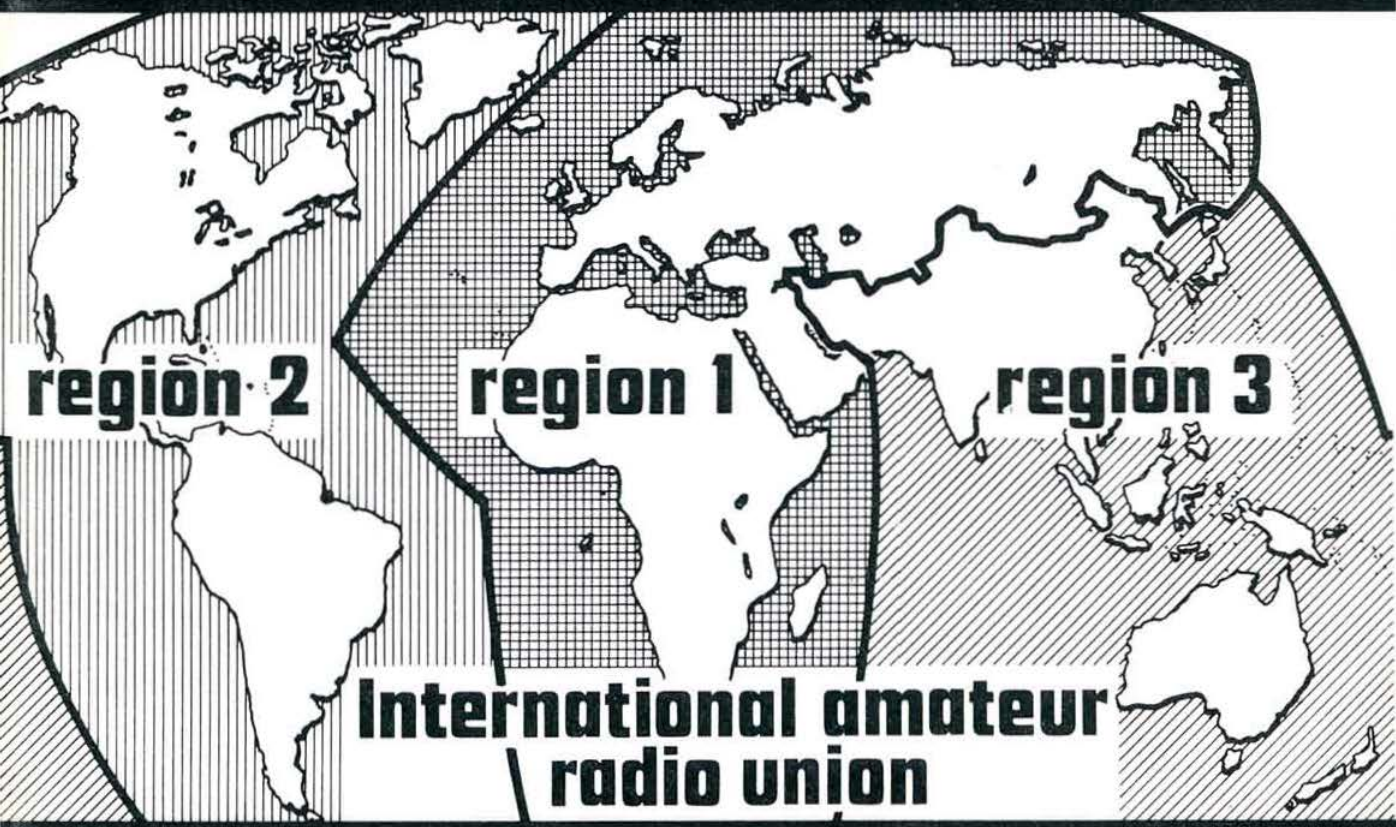
AUGUST 1973

RADIO COMMUNICATION



RSGB Diamond Jubilee Year

1913 – 1973

Journal of the Radio Society of Great Britain

AUGUST 1973

RADIO COMMUNICATION

Volume 49 No 8 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

17,313 copies per issue average circulation in 1972

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.

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

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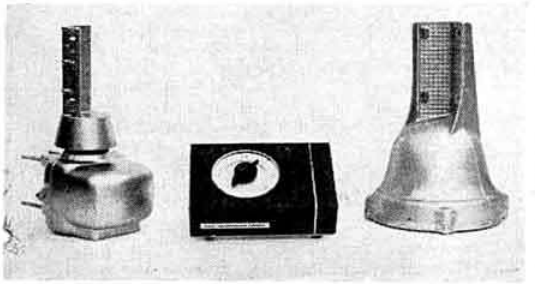
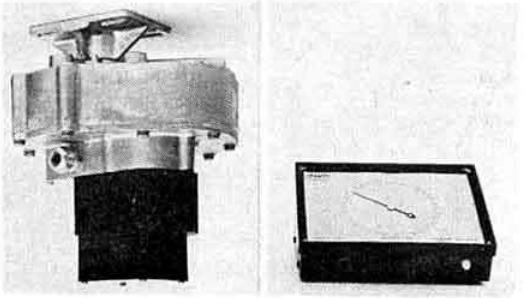


AR20 AR22

TR44 HAM-M

HY-GAIN 400



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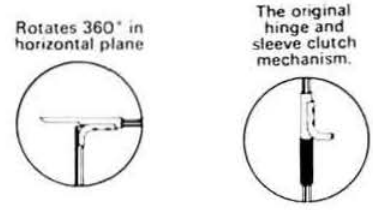

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LINER 2 NEWS

May we respectfully point out that we are the Sole Agents in this country, our price is £120 plus V.A.T., and our Liner 2's are on the popular (145·25 to 145·48) segment of 2m. If anyone wishes to be a lone voice crying in the wilderness, we can supply the necessary crystal and dial for 144·10 to 144·33. The price of £4 includes realignment and unless you have a good spectrum analyser, please don't attempt realignment—don't even think about it!

By the time you read this we should have matching A.C. power supplies in stock at £15 including V.A.T.

HINTS AND TIPS

We are often asked if we can recommend a pre-amp for 2m use—a simple enough request on the face of it, but not so easy to answer in practice. Most equipment is a compromise between sensitivity and signal handling and you can't have one without degrading the other. In the case of Japanese 2m equipment it is instructive to consider Japanese band conditions to form some idea of what the designer is trying to achieve. 2m in Japan is packed solid, the use of amplifiers widespread and a high gain beam mandatory. The net result is that the problem of I.M., cross modulation etc. rears its ugly head and the designer is forced to make signal handling his first consideration rather than absolute sensitivity. Hence the adoption of a double tuned input coil on the Liner 2 and the beautifully designed band pass filter on the FT2FB. In this country, on the other hand, signal handling has not been much of a problem due to the comparative sparseness of hefty signals, but I would like to suggest that with increased activity on 2m, this is an aspect of design which must receive more and more consideration.

However, if you are relatively free of strong local signals, by all means try a pre-amp—it could well make the difference between hearing someone and working him, but you must accept that you cannot have your cake and eat it—you may bump up the weak signal only to find that you still can't work him because of I.M. products or cross modulation. However, human nature being what it is, the average chap will convince himself that his modified front end makes a vast improvement all round. Who are we to argue—if you want to shove in a pre-amp, go ahead, you can't do any damage, and if you yourself are happy with the result, then that is the main thing.

Experience has shown that many of the troubles which beset the 2m man are due to ill-advised tweaking. May we suggest that if you suspect that your rig is not up to snuff—take it back to your Dealer and get him to actually measure the performance.

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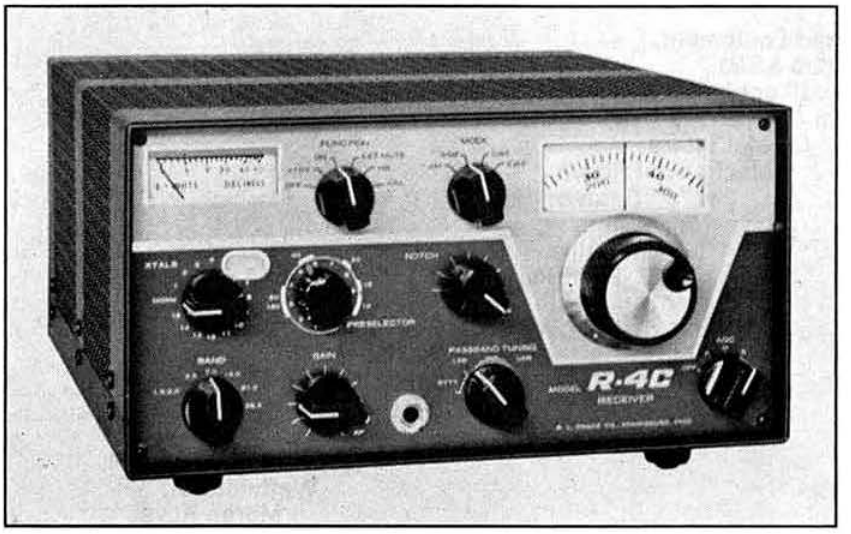

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QTC AMATEUR RADIO NEWS

Delay to July issue

As a result of an industrial dispute at the printers, the July issue of *Radio Communication* was posted to members on 9 July instead of on the scheduled date of 29 June.

It is hoped that the current issue will be posted on the scheduled date of 27 July.

Propagation Predictions

Following comments in *Your Opinion*, the following information has been received from Dr G. Lange-Hesse, DJ2BC, of the Max-Planck-Institut für Aeronomie, by whose co-operation the monthly propagation prediction information is made available.

"The predictions are based on conditions in central Europe and there may at times be discrepancies between observations in the UK and the predictions, which are based on a cw power of 100W and a vertical dipole aerial. During the greater part of 1972 the solar activity was considerably higher than predicted, and consequently there were differences between observations and predictions, particularly on the 28MHz band, but also on 14 and 21MHz."

Licence figures

The Ministry of Posts and Telecommunications advises that the following numbers of amateur licences were in force at 31 May 1973:

Class A	14,701	Class B/M	984
Class B	3,920	Television	244
Class A/M	3,004		

Reciprocal licensing in Italy

Further to the paragraph on page 453 of the July issue of *Radio Communication*, members should note that an application for a temporary licence should be accompanied by a remittance of 500 Italian lira. Application forms may now be obtained from G2BVN. For those who may already have applications pending, the Italian national society will forward the licence fee to the administration.

Advance notice

South-east Counties HF Convention

Sunday 18 November 1973

Airport Hotel
Crawley

Details later

CBE for the President

Members will be delighted to hear that this year's President of the RSGB, Dr J. A. Saxton, was honoured by HM The Queen in this year's Birthday Honours. She was graciously pleased to appoint Dr Saxton, who is Director of the Radio and Space Research Station, to be a Commander of the Most Excellent Order of the British Empire (Civil Division).

We congratulate Dr Saxton on this well-deserved recognition of his services to the country.

Help required

The international beacon project, mainly a 28MHz programme, is now well established with transmitters in all ITU regions. The other half of the story, which is concerned with reception reports and their analysis for propagation studies, is now assuming greater prominence. There is a need for someone, or perhaps a small team, to handle this task. Anyone willing to assist should write to Alan Taylor, G3DME, Altadena, South View Road, Crowborough, Sussex TN6 1HF.

Maidenhead & District ARC

From this month the club meetings will be held at a new venue and on new dates, the British Red Cross Hall, The Crescent, Maidenhead, on the first Thursday and third Tuesday of each month at 7.30pm.

"Yet another keyer"

The author of this article, which appeared in the May issue, advises that in Fig 6 on p 327 there should be a break in the track of N43. G3SZW apologizes for any inconvenience caused to readers.

A family affair

The interest in amateur radio shown by John Clarricoats, G6CL, for many years general secretary of the Society, was continued by his son-in-law, Peter Mathews, G3BPM, and is now being further continued by Peter's daughter Hilary, who at the age of 16 passed the RAE and is now G8HCG and very active on 2m.

RAOTA notice

At the last AGM it was agreed that in future, owing to the large increase in the cost of production, the charge for individual callsign badges would be additional to the subscription. The life membership subscription remains the same at £1.05, but the callsign badge will now cost 70p extra.

It is regretted that this change has become necessary.

G. R. Jessop, G6JP
Hon Treasurer, RAOTA

RAE Courses, 1973-4

Bath, Somerset. At the City of Bath Technical College, Avon Street, Bath, commencing in September. Enrolment will be in early September, further details from course tutor P. A. Bubb, G3UWJ QTHR.

Beckenham, Kent. At the Beckenham and Penge Adult Education Centre, 28 Beckenham Road, commencing Monday 24 September at 7pm. Enrolment will be on 17 or 18 September, or at the first attendance; course tutor is R. E. Piper, G3MEH.

Boston, Lincs. At Boston College of Further Education, Rowley Road, Boston, Lincs, commencing Thursday 20 September at 7pm. Further details from G3KPO QTHR.

Bridgnorth, Shropshire. At the Bridgnorth College of Further Education (Dept of Engineering), Stourbridge Road, commencing 17 September. Monday will be theory night, Thursday morse and practical, from 7 to 9pm each night. Enrolment will be on Wednesday 5 and Thursday 6 September between 6.30 and 8.30pm. Further details from Mr M. Jones, course tutor, at the college. Fees will be as follows: theory only, £4.20, complete course £4.80, reducing to £2.20 and £2.50 respectively for under-18s.

Cannock, Staffs. Commencing 20 September and running until May 1974, this course will be held at Cannock Chase Technical College. Practical demonstrations and films will be included.

Cheltenham, Glos. At the North Gloucestershire College of Technology, The Park, Cheltenham, commencing 25 September. Classes will be held at 6.30pm every Tuesday, enrolment will be between 6.30 and 8.30pm on 10, 11 and 12 September.

Chertsey, Surrey. At the St Paul's Centre of the Chertsey and Egham Institute of Further Education, School Lane, Addlestone, Surrey, on Tuesdays at 7pm. First class is on 25 September. Tutor will be Mr C. Duckling, course fee is £3 (for RAE exam).

Cove, Hampshire. At the North and West Farnborough Further Education Centre, Cove County Secondary School, St John's Road, Farnborough, commencing 27 September. A morse proficiency course will be held on Wednesdays, commencing 26 September. Both classes begin at 7.30pm, course tutor will be John Hardy, G3KND. All enquiries to Mr P. D. Dimmick, principal, at the centre.

Doncaster, Yorks. At the Doncaster College of Technology, Waterdale, Doncaster, commencing in September. Full details from Mr F. Smith, G3JKS, in the Electrical Engineering Dept.

High Wycombe, Bucks. At the High Wycombe College of Technology, Queen Alexandra Road. Enrolment on 10 and 11 September, between 2 and 9pm, further details from Mr R. Stringer, lecturer, in the Engineering Department.

Holloway, London. The newly-formed Shelburne Youth Centre Radio Club (G4BXW) will run a course at the centre, Benwell Road, N7, commencing in September. Mr R. C. Cummings, G3SLF, will be course tutor, and invites licensed amateurs and SWLs to join in the club activities. Further details from either G3SLF or the warden of the centre.

Lichfield, Staffs. At the Lichfield School of Art and Evening Institute, commencing in September. Classes will be every Thursday, 7 to 9pm, further details from the principal, Mr Sanders, or from G3DZT QTHR.

Liverpool. At the Riversdale College of Technology, Riversdale Road, Liverpool L19 3QR, commencing Monday 17 September. Classes will be two nights per week, Mondays and Thursdays, 7 to 9.30pm, for which the total fee is £7.15 (under review). Enrolment from 6.30 to 8.30pm on 5, 6 and 7 September.

Peterborough, Hunts. At the Electronics Department, Peterborough Technical College, Eastfield Road, Peterborough, commencing mid-September. Will probably be held on Tuesdays at 7pm, further details from G3KPO QTHR.

Sheffield, Yorks. At King Edward VII School, Darwin Lane, Crosspool, Sheffield 10, commencing 3 October. Enrolment will be during the week commencing 24 September, further details from J. Bell, G3JON QTHR, tel 367774 (home) or 732333 (office).

Stafford. At the College of Further Education, Tenterbanks, Stafford, commencing Monday 24 September. Mondays will be devoted to morse, Thursdays to theory, 7 to 9.15pm both evenings. Enrolment will be from 6.30 onwards on 11-13 September, further details from course tutor J. W. Boswell, G8AAX QTHR.

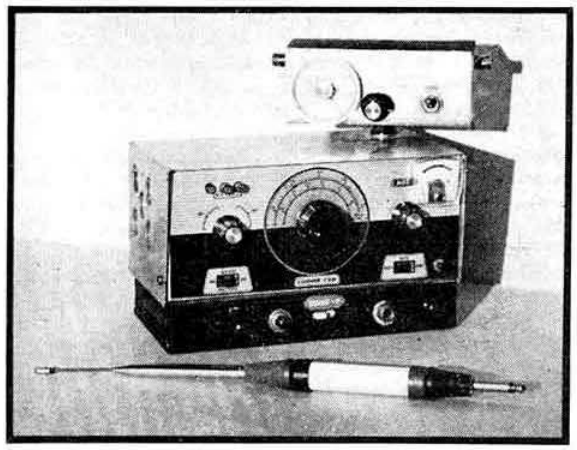
Welwyn Garden City, Herts. At the Mid-Herts College of Further Education, The Campus, WGC. Enrolment will be on 10 and 11 September between 2 and 9pm. Further details from Mr Yurek, head of the Engineering Department.

Weybridge, Surrey. At the Brooklands Technical College, Heath Road, Weybridge, on Tuesday evenings commencing in September. Classes commence at 6.30pm, enrolment is on 10-12 September from 2.30 to 4.30 and 6 to 8pm, or by post to the head of the Department of Technology. Course fee is £3.

The Radio Amateurs' Examination Advisory Committee

Since the initiation of the RAE, immediately after the second world war, almost every holder of a transmitting licence has passed this examination. In 1946, Mr W. A. Scarr, G2WS, was instrumental in forging a liaison between the City and Guilds of London Institute and the GPO which culminated in the formation of a committee concerned with both the syllabus content and the moderating of the question paper. The composition of the committee indicates the range of interests involved in the RAE, with one representative from each of the following: the Ministry of Posts and Telecommunications, the Post Office Wireless Telegraph Section, the IEE, the IERE, the Department of Education and Science, the Association of Colleges for Further and Higher Education, the Association of Principals in Technical Institutions, and the Association of Teachers in Technical Institutions; there are *three* representatives from the RSGB (G2WS, G6NZ and G3GVV). This is yet another way in which the Society looks after the interests of all amateurs, not only its own members.

For some 26 years, Mr Scarr has presided over the RAE Advisory Committee, where his breadth and depth of knowledge, tact, courtesy and wisdom were always respected. Recently he expressed a wish to hand over the chairmanship, while continuing to serve as a member, and he has been succeeded by Mr R. J. Hughes, G3GVV, Immediate Past President of the RSGB, who is Director of Technology at Tonbridge School.



A problem sometimes faced by would-be purchasers of commercially-made gear is that none of the designs seems to provide all the subsidiary facilities required. It is often possible, however, to "personalize" commercial gear, making small additions and alterations to the basic unit, to bring it into line with one's needs.
This article shows how a Codar T28 receiver was modified to suit one amateur's requirements, and illustrates how the judicious use of published circuits and ideas can considerably extend the facilities of a straight-forward two-band receiver.

The complete "Pipsqueak" with the rotatable df aerial in place. The QRP transmitter is fixed beneath the receiver case, adding 1½in to the overall height; in front of the unit is the telescopic 160m loaded whip

The "Pipsqueak"
—a modified Codar T28 receiver

by B. BLESSED, BSc, G3XWC*

WHEN the author was a student, he required a very compact transmitter/receiver which would serve as a complete /A station, without any extra units (power supplies, frequency meters, etc), and which would be light enough to be easily transported between home and temporary addresses. Time was limited by studies, so it was decided to purchase a commercially-built receiver as the basis of the project, and to this end the Codar T28, a splendid little two-band receiver, was chosen.

The T28 uses nine transistors, and is designed around Mullard i.f. and af modules, giving full coverage of the 160 and 80m amateur bands. A supply voltage anywhere in the range 10–15V can be used, current drain varies from 20mA standing to some 40mA when in service, depending on the volume control setting. A bfo is included for the reception of cw and ssb signals; the rf stage is separately tuned by a *peak* control, to assist in obtaining maximum performance from a variety of aerials. Negative or positive earth systems may be used, and the overall size (8 by 4 by 3½in) makes it ideal for portable or mobile use.

The additions and modifications made to the basic receiver were: (1) internal loudspeaker, (2) S-meter, (3) plug-in direction-finding coil, (4) 1MHz/1·93MHz crystal calibrators, (5) 0·5W QRP transmitter, cw and a.m., (6) noise limiter, (7) crystal-controlled bfo, (8) miniature loaded whip for 160m.

Case alterations

It is a good idea, before commencing the modifications, to alter the method of fixing the case top to the chassis, making the interior much more accessible. Both the metal fixing brackets must be removed from the inside of the case top (Fig 1), and some filing will be necessary as these are spot welded in place.

The simple alternative devised by the author was to cut four small right-angled brackets from aluminium and fix these to the underside of the chassis as shown in Fig 2. The case top is then drilled to align with the holes in these brackets, and held in place with self-tapping screws.

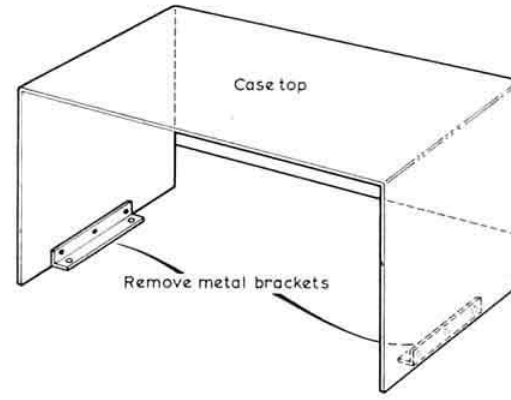


Fig 1. In the standard design, the case top is fixed to the chassis with two welded metal brackets. These are removed in the author's modifications

* 60 St Peters Avenue, Cleethorpes, Lincolnshire.

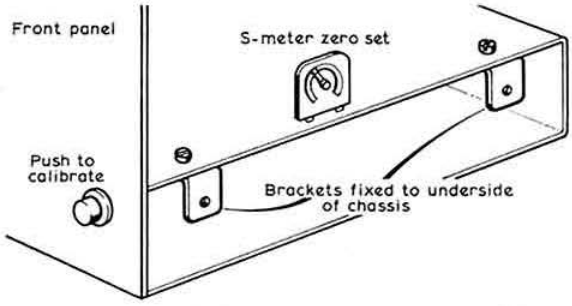


Fig 2. Once the original brackets have been removed the replacements can be fixed in place. They are mounted on the underside of the chassis, and the case top held in place with self-tapping screws

Internal loudspeaker

The loudspeaker used by the author is 4in in diameter, and rather too large for the amount of space available, although by carefully cutting the printed circuit board and relocating one of the aerial coils a reasonable fit can be obtained. If a 3in speaker is used, this operation is simpler. The position of the speaker is shown in Figs 3 and 4. It is important to keep the speaker coil from the aerial coils, if it is too close it will have a detrimental effect on the performance of the receiver.

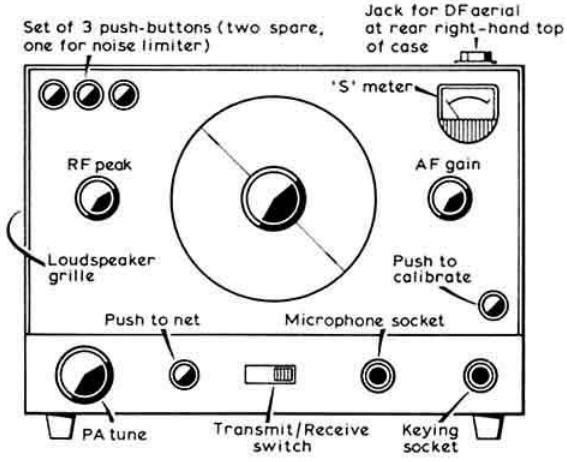


Fig 3. External appearance of the fully-modified station. The transmitter can be seen fixed to the base of the receiver, adding about 1½in to the overall height

A set of five holes was punched in the side of the case top of the receiver, and metal grille fixed to the inside with impact adhesive. The loudspeaker was fixed to the chassis and not to the case top, to simplify removal of the top.

S-meter

The meter used by the author was a 50μA level meter which had a simple red and green scale and was easily "calibrated" (using a fibre-tip pen) so that comparative signal reports could be given. The meter was mounted in the top right-hand corner of the front panel (Figs 3 and 4).

The amount of drive available from the i.f. module (Fig 5) is about 200μA on very strong signals, so a shunt resistor was required to adjust the fsd of the above meter. The value of resistance was calculated roughly, and then final adjustments made by trial and error.

The zero-set potentiometer (10kΩ) was of the skeleton preset variety, mounted as shown in Figs 2 and 4. In order to be able to adjust it from outside the case, a small hole was drilled in the right-hand side of the case, just large enough to permit the insertion of a trimming tool.

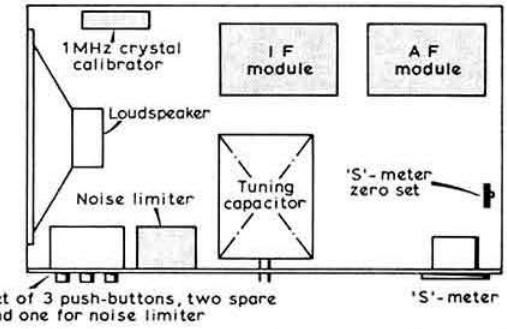


Fig 4. Positioning of components inside the receiver chassis. Note the position of the noise limiter, alongside the push buttons

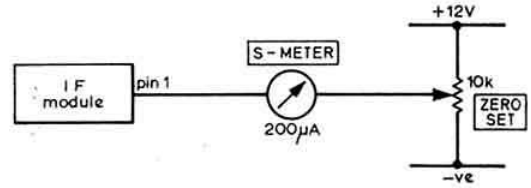


Fig 5. The S-meter and associated circuitry. Drive is taken from pin 1 of the i.f. module

Plug-in df aerial

The prototype df aerial consisted very simply of a tuned circuit plus ferrite rod (Fig 6). This was effective on strong signals, but left weak signals undetectable, so it was replaced by a more sensitive version consisting of a single-transistor rf amplifier coupled to a ferrite rod by a few turns of wire (Fig 7). Based on a Denco coil and MAT101 transistor, the completed aerial was found to be very sensitive, and it was now possible to use the receiver section without a long-wire or similar aerial. In fact, the majority of signals received on the long-wire could be received at a similar strength on the df aerial, which was considered to be a big bonus.

The rf amplifier was constructed on a small piece of Veroboard, and the df aerial itself mounted on a standard ¼in

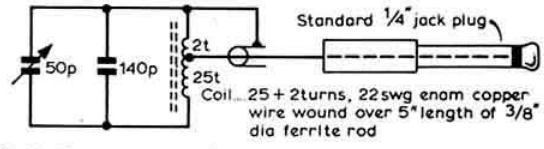


Fig 6. The prototype df aerial, subsequently abandoned in favour of the circuit shown in Fig 7

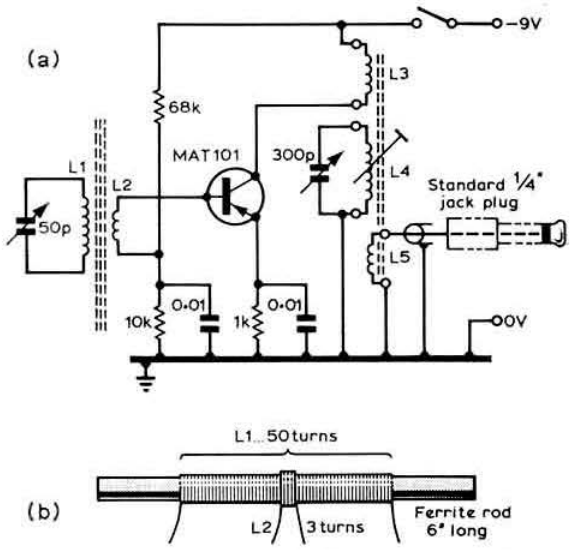


Fig 7. Use of this circuit as the df aerial gave considerably improved sensitivity, sometimes even to the point of equalling a long-wire in performance

jack-plug (Fig 8). The mounting was simply achieved by sandwiching the aluminium screen of the df aerial between the two halves of the plug (Fig 8c). The section of the plug which is normally enclosed in the screw cap is passed through a suitably-sized hole in the base of the screen, and the cap is then firmly screwed home. The matching jack-socket forms an excellent and very simple means of obtaining the desired rotating bearing for the aerial. In addition, it was now possible to unplug the aerial when not in use—another distinct advantage.

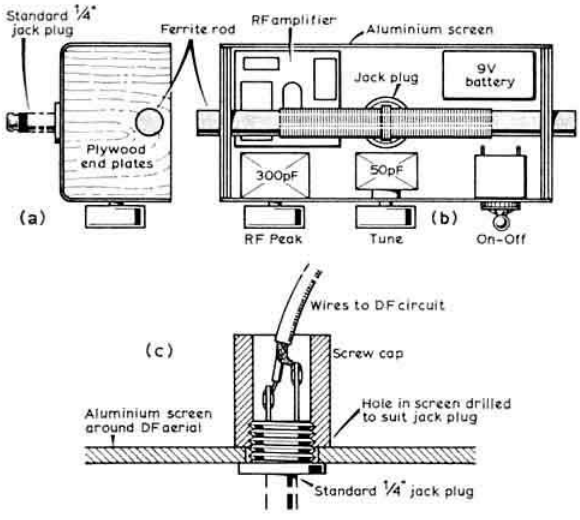


Fig 8. Constructional details of the df aerial. The use of a jack-plug in this way provides an ideal rotating mount for the aerial, as well as obviating the need for any connecting wires

The screen for the aerial was cut from sheet aluminium, with end-pieces cut from plywood.

