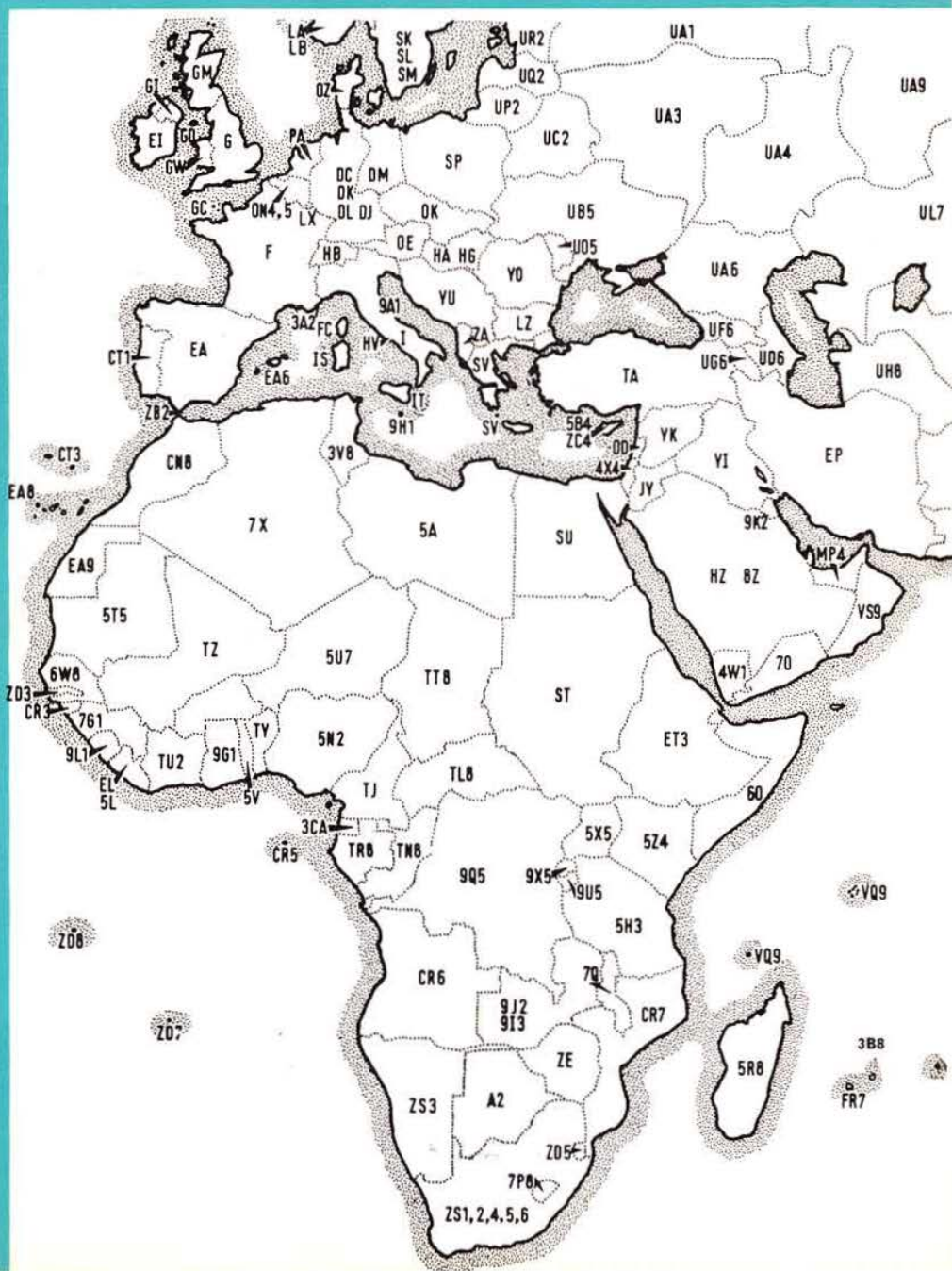
radio communication

February 1972

Journal of the Radio Society of Great Britain



February 1972

radio communication

Volume 48 No 2 Price 30p

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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**

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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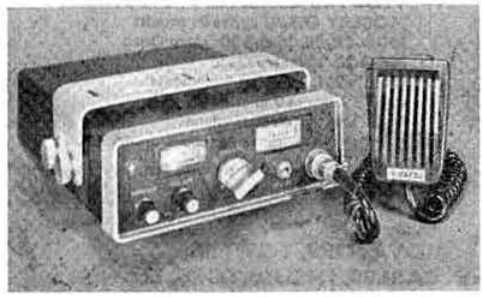

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FV-401 Remote VFO	**£38**	SP-401 Speaker	**£10**
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Current Comment

Those members of RSGB who are readers of *Short Wave Magazine* may have been surprised to read in its January issue the Editorial attacking the financial policy of the Society.

To deal with this Editorial in detail would require too much space but brief comments are given below:

DEFICIT

Statement	Facts
"... that the continuing loss for the current year 1971-2 is running at about the same rate ..."	It was stated at the AGM that the continuing loss was running at approximately half last year's rate.

SUBSCRIPTION

Statement	Facts
"... the figures suggest that the subscription increase is only producing about an 8 per cent improvement in gross revenue ..."	Subscriptions were increased at 1 January 1971. The financial year of the Society ends on 30 June and therefore only a part of a year's increase was shown in the accounts at that date.

DEBENTURES

Statement	Facts
"... no reasonable likelihood of those £20,000 of debentures ever being repaid ..."	The RSGB maintains an insurance fund which will provide the full amount for repayment at the due date.

SALARIES

Statement	
"... a headquarters staff costing £17,000+ in salaries for a membership of about 16,000 ..."	There is no direct connection between these figures. In addition to membership services, staff also deal with Society publications.

COST OF "RADIO COMMUNICATION"

Statement	Facts
"... a production bill ... grossly inflated ... no proper balance between advertising revenue and the cost of printing and distribution ..."	*Radio Communication* advertising rates are under continuous review and are more than competitive, being backed by audited circulation figures certified by the Audit Bureau of Circulations.

STOCK OF PUBLICATIONS

Statement	Facts
"... stock of publications ... of nearly £18,000 ... one wonders what, for the RSGB, is going to happen next."	At 30 June the RSGB had taken delivery of a large reprint of the *Radio Communication Handbook* and the new edition of the *VHF/UHF Manual*. The stock valuation was checked and approved by the auditors, and the profit on sale of publications will be solely for the benefit of the members.

This will put the record straight.

Amateur Radio is an excellent hobby—the RSGB will continue to do its utmost to ensure that it remains so.

"Nuisance from a transmitter"

Readers of that respected newspaper *The Financial Times* must have been surprised to find the above headline in a mid-December Saturday issue—still more surprised that it formed part of a regular feature "Finance and the Family". As the title suggests, this feature offers simple advice on a wide range of personal financial matters, and is conducted by a legal adviser, with strict anonymity preserved on both sides.

Occasionally a matter not strictly financial is allowed space, no doubt to bring variety into an eminently readable feature, and it was just such an "offbeat" item which achieved the dignity of an extra-large headline. The enquirer reported that he suffered interference by a local amateur transmitter to his radio, tape-recorder, record player and tv; he went on to imply that the GPO investigator had advised him to contact the set manufacturers—from which it could be inferred that the interference was not caused by the amateur operating outside the terms of his licence.

