP2MH, VP8s, FL, NO, NP, ZB2WPX, ZD7FT, 5R8AR. **2100** CV2T, FP0BG, TR8VE, VP5CW. **2200** 9M2CJ. **2300** W6IRD.

21MHz. 0800 XU1DX. **0900** JAs, *UA0YT*, YK1AA. **1000** AP2ZR, HS4AGN, *VP8KF*, ZD7FT, 5N2ESH, *7Q7RM*. **1100** P29GG, P29PK, *VS6GE*. **1200** A4XFD, CR8AB, VS9MJ, VP8LP, VU2AT, YC3AP. **1300** A6XB, KC4AAC, VK9XK, YB3DC. **1400** DK5KE/ET3 (with Famine Relief), *HK0AB*, ST2SA, VS5MC, 3B8AX. **1500** *FL8CE, TR8CQ*, VP5CW, VS9MB. **1600** VQ9s, VS9UA, ZS3HT/M. **1700** *TN8BI*, VP2LX. **1800** VQ9D, *ZP3CA*. **1900** TR8VE, VP2GGG, VP2LL, VP8ML. **2100** CE3FI, 5T5DY.

28MHz. 1000 ZC4BI, 4Z4GF, 5Z4OY/A. **1200** CQ6LF, ZEs, 5Z4s. **1300** CR7, ZP5EF, ZS6, 9J2. **1400** FY7AL. **1500** 5T5FP, 5X5NK. **1600** CR7, CX6BQ, EA6JJ, VP8AF, ZS. **1700** PY2ELV, TI2WD, VP2AR, K3NES, ZD9GD, 5U7AZ. **1800** OZ1LO/CT3, HK3CTJ, LU, PY, ZB2CJ. **1900** VP8HZ. **2000** CE3LP, CR6, LU, PY.

Very many thanks to all correspondents and specially to the authors of the following for material obtained from their publications: The **29 DX Club Newsletter** (*George Allen*), **World Radio News**, the **DX'ers Magazine** (*W4BPD*), **Long Skip** (*Nick Sawchuk*), the **West Coast DX Bulletin** (*WA6AUD*), **DX'press** (*PA0INA/PA0TO*), the **Ex-G Radio Club Bulletin** (*W3HQO*), and **DX News Sheet** (*Geoff Watts*).

Please send all material for **June** issue to arrive no later than **6 May**, and for **July** no later than **5 June.**

Propagation Predictions

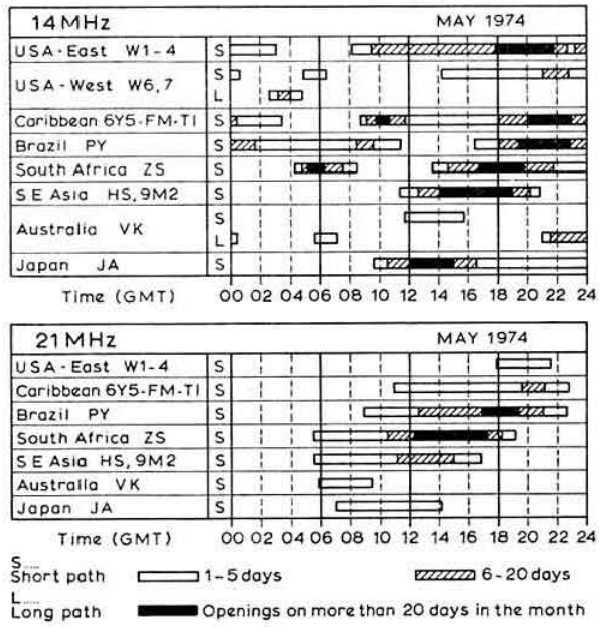
High summer conditions in the ionosphere begin in May, with nights relatively short and F2 night frequencies higher compared with those of the winter months. This will lead to an improvement in dx conditions mainly on 14MHz during night-time. **28MHz** has no practical importance now because of low F2 MUFs; only on days with above average F2 MUFs is there a chance of contact with Africa (1230-1830gmt) and South America (1500-1930gmt).

As in the previous month, only Africa and South America will be heard on **21MHz** but the band will become more lively by sporadic short-skip contacts over distances of about 800-1,800km.

14MHz will remain open longer in the evenings than in previous months. Now and again it will remain open all night for dx traffic with Central and South America. Under favourable conditions there might be a chance of dx via the indirect path, eg South America, Japan and Australia. Traffic with Hawaii will be possible on favourable days via the indirect path from about 0600-0900gmt and sometimes from 0400 to 0600.

Conditions on **7MHz** and **3·5MHz** will differ little from those of the previous month, only on 3·5MHz will local traffic be interrupted by the dead zone.

The provisional sunspot number for March 1974 from the Swiss Federal Observatory was 22·7, with the low amount of solar activity distributed reasonably evenly throughout the month. The predicted smoothed sunspot numbers for July, August and September are 18, 17 and 16 respectively.



Looking ahead

11 May—Region 15 ORM, Windsor Hotel, Knocknagoney, Holywood, Co Down.
12 May—NRSA Convention, Belle Vue, Manchester.
16 May—Radio Amateurs' Examination.
17 May—RAOTA reunion, Bonnington Hotel, Southampton Row, London WC1.
10-17 August—GB3RN operational on board HMS *Belfast.*
24-26 August—GB3RN operational during Portsmouth Navy Days.
14-15 September—North-West Amateur Radio Convention, University of Lancaster, Bailrigg, Lancaster.
28 Sept—Scottish VHF Convention, Region 12 ORM and Zone G Conference, Dundee.
31 October-2 November—Midland National Amateur Radio Exhibition, Leicester.
25 November—RSGB lecture at the IEE.

YOUR OPINION

The Editor
Radio Communication
Sir—In disagreement with Mr Wood, G8EQA, I feel that there would be absolutely no point in trying to establish professional status for amateurs. I myself have a degree and I am a member of an appropriate professional institution; but these things are only of interest to prospective employers. And who would be likely to employ a "professional amateur"—and for what? No, let us rejoice in the fact that we can find something that ensnares us so completely, a hobby to which we are happy to *devote* so much time and energy. Many people—most people—pass through life without experiencing a feeling of such intensity.

And as for the RSGB: us older 'uns spent 30 years discussing heatedly what was wrong with the RSGB, but there is a whole lot *right* with the RSGB now.

J. B. Roscoe, G4QK

The Editor
Radio Communication
Sir—Referring to the letter from G8EQA in the March issue it shows a complete ignorance of the activities and functions of the RSGB which can only be excused by the fact that G8EQA is a newcomer to amateur radio.

To compare the RSGB with an "overgrown school society" is fatuous. The suggestion that it should be superseded by a semi-professional society, an Amateur Radio Institute, is ridiculous.

That G8EQA is permitted to use the vhf/uhf frequency spectrum is largely as a result of the past co-operation between the RSGB and the licensing authority.

The RSGB was formed to look after the interests of all radio amateurs by co-operation with national and international authorities, to help the amateur through the publication of technical literature, and by organizing events to bring them together in person. The RSGB is achieving its mandate with considerable success and the majority of its members are satisfied with the work it is doing.

With regard to the proposed Amateur Radio Institute, there is already in existence a professional body, the Institution of Electrical Engineers, many of whose members are also members of the RSGB and who wish to keep their amateur radio interests apart from their professional interests. The amateur radio interests are, after all, largely social.

The Institution of Electrical Engineers give recongition to the RSGB in several ways and recently published an article giving credit to the amateur radio movement for its use of advanced techniques and experimental work.

Harold Turner, G8VN

The Editor
Radio Communication
Sir—While I agree with much of what Mr Wood writes about the need for a strong national Society, I cannot agree with his solutions. Surely the qualifications of individual members can have no bearing on the outcome of international negotiations? In my opinion what matters is the quality of the men representing us at these meetings and the total number of amateurs they represent. It follows that what we really need is a few highly qualified negotiators to represent us, and in order to pay them an attractive salary and give them the support they need a very high percentage of UK membership in the Society is required.

Why does the RSGB appear to lack the attraction it should have? From eavesdropping on the bands one gathers that members feel that they are managed by a small clique and while we appreciate their efforts on our behalf they do not really represent our views and are out of touch with the general membership. Aha!, you say, everyone has a chance of voting members to the Council—what could be more democratic? In their "manifesto" we are told that they are ex-RAF, MIERE, and have been amateurs for "x" years etc; but this tells us nothing of the man or his opinions. Most of us are voting quite blindly.

My solution—first of all, I believe that the clubs really foster amateur radio in the UK. They train the new amateurs and keep the hobby alive and therein lies our strength. Let us reorganize the present arrangements to ensure that the voice of the membership can be heard by cutting out the AGM in its present form and replace it with an annual conference and AGM. The venue for this conference might rotate around, say, six major cities in the UK but should swing from north to south or south to north each year. All clubs would be allowed to send delegates—numbers in relation to membership. Other interested RSGB members could attend as observers. Apart from the delegates discussing matters affecting us nationally it would be their chance to meet those standing for Council membership. In this way the Society would know what the majority of membership was thinking and voting would be for people and not for names.

Please do not turn *Radio Communication* into a professional type magazine. For members who want that sort of thing there are plenty of institutions and publications they can enjoy. After all, we are "amateurs" and in fact I would go even further and appeal for a return to a little more of the social news and more to interest younger members (the amateurs of tomorrow!) Surely the reason that the "SWL News" feature is not receiving support is that those interested were lured away years ago by publications catering more for their interests? Can one really recommend the journal to a 14-year-old just becoming interested in amateur radio! I appreciate that I might appear unreasonable in expecting it to provide something for everyone from the schoolboy to the professional expert but if we expect to recruit and maintain their membership then it must contain something of interest to both.

Let us first create an attractive Society and then go to it and ensure that we all individually improve the membership figures. If, when we have reached this happy state, members vote to turn us into a professional type institution such as Mr Wood advocates then I would bow to their decision and like Mr Wood become a Consociate!

Les Mitchell, G3BHK

The Editor
Radio Communication
Sir—I have not in the past been moved to write to you, but I found the letter from Mr Wood, G8EQA, in your March issue particularly interesting.

Mr Wood begins by suggesting that the RSGB is not strong, basing his conclusion on the fact that half of the country's licensed amateurs are not members. I would suggest, on the contrary, that these figures evidence the strength of the Society, for in what other hobby could one find anything approaching half of the adherents as members of a national society? I know of none. I would contend that it is not *prima facie* obvious that there is any objection to an "overgrown school society", even if this description were accurate; most certainly I feel it is very dangerous to condemn the "goodwill and energies of its organisers" (and, incidentally, I fail to see the connection between these two charges). There are, indeed, disadvantages in depending upon volunteer help—the prime example to my mind being the youth movement; does Mr Wood assume the youth service to be "something not worth consideration"?

It is very easy to dismiss an organization as "50 years old and equally out of date" and in the current social climate this dismissal would often be considered sufficient. Its truth has, however, manifestly not been established, and is not the fact that such a technical society has managed to survive (with strength or weakness, depending upon your point of view!) for 50 years of tremendous technical advance in itself some evidence of the progressiveness of the Society?

Amateurs and other interested people join the Society for probably many reasons. Mr Wood is undoubtedly correct in pointing to the QSL service as a major one, and I would think that this excellent journal would be more important; then there are the contests, the technical services, and so on—the list is almost endless, and certainly includes the wish to be of benefit to other amateurs. I would, however, object strongly to any suggestion that amateurs have any obligation to amateur radio, their fellow amateurs, or even to the RSGB. The fact that many people do feel these obligations reflects great credit upon them, but in no way can be taken as a criticism of those who do not; in the same way that if a person chooses to serve his fellow men by being a youth organizer, this does not condemn those who do not so choose. If a group of people dedicated in this way offers to its fellows, on payment of a subscription, a number of services, is it "disgusting" that only a very small number wish to avail themselves of one of these (the AGM)? It is sad, perhaps, but not disgusting. It is a basic part of human nature that those who are content do not stand up to be counted—one could indeed argue that the small attendance at the AGM was a vote of confidence in the Society as it is at present!

Thus you will see that I disagree with most of Mr Wood's criticism of the Society in its existing form. However, he puts forward a

suggestion for reorganization that is in no way invalidated by the arguments I have advanced. Unfortunately, though, I do also disagree with this, for other reasons!

Having considered the criticisms of the existing arrangements, one must examine the advantages and disadvantages of the proposed change. Let us take the advantages first. I quote Mr Wood: "It would have the inestimable advantage . . . of giving 'amateur' radio a . . . professional, responsible reputation, which . . . would add considerable weight to any arguments the movement could be involved in. Also . . . people would have a better outlook of their organization if being a member actually meant something." Would this reputation prevent the local press from distorting reports of amateur activity? Or perhaps it would prevent irate neighbours suffering from tvi from knocking angrily on the front door? Maybe the MPT engineers would no longer look at arguments from the point of view of their technical merit, but from the number of letters their proposer has after his name. (I believe that the Society officers are at present proud of the esteem in which they are held by the MPT—does Mr Wood consider this inadequate?) I agree that members like to feel their Society means something, but does a private in the Army feel anybody, even though he may admire the Army itself? The advantage of the present arrangement is that Mr Wood, Fred Bloggs down the road or I could, if we wished, be nominated (and may even be elected) as President. By its very nature the Society regards all its members as equal, their contributions, large or small being equally valuable. Surely this is the very nature of a hobby? The professional institute has its structure of Fellow, Member, Associate Member, and so on for professional reasons unconnected with the advancement of the discipline it represents, and let us not forget that "professional" means "one who is paid", and indicates no form of superiority over "amateur", and is even less synonymous with "responsible"—possibly the reverse!

Let us leave professional institutes to the professionals (and, as a member of one, I think it corresponds more closely to the "overgrown school society" than does the RSGB) and let us be profoundly grateful that there are amateurs sufficiently concerned to take the time to run the Society and to represent us when representation is needed. Let us examine the true situation before charging that "it cannot exert much of an influence in a modern world where amateurism is despised, and only results really count for anything". Then, even if we find this charge to be just, let us not be defeatist, but let our voices be heard against this trend rather than allowing ourselves to be swallowed by it. And finally let us be a little philosophical over our rôles—let us by all means aim for the stars, but let us not get discouraged if we do not quite get there!

A. J. Garratt-Reed, G3VBZ/W1

The Editor
Radio Communication

Sir—We were amused at the devious statistics quoted by Mr Sharpe to justify his attack on 4m. It took us some time, thought, and careful reading, as well as checking figures, to fathom out the basis of the statistics shown, which can only have been designed to mislead the casual reader. We checked the numbers and worked out the same calculation for another band, to test the validity of the method. The results are most interesting:

Step 1	**1970**	**1971**	**1972**	**1973**
4m VHF NFD entries as a percentage of total VHF NFD entry	68%	68%	65%	71%
70cm ditto	57%	59%	65%	68%
Step 2				
4m open contest entries as a percentage of VHF NFD 4m entry	32%	36%	37%	45%
70cm open contest entries as a percentage of VHF NFD 70cm entry	66%	59%	42%	32%

There are three points to note about these figures:

1. Years prior to 1970 are not comparable, since they are greatly distorted by the change in B-licence conditions;
2. The committee omitted 1973 results from the statistics, although the necessary contest results were available; and
3. The 4m cw contest entry is irrelevant to the argument.

Based on the above statistics and comments, we think that the VHF Contests Committee should have drawn the following conclusions:

(a) That more groups entering VHF NFD are equipping themselves for both 4m and 70cm, in order to improve their chances;
(b) That more of these groups are using their 4m equipment between VHF NFDs;
(c) That fewer of these groups are using their 70cm gear outside VHF NFD.

It seems, therefore, that the comments about 4m in the VHF NFD results would have been more appropriate to 70cm. We note that the 1973 70cm open contest attracted 26 entries, and is scheduled as a 24-hour event again in 1974. The 1973 4m 24-hour open attracted 37 entries, but is cut to an eight-hour event in 1974. Furthermore, this one-day event is scheduled for the same weekend as HF NFD. Doubtless the 4m open statistics will therefore show a drop in entries versus 1973—and will be used to justify dropping the 4m open altogether in 1975.

Having disposed of the statistical smokescreen, we have some further comments on the remainder of the incomplete reply. In fact, we had enough comments to fill several pages of *Radio Communication*, but decided to try at least to make our answer short and sharp.

First, the letter is signed by Mr Sharpe as the committee chairman, and therefore purports to represent the views of the whole committee. This we question, in view of the sterling efforts of some members of the committee to promote 4m activity. Secondly, the letter cites lack of support for 4m cumulative contests as a pointer to lack of interest in 4m. Our records reveal that one of the last 2m cumulatives attracted all of three entries! Thirdly, 4m operators are accused of being out of step with the march of progress. If operating plug-in one-band wonderboxes is "progress", then heaven help us all. And because all 4m operators are licensed for cw, the need for ssb is less pressing.

Most insulting of all, regular 4m operators are told that they cannot see the wood for the trees, and that they do not know what is best for them. Apparently, the committee knows better, because it relies on statistics! Statistics with which one cannot even see the trees. So, please, let us have no more of these "Daddy knows best" comments.