On strong signals the aerial still works effectively if the rf stage is switched off. When close to a transmitter the aerial sensitivity may be further reduced by shorting a wire across the two sides of the aluminium case. This acts like a shorted turn around the ferrite rod and decreases its effectiveness.

1MHz/1·93MHz crystal calibrators

The 1MHz crystal calibrator is quite straightforward, and was also built on Veroboard. The crystal was of the 10X type, salvaged from a Class D wavemeter, and, like the loudspeaker, was a little too big; however, it was put to good use in the circuit of Fig 9. The Veroboard was glued to one side of the crystal, and the whole mounted in position inside the case (Fig 4).

The switch was a small push on—release off button type, positioned in the bottom right-hand corner of the front panel (Figs 2 and 3). Only one hole was required, approximately ¼in in diameter.

It is unnecessary to inject the crystal oscillations into the receive circuitry as the small radiated signal is more than adequate for calibration purposes.

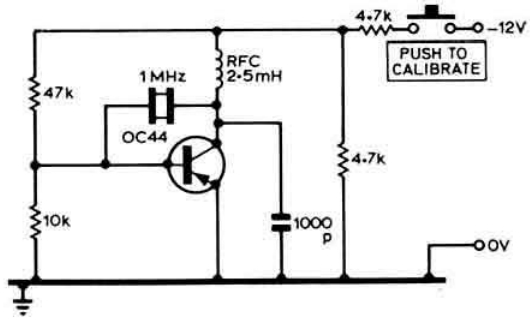


Fig 9. The 1MHz crystal calibrator. The circuit board is glued to the side of the crystal

The 1·93MHz calibration signal is another bonus. It is obtained from the netting signal of the 500mW QRP transmitter which is crystal-controlled on this frequency. Any crystal in the 1·8–2MHz band would do, but this particular frequency was chosen by the author as it was a very popular channel in his area.

500mW QRP transmitter

As can be seen from the circuit diagram (Fig 10), the transmitter is very simple, and yet, despite its simplicity, capable of satisfying results when used with a good aerial. With a highly active crystal, an input of about 500mW to the pa was obtained, a figure which was reduced by a low-activity crystal. With an input of only 60mW, stations within a radius of six miles could be worked with ease on a.m., A1 proved even more successful.

The layout is not critical, in fact it is very flexible, and constructed on Veroboard it occupied a space of about 2in by 3in by 1in. The modulation transformer T1 was salvaged

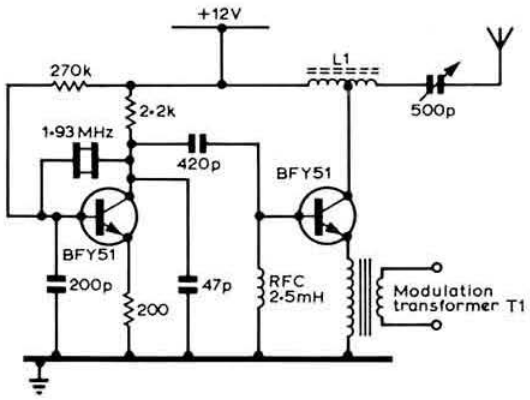


Fig 10. The low-power transmitter circuit. L1 consists of 30 turns 24swg enamelled copper wire, centre-tapped, close-wound on a 2in length of ⅜in dia ferrite

from an old transistor radio, and was quite small in size. The modulator itself was a 1W audio amplifier which happened to be on hand at the time, and the aerial coupling capacitor, a solid dielectric type, also came from the junk box. There was found to be no noticeable difference in performance between an air dielectric capacitor and a solid type in this application, so the solid type was chosen on account of its smaller size. Details of the layout are given in Fig 11. Current drain from the batteries is low when the transmitter is in use. For an input of 500mW, only 40mA is drawn on cw, and an average of 80mA on a.m. reaching a maximum of about 120mA on speech peaks.

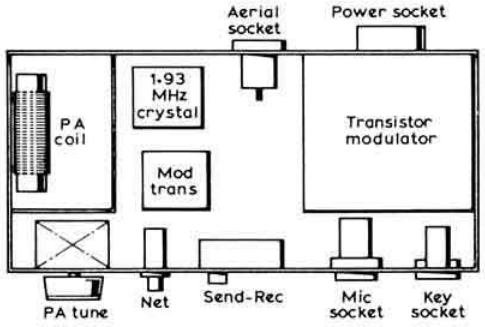


Fig 11. Layout of the 500mW transistor transmitter

The transmitter case measured 8in by 4in by 1¾in, and was fitted underneath the receiver, using the holes revealed when the plastic feet were removed. It was constructed of thin plywood, because metalworking facilities were not available at the time, which did pose some earthing problems, but as long as a constructor bears this in mind it should cause no difficulty.

Noise limiter

The circuit used was originated by G3XGP (see the August 1970 issue of *Radio Communication*), and is reproduced in Fig 12. When completed, it was fixed in position in the case (Fig 4). The on/off switch was one of three miniature push

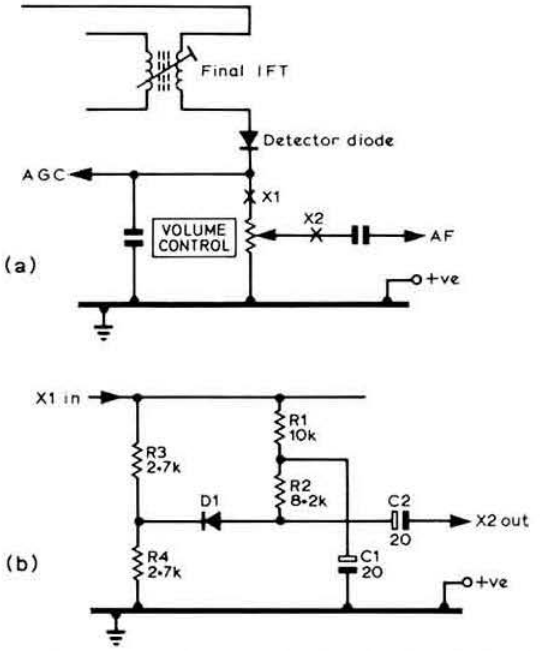


Fig 12. (a) detail of circuitry following the final ift, (b) the noise limiter circuit, originated by G3XGP, which can be switched in between points X1 and X2

on—push off button types mounted beside the noise limiter (Figs 3 and 4).

Crystal controlled BFO

The original bfo circuit was modified because it tended to drift and was also pulled noticeably by strong ssb and cw signals. Very simply, a 500kHz crystal was soldered into the bfo from the collector to the base of the transistor. The slug in the collector coil was adjusted until the LC frequency was the same as the crystal frequency, and the bfo was thus locked on to the crystal, and as stable as a rock.

Having altered the bfo, it was necessary to alter the i.f. to suit. Its centre frequency had to be lowered by 5kHz to 500kHz, so, with the bfo switched on, the slugs in the i.f. coils were carefully adjusted for maximum reading on the S-meter, thus ensuring that the i.f. passband is centred on the bfo crystal. (Incidentally, a harmonic of the crystal at 2MHz provided yet another calibration marker).

Miniature loaded whip (160m)

Experiments carried out with miniature loaded whips for Top Band showed that they could give favourable results in good conditions, despite their obvious limitations.

A 24in telescopic aerial was available and the final aerial was based on this, with a 3in length of ⅜in diameter ferrite rod used as the core for the loading coil. The whip was extended to 20in (allowing 4in for adjustments), and the number of turns on the ferrite rod adjusted until the gdo showed resonance at 1·93MHz. The coil was then potted, with the base of the whip, inside the two halves of felt tip marker

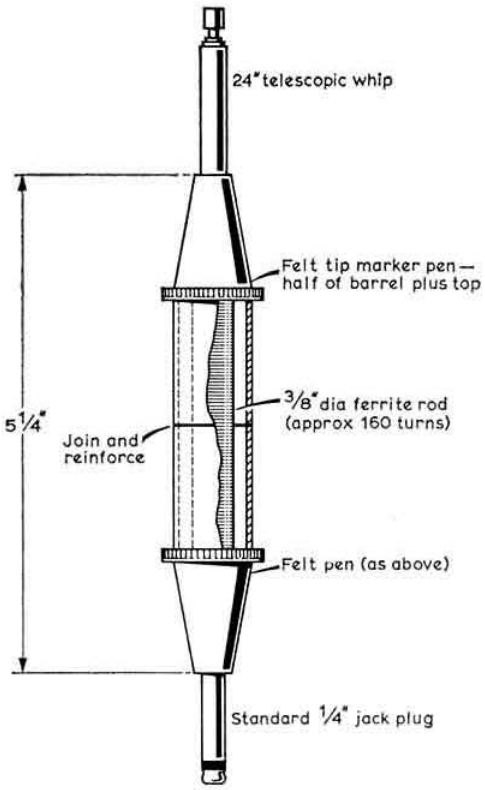


Fig 13. The miniature 160m whip, constructed from two halves of felt marker pens. For improved rigidity the join between the two halves should be reinforced

pens. As with the df aerial, the whip was mounted on a $\frac{1}{4}$in jack-plug (Fig 13), so that the two aerials are interchangeable.

Power supplies

In the author's system, the whole unit was powered by batteries; two 6V bell batteries were used and gave several months' of service. They were housed in a leather bag with a carrying strap for easy handling.

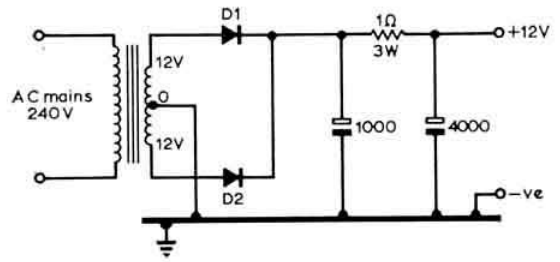


Fig 14. In the interests of economy, a mains power supply, such as the one illustrated here, can be used for fixed QTH operation. If a small transformer is used, it may be possible to mount the whole unit inside the receiver case. D1 and D2 are BY100s, or similar

If operated from a fixed QTH, the power supply circuit of Fig 13 could be used, and provided a small enough transformer is available it should be possible to mount it inside the T28.

Conclusion

The completed station has been in use now for several years and in that time has proved a very versatile unit. For example it has been used as a "pedestrian portable" station, using the miniature loaded whip, with a range of up to half a mile in good conditions!

The various circuits and ideas described can obviously be put to good use elsewhere, apart from the T28; the crystal calibrator and noise limiter are small enough to be included in the most crowded chassis. It should be pointed out that the author claims no originality for any of the circuits used.

It is hoped to follow up the capabilities of the QRP transmitter when a more permanent QTH is decided upon. Until then, working up to the 1,000 miles per 1W level, or 60 miles per 60mW, must remain an unfulfilled ambition!

BOOK REVIEW

A Course in Radio Fundamentals by George Grammer [Technical Director, ARRL, and Technical Editor, *QST*, (retired)]. Published by ARRL, 184 pages, over 200 illustrations, *QST* format. Obtainable from RSGB, 35 Doughty Street, London WC1N 2AE, price £1.15 post paid.

This popular book achieves its independence in the present edition. Thirty years and five editions ago it was developed from a series of articles in *QST*, and in later years it used *The Radio Amateur's Handbook* as a basic text.

The functions of a regularly progressing handbook and a fundamental educational course are sufficiently dissimilar to make this increasingly undesirable, and the *Course* has now been entirely rewritten, modernized, and expanded in scope and length, to almost double its previous size. It is concerned with principles and not with applications.

The book is now a self-contained study manual, with exercise questions at the chapter ends, and answers. Descriptions of simple practical experiments to be conducted for a fuller understanding of the lesson material are included, and the apparatus required is simple and either available or easily obtainable.

The treatment is of "intermediate technical level", and it is suggested that the novice "probably will benefit if, as a preliminary, he first takes the even simpler path offered by *How to Become a Radio Amateur* and *Understanding Amateur Radio*, and then later follows with this *Course*."

The reviewer agrees with this advice, because the pace must of necessity be faster and the manner concise, when such a broad field is covered; and this might be uncomfortable for the absolute novice. This is not to say that a reader who has a simple familiarity with elementary algebra and physics should have the slightest difficulty, but 26 chapters in 142 pages only gives about five or six pages to each subject.

The coverage includes electric and magnetic fields, simple dc and ac circuits, phasers, impedance matching, transformers, radio-frequency circuits, filters, feeders, valves, semiconductors, field-effect and bipolar transistors, amplification and amplifier circuits, feedback, and radio-frequency amplification.

The presentation is clear, skilful, and visually attractive, as one would expect from such an experienced writer.

The *Course* is strongly recommended to all those who want to establish, or refresh, their radio fundamentals in a sound, enjoyable way. T.P.A.

Tilting with the Stolle rotator

by R. A. HAM, FRAS, BRS15744

THE majority of vhf operators mount their 2m beams horizontally and adjust the azimuth position with some form of turning motor coupled to a direction indicator at the operating desk. While for most amateur radio activities such an arrangement is adequate, increasing activity in the field of auroral, satellite and meteor trail communication, frequently make it desirable to have control over the vertical attitude of the aerial as well.

Needing to pan and tilt a 2m array for astronomical work, the author investigated a suggestion by G3FEX that the Stolle rotator, marketed by J Beam Engineering, might be suitable for this purpose. An enquiry to J Beam Engineering to find out more about the shafting of the Stolle, and the possibility of mounting this rotator on its side and carrying vhf beams in this mode, brought the following reply from G8COB:

"The rotator could be mounted on its side and does allow a tube to go right through and extend either side, consequently it would do the sort of job you have in mind. But the proviso that our rotator expert has made is that all the slam of the wind will be taken on the worm gearing and the gear train in the rotator, consequently he recommends that the aerial should be balanced from the windage point of view and suggests that probably two 2/8Ys, one being either side of the rotator, might be about the limit, or such equivalent windage as you might prefer."

Fixing

Having found a suitable motor with which to tilt the aerial, the next problem was to fix it to the author's existing 2in mast, and reference to the J Beam pamphlet *Amateur Radio Aerials and Accessories* indicated that the 2in by 2in CP1 crossover plate would be suitable. The plate has two pairs of "U" bolts, but for this purpose one pair was removed and discarded, leaving the remaining pair to secure the plate to the existing serial support mast (Fig 1).

The next step was to drill four holes in the plate to align with the fixing studs on the rotator. These holes must be drilled in the opposite direction to the remaining "U" bolts so that the rotator can be mounted horizontally on the plate and bolted up to its shanks. *Note:* A small slot must be cut in the "side/edge" of the CP1 plate to let in the mast-end stop which is part of the rotator casing.

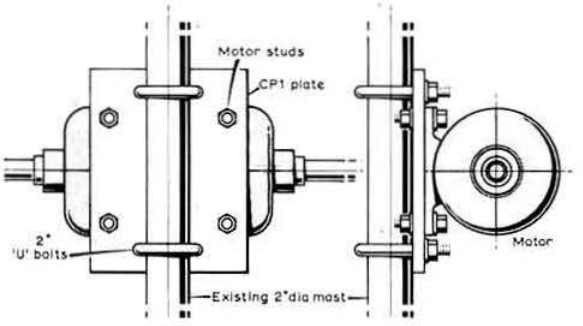


Fig 1. The Stolle rotator fitting on the mast

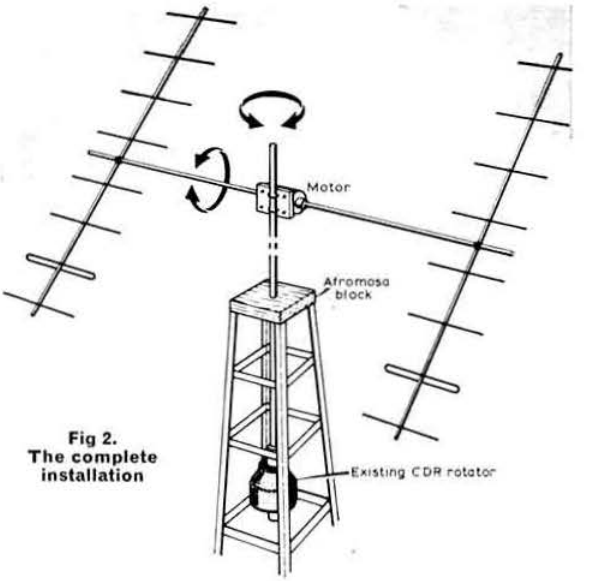


Fig 2. The complete installation

The mast protrudes through the top of the author's tower (Fig 2) and is driven in azimuth by a CDR (AR22) which carries the weight of the mast, and the sideways movement is taken by an afromosa wood block which is bolted to the top of the tower and drilled to let the mast pass through.

Having secured the rotator to the CP1 plate, one can now pass a 9ft by 1½in aluminium tube through the horizontally mounted rotator so that equal amounts protrude on each side, and when the tube clamps are tightened the rotator has a firm grip on the tube.

Aerials

The author decided to use two 8-element 2m Yagis (J Beam 2/8Y) as suggested by G8COB. Before fixing these two aerials, one on either side of the horizontal tube, it is advisable to find the balance point of each Yagi so that they can be secured to the tube at this point by the clamps provided with the aerials.

Final steps

Weather proofing. In the author's opinion it is necessary to fix a strong plastic bag around the rotator to protect the shaft bearings which become vulnerable to water when the rotator is mounted on its side.

Stolle control unit. The installation was adjusted so that the indicator on the "Memomatic" control unit points *North* for vertical and *East* for horizontal. In this mode, the triangular indicator will show the vertical attitude of the aerial.

Important note

The reader must bear in mind that this is an experimental project and that the Stolle rotator is not being used in the way the manufacturers intended.

Intense radio aurora

by Professor M. Harrison, G3USF,

from an original manuscript prepared by C. E. Newton, G2FKZ. for the RSGB Scientific Studies Committee

THE demodulated hiss of Tone A cw and the rusty rasp or ghostly whisper of auroral sideband are perhaps the most distinctive of all propagation effects at vhf. Few operators are in on so many events that they become blasé about them and, not surprisingly, at the sound of that characteristic burble or buzz-saw note most are happy to hook what dx they can and leave the physics of the event to look after itself. But not only is radio aurora a highly complex phenomenon about which professional research workers still have much to learn, but at the purely practical level it is clear that an imperfect understanding of the dynamics of radio aurora causes many operators to fail to make the best of the opportunities open to them for dx.

In the *VHF-UHF Manual* there is a succinct summary of the genesis and development of radio aurora, and the purpose of this article is not to restate that account but discuss it in the light of actual auroral contacts reported to the RSGB Scientific Studies Committee. (Unless otherwise stated all propagation references relate to the major event of 8 March 1970) [1]. Some ways in which our earlier understanding should now be qualified will be seen and some intriguing dx possibilities noted.

Auroral geometry

Condensing the *VHF-UHF Manual* version somewhat brutally, the conditions for auroral propagation at vhf are:

(a) The existence, as a result of solar disturbances, of ionized patches (field-aligned scattering centres) of sufficient intensity to sustain back-scatter at, say, 144MHz. The assumed height of these patches is 100–120km in the E layer.

(b) These scattering centres are aspect sensitive. Thus, the radio ray must meet the earth's magnetic field at, or very close to, 90°. (Putting it somewhat crudely, if one visualizes the ionization as existing in the vertical plane, then the signal radiated along line-of-sight must strike it within the range $90° \pm 6°$ if the power loss is not to preclude a successful return). The optimum orthogonal 90° condition is also known as the line of specular reflection.

Taking first the simpler case of co-sited transmitter and receiver, Fig 1a shows for Stuttgart the area of sky from which auroral back-scatter is possible, for a layer height of 110km—given, of course, the requisite ionization. The zero line represents the optimum condition where the radio wave and the earth's magnetic field are at right-angles and thus perfectly field-aligned. The other lines mark variations in aspect angle from orthogonality (−2°, +2°, etc). The minimum northerly range for specular reflection from this location in 1970 was thus 208km (the exact distance varies over time with changes in the earth's magnetic field) and

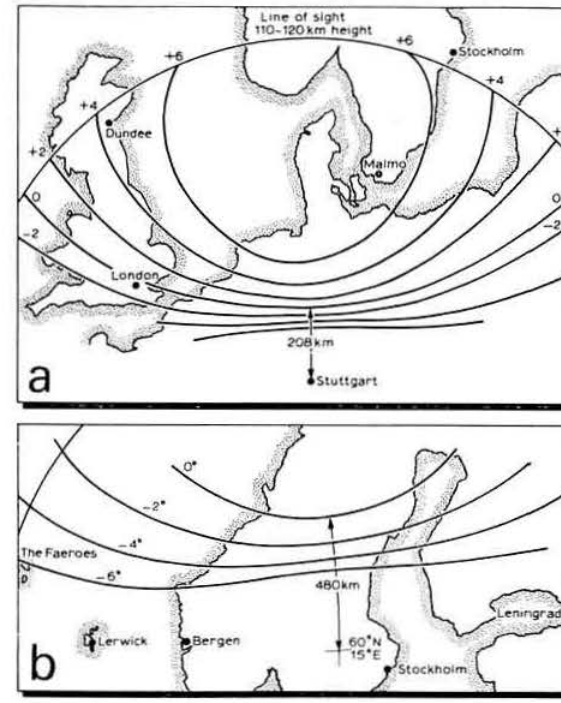


Fig 1. (a) Plan field pattern for Stuttgart, 1970; (b) Plan field pattern for 60°N 15°E, 1970, as calculated by G3NAQ

the maximum range about 1,250km, the line-of-sight limit for a ground station and a layer height of 120km. The comparable geometry for any station varies according to its geomagnetic location. Fig 1b for a site in southern Sweden shows how great this difference can be.

Thus each station has an arc of sky from which it can hope to receive auroral returns; this is called its plan field orientation pattern. For bistatic working, with transmitter and receiver on separate sites, auroral ionization with appropriate field alignment must occur in the area where the plan field orientation patterns of the two overlap. (For an actual illustration see the *VHF-UHF Manual*, p214.)

From this it would seem but a short step to producing a map of Northern Europe plotting the best geometry for contacts between any two specified areas. With such an aid, the operator in search of LX or SP5 would know roughly which beam headings to watch; all he would then need would be the ionization! However, although Dr G. M. Grayer, G3NAQ, succeeded in outlining such a map after a considerable deployment of energy and computing assistance, comparison with observers' reports of actual contacts showed that while the fit was reasonable for weak auroras, it was much less satisfactory for an intense aurora such as that on 8 March 1970.

Propagation problems

Consider, for example, SM3AKW's contacts with G, GW and PA0 on a heading of 265° (Fig 3); these appear incompatible with both a direct path and with the ionospheric geometry discussed above. Again, on 21 April 1970, SWL

Heinz Stelberg of Koegniswinter, who had been taking LX1SI on an orthodox heading of 330–350° early in the event, found this station peaking due west at the close. (Such examples encourage speculation that an adventurous operator might land prime dx by exploring directions conventionally thought hopeless: thus, by analogy with SM3AKW, is it conceivable for, say, PA0s or Gs to reach into EA, CT or south-west France by pointing their beams westerly?)

Occurrences like this do not lead us either to dismiss them as freaks or to abandon our previous understanding of auroral propagation. However, we shall have to accept that it is a highly complex phenomenon [2]. It now seems clear that there are several types of aurora: B1 diffuse, B2 short-discrete, B3 long-discrete, and quite likely more than one production mechanism. To summarize starkly a debate which is far from resolved, it is widely thought that the ion-acoustic wave instability theory illustrated in the *VHF-UHF Manual* explains B1 aurora, but it less happily explains types B2 and B3, for which other plasma instabilities may be responsible. The possibility of alternative mechanisms producing aurora with aspect-sensitivity characteristics different from the *VHF-UHF Manual* model must, therefore be kept in mind.

Returning, however, to the two-stream ion-acoustic wave instability explanation, recent work suggests that during auroral events the auroral electrojet currents are sufficiently intense both to change locally the direction of the magnetic field by several degrees and to increase substantially the maximum feasible deviation from orthogonality. Consequently, deviations of $\pm 10°$ from the perpendicular are theoretically acceptable, and observed deviations of up to 20° have been recorded. Other recent work demonstrates that losses are as low as 1·3–1·5dB/degree of deviation from perpendicularity for the interval 4·5°–19·5°, as against some earlier measurements of 10dB/degree *for certain events*. It must be borne in mind, however, that the bistatic work from which these comments are drawn was at 40–50MHz and its applicability at 144MHz is uncertain. All that can be said

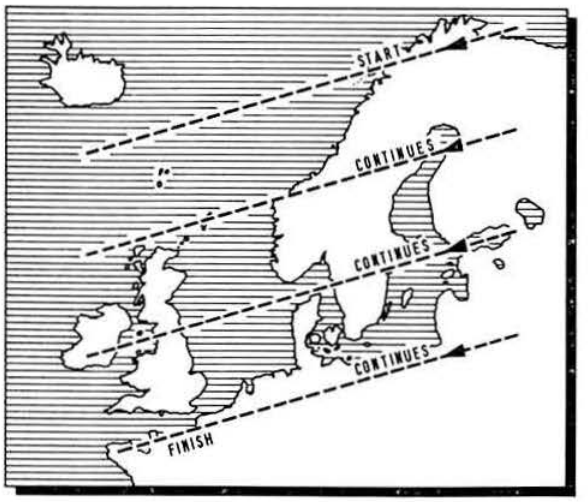


Fig 2. Apparent "spiral" drift of aurora across Northern Europe

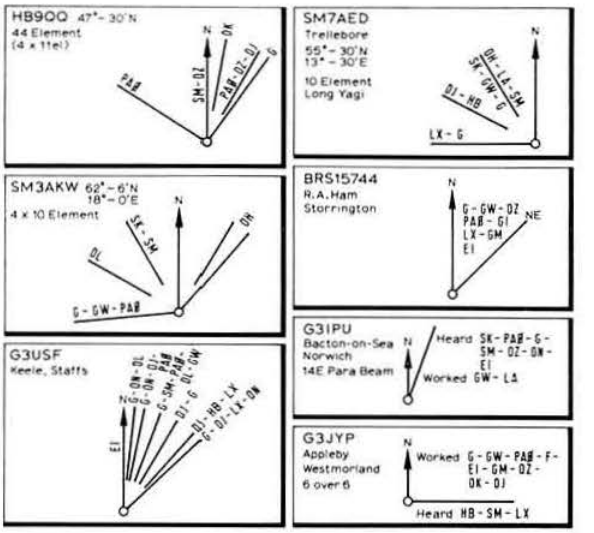


Fig 3. Specimen beam headings reported by operators on 8 March 1970

with safety, therefore, is that in auroras of the *VHF-UHF Manual* type, perpendicularity remains the optimum, but the limits imposed by ionospheric geometry may not be as stringent as previously thought. The arc available to any station may be broader than was hitherto believed during the more intense events, while the plan field orientation pattern will vary slightly if there is bending of the earth's magnetic field.

A different problem is set by HB9QQ's contacts with DK1KO (Figs 3 and 4) on a "direct" 010° heading, with strong signals early in the event, then with weak ones at the end. (And with his 44-element stack HB9QQ is not a man to make a mistake where his rf is being fired.) Another problem arises from SP9FG's tentative identification of GI5AJ at a range of 1,850km from Kaspowvy—well beyond the theoretical line-of-sight range. Similarly on 24 April 1970 G3LTF contacted UR2UQ via aurora.

This group of problems can be considered briefly. The HB9QQ/DK1KO contact is attributable to conventional back-scatter in the first instance, when auroral ionization lay to the north of both stations, but the later contact, coming when the ionization had moved well south is tentatively identified as due to forward-scatter from somewhere near the midpoint between the two stations. On the other hand, the G3LTF/UR2UQ and SP9FG/GI5AJ contacts may perhaps be explained by increasing the height of the back-scatter centre. This is confirmed by the beam headings used, and the auroral characteristic of the signal. In plotting a number of these super dx paths it appears that either the UK station covers most of the distance well beyond its line of sight at 120km height and the Continental covers a relatively short distance slightly north-westerly, or it is a mirror image of this with the Continental making the long haul.