In reply he was advised that his correct course of action was to apply to the High Court for an injunction against his neighbour. The *Financial Times* Legal Adviser went on to say that: "*in principle we think that the ordinary and natural enjoyment of a house ... includes the enjoyment of a tv set and radiogram free from interference from one's neighbour. He* (the amateur) *may reply that he has a licence but this does not entitle him to commit a nuisance to his neighbours.*"

The advice given appeared to the Society to set a highly dangerous precedent and to be based on the erroneous belief that "the Englishman's home is his castle" to the extent that he can claim absolute immunity from the interference resulting from deficiencies of any equipment he chooses to use in his home, and can legally prevent others from following a pursuit in which they have fulfilled their legal obligations. This is tantamount to saying that if a person buys a

television set which receives two programmes at the same time the purchaser can force the interfering tv station to close down—clearly a ludicrous situation, but the logic is inescapable.

The chairman of the Society's TVI Committee therefore consulted at once with the President and with the chairman of the MPT Liaison Committee, and sent a letter to the editor of the *Financial Times* suggesting that the advice given was wrong, and that the Society would support the amateur in any way possible if turned to for help. The general manager followed this up by telephoning the paper's legal department and sending a further letter to be forwarded to the complainant setting out the Society's point of view.

It is not known where the complainant lives, and the amateur concerned probably does not know that the problem has been "aired" in this way. No reply to correspondence has been received from the *Financial Times* and no comment on the Society's case has been noted in the paper's columns. Perhaps no further light will be shed on the matter, but the story points a moral. It is that members should *do something* about any case of interference which comes to their notice, and should seek the Society's help if they are unable to solve their problem. It does not help the individual or the amateur cause simply to say, "I don't operate during tv hours in case I cause tvi" or to succumb to social blackmail on the grounds that 10 viewers with poor equipment are numerically stronger than one amateur complying with the terms of his licence. If the amateur concerned in this case is *not* a member of the Society then he is *on his own* in fighting any attempt to serve an injunction on him, but more than this, by being alone he is doing the amateur movement a great disservice, and calling down on his head a decision which may be to the detriment of us all. If *you* know of a non-member TELL HIM HE CANNOT AFFORD TO STAY OUTSIDE.

J. W. S.

QTC AMATEUR RADIO NEWS

"Radio Communication" December

It has come to our notice that some wrappers for the December 1971 *Radio Communication* were mutilated in preparation and it is likely that members did not receive their copies. The wrappers were for members whose month of renewal is December and whose names are in the E-H series.

Will any member who has not yet received a December copy please let RSGB HQ know.

RSGB lecture at the IEE

Mr B. O. Cooke, Chief Engineer of Eddystone Radio Ltd, will give a lecture and demonstration entitled "Modern techniques in high stability receivers" at the IEE, Savoy Place, London WC2 on Tuesday 22 February. Mr Cooke will be supported by the Managing Director of Eddystone, Mr R. M. Carroll, and the Sales Manager, Mr K. R. Wilkins.

Buffet tea will be served at 6pm and the lecture will commence at 6.30pm.

NW Amateur Radio Convention

The University of Lancaster Amateur Radio Society, assisted by many other local amateurs and clubs, is organizing the North-West Amateur Radio Convention which is to take place on 23-24 September 1972. The venue is the campus of the new University of Lancaster; an ideal site for this event, with its excellent facilities and accommodation, and close to the M6 motorway.

Attractions will include exhibitions, demonstrations, lectures, films and trade stands. Several well-known figures in the amateur radio world are being invited to lecture and speak, while visits to places of interest are being arranged for the ladies.

Members' Ads

The spiralling costs of printing and paper will not have escaped the attention of members. Further increases are now being negotiated, to which will be added the new postage rates recently announced. If the Post Office has its way the postal increase will amount to £2,000 in a full year for *Radio Communication*. It is the intention to maintain the quality and size of *Radio Communication* and it is therefore necessary to effect every possible economy. The present-day cost of printing an average Member's Ad (excluding cost of paper) is 60p and if this figure is multiplied by 160, being an average of the number of Members' Ads in recent issues, it will be seen that in a full year the cost to the Society is about £1,100.

The Council of the Society is aware that the facility of free advertisements is one of the advantages of membership and it is not the intention to ask that, in future, the full cost of advertisements should be paid by the member. However, it is considered reasonable to ask that each advertisement should be accompanied by a remittance of 25p. This will defray part of the cost and yet still be of benefit to members.

Therefore all Members Ads submitted for the **April 1972** issue (those received at headquarters **after 4 February**) must be accompanied by a remittance of 25p (preferably in the form of a postal order). All other conditions will remain substantially unaltered.

Reciprocal licensing

A reciprocal licensing agreement has been concluded between the UK and Norway. The Norwegian authorities are prepared to authorize holders of UK Amateur (Sound) Licences A to operate on their territory, and licence application giving information about dates/duration of stay in Norway, address and/or car registration number, and brief description of technical equipment, together with

proof that the applicant holds a current UK licence, should be sent to the Administration of Telecommunications, Headquarters, Universitetsgata 2, Oslo 1, Norway.

A reciprocal licensing agreement has also been concluded between the UK and El Salvador.

Information regarding licensing arrangements in overseas countries is held by the secretary of IARU Region 1, R. F. Stevens, G2BVN, to whom enquiries may be sent (QTHR).

Northern Ireland 2m beacon

Contrary to reports from some quarters, members are advised that no licence has yet been issued for GB3GI to become operational again. Members will be notified over GB2RS and in these columns when the necessary authority has been received by the RSGB.

"Lightning and your aerial"

Details have been received of copper clad steel earthing rods manufactured by British Insulated Callender's Cables Ltd, and sold under the trade name of *Biclad*. Each rod consists of a length of mild steel bar overlayed by a close-fitting copper sheath. The steel core gives strength and rigidity while the copper sheath provides the electrical characteristics and protects against corrosion. Separate driving tips and driving caps are provided, thus facilitating insertion into the earth. Each section contains a sealing compound, a portion of which is forced from a stud hole into the interface between the sections thereby giving protection against moisture and corrosion at the joint. A range of clamps for connecting strip or stranded earth leads is available. For further details contact BICC, Accessories Division, Prescot, Lancs, or one of the local offices of the company.

Arrangements have been made for the following agents to hold stocks of the surge arresters and mounts referred to in *Lightning and your aerial* publishing in the January issue:

Lugton & Co Ltd, 209-212 Tottenham Court Road, London W1. Tel 01-636 3269. Contact Mr C. O. Hertzog.

Edmundson's Electronics Ltd, Cowley House, 30-50 Ossry Road, Deptford, London SE1. Tel 01-237 0404. Contact Mr R. S. Gomm.

Smith, Cookson & Son Ltd, 49-57 Bridgewater Street, Liverpool, L1 OAU. Tel 051-709 3154. Contact Mr T. G. Ward.

Wireless Electric Ltd, St Thomas Street, Bristol 1. Tel Bristol 294313. Contact Mr S. J. Evans.

Harper Robertson Electronics Ltd, 82 Loanbank Quadrant, Glasgow SW1. Tel 041-445 3347. Contact Mr J. P. Davidson.

Gothic Electronic Components, Hampton Street, Birmingham 19. Tel 021-236 5060. Contact Mr B. Chinery.

DARC journal

With effect from February 1972 the journal of the Deutscher Amateur Radio Club, the German national society, will be *CQ-DL*. The publishing house of the new journal is Beltz near Weinheim. *CQ-DL* is available to foreign readers at an annual subscription of DM16. Subscription applications should be sent to DARC, Beseler Allee 10, 23 Kiel 1, W Germany. The equivalent of DM16 should be made payable to postal cheque office Hamburg account number 356 11-02.