To prevent vhf contests becoming 2m-ssb-only events in a few years' time, we would like to repeat our suggestion that stations entering VHF NFD must have submitted an entry for a contest on each band they intend to use during the preceding 12 months, and additionally that all entrants must use at least two bands during VHF NFD.

We would also advise the committee against any more hairy statistical ventures by whoever did that last lot of numbers!

K. F. Eastty, G3LVP, K. P. Jillings, G3OIT
(for and on behalf of the G4KF Contest Group)

The Editor
Radio Communication

Sir—I am sorry to see that my good friend Arthur Milne has joined the "stroke-portable" bandwagon. It may simplify the handling of QSL cards (although the answer is to QSL to GW3VLX/P via G3VLX) but it does not help the operator one little bit—in fact quite the reverse. I expect we all have our examples but one of the worst I have come across is WB2RLK-portable-VE1. Try sending that on cw, and in a contest!

Arthur Milne may be on safer ground when he calls for separate prefixes for Jersey and Guernsey though I suspect that the main benefit would be to the prefix hunters and I really do not think the MPT will want to encourage them.

I suggest that the MPT does not issue calls in the GB4 series because they have to draw the line somewhere.

Let us leave well alone.

D. Buckley, G3VLX

The Editor
Radio Communication

Sir—GB3PI has been operational now for well over a year, and during this period it has provided a very effective mobile to mobile link for eastern England. Most of the operating procedure is of a high standard, but as the number of users has risen we have become concerned at some types of operating through the repeater.

The principal objection we would like to draw attention to is that known as "phantom bleeping", ie accessing the repeater and then immediately going off the air without giving a callsign. This is contrary to Amateur Licence conditions, and extremely annoying to listeners. Another problem is that of long contacts made by a small number of fixed stations which should be carried out by the direct route. Sometimes these stations will continue by contacting another station local to themselves. This type of operation cannot justify the use of a repeater and is outside the proposals forming the basis on which the licence was applied for and granted. There has already been correspondence between the MPT and the RSGB on this point and fixed station usage presents a risk to continued operation of the repeater.

It should be realised that continuous talk-through operation on vhf is a privileged facility for us, and in fact one not easily obtained by the commercial mobile radio user.

GB3PI is intended to improve the technical standard, quality and coverage of 2m mobile operation in its service area, and it is felt that this objective is being achieved. It is essential that in order to ensure its continued operation any undesirable repeater usage should be made known and eliminated before official action becomes necessary.

C. J. Morcom, G3VEH; G. Douglas, G3SZY; J. Easteal, G8AYS; R. Thornton, G3WKW; R. J. Howes, G8DJK (Pye Telecommunications Repeater Group)

The Editor
Radio Communication

Sir—I notice with some dismay that many amateurs, especially those with ssb transmitters using line output type valves, are attempting to ease the tune up dissipation of their transmitters by the use of "pulsers", which provide an interrupted signal, thus reducing the duty cycle of their PAs. I say that I notice this with some dismay, because unfortunately all too many users of these devices are using them to tune up into their aerials.

Only recently, I was in contact on 3,740kHz when the station I was working at S7 disappeared under the row produced by one of these devices being used on 3,755kHz. This is, at the very least, rather anti-social.

This sort of spread of the signal from an ssb transmitter being modulated by one of these decives is only to be expected unless the rise and fall times of the pulses are strictly limited. The resulting output from an ssb transmitter modulated by a square wave is well known; restriction of the rise and fall times of a pulser to not less than 300μs, and preferably to a region of about 1ms would reduce considerably the bandwidth of a transmitter modulated by one.

The question of such devices being legal I leave to those more expert in the matter: since the output of such a transmitter is strictly speaking, PO, I am doubtful of the legality.

I would, therefore, make a strong plea for anyone who uses one of these devices to do so only on a dummy load, or to slow the rise and fall times to about 500 to 1,000μs so that other users of the band do not suffer the unwarrantable interference that is growing all too common.

Peter E. Chadwick, G3RZP

The Editor
Radio Communication

Sir—May I say how much I agree with G3ICX and G8ATA (*Your Opinion February* 1974) about the continuous stream of complaints about vhf operating standards currently being put out by G5UM in *Four Metres and Down*

I fail to see how such phrases as "Carefully tuning", "any possible call" and "K somebody, please" can bring the amateur service into disrepute. On cw they might be regarded as a waste of time, but on phone these phrases imply politeness and that the caller would be pleased to hear a reply. Let us not forget that nobody is obliged to reply to every CQ call they hear, and "K somebody, please" at least suggests that a friendly welcome will be given to your answering call.

The remarks by G3VMB (*FMD* February 1974) about the lack of technical knowledge shown by many amateurs are most unacceptable. I regret that not everybody is as clever as he is. He should remember that the amateur licence exists for the self-training of the licensee, and that discussing technical matters on the air is one very good way of learning something new. We are learning all the time, and it is far better to try to help people to increase their technical knowledge, rather than to waste valuable space in print by moaning about their lack of it.

For my part I shall continue to take great pleasure in carefully tuning the band for any possible call: K somebody, please.

N. G. Pope, G4AXA

The Editor
Radio Communication

Sir—In his January 1974 column, Jack Hum, G5UM, quotes a London area member as saying "Some of the newcomers to 2m purchase wideband fm sets and chatter about their motor cars and other personal business, on nets and often with bad jokes . . .". From the remaining comments under the same heading, I take it that he disapproves of this practice!

In my work as a schoolmaster I come across many youngsters who are very keen on all things electronic, yet when one mentions the topic of amateur radio, a typical comment is . . . "Who wants to sit down all day and talk about your own equipment, the other chap's equipment and the weather at both your locations?" How many people *do* ever discuss anything other than these topics?

When are people going to read their licences carefully. There is nothing in the United Kingdom licence that restricts one in this way. Why must the general run of contacts on the bands be so dull? I regularly discuss anything, from motor cars to the peculiarities of the rape laws in New York, with friends in the United States. Are these subjects grossly offensive or of an indecent or obscene character? Are they messages of or on behalf of, or for the benefit or information of any social, political, religious or commercial organization? It is long past time that radio amateurs woke up to the fact that there are a lot of scaremongers in our midst, who, having reached middle age, want nothing more than a quiet time.

C. Pedder, G3VBL

Special event stations

GB3BB, 25-26 May
This station will be in operation for the "West Lothian Hike" organized by the Boys Brigade. The station will be located at the hike camp site at Spango Bridge, Dumfriesshire, on the Saturday and at Muirkirk, Ayrshire, on the Sunday. Operation will be cw/ssb 80 and 10m, noon to late at night on Saturday, and 11am to 5pm on Sunday.

Hertfordshire Cub Scouts Activity Day, 12 May
The Hertfordshire Cub Scouts will be operating GB3CUB on 80m and 20m ssb, at Hartham Park, Hertford. All contacts and QSLs welcome. Any station wishing to make a sked should contact G3JKB, QTHR.

Weymouth Lions "Big Affair", 21 July
The Weymouth Lions will be operating GB2WL, and are looking for other licensed Lions at home and abroad. Bands to be worked 100 per cent are 80, 40, 20, and 15m.

Kilbirnie Civic Week, 10-13 June
To commemorate this event, the special callsign GB3KCW has been issued, and will be on the air between 1800 and 2100bst on 80-15m ssb. QSLs via RSGB and GM3YKE, QTHR.

Dundalk Maytime Festival
The Dundalk ARS will be operating EI0DMF on 17-19 May and 24-26 May during the Maytime Festival. Operation will be on all bands 80-10m, and there may be limited operation between these week-ends.

The Holiday Fellowship
The Holiday Fellowship is running a course on 7-9 June at Stratford-upon-Avon entitled "The story of Radio and Television", stressing the social aspect and growth of broadcasting. There will be many demonstrations and exhibits of early and modern equipment, and the callsign GB2HF will be in operation during the course. Cost for the weekend will be £9.25-£10 according to bedroom. For details, write to The Holiday Fellowship, 142 Great North Way, London NW4 1EG. Tel 01 203 3381.

Cheshire Foundation Homes for the Sick, 8 June
The Colchester RC, with members from Tiptree, will be operating the special callsign G4AZR/P from 11am to 7pm on 80-10m and 2m. Contacts with other Cheshire Homes would be welcome.

Newton Abbot Trades Fair, 13-16 June
An exhibition station, callsign GB2NFT, will be set up during the Trades Fair at Newton Abbot Racecourse. Bands to be operated are 80, 40, 20 and 15m. Special QSL cards.

Davenport Home for Children, 6 July
Exhibition station GB2DHC will be operational at the Childrens' Home at Buckfastleigh, nr Totnes. Bands to be operated are 80, 40, 20 and 15m.

Mobile Rally News

The crowd in the main hall shortly after noon at the White Rose Mobile Rally (*Photo: G3FCW*)

White Rose Rally report
The first rally of the season at Leeds on 31 March was an outstanding success despite the increased cost of fuel. In brilliant sunshine the attendance was approximately 3,000, and from opening time until late afternoon crowds thronged round the trade stands. If this trend continues, even larger premises may be needed next year.

Talk-in stations were active on Top Band and 2m, although fewer mobiles were contacted. There was a noticeable increase in ssb and this may well be the mode for future talk-in.

RNARS Mobile Rally, 25 May
HMS *Mercury*, near Petersfield, Hants, (14 miles north of Portsmouth), will be the site of the Royal Naval Amateur Radio Society's mobile rally. The call GB3RN will be used by talk-in stations on 2m, 4m and 160m, and on hf bands for those who wish to log a GB call.

The entrance fee will be a bottle of any sort per head or 15p per car in lieu. Items of interest, in addition to the usual trade stands, will include a treasure hunt, a rafile and a first-aid display by the Red Cross. Further details from G3BZU, QTHR.

Hull Mobile Rally, 26 May
This third rally organized by the Hull & D ARS will again be held at the East Riding College of Agriculture, Bishop Burton, near Beverley, Yorkshire, on the A1079. Talk-in stations G3AMW/A on 1,980kHz a.m, and G8GBY/A alternately on 145MHz a.m. and 144·3MHz ssb will operate from 1045am, and the rally grounds will be open from 12 noon.

For the OMs: all the usual trade exhibits; technical lecture by G3OHT; bring and buy stall; new style treasure hunt, QSL scramble; and raffle.

For the ladies: cookery demonstration; haycart rides and raffle.

For the juniors: Sports, haycart rides, cartoon film shows and bran tub.

The ladies committee will provide refreshments and there are 10 acres of grounds available for picnics.

Further details from Len Colley, G3AGX, QTHR.

East Kent Mobile Rally, 16 June
To be held at the Westgate Hall, Canterbury, from noon to 5pm, this rally is being organized by the East Kent Radio Society. Talk-in will be on 145MHz fm and 1·98MHz a.m.

Although it is "Fathers Day" there will be plenty of interest for all the family, ranging from trade stands, side-shows and other attractions to local places of interest.

Humberside Rally, 23 June
Organized by members of Humberside amateur radio societies, this rally will take place at the Goole High School, Goole. Talk-in on 160, 80 and 2m.

The afternoon's programme will include lectures by leading radio specialists, trade stands, home-brew and best-mobile competitions, closed circuit colour tv demonstration, free coach trips round the local sights for XYLs and harmonics, free film shows for the youngsters, lectures for the XYLs on health foods—and lots more besides.

Cornish Mobile Rally, 21 July
The Cornish Radio Amateur Club's rally will be held on the campus of Cornwall Technical College, Pool, Redruth, Cornwall; about two miles west of Redruth on the A30. It is the site of 2m beacon GB3CTC, the aerial of which can be seen from the road. Talk-in stations on 2m and 160m will operate from 10am, as will a demonstration station on 80m.

There will be the usual trade stands, club raffles and refreshments in addition to local attractions in this popular holiday area.

Mobile Rallies Calendar

12 May—South Leicestershire MR, 11am, Westfield Activity Centre, Westfield Road, Hinkley, Leics. Organized by Hinkley ARC; details from G4CAJ, QTHR.
19 May—Northern MR, Victoria Park Hall, Keighley. Organized by Otley RS; details from G8BZY, QTHR.
25 May—RNARS MR, HMS *Mercury*, Petersfield. (Details in this issue).
26 May—Hull MR, East Riding College of Agriculture, Bishop Burton, near Beverley. (Details in May issue).
9 June—Elveston Castle MR, Elveston Castle, Nr Derby.
16 June—East Kent MR, Westgate Hall, Canterbury. (Details in May issue).
23 June—Humberside MR, Goole High School. (Details in May issue)
30 June—Upton MR, Organized by Worcester & D ARC; details from G8ASO, QTHR.
7 July—Longleat MR.
14 July—South Shields MR, Redwell School, Prince Edward Road, South Shields. Organized by SS & D ARC; details from G3SFL, QTHR.
14 July—Anglian MR, Stanway School, Colchester. Organized by Colchester Radio Amateurs; details from E. T. Jacobs, 26 Pondfield Road, Colchester, Essex.
21 July—Cornish Radio Amateur Club MR, Cornwall Technical College, Pool, Redruth. (Details in May issue).
21 July—Wessex MR, Breamore House, near Fordingbridge, Hants. Organized by Wessex ARG; details from G3YWG, QTHR. Talk-in on 160, 4 and 2m.
21 July—Southdown MR (Polegate Steam Engine Rally. Details from G4BCO, QTHR.
4 August—RSGB National MR, Woburn Abbey.
11 August—Torbay MR, Newton Abbot Rugby Club ground. Organized by Torbay ARS; details from L. H. Webber, G3GDW, QTHR.
11 August—Derby MR.
18 August—Saltash MR, Saltash School, Wearde, Saltash. Organized by Saltash & D ARC; details from G3XWA, QTHR.
18 August—Preston ARS MR. Details later.
18 August—Bromsgrove Mobile Picnic. Organised by Bromsgrove & DARS. Avoncroft Museum of Buildings.

NOTE: The ARMS rally which was scheduled to take place at RAF Cosford on 19 May has been cancelled.
NOTE: The date of the South Shields Rally has been changed to 14 July.

CONTEST NEWS

DF Qualifying Round—South Manchester

Date. 19 May, 1974.
Map. OS new 1: 50,000 series Sheet 118.
Assembly. 1300bst for start at 1320bst.
Location. NGR 721553, layby on A534 ½mile ENE of Crewe Station.

This event is being organized by members of the South Manchester Radio Club, and intending competitors are asked to notify Mr D. C. Holland, G3WFT, 7 Alcester Road, Sale, Cheshire M33 3GW, of the numbers in their parties requiring tea not later than 10 May.

1st 1·8MHz Contest 1971 results

This contest coincided with yet another spell of fine conditions, with six stations working VX1KE (Newfoundland), and nine other countries appearing in the logs. The total of 48 acceptable entries is higher than for some years in this event, and special thanks are extended to those entrants right at the bottom of the table who, although without the slightest chance, still sent in their logs. This information proved invaluable in sorting out the tussle for the top few positions.

The University College of North Wales ARS station, GW3UCB, made 139 contacts, 13 of which were outside the UK, using an FT101 and a dipole at 160ft. D. Dalrymple, GM3OLK, used his SB102 and transverter to 350ft of wire. His log contained only one error in 131 contacts. In third place, the University of Manchester Institute of Science and Technology ARS station, G3CXX, used an AT5 and an EA12, in conjunction with 250ft of aerial at 150ft, and a sloping wire with its highest point at 250ft agl. The leading station in the Under-18 section, G4BJM, achieved eighth place overall—a very creditable performance.

Congratulations to GM3YOR, whose consistent performances in this event and in the 2nd 1·8 Contest 1973 win him the Maitland Trophy for another year.

Posn	Callsign	Points	Cnty
1	GW3UCB/A (op G3WXS)	770	CV
2	GM3OLK	745	FE
3	G3CXX (op G3ZSS)	743	LE
4	G3VMW	705	YS
5	G3FEC (op G3RVM)	700	WE
6	G3RPB	635	LD
7	G3ORP	603	KT
8	G4BJM*	598	BS
9	G3XSC	577	EX
10	GM3YOR	573	FE
11	G3SJE	558	MX
12	G4BUO *	552	KT
13	G3RRS	543	BS
14	G4BUE	519	SX
15	G3TIR	516	SX
16	G3XDY/A	501	LE
17	G3NKS	468	SX
18	G3SKC	465	MX
19	G3XDV	450	KT
20	G3KKQ	447	MX
21	G3YMC	445	BE
22	G3NUE	442	WR
23	G3SVL	434	SY
24	G3LCH	414	LD
25	G3IGZ	408	LD
	GW4BUC/A (op G4BRK)	408	CV
27	G3GC	387	MX
28	G3OUR/A	378	OX
29	G4CNY	348	HD
30	G3YRZ	346	CE
31	GM4ALK	338	FE
32	G3ATF	319	MX
33	GW4BCA*	304	CV
	G3TLF	304	YS
35	G2FNK	295	MX
36	G3DOT	282	BD
37	G3VLX	271	KT
38	G3FJE/A	264	BD
39	G4CEN	256	HE
40	G3ZNH	250	HE
41	G4AEM	228	HF
42	G3VFI	194	HE
43	G3FVW	176	YS
44	G4CMY	138	GR
45	G8QZ	118	DY
	G2CIL	118	SX
47	G3WRR	66	SY
48	G3PYC	36	SX

* Entrant under 18 years of age.