However, possible auroral Es must also be noted. Though familiar enough on 10, 6 and 4m, auroral Es has not, in the author's knowledge, been finally confirmed on 2m. Even though data has been collected from all over Europe since the IGY (1957), only three reports of vhf auroral Es have

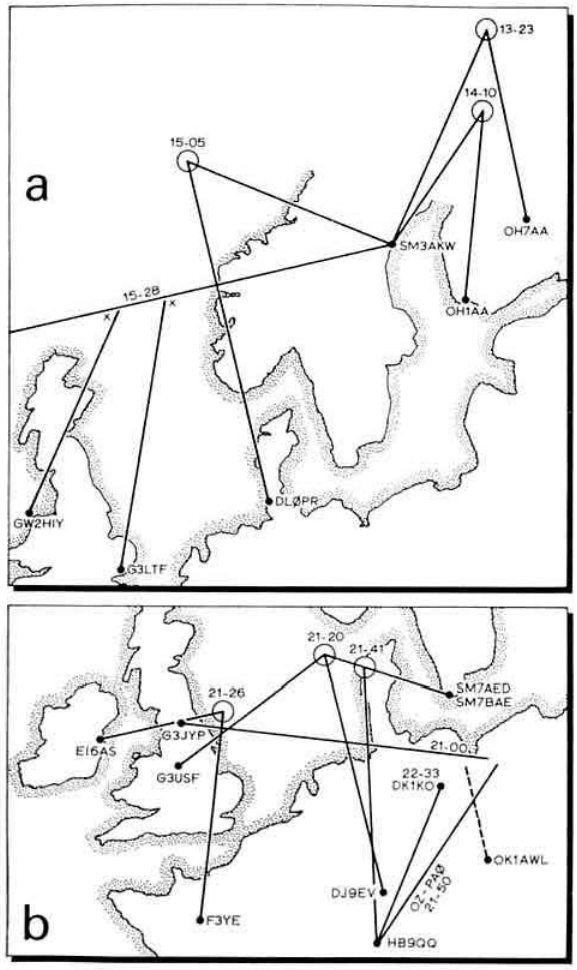


Fig 4. Beam headings (a) towards the start of the event and (b) towards the close (x indicates approximate bearing)

been received; in each case it was reception of Polish tv and occurred between the afternoon and midnight phase of the aurora. Yet, since conventional Es occasionally reaches 2m, and auroral back-scatter echoes have been reported up to 1,000MHz, rare appearances of auroral Es on 144MHz should cause no surprise. Its outer range would be about 2,000km, with an optimum hop around 1,600km. Thus, in addition to making contacts by the traditional back-scatter mode, the 2m operator should be alert for the possibilities of both forward-scatter and auroral Es, with the latter promising the best dx of all.

Indeed, auroral events may well produce still more unusual propagation—such as W2BOC's reports of strong 50MHz signals propagated, single-hop, 1,500–2,500 miles over a wide variety of North American paths around 2000–2200 local time during intense auroras. This is, of course, well beyond one-hop Es range. Perhaps someone will watch Band I tv and the European fm band during future auroras to see if W2BOC's observations can be replicated here.

Auroral motion and dx working

Though every aurora is unique, there are characteristic patterns. Thus the weaker or diffuse auroras known mainly to GMs seem to move little and slowly. The progression of the intense event of 8 March 1970 was different but equally familiar. Such an event typically opens suddenly in the north-east early in the afternoon and moves slowly southward in a spiral motion. During this gradual unwinding the field-aligned scattering centres move from east to west. Fig 2 conveys this process impressionistically. Any particular blob would take roughly two hours to cross the map—though it is doubtful whether it would last that long. Typically also there is an afternoon and an evening phase (cf Fig 5), and during each phase there are curious pauses lasting perhaps 10–15min during which, apparently, auroral propagation stops right across Northern Europe. (This is the moment when operators may well conclude all is over, pull the switch—and miss the best dx.)

As an aurora moves, dx possibilities vary steadily. This is best illustrated by SM7AED at Trelleborg on the southern tip of Sweden, who began with OH2, LA, G and PA0, later found OH1, SM5, PA0, GW, G and DL7, and finally moved to SM5, SM4, SK6, LX, G, HB, SM5 and DJ. Figs 4a and

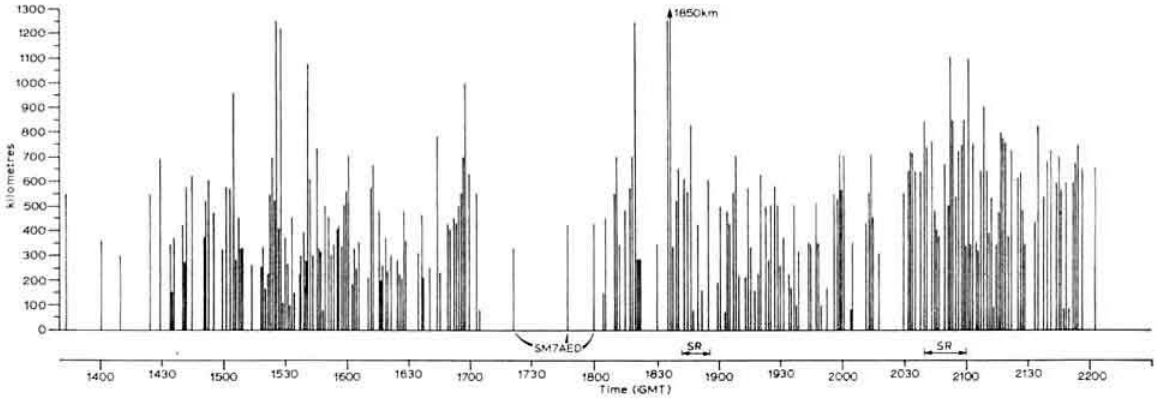


Fig 5. Times and distances for all heard or worked signals used in the survey. Note the pauses and the bunching of the longer range contacts. The SR sections are as recorded by Sheffield University radar to the north-west of them

4b show characteristic working patterns in the early and later stages in the same event.

Auroral motion explains why, although the GMs have relatively frequent weak auroras, they lose out on some intense events; ionization moves too far south for them in the middle and later phases. GM3UAG (Banff) commented shrewdly: "If I see a faint glow in the distant horizon, then it is a night of aurora. But if it is a bright manifestation overhead, I switch off and go to bed." And, in fact, there were strikingly few GMs in the reports of the 8 March 1970 aurora. Experience suggests that the most favoured UK operators live between London and the Scottish border, for they may hope to keep aurora within range right through its southerly unwinding. Fig 3 shows the actual beam headings used by several operators, tending to confirm that most UK stations can look well to the east of north, particularly for long dx runs. (G3JYP (Appleby), blocked by hills to the north-east, took a chance on beaming due east and had his reward.) Thus for most UK operators, beams should be more northerly early on—for SM, LA or OH, but later the beam may well have to come round more to the east until, if the aurora lasts long enough, OK, HB or F may be found nearly due east.

Timing

The incidence and timing of auroras has been admirably documented by LA2IM, who watched SK4MPI at 550km from his QTH 70km west of Trondheim during 1970. As Fig 6a shows, signals were received during 71 days, with peak incidence during the autumn in the period round 1600 and 2100gmt. LA2IM's observations were compared with Lerwick geomagnetic data by G3LTP for solar rotations 1,556–1,569. It would appear that radio auroras are delayed for six hours against the geomagnetic variation, though the expected difference between Lerwick and LA2IM's QTH would be only about three hours. Here is a matter which would repay further investigation.

But the need for further investigation is the recurrent theme of auroral propagation. The progress of our understanding is ultimately dependent on the number and quality of reports available to the Scientific Studies Committee. Reports of almost all abnormal vhf phenomena during and around auroras are needed: beacon reports, unusual happenings on the tv or fm channels, possible instances of

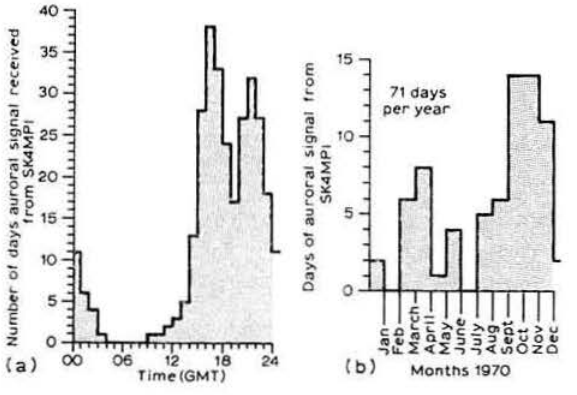


Fig 6. Reception of SK4MPI at LA2IM, 1970

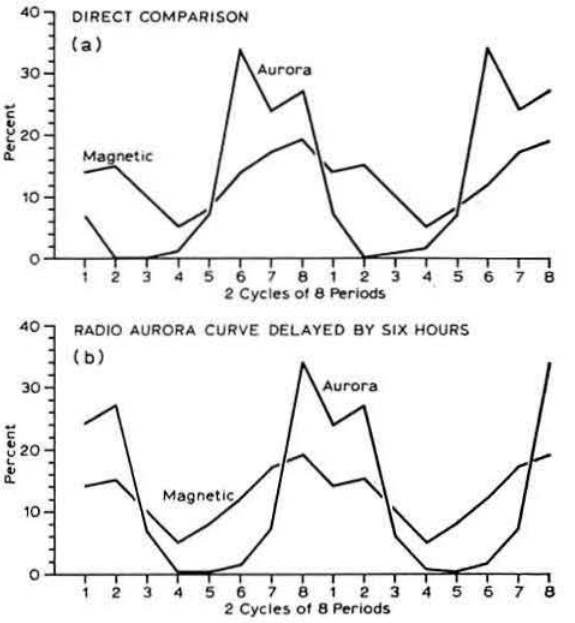


Fig 7. Comparison of LA2IM's results with Lerwick geomagnetic data

forward-scatter or auroral Es—or simply apparently inexplicable happenings. Plus, of course, reports of conventional auroral back-scatter signals, both heard and worked (and here is a chance for SWLs, unflurried by the chase for the elusive OK QSO, really to show their value). But to be useful, reports *must* be precise, detailed and accurate, particularly in stating *time and beam headings*. Regrettably, many of the observations reaching the SSC are diminished in value through their imprecision. Best of all, before the next aurora secure a supply of auroral report forms, obtainable on request from RSGB headquarters. Though much can be learned from the professionals, there are aspects of aurora to which as yet they have paid little specific attention (such as bistatic propagation at 144MHz), and others where their radar echo techniques can throw little direct light on amateurs' problems. In short, in many respects amateurs are on their own—and as this article has surely shown, they still have a great deal to learn.

References

[1] For an earlier report on this event see "The auroral opening of 8 March 1970" by R. G. Flavell, *Radio Communication*, September 1970.

[2] These comments draw on the following sources:
Farley, 1963 *J. Geophys. R. 68*, 6083.
Hoftee & Forsyth, 1972 *J. Atmosph. & Terr. Phys. 34*, 893.
Knox, 1972 *J. Atmosph. & Terr. Phys. 34*, 747.
McDiarmid, 1972 *Can. J. Phys. 50*, 2557.
McDiarmid & McNamara, 1969 *Can. J. Phys. 47*, 1271.
Moorcroft, 1972 *J. Geophys. R. 77*, 765.
Morgan, 1966 *J. Atmosph. & Terr. Phys. 28*, 1233.
Unwin & Knox, 1971 *Radio Sci. 6*, 1061.

An integrated circuit speech compressor

by A. LANGTON*

SPEECH compression is the process by which the dynamic range of a signal is reduced. Most transmitters are adjusted so that they do not exceed 100 per cent modulation on speech peaks—these can be about 20dB above the mean level—and this results in the transmitter working inefficiently. A compressor will reduce this range to about 2 or 3dB, making it possible to set the modulation level much higher without fear of overmodulating, and this can have the same effect as increasing the power of the transmitter 10 or more times.

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The compressor described below uses an audio amplifier with automatic level control, and the input attenuator is voltage-controlled by rectified audio from the output of the amplifier. An integrated circuit was chosen for the amplifier, to simplify construction and ensure repeatability of results; the device used was a General Electric PA237, in a circuit described in the manufacturer's application note. It was selected for its low output impedance and high peak current capability.

Circuit operation

The diode D1 rectifies audio and charges C7, which discharges through R9 and controls the fet via R10. In order to have a fast attack time and to work on sudden speech peaks the charging time constant must be very small, and this is the reason for using a power amplifier with a low output impedance. The diode also has a low resistance, which helps in this respect. The decay time is made much longer to hold down noise between syllables.

The voltage-controlled attenuator, consisting of a fet shunted across the input of the amplifier, acts in conjunction with R1 as a potential divider. When the fet is turned off, the system behaves as an ordinary amplifier with a gain of 24dB. When it is turned on fully no further decrease in resistance takes place and the system functions again as a

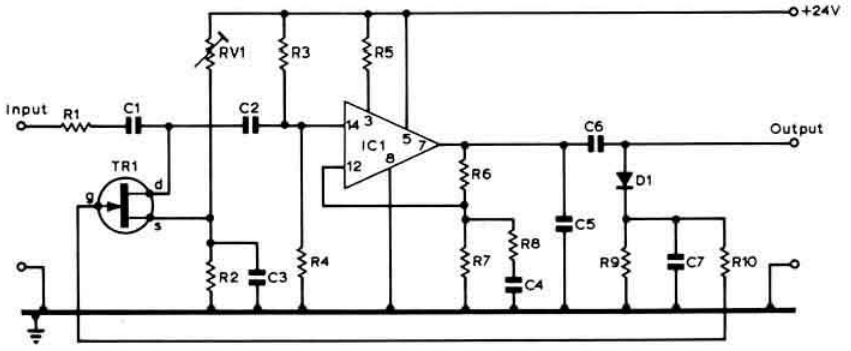


Fig 1. The complete speech compressor. TR1 acts as a variable attenuator to the system, being voltage-controlled by the rectified audio output from IC1. Compression ratio is set by adjustment of RV1

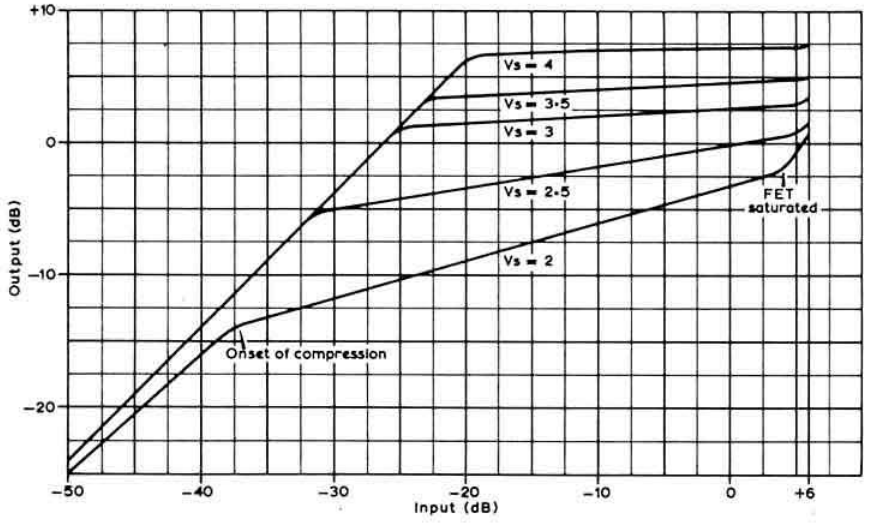


Fig 2. Compressor response curves for different settings of fet source voltage (controlled by RV1)

straight amplifier with a gain in the region −6 to +4dB, depending on the selected compression ratio. It will handle an input with a range of −20 or −30dB to about 0dB, again depending on the compression ratio. The compression ratio itself is varied by adjusting the source bias voltage with RV1, (see Fig 2). The onset of compression can be altered by varying the gain of the amplifier, by changing the value of R8. Total harmonic distortion with 0dB input is about 2 per cent.

A selection of MPF103s was tried in the prototype and all gave similar results, although requiring slightly different source voltages to achieve the same compression ratio. The current consumed is about 20mA when working into a 600Ω load. If a band-limiting filter is used, it should be connected to the output of the compressor, or else the action will reduce the effectiveness of the filter.

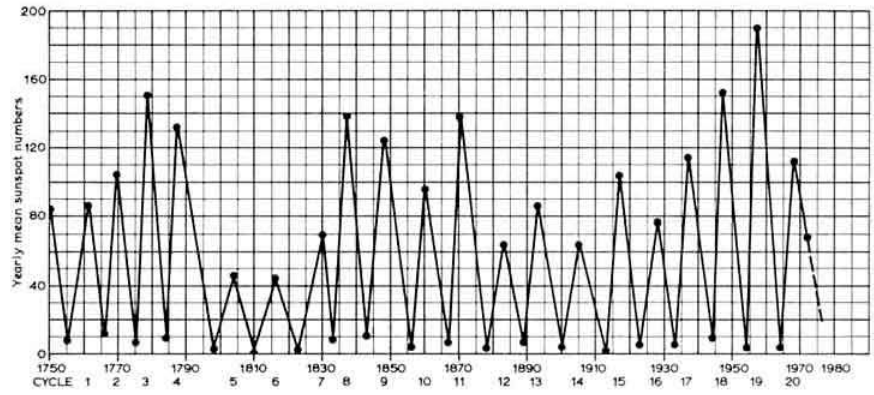
Component list

R1 47kΩ 2% m/o ¼W
R2 1kΩ 10% carbon ¼W
R3 680kΩ 2% m/o ¼W
R4 56kΩ 2% m/o ¼W
R5 18kΩ 10% carbon ¼W
R6 330kΩ 2% m/o ¼W
R7 56kΩ 2% m/o ¼W
R8 6·8kΩ 10% carbon ¼W
R9 220kΩ 10% carbon ¼W
R10 100kΩ 10% carbon ¼W
RV1 22kΩ
C1, C2 0·22μF 63V
C3 10μF 10V
C4 0·22μF 63V
C5 0·1μF 150V
C6 10μF 100V
C7 1·5μF 100V
TR1 MPF103
IC GE PA237
D1 OA10

Improvements under investigation are the use of a chopper fet to increase input range, a simpler ic to reduce the number of components, and a lower voltage system for portable/mobile work.

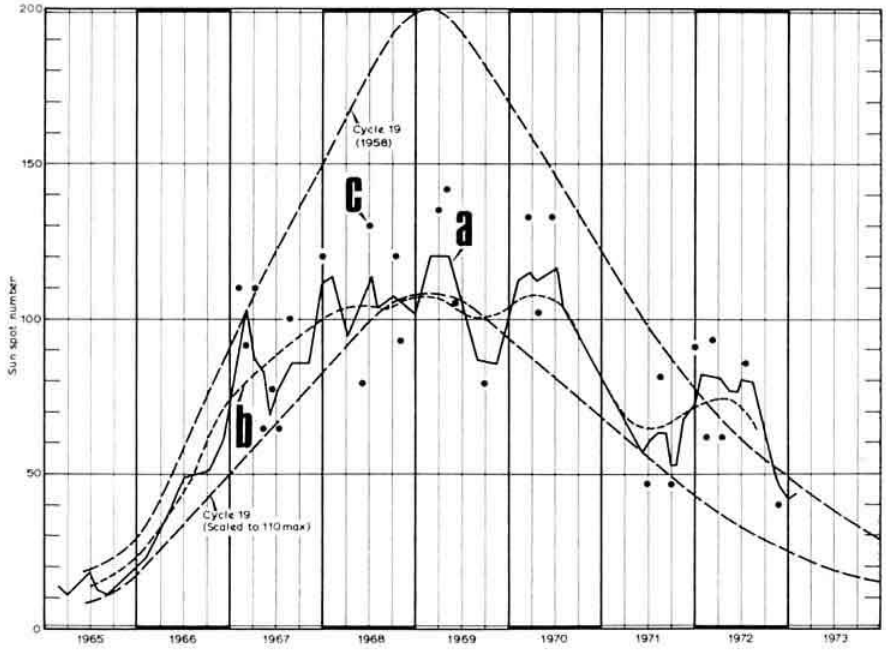
SUNSPOT RECORDS

This diagram shows the maximum and minimum sunspot values for each cycle since records were kept. It is interesting to note that there is an outline indication of maximum and minimum cycles each themselves comprising several complete individual sunspot cycles



Solar Cycle 20, now well on the way to its minimum, has shown an unusual degree of variation. The curve "a" shows the variation of the three-month-mean sunspot number, based on the provisional Zurich numbers published monthly in *Radio Communication*. This gives a better idea of the actual variation in radio conditions than the more usual twelve-month mean (curve "b"). Curve "c" shows the more extreme of the monthly variations.

Note the long period during which the ssn was above 100 and the "Indian Summer" in 1972 during which conditions were actually better than in the corresponding year of the very much higher Cycle 19



(Original curves supplied by F. M. Smith, G8KG)

TECHNICAL TOPICS

by PAT HAWKER, G3VA

Technical Topics can claim to be a column which has consistently, for a number of years, drawn attention to the possibilities of long-distance vhf communication offered by supermode and the associated transequatorial propagation. We were, therefore, extremely interested to learn from the editors of *Television* that this year has already brought forth two confirmed reports of the reception in the UK of Rhodesian television pictures (Channel E2 about 50MHz); on April 24 and May 24.

The transequatorial path between Rhodesia and Cyprus is of course well known, thanks to the pioneer work of R. G. Cracknell, ZE2JV. How is it that this path has extended as far north as County Durham? The answer could well be a happy combination of transequatorial propagation with sporadic E, the signals possibly reaching North Africa by chordal hop F2 and then making the final journey up to the UK during the many sporadic E openings that have been evident this year. That, of course, is still speculation—what seems certain is that the signals were received—and for quite long periods.

Digital ssb mixer

The basic problem of mixing is the very large number of unwanted products that are produced. A considerable reduction is possible using a balanced mixer; and a further series of unwanted products eliminated with the double-balanced configuration. But even with the double-balanced mixer the upper and lower sideband frequencies (ie f1 $\pm$ f2) will be produced,

In the days when amateurs used mixers only in small numbers in receivers and never in transmitters this was probably not of much practical significance, although even then it meant that care had to be taken to reduce the susceptibility of receivers to spurious responses. But it is a major problem when thinking about various forms of frequency synthesis and use of mixers in ssb transmitters. A system of mixing which would provide a choice of either upper or lower sideband product would clearly have many advantages. Unfortunately, conventional types of single-sideband mixers are relatively difficult to implement, although of course this is in effect what is done in a phasing type ssb generator except that here one of the signals is at audio frequency.

In a letter to *Proc IEEE*, April 1973, pp 478-9, C. C. Counselman and H. F. Hinteregger describe a simple method of digital ssb mixing, using well-known ttl logic ic devices and with no reactive or frequency selective analogue circuit elements. This is claimed to generate an output signal at either the sum frequency, f1 + f2, or the difference frequency, f1 − f2. The writers add: "The output signal generated by this method has a three-level waveform (negative/zero/positive) which is perfectly suited for driving conventional linear mixer applications, for example to drive a phasing-type linear mixer."

Fig 1 shows what the writers call one form of this digital technique. In this version, quadrature square waves are generated at frequencies f1 and f2 from original single-phase inputs at *double* these frequencies. Quadrature ssb output signals are generated by mixing and adding the appropriate phases in a manner resembling the analogue phasing technique. Exclusive-or logic gates (that is gates in which the output assumes the "1" state if one and only one input assumes the "1" state) are used as the digital mixers. It is stated that the strongest undesired component in the output is at the frequency f1 + 3f2 and even this is 10dB down on the desired output. Further, the digital mixer can be followed with a phase-locked loop (implemented in either digital or analogue form) whose oscillator can be made to lock on the desired output frequency and no other.

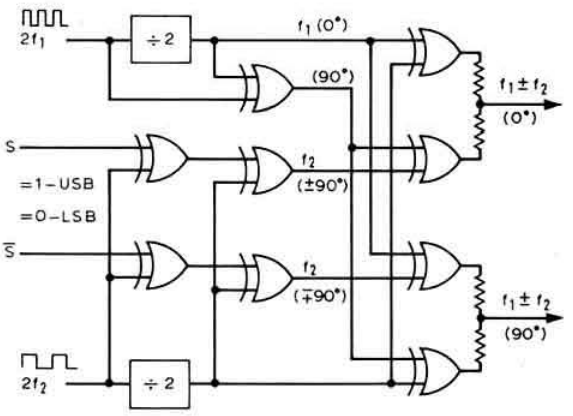


Fig 1. Digital ssb mixer using two-input exclusive-or gates. Either upper or lower sideband output may be selected by setting logical inputs, s and $\bar{s}$ to 1 and 0 or 0 and 1 respectively. Input square waves switching between levels 0 and 1 at frequencies 2f1 and 2f2 are converted to quadrature wave pairs at f1 and f2 by flip-flops (divide-by-two) and exclusive-or gates although many other means may be used to generate quadrature waves at these frequencies. Frequencies (and phases) are indicated in some cases with two signs, upper and lower, corresponding to s = 1 and s = 0 respectively. Outputs are derived by averaging together resistively the outputs from pairs of gates. The output waveform thus has three levels, corresponding to logical 0, 1 and midway between (*Proc IEEE*)

It appears that this novel digital ssb mixer has been used in special-purpose doppler-tracking ssb receivers for the NASA space-tracking network. With f1 about 10MHz and f2 between 0·5 and 3MHz, low-cost industrial ttl digital devices proved entirely suitable. The writers consider that ssb frequency conversion can be accomplished for many applications much more efficiently with simple digital circuitry than in the usual way with complicated linear frequency-selective filter and phasing circuits. A further indication of the way that digital circuit techniques are likely to creep into communications equipment.

Varistor improves agc performance

Several circuit ideas of interest to amateurs are to be found in the "Designer's Casebook" section of *Electronics* (21 June 1973).

For example, M. J. Salvati indicates that the addition of a varistor—that is a resistor whose value falls off rapidly when the voltage applied across it increases—to the agc circuitry of a communications receiver can provide a simple but effective means of improving performance. Fig 2 shows how this is used to provide a voltage-divider network made up partly of a fixed resistance and partly of the varistor connected between the agc rectifier and the agc-controlled rf amplifier stage. This means that the percentage of the agc voltage that is applied to this stage will vary according to the level of the control voltage. For weak signals the rf amplifier is virtually unaffected by the agc line, since the percentage applied to this stage can be made very low: but as the agc voltage increases and the effective resistance of the varistor decreases, much more of the control voltage will be applied to the stage.

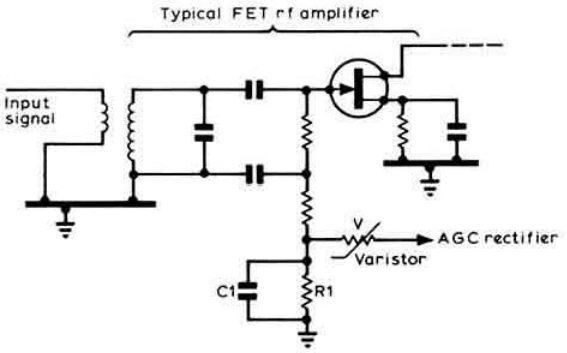


Fig 2. Varistor agc system providing the advantages of delayed agc without abrupt discontinuities, enhancing receiver sensitivity and improving output-signal levelling (*Electronics*)

The "varistorized" agc system thus provides the benefits of delayed agc (or manually switching off agc on weak signals) with no abrupt discontinuity in control characteristics. Clearly the operation of the system depends on ensuring that the resistance of the varistor will drop to a suitably low figure on strong signals so that most of the agc voltage appears across R1, while at the same time arranging that the varistor's resistance is high with weak signals. The resistance values of the varistor and R1 are selected so that the varistor is about half the value of R1 when the agc voltage is at maximum. The actual values depend on the signal levels available at the agc rectifier. In general, it is stated, R1 will be about 2MΩ for valve receivers and about 100kΩ for semiconductor receivers. Since the time constant of the agc filter formed by the varistor, R1 and C1 changes with signal level, the value of C1 has to be chosen for adequate filtering of modulation variations when the resistance of the varistor is half the value of R1.

It is claimed that when included in all the controlled stages (along with the rf amplifier stage) of a semiconductor receiver the technique can improve receiver sensitivity by 3dB, halve the decibel change in receiver output for a given change in input level, and increase the receiver's absolute output level by 8 to 12dB.

Regulated power supply

Also from the same source comes a suggestion by Glen Coers for regulating high voltages with low-voltage zeners without the now customary op-amp technique. In the example described, Fig 3, a 200V supply is maintained within 1V for outputs between 0 and 100mA, and the regulated output can be adjusted between 50 and 250V. A 1N970 24V zener is used as the reference source. It is pointed out in *Electronics* that the arrangement is particularly useful where an op-amp ic would introduce unwanted complications, such as the need for low-voltage positive and negative supply voltages. The system depends directly on the 300V unregulated supply. The fet TR1 allows R1 and R2 to have high values so that output loading is kept to a minimum and low-wattage resistors can be used.

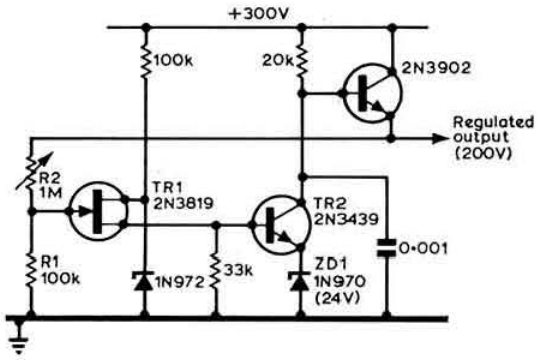


Fig 3. Arrangement for regulating high voltage outputs between 50 and 250V with typical regulation of 0·5 per cent. Reference voltage is supplied by the 24V zener diode. The field-effect transistor allows high-value low-wattage resistors to be used for R1 and R2, reducing loading (*Electronics*)

Variations on folded dipoles

The hf folded dipole has lost a good deal of its former popularity since the advent of multiband dipoles. In some ways this is rather a pity since the folded dipole possesses a number of significant advantages over the higher-Q single-wire equivalent. Inherently it is a decidedly wider-band aerial and can almost always be depended upon to work efficiently when cut to formula dimensions without the need to trim to resonance in situ. This applies to a marked degree for different heights or in different conditions of screening, or where it is necessary to bend the aerial into odd shapes, or to operate it with the ends hanging down in a restricted space. It is also very easy to check the state of any connections and joints by means of a simple continuity test. Both the element and the feeder can be conveniently made from 300Ω ribbon or tubular feeder.