RSGB LECTURE

Modern techniques in high stability receivers

Lecture and demonstration by Mr B. O. Cooke,
Chief Engineer of Eddystone Radio Ltd.

Tuesday 22 February 1972

Institution of Electrical Engineers
Savoy Place, London WC2.

Buffet tea 6 pm **Lecture 6.30 pm**

Radio Amateurs Examination

The next RAE will be held on 9 May 1972 and applications to sit this examination should be made to the candidate's local examination centre.

The RSGB will provide an examination centre at University College, London WC1, and applications to sit the examination at this centre should be sent to RSGB HQ together with a remittance of £2 for RSGB members, or £2.50 for non-members.

Closing date for applications: 29 February 1972.

Crewe Communications

We understand that Mr Wilfred Thomas Saunders and Mr John Ivor Wainwright who carried on the business of Crewe Communications at 110 West Street, Crewe, have been adjudged bankrupt.

The first meeting of creditors was to be held on 5 January 1972. The Public Examination is fixed for Thursday 24 February 1972 at the Law Courts, Civic Centre, Crewe, at 2.15pm.

The reference number of this matter in No 18 of 1971 and the address of the Official Receiver is London House, Hide Street, Stoke-on-Trent.

G3LWH awarded CBE

The New Year Honours List announced the award of the CBE to George Twist, G3LWH. We join his many friends in offering our congratulations. G3LWH has been a Chief Constable since 1963 and was a member of the RSGB Council during 1968/69. His main interest lies in operation on the hf bands.

G3XBF Constructors Award

The results of the Barking Radio and Electronics Society's constructional contest held on 11 November 1971 have been announced. G3NNK was awarded first prize for a superbly built transistor tester, while G8EOE and G3XOK gained second and third places respectively.

RAEM

It is with great regret that we report the death of Ernst Teodorovich Krenkel, RAEM, on 8 December 1971. Ernst Krenkel was the President of the Radio Sport Federation of the USSR, and in that capacity attended the IARU Region 1 conferences in 1963, 1966 and 1969. He was active on 14MHz cw and had contacted many UK stations. Ernst Krenkel was created a Hero of the Soviet Union after his actions in connection with the sinking of the *ss Cheluskin*, on which he was the radio operator, in the Polar Sea in 1934. RAEM was the callsign of this vessel and was thereafter assigned to Ernst Krenkel as his personal callsign. RAEM also took part in the USSR North Pole expedition, 1937-8.

Change of address

The headquarters address of the Dutch national society, VERON, is now Postbox 1166, Arnhem, Holland.

Pirates caught

As a result of Post Office enquiries into the suspected unlicensed use of wireless telegraphy transmitting equipment, the following convictions have been obtained for using wireless transmitting apparatus without the appropriate licence, contrary to the provisions of Section 1 of the Wireless Telegraphy Act, 1949:

Mr D. Elliott, 56 Lincoln Avenue, Willenhall, Staffs. on 1 July 1971 at Walsall Magistrates' Court. He was fined £15, plus £6 costs and forfeiture of equipment.

Mr F. C. Meigh, 49 Ladywood Road, Kirk Hallam, Derbyshire, on 22 July 1971 at Ilkeston Magistrates' Court. He was fined £50 on each of two charges, plus £10 costs.

Mr K. W. J. Skelton, 93 Rushmore Road, London E5, on 19 July 1971 at Hackney Magistrates' Court. He was fined £2.50 on each of two charges, plus forfeiture of equipment.

Mr A. Kumotowska, Yew Tree Cottage, Willersby Lane, Cromford, Derbyshire, on 15 July 1971 at Matlock Magistrates' Court. He was fined £2.50 on each of two charges, £6 advocates fee and forfeiture of equipment.

Mr A. M. G. Smith, Ford Cottage, Linden Park, TunbridgeWells, on 9 August 1971 at TunbridgeWells Magistrates' Court. He was fined £15 on each of two charges, plus £5 costs and forfeiture of equipment.

Mr J. Tyers, 22 Ruddington Lane, Wilford, Nottingham, on 6 August 1971 at Nottingham Guildhall. He was fined £10 on each of two charges, plus £5 costs and forfeiture of equipment.

Mr D. C. Cox, 9 Princes Street, Slough, on 1 September 1971 at Slough Magistrates' Court. He was fined £10 on each of three charges, plus £8 costs.

Mr R. Ainsworth, 2 Egerton Road, Britwell, Slough, on 1 September 1971 at Slough Magistrates' Court. He was fined £10 on each of three charges, plus £8 costs and forfeiture of equipment.

Mr D. G. Ellis, 37 Lower Leas Road, Britwell, Slough, on 1 September 1971 at Slough Magistrates' Court. He was fined £10 on each of three charges, plus £8 costs.

Mr M. Pratt, 87 Marescroft Road, Britwell, Slough, on 1 September 1971 at Slough Magistrates' Court. He was fined £5 on each of three charges, plus £8 costs.

Mr V. C. Ellis, 9 Princes Street, Slough, on 1 September 1971 at Slough Magistrates' Court. He was fined £10 on each of three charges, £8 costs.

Mrs F. K. Armstrong, 7 Welford Road, Leicester, on 26 August 1971 at Leicester Magistrates' Court. She was fined £50, plus £10.50 costs.

Messrs R. Campbell and K. Keegan, New Strand Radio Cars, 361 Westminster Road, Liverpool 4, on 30 March 1971 at Liverpool City Magistrates' Court. They were fined £50 on each of two charges plus £25 costs.

Mr I. P. Drake, 89 Capel Road, Enfield, Middlesex, on 5 October 1971 at North London Magistrates' Court. He was fined £3 on each of two charges, plus £2 costs and forfeiture of equipment.

Presidential Installation, 1972

Mr R. J. Hughes, TD, DLC, G3GVV, was installed as the thirty-eighth President of the Radio Society of Great Britain during the course of a social evening held in London on 7 January 1972. Some 150 members of the Society and guests were present.

Immediate Past-President F. C. Ward, G2CVV, congratulating Mr R. J. Hughes, TD, DLC, G3GVV, left, after installing him as thirty-eighth President of the RSGB. *Photo: P.M. Fletcher*

Mrs Ward, left, receiving a bouquet from Mrs Hughes as a token of the Society's appreciation of her support of G2CVV during his year of office. *Photo: P. M. Fletcher*

Some thoughts on mixer-type VFOs for the 2m band

by W. H. ALLEN, MBE, G2UJ*

THIS is not intended to be a constructional article but an account of how Eric Hubbard, G5OX, and the author set about producing a vfo for a 2m transmitter with the following criteria:

(a) the stability should be comparable with crystal control;
(b) spurious emissions, both in and out of band, should be reduced to the minimum;
(c) the design should be realized from components available from our combined resources.

At this location mains electricity is distributed by overhead cables and is subject to small but rapid fluctuations in voltage which make a really stable valve oscillator a very difficult proposition. The provision of an adequately stable source of ht presents few difficulties, but even small variations in heater voltage can cause drift and are not so easily overcome. As a 12V accumulator already formed part of the station equipment it was decided to use this as the source of power for a transistorized drive unit. Other constructors might prefer to derive their 12V from the mains via a stabilized power supply, circuits for which have appeared in the literature from time to time.

It was found that a decided improvement in frequency stability resulted if the variable oscillator ran continuously, and as the total current drawn by the complete vfo amounted only to some 20mA for the first design and 45mA for the second (Mark II), this presented no difficulties with the power supply.

The final result of a considerable amount of experimental work was the system shown in the block diagram, Fig 1.