Entry not accepted: G4BBX—no cover sheet.
The HF Contests Committee gratefully acknowledges check logs from OK2PAW, G3IYT, G3NYA, G3ZRZ and G4BXN.

MAITLAND TROPHY

Posn	Callsign	2nd 1·8 1973	1st 1·8 1974	Total
1	GM3YOR	454	573	1,027
2	GM3OLK	122	745	867
3	GM4ALK	224	338	562
4	GM3PFQ	384	—	384
5	GM3FXM	174	—	174

Summer 1·8MHz Contest 1974 rules

1. The General Rules for RSGB HF Contests, published in the January 1974 issue of *Radio Communication*, will apply.
2. When. 2100gmt Saturday 22 June to 0200 Sunday 23 June, 1974.
3. Eligible entrants. The contest is open to licensed amateurs in all parts of the world. Multi-operator entries will be accepted. There will be two sections:
(*a*) British Isles stations.
(*b*) Overseas stations.
British Isles entrants must be members of the RSGB.
4. Contacts. CW (A1) only in the 1·8–2MHz band. County Code letters, as published in the January 1974 issue of *Radio Communication*, must be sent after the RST/serial number group by all British Isles entrants, eg for a contact from Surrey—579001 SY.
5. Scoring. British Isles section—three points for each contact, with a bonus of five points for the first contact with each county within the British Isles, and with each country outside the British Isles.

Overseas Section—three points for each contact with a bonus of five points for the first contact with each county in the British Isles. Overseas stations may work only British Isles stations for points.
6. Logs. Column (5) of the log must be headed "County Code Letters received". Multi-operator entries should show the callsign of each operator against the contacts for which he is responsible, and the names and callsigns of all the operators should be listed on the cover sheet.
7. Entries must be addressed to The RSGB HF Contests Committee, c/o S. V. Knowles, G3UFY, 32 Nursery Road, Thornton Heath, Surrey CR4 8RF.
8. Awards. Certificates of merit will be awarded to the leading three entrants in each section.

RSGB 21/28MHz Telephony Contest 1974 rules

Radio amateurs and SWLs throughout the world are invited to take part in this contest for single-operator stations. Each overseas entrant will receive a copy of the results by surface mail. Suitable contest log and cover sheets may be obtained from The General Manager, RSGB, 35 Doughty Street, London WC1N 2AE.

GENERAL

A station, whether fixed, portable, mobile or alternative address, may be logged only once for the purpose of scoring.

TRANSMITTING SECTION

1. The **General Rules for RSGB HF Contests**, published in the January 1974 issue of *Radio Communication*, will apply.
2. When. 0700gmt 12 October to 1900gmt 13 October.
3. Eligible entrants.
(*a*) Home section: RSGB members resident in the British Isles.
(*b*) Overseas section: Licensed amateurs in all parts of the world except the British Isles.
4. Contacts may be made using any telephone system for which the entrant is licensed on the 21 and 28MHz amateur bands.
5. Scoring. British Isles stations may not work each other for points. Overseas stations may only claim points for contacts with stations in the British Isles.
(*a*) **British Isles stations.** Each completed contact will score five points. In addition, a bonus of 50 points may be claimed for the first contact with each country "on each band". For the purposes of scoring, the RSGB countries list will apply, with the exception that VE, VK, W/K, ZL and ZS call areas will each count as a separate country.
(*b*) **Overseas stations.** Each completed contact with a British Isles station will score five points. In addition, a bonus of 50 points may be claimed for the first contact "on each band" with each of the following British Isles prefixes. **G** 2, 3, 4, 5, 6, 8; **GC** 2, 3, 4, 5, 6, 8; **GD** 2, 3, 4, 5, 6, 8; **GI** 2, 3, 4, 5, 6, 8; **GM** 2, 3, 4, 5, 6, 8; **GW** 2, 3, 4, 5, 6, 8.
(*c*) Separate **check lists** showing the bonus points claimed for "each band" should be included.

6. **Entries** should be sent to: The RSGB HF Contests Committee, c/o M. Harrington, 123 Clensham Lane, Sutton, Surrey SM1 2ND, England. Overseas entries should be posted to arrive not later than Monday 9 December 1974. UK entries to arrive not later than 31 October 1974.
7. **Awards.** The Whitworth Trophy will be awarded to the leading home section entrant. Certificates will be awarded to the leading station in each country and W, VE, VK, ZL and ZS call areas.

RECEIVING SECTION

1. The **General Rules for RSGB HF Receiving Contests,** published in January 1974 issue of *Radio Communication*, will apply.
2. **When.** As rule 2 of the transmitting section.
3. **Eligible entrants.** The contest is open to all short-wave listeners throughout the world. All entrants agree to be bound by these rules.
4. **Scoring.** British Isles entrants may only log overseas stations working British Isles stations in the contest. Overseas entrants may only log British Isles stations in contact with overseas stations in the contest.
   (*a*) **British Isles entrants.** Each complete log entry will score five points. In addition a bonus of 50 points may be claimed for the first station logged in each country "on each band". For the purposes of scoring, the RSGB countries list will apply, with the exception that VE, VK, W/K, ZL and ZS call areas will each count as a separate country.
   (*b*) **Overseas entrants.** Each complete log entry will score five points. In addition, a bonus of 50 points may be claimed for the first station logged, "on each band" of the British Isles prefixes listed in rule 5(*b*) of the transmitting section.
   (*c*) **Check lists.** As rule 5(*c*) of the transmitting section.
5. **Entries.** As rule 6 of the transmitting section.
6. **Awards.** The Metcalfe Trophy will be awarded to the leading British Isles Entrant. Certificates will be awarded to the leading station in each country and W, VE, VK, ZL and ZS call areas.

Contests calendar

12 May	—Mid-Severn Valley Teleprinter (Rules in February issue)
19 May	—South Manchester DF Qualifying (Rules in May issue)
25 May	—1,296MHz Open (Rules in April issue)
26 May	—432MHz Open (Rules in April issue)
2 June	—70MHz Portable
8-9 June	—NFD (Rules in February issue)
15-16 June	—Microwave Field Day (Rules in February issue)
15-16 June	—All Asian DX (phone)
16 June	—Slade DF Qualifying
22-23 June	—Summer 1·8MHz (Rules in May issue)
23 June	—Region 1 (RSGB) VHF
25 June	—Start of 432MHz Summer Cumulative
30 June	—Derby DF Qualifying
6-7 July	—"Jubilee" VHF/UHF & SWL
13-14 July	—SSB Field Day (Rules in March issue)
21 July	—432MHz Open
21 July	—Stratford-on-Avon DF Qualifying
28 July	—70MHz Open
4 August	—Oxford DF Qualifying
18 August	—144MHz QRP
24-25 August	—All Asian DX (CW)
1 September	—Dartford Heath DF Qualifying
7-8 September	—VHF NFD & SWL (Rules in March issue)
15 September	—80m Field Day
22 September	—DF Final—Coventry and Rugby
5-6 October	—UHF NFD & SWL (Rules in April issue)
5-6 October	—VK/ZL/Oceania (phone)
12-13 October	—VK/ZL/Oceania (CW)
12-13 October	—21/28MHz Telephony (Rules in May issue)
October	—Start of 70MHz Cumulative
October	—Start of 432MHz Cumulative
19-20 October	—7MHz CW
2-3 November	—7MHz Phone
2-3 November	—144MHz CW
9-10 November	—Second 1·8MHz
8 December	—144MHz Fixed

RAYNET

by S. W. LAW, G3PAZ*

The winds of change blow inexorably and while he that runs may read, there are yet those who fall by the wayside by avoiding the movement of events. By all means let us keep clear in our minds our basic aim; the use of our particular talents in the voluntary provision of a reliable communications service when called upon to assist in times of disaster. Reliable we must be as, once committed, a life may well be dependent on the speed and accuracy of a message in our hands to be passed along the line. Does it matter, therefore, what boundaries are set by changed legislation to adjust areas of administration to comply with our changing economy? Let us cheerfully move with the times and liaise with our fellows to arrive at an amicable solution to the problems of coverage of new areas in the light of the main aims of Raynet. Concentrate on the main isssue, be your group large or small; and remember the Raynet Committee is always there to help you with your problems.

The static/mobile problem

The /M transmitter has had a Raynet problem for many years; that of operating for long periods from a stationary vehicle while maintaining the power supply. Most cars are obviously designed to move continuously through a current of air; those unfortunates who have had to pull off the road in those mile-long queues will have realised the problem long ago. The luxury of an auxiliary fan is only for the few. Even a spare battery (with diode-protected charging, of course) is only in the nature of a stop-gap. Again the baby portable generator is an expensive outlay for the individual, although the obvious answer. However, with the continued rise in cost of fuel, many are turning to a smaller car and disposing of their thirsty petrol-drinkers.

Now it so happens that a number of manufacturers have rediscovered the air-cooled engine. To the delight of the user, the designers have used an in-built air cooling system in order to cater for interior car heating as required; a spin-off from this is that the wind of the car's movement is no longer a factor in engine cooling. In short, such an engine will run trouble free for hours with the car at rest. So the air-cooled /M now has the edge over his water-cooled friends when working "static-mobile". But be sure your car is of the type described or you may find your confidence blunted by an expensive repair bill. A final word; need we remind you to watch the petrol gauge and carry a spare can!

Private codes

It has been pointed out that, even in third-party emergency messages, the MPT will not tolerate the transmission of any code which "is not publicly available". Members should endeavour to get any message handed in which contains such matter re-worded to comply with normal amateur radio practice.

Hon Registrations Secretary; Mrs L. A. Crane, "Greta Woods", Bromley Road, Ardleigh, Colchester, Essex.

*130 Alexandra Road, Croydon, Surrey CR0 6EW

INTERFERENCE PROBLEMS

Members accused of causing interference or who suffer interference from external sources are invited to seek the assistance of the Interference Committee in solving their problems.

Enquiries should be addressed to: The Chairman, Interference Committee, RSGB, 35 Doughty Street, London WC1N 2AE.

CLUB NEWS

RSGB Affiliated Societies and Clubs, and RSGB Groups, are invited to submit items for inclusion in this section to their Regional Representatives (not direct to the editor), whose addresses appear on page 285 of this issue, for inclusion in the appropriate regional section.

Items of news and dates of forthcoming events should reach RRs by the following dates: 31 May, 30 July, 1 October.

REGION 1 — RR B. O'Brien, G2AMV

Ainsdale ARC—Thursdays, every two weeks, 8.15pm. 9, 23 May. Ainsdale Scout Headquarters. Further details from N. Horrocks, G2CUZ, QTHR.

Blackburn (ELARC)—First Thursday of each month. 2 May ("HF aerials (continued)" by G3JAG), 6 June ("2m and 2m equipment" by G8EJB). A news-letter is now in course of preparation and it is hoped that with full support from members this will be a regular quarterly publication. Visitors are welcome at all meetings. 7.30pm. Edinburgh House, Shearbank Road, Blackburn. Sec W. E. Baxendale, G8FDG, "Juverna", Westland Avenue, Darwen, Lancs.

Blackpool (B & FARS)—Mondays, 8pm. Pontins Holiday camp, Squires Gate. Morse tuition, 7.30pm.

Bolton (B & DARS)—Third Wednesdays of each month, 8pm. Clarence Hotel, Bradshawgate. Sec S. Macdonald, G4AQB, 8 Archer Avenue, Bolton.

Bury (B & RRS)—Second Tuesday of each month, 8pm. Mosses Community Centre, Cecil Street, Bury. 14 May ("Some design considerations in vhf and uhf" by Microwave Modules Ltd), 11 June ("Hi-fi and stereo equipment" by Mr Bell). RAE classes and morse every Tuesday except the above dates, also an informal meeting. Sec Chris Kirby, G8HQW, 2 St Peter's Place, Haslingden, Rossendale. Tel Rossendale 4915.

Carlisle (C & DARS)—Mondays, 7.30pm. Currock House, Lediard Avenue, Currock, Carlisle. A very full programme of lectures and demonstrations has been arranged for the coming months. Details from sec G8DVD, QTHR.

Cheshire (Mid-Cheshire ARC)—Wednesdays, 7pm. Technical Activities Centre, Winsford Verdin Comprehensive School, Grange Lane, Winsford. Nets on 160m, 7pm, Mondays; on 2m, 7pm, Tuesdays; on 10m, 7.30pm, Thursdays. Tuesdays, RAE classes and slow morse transmissions are available. Details from sec G3SIQ. Chairman is G3JWK.

Chester (C & DARS)—Tuesdays, 8pm. YMCA, Chester, except first Tuesday in each month which is a net night on 145·08MHz and 433·15MHz. Details from G8AYW, G6AHC/T, QTHR.

Douglas IoM (D & DARS)—Secretary GD3YUM will be pleased to hear from any member who intends to visit the island.

Eccles (E & DARC)—Tuesdays, 8pm. Bridgwater school, Worsley, Manchester. Club 2m net 11am on Sundays on 145·65MHz. Sec G4AEQ, QTHR.

Lancaster University (UOLARS)—Wednesdays, 7pm. Furness College. Also RAE and morse classes. The society is active on the hf bands and 2m using G3ZBY and G8DOU. The rtty gear is also operational on these bands. Skeds and visits welcomed. Enquiries please to Colin Pegrum, Department of Physics.

Leyland Hundred (ARG)—Second Monday of each month, 7.30pm. "Rose and Crown", Ulnes Walton, Leyland. Net night, Saturdays 2000gmt on 145·8MHz. Details from F. Harrison, G3XII, 78 Lancaster Lane, Leyland, Lancs.

Liverpool (L & DARS)—Tuesdays, 8pm. Conservative Association rooms, Church Rd, Wavertree. Sec G3WCS.

Liverpool (NLRC)—Tuesdays, 8.30pm. "Nags Head", Thornton, Crosby, Liverpool 23. Visitors welcome. Sec R. B. Porter, 11 Cranmore Avenue, Crosby, Liverpool L23 OQD.

Liverpool University (UOLARS)—Lunch-times. Radio shack, Students Union. Formal meetings on Monday nights, 7.30pm. Now active on all bands up to 70cm. Visitors are always welcome. Sec Mike Harbach, G8GMC, Radio Society, c/o Students' Union, 2 Bedford Street North, Liverpool.

Manchester (M & DARS)—Wednesdays, 7.30pm. All meetings include morse classes. 203 Droylesden Road, Newton Heath, Manchester 10. Sec G3IOA.

Manchester (SMRC)—Fridays, 8pm. Sale Moor Community Centre, Norris Road, Sale, Cheshire. The vhf and df "lads" meet on Mondays at the club "shack", "Greeba", Shady Lane, Manchester 23. It is hoped to organize a number of df practice events during the summer. Anyone interested contact G3WFT. Visitors are welcome on both Mondays and Fridays. 10 May (DF warm up), 17 May (AGM, 8pm prompt), 24 May (Natter nite), 31 May (Talk by the winner of the home-built equipment contest), 7 June (Discussion on aerials), 14 June ("Amateur television" by J. Clegg, G3UYG), 21 June (Mini DF contest and discussion on Region 1 VHF Contest), 28 June ("Modern circuit design" by P. Saul, G8EUX). Any queries etc to hon sec G3WFT, QTHR.

Manchester University (ARS)—G3VUM is active on all bands 160-10m and also on 2m. The programme of lectures, visits, RAE and morse tuition continues as previously. Details from sec G. T. Phelan, G8EPS, University Union, Oxford Rd, Manchester M13 OPL, or G3AOS, QTHR.

University of Manchester—Institute of Science & Technology (ARS)—G3CXX is active on all hf bands and G8FOT on 2m and perhaps 2cm. Items for club magazine/newsletter or letters from intending members gratefully received by G8GOS, 66 Howard Road, Kings Heath, Birmingham B14 7PQ.

Preston (PARS)—7.30pm. "Windsor Castle" (private room), St Paul's Square, Preston. Morse practice 7.30pm, main feature 8pm. 9 May ("Transceiver (business radio) modifications" by Mike Horrocks), 23 May (Open meeting), 6 June (Tape lecture—aerials), 20 June (Inter-club quiz contest with Bury & Rossendale Radio Society at Preston).

Stockport (SRS)—Second and fourth Wednesday of each month, 8pm. Blossoms Hotel, Buxton Road, Stockport. Sec G3FYE, QTHR.

Thornton Cleveleys (ARS)—First and third Wednesdays, 8pm. St John Ambulance Brigade HQ, off Fleetwood Road North (behind Police Station), Thornton, Lancs. Project group meets on Fridays 7.15-9pm, Project Laboratory, Rossall School, Fleetwood. Work in hand includes 160 and 2m transmitters and receivers. Please note acting sec is J. Duddington, G4BFH, The Grove, Thornton, Cleveleys, Blackpool.

Warrington (W & DARS)—Tuesdays, 8pm. Thames Board Mills Social Club, Alford Hall, Manchester Road, Warrington. Sec G. H. Read, 2 Princess Avenue, Great Sankey.