For a number of years we used a version of the folded dipole which has long appeared in *Radio Handbook*—in which 300Ω line is used for the element but with account taken of the velocity factor of the ribbon: see Fig 4. This minor modification is always stated to allow a ribbon-type aerial to retain the good bandwidth characteristics of open-wire construction, and certainly we never found any reason to doubt the validity of the claim. The system was mentioned many years ago in *TT* (and can be found in *ART*)

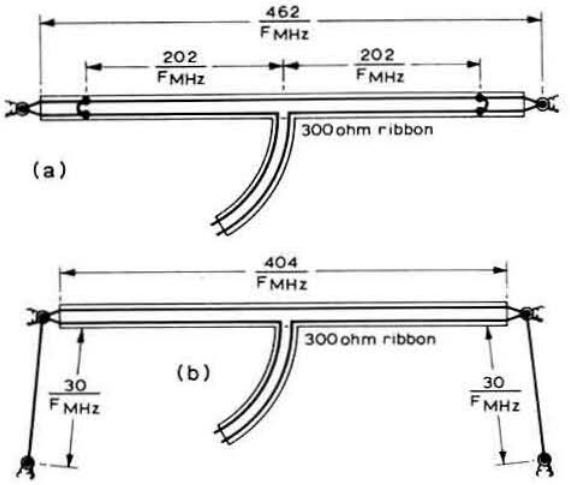


Fig 4. Use of shorting straps to improve match and bandwidth characteristics of folded dipole aerials made from 300Ω ribbon feeder. Shorting point represents the velocity factor times the dipole length from centre. (b) shows a basically similar system with ends bent downwards (*Radio Handbook*)

but there still seem to be many amateurs who are unaware of the system.

A further excuse for republishing this variation of the standard folded dipole is that it provides a useful introduction to yet another little-known variation: the "double coaxial" folded dipole.

The double-coaxial folded dipole

The double-coaxial aerial is not a new concept, but it is little known, and a timely reminder has recently been published in *73 Magazine* (May 1973) by John Schultz, W2EEY; and D. Ross Webster, K6WM, was kind enough to bring it to our attention. In this system, in effect, the 300Ω ribbon of Fig 4 is replaced by lengths of coaxial cable, and the velocity factor becomes 0·66 rather than 0·82: see Fig 5. There is also the difference that the inner and outer conductors are no longer the same, and this affects the feed impedance. It is claimed by W2EEY that this form of construction provides a good match to a 52Ω coaxial feeder, and further that because of the stub action of the lengths of coaxial in the aerial element there is no requirement for the use of a balun. In other words one finishes up with a dipole aerial that retains the advantages of a folded dipole but suitable for use with coaxial feeder. The

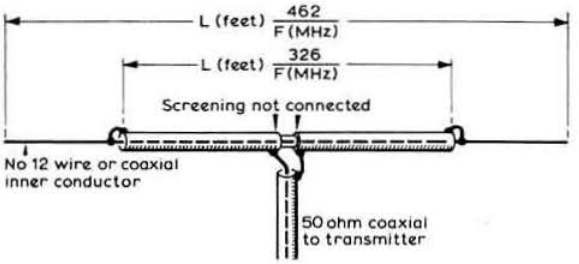


Fig 5. The basic dimensions and arrangement of the double-coaxial aerial (*73 Magazine*)

shield of eacn coaxial line section in the radiator is connected to the inner conductor only at the outer ends; the shield of each coaxial line section is not connected to the inner conductor at the centre of the aerial. The radiator sections can thus easily be formed from either a single piece of coaxial or, if required, by two pieces

In *73*, W2EEY provides a detailed account of why the aerial works and a good deal of advice on mechanical construction, but the details given here should be sufficient for anyone to give the idea a try. It is stated that the swr should generally be less than 1·5:1 over all hf bands except the wide American 3·5MHz band (3·5 to 4MHz). For 3·5MHz it is pointed out that bandwidth can be widened if necessary by using, for the non-coaxial sections, twin or multiple wires of slightly different length, left unconnected at the far end, akin to the ideas discussed in *TT* of March 1972.

The cocktail party effect

Often, when describing the use of sharp audio filters for narrow band cw reception, we have added a word of warning: the operational benefit may in practice prove a good deal less than might be expected from the theory This is because we bring to the receiver ears that can, with practice themselves provide extremely good selective filters. It is noted in *ART* for example that "the human ear can provide a 'filter' bandwidth of around 50Hz with a remarkably large dynamic range (well over 100dB) and the ability to tune from about 200 to over 1,000Hz and all without introducing 'ringing'." With such good "no-cost" filters the degree of improvement provided by additional electronic filters is limited.

This naturally raises a further question: are there not other ways in which we could use our ears to better advantage in eliminating signals we do not want to hear? Which brings us, as you may have guessed, to the so-called "cocktail party" effect. This has been described (for example in the book *Correlation Techniques* by F. H. Lange) as follows:

"If a large number of people are in conversation with one another in one room, it should in general be impossible to carry on a conversation with someone even in the immediate vicinity. Nevertheless experience teaches us that this raises no great difficulty—in fact quite the reverse provided that the listener is 'tuned in' to the partner and the subject of conversation. This implies, therefore, the existence of a tuning (modulation) mechanism in the human ear, certainly of another kind to that used in radio receivers since all conversations are using the same frequency range . . . the human ear achieves more than all the methods of analysis hitherto known . . . if there are any kind of peculiarities of the useful and the interference signal—functions or spectra—then the useful signal can be separated from the interference signal with the help of correlation analysis. Classical filter theory with its band-pass and rejection bands breaks down here."

Undoubtedly one of the ways in which we can separate wanted and unwanted signals is by means of apparent differences of direction, making use of the fact that we have two ears rather than one. Stereo- and more recently quadraphony are examples of how we can take advantage of the spatial characteristics of our ears. But in communications we are normally interested in what can be done with only one channel—and so at first glance it might seem that nothing can be gained from our ability to concentrate hearing in this way. Actually, this is not so—though electronically it involves some complexities.

Several years ago in *TT* (September 1969 and later in *ART3* and *ART4*) we referred very briefly to a special form of bi-aural demodulator which has been shown to provide a very high degree of interference rejection when used on double-sideband signals. More recently I described the principles in rather more detail (*Wireless World* November 1972, page 128) pointing out that the purpose of two audio channels is not to provide a stereo effect but rather to locate the wanted signal (which is contained in both sidebands) roughly mid-way between the two loudspeakers; whereas most forms of interference, where this relationship is unlikely to occur, will appear to be located to one or other side. A study of this system (Fig 6) by the CCIR is reported to have suggested that it provides an improvement of some 10 to 20dB, and in some circumstances the interference rejection improvement can be as much as 30 to 40dB. I have yet to trace a detailed circuit description of this system.

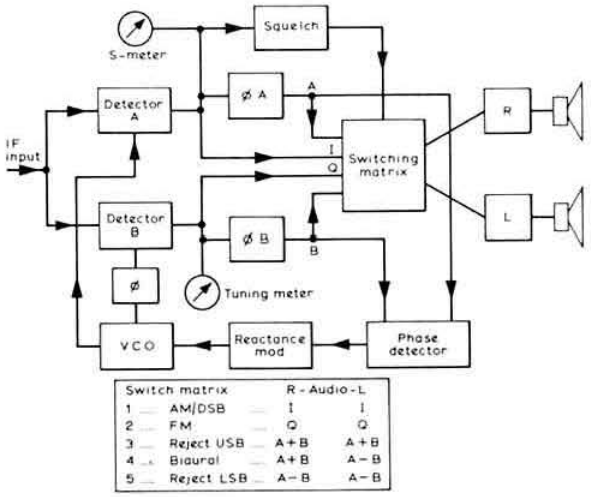


Fig 6. The bi-aural synchronous exalted-carrier detector as investigated by CCIR (*Wireless World*)

The "frequency-scissors"

However, publication of the outline of the bi-aural demodulator resulted in an interesting letter from Dick Rollema, PA0SE, who pointed out that this system closely resembles a system developed by Hans Evers, PA0CX, and described in *Electron* in January and February 1958. He called his system (Fig 7) a "frequentieschaar" or "frequency scissors" because by using phasing techniques he was causing the wanted signal to be split into two halves. PA0CX used a vectorscope to provide a good deal of information about what was happening to the received signal. The demodulator was used following the i.f amplifier of an R1154 receiver, and it was possible to feed the upper and lower sidebands to different halves of a pair of headphones to produce a form of pseudo-stereophony on signals affected by selective fading.

PA0SE vividly recalls a demonstration of the "frequentieschaar" given to him about 1959, and he was most impressed with its operation; for its development Hans Evers was awarded a prize from the "Veder Scientific Radio Fund", normally awarded only to professional engineers,

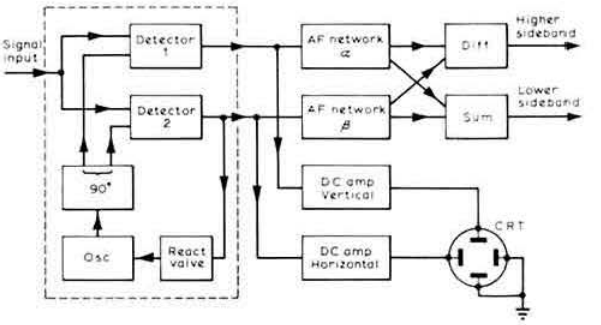


Fig 7. The "frequency scissors" detector developed in 1958 by PA0CX (*Electron*)

and thus became one of the very few amateurs who have ever been so honoured.

PA0SE feels that it might be interesting to reconstruct the system with modern components, even though today double-sideband signals have largely disappeared from the hf bands. He has translated several extracts from the original articles into English. One of these is as follows:

"*Black Magic*? As will be shown it is possible on an a.m. signal to feed the lower sideband to the left ear and the upper sideband to the right ear. On reception under normal conditions one observes nothing unusual; both sidebands provide exactly similar information. But if one sideband suffers interference from an adjacent channel signal then the interference is heard predominantly in one ear. If, for example, the interference is heard only by the left ear, then the interfering signal is lower in frequency than the wanted signal. Interference that sweeps over the band appears to 'pass through oneself' approaching from one side and disappearing towards the other. One has the feeling of sitting on a 'band' with other signals to the right and to the left.

"Moreover, if the wanted signal is interfered with by different stations on higher and lower channels—as often happens on the amateur bands—one hears the wanted signal with both ears simultaneously, while the unwanted sounds, although heard in both ears, are different. Sometimes a signal that has become unreadable due to interference from other stations in both sidebands can be read when listened to in this way.

"The effect is rather hard to describe. One has the feeling that the wanted sound is heard everywhere, but especially in the back of the head, while the interference is whirling around outside the headphones. If sounds are heard from different directions one can discriminate them better than when they come from one direction only. It is the only explanation I can think of for this remarkable phenomenon. During fading, phase-shifts and differences in strength between the sidebands can cause effects strongly reminiscent of real stereophony. One moment one feels the music shift through oneself and a few moments later one has more or less the feeling of being present in a large hall.

"Sometimes high notes seem to be coming from far away against a foreground of low notes, always changing in character. It often provides a curious sensation to listen in this way to a remote mf or hf broadcast station . . . The "frequentieschaar", however, is less effective for listening to stations which are being deliberately jammed. For if the

interference becomes too complex, it begins to resemble noise, and stereo reception gives but little relief . . ."

Remember that this is a translation of what PA0CX wrote in 1958 long before the days of pilot-tone stereo. His system closely resembles the later bi-aural demodulator and was built using two Dome audio phase-shift networks, an afc loop and, of course, entirely with valves. The full circuit diagram was given in the January 1959 issue of *Electron*, and included a built-in vectorscope.

Now, coming quickly up to date, a letter from Richard Harris, G3OTK, indicates that his mind has been running along comparable lines in wondering whether it would be possible to use stereo headphones to improve cw reception by generating some sort of synthetic stereo effect.

He writes: "When contest operating I prefer to use a fairly wide receiver bandwidth so that I do not miss stations calling me slightly off frequency; the penalty is the presence of more heterodynes, requiring greater concentration on the note to be read, and possible confusion when trying to identify the right signal by remembering the pitch when receiving again after an 'over'. If it were possible to 'spread' the notes out spatially, having perhaps the lower notes on the left and the higher notes on the right (so tying up with the physical direction of my receiver tuning) one would only need to concentrate on a signal of a particular tone in a *particular direction*, making it much easier to read. The only reference that I have to the directional characteristics of the ear is 'Towards true stereophony—a practical headphone system' in *Wireless World* September 1969, pp 423–4. This suggests that the ear appears to use phase differences below 500Hz and amplitude differences above 500Hz to determine direction. Electrically, this could probably be achieved for cw reception by carefully controlling low-frequency phase-shifts by means of 'all pass filters' and amplitude differences by high and low pass filters at high frequencies, bearing in mind that the hf filters will have some effect on the overall low-frequency phase-shift characteristic. Fig 8 is a block outline of such a system. A good reference to all-pass filters is the paper on phase-shift ssb generation in *Proc IRE* of December 1956. As a preliminary experiment I connected an af signal generator to my stereo amplifier and by adjustment of the bass and treble controls for each channel I have obtained a certain amount of spatial resolution. Unfortunately the phase characteristics at low frequencies were poor due to the type of tone controls. Perhaps members may find this idea of interest and be willing to develop it further since pressure of professional design work leaves me little time in which to develop the necessary circuits."

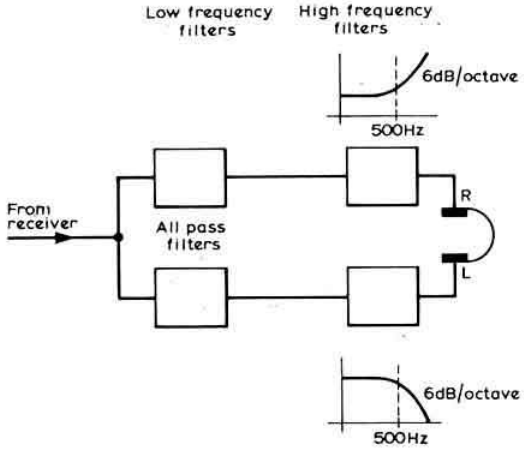


Fig 8. G3OTK's suggestions for providing "stereo" effect for cw reception

So there we are. The evidence is fairly conclusive that we could use the cocktail-party effect to copy signals better through interference, certainly on a.m., possibly on cw. But full benefit is not likely to be achieved without a good deal of careful investigation into the man-machine interface!

Testing unknown zener diodes

The following tip stems originally from Bruce Rahn, WB9ANQ, in *CQ* although we picked it up from *Electronics Australia* (April 1973).

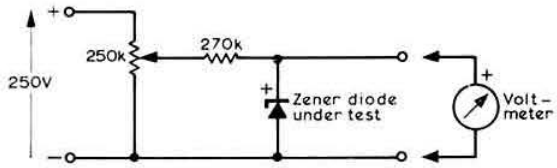


Fig 9. Method of testing unknown zener diodes

Fig 9 shows a simple method for determining the zener point of unknown zener diodes. All that is needed is a sensitive voltmeter, two ½W resistors and a 250V, low-current dc supply. The 250kΩ pot is used as a voltage divider and should be a linear type; the 270kΩ fixed resistor is used as a current limiter. The diode is placed in circuit with the cathode to the positive side of the supply. The voltage is adjusted upwards until the meter shows no further increase in voltage; the indicated voltage is then the zener breakdown voltage of the device under test. If the meter reads zero, the zener diode is short-circuited; if the meter just reflects the supply voltage, the diode is open-circuited.

Mains-connected-chassis precautions

The raising in *TT* (April) of the question whether mains-earth and mains-neutral leads should or should not ever be joined together resulted in informative letters from John Roscoe, GM4QK; J. I. Parking, G8CRK, and R. D. McMillan, G2CWY. All agree that electricity boards tend to frown on any such connection, partly because it tends to upset their own monitoring and safety arrangements based on earth leakage. G2CWY points out that the relay arrangement shown in the original power supply (January *TT*) is an ingenious solution to the 'polarity' problem prevalent on the Continent which arises from the widespread use there of reversible plugs using two pins for "line" and "neutral", with a *schutz-kontakt* (screen contact) on the plug circumference mating with an earthed screen around the socket.

It would seemingly mean that British users would do better, if they use mains-connected chassis systems, to rely on the non-reversible nature of the three-pin plug in order to ensure that the chassis is always connected to mains-neutral.

This is achieved automatically with three-pin plugs and sockets provided that both plug and socket are correctly wired. Unfortunately it is not safe to assume that this is always the case in practice and it is advisable to check first your own plug, and then any socket into which it is to be fitted (see *Amateur Radio Techniques* for diagrams showing the correct connections).

R. D. McMillan points out that his company (James McMillan & Co, 112 High Holborn, London WC1V 6JS, phone 01-405 3770), market a little device which he invented called "Polaritest" and which forms a self-contained little tester with neon bulbs that plugs into 13A three-pin sockets and provides a rapid check on whether the socket is correctly wired, and also shows up various fault conditions such as earth or neutral leads disconnected or reversed. Such a device would be useful to any amateur operating mains-connected-chassis equipment from a number of different locations.

He adds: "However, correct 'polarity' is not the only requirement to be met, since mains earthing systems in domestic installations often fall short of minimum safety requirements. In fact, I would go so far as to say that in this particular application mains earthing systems *always* fall short of desirable safety requirements. This apparent impasse can, however, be overcome by the use of a current operated earth leakage circuit breaker in the mains supply to the shack. Briefly, this device operates by feeding 'line' and 'neutral' through coils which are normally balanced in flux, but which become unbalanced if there is a leakage current from 'line' to earth, and a number of these are now on the UK market which 'trip' at only 30mA leakage current, cutting the supply in a matter of milliseconds before damage to self or equipment. Apart from the earth leakage feature they also operate as normal circuit breakers in various loadings from 10A upwards, with the usual advantages over protection systems using fuses. But note that protection by this means would be impaired if 'earth' and 'neutral' are joined together."

Damping multimeter movements

In *Radio-ZS* (May 1973), D. T. K. Price, ZS6ZL, points out that many low-cost multi-test meters, although providing high sensitivity, good accuracy and reliability tend to suffer from the annoying defect of poor damping. This means that the needle overshoots the correct reading and may oscillate several times before coming to rest. The textbook approach to providing better damping would be to connect a resistor across the meter movement: unfortunately this cannot be done in a multimeter since it will affect the calibration.

ZS6ZL has found that such oscillations can be damped out successfully without affecting calibration by using a series RC combination in place of just resistance, provided that suitable component values are used. He says the procedure is first to identify the movement terminals, and, since an electrolytic capacitor is used, to find out their polarity (a 470kΩ resistor in series with a 9V battery will allow this to be done). Next connect a resistor (4·7kΩ is a good starting value) across the movement terminals, and observe whether this provides the required degree of damping, without worrying about the effect on calibration. Select the highest value resistor that adequately suppresses overshoot.

Then connect a small electrolytic capacitor in series with

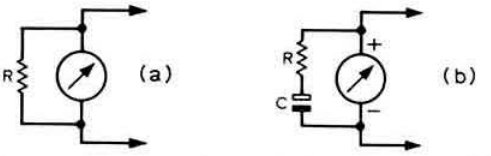


Fig 10. Method of improving needle damping for multi-test meters. (*a*) Use of resistance alone will affect calibration, (*b*) method recommended by ZS6ZL using RC combination

the resistor (ZS6ZL recommends a "teardrop" type tantalum electrolytic). The meter calibration should now be normal but damping may again be poor. If overshoot is observed try a larger value of capacitor; but if the needle hesitates and approaches its final reading slowly, then reduce the value of the capacitor. It should prove possible to find component values that result in the needle moving rapidly to its final resting place without overshoot or creep, although some compromise may be necessary to obtain satisfactory results on all ranges. Once the optimum values have been determined they can be permanently soldered in place, and the meter closed up.

Here and there

A vital resistor was unfortunately omitted from the G3OTK tunable notch filter circuit diagram in the June issue (Fig 7). To set the record straight, the corrected diagram is shown in Fig 11.

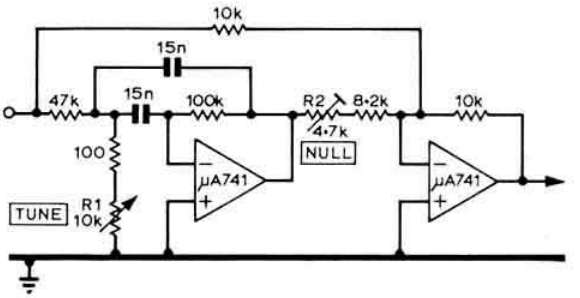


Fig 11. Amended circuit diagram for tunable notch filter developed by G3OTK (see June issue, Fig 7)

Mike Whitaker, G3IGW, one of the keen 1·8MHz dx operators, agrees with the views in *TT* (January) that many of the very long distance contacts on these bands do not accord with multi-hop theory. From a hand-picked site in Scotland he and G4MH recently enjoyed a 30min contact with VK6HD, using a high inverted-V aerial, and is convinced that a good site-aerial combination would regularly produce long-distance contacts on 1·8MHz.

As a follow-up to the item last January on the use of tags for plug-in integrated circuits, Denys Gaskell, G8BGW, obtained a large supply of these from Molex International and is willing to supply them at the rate of 60p per strip of 100 pins (postage and packing 5p) or a sample in response to an sae. He reports that the pins are easy to use and ideal for experimental work, can be easily removed from printed circuit boards for re-use and provide a firm mount for the ic.

Clive Burchell, G3NKQ, mentions that he has been getting very satisfactory results using a vertical dipole (see *TT* April) on 14MHz.

FOUR METRES AND DOWN

by JACK HUM, G5UM*

The first twelvemonth of GB3PI

As the first anniversary of the GB3PI experiment approached, a number of the Pye men involved with it hit on the idea of inviting interested parties along to a meeting at Cambridge to talk around the subject of "Where do we go from here?" and "How have we done so far?" So, on the last Sunday of June, a score or more members gathered at the joint QTH of G3VEH and G3WLD, and pooled their repeater knowledge and experience to date.

"How have we done so far?" Pye men themselves have been considerable users of GB3PI over the last twelvemonth during their journeys to and from work; so have many others since the device was moved to Barkway in the spring, with an enormous consequent extension of its range. Much valuable how-to-use-a-repeater lore has been built up as a result. This was condensed by G3SXK into a few succinct paragraphs. These are reproduced below.

"Where do we go . . . ?" The Society's VHF Manager, G3FZL, described the circumstances in which future repeaters might be sanctioned by the MPT, and reminded his hearers of the bandplanning implications coincident with any development of a repeater chain in this country. The subject was a permanent agenda item at meetings of the VHF Committee.

Now for the repeater user's operating code, which, when you come to analyse it, is nothing more than an amalgam of commonsense and good manners anyway:

1. Your licence requires you to identify with your callsign, preferably using phonetics: please do so, whether or not the repeater replies;
2. Your licence requires you to be able to listen on the frequency on which you transmit;
3. Restrict sending time to less than one minute per over;
4. Pause between overs to let fresh callers in;
5. Avoid large nets: three stations per QSO is enough;
6. Unless circumstances are exceptional, wait until the current QSO finishes before you break in;
7. Give priority to mobiles;
8. Check up-channel and down-channel regularly (in the case of GB3PI, 145·15 and 145·75MHz) and never use the repeater if you can QSO direct;
9. County and country chasing are invalid via repeater;
10. Be courteous (not only through the repeater!) and observe the Metre Wave Man's Code (see p337, *FMD* May);
11. Use a repeater to supplement your metre-wave activities: do not forget the rest of 2m, or 4m, 70cm and beyond.

German repeater news

A mod to our paragraph on p 262 (*FMD* April) comes from G8AUU: Kris Partridge says DL0VR is on 145·075 receive and 145·675 send (same 600kHz separation as our own GB3PI). He tells us further that the Germans intend to establish two repeaters purely for rtty on 2m, coupled with some methodical planning of a 70cm chain: there will be a grid of 70 by 70km squares over the whole of West Germany, with repeater channels allocated to each square in such a manner that the nearest two co-channel repeaters will be 140km apart.

Another bit of G8AUU news gleaning is that the Germans have established two beacons on 23cm, DC6MR Dortmund DL48a on 1,296·100, and DJ2LFA at DL38j on 1,296·024 MHz. No aerial bearing known at the moment.

Collating Ar data

Few propagation phenomena are of more interest than auroras to the Society's Scientific Studies Committee. This year they have had plenty of Ar to work upon.

If you work dx by aurora (or if you have already worked some this year) note beam headings required and ask the man at the other end to tell you his. This can be done quickly by an adapted international "Q" signal "QTF/A", meaning "What is my auroral signal bearing?" which elicits the reply "My auroral signal bearing is . . . deg".

For a mass observation exercise amateur radio is ideal: there are so many of us so widely scattered. If between us we can feed about 1,000 cross-bearings to the SSC the committee will be in a position to plot the movement of Ar reflection centres across Europe.

You can hardly send "QTF/A" to a beacon and expect a reply. You *can* log its Ar heading, and this will be useful information to feed into the current research programme. Co-ordinator of this programme is Charlie Newton, G2FKZ. If you have already amassed QTF/A and QTR for the manifestation in April he would welcome it at 61 Merriman Rd, London SE3.

Evidence shows, says 'FKZ, that the best dx will be worked at the start and towards the end of an auroral phase. Under intense auroral conditions beam headings will probably be much more easterly than many people think. This was indeed reported after last April's show.

Aerials at 70MHz

As we remarked here a couple of months ago, 4m is such an easy band to get going on that "any old aerial" (eg dipoles in lofts) will give results of a sort. At most sites it pays to add a few parasitic elements and to get the skyhook outside to double your service area. The multi-element aerials common on 2m and 70cm are not necessary on 4m, points out Paul Gaskin, G8AYY, of Birmingham; "A 46-element 'Monster' beam would require a boom 53ft long!"

He offers the thought that as gain is proportional to frequency, and taking the variation of propagation losses with frequency into account, it is likely that at 70MHz a three- to four-element beam will be adequate for most amateur purposes, even at the 50W dc input level.

Very true for most of us; there are one or two members around the place more fortunately situated and able to demonstrate that the more metal you put up the better you will get out. One of them is GW3MHW. Down in his valley in Cardigan he has been evaluating a 6-over-6 for 70MHz compelled by its environment to look straight into

*Houghton-on-the-Hill, Leicester LE7 9JJ

a clump of trees and, beyond them, steeply rising rock. Continuous watch on 70·26MHz over many weeks of receiver noise at last produced a weak carrier—and there was G3VPK at 200 miles, to give a solid contact at 569 on the key and S6 on A3J. Then the 60ft mast arrived at John Baker's alternative site in Montgomery, 1,000ft up. By now the 6-over-6 slot will be at the top, emitting "GW3MHW", all modes. If you hear "GW3MHW/A" you will be listening to rare Cardiganshire (ssb and cw only).

Oscar news

Another "Satellite 1000" award for Britain. To G3PEJ went No 100, dated 12 June, in a notification from ARRL.

Believed first aeronautical mobile QSO via Oscar 6 is claimed by W6OAL/AM flying in a Super Constellation near Hawaii, who worked K7BBO of Tacoma at about 5,000 nautical miles. A quarter-wave ground plane on 2m was poked through a disused flare-port on the aircraft for the up-link. The down-link on 29·5MHz had a long wire 23m aerial feeding one of the aircraft's Collins receivers.

Another unusual one: G6CJ got his Barbadian at last, 8P6DR via the satellite, for the first Europe-to-8P6 via Oscar. The charts showed that about every third week a four-minute chance popped up. A schedule arranged for 9 June on Orbit 2971 was successful. The 8P6DR signal on ascending orbits appears on 29·482 crystal controlled. Nearby VP5DD and VP9GR, who are vfo, are lying in wait for Oscar-to-UK contacts.

Oscar sub-horizon signals

Extract from a letter from G3IOR of Norwich to G6CJ of Gillingham, Dorset:

"It looks as if old Marconi was right. Radio waves *do* go in curves. Oscar 6 has proved it conclusively by sub-horizon signals. It's obvious really . . . it can't be ionospheric, as Oscar 6 is way above any possible ionized gases at 920 miles up, and normal tropospheric is only a spit in the ocean in terms of extension above horizon. But the air and the ionosphere are not a continuous density medium: they are a density gradient, and gradient refraction curving will produce a gentle curve tending to angulate back to earth.

"I have tilted my 2m six-over-six at 7° to the horizontal, which seems to be optimum for this effect of range extension, while the receiver three-element beam on 10m although truly horizontal is only two wavelengths up at 29·5MHz, and maximizes at this angle anyway."

FMD Awards

Operators in England who talk about "elusive GMs" would have been interested to see the FMD Certificate claim for 144MHz turned in by GM4BHA, of Edinburgh. It told a story of "elusive G stations": only three appeared on the claim form. Of the remaining 27, 24 were GM call-signs. Now Certificate No 329 for 2m is on the wall at 'BHA.

No 330 goes to the GW8ERP/P team: their consistent contest operation on Welsh high spots paid off in quick QSL returns. And it was hilltop operation in Wales by G(W)8BNJ/P of Cheltenham and by G(W)8COP/P of Cambridge that secured them Certificates 323 and 324 respectively. Among other Gloucestershire members, G8CIB/P earns No 326, Cheltenham's G4BBR No 325 from contacts made entirely on ssb (parchment duly endorsed), and G3YNT of Newent gets No 328. As for No 329, this went to G4AEQ, whose impeccable cw can be heard from Manchester on most Monday telegraphy nights.

Expeditionaries

Peter Lennard's three-night stand in MR, HD and GN brought from G5DF a comment about G3VPS which many will echo: "What a nice chap he is! He gets such pleasure in giving people these remote counties on 4m and 2m". The same goes for two other confirmed peripatetic *expeditionaires*, the 'JFG/AGU team, whose "one GM county a day" tour in June evoked admiration for their stamina and operating procedure alike.