The existing transmitter was designed to accept drive at half the radiated frequency, ie 72 to 73MHz. This eased the screening problem considerably because there was then no difficulty in preventing output from the pa stage feeding back into the low-level mixer, and in addition enabled the necessary amplification to be carried out on two different frequencies.

The main considerations governing the circuitry and choice of frequencies for the crystal and variable oscillators were:

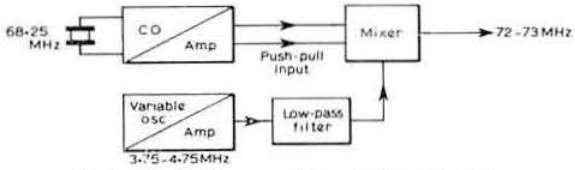

Fig 1. Block diagram of the Mark I mixer vfo

(a) harmonic frequencies from the variable oscillator should not cause unwanted combinations which might be radiated; and
(b) the crystal frequency should be sufficiently removed from that of the desired output that selectivity in the mixer and in the later stages of the transmitter would reduce it to a negligible amount in the pa output.

With regard to (b) it was found essential to employ an overtone crystal with output only on the frequency required for injection into the mixer. A fifth overtone crystal giving output on 68·25MHz was available, and this determined the frequency swing of the variable oscillator as 3·75 to 4·75MHz, which is about as low as it is wise to go in the circumstances.

A few minutes' calculation will show that unless the frequency of the variable oscillator is quite high (see later), any 1MHz range will generate high-order harmonics falling between 72 and 73MHz, and tests showed that even with a transistor oscillator consuming only a few milliamps of current, harmonics up to as high as the 20th were significant. It was decided that the only worthwhile approach would be to accept this fact and to render the unwanted frequencies ineffective by interposing a low-pass filter between the output of the variable oscillator and the input to the mixer.

The variable oscillator and amplifier (Fig 2)

The circuit chosen was the well-tried "synthetic rock" arrangement [1] with an OC170 as oscillator transistor, mainly because this had been well tested in a previous application. There is no particular magic about the circuit and any stable arrangement with the required frequency coverage should be satisfactory. At a later date, when a number of different circuits were tested experimentally, attainment of adequate stability was found to be the least difficult of the various considerations for a variable oscillator.

The rf output measured at the collector of the second buffer amplifier was of the order of 2V, but this was reduced somewhat by the low-pass filter. It is essential to screen the oscillator, amplifier and particularly the low-pass filter adequately so that rf does not leak around the latter and frustrate its purpose.

A further advantage to be gained by making the output of the mixer 72 to 73MHz is that the variable oscillator only has to cover a range of 1MHz and not two, as would be the case if output were in the range 144 to 146MHz. This not only means a smaller tuning capacitor but also leads to a more constant output over the band.

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The low-pass filter (Fig 2)

The object of this circuit is to pass frequencies up to around 5MHz with as little attenuation as possible but to attenuate severely the second (7·5MHz) and higher harmonics. The circuit first employed was that shown in Fig 2. It worked, but it is now realized that the constants were unsuitable, resulting in a rather high insertion loss, some 30 per cent of the output from the amplifier being absorbed by the filter. In the circumstances this was of little consequence as there was ample output in hand.

The filter was adjusted in the following manner:

(1) With C2 and R1 disconnected, join the free end of L1 to ground and adjust the inductance by means of the core to resonate at the *high* frequency end of the oscillator range;
(2) Join the free end of L3 to ground and adjust to the same frequency as L1;
(3) Remove the temporary ground connections mentioned in (1) and (2) and adjust L2 to resonate at the *low* frequency end of the oscillator range;
(4) Reconnect C1 and R1.

If a valve voltmeter is available a check may be made that the oscillator output is reasonably constant over the band and the degree to which the filter has reduced its previous output.

A more satisfactory circuit from the loss point of view is that shown in the Appendix [2].

The crystal oscillator and amplifier (Fig 3)

This employed a sure-fire type of oscillator circuit used by the author on previous occasions [3]. While giving adequate output with overtone crystals this circuit does not suffer from instability and the consequent risk of an output uncontrolled by the crystal. The amplifier following this stage employed a 2N3826 transistor which, it is believed, is no longer readily available, but the type is not critical, and any transistor with a suitable frequency rating, such as the 2N706 or 2N708, to name but two, should suffice although with other than those mentioned it might be necessary to try a different value of emitter resistor. The fact that the latter is not bypassed, and thus introduces a measure of negative feedback, makes for stable operation, and the resulting circuit could hardly be more simple. With the several transistors tested in the amplifier circuit, optimum output was obtained when the collector was tapped on the centre of the inductance.

The mixer circuit (Fig 4)

This consisted of a pair of 2N706s arranged as a differential amplifier with the crystal frequency fed in push-pull to the two bases and output at 72 to 73MHz taken from a link winding coupled to the centre of the inductance in the collector circuits. Another 2N706 was connected in the "tail" of the differential amplifier and the output from the variable oscillator—via the low-pass filter—injected into its base. It will be noted that, apart from the 100Ω resistor in the emitter of the "tail" transistor, there is no bias applied. It is important that the two "upper" transistors should be of similar characteristics, and in our case all three were selected with similar values of beta.

Approximately 1V rf at the base of the tail transistor was found optimum when about 2V rf was measured on the link winding from the crystal oscillator. The rf voltage on the bases of TR1 and TR2 could not be measured accurately as the probe of the valve voltmeter seriously disturbed the tuned circuit. The open-circuit rf output voltage under these conditions was approximately 2·5, but careful adjustment of the coupling of the output link should be made while observing the drive to a later stage of the transmitter. Too tight a coupling at this point will so reduce the Q of the collector circuit that it will be difficult to separate the required output from that of the crystal oscillator, and great care should be taken to ensure that it is not the latter which is driving the transmitter! In our case optimum coupling, for maximum drive to the transmitter, was found to be quite light and good separation of the two frequencies could be achieved.

It will probably be found difficult to determine the correct tuning point for the collector circuit by means of a gdo because most of these instruments are fairly insensitive in the absorbing position and require tight coupling to a tuned circuit when the power is low, as in this case. A preferred method of ensuring that the circuit does, in fact, tune to the required frequency is to listen to the mix on a receiver and peak the tuning by ear.

Driving the transmitter

It should be remembered that in the unit itself there is only one circuit tuned to the output frequency and that, clearly, does not alone provide sufficient protection from the crystal frequency despite the balanced mixer.

In G5OX's transmitter there already existed a two-stage broad-band amplifier for use with an earlier 72MHz vfo and the unit was fed into this prior to connection to the 5763

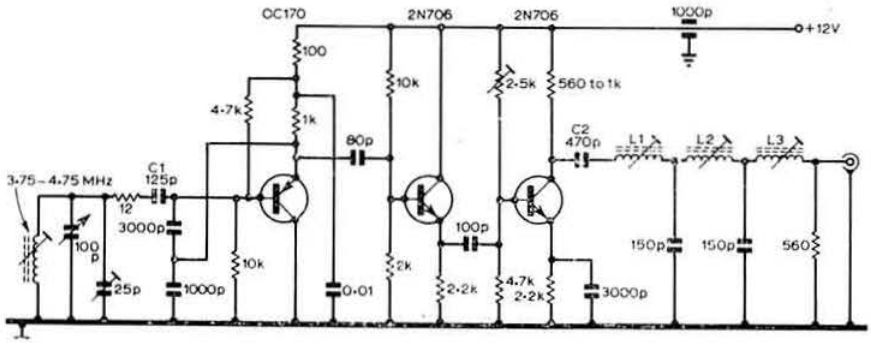

Fig 2. Circuit diagram of the variable oscillator and amplifier with the original low-pass filter. The 2·5kΩ potentiometer in the base bias circuit of the last transistor sets the level of output and may be replaced by a fixed value resistor when the value has been ascertained. R1 is the 560Ω resistor