Wirral (WARS)—First and third Wednesdays of each month, 7.45pm. Sports & Recreation Centre, Grange Road West, Claughton, Birkenhead. Sec G3YGL, QTHR.

Wirral (Wirral DX Association)—Please note change of day. Last Tuesday of each month at members' homes. Visitors are welcome. Please inform sec G3XJZ, QTHR, beforehand.

Special Region 1 Events

Merseyside members meet for lunch on first Monday of every month. It is essential to book beforehand and obtain details of the venue from either G3VQT or G2AMV.

12 May (Belle Vue Convention, Manchester), **23 June** (Region 1, VHF Contest), **1 Sept** (Exhibition at Warrington (Peninsular Barracks), **14 & 15 Sept** (Weekend convention at Lancaster University).

REGION 3 — RR B. Kennedy, G3ZUL

Birmingham (BARS)—14 May ("Interference, prevention or cure" by G3VUG and G3OHX), 18 June (No confirmed subject). 8pm Birmingham and Midland Institute, Margaret St. *G3ZKO.*

(Slade)—No information. Alternate Fridays, 8pm. Committee room, Church House, Erdington. *G4BRT.*

(South)—5 June (Surplus equipment sale). 8pm. Hampstead House, Fairfax Rd, Birmingham 31. *G8GDZ.*

Coventry (CARS)—Fridays, 8pm. Baden Powell House, St Nicholas St, Radford Rd, Coventry. *G3TFA.*

Dudley (DARC)—7 May (Committee meeting), 14 May ("Nuts and bolts" by G3ZGY), 11 June (Talk by G3URJ), 25 June ("Hi-fi" by G8HHK). For venue contact hon sec G3PWJ. *G8HHK.*

Hereford (HARS)—First and third Fridays of each month. Civil Defence HQ, Gaol St, Hereford. *G4CNY.*

Lichfield (LARS)—First Monday and third Tuesday of each month. Swan Hotel, Bird St, Lichfield. *G3NLY.*

Mid-Warwickshire (MWARS)—6 May (Visit to BR power signal box, Rugby), 13 May (Morse class by G3EHA), 20 May (Equipment demonstration), 27 May (Open evening). Each Monday, 9pm. 28 Hamilton Terrace, Leamington Spa. *G8GDY.*

Rugby (RDAR & EC)—Informal meetings on first Tuesday of each month. Lawrence Sheriff Arms, Town centre. *G3YQC.*

Solihull (SARS)—21 May ("Copper laminate and pcb" by G. Rippington), 18 June (Film show). Visitors welcome. Manor House, High Street, Solihull. *G4AEJ.*
Staff (North)—Every Monday, 8pm. Harold Clowes Community Centre, Ubberley Rd, Bucknall, Stoke-on-Trent. *BRS33329*, 36 Newstead Road, Abbey, Hulton, Stoke-on-Trent.
Stourbridge (STARS)—At the AGM the following offices were elected: G8DZQ, president; G3ZVK, hon sec; G8HET, hon treasurer. Third Monday of each month. Longlands School, Brook St, Stourbridge. New members and guests welcome. *G3ZVK.*
Sutton Coldfield (SCRS)—13 May (Demonstration of equipment by Lowe Electronics), 27 May (No meeting), 10 June (Visit to BBC transmitting station, Sutton Coldfield), 24 June (Film night by courtesy of the PO). Alternate Mondays. Central Youth Headquarters, Clifton Road, Sutton Coldfield. *G8ALO.*
Willenhall (WDARC)—"The Three Crowns", Stafford St, Willenhall. Morse classes at the end of each meeting. *G4CFR.*
Wolverhampton (WARS)—Neachell's Cottage, Stockwell End, Tettenhall, Wolverhampton. *G3UBX.*
Worcester (WARS)—6 May ("South Africa—amateur radio and wild life" by G3LZN), 25 May (Planning for NFD), 30 June (Upton Mobile Rally). "Old Pheasant", New St, Worcester. *G8ASO.*
Wrekin (WARS)—Wednesdays, 8pm. Ketley Bank Youth Centre, Nr Oakengates. (Except first Wednesday in month when at Walker Technical College, Nr Wellington). *G3UKV.*

REGION 4 — RR T. Darn, G3FGY

Derby (DADARS)—8 May (Barbeque night), 15 May (D/F practice run No 2), 22 May (Slow scan tv), 29 May (Preparation for NFD), 5 June (Surplus sale), 8 and 9 June (NFD at Drum Hill), 12 June (Treasure hunt), 19 June (D/F practice run No 3), 26 June (Film show), 29 June (Summer dinner dance at the Regency Rooms, Ilkeston. Tickets £2 from G2CVV), 30 June (Qualifying round for RSGB National D/F contest). 7.30pm for prompt start at 8pm. The Clubroom, 119 Green Lane, Derby. Club net at 1930bst on 1930kHz Saturday evenings. This is often preceded at 1900bst with slow morse transmissions between G3FGY and G3VGW. *G2CVV.*
Derby (NHCAARG)—2 June (D/F run on 160m starting from Nunsfield house at 3pm), 7 June (Preparation for mobile rally), 9 June (Fifth Elvaston Castle mobile radio rally), 21 June (Technical film show). 7.30pm. Nunsfield House Community Centre, Boulton Lane, Alvaston, Derby. *G4CTZ.*
Grimsby (GARS)—9 May ("History of the Derby Wireless Club" by Fred Ward, G2CVV), 23 May (Organisation for NFD), 6 June (Visit to trawler/RNR), 20 June (Junk sale). 7.30pm. Community Centre, Duncombe St, Grimsby. Visitors and holidaymakers always welcome. *G8HAE.*
Hinckley (HARAES)—Alternate Wednesdays. Hinckley Technical College, London Road, Hinckley. 12 May (Mobile rally), 5 June and 28 August (D/F hunts). An alternative venue for meetings is being sought when the Technical College is closed for summer holidays. *G8BFF.*
Lincoln (LSWC)—8 May (Films), 15 May (Talk, subject to be arranged), 22 May (Treasure hunt), 29 May (On the air with club station G3IXH). Wednesdays, 7.30pm. Lincoln Astronomical Society HQ, off Burton Rd, Lincoln. *G. F. Cogan.*
Melton Mowbray (MMARS)—17 May (Lecture by G3PLL on radio navigation). 7.30pm. St John Ambulance Hall, Asford by Hill, Melton Mowbray. All welcome. *G3NVK.*
Spalding (AADARS)—The club is going from strength to strength, showing a 100 per cent increase in membership over the last 12 months. Good Luck to G400 and his team and we wish them every success with their efforts. *G3FGY.*

REGION 5 — RR P. J. Simpson, G3GGK

Bedford (B & DARC)—Thursdays, 7.30pm. "The Dolphin", The Broadway, Bedford. Hon sec G. E. Parker, 12 Dawlish Drive, Bedford.
Bishops Stortford (BS & DARC)—Third Monday of the month, 8pm. The British Legion HQ, Windhill, Bishop's Stortford. Hon sec Arthur Stanley, G3WUR, 42 Havers Lane, Bishop's Stortford, Herts.
Cambridge (C & DARC)—At the AGM on 1 March the following officers were elected: chairman, G8FBF; sec, G3YRZ; treasurer, G3PJT. Arrangements are in hand to modernize the club station and aerial system to encourage their use on informal nights. It is also proposed that during 1974 the club will increase its contest participation.
10 May (informal), 17 May (Junk sale), 24 May (Informal). First meeting of the month at Civil Service Sports Club, Brooklands Ave, Cambridge, others at club HQ, Corporation Yard, Victoria Road, Cambridge, 7.30pm. Hon sec J. Fellows, G3YRZ, 8 North Street, Burwell, Cambridge.
Dunstable (DDRC)—10 May ("Ham radio in the USA" by Larry Winslow, W0NFU), 17 May (Between week), 24 May (Hints and tips), 31 May (Between week), 7 June (Open forum), 14 June (Between week), 21 June (Evening df hunt—145·05MHz), 28 June (Between week). 8pm. Chews House, 77 High Street South, Dunstable, Beds. Hon sec C. G. Powell, G8BPK. 1 Wenwell Close, Aston Clinton, Aylesbury, Bucks.
Ely (EARS)—Ely Adult Education Centre, Bedford House, St Mary's Street, Ely. Details from P. Brown, G8GLB, 59 Fieldside, Ely.
March (M & DRAS)—Each Tuesday, 7.30pm. 2 Grays Lane, March, Cambs.
Peterborough (PR & ES)—17 May (DF Hunt), 21 June ("Integrated circuits" by G3SGC), 7.30pm. Scout Hut, Occupation Road, New England, Peterborough. ASR Peter Chilcott, G4BBA, 258 Coneygree Road, Stanground, Peterborough.
Shefford (S & DRS)—9 May ("Integrated circuits for power supplies" by G3XTQ), 16 May (DF hunt), 23 May (Morse quiz and junk sale), 30 May (NFD final planning), 6 June ("Integrated circuits for audio" by G3XTQ), 8 & 9 June (NFD Contest), 13 June (NFD post mortem), 20 June (DF hunt), 27 June (VHF NFD planning). Every Thursday, 8pm. Church Hall, Ampthill Road, Shefford. Hon sec Bob Squire, 10 Brittains Rise, Lower Stondon, Henlow, Beds.
Stevenage (S & DARS)—16 May ("Transmission lines and vhf aerials" by G4BGP), 6 June (Constructional items—a discussion), 20 June (Not yet decided), 8pm. Hawker Siddeley Dynamics Senior Staff Canteen. Hon sec Cliff Barber, G4BGP, 473 Canterbury Way, Stevenage, Herts.

REGION 6 — RR L. W. Lewis, G8ML

Cheltenham RSGB Group—First Thursday in each month, 8pm. Royal Crescent Hotel, Clarence St, Cheltenham. *G3KII.*
Cheltenham (CARS)—Wednesdays, 8pm. St Marks And Hesters Way Community Centre, Brooklyn Road, Cheltenham. *G8DVA.*
Banbury (BARS)—Fridays. 43 North Bar, Banbury. Details from G3LTN. Tel Banbury 710623.
Gloucester (ARS)—First Thursday in each month, 7.45pm. The Oddfellows Club, Eastgate St, Gloucester. Each remaining Thursday, 7pm. Leisure centre, The Old Drill Hall, Painswick Road, Gloucester. *G3MA.*
Milton Keynes (MK & DRS)—(Formerly North Bucks ARS)—Second Monday of each month. Wolverton Youth Club.
Oxford University (OURS)—G3OUR is active on ssb, cw, a.m. & rtty. Constructional facilities and test equipment available. Also talks and informal meetings. Further details from D. D. Price, G4BIX, St Edmund Hall, Oxford (during term), Colehill House, Winchester Rd, Bishops Waltham, Southampton (during vacation).
South Bucks VHF Club—First Tuesday in each month. Bassetbury Manor, High Wycombe. *G8DDM.*

REGION 7 — RR R. S. Hewes, G3TDR

Acton, Brentford & Chiswick (ABCRC)—21 May (RAE exam paper—discussion), 18 June ("2m ssb transceiver-stage two" by G3CCD), 7.30pm. Chiswick Trade and Social Club, 66 High Rd, Chiswick 4. Hon sec W. G. Dyer, G3GEH, QTHR.
Addiscombe (AARC)—Tuesdays, 9pm. "Prince George", High St, Thornton Heath. Hon sec S. F. Knowles, G3UFY, QTHR.
Ashford, Middlesex (Echelford ARS)—13 May (Slide show by Alf Othen, G8FSZ), 30 May, 10, 27 June (To be announced), 7.30 for 8pm. St Martins Court, Kingston Crescent, Ashford. New committee elected at AGM: chairman, J. Horne, G3YCQ; secretary, A. Whenham, G3ZXA; treasurer, D. Holding, G8EDL; members, P Hale G2HS, D. Walmsley G3HZL, J. Stanley G3YFF, and G4CNN. Hon sec QTHR.
Barking (BR & ES)—Mondays (Morse practice), Tuesdays (RAE class), Wednesdays (Operation of the club stations), Thursdays (Informal and constructors evening), 7.30 to 9.30pm. Visitors welcome on Thursdays. Westbury Recreation Centre, Ripple Rd, Barking, Essex. New committee elected at AGM: chairman, A. Foss, G8AEY; secretary, R. Clarke, G8BXC; assistant sec, J. Wiles, BRS34390: treasurer, K. Currie, BRS34195, and K. Caldwell, hon sec QTHR.
Burnham Beeches (BBARC)—First and third Thursdays in each month, 8pm. Hedgerley Scout Hut, Hedgerley Nr Slough, Bucks. Hon sec Margaret McCabe, G8HCO, QTHR.
Cheshunt (CDRC)—First Friday in each month, 8pm. Methodist Church Hall, opposite Theobald's Station. Hon sec Richard Cudwell, G3ZZQ, QTHR.

Chingford (Silverthorn RC)—Fridays, 7.30pm. Friday Hill House, Simmonds Lane, Chingford E4. Visitors very welcome. Hon sec C. J. Hoare, G4AJA, 41 Lynton Rd, South Chingford. Tel 01-529 2282.
Cray Valley (CVRS)—16 May (Natter nite), 6 June (To be announced), 20 June (Natter nite), 8pm. United Reformed Church Hall, Court Rd, Eltham SE9. Hon sec P. F. Vella, G3WVP, QTHR.
Croydon (Surrey Radio Contact Club)—Third Tuesday in each month, 8pm. "The Ship", 47 High St, Croydon. Hon sec Sid Morley, G3FWR, QTHR.
Crystal Palace (CP & DRC)—11 May, *one week earlier than usual*, ("Loudspeakers and their applications in public address systems" by G3IIR), June meeting to be announced, 8pm. Emmanuel Church Hall, Barry Rd SE22. Hon sec Geoff Stone, G3FZL, QTHR. Tel 01-699 6940.
Dartford Heath (DF Club)—Fridays, 8pm. The Scout Hut, Broomhill Rd, Dartford. Hon sec Maureen Worby, G3XXC, QTHR.
East London RSGB Group—19 May (Jermyn Industries: talk, slides on radio hardware and devices). 3pm. Wanstead House, The Green, Wanstead E11. (Buses: 10, 20, 66, 101, 167; Underground: Wanstead Central Line Station). All SWLs, transmitting amateurs and friends very welcome.
Esher (Thames Valley ARTS)—First Wednesday in each month, 8pm. King George's Hall (next door to fire station), Esher, Surrey. Pro Rob Muir, G3LHN, QTHR.
Edgware (E & DRS)—9 May ("Varicap doides in practice" by Robin Hewes, G3TDR), 23 May (NFD preparations), 13 June (to be announced), 27 June (Informal, club station on the air), 8pm. Watling Community Association, 145 Orange Hill Rd, Edgware. Hon sec Alan Masson, G3PSP, QTHR. Tel 01-950 6827.
Farnborough (Bromley RC)—Third Monday in each month, 8pm. Rear of Farnborough (Kent) Village Hall (opposite "The Woodman" public house). Details from Derek Morgan, 59 Bassetts Way, Farnborough, Kent.
Gravesend RSGB Group—Mondays, 7.30pm. "Windmill Tavern", Shrubberry Rd, Gravesend, Kent. Area representative P. F. Jobson, G3HLF, QTHR.
Guilford (G & DRS)—Second and fourth Fridays in each month, 8pm. Model Engineering HQ, Stoke Park, Guilford, Surrey. Hon sec Dave Coltart, G3SYM, QTHR.
Harlow (DRS)—Tuesdays, 8pm. Mark Hall Barn, First Avenue, Harlow, Essex. Hon sec Vic Heard, 106 Vicarage Wood, Harlow.
Harrow (RSH)—10 May (Slide and tape lecture, subject to be announced), 17 May (Morse practice/club project), 24 May (Talk to, be arranged), 31 May (Junk sale), 8pm. Harrow Sea Scouts HQ, Woodlands Rd, Harrow. Refreshments available during evening. Hon sec Leslie Light, G3KDL, QTHR. Tel 01-902 2570.
Havering (H & DARC)—8 May (DF hunt—members to be advised), 22 May (HF NFD arrangements—final session), 5 June ("Progression of modern music"—a talk by G3WRO), 19 June ("Static"—a talk by G3VUN). Alternate Wednesdays (Natter night), 8pm. British Legion House, Western Rd, Romford. Hon sec K. S. Hutchinson, G4ALN. Tel 01-597 1068.
Holloway (Grafton RS)—Fridays, 7.30pm. Archway School Annexe, Whiltington School, Highgate Hill, London N19. Hon sec H. D. Ashcroft, G8AYU, QTHR.
Ilford RSGB Group—Thursdays, 8pm. Mortlake Rd (off Ilford Lane), Ilford, Essex. Hon sec Derek Sapsworth, G3YMW, QTHR.
Kingston (K & DARS)—8 May (Surplus equipment sale), 12 June (Teach-in on radio propagation), 8pm. Berryland's Scout Troop, Stirling Walk (off Grand Ave), Surbiton (behind Surbiton Lagoon). SWLs made welcome. Hon sec Dick Babbs, G3GVU, QTHR.
Loughton (K & DARS)—Second and fourth Fridays in each month, 8pm. Loughton Hall, nr Debden Station. Hon sec David Bowers, 12 Theydon Park Rd, Theydon Bois, Epping, Essex.
New Cross (Clifton ARS)—Fridays, 8pm. 225 New Cross Rd, London SE14. Details from hon sec R. A. Hinton, 48 Camilla Rd, Bermondsey, SE16.
Northolt (British Airways, European Division)—First Thursday in each month. Trident Club, Western Ave, Northolt, Middlesex. The club is open to non-BA employees by invitation. Details from David Evans, G3OUF. Tel Amersham 21573.
Paddington (P & DRS)—First Thursday in each month, 8pm. Beachamp Lodge, Warwick Cres, W2. Hon sec Mike Pawley, G8AWV, QTHR.
Purley (P & DRS)—17 May (Frank Emery, G3ZMF, will show film of his voyage to and from Australia), 7 June (Final arrangements for NFD), 21 June (AGM), 8pm. Lansdowne Hall, Lansdowne Road, Purley, Surrey. Hon sec M. H. Roach, G3TWJ, QTHR.
Reigate (RATS)—23 May (Surplus equipment sale), 18 June ("Fm repeaters" by G8AAI), 8pm. St Marks Church Hall, Alma Rd, Reigate. 7 May, 4 June (Natter nites), 8.30pm. "Marquis of Granby", Hooley Lane, Redhill. Hon sec F. H. Mundy, G3XSZ, QTHR. Tel Reigate 43130.
St Albans (Verulam ARC)—15 May ("A lifetime of radio" by Vic Buckland, G3DIR), 19 June ("What is magnetism?" by Charlie Newton, G2FKZ), 7.30 for 8pm. Visitors very welcome. Hon sec Hugh Young, G3YHY, QTHR.
Southgate (SRC)—Second Thursday in each month, 8pm. The Green, Winchmore Hill, N21. Hon sec Brian Oughton, G4AEZ, QTHR.
South Kensington (Baden Powell House ARG)—Third Tuesday in each month, 8pm. Baden Powell House, Queensgate, S Kensington SW7. Hon sec Alf Watts, G3FXC, QTHR.
Southall (UK FM Group London)—21 May (NFD planning), 18 June (NFD discussion and surplus equipment sale), 7.30pm. The Library, Cheam. Hon sec Alan Keech, G4BOX, QTHR.
Sutton & Cheam (SCRS)—13 May (Brian Coleman, G8AZU, and Derek Holding, G8EDL, talking about 70cm), June (To be announced). 8pm. The Scout Hut, Hayes Rd, Southall, Middlesex. PRO Roger Wilkins, G3XFA, QTHR. Tel Heathfield 2189.
Welwyn (Mid Herts ARS)—Second Thursday in each month, 8pm. Welwyn Civic Centre, Prospect Place, Old Welwyn. PRO Maurice Pyle, G2BLA, QTHR. Tel Welwyn 4685.
Wimbledon (W & DRS)—Second and last Fridays in each month, 8pm. St John Ambulance HQ, 124 Kingston Rd, Wimbledon SW19. Hon sec F. W. Hill, G3WDO, QTHR.