A rather different brand of expedition will be Sonde 6 on either 16 or 23 September (the French will say precisely in their broadcast on each of these days on 3,690kHz at 0900 gmt). There will be a beacon-cum-telemeter on 144·62 emitting "BF" (Ballon Francaise, in case you wondered). You should be able to access it (*à la* Mirabel) on 432·1 to 432·4 to give a down-channel output between 145·6 and 145·9MHz. The French urge the use of the lowest possible power to trigger the device (no Oscar excesses). Look for it from 1400gmt. It should go very high and enjoy an extensive service radius.

To prove the effectiveness of these French repeater devices it is necessary to do no more than quote the remarkable results achieved by G3JVL on the Hampshire coast on the earlier Mirabel experiment: Mike Walters identified 20 German stations, eight French, two Belgian, and one each of England, Holland and—wait for it!—Austria in the signal of OE3XUA. The 145·2 beacon remained audible with him for two hours at S9 until drop-out at 1700gmt.

Beam on Huntingdonshire on 18/19 August for G3PMH/P; the March and District RAS will operate to the following schedules: 1700-2100gmt on Saturday the 18th to coincide with the 2m QRP contest using 145·41MHz for the first 15 min of each hour, then 145·2MHz a.m., with 433MHz a.m. on request. After 2100gmt on 70cm only. On the Sunday 145·41MHz throughout the sideband contest. Skeds for 70cm only, sae to G4BEL.

Taking your m-i-m to Edinburgh?

There is special relevance in having a made-it-myself exhibition at the Scottish VHF Convention next month. It ties in with the RSGB Diamond Jubilee home constructed equipment competition which was announced in March on p169; for one of the three sections of the latter invites members to submit a tunable vhf/uhf receiver for adjudication. Could be that the winner will appear at Edinburgh!

Whether you decide to build the Diamond Jubilee receiver or not, take something "vhf-ish" to show at the Edinburgh Convention on 22 September at the University's Pollock Halls of Residence.

One of Scotland's leading portable operators is GM8FFX: he will relate some of his /P experiences during the lecture session. The latest on integrated circuits for vhf will be expounded by GM8BJF. The Society's VHF Manager, G3FZL, will be there to up-date everybody on current topics.

Edinburgh is a delightfully easy city to drive in. And the University stands out a mile. You may still wish to use your mobile on the way there: look out for GM3HAM/A.

Next band up (again)

"Call every hour on the hour". The time honoured practice is observed by many 70cm operators in the Greater Birmingham conurbation, reports G3UBX of Wolverhampton, and it is one that gets the QSOs.

But *time* is only one term in a fairly complicated formula. Another is *space*. When you have a meg-and-a-half to tune it is useful to know where to look first. Obviously on the national calling frequency of 433MHz, and on the proposed new one at 433·2 ("What a pity there are two!" adds 'UBX).

A third term is *direction*. Most 432MHz beams are much sharper than aerials on 2m, and will exclude very effectively most signals outside their main lobes. Often people are there on the band unheard because unbeamed. Try an omni and cut down your 70cm aerial gain drastically? The prospect appeals to few in spite of its merits for local nets (but G3HVI has been experimenting with quasi-omni turnstiles that give good coverage well out).

G3UBX has mixed feelings about 70cm activity nights and rightly says that those which suit some will be useless to others. None would be necessary if "on the hour whenever you can" were to be observed. Peter Burden is unequivocal, though, on the bad habit sometimes heard on 70cm of engaging in a lengthy QSO and at the end of it doing no more than to mumble one's callsign and close down, to the frustration of the distant listener itching to get a contact. ("Items 9 and 10 of the Metre Wave Man's Code could be emphasized," he remarks—and if you have not yet taken a copy to pin on the clubhouse notice board thumb back to p337 of last May).

See you on 70cm on the hour!

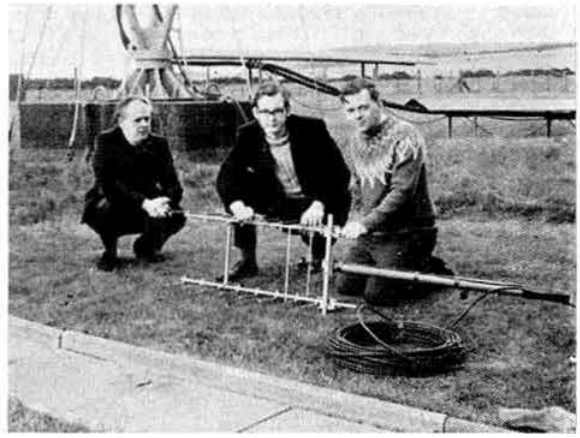
Contest comment

To most participants in the May 70MHz Open "best dx worked" was represented by GM3WOJ/P operating among the Peebles hills (though EI2VFZ/P, better known to "Four Meterites" as G3WOS, ran him close where QRB was concerned). Of Chris Tran's 31 stations worked from PB, a score were on cw. A further 30 users of 70MHz will be chagrined to learn that they were heard at 'WOJ and called in vain. "The old story: few stations bothering to beam north because usually nothing there!" he adds. He asks operators to try cw on any Sunday morning, looking to Scotland. He will be there from his home QTH at Glenluce, or out portable on the hills. Go hunting for him on "The Twelfth" (see Contests Calendar).

In the June microwave event Nick Richardson, A6812 (one of the few holders of the 432MHz Listeners' Award, by the way), held a watching brief on the 70cm talk-links which were being used—and from his Chiltern high-spot he heard a lot of these. He also heard a lot of 70cm driver stages putting out fat signals on 432 when the terminal frequency was 1,296! Other intending uhf listeners will like to know what he uses: there is a BF180 pre-amp into a Solid State Modules converter for 70cm, which in turn feeds a bipolar 144-146MHz converter terminating in an EC10. The aerial is a Multibeam at 37ft.

To give details of the Mediterranean VHF/UHF Contest organized by the Spanish may seem a little academic to we in high latitudes, but here goes . . .

Dates: 18-19 August, 1700gmt-1700gmt. *Object:* work as many stations as you can on vhf/uhf, usual exchanges, one point per kilometre, then multiply number of points by number of QSOs. *Certificates:* for best dx achieved, and to the top scorer in each country. Logs, summary sheet and multiplier check sheet to PO Box 34, Palma de Mallorca. Nothing in the rules says you *must* work the Med, so it seems in order to work as many as you can that weekend, even if they are all UK, and send in the result.



Preparing for a 70-centimetric GB3DM; left to right, G8BWH, G8CZY and G8ANQ at the Burnhope IBA station introduce one of the 8-over-8 aerials to its boom (there is another at the opposite end of the boom). If tests have not begun by now, watch GB2RS news bulletin for information about them

For the Diamond Jubilee metre-wave contest during the first weekend of July, clubs and vhf groups hit the hills in droves for what promised to be a rehearsal for VHF NFD a couple of months later (except that you could use only one callsign and therefore only one band at a time). Anticipating the September event, the first VHF NFD where the "full gallon" will be permitted, many portables elected to concentrate on A3J, at least up to the point at which there were no more ssb stations left to work—and that point was a very long way from the starting time of 5pm on the Saturday, eloquent testimony to the tremendous increase in 2m sideband which has taken place in perhaps as little as a year.

If the July Diamond Jubilee event is accepted as a precursor for the September one, it may well be that VHF NFD 1973 will stand out as the most significant since the series began in 1962 by giving the advantage to participants able to use high power and contemporary operating techniques from superb sites. And if this seems daunting to participants lacking such advantages, never forget that contests are for fun and that when the best men win you will be in good company among the losers.

Piquantly enough, there will be an opportunity to assess *on the same week-end this month* the relative effects of lots of p.e.p./erp and of very little, when the new 144MHz QRP Contest precedes the 2m sideband one.

Tone "A" again

Fleeting auroral lifts during June showed that it is wise to turn beams north from time to time, especially if the GB2RS Sunday bulletin suggests that unusual solar activity is imminent.

On 10 June one of the "aurora regulars", GM2DRD, was a good 55A down in South Wales with GW3ZTH. On 24 June more GM telegraphists were caught at 'ZTH in an Ar opening of less than 10min duration.

Watch north-headed beacons for Tone "A" burble.

Look for long-haul

From Dunmore East in the county of Waterford, EI9Q is reactivated on 145·4 ssb and cw from 7.30 to 10pm local time every Monday, Tuesday and Wednesday, and tunes the whole of 2m for any-mode contacts. (Thanks to GW3ZTH for this info).

North London's G4ASR (David Butler was once G8ASR) has had MPT permission to move his station to an elevated site at North Weald, near Epping in Essex. Optimum range even under normal conditions seems to be 200 miles on cw, off a 12-over-12 fed by 25W of rf, this to be upped to 100W any moment now. Commissioning of transmitters for 90W output on 70cm and 30W output on 4m is in hand.

Tech corner

From G8BUR (Andrew Marshall, Datchworth, Herts)

Absolutely no originality is claimed for the converter shown below, which is an amalgam of design ideas taken from several sources, but some of them may be new to or forgotten by some readers, so no apology is offered.

Only the front end of the converter is shown. The crystal oscillator section is perfectly straightforward and so not shown; it consists of a crystal oscillator (2N706) at 35·5MHz followed by a tripler (a further 2N706) to 106·5MHz. However, both these frequencies are used in the mixing process. The 106·5MHz line feeds a 40673 mosfet to mix with incoming 144MHz and produces an i.f. at 38·5MHz ±1MHz. This i.f., together with the 35·5MHz output from the crystal oscillator, is passed to a second 40673 and the result is a 3MHz output to tune on the station receiver, via the source follower 2N3819.

This dual-conversion configuration, in conjunction with the cascode rf amplifier (two 2N5245s aided by double-tuned circuits), is a great help in reducing out-of-band professional QRM, which is an increasing problem on the vhf scene today.

What they say

"If a new repeater is commissioned it would be a good idea to use 70cm, either with 70cm in and 2m out, or vice versa, or better still 70cm to 70cm. This might encourage the use of ground-plane aerials and stimulate more 70cm contacts, people being heard over a more uniform area instead of in a 20° beam lobe"—A6812 (Nick Richardson, Wendover).

"Does the Isle of Man count as a country? Can I use a Welsh county as my country claim?"—A8334 (Glyn Fisher, Oakham). Answer is yes in both cases. All needed info is on the FMD Certificate claim form obtainable if you send a long sae to G5UM.

"The Castlereagh Hills screen most Belfast GIs from England. The usual solution is to go portable on the hills only 5-10 miles away. A chap at my place of work does this regularly (GI3WEM), combining hill-walking with QRP (½W) dx chasing on 4m"—BRS8808 (R. K. Quigg, Belfast).

"With regard to the G8GMV query (*FMD*, June) 'Why does the morse test make you a better operator/designer/constructor?' I suppose the answer is 'Learn the code and find out!' In all my years of brass pounding I have never yet heard a cw man claim this distinction"—G3DAO.

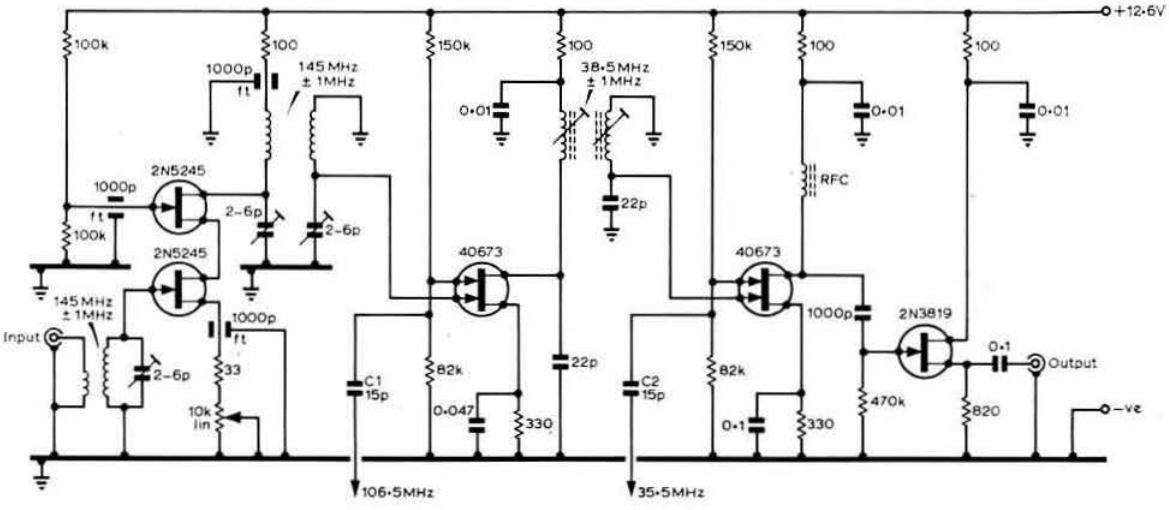
"As of 27 June there were 202 repeaters in IARU Region 1, 171 on 2m and 31 on 70cm. Top of the list came Germany (Federal Republic) with 104 (80 plus 24). Bottom of the list Israel and the UK with one each"—G8AUU.

"Repeaters on 432MHz would, I am sure, be welcomed by all and give a great boost to activity"—G3UBX.

25 YEARS BACK

"The band 145-146Mc/s will be released to UK amateurs on 1 September next . . . input power of 25 watts. Members will appreciate that this facility has been obtained by the Society in advance of the coming into force of the Atlantic City Conference Allocations Table".

RSGB Bulletin, August 1948



THE MONTH ON THE AIR

by JOHN ALLAWAY, G3FKM*

THE April issue of *Worldradio News* gave the information that a Bill is being introduced to the US Congress by Congressman Teague of California to require that radio and television receivers be constructed to standards such that "all interference from any amateur station, and any citizens radio station operating on its assigned frequency, be filtered out". It will be of interest to see what the outcome of this move is, but it seems to the writer that such regulations are highly desirable in this country too! The situation whereby television sets which are normally completely screened (by law) in their country of manufacture (eg the German Korting sets) may be imported into this country unprotected is utterly ridiculous. The British television industry is apparently being allowed to thrive at the expense of other legitimate users of the radio spectrum.

Congratulations to the winners of the 1973 Bermuda contest, Mr M. Moss, G3RZI, (cw section) and the Government Communications HQ Station, G3SSO, (phone section).

Top Band news

W4WFL/1 of ARRL has kindly written to say that 160m WACs were issued to K2GNC, W2BP, W2QD, K4CIA and WA8IJI between 12 April and 12 June. *29 DX Club Newsletter* reports that VK6HD contacted ZS6ZE on 5 June for his fifth continent on the band. He has received ZS6ZE's QSL card which said that 6ZE was using a whip aerial at 50ft with 10W input and that this was his only contact on 160m!

German stations are now permitted to use the segment, 1,815 to 1,835kHz, with ssb restricted to the top three kilohertz.

Those who would like a contact with St Pierre will be interested to know that FP8AA will be active on 160m from 1 to 16 August.

G3JVJ reports that he has been hearing some S American signals nearly every night, sometimes at good signal strength.

* 10 Knightlow Road, Birmingham B17 8QB.

Carl, VQ9R, seen in his shack

W1BB/1 has also been RST 589 at times. During June CP1EU, EP2BQ, LU5HFI, PY1DVG and ZP9AY were all logged around 0000, and LU5EVM, W1BB/1, W1HGT, K2GNC, W2DEO, W3IN/3, KV4HW and VP8KF around 0300—the latter peaking at RST 579 and reporting that he had worked JA1MCU/C21 on 1 July.

DX news

No official decision concerning the eligibility of VK9JW contacts for DXCC credit has yet been announced. USA sources are awaiting final word from WIA who seem reluctant to answer their correspondence. A new operator—Kev Collins—is on Willis Is and is using the callsign VK9ZC. He arrived at the end of June and should be on the island until December using his FT101 and dipole and quad aerials. QSLs go via VK3AH. Brent, formerly VK9ZB, married recently and has only just started to send out QSLs from his home in Australia. Owen, VR2DK, has left Fiji and may now be found using his VK8OM callsign.

A number of stations using the XV5 prefix have been reported active recently. Most of them are thought to be located outside Vietnam, but in any case only XV5AC is authorized and only XV5AC QSLs are accepted for DXCC purposes. Les, G3HZG, is often to be found using his VS5LH call from Brunei at around 1500 on Sundays on 14,225kHz. Father Moran, 9N1MM, keeps a schedule with HV3SJ each Saturday at 1600 on 14,275, and those who wait until the contact is finished may be rewarded with a contact with Nepal.

G3EAX has returned to the UK and cards for contacts with him at 9M6AW and VK8AW may be obtained from the address in *QTH Corner*.

K5LTH is on Kure Is and has been on the air as KH6HDB/Kure. He hopes to be active on all bands and will be there for an extended tour of duty.

QSL cards for contacts made by ZD3X, ZD3Y, ZD3Z, TZ2MM, 5T5BH, OH2BH/6W8 and OH2MM/6W8 began to be sent out early in June. The delay was caused by lack of funds required to print the 20,000 cards, the money has been donated from Finnish sources. The expedition cost some £2,000 to carry out and it is reported that only £35 was received in donations.

Steve Hawley, GM5AXO, has left Scotland for the Panama Canal Zone and is now KZ5NG. He will be there for 18 months and asks for GM5AXO and KZ5NG QSLs to be sent to his WA4UAZ call via the WA4 bureau.

XG1A was operated by XE1J to commemorate the founding of Mexico's third city—Colima. In future the prefix XF4 will be used for the more northerly of the island groups off the Pacific coast of Mexico (eg Revilla Gigedo), and XF2 for the more southerly group. XF2A has been reported on from Isla Lobos. It seems that any Chilean station who has been licensed for 10 years or more may use the XQ prefix instead of CE.

JT0AE and his wife, JT0AG, will be in Mongolia for another three years. They ask for QSLs via Pavel's own call —OK1IAI—through the OK bureau, or via OK3YAO.

The Radio Society of East Africa no longer exists and its place in Kenya has been taken by the Radio Society of Kenya. In future QSL cards and correspondence should be sent to Box 45681 Nairobi.

Philip Cohen, G3LKY, is in Bangkok and licensed as HS1AJB. He would be pleased to arrange schedules with anyone who would like to contact him at the address in *QTH Corner*. He expects to be in Thailand for three years and is active almost daily on 14 or 21MHz ssb around 1600.

Don Smith, GW3OJB, will be operating as 9M8FDS from Kuching, Sarawak, until mid-September, using cw on 14,007 and 21,007kHz, and ssb on 14,272 and 21,272kHz (plus or minus QRM).

News from overseas

In a letter to RSGB, VS6DB lists the officials of HKARTS for 1973 as follows: president, John Tam, VS6FU; hon treasurer, Lyell Louttit, VS6BE; QSL manager, Dave Moxon, VS6DM/G4BLV. Council members: S. De Silva, VS6BS, and Ian Dredge, VS6GA/G8ATV. John Grigsby, VS6DB/G3WNG, is hon secretary and reports that this year's Hong Kong Activity Day will take place from 1100 17 November to 1100 18 November. The VS6 with the highest score wins a trophy presented by a local member. 1973 marks the 50th year of amateur activity in Hong Kong although it was not "legalized" until 1928!

G6XJ reports an excellent trip out to New Zealand via Tahiti, where he met FO8BX. G3UOF/MM was a radio officer on the *Fairstar* and through him contacts were made with ZL2OU at whose home Arthur is staying. A number of ex-G stations have been visited, including ZL2BKC (G5LC) and ZL1NW (G6VX—Morrie). He expects to move to Australia in October and will visit VK3ML, VK2EK and VK8AD. During this time a visit to Japan will be made but no reciprocal licensing arrangements apply there so he will not be on the air. 6XJ's New Zealand call is ZL2ACN.

Contests

The 14th All Asian DX Contest

1000 25 August to 1600 26 August.

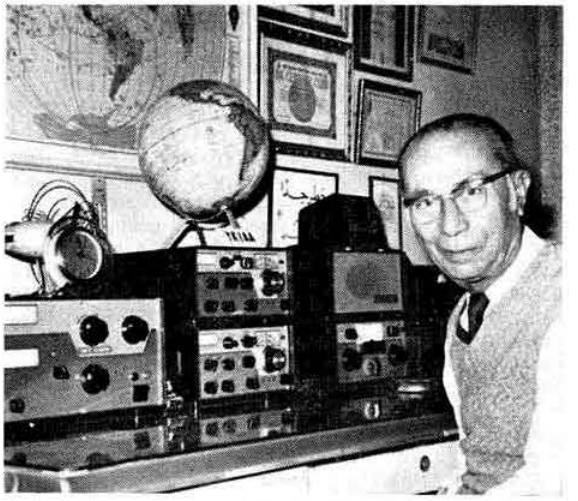
All bands. CW only. Non-Asians call "CQ AA", and endeavour to contact as many stations in Asia as possible. Each contact counts one point and a five-figure number consisting of RST plus a two-figure number indicating the participant's age (ladies give "00") should be exchanged. The multiplier is the number of Asian prefixes worked on each band, and the total score is the total of prefixes multiplied by the QSO points on each band all added together. Note that stations in Minamitorishima Is are not in Asia. Logs should indicate new prefixes as worked and a separate sheet should be used for each band. They should reach the JARL Contest Committee, Central Post Office Box 377, Tokyo, before 30 November.

In the 1972 contest UK entrants scored as follows: **G3ESF** (7,316 points), **G2DC** (5,555), **G3VDW** (1,792) and G2AJB (760) (all multi-band). **G6GH** (105 points—21MHz), **G3PVA** (2,610—14MHz) and **G3OCA** (70—7MHz). Certificate winners are in bold type.

The WAE Contests

0000 11 August to 2400 12 August (cw).

0000 8 September to 2400 9 September (phone).



Many amateurs will be indebted to YK1AA for their only contact with Syria. Rasheed operates this neat set-up mostly on 14 and 21MHz ssb

All bands 3·5 to 28MHz. Single- and multi-operator sections; the former must take a compulsory total of 12 hours' rest—this must be clearly indicated in the log and may be taken in up to three periods. Exchanges consist of RS/T plus serial number of contact (starting from 001) and each contact counts one point. Multipliers for European entrants are DXCC countries plus JA, PY, VE, VO, VK, W/K, ZL and ZS call areas, UA9 and UA0. 3·5MHz multipliers should be multiplied by four, 7MHz by three, and 14, 21 and 28MHz by two before arriving at the total final multiplier. Additional points are derived from receiving QTCs from non-European participants. These consist of the times, callsigns and serial numbers received from European stations worked previously, and up to 10 may be passed at any one time. Full details of contest rules and official DARC log forms may be obtained from EUDC Committee, D-895 Kaufbeuren, Postbox 262, Germany. Deadline date for logs is 15 September (cw) and 15 October (phone).

Trinidad & Tobago Independence Anniversary QSO Party

0000 18 August to 2400 19 August.

3·5 to 28MHz, phone only. Exchange RS plus serial QSO number (starting from 001). A certificate will be awarded to stations contacting five or more 9Y stations. The same station may be worked on different bands for credit. A special certificate and QSL cards will be awarded to those who contact Trinidad stations on five bands. For the five-station award send log only, but for the five-band award send log plus QSLs. Please enclose $1 or eight IRCs and post before 15 October to STARC, PO Box 131, San Fernando, Trinidad.

Dxpeditions

KA2DF did not manage to get on the air during his visit to Macao, but is hoping to be able to operate from CR9 on another visit in the autumn.

It is rumoured that WB5BID has been given permisssion to land on Bouvet Is, but nothing is known about a licence

being issued for use on the island. It is believed that he may try to make 3Y0 next February.

YA1AH's visit to Sikkim unfortunately coincided with political disturbances and the occupation of the country by Indian troops. The Indian Political Officer advised that if Arne returns next year some AC3 operation should be possible. On leaving the country YA1AH and family were confronted by a hostile mob but all was well when his wife burst into tears and they were allowed to proceed!

YK1OK will be on the air from Syria, commencing 15 August, for a period of 15 days. Operation will include 160m, and from 2200 to 2400 transmission will take place between 1,800 and 1,805kHz and Europeans will be listened for between 1,825 and 1,830kHz. No information is available about activity on the other bands. QSLs go via OK2QF.

GW6GW will be operating /P from some of the rarer Welsh counties between 4 and 11 August, most operation will be on vhf but some rarer WAB areas will see activity on 3,760 and 7,060kHz.

Awards

The Shamrock Award

Issued by the Dundalk ARS and based on the Irish Grid system (similar to the WAB Award). Four classes are available—Basic, Green, White, Gold and the Shamrock. A combined record/check book can be obtained from the award manager, GM3MTH, 9 Ramsay Place, Oldmonkland, Coatbridge, Lanarks, ML5 5RE, and its price is expected to be 75p (please check before sending money). GI3KVD and G8TR will also have supplies. 3,710 and 7,070kHz have been chosen as nominal frequencies around which Irish stations can be found.

The Slovensko Diploma

This is issued by the OK3 DX Club to any licensed amateur who has confirmed contacts with the requisite number of different districts in Slovakia (OK3, OL8, OL9 and OL0) since 1 January 1946. Applicants in HA, OE, SP and UB require 35, other Europeans 20, and all others 10. A list of

QSLs (showing callsign, date of contact and location of station worked) certified by a radio society or two licensed amateurs should be sent with five IRCs to: Central Radio Club, PO Box 69, 113 27 Praha 1, Czechoslovakia.

The ZMT Award

For contacts since 26 April 1949 with one station in each of the following 39 areas: OK1, OK2, OK3, HA, LZ, UA1, UA2, UA3, UA4, UA6, UA9, UA0, UB, UC, UD, UF, UG, UH, UI, UJ, UL, UM, UN, UO, UP, UQ, UR, DM —three different districts, SP—three different districts, YO —three different districts, YU—three different districts. The DM districts are distinguished by the last letter of the suffix. Reports should be not lower than RST337 or RS33. The **P-ZMT** award for listeners requires cards from 25 areas: OK, DM, HA, LZ, SP, UA1, UA2, UA3, UA4, UA6, UA9, UA0, UB, UC, UD or UF, UG, UH or UI or UJ, UL or UM, UN, UO, UP, UQ, UR, YO and YU. This certificate also costs five IRCs.

The Arabian Knights Award

This is issued by HM King Hussein (JY1) for contacts with 10 of the following countries since 31 December 1970: 9K2, 7Z3, JY, 7X, SU, YK, CN8, OD, 3V8, MP4B, MP4M, MP4T, MP4Q (or their current prefixes), FL, 4W/VS9 and ST. A contact with Jordan must be included. Send certified list with seven IRCs to: JY1, Box 1055, Amman, Jordan.

The Swedish Prefixes Award (SWEP)

For certified list of contacts with 10, 15, 20 or all 25 Swedish prefixes (SK, SL, SM1-7, 0, plus SK9). Apply, with 10 Sw Kr (or equivalent), to SK5AL, Orrstigen 36, Ronninge, Sweden for the screen-printed award on "tree-imitation".

Odds and ends

HB9S, radio station of the International Jubilee Camp 50 Years, Scouts Centre, Kandersteg, Switzerland, will be on the air from 29 July to 5 August daily on 3,675, 7,075, 14,325, 21,325 and 28,825kHz. It will operate from 0900 to 0930, 1500 to 1530 and 1900 to 1930.

GB2SJC will be on the air from 28 July to 11 August at "Scout Jamboree Cymru 1973" at Penryn Castle Park, Bangor, Caerns (WAB area SH67). It is hoped to exceed the record number of over 1,000 contacts made in 1969 when the station operated from Pembrokeshire. (QSLs are still available for those who did not receive one.) GB2SJC hopes to run two transmitters on frequencies near 3,760, 7,060, 14,200, 21,350 and 28,550kHz mostly on ssb. Volunteer helpers would be welcomed and should contact Dave Roberts, GW3UBV, 33 St Martin's Park, Haverfordwest, Pembs.

Yet another special Scout station is CT1CNE which will be on the air from an international camp at Leira between 18 and 26 August. The station will celebrate the 50th Anniversary of the Portuguese Scout Association, and all contacts will be confirmed with a special QSL card.

G3SEA is at present in Honolulu but reports that his callsign is being pirated. Paul hopes to acquire a KH6 call at a later date but has not been on from G3SEA for several years, and apologises to those who have sent QSLs to no avail.

A cutting from the *Japan Times*, kindly submitted by G3TGV, gives details of two amateurs who were charged with assault and illegal possession of a weapon following a fight which developed as a result of a disagreement over the air. The paper states that the police suspected that the fight had something to do with a feud between two amateur organizations!

QTH Corner

A6XP	C. G. Thompson, Box 1057, Sharjah, Arabian Gulf.
F0WV/FC	via ON4TJ, 61 Breughellaan, B-9720 de Pinte, Ov, Belgium.
HC8GI	via K2SSD, 144-61 68th Av, Flushing, NY, 11367, USA.
HS1AJB	P. Cohen, c/o Bangkok Post, 3rd Floor U-Chuliang Fnd Bldg, 968 Rama IV Rd, Bangkok, Thailand.
JT0AE	via OK3YAO, Malinovskeho 339, Kremnica, okr Ziar n/Hronom, Czechoslovakia.
JT0AG	
KH6HBD/Kure	via WA3HUP, Mary Crider, 212 Clark St, Lemoyne, Pa, 17043, USA.
K5LTH/KM6	
KJ6DI	via K4RHU, 127 E. Montague Av, N. Charleston, SC, 29406, USA.
KX6LA	Box 196, APO, San Francisco, Calif, 96555, USA.
OH0AM	via OH2NB, Lansipellontie 12, SF-00390, Helsinki 39, Finland.
OJ0AM	
VR4AR	via ZL3JO, 107 Beverley Rd, Timaru, New Zealand.
XT2AJ	BP 7009, Ouagoudou, Upper Volta,
XW8EO	via W3HNK, Box 14, Norwood, Pa, 19074, USA.
WS9BGF	via W9HRF, 1100 East Av, Belvidere, Ill, 61008, USA.
ZK1TA	via W6KNH, 42 Donald Drive, Orinda, Cal, 94563, USA.
3V8BD	via DJ4DW, PO Box 52, 755 Rastatt, Germany.
5T5ES	via K5HAY, 1020 W Pipe Line Rd, Hurst, Texas, 76053, USA.
5T5KPO	via WA7UHR, 1641 N Andros Place, Tucson, Ariz, 85705, USA.
5T5LO	via K9KXA, 6430 N Lakewood Av, Chicago, Ill, 60626, USA.
5T5MG	G. Menard, BP 275, Nouakchott, Mauritania.
5W1AR	via WA7LFD, 20024, Meridian Pl. North, Seattle, Wash, 98133, USA.
9M6AW	G3EAX, 38 Southview Drive, West Worthing, Sussex.
9M8FDS	D. Smith, 71 Lintang Park, Kuching, Sarawak, Malaysia.