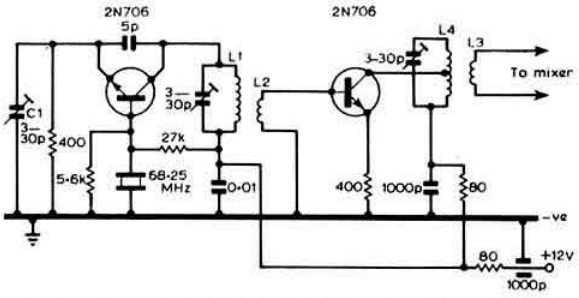

Fig 3. Circuit of the Mark I crystal oscillator and amplifier. C1 controls the output of the oscillator. L1, L4 5 turns of 18swg, ⅛in diam, ¼in long, L4 centre tapped. L2 3 turns wound over earthy end of L1. L3 2 turns wound over the earthy end of L4

frequency doubler. The broad-band amplifier could consist of two EF91s or similar type valves or might well be transistorized and built into the described unit. For obvious reasons this course was not pursued in our case.

Results

Listening to the transmitter on dummy load on a nearby receiver revealed the presence of a weak spurious emission which was found to be due to a high-order harmonic of the variable oscillator which had defeated the low-pass filter. This was successfully eliminated by a series-tuned trap comprising three turns of No 18g wire ⅜in diameter in series with a 3/30pF Philips concentric trimmer connected directly across the input to the tail transistor in the mixer.

Reports from other stations were excellent both as regards stability and the absence of spurii, and the vfo has been in use by G5OX for more than 15 months at the time of writing and continues to give good service.

Further experiments—the Mark II vfo

As stated in the previous paragraph, harmonics generated by the variable oscillator are the main cause of spurious emissions from mixer type VFOs provided, as has already been stressed, the crystal oscillator supplies only the frequency required for mixing. It was decided, therefore, to try various oscillator circuits in an endeavour to reduce them as much as possible. The following brief notes may, therefore, be of interest:

(1) Bipolar transistor oscillators generally produce far stronger harmonics than do the best valve circuits, but much can be done by ensuring that the transistor is not overdriven by keeping the coupling between the tuned circuit and the transistor as light as possible. Referring to Fig 2 it will be noticed that a 12Ω resistor is connected in series with the 125pF capacitor C1. This made a considerable reduction in harmonic power and was found more satisfactory than trying to reduce C1 to the smallest value which permitted oscillation, as the latter move could result in the oscillator failing to start under certain conditions.

(2) Cascode or Darlington (super-alpha) pair arrangements of bipolar transistors were found to give no better suppression of harmonics than single units.

(3) A fet (2N3819) Vackar circuit (see Fig 5) at first proved no better than the bipolar from the harmonic point of view until it was found that critical adjustment of the source resistor was the key to the situation. Testing first on 5MHz, the fourth and lower harmonics fell abruptly in strength when this was around 800Ω, but it is suggested that the optimum value be determined first with a variable resistor subsequently to be replaced with a high-stability type because variations have an effect on frequency. It should be noted that the value of the coupling capacitor between tuned circuit and gate was at all times kept to the minimum to maintain reliable oscillation.

(4) The use of a diode between gate and ground reduced harmonics only because the general output level was reduced: if the latter was returned to its previous value the strength of the harmonics increased.

The next line of experiment was to see if acceptable stability could be obtained from an oscillator on a higher frequency where the unavoidable harmonics did not fall within the band 144 to 146MHz. For a 1MHz swing this would be approximately 13·3 to 14·3MHz. (For a swing of 2MHz the range becomes of the order of 18·3 to 20·3MHz.)

A fifth overtone crystal was available for a frequency of 55·525MHz, requiring a variable oscillator tuning between 16·475 and 17·475MHz, and a Vackar circuit for this range was constructed. See Fig 5.

It has been shown [4] that the value of C2 and C3 should be equal and as large as possible, but that $C(pF) = \frac{3000}{f(MHz)}$ would be adequate, or approximately 180pF in this case. The value of 300pF for C3 shown on the circuit diagram was employed in order to cover the required frequency range with the 12pF tuning capacitor it was desired to use. No detectable difference in performance was found to result from this departure.

The reason for double bypassing of the source resistor (R1) was to guard against oscillation at af to which, it is understood, this circuit is prone. It was not in evidence in our case but the additional 4,700pF capacitor was left in as a precaution.

Direct coupling between the drain of the 2N3819 and the base of the first buffer was found to give far greater output

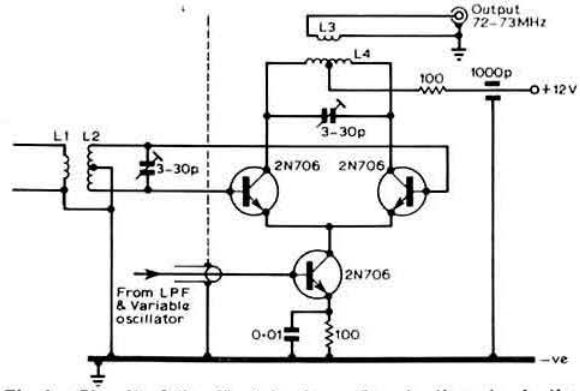

Fig 4. Circuit of the Mark I mixer. A potentiometer in the emitter circuits (see Fig 5) for better suppression of the crystal frequency in the output would be advisable. L1, L3 2 turns wound over the centres of L2 and L4. L2, L4 5 turns 20 swg ⅛in diam ¼in long, centre tapped. TR1 and TR2 are the transistor pair