REGION 8 — RR D. N. T. Williams, G3MDO

Canterbury (EKRS)—10 May (Visit to North Foreland Radio Station), 6 June ("Colour television" by G8EQZ and G8GHH), 16 June ("East Kent mobile rally").
Dover (SEKYMCAARC)—First and third Wednesdays in each month, 7.30pm. Dover YMCA. Further information from G8DRS, QTHR. Tel Dover 203000.
Mid-Sussex (M-SARS)—9 May (Informal), 20 June ("Windmills Evening"). Marle Place, Leylands Road, Burgess Hill.
Medway (MARTS)—Fridays, 7.30pm. Aurora Hotel, Gillingham. Further information from secretary C. R. Blackmur, G8FHN, QTHR.
Horsham (HARC)—First Wednesday in each month. Civil Defence HQ, Moons Lane, Brighton Road, Horsham. Further details from G3NPF, QTHR. Tel Horsham 66290.
West Kent (WKARS)—Alternate Fridays. Adult Education Centre, Monson Road, Tunbridge Wells. Further details from hon sec S. Emlyn Jones, 36a London Road, Southborough, Tunbridge Wells.
Eastbourne (SARS)—First Monday in each month. Victoria Hotel, Latimer Road, Eastbourne. PRO G3JFM.
Worthing (W & DARC)—Rose Wilmot Youth Centre, Littlehampton Road, Worthing. Further details from G8ETL, 12 Bramble Crescent, Worthing.
Maidstone (MYMCAARS)—"Y" Sports Centre. First and third Fridays devoted primarily to beginners.
Crawley (CAEC)—Fourth Wednesday in each month. United Reform Church Hall, Ifield, Crawley. Further details from G3MGL, QTHR.

REGION 9 — RR H. W. Leonard, G4UZ

Bath (B & DRG)—Wednesdays, 8.30pm. The Crypt, Church of the Ascension, Oldfield Park, Bath. Details from G8DRK. Tel Bath 23465.
Bristol RSGB Group—20 May ("GB3PI" by Pye Telecommunications), 24 June ("Potted lectures"), 7 July (Longleat Mobile Rally). 7pm. Becket Hall, St Thomas Street, Bristol 1. *G3ULJ.*
Bristol (BARC)—Tuesdays, 7.45pm. 24 Bright Street, Barton Hill, Bristol 5. *G4BZZ.*
Bristol (Shirehampton ARC)—Fridays, 7.30pm. Twyford House, Shirehampton, Bristol. Prospective new members most welcome. *G4BOL.*
Bristol (University ARS)—Most Saturdays during term time, 2.30pm. Dept of Physics, Royal Fort, Tyndall Avenue, Bristol BS8 ITL. All details from G3WDG.
Cornish (CRAC)—First Thursday in month, 7.30pm. SWEB Club Room, Pool, Camborne.
West Cornwall (CRAC)—Alternate Wednesdays, 7.30pm. The Guildhall, Penzance. Details of Cornish and West Cornwall clubs from G3NKE, QTHR. Tel Camborne 2419.
Exeter (EARS)—Second Monday of each month, 7.30pm. ATC Hut, Colleton Hill, The Quay, Exeter. Hon sec Jack Bawden, 232 Exwick Road, Exeter EX4 2BA.

Newquay (N & DARS)—Alternate Wednesdays. Meetings pro tem at 41 Crantock Street, Newquay. Details from G3THT, QTHR.
North Devon (NDRC)—Second and fourth Wednesdays. 8, 22 May (Ragchew), 12 June (Talk), 26 June (Ragchew). 8 May at 8.30pm but thereafter at 7.30pm. "Crinnis", High Wall, Barnstaple EX31 2DP. *G4CG.*
Plymouth (PRC)—First and third Tuesdays. 7 May (Film night), 21 May (Open meeting). 7.30pm. Virginia House, Bretonside, Plymouth. Visitors always welcome. *G3UVS.*
Saltash (S & DARC)—First and third Fridays. 3 May ("Decca Navigation system" by G3OGH). 7.30pm. Burraton Toc H Hall, Saltash. *G3XWA.*
South Dorset (SDRS)—First Tuesday of month, 7.30pm. Lecture Hall, South Dorset Technical College, Newstead Road, Weymouth. *G3WAO.*
Taunton (T & DARS)—Fridays, 7.30pm. Jelalabad Barracks, The Mount, Taunton. Hon sec G. Swetman, "Little Copse", Monkton Heathfield, Taunton. Tel West Monkton 298.
Torbay (TARS)—Tuesdays with special meeting on last Saturday of month. 25 May (NFD preparation and junk sale), 29 June (Film show.) 7.30pm. Rear of 94 Belgrave Road, Torquay. Visitors most welcome. *G3UIQ.*
West Dorset VHF Group—First Wednesday each month, 7.30pm. Victoria Hotel, Dagmar Road, Dorchester. Hon sec Mrs V. March, 27 Great Western Road, Dorchester.
Weston-super-Mare (WsMRS)—Second Friday each month, 7.30pm. Room Lewis M2, Worle School, New Bristol Road, Worle. *G3PQE.*
Yeovil (YARS)—Thursdays. 2 May (AGM), 16 May ("RF indicators and wavemeters" by G3FXW), 23 May ("The QRA locator" by G8AFA). RAE class by G3FXW at 6.45 each Thursday. Meetings 7.30pm. The Youth centre, 31 The Park, Yeovil. *G3NOF.*

REGION 10 **RR D. M. Thomas, GW3RWX**

Material for Club News should in future be sent to Mr R. G. Barrett, GW8HEZ, QTHR, Deputy RR.
Barry College of Further Education (ARS)—Thursdays, 8pm. Barry Rugby Club. 16 May ("Test your knowledge" by Phil Scoular, GW3PPF), 22 June (A "Hambeque" will be held at the above venue, YLs and XYLs welcome). Details from sec GW3VPB, QTHR.
Blackwood (ARC)—Fridays, 7pm. Oakdale College of Further Education, Oakdale, Monmouth. 3 May (RSGB tape lecture—"Aerials and propagation"), 31 May (RSGB tape lecture—"The station and the operator"). A convention will be held on 22 September. Details from sec GW3KYA, QTHR.
Cardiff (RSGB)—13 May and 10 June, 7.30pm. BBC Social Club, 118 Newport Rd, Cardiff. 10 June ("Surplus sale"). The annual mobile picnic will be held at Porthkerry Park, near Barry, on Sunday 19 May from 1pm, with 160m df hunt (on foot) at 3pm, and talk-in on 2m. There is a beach 300yd from the car park. Details from GW3GHC QTHR.
Hoover (ARC)—Mondays, 7.30pm. Hoover Social Club, Pentrebach, nr Merthyr. Details from sec GW3RNC, QTHR.
Glamorgan VHF/UHF Group—Third Thursday of each month. NCB Social Club, Tonddu, near Bridgend. 21 May ("VHF constructional practices" by Joe Ludlow, GM3ZTH), 6 June (A picnic /P event from 1400 at Mynydd Gaer, OS grid No ST967857 sheet No 154 (Cardiff)). Details from sec GW3ZTH, QTHR.
Monmouth (ARS)—Due to loss of premises all meetings have been suspended until an alternative can be found. Offers to sec GW8GPX, QTHR.
Pembroke (RSGB)—Last Friday of each month. Defensible Barracks, Pembroke Dock. Details from sec GW4AKO.
Pontypool (RSGB)—Tuesdays, 7pm. Educational Settlement, Parkhill Road, Pontypool. Details from sec GW3JBH, QTHR.
Port Talbot (ARC)—Second Thursday of each month. Rail and Transport Club, Station Rd, Port Talbot. Details from sec G. Watson, 19 Kelvin Rd, Clydbach, Nr Swansea.
Rhondda (ARS)—Every other Thursday, 7.30pm. Transport Employees Club, Porth. 7 May (A social evening at the RAFA Club, Treorchy). All YLs and XYLs welcome. Details from sec GW3PHH.
Sully and District Shortwave Club—Tuesdays, 7pm. Sully Bowls and Social Club, 59 South Rd, Sully. Details from sec A. B. Dixon, GW4CJC, 37 Bellevue Crescent, Cardiff.
Swansea Radio Society—7, 21 May and 4, 18 June. Commercial Inn, Killay, Swansea. Details from GW4BIQ, QTHR.

REGION 13 **RR V. W. Stewart, GM3OWU**

Berwick (BARS)—Last Sunday in each month, 3pm. Tweed View Hotel. Further details from G. Shankie, GM3WIG, 8 Ettrick Terrace, Hawick, Roxburghshire.
Dunfermline (DRS)—Second Wednesday in each month, 7pm. Queen Anne High School (TV studios). Further details from D. G. L. Anderson, GM8HEY, 10 Cairneyhill Road, Crossford.
Edinburgh (LRS)—Second and fourth Thursdays, 7.30pm. Adult Education Centre, Riddles Court, High Street. 9 May (Talk by GM3BCD), 27 May (DF hunt), 13 June (Talk by GM8DIJ), 27 June (AGM). Next meeting in September. Further details from J. B. Howie, GM8DIJ, 39 Marionville Road.
Glenrothes (G & DARC)—First Sunday in each month, 7.30pm. Old Nursery Buildings, Leslie, Fife. Special meeting for project groups every Wednesday. Further details from GM3YOR, QTHR. 5 May (The human machine as a radio operator), 2 June (NFD preparation), 7 July (Aurora).
St Andrews (UStAARS)—Details from R. Marchant, GM3ZCQ, Dept of Physics, North Haugh, St Andrews.

REGION 14 **RR M. A. Comrie, GM3YRK**

Ardeer (ARCARS)—Thursdays, 7.30pm. Ardeer Recreation Club, Stevenston, Ayrshire.
Ayrshire (ARG)—6, 20 May, YMCA, Howard Street, Kilmarnock. Further details from hon sec R. D. Harkness, GM3THI, 55 Woodend Road, Alloway, Ayrshire.
Falkirk & D RSGB Group—Temperance Cafe, Lint Riggs, Falkirk. Further details from J. Ramsay, GM3OQI, 78 Wheatlands Avenue, Bonnybridge, Stirlingshire.
Greenock (G & DARC)—GM3ZRC Tuesdays & Fridays at 7.30pm. Watt Library, Union Street, Greenock. Enquiries to hon sec N. C. Henderson GM3LYI QTHR.
Glasgow (GURC)—George Service House, University Gardens, Glasgow. Details from hon sec, c/o Dept of Engineering.
Mid-Lanark RSGB Group—Each Friday with alternate meetings informal. Contact GM3KMG, QTHR, tel Hamilton 28759, for further details.
West of Scotland (ARS)—Wednesdays and Fridays. 81 Virginia Street, Glasgow. Chairman Tommy Hughes, GM3EDZ. Enquiries to Mike Parks, GM8HBU, QTHR.

GI honours its newsreader

In 1964 Syd Foster, GI3GAL, was asked to take over "in a temporary capacity" the duties of Northern Ireland reader of the weekly GB2RS news broadcast. Now, 10 years later, he is still going strong and his efforts were recognized recently by awarding him the GI2KR Trophy.

This solid silver salver is awarded each year by the officers of the RSGB in GI for "meritorious service to the amateur radio movement in Northern Ireland". Presented by Dr Bill Kerr, GI2KR, it was first awarded in 1967 to GI3KYP, then president of the RSGB, and since then it has been awarded to GI3KDS, GI5AJ and GI3GXP (joint winners), GI3JEX, GI3RNY and GI3HXV.

Syd runs a weekly sked after the news on approximately 3,610kHz, when over-the-air reports are received not only from GI but EI, GM and the north of England. Many swl reports have also been received from the same areas and are always welcome.

Syd Foster, GI3GAL, holding the GI2KR Trophy in his "shack" (*Photo: GI3GTR*)

REGION 15 **Deputy RR H. J. Campbell, GI8FOK**

Bangor (B & DARS)—First Friday in each month, 8pm. Redcliff Hotel, Seacliff Road, Bangor. Hon sec N. S. Newell, GI3YMY, QTHR.
Belfast RSGB Group—Third Wednesday in each month, 8pm. 90 Belmont Road, Belfast. New members and visitors made most welcome. Further information from H. J. Campbell, GI8FOK, QTHR.
Mid-Ulster RSGB Group—First Sunday in each month, 3pm. At GI4BAC, QTHR. All welcome. Hon sec R. F. S. Sinton, GI3ONF, QTHR.
Queen's University of Belfast Radio Club—Each Tuesday, 8pm. 37 Fitzwilliam Street, Belfast. CW practice sessions Wednesdays 1.30pm onwards. All very welcome. Details from Miss Ruth McCullagh, Ogilvie Hall, Queen's Elms, Malone Road, Belfast 9.

REGION 16 **RR E. T. Jacobs, BRS32513**

Chelmsford (CARS)—First Tuesday in each month, 7.30pm. Marconi College, Arbour Lane, Chelmsford. Details from W. L. Pechey, 49 Vicarage Road, Chelmsford.
Colchester (CRA)—Most Wednesdays, 7.30pm. Stanway School, Stanway, Colchester. Details from hon sec E. T. Jacobs, 26 Pondfield Road, Colchester.
Colchester (UoEARS)—Hon sec A. E. Green, G4ABB.
Gt Yarmouth (GYRC)—Last Thursday in each month. 67 Southdown Road, Gt Yarmouth. Details from hon sec A. D. Besford, G3NHU.
Ipswich (IRC)—8 May ("ICs" by D. Hill), 12 and 26 June, 10 July ("Slow scan" by J. Gee). Handford House, Ranelagh Road, Ipswich. Hon sec P. Hubert, G3YWM.
Lowestoft (L & DARC)—Twice weekly, 7.30pm. YMCA, Park Road, Lowestoft. Hon sec R. P. Finch, G4AJO.
Martlesham (MRS)—Details from G. Murchie, G8AXU, Post Office Research Centre, Martlesham Heath, Ipswich IP5 7RE.
Norwich (Norfolk ARS)—Every Wednesday, 7.45pm. Crome Community Centre, Telegraph Lane East, Norwich, Norfolk NOR 36T. Details from J. M. Draper, G8BLD, Framingham Earl 2271.
Norwich (UoEAR & EC)—Meeting room 029 UEA Village. Details from hon sec P. Gowen, G3IOR.
Stowmarket (SDARS)—Hon sec K. J. Bertrard, 35 Curwen Road, Stowmarket, Suffolk.
Vange (VARS)—Every Thursday, 8pm. Youth Hall, Barstable Community Centre, South Riding, Basildon. Details from Mrs D. Thompson, 10 Feering Row, Basildon.