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

Band reports

A very variable month with W8ZOK's sunspot report indicating that there were no easily visible spots during the first week of June, and the arrival of several between the 9th and the 12th. Two medium-sized spots appeared on the latter date and were spaced a long way away from the sun's equator (often these have been hailed as precursors of a new cycle) and towards the end of the month there was a falling off in activity.

Very many thanks to the comparatively small band of supporters who found time away from summer pursuits to write to your scribe and provide the information used in this column. They included: G2BJY, G2HKU, G5JL, G6GH, GW3NJW, G3NKQ, GW4BLE, BRS17567, A7511, A7785 and A8312.

Stations listed in italics were on cw, the rest used ssb.

3·5MHz. **0300** CO2AA, PY4BTK. **0400** *CX8BBH, F0AHY/FC*, HR1RSP, *YV5CKR*. **2200** OY7BD, 5Z4KL. **2300** CX2AX, KP4AN, *TZ1AB*.

7MHz. (GW3NJW reports that conditions on this band in the latter part of June were abnormally good). **0000** *CR4AG*, CR6IS, OA4OS, OX3WQ, *ZP5AL, ZS6ZE*. **0100** *KZ5BB*. **0400** *G3QKR/KP4*. **0500** *CN8CF, XE2VB*. **0600** *OA4MS*, PJ2CW, TG8KT, VK2AVA, ZLs. **0700** YV4AGP. **2000** CR6AL *EA9EU, ZE5JJ, ZE6YK, 3D6AX*. **2200** TU2DO/DV, *9J2WR*. **2300** CP5BG, *F0AHG/FC, FG7TG, LU3EX*, YVs, *4K1A* (Antarctica), 6Y5MJ, 9X5VA.

14MHz. **0400** 4S7SW, **0500** *FL8BZ, UA0YT*. **0600** KH6s, KL7s, MP4BJR, YA1RYS. **0700** *YK1AL*, 5T5ES, 5W1AR. **0800** K5LTH/KH6 (Kure Is), KH6s, OH0MAS, ZK1TA (Tongareva) 4W1BC. **1100** ET3USF, 4J0GI. **1500** A6XP, XU1AA **1600** HS4AIA (QSL to VE6AKV), **1700** A51PN, DU1OR, *VQ9M*, YB0AB. **1800** HZ1SH, 9K2AF, 9M2s DQ, *LN*. **1900** VE6DJ (QSL to VE3DAM), ZD7SS. **2000** JY8AA (QSL to W2NSD), 5V7GE. **2100** FY7AM, HM1EJ, VP2s AX, VS. **2200** *CR5AJ*, JY9BB, VP2s *SU, VAM*, 5B4AH. **2300** VQ9BP, ZD3D.

21MHz. **0900** 3B8AX, 9G1DY. **1200** EL2AK, VU2AIK, ZD7FT, 5B4ES. **1300** VP2SV, ZD8RR, *3B6CF*. **1400** LU8FT, M1D, 5U7AZ. **1500** A4XFE, TR8MC, *VQ9M*, 9K2AU. **1600** A2CCY, CE3JU, *F0AHY/FC*, W6s, 5T5ES. **1800** *PJ8NLO*, VQ9MC (ex-MP4BCC). **1900** CO3PY, EA9EJ, ZD7FT, 5H3AQ, *9L1RP*. **2000** CE2HW, LUs, ZD7FT, ZPs. **2300** ZF1RH.

28MHz. **1400** WA4WRN/TF. **1600** 9Y4EH.

Very many thanks to all correspondents and specially to the following for information obtained from their publications: **DX News Sheet** (*Geoff Watts*), the **29 DX Club Newsletter** (*George Allen*), **QUAX** (*G3DME*), the **DX'ers Magazine** (*W4BPD*), **NARS Newsletter** (*5N2ABG*), **Long Skip** (*Nick Sawchuk*), the **West Coast DX Bulletin** (*WA6AUD*), the **Ex-G Radio Club Bulletin** (*W3HQO*), and **DX'press** (*PA0INA/PA0TO*).

Please send all items for **September** issue **to reach G3FKM** no later than **5 August** and for **October** by **5 September**.

Propagation Predictions

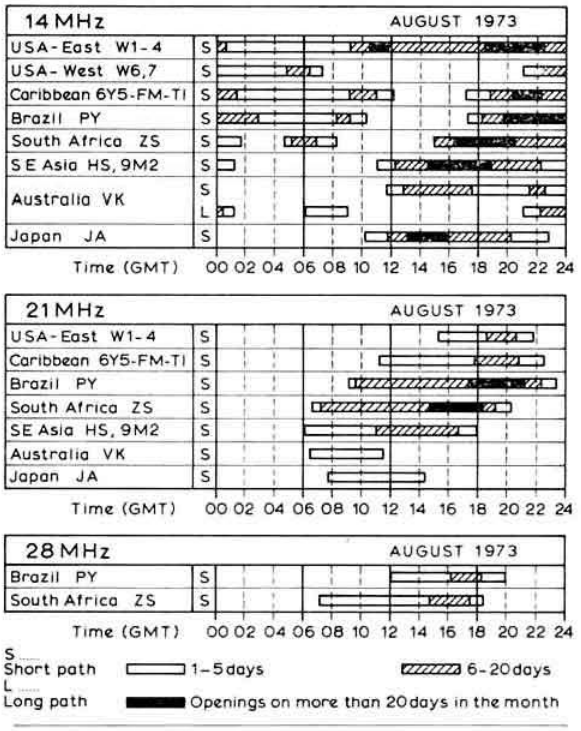
The summertime period of poor dx conditions will come to an end during August, and improvement during September will lead to maximum conditions during late September or October. With the sunspot minimum expected during 1975, dx conditions will not be as good as during previous years.

Conditions during August on **28** and **21MHz** will differ little from those of June and July and only contacts with South America and Africa will normally be possible on 28MHz, with somewhat better conditions on 21MHz. The period for short skip contacts between 500 and 2,000km will come to an end during August.

Night-time conditions on **14MHz** will be inferior compared with the two previous months and there will be less possibility of dx contacts on the indirect path. With the occurrence of spring in the southern hemisphere the path to South Africa will remain open longer on 14 and 21MHz.

On **3·5** and **7MHz** conditions will remain the same as during the two previous months with only occasional interruptions of local contacts on 3·5MHz.

The mean provisional sunspot number for June 1973 from the Swiss Federal Observatory was 37·6. Solar activity was at a low level and fairly evenly distributed throughout the month. The predicted smoothed sunspot numbers for October, November and December are 32, 30 and 28 respectively.



MICROWAVES—1,000MHz and up

by DAIN EVANS, G3RPE*

The June Microwave Contest

For what seems to be the first time, a microwave contest was blessed by reasonable weather: even the winds were quite moderate. Despite good propagation conditions immediately before the contest, conditions actually during the contest were nothing special, except in the far south where there was a fine opening but few people to work. The level of activity on 23cm and 13cm was reasonably high. On 3cm there was a significant boost with G3KSU on the Isle of Wight acting as a focus for activity along the south coast, as is shown by Fig 1.

The writer had his usual little problems, like forgetting 34 tent pegs, the table collapsing during the first QSO, and the by now traditional dawn assault by 100 bullocks. (For cattle unimpressed by waving sticks or towels, I can thoroughly recommend using a petrol generator—running of course.) But we were lucky: G4ARD on Dunstable Downs was visited by two car-loads of villains who then proceeded to wreck their station. It is to be hoped that this is an isolated occurrence.

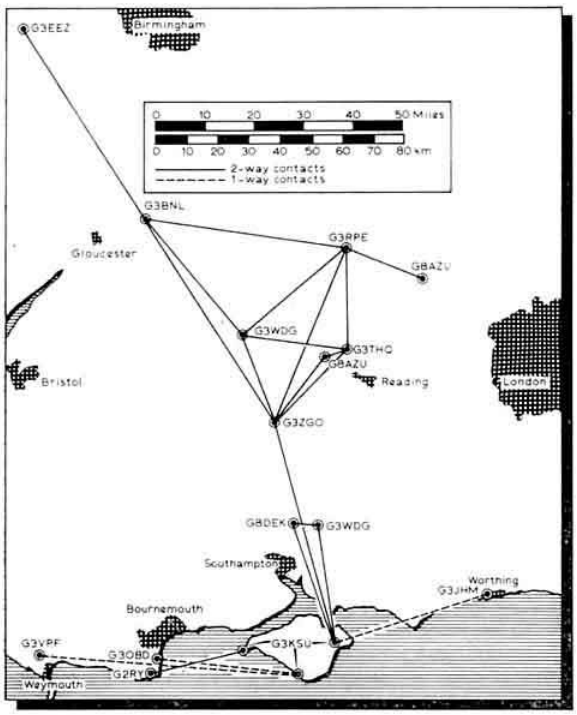


Fig 1. Some of the contacts made on 3cm during the June Microwave Contest

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

Microwave calling frequency

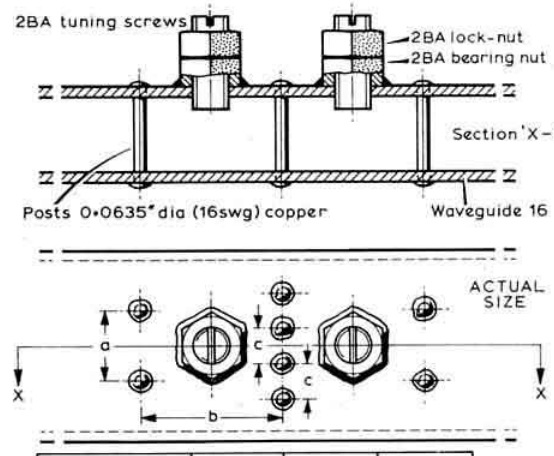
Several readers from time to time have suggested a calling frequency on 70cm for microwave working. The VHF Committee recently considered the question and have put forward 433·2MHz for consideration. Comments are invited.

It is possible that some 3cm contacts were missed during the June contest because some people were restricted to 2m for talk-back while others, perhaps trying also to work 23cm and 13cm competitively, had their hands full keeping tabs on 70cm. It would be a pity if this were the case: as was said last month, there is not so much activitiy on microwaves that we can afford to miss *any* contacts without a better reason than lack of talk-back facilities. Perhaps the 70cm calling channel proposed will go some way to prevent this happening.

Filters for 3cm

The growing interest in narrow-band operation on 3cm has led to a demand for filters to attenuate unwanted harmonics generated in multiplying from lower frequencies. G8APP has designed two filters to cover the top half and the bottom half of the band. As is shown by Fig 2, eight posts are fitted across the guide in precise positions, and two tuning screws are used to set the frequency. The filters have an 80MHz equal ripple bandwidth, a 3dB bandwidth of 120MHz and an insertion loss of 0·3dB. Frequencies 1GHz away are attenuated by about 40dB.

Although this type of filter is relatively tolerant, the posts should really be positioned within a few thousandths of an



Frequency GHz	a	b	c
10·0 — 10·25	0·375"	0·730"	0·198"
10·25 — 10·50	0·370"	0·707"	0·197"

Fig 2. Waveguide filters for 10 to 10·5GHz

inch. Ideally, a milling machine would be used and the subsequent alignment done with elaborate test equipment. However, G3WJG has demonstrated that perfectly acceptable filters to this design can be made by marking out using an accurate rule and a magnifying glass, drilling with a diy drill and stand, and aligning by means of a klystron or Gunn oscillator, a variable attenuator and a mixer diode as a detector.

The method of assembly used by the writer is as follows:

1. Straighten the copper wire by stretching. Cut to length and squeeze one end to stop it slipping through the holes in the waveguide.

2. Fit the wires and the flanges, and hold the 2BA bearing nuts in position using chrome-plated screws. Using a flux which leaves a residue soluble in water (eg Bakers Fluid), and preferably a small gas flame, solder the flanges and also the post joints on the *underside* of the guide only, which will prevent solder running into the inside of the guide.

3. When the solder has solidified, invert the filter and place a piece of wet rag over the post joints already soldered. Solder the 2BA bearing nuts and the remaining post joints, again from the underside, allow to cool and then wash well in running water.

The writer has made a drilling jig for the lower frequency filter which can be used, less accurately, for the higher frequency filter. On the receipt of 4in of waveguide 16, the writer will drill the post holes for the cost of the return postage.

Gunn oscillators

The Gunn oscillator published in the April 1971 column has since been copied by a number of people. Judging from reports, about half of those made have performed well, tuning reliably at least 100MHz. Others have displayed the vices about which readers were warned in the original article, a limited tuning range, frequency hopping, or not tuning at all. Unfortunately, why some oscillators behave and others, apparently identical, do not has not been really sorted out.

However, since this time other designs which seem to be more reliable have been developed. These will be published as space permits: for those in a hurry, an sae will produce drawings.

YOUR OPINION

Repeaters

The Editor
Radio Communication

Sir—I would like to congratulate all members of the Pye Telecom Amateur Radio Group who have devoted much time and energy to the establishment of GB3PI. Surely here is an outstanding example of the true "Amateur" spirit.

It is hoped that from the example of GB3PI further repeaters will be established in the UK and that experiments are also conducted into the use of uhf repeaters.

In the vast majority of cases, operating procedure through GB3PI has been of a very high standard. Assistance has been made readily available to all stations using the repeater to get on channel and achieve correct deviation and tone burst frequency. Any station with an inadequate signal is very soon made aware of the shortcomings of his transmission and help is available to ensure correct adjustments.

Mobile operation has been made a pleasure and the use of the repeater to alert a large number of stations to unusual propagation conditions has proved most useful and can lead to numbers of stations operating under such conditions.

I look forward to a national system of repeaters in the not too distant future.

J. D. Harris, G3LWM

The Editor
Radio Communication

Sir—The article by G3USB in the June issue of *Radio Communication* on the repeater experiment poses a number of vital questions, the most important of which is, perhaps, "Do we want repeaters at all?"

An experiment is one thing. A full-scale repeater service is another matter altogether, and before we ever consider embarking on such a costly venture it would seem to me that far more discussion should take place among all sections of the membership. Only by wide discussion can the full implications be properly appreciated and the very laudable ideas of a few enthusiasts seen in their correct perspective.

"Fools rush in where angels fear to tread" and it seems to me that there is a grave risk of decisions being taken upon an inadequacy of facts and upon an insufficiency of technical data.

We are told, for example, that a channel spacing of 1·6MHz "gave very satisfactory results with very little receiver degradation". Then we are told that the Finnish plan for a 600kHz spacing has been chosen—but we are not told the extent to which the signals were degraded by this narrowing of the channel-spacing. Having regard to the limited bandwidth available, surely one of the first objects should be to determine by experiment and development what really is the minimum channel-spacing which will provide an acceptable degree of signal degradation.

Maybe I am just plain stupid but it does seem to me that we are running a grave risk of allowing the enthusiasm of a few to commit us to a policy decision which could have very wide repercussions and prove exceedingly expensive—all for the benefit and amusement of a very small proportion of the membership.

I am not yet saying "to hell with repeaters"—though I may well arrive at that view in time. For the present, however, do let us proceed with the utmost caution in this field and let our motto be *Festina lente* until we know a whole lot more about all the implications.

G. R. M. Garratt, G5CS

Looking ahead

22 September—Region 10 ORM and dinner, University College, Park Place, Cardiff.

22 September—Region 13 ORM and Scottish VHF Convention.

6 October—Region 7 ORM, "Winning Post", Whitton, Middlesex.

25-27 October—Amateur Radio Retailers Association Exhibition, Granby Halls, Leicester.

RSGB REGION 1 (Manchester)
Diamond Jubilee Dinner
Friday 21 September 1973
Post House Hotel, Palatine Road, Northenden, Manchester
7.30pm for 8pm
Price: £2.25 (inclusive of VAT)

Inquiries to, and tickets from, (sae please): Wm Furness, G3SMM, 16 Coniston Avenue, Sale, Cheshire. Tel (061) 973 6676.

The hotel has excellent parking facilities and is situated five miles south of the centre of Manchester adjacent to Princess Parkway and M56. NGR—Sheet 101, SJ 824901.

46th Annual General Meeting

Minutes of the 46th Annual General Meeting of the Radio Society of Great Britain held at the Royal Society of Arts, John Adam Street, Adelphi, London WC2, on Friday 1 December 1972 at 6.30 pm.

Present: *The President (Mr R. J. Hughes, G3GVV) in the chair, the Executive Vice-President and Honorary Treasurer (Mr J. C. Brown, G3DVV), the Immediate Past-President (Mr F. C. Ward, G2CVV), Dr E. J. Allaway, G3FKM, Messrs B. D. Armstrong, G3EDD; W. J. Green, G3FBA; G. R. Jessop, G6JP; L. E. Newnham, G6NZ; W. A. Scarr, G2WS; R. F. Stevens, G2BVN; G. M. C. Stone, G3FZL; E. W. Yeomanson, G3IIR (members of Council); D. A. Findlay (secretary), A. W. Hutchinson (editor), and 95 Corporate members of the Society.*

An apology for absence had been received from Mr. W. E. F. Corsham, G2UV.

The President welcomed the members to the meeting.

Notice convening the meeting

The Secretary read the notice convening the meeting.

Minutes

The President asked if the minutes of the 45th Annual General Meeting held on Friday 3 December 1971, and published in the September issue of *Radio Communication*, could be taken as read.

There being no objections, the minutes were confirmed, and the President signed them as a correct record.

Annual report of Council for the year ended 30 June 1972

The President explained that the report of Council which was in the accounts was in line with what was required by statute. It was intended, however, that a full report including details of the work of committees up to 31 December would appear in the February issue of *Radio Communication*.

Mr Holloway, G3VUQ, said that he felt that a report in line with that which had previously been included in *Radio Communication* was necessary, so that members could be aware of the activities of the Society.

Mr J. H. Ellis, G2FNK, asked why the report had not followed precedent. Mr J. O. Brown, G3DVV, Executive Vice-President and Honorary Treasurer, explained that the report as now presented was more in keeping with the statutory requirements and previous reports had not been strictly correct. Mr J. Bluff, G3SJE, suggested that the previous basis of a twelve-month account would be more acceptable and Mr H. W. Rees, G3HWR, agreed with this point. It was suggested that the requirements of the Companies Act were minimum and that more information should be available.

The resolution to adopt the report of the Council was put to the meeting and votes were cast: 61 for, 17 against, and there were 29 abstentions.

Audited accounts for year ended 30 June 1972

The report of the auditors was read by Mr J. O. Brown.

The Honorary Treasurer explained that the accounts had been prepared in a slightly different form to that used previously in an attempt to give a clearer picture. Further information was provided by the circular charts that had been prepared showing the breakdown of items of expenditure.

Mr Ham, BRS15744, asked what effect there would be on the Society's finances with the imposition of Value Added Tax (VAT). Mr Brown pointed out that VAT would only apply for three months of the current financial year, and the effect would not therefore be great. However, the Council were considering this matter very carefully. There were a number of ways in which the tax could be dealt with. In the first place the Society could allow the position to remain as at present and then there would probably be an addition to the subscription for VAT which would be paid over to Customs and Excise. Alternatively the annual income could be arranged so that there was a low charge for subscriptions and a separate charge for *Radio Communication*.

The members present indicated that they were much in favour of an arrangement that would minimize the amount of VAT payable.

Mr Shirville, G3VZV, commented that the accounts showed only one figure for salaries whereas previously an amount for staff and agency fees had been shown. Mr Brown pointed out that these figures had been consolidated to remove some of the detail from the accounts but that the figure for staff and agency fees was approximately the same as that for the previous year.

Mr Newton, G2FKZ, asked the position of the Sinking Fund insurance policies shown in the balance sheet of Lambda Investment Co Ltd. It was explained that the annual premiums would result in an amount being available to redeem the debentures of Lambda Investment Co Ltd at redemption date. It was explained that the rent paid to Lambda Investment Co Ltd was equal to the expenses of that company so that there was no surplus arising.

Mr Holloway, G3VUQ, expressed the hope that as there had been a surplus in 1971-2 the Society would spend more on other activities. The President commented that as he would not be in the Chair next year, he could not commit the 1973 Council.

Mr John Bluff, G3SJE, asked if members' life subscriptions were carried forward, and if so under what item in the accounts. Mr Brown confirmed that a part of each life subscription was carried forward and was included in "Subscriptions in Advance".

Mr Brown, in reply to a question from Mr J. H. Ellis, G2FNK, confirmed that the new machine was for the membership subscription records. Mr Ellis suggested that it would be to the Society's advantage to buy access time on a computer installation to maintain the membership records. Mr R. A. Ledgerton, G2ABC, commented that the subscription records were not large enough to warrant the application of computer techniques.

Mr R. Glaisher, G6LX, proposed and Mr Williams, G3ZKI, seconded that the audited accounts for the year ended 30 June 1972 be adopted.

The motion was carried unanimously.

Council 1973

The President read a letter dated 24 November 1972 that had been received from the scrutineers of the ballot for Council members.

The President announced that Dr E. J. Allaway, G3FKM; Mr L. E. Newnham, G6NZ; and Mr F. C. Ward, G2CVV, were elected to Council as ordinary members for 1973, and that Mr W. J. Green, G3FBA, was elected to Council as member for Zone C for 1973.

The President also announced that he had been notified by Mr J. Bazley, G3HCT, that he wished to resign from his position as a member of Council for Zone B. At the meeting of Council in January 1973, this matter would be considered and an appropriately qualified member would be invited to serve on Council.

The President congratulated the members elected for 1973 and thanked the unsuccessful candidates for taking part in the election.

Auditors

It was announced that the Society's auditors, Edward Moore & Sons, Chartered Accountants, would continue in office. Mr Brown proposed that the remuneration of the auditors for 1973 be fixed at £325. The motion was seconded by Mr C. Powell, G8BPK, and duly passed.

Other business

The President explained that under this heading only matters relevant to an Annual General Meeting could be dealt with.

Mr Andrew Holloway, G3VUQ, and Mr Ian Jackson, G3OHX, asked what procedure must be followed to enable a member to submit questions at an Annual General Meeting. The Secretary explained that the Companies Acts were restrictive in this matter and while it might be that questions could be dealt with informally, no proposals could be accepted and voted upon unless they had appeared on the agenda on the notice calling the meeting, and proper notice had been given to all members.

The Secretary said that two resolutions had been submitted to the Society for consideration at the Annual General Meeting. Neither resolution had the necessary number of members' signatures required for a requisition and could therefore not be accepted. Section 140 of the Companies Act 1948 states at length that the number necessary for a requisition shall be members representing not less than one twentieth of the total voting rights of all the members.

The first resolution had required that the Articles of Association be altered so that the Annual General Meeting be held on a Saturday

or Sunday. It was pointed out that this was already covered by the Articles of Association which stated that the meeting be held at such time and such place as the Council shall fix. There was therefore no restriction on the day on which a meeting could be held.

The second resolution asked that an agenda item "Any Other Business" should be included in the agenda. It was pointed out that there was already a statutory requirement for this item, and it was always included in an agenda.

It was pointed out by Mr Yeomanson, G3IIR, that Council members always endeavoured to deal with questions at meetings, but it was always advisable to submit in writing questions which required a detailed reply to the meeting so that a full reply would be available.

There being no further questions, the meeting was declared closed at 7.10pm.

After the Annual General Meeting and the presentation of Society trophies, an informal meeting was held. A report of this meeting appeared in *Radio Communication* of January 1973 on pages 48-9.

COUNCIL PROCEEDINGS

A brief report of the Council meeting held on 8 May 1973

Present: *Mr G. R. Jessop (Executive Vice-President, in the Chair), Dr E. J. Allaway, Messrs B. D. A. Armstrong, J. O. Brown, R. W. Fisher, W. J. Green, R. J. Hughes, E. G. Ingram, W. F. McGonigle, L. E. Newnham, W. A. Scarr, A. W. Smith, R. F. Stevens, G. M. C. Stone and F. C. Ward (Council members), D. A. Findlay (general manager) and A. W. Hutchinson (editor).*

Apologies for absence had been received from the President, Dr J. A. Saxton; Mr C. H. Parsons and Mr J. R. Petty.

Finance report
The Honorary Treasurer commented on the interim accounts for the nine months ended 31 March 1973. There would be increases in expenditure in the fourth quarter, including VAT on the subscriptions received, and a considerable increase for general rates.

It was not expected that the accounts for the financial year to 30 June 1973 would show an appreciable surplus.

It was agreed that the Honorary Treasurer and the general manager should consider the advantages of charitable status for the Society and take appropriate action.

Membership and affiliation
It was resolved:

(*i*) to approve the applications for membership, transfers and reinstatements for March and accordingly elect 245 new members;
(*ii*) to accept reduced subscriptions from four members;
(*iii*) to waive the subscription for 1973-4 of 14 members on the grounds of blindness or other disability;
(*iv*) to grant affiliation to the Bath & District Radio Group, Bromley Radio Club, Hinckley Amateur Radio and Electronics Society, Kettering and District Amateur Radio Club and Willenhall and District Amateur Radio Club.

Reduced subscriptions
In order to clarify the requirement as to membership of the Society when applying for a reduced subscription it was agreed that part of the original minute should be amended so as to read: (a) "The said member is not less than the age at which the National Retirement Pension becomes payable, and is at the time of application, and has been for at least 15 years immediately prior to the date of application, a member of the Society."

Gift from Mr M. R. Campbell, VK3MR
It was reported that a gift of £25 had been received from Mr M. R. Campbell, VK3MR, through Mr F. J. Charman, G6CJ, who has recently returned from a visit to Australia.

Council agreed that the money should be used for the headquarters station, and a vote of thanks to Mr Campbell was carried unanimously.

"Wireless World"
It was reported that Mr Harold Barnard, on his retirement as editor of *Wireless World*, had expressed appreciation of the help and co-operation that he had received from the Society over the years.

It was agreed that the general manager should send an appropriate letter of appeciation.

Repeaters
The minutes of the VHF Committee meeting of 25 April 1973 included a recommendation to Council in connection with continuation of the repeater experiment.

After considerable discussion it was agreed that the experiment had proved successful to date and that the MPT should be approached with a view to an extension of the experiment.

Marconi Celebrations—Ballycastle 6 July
Council approved the visit of Mr McConigle and the general manager to Ballycastle on 6 July to attend the Marconi/Kemp Memorial dedication. Council noted that an informal meeting of Northern Ireland representatives would be held on Saturday 7 July.

Bristol '73 Celebrations
Council noted that Mr Jessop would be giving a talk during the Convention on 26 May. Mr Scarr pointed out that Mr Jessop would be giving his personal opinions on the future of the RSGB as Council could not make any forecast.

Committee minutes
Council received the minutes of the following committees: Raynet (20.1.73), Diamond Jubilee (30.1.73), HF Contests (1.2.73), MPT Liaison (15.2.73), Mobile & Exhibition (20.2.73), VHF Contests (26.2.73), Membership & Representation (5.3.73), Finance & Staff (13.3.73), Diamond Jubilee (13.3.73), VHF (14.3.73), Interference (16.3.73), Technical & Publications (20.3.73), VHF Contests (26.3.73), Mobile & Exhibition (27.3.73), Education (31.3.73), Scientific Studies (2.4.73), VHF (27.4.73).

Region 7 Official Meeting
Council noted that a Region 7 ORM would be held on 6 October at the Winning Post Hotel at Whitton, Middlesex.

OBITUARIES

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

Mr W. Bedwell, BRS29549
Walter Bedwell died on 10 June at the age of 66. His interest in amateur radio dated back to the 'twenties, in recent years he did much to encourage younger radio enthusiasts, to which end he was the founder of the Sully and District Short-Wave Club, and at the time of his death its chairman.

Mr R. C. B. Cutts, G3HRC
Reg Cutts died on 11 April after a long illness. He had been associated with Cray Valley Radio Society since around 1950, and was well-known as a constructor of fine gear. At various times he had been active on 160, 15 and 4m.

Mr D. S. Mitchell, G2II/GW6AA/ZL1MP/VP7NI
David Mitchell died on 20 April at his home on Eleuthera Island, Bahamas. Although badly crippled by poliomyelitis in his youth, he pursued a wide range of activities, and was for many years a keen cw operator.

We have also been advised of the deaths of

Mr A. W. L. Summers, G5SS, on 4 May.
Mr A. G. Racher, GM3JFJ, of Glenrothes, on 6 June.