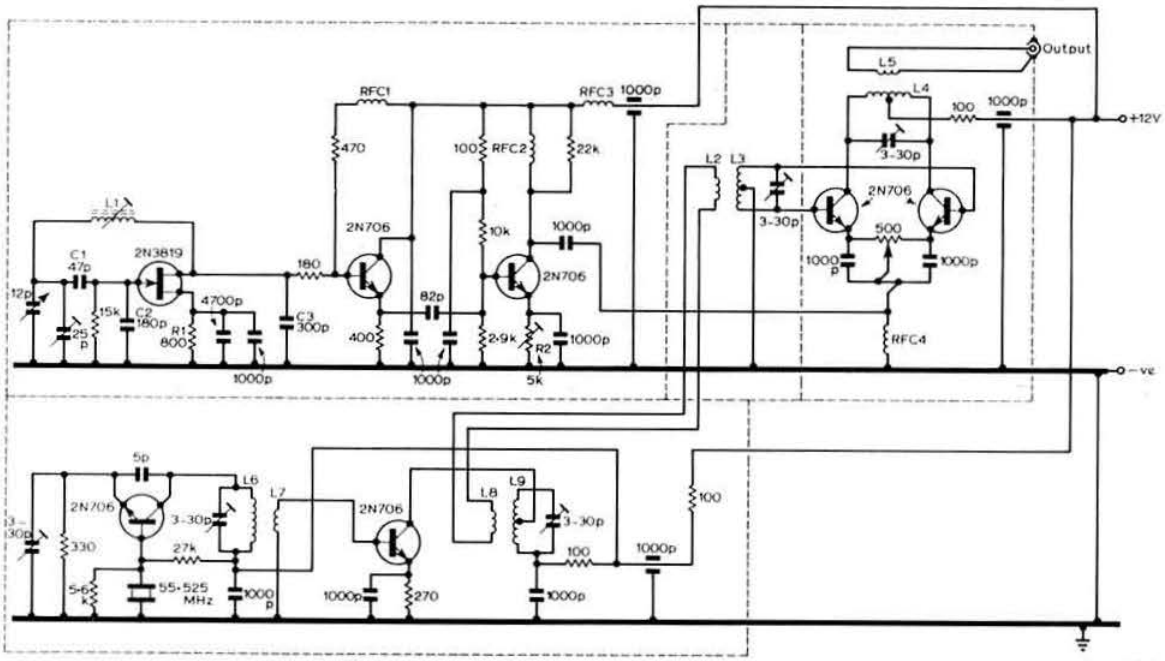

Fig 5. Circuit diagram of the Mark II vfo. L1 15 turns 22 swg enam on 0·3in former with slug. L2 2 turns wound over centre of L3. L3 12 turns 22 swg ¼in diam, ¼in long, centre tapped. L4 5 turns 18swg ¼in diam, ¼in long, centre tapped. L5 2 turns wound over the centre of L4. L6 7 turns 22 swg ¼in diam ¼ in long. L7 3 turns wound over cold end of L6. L8 2 turns wound over cold end of L9. L9 7 turns 22swg ¼in diam ¼in long. RFC1, 3 single pie—inductance unknown, Value not critical. RFC2, 2·5mH., RFC4, 1·5mH. R1 may be varied for minimum harmonic output from oscillator. R2 replaced by fixed resistor when correct value ascertained

from the latter stage without any deterioration in performance and, if required, 7V rf could be realized at the output of the second buffer amplifier. This amount of rf was not, of course, required in this application, optimum drive to the mixer being found to lie around 1·5V rf. Adjustment was made by varying the value of R2 which should be replaced by a fixed resistor when the correct value has been ascertained. The output of the variable oscillator was constant over 90 per cent of the band, increasing by a very slight amount at the extreme low frequency end of its range.

The mixer (see Fig 5) was similar to that employed in the Mark I model but without the tail transistor, the output of the variable oscillator being connected across an rf choke. Base bias was tried but found of no advantage.

Construction

In both models the three sections—variable oscillator and amplifier, crystal oscillator and amplifier, mixer—were built as separate units, screened from one another, and the individual supplies decoupled.

Adjustment

This, it must be admitted, was mostly of the "try and see" variety. As a start the output from the crystal chain should be adjusted, by varying the link coupling, to be approximately 3V at the base of each of the mixer transistors. As mentioned before, the circuit may be detuned by the vvm probe and temporary retuning may be required. About 1V rf should then be injected from the variable oscillator, its tuning range having previously been checked on a hf bands receiver, and the collector circuit of the mixer tuned to resonance in the band 72 to 73MHz by means of an rf indicator of some sort connected across the output link. Coupling should be quite light at this stage. It is as well to check the point of resonance by listening on a 2m receiver to avoid the possibility of the circuit being tuned to the crystal frequency, although with considerably greater separation between the crystal and output frequencies in the Mark II there is much less likelihood of this occurring.

With the trimmer across the mixer collector circuit at maximum capacity it should be possible to get some indication from the crystal frequency, and this should be reduced to as low a value as possible by adjustment of the miniature 500Ω potentiometer in the emitter circuits. In our case some reduction was possible but not complete elimination. The next step would be to listen to the vfo output on the receiver. If the rf stage in the converter is temporarily disabled the risk of overloading can be reduced, but ideally vfo and receiver should be well separated so that the signal is not unduly strong. This should enable the presence of any gross spurious output to be discovered, and if such should be found the cause will almost certainly be excessive drive to the mixer from the variable oscillator.

From then on it is a matter of trying different levels of injection from crystal and variable oscillator, always keeping the latter as low as possible consistent with adequate output from the vfo and freedom from unwanted frequencies.

When first driving the transmitter by the vfo it would be a wise precaution to run the former into a dummy load until one is sure that nothing disastrous is occurring.

The stability of the Mark II vfo was in no way inferior to that of the first model and the outputs were of similar order.

There are two points which might be of interest to those building this type of equipment. Firstly, a valve voltmeter measuring both dc and rf is absolutely invaluable in ascertaining transistor operating conditions and the rf output from the various circuits. Secondly, the use of a valve type grid dip oscillator *in its ordinary mode* can be dangerous to transistors as excessive rf voltage may easily be induced into the tuned circuit under test. A grid dip oscillator may, however, be employed quite safely if, instead of using the indication of resonance of its built-in meter, a low reading milliampmeter (say 1mA fsd) is connected across the battery leads of the circuit being tested—without, of course, the battery being connected! This auxiliary meter will give an indication of resonance with the coil of the gdo much farther away from the tuned circuit under test than would normally be the case and possible damage to the transistors thereby avoided.

Appendix

Several low-pass filters were designed from data in reference [2] to the circuit shown in Fig 2 of Table 2 in that article. (See Fig 6.) Although more elaborate than strictly necessary for this application, they performed satisfactorily and introduced negligible attenuation in the pass-band.

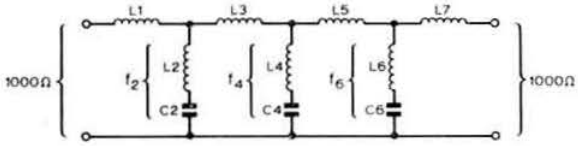

Fig 6. Circuit of the three-section low-pass filter. The frequencies of maximum attenuation (f2, f4 and f6) are the resonant frequencies of the tuned circuits L2C2 etc

Obviously no choice of filter constants could provide maximum attentuation across the wide band of harmonic frequencies generated by an oscillator covering 3·75 to 4·75MHz, and the best approach seemed to be to choose f_s (the frequency where minimum stop-band attenuation is first reached) to be equal to or slightly lower than the frequency of the lowest harmonic generated, ie 7·50MHz. If the cut-off frequency is taken as 5MHz, then Table 2 yields the following possibilities:

Table	Attenuation	f_s in MHz
2-1	50dB	7·62
2-2	50dB	7·07
2-3	60dB	7·62
2-3	55dB	7·20

Values for the second mentioned, assuming input and output loads of 1,000 Ω, would be:
C2 37·2pF, C4 32pF, C6 27pF, L1 17·5μH, L2 3·3μH, L3 39·4μH, L4 15·3μH, L5 36·4μH, L6 13·0μH, L7 10·4μH.
For other load resistances (R) it is necessary to multiply the above figures by $\frac{1,000}{R}$ for capacitance and by $\frac{R}{1,000}$ for inductance.

References

[1] *Amateur Radio Techniques*, 3rd edition, p. 99.

[2] "Modern filter design for the radio amateur", *Radio Communication*, August 1971, p. 532.

[3] "A transistorized converter for 70MHz," *Radio Communication*, May 1968, p. 284.

[4] "The Vackar VFO—a design to try," Jordan, *Electronic Engineer*, February 1968.