REGION 17 **RR L. N. G. Hawkyard, G5HD**

Basingstoke (BARC)—First and third Saturdays of each month. Chineham House, Popley, Basingstoke. *G3CBU.*
Bracknell (BARC)—Mondays, 8pm. Coopers Hill Community Centre. Morse sessions etc. *G3YMC.*
Farnborough (F & DRS)—Second and fourth Wednesdays of each month. 8th Air Scouts Hut, Rectory Road, Farnborough. G8ECO or G8ATK.
Harwell (AERERC)—Third Tuesday of each month, also informal meetings every Friday lunch-time. Social Club, AERE, Harwell, Berks. *G3NNG.*
Petersfield (RNARS)—25 May (Mobile rally at HQ), 10-17 August (Activity week on board *HMS Belfast*), 24-26 August (Live station at Portsmouth Navy Days).
Portsmouth (P & DARC)—Wednesday, 7.30pm. Portsmouth Community Centre, Malins Road, Buckland, Portsmouth. Visitors and new members welcome. *G3CNO.*
Reading (RARC)—Alternate Tuesdays, 8pm. "White Horse", Emmer Greeen. *G4BLT.*
Winchester (WARC)—Fridays. Antrim House Basement, St Cross Road. *G4BKE*, tel Win 61133.
Southampton RSGB Group—11 May and 8 June. Lanchester Building, Southampton University. All welcome. Also Wednesday evenings at the clubroom in Kent Road. *G4AEU.*
Swindon (SADARC)—Wednesdays. Penhill Junior School, Swindon. *G3YKC.*

MEMBERS' ADS

These low-cost flat-rate advertisements are accepted as a service to members of RSGB. They must be submitted on the Members' Ads order form printed on the last page of each issue of *Radio Communication*, or on a postcard similarly laid out. Each **must** be accompanied by a **recent** *Radio Communication* wrapper addressed to the advertiser, as proof of membership, and a remittance by postal order or cheque for 25p (stamps not accepted). They will not be acknowledged. Those not clearly worded or punctuated will be returned. No other correspondence concerning this service can be entered into.

The closing date for each issue is the 4th of the preceding month but no guarantee of inclusion in a specific issue can be given. Valid advertisements not published in the issue following receipt will be held over until the next issue.

Trade or business advertisements, even from members, will not be accepted for Members' Ads but should be submitted as classified or display advertisements in the usual way. The RSGB reserves the right to refuse advertisements, and accepts no responsibility for errors or omissions or for the quality of goods offered for sale.

Members are advised to enclose a stamped addressed envelope when replying to advertisements.

See the current order form on the last page for further details.

Post to : MEMBERS' ADS, "RADIO COMMUNICATION", 35 DOUGHTY STREET, LONDON WC1N 2AE

FOR SALE

Trio JR310 with top band and SP-5D speaker, mint cond, £60. Codar AT5 with ac psu, hardly used, £15. G3ZVR, QTHR. Tel 607443.

Pye Vanguard fully modified for 2m, complete with control box and handset, £10. GEC Courier fm Handiportables suitable for 2m ,less batteries, £12. Cambridge rf boards, hi or low band, £1.50. D. McLay, 29 Cramond Ave, Edinburgh 4. Tel 031 336 4668.

"Wireless World" desk calculator with designer's mod for floating or fixed 2 or 4 decimal point readout. Circuit and all details, £35. B8BSX, QTHR.

Heathkit RA1 + cal, £20. FT2F 144·48, 144·60, 144·80, 145, GB3PI, 145·20, £70. G8AXA, M.Wallace, 35 Winchelsea Ave, Bexley Heath, Kent.

Labgear LG50 tx, good condition, £10 or will exchange for 2m tx/rx in working order. G4BKF, QTHR. Tel 051 667 4134.

Hi-fi cabinet consisting of Bailey 30W amps and pre-amp, SP25 deck with G850, Mullard tape deck (mono) and fm radio (mono), needs only speakers, £30. G3WPB, 121 Kirkby Road, Barwell, Leics.

Racal RA217 transistorized receiver, 1–30MHz, specification similar to RA17s. 13in wide, 7in high, 13in deep, with handbooks, £280 ono. G8BIH, QTHR. Tel 82739.

Plessey PF215 ssb/dsb/a.m./isb drive unit + PF223A frequency changer, solid state, output 3·1MHz, as new with manuals, £28. Cambridge AM10DV, high band, £12.50. Ranger PTC2107V, low band, £3.50. All equipment unmodified. G3YLQ, QTHR. Tel Luton 25595.

Sig gen Marconi TF867, fab condition, £90 including carriage and packing. Square wave and pulse generator, Cintel Cinema and Television Ltd make, fab condition, £20 including packing and carriage. George Hill, 19 Station Rd, Tadcaster. Tel 2253.

Emsac 2m transmitter a.m./fm/cw 15W input plus three crystals, £20. *Wanted:* KW2000 transceiver with ac psu, in good condition. J. H. Clark, 21 Grant Road, Liverpool L14 0LE

AVO Electronic testmeter 10kV multiplier manual, £10. Heathkit grid-dip GD-1U, £8. Mullard QY3-65, £2. 4 off 829 valves, £2 the lot. 2 off 832 valves, £1 the lot. G3COP, "Iona", Sherwood Lane, Worcester Tel. 423008.

Eddystone 898 dial, new unused, £7.50. Knight xtal filter, 3395kHz 1·7 : 1, 6–60dB, usb/lsb carrier xtals and all het xtals for 3·5MHz to full 28·0MHz coverage, £25. National XCU-27 calibrator 100kHz, £5 + carr. G3MOE, QTHR. Tel Cheltenham 24217.

Storno Viscount tvr 145MHz complete with mike, control box and handbook. Set up as portable stn, £20 ono. GW3XHD, QTHR. Tel Neath 55676.

Codar PR40 preselector as new, in perfect condition complete with instructions, not quite four months old. To clear, £7.50 ono. P Valteris, 5 Gent Close, Blandford, Dorset.

Eddystone EC10 Mk2 with type 924 ac/psu and type 945 dc/psu. Very little used, perfect working condition, £85 ono, postage extra. K. Arasu, School House, Brighton College, Brighton BN2 2AL.

KW2000 series (A/B) mobile psu 12V pos/neg earth, £19 complete. G3PHO, QTHR. Tel Sheffield 306956.

3kW 240V ac petrol generator, stripped for overhaul repairs, partially rebuilt. First offer over £20 secures. Club sale. G3OKA, QTHR Tel 051 608 5573.

Advance constant voltage transformer, 190–260V input, 230V output, 1kVA, brand new, £30. Cowl-gill motor, new unused, £10. Both plus carriage. 3–20A brand new, £3.25. *Wanted:* B40C or D. Must be in excellent condition. G3GUU, QTHR.

Yaesu FT2F vhf transceiver, ex G8FVA/M deceased, £70. Commander double s-het communications rx, £20. P. R. Clark, 27 Carlton Ave, S Croydon. Tel 01 688-5919.

Late G8RI; Heath HM102 power meter, £8. Stolle aerial indicator rotator 3001, £12. Slide voltage regulator, £5. Bird dummy load type 81, £5. Johnstone tr switch, £2. R220, £2. Sae please. G3NYN, QTHR. Tel 051 526 2912.

Heathkit SW-717 general coverage receiver, factory aligned and tested. Ideal beginner swl, £23 ono. Also 19 set and 12V psu. Offers? G8HSS. M. Saxon, Shepherds Fennel, Hendon Wood Lane, London NW7. G8HSS. Tel 01 959 7033.

QTH Norwich. Unique chalet bungalow. Large lounge, dining room, two bedrooms, bathroom suite/shower, fitted kitchen, double sink, full ch/hw Parkray, pine staircase, hall, garage, planning permission 40ft mast/ beam. £12K ono. G3XLL, QTHR. Tel Norwich 48685.

Imperial electric typewriter and calculating machine, t/w £25; c/m £15; or exchange for useful working equipment, ie mobile rig or why? For swl taking RAE, can anyone please help? Doug Muir, 190 Blythway, Welwyn Garden City, Herts. Tel Wel Gdn 30241.

HRO 0·9–15MHz, B8AG rf stages, noise limiter, int l/s, pu, £25 ono. Exchange HC18U glass 43·660 for 46·666 or sell £1. G8PFN, J. F. Williams, 34 Newfield Dr, Kingswinford, Staffs. Tel Kings 5406.

Koyo KTR 1664 B7O 8-band all transportable radio, £30 ono. Grundig TK5 tape recorder, recent overhaul, new mike, 5 tapes, £15. R. C. Ebden, 2 Rolleston Close, Petts Wood, Kent. Tel 01 467 5908.

Creed 7B with silence cover, electronic 2 speed psu 80–0–80 etc. Fsy tu crm ind. Tuning scope. Rack mounted with cables, £40 consider splitting. Also 80–10m 100W a.m./cw tx adapted fsk, £15. G3MNV. QTHR. Tel 021 353 3012.

Transistor 2m rx switched fm/a.m./i.f. strips, tunable, £15. 160m tx, transistor mod, valve rf, inverter, £9. Connoisseur Classic turntable, £5. Offers? G3YZW, QTHR. Tel 021 705 2572.

Property late G2BYI. NCX500 ncx/ac/pu (Shure mike), £160. Hammarlund HQ145X (spkr), £65. AR88LF, £30. Multielmac tx, £20. Rx, £20. BC221, £20. Valient, £20. CR150, £20. 20m ssb/cw/tx and linear, £20. ET4332, £12. G3KPO, QTHR. Tel 077 584 485 (Gosberton 485).

Heayberd enclosed double wound xformer 200/250 to 115V 1kVA. Xformer 230 to 13–15V 60A. Mains pu 350V 150mA, 2·5kV 5mA. Magslips tx AP6550 rx AP6549 with pointer. Set FT241A channels 0–79. Offers. G6ZH, 18 Elmtree Rd, Locking, Somerset. Tel Banwell 2119.

75A2, £75. 770R, £55. BC211 with mod, £15. Bridge megger, £20. Wee megger, £10. AVO model 7, £10. Prop/pitch motor, £15. Advance Q meter, £25. G2FSP, QTHR.

Mosley Atlas vertical, 10/40m, little used, £16 or swop for TA31/32JR with cash adj. G3KEN, QTHR. Tel 03916 6371.

Eddystone 888A rx, excellent condition, £60 ono. G3CSG, QTHR. Tel 051 677 6368.

Eagle rx 60N, 550kHz–30MHz with bandspread. Good condition, suit swl, £16 ono. G3WDN, QTHR.

HRO coils: 100–200kHz, 180–430kHz, 0·9–2·05MHz, 3·4–7·3MHz, 40m bandspread, 7·0–14·4MHz, 14·0–30·0MHz, very good cond. All £2.20 each. J beam 2m 8-ele + 35ft coaxial, £4.50. J Beam 20ft portable mast, £4.50. 1 month old hro psu, £4.50 carr extra. 23 Field Avenue, Baddeley Green, Stoke-on-Trent, Staffs. Tel Stoke-on-Trent 535287.

Brand new aerial tuning unit Mk3, £2 plus carriage. Sae with enquiries. R. G. Hayward, "Sunnyfields", Lighthouse Road, St Margarets Bay, near Dover, Kent CT15 6EJ.

Three bedroom town house with excellent accommodation, heating by most economic electric panel radiators, some expensively fitted carpeting, garage, good 80m results, £8,950 ono. P. K. Goode, 40 Lutley Drive, Pedmore, Stourbridge. Tel Stourbridge 73527.

Drake SPR-4 transistorized communications receiver. Had less than 20 hours use. As new in makers packing. List price with accessories, £390. Must be a bargain at £290. A. Fletcher, 62 Moorbridge Lane, Stapleford, Nottingham. Tel Sandiacre 397 446.

2m kilowatt linear complete. 14AVQ Hi-Gain vertical, vgc. Vhf/uhf amplifier, four 4X250Bs. 70cm linear 4CX250B complete. 100W modulator, modern, complete. Command receiver 3–6MHz, v clean, excellent tunable i.f. Enquire then buyer collects. All reasonable. G3ZYC, QTHR. Tel Ripley (Derbys) 3883.

KW2000A ac psu. 6146Bs in final. Serviced by makers Jan 1974, £145. KW 160 a.m./cw tx, £18. Class D wavemeter, £4. Many other items. Callers by appointment please. G3WXT, QTHR.

House, Petts Wood, 13 miles London, 1936 semi-det, three beds, large garage/workshop, quiet position near station, shops. Good vhf location. £13,250. G3OHD, QTHR. Tel Orpington 24138.

H. L. Smith instrument case 19 × 8½ × 10in, £3.50; and 16 × 6 × 8in, £2.50. 4CX250B, base and chimney, £4. 2m converter xtals 131-MHz, 116MHz for 14MHz and 28MHz i.f. Offers. *Wanted:* Liner 2. G8DCQ, QTHR.

Eddystone 640, £15. Panda Cub, excellent cond, £20. HW30 tour TR with vib pack at mains trani, £20. G3GMQ, QTHR.

Eddystone 888A rx, good cond, first £60 or make an offer. Buyer to collect. G8GUB, QTHR. Tel Epping 2757.

Panoramic adapter suitable 455kHz i.f. rx, £18. Homebrew hamband rx with Electroniques Quoilpax and s motion dial, £15. *Wanted:* HW 12, any condition. G4BG, QTHR. Tel 5379.

Will exchange my Eddystone EG10 receiver in very good cond for an HA800, JR500, JR60, or other hamband receiver, preferably double conversion. P. Kelly, 30B Roughdale Avenue, Southdene, Kirkby, Nr Liverpool.

Creed model 54 teleprinters complete with silencer cover. Also integral tape punch, 230V 50Hz mains operation. Working order and very reasonable general condition, £12 each. Prefer buyers inspect and collect. G3KOU, QTHR.

Kokusai filter MF455-10CK, £7. Jackson Bros 3-gang 170pF variable capacitor, £1. Eddystone 898 dial drive, £3. Philpotts cabinet for G2DAF rx, panel pierced for 898, with blank chassis, £5. All above unused. G4BEZ, QTHR. Tel Cheltenham 57595.

KW2000A ac psu, unused for one year. Business pressure forces reluctant sale, £105. G3VNI, QTHR. Tel Maidstone 53729.

Eddystone 940, £100 ono. Fet solid state rx. URIA, £18 both in new condition. *Wanted:* KW2000B with manual. Eddystone 750 730/4, must be good unmodified condition. Part exchange considered with cash adjustment. G3FK, QTHR. Tel Breamore 436.

HW101 Heath transceiver with sb series de luxe ssb filter plus Heath psu. Excellent condition, £140 ono or will sell separately. Carriage extra or collect. G4BZE, QTHR. Tel Exeter 51646.

IC2F 2m fm transceiver, built-in a.m. detector with tx vfo. Buyer collects or deliver reasonable distance. G3AHU/A. D. H. Lewis, 1 Mildred Avenue, Watford, Herts.

Heathkit general coverage receiver, £60 ono complete with handbook. Also RF-1U signal generator, £16 ono. N. C. Clemons, 310 Hipswell Highway, Stoke, Coventry CV2 5FS.

Pye AM25T, rx fully tunable, tx xtalled 5 channels 145·00, 145·10, 145·26, 145·46, 145·80 spare position. Halo, Bantex whip on gutter mount. Complete, £30. Pye low band Bantam a.m., offers. G3MNV, QTHR. Tel 021 353-3012.

23cm wavemeter, brand new, £10. DX100 excellent condition, £35. 230/6000V, 900W RCA transformer, unused, £4. 3cm waveguide sections, thermistor units etc, British and American types, state requirements. *Wanted:* 14AVQ stating condition. G3IUD, QTHR.

HW32A, HP23A, SB600 in immaculate condition, £65 ono. Pye Vanguard on 2m, £15. GR64, £15 ono. *Wanted:* R-4C, R-4B, hf beam pref Mustang Shure 444. G4AFI, QTHR. Tel 061 368 9372.

AM25B high band, not modified, with manual mod gen and control gear, £14 ono. Buyer collect. Consider top band mobile or ssb gear in exchange. G8GRJ, QTHR. Tel Droitwich 2087.

Lafayette HA-63 general coverage receiver. 0·55–31MHz a.m./cw, very good condition, delivery can be arranged, £15. T. Peel, Bankwood, Ninelands Rd, Hathersage, Sheffield S301BJ. Tel Hathersage 394.