CONTEST NEWS

Code of practice for vhf contest operation

1. Obtain permission from the landowner or agent before using the site, and check that this permission includes right of access. Portable stations should observe the Country Code.
2. Take all possible steps to ensure that a site is not going to be used by some other group or club. If it is, come to an amicable agreement *before* the event. Groups are advised to select possible alternative sites.
3. *All transmitters* generate unwanted signals; it is the level of these signals that matters. In operation from a good site, levels of spurious radiation which may be acceptable from the home station may well be found excessive by nearby stations (up to 25 miles or even further).
4. Similarly, *all receivers* are prone to have spurious reponses or to generate spurious signals in the presence of one or more strong signals, even if the incoming signals are of good quality. Such spurious responses may mislead an operator into believing that the incoming signal is at fault, when in fact the fault lies in his own receiver.
5. If at all possible, critically test both receiver and transmitter for these undesirable characteristics, preferably by air test with a near neighbour before the contest. In the case of transmitters, aim to keep all in-amateur-band spurious radiations, including noise modulation, to a noise level of at least —90dB relative to the wanted signal. Similarly, every effort should be made to ensure that the receiver has an adequate dynamic range.
6. Above all, be gentlemanly at all times. Be helpful and **inform all stations** apparently radiating unwanted signals at troublesome levels—having first checked your own receiver! If asked to close down by a Government or Post Office official, do so at once without objectionable behaviour. If the site owner requests your station to close down, accede to his request without hostility.

VHF Contests errata

The VHF Contests Committee apologises for the following errors in published results:
144MHz Fixed Contest—G8DNK, 548 points, should have been in 3rd place and G3NHE, 538 points, in 4th place.
432MHz Cumulative Contest—G4AGE, 266 points, was inadvertently omitted from the table.

21/28MHz Telephony Contest—rule clarification

To avoid possible confusion, the **General** rule published on p 348 of the May 1973 issue of *Radio Communication* should read:
General
A station, whether fixed, portable, mobile or alternative address, may be logged only once *on each band* for the purpose of scoring.

1973 80m LP Contest results

Posn	Callsign	Points	Power (W)	QSOs
1	G4BCH	4,000	0·5	40
2	G3KIN/P*	3,900	0·45	39
3	G3NEO	3,600	0·5	36
4	G4BGG/P*	3,200	0·5	32
5	G3JKY	2,900	0·45	29
6	G3ROZ	2,700	0·5	27
7	G2AVC	2,500	0·5	25
8	G3SHY	825	0·9/1·9	31
Check log	G8PG	550	0·72	11

* Operated by G4BEG and G3WKH respectively.

80m Field Day 1973 rules

1. The General Rules for RSGB HF Contests, published in the January 1973 issue of *Radio Communication*, will apply.
2. **When.** 0900gmt to 1600gmt on Sunday 9 September 1973.
3. **Eligible entrants.** Multi-operator entries will be accepted. A maximum of two operators per station will be allowed.
4. **Contacts.** CW (A1) only in the 3·5-3·6MHz band. The location of the station must be sent.
5. **Scoring.** 15 points for a contact with another portable or mobile station, 5 points for a contact with a fixed station.
6. **Power.** The maximum power input to the pa stage must not exceed 10W. The power for all parts of the station must be derived from dry batteries or accumulators; the practice of "float" charging the batteries or accumulators is not permitted.
7. **Trophy.** The Houston Fergus Trophy will be awarded to the winning station.
8. **Logs.** Column (5) should be headed "Location of station contacted".
9. **Entries** must be addressed to the RSGB HF Contests Committee, c/o D. Thom, G3NKS, 20 Bramble Close, Copthorne, Crawley, Sussex, RH10 3QB.

1st 1·8MHz Contest 1973 results

The HF Contests Committee regrets the late publication of these results, which was due to the unavoidable delays involved in obtaining proof of contact for QSOs between entrants and certain non-competing stations.

Operating in his first 1·8MHz contest, G3YVY takes first place and the Somerset Trophy, while the Cambridge University Wireless Society station G6UW, ably operated by G3XTT, occupies second position. The leaders all used transceivers and inverted vee aerials. North of the border, GM3YOR won the Maitland Trophy. Disappointingly, only three entries were received for the under-eighteen section; the honours go to G4AMH for the second time running.

Logs were generally well-presented, but there were the usual one or two guaranteed to try the patience of the adjudicator, and all the entries lost points for inaccuracy. Many of these errors appear to be due to the use of excessively high speeds under QRM conditions, and entrants are reminded that a mistake in reception of a callsign means that the transmitting station also loses points. Comments were few and far between.

Subject to the usual approval, the Somerset Trophy will be awarded to G3YVY, and certificates of merit to G6UW, G3ZPC and G4AMH.

S.K.

Posn	Callsign	Points	Cnty
1	G3YVY	834	DH
2	G6UW (*op* G3XTT)	735	CE
3	G3ZPC	714	DH
4	G3RPB	702	BE
5	G3SSO (*op* G3PEO)	678	GR
6	G3RVM	669	WE
7	G6BQ	666	KT
8	G3KLH	639	BE
9	G3WDF/A	636	EX
10	GW3UCB/A (*op G3WKH*)	615	CV
11	G3TR	612	SY
12	G3RRS (*op G3UKS*)	591	BS
13	G3SKC	588	MX
14	G3IGW	573	YS
15	G3IAS	549	SY
16	G3TIR	525	SX
17	G3UKC	507	KT
18	G3ZJK	489	GR
19	G4AAL	417	WR
	G4AKY	417	SY

Posn	Callsign	Points	Cnty
21	GM3YOR	408	FE
22	G4AMH*	375	SY
23	G3TLF	363	YS
24	GW3HGL	357	DB
25	GM4ASY*	339	RW
26	GM3FXM	330	FE
27	G3VLX	303	KT
28	G3RSM	285	LE
29	G3ZYW	279	ST
	G4AKA	279	SY
31	G3ATF	270	MX
32	GW3GWX	264	CV
33	G3ZNH	261	WE
34	G3LCH	258	LD
35	G8AB	240	EX
36	GW4BCA*	231	CV
37	G4ALG	228	BE
38	G4AEM	216	HF
39	G3HTA	213	DN
40	G3VDW	171	LR
41	G3YMC/A	156	BE
42	G3CNX	129	LN

* Entrant under 18 years of age.
Disallowed entry: G3WAH/A—late entry sent to wrong address.

The HF Contests Committee gratefully acknowledges check logs from G3ZPP, OK1MCW and OL1API.

MAITLAND TROPHY

Posn	Callsign	2nd 1972	1st 1973	Total
1	GM3YOR	482	408	890
2	GM3FXM	550	330	880
3	GM4ASY	273	339	612
4	GM3UKG/P	202	—	202

May 144MHz Portable Contest results

All G call areas were represented in the large entry received for this contest, with an LX station for good measure. Conditions being no more than average for the greater part of the time, the advantage lay with those remote stations who could continue to work dx at low signal levels. The event was convincingly won by the GM3BA/P team on the Mull of Galloway, and the Mitchell-Milling trophy will be borne away in triumph to Sutton Coldfield. Certificates of merit will be awarded to runner-up G8AGU/P for his solo effort from Devonshire, and to G3CGQ/P, who celebrated his 25th consecutive year of 144MHz portable contests by coming—25th!

I.F.W.

Posn	Callsign (/P)	Score	QSOs	Cnty	Best dx	Km
1	GM3BA	1,370	138	WG	G8FCD/P	525
2	G8AGU	1,152	141	DN	—	—
3	G3FEC/LX	1,129	128	(LX)	OZ6OL	716
4	GM8FFX	1,012	83	KE	G8AGU/P	—
5	GW3OBD	939	163	BR	G4ARN/P	308
6	GW3WAS	842	140	DB	GM8FFX/P	455
7	GW8EMF	785	106	MR	GM8FFX/P	460
8	G3IZD	727	119	SX	F1CF	540
9	GW3PXP	718	112	MG	—	—
10	G3UGF	711	99	YS	F1FT	640
11	G3JIJ	686	96	YS	G3WKS/P	385
12	GW4ALE	652	118	MR	G4AYT	352
13	G3JFO	628	82	YS	PA0BCA	420
14	G4ARN	594	81	NK	GM8FFX/P	490
15	GW3NNF	584	76	AG	GM8FFX/P	453
16	G3SDC	573	115	LR	PA0GMV	470
17	GW3GHC	556	98	GN	F1COF	368
18	GW4ABR	544	78	MG	G4ARN/P	340
	GW3YCQ	544	87	BR	G4ARN/P	363
20	G8FCD	525	61	SX	GM3BA/P	525
21	GW3UUS	517	109	MH	G4CDF/P	280
22	G3ZBY	491	104	LE	G8GON/P	315
23	G3WIN	480	84	CD	G3JEQ/P	392
24	G3XMG	469	101	YS	G3WKS/P	378
25	G3CGQ	466	63	DT	PA0JMV/A	560
26	G3PIA	461	87	BE	GM8FFX/P	—
27	GW4APJ	426	74	BR	PA0JMV/A	612
28	GC8EZA	423	51	JY	G3FIJ	355
29	GD3YEO	422	65	IM	G8DWC/P	379
30	GW8CEH	418	88	RN	G4ARN/P	300
31	G3WKS	412	78	KT	G3FEC/LX/P	390
32	G8DDW	403	59	SY	GM3BA/P	475
33	G8BQX	379	52	SX	F6ANW	462
34	G8EQL	367	81	ST	G4ARN/P	352
35	GW3ITZ	366	93	DB	G3WXC/P	310
36	G4ACG	360	79	SX	GM3BA/P	500+
37	G8GTE	347	60	DH	G8GUE	405
38	G4BZP	329	65	WD	G4ASR/A	374
39	G8DJW	319	77	DT	F1BZN	250
40	G8CUB	315	47	KT	G3FEC/LX/P	440
41	G3WDH	314	72	LE	G6GN	245
42	GW8DWA	309	70	DB	GM8FFX/P	437
43	G8GXE	291	61	OX	G8FTX	322
44	G3JEQ	283	83	SY	G3WIN/P	398
45	GI8AYZ	282	40	AM	G4ASR/A	533
46	G4ADV	275	55	CL	G4ASR/A	310
	G8CIB	275	67	GR	G8FRR/P	310
48	G3KUE	262	70	LE	G8AGU/P	316
49	G8FDW	255	57	GR	F1CCP	310
50	G4AKA	244	76	SX	GW3WAS/P	264
51	G8FDJ	232	50	LE	G3CGQ/P	335
52	GW3ATZ	227	65	FT	G2DSP/P	312
53	G3ZLQ	217	53	OX	G3XMG/P	320
54	GM3OWU	214	39	LK	GW3GBU/P	312
55	G3WXC	213	51	HE	—	—
56	G3WCB	211	49	OX	GD2HDZ	349
57	G8GIY	209	42	DY	—	—
58	G8FVC	206	81	SD	GI8AYZ/P	320
59	G8FBL	205	65	DY	G8DVC/P	185
60	G2DSP	190	51	SX	G8GKI/P	305
61	G4ARF	188	58	LE	G8HIA/P	299
62	G8HIA	185	55	ST	G4ARF/P	299
63	G8CHU	177	45	LR	GM3BA/P	315
64	G8ELO	170	50	WK	GM3BA/P	290
65	G8HHI	163	43	YS	GW3OBD/P	260
66	G8BDM	161	45	WE	G3ZBY/P	—
67	G8GDZ	151	46	WK	G4ARF/P	210
68	G8FRR	137	23	CD	G8CIB/P	300+
69	GM4AOR	132	48	PB	G4CDF/P	325
70	G8EOJ	129	43	ST	GC8DCO/A	195
71	G3OUR	123	41	OX	G3JFO/P	242
72	G3SXY	108	30	ST	G4ARN/P	—
73	G3VPR	103	27	RD	GM3BA/P	355
74	G8HBZ	101	33	NR	GW4ALE/P	175
75	G4BHZ	100	34	DN	GW8CEH/P	155
76	G3ZXD	94	50	DT	—	—
77	G3OHW	63	19	HF	—	—
78	G3XFW	57	23	ST	—	—

Check logs acknowledged from G3EJF/G3JZP/P, G4ASR/A, G4BMM, G8BKR and BRS33823.

May 144/432MHz Open Contest results

This contest has had split comment on the 144/432 activity, one side asking why the two bands were mixed, the other applauding the renewed activity, if only for a short while, on 70cm. The weather was not altogether at its best but the portable stations were able to make good contacts well into Europe Propagation direction seems to have been lacking in any sense.

The use of 70cm and the multiplier enabled the top scorers in both Fixed and Portable to hold their places, but by use of only 70cm G8ARM was able to hold third Fixed position.

F.M.

FIXED

Posn	Band	Callsign	Points	QSOs	Cnty	Best dx	Km
1	2/70	G3ZMD	769	116	DB	G8GPR	285
2	2/70	G3UKC	613	120	KT	ON5EW/A	356
3	—70	G8ARM	420	37	LD	G8FBG/P	157
4	2/70	G4AGO/A	394	108	YS	G8BQX/P	318
5	2/70	G8CTT	368	110	KT	GW4ABR/P	250
6	2/70	G3JHM	356	36	SX	F6BSJ/P	640
7	2/70	G3WGC/A	344	79	HF	F1BWI/P	360
8	2/70	G4BMM	313	74	BD	F2YT/P	—
9	2	G4APL	303	66	SY	ON5EWA	440
10	2	G3FPK	214	90	SY	G4AGQ/A	258
11	2	G8DCL	169	77	KT	G3SZS/P	155
12	2	G3UOE	138	58	EX	G8BKU	—
13	2	G8FUR	117	69	LD	G3OBD	170
14	2	G8EWK	104	36	LN	GI8AYZ/P	350
15	2	G3VWI	100	45	WK	GW4ABR/P	165
	2/70	G8BKR	100	40	GR	G4BEM/P	180
17	2	G8ECO	90	45	SY	G8DJW/P	148
18	2	G8FXB	85	41	EX	G8AAY	195
19	2	G4BKY	82	38	GR	G8PY	165
20	2	G8HBA	81	53	LD	G8CIB/P	152
21	2	G4BPO	80	36	SF	G3NNG/P	205
22	2	G3OHM/A	71	47	WK	G8FHB/P	90
23	2	G4BOW	68	46	LN	G3NNG/P	106
24	2	G8BBP	67	31	WR	GW8FOL	200
	2	G8HDZ	67	55	KT	G8BQX/P	70
26	2	G2AVC	66	38	MX	—	—
27	2	G8BXJ	62	36	GR	GW4ABR/P	142
28	2	G4CCA	54	38	LD	G8BQX/P	95
29	2	G4BWP	18	12	BD	G3NNG/P	89
30	2	G8GGU	16	16	EX	G8DTQ	40

PORTABLE

Posn	Band	Callsign	Points	QSOs	Cnty	Best dx	Km
1	2/70	G3NNG/P	1,404	229	BE	DL0OM/P	600
2	2/70	G8BQX/P	1,309	198	SX	DL6QB/P	445
3	2/70	GW3UCB/P	1,033	120	CV	G3BHW	455
4	2	GW4ABR/P	950	147	MG	ON5UI	480
5	2/70	G8ELO/P	737	144	NH	G3YCQ/P	255
6	2/70	G4AFN/P	635	136	BS	G8GPR	265
7	70	G8DOR/P	576	40	OX	G3SXK	117
8	2	G8ALM/P	566	160	EX	DC9DZA	425
9	2/70	G8GHR/P	565	108	BD	GW4ABR/P	230
10	2	G3FZL/P	564	146	SY	F5SE/P	510
11	2/70	G8GSX/P	519	144	SY	PA0MS	390
12	2/70	G4ALE/P	490	95	WE	G4ARN	225
13	2	G3WIR/P	457	163	OX	GW4ABR/P	212
14	70	G8AYY/P	450	27	SD	—	—
15	2	G4BEM/P	448	131	SD	—	—
16	2	G8CIB/P	382	102	GR	F1KCG	275
17	70	G8DLQ/P	378	28	KT	G3NNG/P	148
18	2	G3OUR/P	373	103	GR	F1KCG	296
19	2	G3KIN/P	334	158	SY	G4ARN	190
20	2	G8FAB/P	330	100	WE	G3EGO	280
21	2	G8DUQ/P	286	96	ST	—	—
22	2	G2FJA/P	242	113	KT	G4BEM/P	258
23	2/70	GI8AYZ/P	240	39	AM	G8EWK	373
24	2	G3JFO/P	234	60	YS	G8CQS	338
25	2	G8GGH/P	223	95	OX	G8FNV	145
26	2	G8FBQ/P	219	85	WK	G8GZP/P	185
27	2	G3JKF/P	212	68	SX	G3CO	154
28	2	G8GHZ/P	200	73	NR	GW4ABR/P	175
29	2	GW4BLE/P	184	80	MH	G4BWD/P	205
30	2	G4ANP/P	174	89	YS	—	—
31	2	G3WOA/P	169	71	HF	F1APQ/P	169
32	2	G4BHZ/P	163	62	ST	G3ZMD	224
33	2	G4CAR/P	149	69	SD	G8FAB/P	152
34	2	GW4AHV/P	140	41	GN	GC2FZC	275
35	2	G8DAZ/P	131	47	DH	G3RSD/P	185
36	2	G8FWV/P	84	41	BD	G4AGQ/P	187
37	2	G8EQK/P	64	32	NK	G4BKG	130
38	2	G8EEM/P	55	37	YS	G3RSD/P	90
39	2	G8FUL/P	48	24	SY	G8CIB/P	120

Check logs from G3SAO, G3WHK and /M, G8ECT, A7683 and BRS33823 are acknowledged.

May 1973 432MHz Fixed Station Contest results

Fourteen entries! Not very encouraging for the VHF Contests Committee in their endeavours to encourage 70cm activity. In view of the success of the last series of cumulatives, two similar events, one in the autumn and one in the winter, will be arranged.

L. H.

Posn	Callsign	Score	QSOs	Best QSO	Km	Cnty	Pwr	Aerial
1	G3KMS	104	26	G5UM	155	LE	150	4 slots
2	G3ZMD	87	39	G8BQX/P	127	BD	25	46-el
3	G8AVX	56	24	G3KMS	142	LR	15	46-el
4	G4BFT	54	24	G3KMS	124	SD	40	18-el
5	G5UM	50	20	G3KMS	155	LR	15	14-el
6	G4AGE	49	25	G8BIL	101	DY	15	18/18
7	G8CIT	44	30	G3NNG/P	88	MX	75	18-el
8	G3UBX	42	22	G3KMS	119	—	20	4 × 46
9	G8ERW	40	28	G3NNG/P	95	HF	25	18-el
10	G8EDF	38	20	G8ELO/P	105	DY	20	46-el
11	G8FMK	36	18	G3SXK	108	OX	6	10-el
12	G2HDJ	33	23	G4ALE/P	84	MX	100	4 × 10-el
13	G4AGQ/A	14	10	G5UM	100	YS	0·25	18-el
14	G8GBV	8	6	G8AVX	63	DY	15	46-el

DF Qualifying Round—Slade, Birmingham

Date: 5 August 1973.
Map: OS Sheet 145 (Banbury).
Assembly: 1300bst for start at 1320bst.
Location: Burton Hills, near Burton Dassett, NGR 399519. Frequencies and callsigns will be announced at the start.

Intending competitors are asked to notify Mr P. M. Williams, 20 George Road, Water Orton, Warks, of the numbers in their parties requiring tea as soon as possible.

South Manchester DF Qualifying Event results

On 20 May, 11 teams gathered at the "Romper" public house for the second qualifying event of the year. Good signals were heard from both transmitters, and about half the teams selected station "A", G3FVA/P, located in a small wood about seven miles from the start, operated by G3WFT and G8AHB, who were well hidden under a mountain of bracken and branches. The first competitors were seen about 1435, searching nearby bushes, but a further 20min elapsed before the first competitor, Eric Mollart, located the transmitter. A number of competitors were confused by the extra-long aerial, which wandered through bushes and up into the trees.

Station "B", G3UHF/P, operated by G3SMT and G8FXO, was approximately 10 miles from the start, in the opposite direction to station "A" about 16 miles away. The transmitter was located near the top of Kerridge Hill (1,023ft high) which, as some teams found out, was rather steep. A number of competitors took the long way in, which included a 500ft climb, and arrived red in the face. They were rewarded with a magnificent view from the hill top, the transmitter actually being in line of sight with the start.

The South Manchester Radio Club would like to thank all who took part and Mrs Parkinson and the ladies who arranged the excellent tea.

Posn	Name	Club	Time of arrival Station "A"	Station "B"
1	E. L. Mollart	Oxford	1457½	1554
2	T. C. Gage	Oxford	1458	1600
3	G. Whenham	Coventry	1604	1452
4	W. J. North	Chiltern	1617½	1453
5	D. E. Newman	Rugby	1458½	—
6	D. Kennedy	Goole	1459	—
7	R. P. Smith	South Manchester	—	1602
8	C. Schofield	South Manchester	1603	—
9	A. Clark	South Manchester	Failed to locate either transmitter	
	J. McBurney	South Manchester		
	B. A. Reid	Derby		

E. L. Mollart and T. C. Gage qualified for the Final.

5th BARTG VHF RTTY Contest rules

When: 1700–2300gmt Saturday 8 September and 0600–1200gmt Sunday 16 September 1973.
Who: Licensed amateur radio stations within Zones 14 and 15 who are permitted to use rtty as a mode of operation. Portable operation will be allowed but must be from one location for the duration of the contest. Contest logs from SWLs will also be very welcome.
Bands: 144MHz and 432MHz bands.
Stations may not be contacted more than once on any one band. Additional points can be claimed from the same station if a different band is used.
Messages will consist of: (a) Time of start of contact. (b) RST report. (c) Message number. (d) QRA Locator (Standard five-symbol Locator) or QTH given either as a town or as a bearing and distance in kilometres from a town. The town must be identifiable on a normal tourist road map.
Points: All two-way rtty contacts will score in accordance with the distance chart shown below.
Band multipliers as follows: 144MHz band, X1; 432MHz band, X6.
Distance:

0– 50km scores 1 point	250–300km scores 11 points
50–100km scores 3 points	300–350km scores 13 points
100–150km scores 5 points	350–400km scores 15 points
150–200km scores 7 points	400–450km scores 17 points
200–250km scores 9 points	and pro rata.

Scoring: If both bands are used the two scores will be added. Portable station scores will not be listed separately.
Logs: Use one log per band. Logs to contain the following: date, time of start of contact, RST report, message number, callsign of station worked, his RST and message number, QRA or QTH received, estimated distance and points claimed.
Send your logs to: BARTG VHF Contest, c/o Eric Yeomanson, G3IIR, 32 Gaynesford Road, Forest Hill, London SE23 2UQ.
All logs must be received by 19 October 1973 to qualify.
Awards: Certificates will be awarded to the top scorers and runners-up on each band in each country. The judge's decision will be final and no correspondence can be entered into in respect of incorrect entries.

1973 BARTG Contest results

This year's event was a pretty grim struggle with the advent of a major solar disturbance a couple of days before, and the ability to make scoring contacts tended to be very much a matter of the area in which a station was located.

Congratulations to I1BAY, I5MPK and IT9ZWS who came first, second and third respectively, and special congratulations to G3OZF in securing fourth place. Other G entries occupied positions 30 (G3YKB), 34 (G3RQY), 44 (G3RDG) and 46 (G3OUR) in the results table which contained 54 entrants. In the SWL Section, D Hare, BRS27239, was placed third out of six entries.

The number of contest logs received was surprisingly small, probably due to the fact that operators in general managed to get far lower scores than usual and may have been reluctant to send in an entry. As an example, the leading station's score this year was only 74 per cent of that of last year's leading station with only 13 fewer contacts.

Contests calendar

4-5 August	—YO DX CW/Phone
5 August	—DF Qualifying, Slade (Rules in this issue)
5 August	—RSGB Region 1 VHF
11-13 August	—WAEDX CW
12 August	—70MHz Fixed and Portable (Rules in July issue)
18 August	—144MHz QRP (Rules in June issue)
19 August	—144MHz SSB Open (Rules in July issue)
1-2 September	—LZ DX CW/Phone
1-2 September	—VHF NFD (Rules in March issue)
1-2 September	—IARU 144MHz (Rules in May issue)
9 September	—80m FD (Rules in this issue)
9 September	—DF Qualifying, Dartford Heath
8-9 September	—WAE DX Phone
8-16 September	—5th BARTG VHF RTTY (Rules in this issue)
15-16 September	—SAC CW
15-16 September	—Cray Valley RS 5th SWL (Rules in July issue)
22-23 September	—SAC Phone
23 September	—DF Final, to be organized by Stratford Group
6-7 October	—VK-ZL-Oceania Phone
6-7 October	—UHF NFD
6-7 October	—IARU 423/1,296MHz (Rules in May issue)
13-14 October	—VK-ZL-Oceania CW
13-14 October	—21/28MHz (Rules in May/August issues)
20-21 October	—WADM CW
20-21 October	—7MHz CW (Rules in June issue)
3-4 November	—7MHz Phone (Rules in June issue)
3-4 November	—144/432MHz CW
10-11 November	—OK DX CW/Phone
10-11 November	—2nd 1·8MHz
11 November	—70MHz Cumulative
9 December	—144MHz Fixed

RAYNET

by S. W. LAW, G3PAZ*

By the time this is read the Woburn Rally will be all set to take place. As we write these words, the glorious sunshine has given way to overcast sky and pouring rain, so we therefore attempt the interesting task of pounding a typewriter with fingers crossed! No wonder the British are adepts at the art of compromise and adaptability.

Which last profound thought leads nicely to the problems faced by controllers and/or committees of Raynet groups when the inevitable disputes arise in the ranks over one or other of the shades of opinion among the members. We have been in turn appalled, amazed and delighted at what we have heard at various group meetings and feel that we all owe a debt of gratitude to those of generations past for hammering out the now accepted principles of procedure which enable an apparent *impasse* to be resolved into mutual agreement by tolerance, good will and democracy. One tip for groups who find that a meeting must take place to settle internal strife; select from your number a good strong-minded chairman. Having accepted the responsibility, a man of good will, whatever his private views, will ensure that order and reason prevail.

To B or not to B?
For some time now we have had a dual licence system; those who could pass the RAE but were either not interested in, or could not find time to pass, the additional morse test were granted a G8+3 letter call graded B, while those who soldiered on through rated a G3 or the new series G4 calls. At one time rarely would the twain meet on the air owing to the original restriction of frequencies for G8+3 calls. Now they can meet on the common ground of the 2m band thanks to the RSGB representations to the MPT. (In the foregoing, please do not think we deliberately omit GC, GD, GI, GM or GW; the illustration is merely generic).

It is a great pleasure to note that so many applications for membership are received from Class B licence holders and we would like to refute the suggestions from certain quarters that a valid Raynet group cannot operate without Class A transmitters. It has been well proven that this is by no means the case, as the list of groups who operate exclusively on the higher frequencies will readily show.

Not so idle words
Although a rose by any other name may smell as sweet, it does not follow that a given word will provide the same mental image to individuals in different contexts. For example, "first aid" has a professional image for the majority even though it is often carried out by dedicated amateurs who have acquired the necessary techniques. How would the public react to "amateur medical assistance" at the scene of a disaster? Not so well, we fear. Hence we have little hesitation in encouraging the use of the term "emergency radio" in connection with Raynet. Too much time can be wasted in convincing the average person that "amateur" is not synonymous with "incompetent", so, to fill in our first quote, "What's in a name?". Explanations can be given fully when there is time to spare; all can then be made clear.

Remember September
Controllers are requested to bear in mind the proposed Raynet event which will soon be upon us and to ensure that their groups are prepared to participate in this, a part of this notable RSGB year. If the date and times have been mislaid, do please check with other groups or with the hon registrations secretary at once.

Honorary registrations secretary: **Mrs Jane Balestrini, "Merrivale", Willow Walk, Culverstone, Gravesend, Kent DA13 0QS.**

* 130 Alexandra Road, Croydon, Surrey, CR0 6EW

MOBILE RALLY NEWS

Derby Radio Rally, 12 August
Venue for this rally is the Rykneld Schools, Bedford Street, Derby, with gates open from 11am onwards. Attractions include a band concert, junk sale, auction sale of surplus radio gear (details from G3FGY), tombola, children's events, trade exhibition, club stand and demonstrations. Admission and car parking are free, and talk-in will be on 160m (G3ERD/A), 4m (G2DJ/A) and 2m (G8DBY/A).

Uncle's Southend "Do", 19 August
A slight alteration to the details given in the July issue of *Radio Communication*. The first meeting will now be at 11.30am, the second at 1.15pm, and from 2pm onwards at the Church Hall, St Johns Road, Westcliff.

Harlow and District Mobile Rally, 23 September
The site for the Harlow rally, the Nettleswell Comprehensive school, is a mere 5min walk from the town centre and Harlow Town Park. The rally will feature a grand draw, trade stands, stalls for the ladies, bring and buy stand, junk stall, and refreshment facilities; entrance and car parking will be free. Main routes to the event will be signposted by the RAC, and talk-in will be available on 2 and 80m. An extra attraction not connected with the rally is the motor show being held on the same day in Harlow Town Park.

ARMS Mobile Rally, RAF Cosford
The Amateur Radio Mobile Society's Mobile Rally at RAF Cosford took place in bright weather on 17 June with an estimated attendance of 500 cars and up to 2,000 people, mainly from the Midlands and North with relatively few from the London area.

The trade show was large and amply accommodated in part of a very big hangar, while the aircraft museum and gliding displays were an attraction for those not interested in radio.

The brochure prize of a portable tv set was won by G3FZR from Cheshire. The RAF Benevolent Fund and the RAIBC will be equal beneficiaries from part of the proceeds, when all expenses have been accounted for.

4th Elvaston Castle Mobile Rally
The rally took place on 10 June and was attended by over 3,000 people. Some 1,000 cars were checked in and it was necessary to open an overflow car park. The many attractions all contributed to make it a very enjoyable event.