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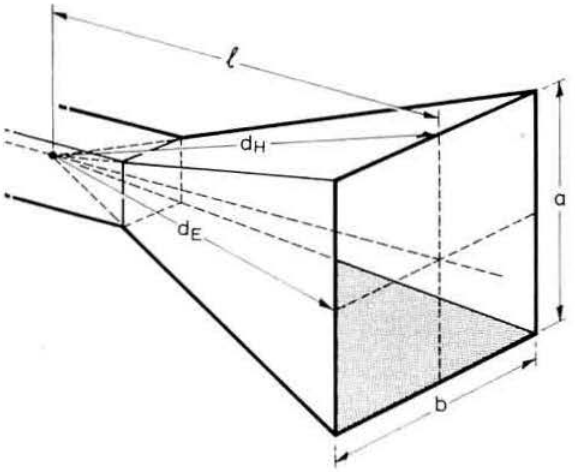
MICROWAVES—1,000MHz and up.....

by DAIN EVANS, G3RPE*

Optimum horn design

Horns have two main advantages over dish/feed combinations. Firstly they provide a good match over a wide range of frequencies, which makes them almost equivalent to a dummy load in initially setting up systems, and particularly useful when devices such as Gunn diodes are employed which are sensitive to matching conditions. Secondly, horns can be designed to have a gain which is predictable within a decibel or so: this makes them useful both in initially checking the performance of systems, and also as references against which other aerial systems can be judged. Horns are therefore rather more straightforward to use compared with dishes. Their main disadvantage, as we shall see, is that as their gain is increased they tend to become very bulky compared with the corresponding dish assembly.

The basic design shown in the figure consists of a pyramidal horn fed by a length of waveguide so that a wave inside the guide can expand in an orderly manner. When the length of the horn is very large compared with the dimensions of the aperture, the wave emerging is nearly planar, and the gain is close to the theoretical value, ie $4\pi.a.b/\lambda^2$ using the notation of the figure. For a horn of moderate length, the wave is spherical with its centre at the apex of the horn. Accordingly, the field near the rim of the horn lags in phase because the distances d_H and d_E measured to the apex are greater than the distance l to the centre of the plane defined by the mouth, and this causes a loss in gain. If the length l is reduced so that the phase lag appreciably exceeds a half wavelength, large minor lobes may be produced. A practical horn is therefore a balance between achieving the desired directional gain pattern and reducing the overall length of the horn.



Pyramidal horn excited by a horizontally polarized wave

According to Terman [1], optimum results are realized when $d_H - l = 0{\cdot}4\lambda$ and $d_E - l = 0{\cdot}25\lambda$, when the following approximate relationships hold: $a = 1{\cdot}73\sqrt{l.\lambda}$: $b = 1{\cdot}4\sqrt{l.\lambda}$; directive gain $= 15{\cdot}3l/\lambda$; vertical beamwidth to 3dB points $= 80\lambda/a$; horizontal beamwidth $= 53\lambda/b$. A 20dB horn for 10GHz (gain × 100) would have the followng dimensions: $a = 5{\cdot}2$in, $b = 4{\cdot}2$in and $l = 22{\cdot}8$in. The vertical beamwidth would be 18°, and the horizontal 15°.

A large horn for the same frequency would have the following dimensions: $a = 12$in: $b = 9{\cdot}75$in; $l = 40{\cdot}6$in, and vertical and horizontal beamwidths of 8° and 6° respectively. Its gain would be 27·2dB, which could also be realized by an efficient dish of 12in diameter. Obviously one can pay a heavy price for the advantages of horns.

It is to be noted that the aperture/length ratio is not constant but varies inversely with frequency. If a horn is modified for use at a higher frequency, its performance will be less than optimum; whereas if used at a lower frequency, the gain will be slightly greater than the optimum value and approaching the maximum theoretical value.

Two other points are worth noting. Where it is not desired to use the optimum aperture geometry, for example where it is necessary to produce the same beamwidth in both directions, then the value for l corresponding to both a and b directions should be calculated and the larger value employed. The formulae given above assume that both a and b are at least several wavelengths in magnitude. If either a or b is one wavelength, then the beamwidth controlled by this dimension is roughly 20 per cent greater than calculated, and the gain is 20 per cent lower.

[1] *Electronic and Radio Engineering*, 4th ed, 1955, F. E. Terman, McGraw-Hill, p913-915.

Broad-band and narrow-band

There is an element of confusion built into the terms narrow-band and broad-band or wide-band. Narrow-band is relatively unambiguous: it usually means a bandwidth of less than 10kHz, and at uhf and shf this implies crystal control of frequency.

In amateur usage, broad-band means a bandwidth of the order of a megahertz. Where the confusion comes in is that while this sort of bandwidth may be required by the type of modulation employed, eg pulse or tv, it is also necessary when using self-excited oscillators on microwave bands due to their relative instability. There is therefore a tendency to associate the term broad-band with absence of crystal control, which clearly need not be the case.

Why need this point be made? Well, it is quite likely that there will be a few stations around this season on the microwave bands which are both crystal controlled *and* broad-band. We must not give the impression that, because they are crystal controlled, they will be incompatible with the more common broad-band but not crystal controlled equipment.

(Continued on page 97)

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The TAD100 as a tunable i.f. system

by D. A. TONG, BSc, PhD, G8ENN*

IT seems to be generally believed that it is more difficult to construct a receiver than a transmitter and this is presumably because of the greater overall complexity inherent in a receiver. Recently, however, the advent of special-purpose integrated circuits has promised to readjust the balance. Since the author began to use a miniature 2m transceiver which incorporates a Mullard TAD100 ic in the tunable i.f. section, many people have expressed an interest and it is hoped that the following notes on the TAD100 might help others to take the plunge into receiver construction.

Basically the TAD100 is designed to contain all the active elements, except for the audio output pair, for a medium or long wave portable radio. Two TAD100s have been used quite successfully in the author's transceiver, despite their intended purpose, at different times and the first i.f. is 10·7 to 12·7MHz. Using a cascode fet rf stage followed by a fet mixer which feeds into the ic via a tunable bandpass coupler, the overall gain of the receiver is adequate to bring the front-end noise up to a respectable volume between stations. The TAD110 is almost identical to the TAD100 in circuitry and price, but is specified to operate at up to 10MHz.

Mullard also manufacture a miniature block-filter, the LP1175, which is expressly designed for use with the TAD100 and which provides all the i.f. selectivity for the receiver. The centre frequency is 470 ± 2kHz and the selectivity at the 3dB points is 5kHz, while at ± 9kHz the response is down by 39 and 29dB respectively. Although better skirt selectivity is desirable when the band is crowded with very strong signals the selectivity is quite acceptable most of the time.

The circuit used by the author for the tunable i.f. is given in Fig 1, and Fig 2 is the circuit inside the ic reproduced from the manufacturers' data sheet. Fig 1 is based largely on the circuit for a portable radio which is also given on the data sheet; the differences are that; (*a*) the internal local oscillator transistor is not used, and (*b*) the ht supply arrangement is altered so that the audio section would operate on both transmit and receive and so that a nominal