Courtenay Courier Mk2 professional electronic flash with extra extension lamp, leads etc, had very little use, £27.50. Prefer buyer to inspect. G3YAX, QTHR. Tel Warrington 37138.

Yaesu FTDX560 complete YD844 as new, £155. Please phone. G3OGE. 36 Harker Way, Hemblington, Norwich. Tel Norwich 712 935.

JR-310 with mf 455 10AZ, four months old, as new, £70. *Wanted:* Trio JR599, consider exchange, cash adjustment. Phone after 4pm. M. Cruz, 35 Woodfield Avenue, Colindale, London NW9. Tel 205 3031.

Generator 28V at 200A engine driven clockwise at driven end, unused, £15. Also unused inverter 28V in 115V at 1600Hz 17A output, £10. G. A. Knox, 16 Woodlands Drive, Morley, Leeds. Tel Morley 7436 after 6pm.

Creed 54 teleprinter with perforator, £20. Desk and 80–0–80V power supply included. Dash mount low band a.m. Cambridge, £12. G4CFV. 288 High St, Boston Spa, Wetherby, Yorks LS23 6AJ. Tel Boston Spa 842180.

Gold plated QQV06–40A unused, £6; ditto QQV03–20A, £4. Two HC6-U xtals 8·081MHz, £1.25 each. Offers for CR100 and AR77E rxs invited. Also HA14 Kilowatt linear plus psu. Buyer pays carriage. G3XAP, QTHR.

Creed 7B printer, £15. Audio terminal unit and afsk. £12. Silence covers, £4. Mobile dash Ranger tunable rx 144/146, £15. Heathkit, twoer HW30, £12 ono. All working. *Wanted:* Rotator cde, AR22, TR44. Yaesu FL2100 linear. G3RQY, QTHR. Tel Norwich 0603 42967.

£160 the pair. Mint condition KW Viceroy 3A with matching rx. KW77 also AR88, £35. G3VTZ, QTHR. Tel Risboro 4481.

Philpotts fully screened black crackle cabinet and chassis for 19in rack or table top, unused, £4 + postage. Crystals 160/80/40m 500/1000kHz, 35p. *Wanted:* Qsts 1973 complete, Stolle rotator. G2FUU, QTHR. Tel Nazeing 2274.

2m a.m. tx and 70cm tripler. Two 3/20 with 20W transistor modulator and inverter supply. Suitable for car use. Used on numerous contests. Complete, £17.50. G3EEZ, QTHR. Tel Wolverhampton 751378.

Heath HW17 2m tx/rx in vgc, £40. Phone enquiries, evenings only. G8FXO, QTHR. Tel 061 928 0530.

Free to anyone who still has a soldering iron: 19 set, Heathkit RA1, two 5in crts suitable for scope with box and pcb. G3OSU. 57 Parish Lane, SE20. Tel 659 3237.

Fantavox general coverage rx, £8; codar Q-multiplier with internal psu, £5; 20m converter, i.f. 2–2·45MHz, £3—or £15 the lot; ideal for swl. *Wanted:* 12MHz vfo for 2m. G8EQX, QTHR.

QY3-125 valve, £9 or offers. G8ML, QTHR. Tel Cheltenham 56094.

CR100/7 works pvc rewired. Instruction manual, £22. Delivered within 40 miles radius. G3TLI, QTHR.

Mosley Mustang Triband beam 2kW. £30. Hy-Gain Thunderbird TH3 senior, only a few months old, £50. *Wanted:* TR44 or Ham-M rotator. G3UJE, QTHR. Tel 0276 65654.

Main capstan drive motor for Truvox tape recorder model R94. G4AZR, QTHR. Tel Colchester 230213 after 6pm.

Rtty, complete rig, Creed 7B, atm terminal unit, cr display unit, 1155 receiver, pp, ls, £50. Woden UM3, £6. Transformer 460-0-460V 272mA, 5·5V 6A, £5 (new). GRCKA, QTHR. Tel Southport 65076.

FP2 ac psu with recharge batteries, £20. HM15 swr meter, £4. KW 1pF chan 1, £3. G3TLV, QTHR. Tel Middlewich 2449.

Trio TS 515 transceiver and power pack/speaker. 22 qsos since new in September 1973. In as new condition and in original packaging, £185. G3NYN, QTHR. Tel 051-526 2912.

Kleinschmidt keyboard perforator (morse) by Teletype Corp, circa 1925. Museum piece but working. Manual and parts list. Bulky. Buyer collect, £6. Transformers 240V in, 600V 200mA, 70V 100mA, 20V 1A, 6·3V 5A, 5V 3A, suit hybrid. New, £2.50 plus 50p p & p. G5XB, QTHR. Tel 073-525 2195.

Europa 2m transverter complete with valves relay and lead for 101. Secured second place in December open, £48. Also 14 AVQ 10–40 plus 80m loading coil, £12. G3CXL. R. Menday, Brindle Crest, Camp End Road, Weybridge. Tel Weybridge 43267.

FT200 with FP200, £140. Heath twoer, £15. *Wanted:* Drake TR4 or TR4C with psu, KW107 atu, 2m ssb tx/rx. P. Smith, 49 Hucknall Avenue, Ashgate, Chesterfield, Derbyshire S40 4BZ.

Trio JR500S rx, speaker, manual, very good cond, £40. Sanyo MR410 mono tape recorder (cassette), mains/batt, mic, £16. Buyer collects. G8IFG. A. Herring, 55 Twyford Avenue, London W3. Tel 992 1452.

Pye Vanguard AM25T high band modified 2m rx tuneable, complete with control box. All connecting cables microphone and speaker, £30. *Wanted:* Amateur bands hf rx. G8ECG, QTHR.

Transformer, new 425V 200mA, 6·3V 4A, 6V 4A, 5V 3A, £2.75. Parmeko transformer 300V 125mA, 6·3V 4A, 6·3V 1A, £1.75. Auto transformer 110V 250V 200W, £1. Taylor meter 0–5μA 5¾in × 4¼in, £9.50. H. H. Seymour, 74 Harold Estate, Pages Walk, London SE1 4HW.

4m Emsac converter i.f. 8–8·6MHz, £4; 2m Emsac converter, i.f. 7–9MHz £4; Command rx 6–9MHz, £3; psu for above, £1; 4m Ranger tx, £7; 2m Ranger tx strip, £3. G3VXJ/A. 10 Mayfair Ave, Maidstone, Kent. Tel 0622-50259.

DX100, vgc, with handbook, no mods, £30 ono. G3RHX, QTHR.
KW2000 dc psu, £15; 70MHz tx a.m./cw, £8. Advance voltstat 240V 100W, £5; *Shortwave Mag* 1962–69, £8. Pair 6146, £2; RA17 handbook, £1.50; B7G crystal 12090kHz, £1.50; ¼hp motor 240V, £3; postage extra. G3OHC, QTHR. Tel 021-308 2512.
Mirror galvo by Tinsley, in polished wood case with ground glass scale and lamp, 22mm per microamp deflection with shunt to read up to 10mA. Callers only, £2. F. Griffiths, 172 Robin Hood Lane, Hall Green, Birmingham B28 0LD. Tel 021 777 5374.
Car radio mw and seven sw bands, transistorized, £6.50. Valve a.m./fm tuner/amp chassis, £4. 2m converter, £7. A. S. Glazier, 138 Dollis Hill Lane, London NW2. Tel 01 452 6724.
FM Cambridge portable. On 2m dual gate fet front end YL1080 quick heat pa. As new less top and bottom covers, mic, xtals, £18 ono. G3VSJ, QTHR. Tel Wx 36512.
Coaxial lead through capacitors 0·5MF 50V dc 100A, ideal for hash elimination in mobile power supplies. 60p each post paid. Raytheon 4000V ct 600MA/s 110V ac primary transformer, ceramic terminals as new, £2 carriage extra. GM3JHL. J. H. Lepper, 128 Sheephouse hill, Fauldhouse, West Lothian EH7 9EL Scotland. Tel Fauldhouse 433 (evenings).
Sony TC366 triple-head stereo tape-deck, as new in original packing, £90 or exchange for commercial linear, tx/rx, rx, modern double-beam scope, hi-fi equipment, or why? G2TS, QTHR. Tel 0423 2130.
Garex 2m a.m. tx QQV03–20A final 12V psu, £48. Garex 15W tx QQV03.10 final, £20; 1000V psu at ¼A, £10; Garex 3'20 tx kit (rp strip only), £10; B40 rx, £20 ono. G8DQZ. 13 Lakeside, Oatlands Drive, Weybridge Sy. Tel 09322 24770.
Huge quantity of junk from shack clearance, valves transformers, variable capacitors, xtals etc. Modern, old and antique components. Sae please with all enquiries. G3NPF, QTHR. Tel Horsham 66290.
TT100 with ceramic holders, £25 pair. 572B, £15 pair. All unused boxed. *Wanted:* SB610E. G3FPD, QTHR.
Frequency Meter BC906D charts, £6. Philips rf voltmeter 6in meter 3mV to 1kV, £7. Marconi FM3 deviation test set, requires attention, £5. *Wanted:* Solartron CX 1257 preamp. F. G. R. Cook, Old Lodge, Seven Hills Rd, Cobham, Surrey. Tel Cobham 3117.
Yaesu FR400 sdx, all options fitted, new Feb 1973, little used, original box and accessories with full instructions and circuit diagram, £140 ono. M. Gordon, 5 French Weir Avenue, Taunton, Soms. Tel Taunton 87406.
Trio JR310, 10AZ ssb filter, Trio ls, £60. KB105 vertical, 80–10m, £15. *Wanted:* Eddystone rx type 730/4. Would swop for all above. D. Faulkner, 22 Queensway, Wellingborough, Northants. Tel Wellingborough 3761.
R1071·2MHz–17·5MHz, excellent reception on amateur bands, any reasonable offers. *Radio Communication* 71–73, £6 ono. Polaroid Swinger II land camera with flash unit, £5.50 ono. B. Robertson, Suilven, Moy, Inverness-shire. Tel Tomatin 265.
Offers wanted: *Practical Electronics* Nov 1964 through Nov 1972, 97 copies. Complete course RAE. Model boat 48in, fitted motor, rudder, prop, superstruct to finish, £6. Minolta 24 rapid camera auto, f gun filter, £20. Sae please. GM8HKR, QTHR.
Beulah D80 tv cam with Domiplan lens, good condition, but spg board faulty, £15. Mullard vericap 70cm atv converter, cn i.f., in case with tuning control, £5. TK20 tape recorder, good condition, £12. 114 Briggs Fold Road, Egerton, Bolton, Lancs. Tel Bolton 57775.
HW32A 20m transceiver, New pa tubes, £40. Trio JR500SE in good condition, £45. *Wanted:* KW2000, HW100 or similar. GM4ASY, QTHR. Tel: Bishopton 2941.
National EICO transceiver, £85, see *Rad Com* January 1974. 680X, £50. BC221 charts power supply, as new, £15. Indicator standing wave ratio 2–30MHz CT216, brand new, £20. SX122, £75. Tunable Vanguard 144MHz, £10. G3OXV, QTHR. Tel Daventry 2265.
7B Teleprinter 12V, £35. 75 teleprinter RPK 4/3, £40. TDMS5A, £5. TTU terminal unit, £60. Marconi D1/D sig gen, £15. AVO cr bridge, £3. TE46 cr analyser, £10. Class D wavemeter, £5. Buyer collects. G3EFP, QTHR.
888 S-meter, vgc, £50. Microwave Modules 2m converter dbl/conv, 4–6MHz i.f. £13. Pye Cambridge AM10D, 2 tx channels and one fixed and tunable rx, £28. G8FSK, QTHR. Tel 086 75 2215.
Hallicrafters HT-46, 10–80m ssb tx incl vox, £160. Matching SX-146 rx incl cw filter, xtal cal, £130. Both brand new. Rtty type 44 perforator, 240V ac, £10. Prefer buyer collect. G3FPK, QTHR. Tel 01-668 5582.
Telford TC7 (built-in conv) and TC9 (synth vfo model), a.m./fm/cw. One xtal channel 145·80MHz Shure 201 mic, complete 2m station, carr paid, £95 ono. G3LCS, QTHR. Tel Stockton 582 738.
Drake Line: R-4C 6 months old, with 500MHz filter and MS-4 speaker, £235. T-4XB, one year old with sturdy hb psu, £180. Also linear parts: vacuum variable and filter caps, txfmrs, etc. P. D. Coull, "Domel", "Elham, Kent CT4 6UE. Tel Elham 244.
"Radio Communication" 1960–73 plus binders, £20 carr paid. *Wanted:* SB640 Heath vfo SB500 2m transverter, 730/4 Eddystone rx, 9EC 989 fm tuner. A. T. Taylor, 8 Heythrop Dr, Middlesbro.
30W Cossor base tx, working 2m a.m., new cond, £19.50. Reslo mic, £1.50. Pye Ranger, working 2m, tunable rx, complete, £7. BC342 gc, £15. Collins mod transformer, £1. Pair 6GJ5, £3. Pair selsyns, £3.50. G2HCV, QTHR. Tel 01-954 2960.
Station transmitter console, mahogany, french polished, overall size 60in × 40in × 24in, holds 2 rxs, 1 tx + atus. A piece of furniture your xyl will like, £10. Buyer arranges transportation. GM3NVU, QTHR.
EMI WM8 calibrating oscilloscope, £30 ono. APT 503 regulated psu, metered 0–500, 0–250 at 500mA, 6·3V 10A, £20. Eddystone 750, £37. Wave analyser Marconi TF455E, £10. Variac 5A, £5. Muirhead decade oscillator, 0–100kHz in 1Hz steps, meter, crt, offers. G3MHS, QTHR. Tel Sedgley 73465.
KW2000CA + psu, complete, £55. Wide spaced pa capacitor, £1.50. Breaking 624/625, all parts cheap. G8VB tx complete or break for parts. Advance sig gen 10MHz-300MHz, £15. *Wanted:* rx, BC221. Sae please. G3JSP, QTHR. c/o Taylor, 48 Kirkley Cliff Rd, Lowestoft, Suffolk.
Pye Reporters complete, offers. Valves 6146s, KT88s, 5B255Ms, etc. *Wanted:* Carrier deviation meter TF791 or similar. Frequency counter Yaesu or Heathkit, also handbooks for Pye Westminsters, loan for photocopying or purchase. G3NPZ, QTHR. Tel Titchfield 43894.
R1155B with power pack, works well, £15. Also freq adaptor for R206, range 50kHz to 600kHz, excellent when used with main rx, £8. G4CSA, QTHR. Tel Lytham 7680.
Complete chassis G3TDZ, 2m tx/rx plus rx-tx boards, £2. *Wanted:* Heathkit HW32, any condition with or without power supply. GI3YMT, QTHR. Tel Belfast 644688.
Microwave Modules tx, 3 xtals, 6 months old, £25. KW500 linear, mint condition, no cabinet, £38. KW Vanguard, just overhauled and re-aligned by makers, £22. Vanguard, working 70·26MHz, good condition, £16. Prefer buyer collect. G3RPD, QTHR. Tel Reigate 48535.
Trio JR310, mint condition, £63 ono. 2 dual gate mosfet converters for 2m 2–4MHz i.f. and 22–30MHz i.f., £8 each. Also other equipment, clearing shack, power supplies, etc. Sae with enquiries please. W. H. Tee, 13 Barry Road, Bitterne, Southampton. Tel Southampton 445877.
Tektronix 545A scope with ca unit, dc to 30MHz, perfect. Offers around £120 or exchange ssb tx/rx eg KW2000A etc, with cash adjustment if necessary. G8BZN, QTHR. Tel Hinckley 0455 35621.
Codar AT5 tx, 160/80m with ac and dc psus and control unit, £28. Topmobile receiver transistorized, 2V dc supply with speaker, £9 or will part exchange HW12 transceiver. G3ZEJ, QTHR. Tel Great Chatwell 381.
Heathkit GR78 rx, little used, £50 ono. G3SYZ, QTHR. Tel 090 853 398.
Lafayette HA350 rx, very little used, in original carton, also pmi preamp. Both now surplus to requirements, £55 ono the lot. G4BQX/G8ECA, QTHR. Tel Rotherham 873370.
"Radio Communication" and *RSGB Bulletin* vols 41–48; *Short Wave Magazine* vols 25–28, 30, vol 24 (No 12 missing), vol 29 (No 10 missing); £1.50 per vol incl post, (incomplete vols, £1.25). G3UBB, QTHR.
4m crystals. 5th overtone HC6U, 70·035, 70·135, 70·260, 70·635, £1.75 each. HC18U 70·575, £1.25. HC6U 8·764, 8·7825, 8·826, £1.50 each. 4m ssb, HC6U 61·435 (+9 MHz ssb), 42·307 (+28MHz), 56·466 (+14MHz), £1 each. 12V modulator for QQV03/20, pa + cct, £4. G3RDQ, QTHR. Tel Radnage 2461.
KW Vespa Mk1 complete with psu. Good condition, £60. Buyer collects. G3FTD, QTHR. Tel Blackpool 45480.
3kW, 240V ac generator stripped for overhaul repairs, partially rebuilt then left. First offer over £20 secures. Club sale, buyer must collect. G3OKA, QTHR. Tel 051 608 5573.
IC21 2m fm transceiver and vfo to tune rx, over 144–146MHz c/w, 7 xtals incl GB3PI, mains or 12V dc operation, £150 ono. G8BPK, QTHR. Tel Aylesbury 630600.
Trio JR500S rx, covers all amateur bands between 3·5 and 29·7MHz, ssb, a.m. cw SP-5DS speaker, manuals, extremely stable. As new in original carton, £45. Sae list of other gear. *Wanted:* KW200A with neg e pu. G3ZDO, QTHR.
Record pen, recorder speed 6in and 1in/hr, 500μA movement, 240V ac, 50Hz, offers. TW 70cm converter, 12-14MHz i.f., £12 ono. AUY10, £1. Buyer coll or carr extra all items. G3XGK, QTHR. Tel Lowestoft 64160.
Storno 2m fm transceiver, 10W o/p. Provision for eight switched channels. Fitted tx: 144·48, 145·0; rx: 144·4, 144·6, 144·48. With Bantex 5/8 whip, £25 Securicor carriage paid. Also Joystick vfa, £2.50.