Mobile Rallies Calendar

5 August	RSGB Woburn Abbey Rally.
5 August	Plymouth Mobile Picnic, Scenic Car Park, Yelverton Down, near Plymouth.
12 August	Torbay ARS, Newton Abbot Rugby Ground, Newton Abbot, Devon.
12 August	Derby, Rykneld Schools, Bedford Street, Derby.
19 August	Bristol Mobile Picnic, Ashton Court, Bristol.
19 August	Preston ARS, Kimberley Barracks, Deepdale Road, Preston, Lancs. (New date).
19 August	Bromsgrove Mobile Picnic, Avoncroft Museum of Buildings.
25-27 Aug	Town and Country Festival, the Royal Showground, Kenilworth, Warwickshire.
23 Sept	Harlow & District, Netteswell Comprehensive School, Harlow.

SPECIAL EVENT STATION

Scout Jamboree Cymru 1973, 28 July–11 August
This year's jamboree will be held in North Wales, at Penryn Castle Park, Bangor, Caerns, and the special callsign GB2SJC, last used in 1969, will be active to mark the occasion. For further details contact GW3UBV QTHR.

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 : MEMBER'S ADS, "RADIO COMMUNICATION", 35 DOUGHTY STREET, LONDON WC1N 2AE

FOR SALE

2m Viscount, 12V, 8-chann, /m tx/rx, £18; 2m fm base stn £20; 4m fm base stn £12. Buyer coll or may del by arrngmnt (S & SW). G8AKA, QTHR. Tel Mortimer 332582.

Ranger, wkg 145MHz, in smart case, £10; linear, complete except trnsfrmr, 4x811A, b & w tank, £25; Ranger, dodgy cond, £4; Webster Bandspanner £4; Nombrex inductance bridge model 66, mint, £7. G3UML, QTHR. Tel 01-550 0882.

Gonset G76 tx/rx with mains power pack £17; 14AVQ, buyer coll both items, £25 the pr. G4AJJ, QTHR. Tel 0723 67803.

Stop that tvi with a uhf tv fltr £1.10 post paid; two B44 mk 3s, tx on 4m, rx tunable, £7 ea; TR2002 tx/rx, tx on 2m, rx tunable, £7, carr extra. G8FUI, QTHR.

Marconi VB 11-3216-01 industrial 625-line spg/ccu for vidicon chann, solid state, inbuilt psu, all boards except talkback fitted, standard rack mntng, 6½ by 19 by 12½in, £5. Dyke, 13 Abbey Grove, Sandy, Beds. Tel Sandy 80828.

G2DAF lin, pair 3Y125s, with separate psu, prof built, first £25, arr carr. **Wanted** Codar /m rx and ac psu. G5ND, QTHR. Tel Blackpool 64508.

Heathkit 32ft galv latt tower, dismantled, but buyer to coll, also cowl gill, motor, offers. Both perf cond. G3RNV, QTHR.

Complete ssb stn, G2DAF tx and rx, mtchng psu, Philpotts blue cabs, Eddystone calbrtd dials, Kokusai fltrs, new xtals, ptt mic, any dems, photo available, 200W p.e.p., £90 ono. G3UCE, QTHR. Tel Heysham 51760 evngs.

9R59DE £25; Class D wvmtr £5; G-whip multimobile plus 80m £13; two 4x150A pa unit, 2B254M driver, new ex service, suit hf lin, £8; pr vhf bases 4x150A £5. **Wanted** KW Ezee-match. Wilson, Flat 2, Cotewall, Sands Lane, Mirfield, Yorks. Tel Mirfield 5168.

Garex 15W 2m tx, trnsstrzd mdltr, mic, 3 xtals, in case but less psu, £20; Garex 2m cnvrtr, i.f. 12-14MHz, £7; Unilauria fet comm rx, 0·5-30MHz (bfo, bndsprd, all usual features) £20; B40 comm rx, gd cond, fitted S-mtr, generally cleaned up, 0·5-31MHz, £20; 1,000V psu @ 0·5A, with lt, 19in rack, £9; Garex 40W 2m tx kit (320A) less valves and all necessary trnsfrmrs, new TW style case (blue hammer finish) £20; all valves for 40W tx £5. All prices ono. Tony Lord, G8DQZ, 13 Lakeside, Oatlands Drive, Weybridge, Surrey, KT139JB. Tel Walton-on-Thames 24770.

Swan Cygnet 260W tx/rx, ac/dc, base/mobile, vgc, £90. Available after 25 August 1973. VQ9DC, c/o Cherriman, Heckington, Lincs. Tel 519.

FTdx400 (basic FTdx401), mint, plus spare pr new boxed final valves, dyn mic, free del 40 miles or by arrngmnt, £160, pref buyer insp. G6FB, 11 Morningside Ave, Portchester, Fareham, Hants. Tel Portsmouth 21892 daytime.

TS510/PS510 VFO5D, practically unused, boxed; G2DAF tx and PSUs, wkg; HROMX with psu, BS/GC spares, Pye Ranger low band; FT75/DC75 FV50 old type valves, mains/batt, new, boxed, new 813s, 8019s, sensible offers please, sae full partics. G3BKL, QTHR. Tel 0980 862489.

Eddystone EC10 mk1, 550kHz-30MHz, gd cond, with manual, plus Microwave Modules Sentinel 144MHz cnvrtr, tune 4-6MHz on rx, perf order, both for £40 ono. Mr Hunter, tel office 01-407 8844 or home 01-858 1448.

Burns Electronics FMD1 fm discriminator, complete, £5; prof built 160m QRP tx/rx, 220mW out, with key, mic etc, a.m./cw, in wood carry case, like spy set, £10, del London. Hunter, tel 01-858 1448.

Homebrew tx/rx, 160m only, 898 dial, cw/a.m., full break-in, sequent keying, pre-amp feeds into rx, 7·050 i.f., TCS rec xtal fltr if buyer coll, gone commercial, offers. G3SVP, QTHR.

Solartron CD643 lab scope £30 buyer coll. Mr D. Pollington, 27 Stoke Ave, Hainault, Ilford, Essex. Tel 01-500 6922.

Eddystone 770R 19-165MHz, first over £50, callers only; Avo sig gen £2; Avo electronic testmtr £8; Philips GM6020 dc millivoltmtr £15. R. A. Newton, 7 Pynchons, Harlow. Tel 027-96 28969.

Cossor scope, dbl beam, old but works well, £20; Trio 9R59DS, 3 mnths old, £45 buyer coll or arr carr. G3ZLX, QTHR.

Brand new QQZ06-40 (YL1030) "quick-heat" vhf tetrode in orig packing, offers. G8FTM/G4BWH, QTHR. Tel Langton 2195.

R208 rx, 10-60MHz, variable bfo, gd cond, 240V ac mains supply, £8 ono. Kaye, 12 Franklin Close, Whetstone, London N20.

Heathkit DX100U 10-160m tx, vgc, £30 ono, pref buyer coll. G3ETY, QTHR. Tel 061-740 9385.

CV129 £1; DET22 50p; Tenna-Rotor service manual £1; NS111A fm ic 50p, all post paid. G8BYV, QTHR.

KW Vanguard, 160-10m, gd wkg order, with two 6146B valves, £28 ono. G3ZLE, QTHR. Tel Yelverton 3581.

High band fm Storno CQM 13C 12V units, just taken out of service, £10 ea. G3SLI, QTHR. Tel 073-22 2945.

Dtl ICs, gates and flip-flops, approx 80 packages, shop price £15, £9.50 for lot with data. All 14-pin dil packages. G3ABK, QTHR. Tel 51492.

Galaxy V 300W tx/rx with external vfo, no psu, £85, available after 25 August 1973. VQ9MI/G3ZUC, c/o Cherriman, Heckington, Lincs. Tel 519.

Bonanza sale of gear and components surplus to needs, visit home of G3BDQ from 11am Sunday 12 August, 100yd east of White Hart Inn, Guestling, near Hastings.

G-whip tribander whip, plus lf loading coils for 80 and 160m, with top telescopic section and base mount, never used, cost £20, will accept £12 ono, pref buyer coll. G3TFM, QTHR.

Trio TR2200 /p tx/rx £55; Solid State Modules 70cm cnvrtr £12. **Wanted** TC7 28-30MHz. G8DKA, QTHR. Tel 021-353 5901.

AT5 /m 12V psu and control, Pye base stn, 320AM morse osc with gd key, 9V, offers; Sinclair 3000 amp and 3000 tuner, 1yr old, stereo, £39 (black). G3ZLH, QTHR. Tel Chirk 2414.

Telford Communications TC7 mk2, tunable i.f., 6 months old, exc cond, £25. G8GAH, QTHR.

Sphinx tx, mint cond, £45 ono. GI8GTX, 17 Victoria Ave, Newtownards, Co Down. Tel 024-781 3210 daytime.

Two pairs power Selsyns, ideal paraboloid azimuth elevation, one pair 230V, weight 12½lb, other 115V 4½lb per motor, offers. **Wanted** dial, 0-100°, with vernier surround, ex BC221, panel also acceptable. G2BPC, QTHR.

Redifon GR289 mkIII r/telephone, vgc, offers. G4AYG, QTHR.

Collins F455A-3, both xtals, £12 plus carr; 30H 150mA choke, trnsfrmrs, 230V prim, 330-0-330 and 4V 3A, 190/250 prim, 250-0-250 150mA, Parmeko choke, 4H 250mA 50p ea, buyers coll. G6XH, QTHR. Tel 0903 42358.

Four hybrid manpack TX/RXs, HF156 6-chann 2-8MHz, matching sets xtals on TA freqs, with ccts, £4 ea; Hartley 13A scope with leads and probe £18. G3WXG, QTHR. Tel Brighton 553150.

KW2000 £100 or consider exch modern gen cov rx with cash adjstmnt; /m psu £18; Yaesu FTdx400, immac, £160, buyers coll. G3DCS, QTHR.

Partridge trnsfrmrs, 700V ct 300mA also 600V ct 300mA £3.50 ea; Admiralty 1,000V ct 170mA £2.50; 25V 5W voltage regs type PA264, comprehensive data sheet, 3 for 50p, last listed over £1 ea. Carr extra. J. H. Lepper, 128 Sheephousehill, Fauldhouse, West Lothian EH47 9EL. Tel Fauldhouse 433 evngs.

Sullivan 0·1% decade box, 0·1–10 Ω, 1–100k Ω, as new, £3.50; quantity trnsfrmrs: 600V ct 120mA 4 × 6·3V 1A 5V 2·5A, varnish impregnated paxoline panels with turret tags, as new, £2 ea, carr extra. R. A. Lapsley, 48 Springfield Road, Linlithgow. Tel Linlithgow 2321 evngs.

Marconi TF1330 scope, with spares, trnsfrmr faulty, £45; TF867 sig gen £115; comm rx GR64 £18. M. Kidman, 27 Norton Crescent, Towcester, Northants.

KW2000 g-line, ac psu, exc cond, £100; KW1000 lin, mint, £90, both with manuals, del 50-mile rad. G3UJY, QTHR. Tel Kingham 270.

Hallicrafter SX130 rx, gen cov plus amateur bndsprd, £45; KW1000 lin £90. **Wanted** SB220 lin, also Ham M rotator. Tel Exeter 74607.

National NCX3 tx/rx, 80, 40 and 20m, with NCXa psu/spkr, gd cond £75 or exch for good comm rx for vhf tx/rx with cash adjustment. GM3TBV, 3 Sherbrooke Drive, Glasgow G41 5AA. Tel 041-427 1337.

GR286/STR28 marine vhf band, style HC6-U xtals, channs 1-5, 7, 9, 12-14, 18-20, 21/22, £2; pair chann 16 (tx) 10, 150MHz £1.25 ea. G3JMJ, QTHR. Tel 073-271 3467.

Cheap wvmtr W1646, ac powered, tunable audio notch fltr cuts out QRM. **Wanted** dummy load resistor, about 250 Ω, bfo coil from old Sky Champion rx S20R. Parker, 133 Station Road, Cropston, Leics LE7 7HH.

Hammarlund SP600 JX rx, gen cov to 54MHz, specimen model, exc cond, with product detector, mtchng spkr and manual, £115 ono. Haslett, 4 Hill Farm Road, Chesham, Bucks. Tel Chesham 5557.

UR1A fet solid state rx, exc cond, 550kHz-30MHz, £19; Hy-Gain 12AVQ trap vertical, as new, instructions, boxed, £12.50. G3FK, QTHR. Tel Breamore 436.

Deluxe VFA and VFA tuner £8; CR100 £15; Acton sig gen, 100kHz-200MHz, £8; Raymart band checker £2; Eagle rf field indicator RF40 £3; Tradiper model TE15 gdo, 0·44MHz-280MHz, £8. E. R. Crane 1 Lea House, Salisbury Street, London NW8.

144MHz 60W fm TXs, QQVO6/40 pa (blown), mains psu, £15 ea; AR88LF, good, clean, S-mtr, i.f. gain, £35 ono; 150W 432MHz a.m. tx, 4CX250B var ht, cab mounted blowers etc, £75 ono. G3LJB 10 Atterbury Close, West Haddon, Rugby. Tel West Haddon 674.

Trio JR-102 rx, 0·55-30MHz, 142-148MHz, a.m./fm/cw, gd cond, £35, buyer coll evngs only. R. Hammond, 30 Harvard Road, Lewisham, London SE13 6SF.

Vanguard on 2m, all controls, testmtr on front panel, int spkr, one neat package; KW2000 ac and dc PSUs, recent KW service, offers. G3LZN, QTHR.

HRO 5T, gd cond, psu, manual, full set gc coils, bndsprd coils for 10, 15, 20, 40 and 80m, £25; GEC Miniscope, offers, buyer coll or carr at cost. G3TVI, QTHR.

Telescopic 40ft tower, steel, 2-section, new, never erected, £65, buyer coll or carr extra. Pt exch welcome. GW3UCJ, QTHR. Tel Briton Ferry 812376.

Eddystone EC10 mk2 £65 ono, or pt exch for 2m TW Communicator or sim /m or home QTH rig. **Wanted** /m or home tx/rx such as above. G8GHU, 14 Maycroft Road, Rodwell, Weymouth, Dorset.

HQ170 Hammarlund rx, immac, £75; DJ9ZR 2m ssb tx, less pa trnsfrmr, £20 ono; Cossor S39A scope £10. G3NAS, QTHR. Tel 53718.

Trio 6m fet cnvrtr, 50-53·4MHz in 2 bnds, output 28-29·7MHz, £5. G4BAU, QTHR. Tel Gravesend 3428.

Eddystone EA12 £140; Heathkit vvm IM18U £13; sig gen RF1U £12; scope IO18U £30; gdo GD1U £10; BC221 with charts £15; Codar PR30 £5; Pye Reporter, mains, with new 70·26 xtals, reqs attn, £6; 14AVQ £12; Joymatch Lo-Z500 with artificial earth £3; Eagle ac/dc cnvrtr LA10S £3; Fullerphone mk IV £3; Caby multimtr B40 £4; 0-300V ac mtr £2. GW3MZY, QTHR. Tel Llanfairfechan 680034.

Eddystone 840C (1968), Codar PR30 rf prslctr, Codar RQ10 Q-mult, all exc cond, £35 ono. M J. Crichton, 66 Oakbank Road, East Calder, Midcalder. Tel Midcalder 677.

EC10 rx, vgc, £35; trnsstr h/brew gen cov rx, fet front end, Eddystone dial, unused cond, needs aligning, cost £35 to build, accept £20 ono. Can del both rsnble dist. Shepherds Mead, Pine Walk, Chilworth, Southampton. Tel 6949.

Pye AM10D Cambridge single-chann, prof resprayed case and front, brand new ptt mic, panel face and leads, modified for 2m but untuned, no xtals, with ccts, leads and fuses, £26 ono. GM4AZC, QTHR. Tel Troon 2756.

Mains trnsfrmrs 0-450-465-480V 180mA, 6·3V, 1·6A, 6·3V 300mA, 7V 14A, £3; chokes, 10H 250mA £1.50; Heath Twoer, complete but not working, £7.50; Hallicrafters S38C £2. G3III, QTHR. Tel 0608 61882.

FTdx401, new, and FV401 vfo, cost £337, accept £260 delvd by Securicor. GW3AX, Belle Vue House, Westcross, Swansea.

Panda PR120V, 150W, 80-10m a.m./cw tx, £15 carr extra. GM3XUV, QTHR. Tel Wishaw 78475.

FT101, April 1972, £190; 18AVT vertical, 25m UR67, £20; Heathkit wattmtr HM102 £10; dummy load £3.50; Medco low pass (50) and high pass fltrs £3.50 pr; £225 the lot. R. Newman, Wychwood, Bryanston, Blandford, Dorset. Tel Blandford 2670.

FTdx401, Mosley Mustang, TR44 with 100ft 8-way cable, used only 4 mnths, as new, photocopy of log available if requested. Moved QTH and gone QRT. GI3XCZ, 21 Kylemore Gdns, Omagh, Co Tyrone, N Ireland.

KW Vanguard a.m. tx, perf, £25; chart recorder £5; 19in cases, various, from £2; Ikegami 625L trnsstr tv camera £25; Admiralty FHBDES3 df rx £6; RCA freq mtr £5; various PSUs from £2. B.S. Homer, 32 Iron Mill Lane, Crayford. Tel Crayford 24625.

Heathkit SB220 lin, mint, £155; SB102 HP23 psu, prof wired, £195; SB610 monitor scope £45; HM102 pwr mtr £12; Comdel CSP11 rf clipper, self-contained, very effective, £45, fix sked for dem. G3XTN, QTHR. Tel Kenilworth 56828.

Trio TS510D tx/rx complete with mains psu and mic, as new, can del 50-mile rad, £150 ono. G3SLL, QTHR. Tel Leeds 621112 daytime.

10W 2m tx, sim TW2, psu, xtal, cnvrtr, mic, £14.50; HRO, 9 coils, psu etc, £21.50 ono; new dial £2; 20m bndsprd coil £1.50; 160/80m 80p, others; G4ZU commercial brand beam £8.50, coll or carr extra. G2HCV, QTHR. Tel 01-954 2960

HRO dial, brand new, boxed, £3.50; Hartley 13A scope manual, £2.50 carr extra. **Wanted** AR8516L and SP600 RXs, both in orig and first class cond throughout, details and price pse. G3GUU, QTHR.

Pair 18-el gp B uhf aerials, mast with Labgear pre-amp and pwr unit, £3; Ensign folding camera, vhf tv (needs attn), Belling shed htr £1 ea, buyer coll or may del. T. R. Upstone, 76 Cleevelands Ave, Cheltenham, Glos.

Drake R4B, hardly used; SB101; SB600, ac psu; 30ft alloy self-supporting tower, sensible offers invited for any of the above. G3RWQ, QTHR.

Trio JR500SE rx, amateur bnds plus WWV, stable vfo, pref buyer sees and colls, £40. R. Kilminster, 32 Shaw Road, Heaton Moor, Stockport SK4 4AE.

Trio JR599, as new, sale, £140 or exch. **Wanted** ssb tx/rx, /p or mains/batt, with top bnd, or why; sstv, cash adjstmnt. G3HQU, QTHR. Tel Barrow 22303.

HW12A 80m tx/rx with HP23E ac psu £50. G3YQV, QTHR. Tel Brighton 735694.

Freq mtr TS174/U, 20-250MHz, mains psu, charts, offers; Parmeko 500W trnsfrmr with taps, will boost low mains, £3. G8ACE, QTHR. Tel Royston 41164.

Collins TCS rx, gd cond, also noise limiter kit plus front panel 12-way plug, £12 with cct diag. Mr P. M. Cleaver, 86 Main Road, Dovercourt, Essex. Tel Harwich 2195.

Cavity wvmtr with rev counter dial, 875-1,330MHz, brand new in orig sealed container, calib chart, £10; AR88D main dial, new, £1; 8MHz Oscar 6 xtals £1.50 ea, sae pse. G3IUD, QTHR.

Eddystone S640 rx with hndbk and spare set valves, gd cond, £15; wvmtr type W1191 £5. **Wanted** AR88 rx with S-mtr and hndbk, gd cond, evngs only. G8FZG,QTHR. Tel 01-546 4867.

Philips trnsfrmr type PT002, as new, bought in error, cost over £4.50, first offer of £3.50 accepted. G3XEN, 27 Ashfield Ave, Lancaster LA1 5EB.

Heath SB401, exc cond, prof built, £130, carr by Securicor; pwr mtr, new, ETI model 703, 50Ω SO209 skts, 50-400W, 2-tone 100-800W, anti-parallax mirror scale, £13.50, callers welcome. G3GYE, QTHR.

Clearing shack: Racal ssb hf tx/rx, £65; 2m a.m. tx with psu £30; 2m trnsvrtr with psu £15; 70cm tripler with psu £10; rtty adaptor £6; 150W mdltr £12, callers only, also many rx valves. G3WJG, QTHR. Tel 01-997 0901.

FTdx401, mint cond, hndbk, guarantee, mic, spkr, swr mtr, coaxial cable, £240 ono. **Wanted** case for RGD B55 lw/mw batt/mains valve rx; 380 + 380pF tuning cpctr for Sonolor Plein Air lw/mw/sw trnsstr rx. Denis McGovern, 1202 Rochdale Road, Manchester M9 2FR. Tel 061-740 4065.

Drake 2C rx, complete with Q-mult, spkr unit and plug-in clbrtr, switched fltr for 0·4, 2·4, 4·8kHz bndwdth, exc cond, £75 ono. G3SVH, QTHR. Tel Cheslyn Hay 414524.

Eddystone 840A rx, 500kHz-30MHz, £20; Codar PR30 prslctr (mains) £5.50; Class D Wvmtr (mains) £5; R81 df rx, 260-530kHz, 1·5-3·5MHz, with df loop aerial, £10. J. Newstead, 16 St Georges Road, Forty Hill, Enfield, Middx. Tel 363 7929.

Two AM25B Vanguards with h/b £15; Heath Cotswold spkr £20; Teletype 14 reperf, mint, £15; Heath tower with 10ft top extension, all galvanized, £40 buyers coll. G3LDI QTHR. Tel Wymondham 3463.

4CX250 valve bases with ceramic chimneys; valves, QQV03/20, 6146 etc, see list valves and components. G3NPZ QTHR. Tel Titchfield 43894.

Heathkit HW17A tx/rx, HG10 vfo, 12V dc psu, vgc and wkg, pref buyer coll. B. Keal, c/o 147 Burscough Road, Ormskirk, Lancs.

Hammarlund SP-600-JX-6, new valves, perf, £110. A. Forrest, 56 Dukes Ave, Muswell Hill, N10. Tel 01-883 4903.

Drake solid state SPR-4 comm rx, virtually unused and in maker's packing, complete with xtal calbrtr, noise blanker, 24 xtals, dc cord and spkr, current value £420, offers around £350. A. Fletcher, 62 Moorbridge Lane, Stapleford, Nottingham. Tel Sandiacre 3446.

Lafayette HE80 rx, tunes 2m, gd cond, £35 ono; TF390G sig gen £5; Sanyo MR929 stereo tape rcrdr £45 ono; 70cm 18-el Yagi, new, £2.50; 2m 4-over-4, new, £2. G8BGY, 26 Cedar Way, Pucklechurch, Bristol. Tel Abson 2537.

Trio JR500SE amateur bnd rx with matching SP5D spkr, exc cond mech and elect, £43. **Wanted** Inoue IC700R or EC10 in gd cond. No phone calls please. T. N. Price, G8FIH, Sherwood House, Brimpsfield, Gloucester.

Complete Codar /m 160/80 rig, AT5 tx, T28 rx, control unit, 12V power unit, no mods, '3FIF whip, maker's fixing instrctns, £30, GW3QN, QTHR.

UNR-30 gen cov rx, 550kHz–30MHz, exc cond, £12 ono, ideal for swl. **Wanted** good gen cov rx, Trio 9R59DS/E, Jr65 or sim. Mr K. P. Corbett, 59 Stansfield Road, Benfleet, Essex.

40ft Telomast with rigging kit £18 carr extra; 100kHz 10X (⅛in) xtal 75p; 500kHz 10X (⅛in) xtal 75p. **Wanted** Heath SB640 vfo 2m trnsvrtr, GEC 989 stereo tuner. Taylor, 8 Haythrop Drive, Middlesbrough.

Trio 9R59DS rx £35; Heathkit Mohican GC-1U rx £20, both little used. Bennett, 13 Dickinson Road, Formby, Liverpool L37 4BX. Tel Formby 73502.

Heathkit SB401, 6146Bs, SB300, 3 fltrs, noise limiter switch for rtty, DL6EQ cnvrtr-keyer (170–850) in SB200 cab; SB100, 6146Bs, psu; Creed 75R. Offers. G3TLC, QTHR. Tel 45244.

HW100 with HP-23A, recent o/haul; SB200 hardly used, both vgc, with manuals, £100 ea; Hudson FM120 base, low bnd, fair cond, £35, all prefer buyer coll or carr extra. G3VUO, 7 Temple Grove, Bakers Lane, Chelmsford CM2 8LQ.

898 dial £5; 10μF 1,500V paper 75p (new); rx mains trnsfrmr, 250-0-250 80mA 12V 1A 75p; scope tube (with rects for eht) 3EGI £2.50; Quoilpack GE166, as new, £3, all plus carr. Sae pse. Hughes, G8DKO, 22 Hall Park Street, Bilston, Staffs.

New unused xtals, HC25U, 72.15, 72.5, 72.24, £1.70; HC6U 8·0555 £1.20; HC18U 38·666 £1.25. G8CGN, 2 Greenways Close, Northwood, Cowes, IOW.

Heathkit scope IO18U £45 carr extra. R. K. Adatia, 43 Netherlands Road, New Barnet, Herts EN5 1BP. Tel 01-449 0022.

30ft Heathkit tower, dismantled, galv, in gd order, reqs new bolts, £30 buyer coll. GW3IEQ, QTHR. Tel Llanwnda 669/314.

B40 rx, mint cond, £20 ono. **Wanted** FR50 rx or EC10, gd price pd, Tel Bedford 52944.

Speech clipper, var up to 26dB clipping, suit high imped dyn and xtal mics, o/put var up to 100mV peak, for ssb, fm etc, jack connctns, £8. M. G. B. Baker, 25 Newtown, Beaminster, Dorset.

KW Vanguard tx, 160–10m, int psu, fair cond, £25 ono; pair brand new unused walkie-talkies for 10m, xtal-controlld tx and rx, approx range half to one mile, £10 ono. P. I. Martin, 41 Ottoline Drive, Troon, Ayrshire KA10 7AN. Tel Troon 2756.

AR88 spkr and lead, mint cond, £3 inc postage. 69 Meadow Waye, Heston, Middx TW5 9EY. Tel 01-570 6490.

Electroniques HB166T Coilpack mk2, 1·6 i.f. strip, brand new Eddystone dial, £23. G3SFV, QTHR. Tel 4827.

Heath GR78 rx, factory built and aligned, exc cond, best offer over £50; Bush solid state rx, model VTR178, 1·6–174MHz, as new, mains/batt, £25; 3in scope, wkg, £7 ono. G3UFL, QTHR. Tel Chelmsford 440851.

Marconi eqpmnt, TF142E distortion factor mtr £8; TF144G sig gen £12; TF948 sig gen £8; TF675E pulse gen £5; TF885 sine/sq osc £5; TF428B vtvm £3; Airmec 712 vtvm £2; Scalamp £10. R. C.Whitbread, 32 Iron Mill Lane, Crayford, Kent DA1 4RR. Tel Crayford 24625.

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Lafayette HA600 rx, vgc, £30; Sentinel mosfet 2m cnvrtr with 2–4MHz i.f., as new, £9; rf sig gen with 6 ranges £3.75. G3ZSE, QTHR. Tel 01-573 3888 ext 2602 (Mr Adams).

Lafayette HA600A gen cov trnsstr rx £40 ono, pref buyers insp and coll. G4AWA, QTHR. Tel Worcester 51575.

2m SSM Sentinel mosfet cnvrtr, 28–30 i.f., J-Beam 2/6 Yagi and 33yd UR43 50Ω coaxial cable, all new last month. G2KF, QTHR. Tel Par 2337.

FTdx401 ssb tx/rx, 5 mnths old, mint, £200, with free new Shure 202 mic, going h/brew cw. B. M. Stone, 26 Crayford Way, Crayford, Dartford, Kent. Tel Crayford 22489.

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HC6-U xtal, 44·888MHz, £1; isoltn trnsfrmr 40VA 230V prim 2 by 110V secs 60p ea. G4BEZ, QTHR. Tel Cheltenham 57595.

Codar AT5 tx with ac psu £19. G3XTQ, QTHR.

"PW" 8 copies, 1940/41, also 6 copies *Amateur Wireless* 1933, 2 copies torn, others very fair cond, money to go to Red Cross funds. Offers to G4ATW, QTHR. Tel Wymondham 2474.

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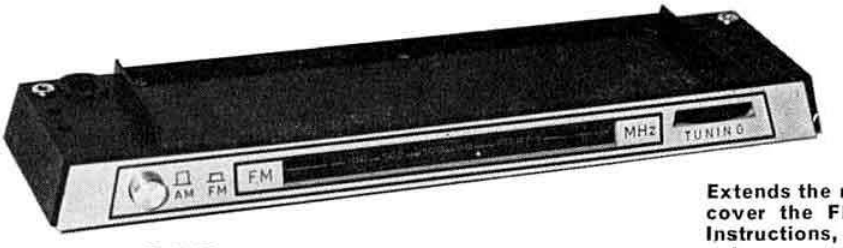

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Printed in Great Britain for the RADIO SOCIETY OF GREAT BRITAIN, 35 Doughty Street, London, WC1N 2AE
by the Garden City Press Limited, Letchworth, Hertfordshire SG6 1JS