Joymatch rx tuner, £2. G4BVH. Peter Reed, 73 Dudley Road, Brighton, Sx. Tel (0273) 504634.

Class D Mk2 wavemeter 6V ac Mullard 5–10 amplifier, both £3.50 each. HC18U 11·155MHz, 10·245MHz ex Cambridge, 75p each. 19in rack psu W8356/A 350V o/p, £1.50. Pye Cambridge AMI0D, many mods, details avail. Offers invited. G8DLT, QTHR. Tel Broadstone 5370.

12AVQ with gen, £15 as new. Pye base stn 320A, offers. Morse osc and gd key free to any buyer! G3ZLH. 3 Oerley Way, Oswestry, Salop. Tel Oswestry 5730 (STD 0691)

Swop DX4OU, no psu wired for extra 6146 to run limit, clean construction, pa, eht, trans available for AT5 or similar rig, haggling a speciality. Pref someone local. G4CEO. The Avenue, Bletsoe, Beds MK44 1QF. Tel Bedford 781634.

"Radio Communication" Bulletins: 1973 complete, 72 complete, 71 (minus March), 70 complete, 69 complete, 68 (minus April), 65/67—28 books. £3 the lot, carriage extra. G3ASL, QTHR. Tel Southend 68254.

Property late G2BYI, NCX500, NCX ac pu, Shure mic, £165; Hammarlund HQ145X, Hammarlund spkr, £65; AR88D, £40; hro, £18; CR100 (B28), £18; MultiElmac hamband rx, £25; MultiElmac tx, £25. All manuals plus carriage. Ono, offers? G3KPO. D. Byrne, Homa House, Quadring, Spalding, Lincs. Tel 077 584 485.

Heathkit DX-100U tx, 160–10m, good cond, recent overhaul, 120W, handbook. Will deliver in London otherwise buyer collect, £35 ono. G4RG, QTHR.

Two Sinclair Z50 amplifiers, unused and boxed, £3.50 each. Also used PZ8, £6, and Z50, £3. Sanken SI-1025A 25W rms ic with data, £6. Solid State Modules Sentinel mf converter almost new. Offers? K. Haywood, 14 Lynton Avenue, Flixton, Urmston, Manchester.

EC10 Mk2, as new condition, with mains psu and portable antenna, £60. D. Craig, 2 Blakehall Road, Carshalton, Sy. Tel 387 0858 (day).

Mint Codar T28 rx, £10.50. SCR522 rx/tx in rack complete with all valves, rx tunes, £2.75. Bendix TA12 tx, no modulator, £3.50 carr at cost, circuit reprints. G3OOQ, QTHR. Tel 0789-5973.

Cambridge FM10D with 145MHz crystals, receiver needs aligning only, manual and ½ Bantex antenna, £40. Homebrew G2DAF linear + psu, pair 4×150s, 10–80m, working but could be improved, £35. Offers? G4BUE, QTHR. Tel 0273 (Brighton) 31786.

Trio 9R59DS, fitted stabilizer, calibrator, 3·5MHz xtal, perfect working order, £40 plus carriage. GM4CIH, 17 Silverlaw Crescent, Annan, Dfs DG12 5EH.

Trio 9R59DS receiver, good condition, with voltage stabilizer, £40. Minimitter 150W cw/a.m. tx with circuits, £12. Buyer collects. G4AJM, QTHR.

KW2000A plus ac psu, vgc, £140. G3TGO, QTHR. Tel 0733 72066.

Drake R4B rx with extra xtals, £175. TR44 rotator unused, £35. HQ1 minibeam, almost new, £30. KW E-zeematch, £8. Tech transistor dip osc model TE15, £8. G3TRY, QTHR. Tel H.W. 881258.

HRO with psu, handbook, seven coils (B/S 40/20/160), B76 valves, filter working, xtal bfo, calibrator. Offers. G3MDQ, QTHR. Tel 021 353 3608.

Green Davis 500W linear 80–10m 240 ac. Only requires 25W drive, £35. Swop for 2m transverter or buy same for cash. Collect. Cambridge AM10D, £20, working on 2m. Collect. G4BXD/G8ESY, QTHR.

FT100, good order, FT400 immac, FT500 immac, offers. *Wanted:* FT101, FT401, FT501. Exchanges considered. Buyers collect. G3DCS, QTHR.

Heathkit RA1 amateur bands receiver with speaker, xtal calibrator, handbook, £21. Sentinel X de luxe 2m converter, 28–30MHz i.f., integral psu, as new, £12. HC25U xtal 21·2525MHz, 75p. P. D. Cockbain, Coplands, Dartington, Totnes, Devon. Tel Totnes 2484.

Trio TR2200 complete with nicads, £65. Also various xtals for above, inc GB3PI. Homebuilt pg mosfet converter, £8. Homebuilt transistor pa 20W at 144MHz for 1W input, £10. Telomast, £15. 8 ele J-beam + rotator, £25. G8GJY. Tel Wickford (Essex) 63141.

WANTED

Codar AT5 tx with matching ac psu and Codar T28 rx. Also KW2000. Only mint unmodified items considered. *For sale:* Mint G3OLB 2m converter 28–30MHz output, £8 post paid. 10 Avenue Road, Frome, Som BA11 1PR.

RF amplifier for wireless set No 19 Mk3, in original unmodified condition if possible for reasonable price. VP1MT. Capt M. G. Taylor, 633 Sig TP, BFPO 12.

KVG XF9B filter (later version) with both sideband crystals. Valves 6A7, 76, 77, also purchase or loan 73 magazine April 1973. G3NKW, QTHR. Tel 061 962 1758.

FDK Multi-8 and Multi vfo manuals to borrow for photocopy or will pay for copies. G8BLD, QTHR. Tel Framingham Earl 2271.

2m Yagi or Halo aerial, prefer complete with coaxial and mounting fixtures. R. V. Copeland, 18 Milton Drive, Boreham Wood, Herts WD6 2BB. Tel 01 953 0329.

AKG C12A, C412, D202C or D224 microphone or similar Neumanns Sennheiser, etc. Koss ESP9 or Stax SR3 electrostatic headphones, also Dolby "B" noise reduction unit. Please give any details and price req. G8HMF, QTHR.

Drake TR4C psu and RV4C. KW107. Send full details and price. *For sale:* Yaesu FT200, FP200 and PTT mic, £140. P. Smith, 49 Hucknall Avenue, Ashgate, Chesterfield, Derbyshire S40 4BZ.

Desperate for Creed 7B typehead clutch and latch. DA2XU, R. E. P. Spencer, HQ Rhine Area, BFPO 34.

Exchange mint condition photo equipment value £450+, including Bronica S2A and MPP Universal enlarger with Schneider lens for ssb gear. Serious offers please. Full list available. GW3FPH, QTHR. Tel Northop 326.

Electroniques type IFA/1·6/ssb i.f. strip with or without xtals. Eddystone dial type 898. D. Tulk, 8 Cleves Close, Weymouth, Dorset.

TC2 or 19 set. Also new valves for AR88D. All replies answered. Postage paid etc. c/o "Acheve", La Ruette Lane, St Martins, Guernsey.

Heath HW12A 80m single band transceiver with handbook and microphone, around £30 to £35. Psu not essential but would be considered. All replies answered. GM3JHL. J. H. Lepper, 128 Sheephousehill, Fauldhouse, West Lothian, Scotland EH47 9EL Tel Fauldhouse 433 (evenings).

Desperate need for crystal filters, 9MHz any bandwidth, ssb 10·7MHz and 4·8 to 5MHz any bandwidth. *For sale:* 6MHz HC6U xtals for 144·576, 145·696, 144·216, tx 10·7MHz HC18 and 100Hz HC13U, 75p. G3YJC, QTHR. Tel 01 647 3134.

Good quality straight morse key, eg ship type-junker, etc. G2HAX, QTHR.

G2DAF Mk2 tx. Any condition considered as long as mostly complete. Linear amp, will collect within reasonable distance of London. Telephone evenings or weekends. G3PAQ, QTHR. Tel 01-223 2675.

35–45ft mast, small rotator with indicator similar to AR20 or Stolle, suitable for vhf/uhf beams, 70cm parabeam or similar, any type considered. Will collect reasonable distance or pay carriage. Chris Lorek, 93 Malvern Avenue, Preston. Tel 0772 25108.

Eddystone 888A, any condition. Also has anyone any idea what an RF105 unit is? G8DEV, QTHR. Tel 0789 68554.

"QSTs": April 1967, May 1967, March 1971, August 1971, March 1973. Also xtal 276kHz or 2·760MHz. G8AXC, QTHR. Tel Snainton 252.

Motor for Grundig TK5 tape recorder. G3ZMN, QTHR.

Tfmrs: 5V at 15A, up to 4kV at 500mA. Also tx/vc 500 pF and 1000pF at up to 8kV, 16 or 32μF paper caps at up to 8kV, choke for above tfmer and any other meaty components. P. Jenkins, 30 Gainsborough Road, North Finchley, London N12 8AG

Creed tape reader type 6S/5 or 6S/6 Prefer 160V motor but anything considered *For sale:* 80m ssb Exiter based on RSGB Handbook valve design, ideal basis for all-band rig. About £10. GM3SZP, QTHR. Tel 041 776 6650 after 6pm.

Eddystone dial 898. GW3KAJ, QTHR. Tel Wenvoe 454.

Technical manual for receiver R209 Mk2. Vibrator for above receiver. *For sale:* Oscilloscope Solartron CD10143 with manual but no mains transformer. Offers? C. A. Cooper, 45 Nightingale Crescent, Bracknell. Berks. Tel Bracknell 4168.

Grid dip oscillator, also keyer similar to Heathkit. GM3LLB. 4 Todlaw Way, Stonehouse, Lanarkshire.

Student requires 2m rig. Must be fairly cheap but in good working order. Please write with full details to Alan Croft, 18 Zenoria Street, East Dulwich, London SE22 8HP.

Communication rx, 2–30MHz in reasonable cond, for keen schoolboy of limited means. G. Sharp, 36 Kenmore Drive, Yeovil, Somerset.

Electroniques ham band only valved coil pack or rx with Electroniques coil pack. Must be in good order. G3SUU, QTHR.

FT101 with 160m band. Also car mounting bracket and fan. Will pay cash or take over hp. Lee, 400 Edgware Road, London W2. Tel 01-723 5521.

10–160m receiver Eddystone tune/h, double/con, ssb/a.m., var bfo g multiplier, built-in stab/psu, speaker noise/blank, s and v meters, £20. Codar PR30, built-in psu, £5. Cossor 2-beam scope, model 1035 Mk2, trolley, £15. Sae please. Ono for lot. GM8HKR, QTHR.

Ferrograph Wearite deck 1c (circa 1948), any cond—complete or fragmental. Mullard pot cores LA2532, 2538, 2332, (pref 2,2,1, off

resp, but single offers welcome). State conds and prices pse. A. E. Tew, 91 Lyndhurst Gardens, London N3.

For army cadet force. Technical information (EMERS) for WS No 12. One or more ATP35 valves or suggested mod to replace. Also modern control harness JD9(24V) I box, M Box. Offers. All info promptly returned—promise. M. J. Buckley, 62 Ballards Way, South Croydon, Sy. Tel 01 657 4778.

Parts for DC6HL ssb tx, 65·0, 65·5 xtals HC25 or HC16U. Good condition Eddystone 960 transistor general coverage receiver preferably with rechargeable psu. G8HIO, QTHR. Tel 66704.

Bird Thruline wattmeter. Elements not essential but around 28–50MHz, required. Also hf elements. Could probably collect. For acf use. M. J. Buckley, 62 Ballards Way, S Croydon, Surrey. Tel 01-657 4778.

Psu for Pye 125T 12V type for mobile use. Also valves XX21s and 7360s. G4B8O, QTHR. Tel Ringwood 2273.

For purchase or copy, manuals for Cossar R107 rx and Murphy Rover boot mount tx rx. D. R. Parkes, 1 Fairview Road, Dudley, Worcs DY12RT. Tel 52964.

Photograph, or negative on loan of lattice tower not over 40ft. Must have planning permission to assist my application appeal. Expenses paid. G3GYE, QTHR.

BSR type TSB2 microphone, metal cabinet with door 34 × 26in. Table top cabinets 19in. Transformer 1000V 200mA, transformer 375-0-375 100mA. Relays. Choke 150mA. Mullard 5–10 amplifier with book. Large wire resistors UM2 transformer G3DFS, QTHR. Tel 021 354 7769.

HW17 2m tx/rx or TR2200. *For sale:* 2m tx vgc, £18. Also 2m tx/rx similar G3TOZ, ideal portable rig complete with mic but requires attention, £22. Both ono. G8CLJ, QTHR. Tel 723934.

Buy or borrow to copy. Handbooks, circuit, calibration instructions for Hartley 13A scope and Lafayette HA800. GW8HDH, QTHR.

Sony aircraft band portable radio and Lafayette HA55 aircraft band receiver. Eddystone covering 108MHz–136MHz considered. G3XER, QTHR. Tel Leeds 658568.

TW communicator for 2m. Must be in good condition and unmodified. Please state power supply available for above. Also Codar T28 receiver. G4BIX. Price, Colehill House, Winchester Road, Bishops Waltham, Southampton. Tel B.W. 2577.

Bar magnets, preferred rectangular 2in × 1in with fixing holes. G5FV, QTHR. Tel Keyingham 2374.

DEAC nickel cadmium cells type 225 DKZ, preferably in 12V units, but other combinations accepted. HC25U crystals: 9·0625MHz, 9·0937MHz, 12·975MHz, 13·0167MHz, 8·7825MHz, 8·8100MHz, 10·120MHz, 10·1475MHz for 2/4m. Please state price. G4AHT, QTHR. Tel 01 857 7810.

Cctv camera, 625 line Pye Lynx or similar, preferably working. G8BFF, QTHR. Tel 0455 39697.

Back issues "Ham Radio"; "Radio Electronics"; "Arrl handbook". GM8FHV, QTHR.

Codar T28 rx in good working condition. G3YXC, QTHR.

To buy or borrow handbook or circuit for R103A receiver (ex Govt). J. A. Richards, 6 The Crescent, Walton-on-the-Hill, Stafford ST17 0TZ. Tel 0785 61341.

Require 7kV at up to 1A, 2–4kV at ½A, 2·5kV at 400mA, 5V at 10A, 5V at 14mA, and 5V at 75A. Whole psu or any comps to make them. Also require B5F bases and any ceramic anode caps or insulators. P. Jenkins, 30 Gainsborough Road, North Finchley, London N12.

AR22 rotator and control, reasonable condition, J-Beam 2m Yagi. 2m converter 4–6MHz if preferred. State price required. G4CEM, QTHR. Tel Hitchin 2990.

Electric hoist mechanism for P60 Strumech tower required. Tel Bazley 021 643 6884 (business hours) or write G3HCT, QTHR.

HMV Ultra or Ferguson mono 20in or 24in screen 5/s television required. P. K. Goode, 40 Lutley Drive, Pedmore Stourbridge. Tel 73527 after 6pm.

FR400SDX rx in good condition, less than £150. Please state price. G. Harwood, 243 Leigh Road, Chandler's Ford, Hants.

Cabinet for Hallicrafters S27 rx. Heathkit SB600 complete or case only. Heathkit 32ft tower. Set of wooden legs for Murphy ctv 2511. *For sale:* Ozalid photocopier, £20. Coll/delivery arranged. Baker, Bontnewydd, Cards. Tel Bronant 608

Honda or similar portable generator. Buyer to collect. Landor' 6 Queen's Road, St Helier, Jersey, CI. Tel Jersey East 186, evenings.

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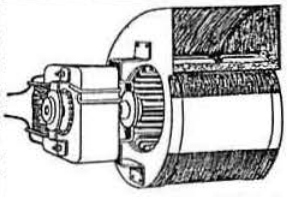

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Printed in Great Britain for the RADIO SOCIETY OF GREAT BRITAIN, 35 Doughty Street, London, WC1N 2AE
by The Garden City Press Limited, Letchworth, Hertfordshire SG6 1JS

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