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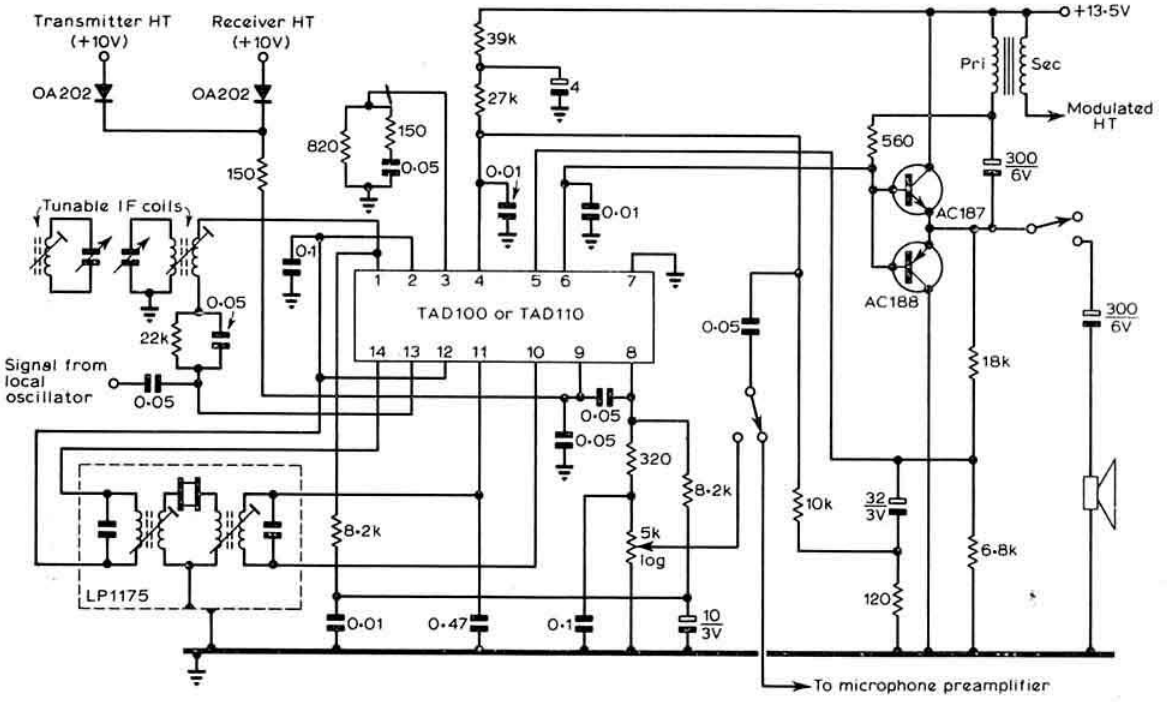


Fig 1. Circuit diagram for a tunable i.f. system using the Mullard TAD100 integrated circuit. The switch shown represents a basic send-receive switch which allows the audio stages to be used as modulator when transmitting. The switch is shown in the transmit position

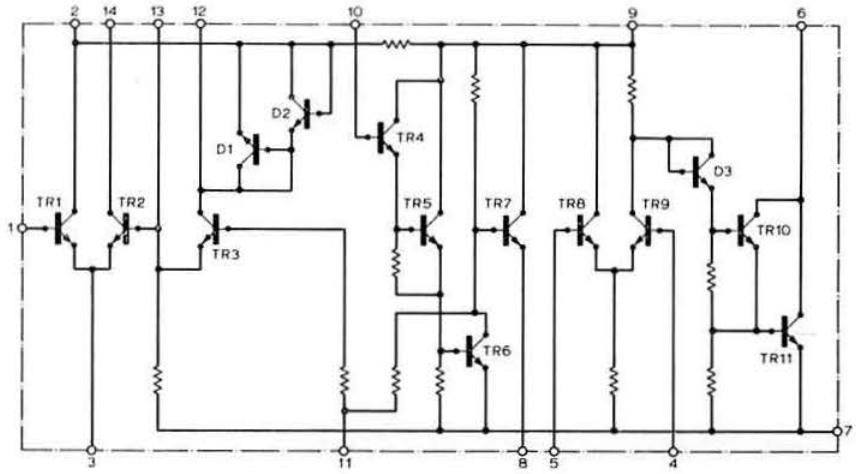


Fig 2. Circuitry contained within the Mullard TAD100. The TAD110 is almost identical. The transistors have the following functions: TR1 and TR2, mixer; TR3, local oscillator (not used in the author's circuit); TR4, 5, 6, intermediate frequency amplifier; TR7, detector and agc; TR8, 9, differential audio input stage; TR10, 11 Darlington connected audio driver stage. D1 and D2 are incorporated to stabilize the local oscillator voltage when TR3 is used

supply voltage of 12 could be used. Since the oscillator transistor is on a tiny silicon chip which dissipates up to 150mW, it was anticipated that a sufficiently stable local oscillator at around 10MHz would not be easily attainable, especially since the choice of oscillator circuit is restricted by the internal wiring. A separate oscillator is therefore used in the author's transceiver, but it is not shown in Fig 1 since any conventional circuit can be used. The injection level should not be more than about 100mV measured at pin 13, otherwise spurious responses may appear due to overloading of the mixer in the TAD100.

The audio output from the complementary output pair specified for use with the ic by Mullard (AC187 and AC188) is a maximum of about 3W according to their data sheets. This output can be obtained with the circuit of Fig 1 and is adequate to modulate a transistor transmitter of, say, 2W output. A modulation transformer ratio of about 2·5 : 1 is appropriate and provided hifi type bass response is not expected, the transformer can be as small as one inch cubed. Laminations of this size are often available in surplus transformers which are suitable for rewinding. In the author's case the primary consisted of 130 turns of 24swg enamelled copper and the secondary of 338 turns of the same wire.

Care should be taken not to use a ht supply greater than 13·5V with the circuit shown, otherwise the output pair may "run-away" thermally. The author found this out the hard way during a long transmission from a fast-moving car while using the car battery as power supply. With a heat sink consisting of a ½in cube of aluminium drilled to take the output transistors, the circuit has proved quite safe at 13·5V, no matter how long the transmission. Ideally one ought to apply some forward bias to the output transistors in order to reduce cross-over distortion, but in the author's transceiver the latter is not objectionable with no forward bias and the thermal stability is improved.

In construction care must be taken to keep the leads to the ic as short as possible and printed circuit construction is strongly recommended. Also one must avoid running the leads to pins 10 and 14 close together since signals will then tend to bypass the filter. On the other hand a very broadband receiver can be obtained by intentionally by-passing the filter, for example by using a fet switch. This can be useful when monitoring a quiet band for strong local signals.

Because the second i.f. is 470kHz, good selectivity at the tunable i.f. is needed to cut out the image response. Two loosely coupled gang-tuned circuits are the minimum requirement when the system is used for the 2m band with a first i.f. of 10MHz. The turns ratio of the mixer input transformer should be about 4 : 1.

Notes on Fig 1

Mullard do not quote voltage levels at the various pins on the TAD100. Since this information can be very useful when designing associated circuitry, the voltages measured at the pins on the author's specimen of the TAD100 are given below.

Pin	V	Pin	V	Pin	V
1	+1·2	6	4·95	11	2·05
2	6·8	7	zero	12	(as 2 and 14)
3	0·6	8	+1·4	13	1·28
4	1·74	9	7·4	14	(as 2 and 12)
5	1·8	10	2·05		

These voltages apply to a circuit which differs slightly from that of Fig 1 but is the same as that given in the data sheet for the TAD100 when operated from 9V.

New equipment

In addition to the Type RCS 501 counter/timer which was recently advertised in *Radio Communication* and which will be the subject of an Equipment Review, the manufacturers have provided details of further counter/timers. These are:

Frequency MHz	No of digits	Price	Type
32 (typically 45)	6	£110	RCS 401 (economy version —no crystal oven)
50 (typically 65)	8	£180	RCS 701 (crystal oven)
200 (guaranteed spec)	8	£248	RCS 801 (crystal oven)
200 scaler		£88	RCS 601 (crystal oven)

The latter plugs directly into any instrument to extend the range to 200MHz.

Further details of these instruments can be obtained from Radio Control Specialists Limited, National Works, Bath Road, Hounslow, Middlesex.

160m with the FT-101

by B. S. SUTHERLAND, G3IES*

BEFORE attempting this exercise, please refer to the maker's circuit diagram and correlate the information given with the circuit configurations. Particular mention is made that on certain of the switch wafers concerned, there are voltages of up to 800V dc floating about, and in the pa these exceed 1,500V rms even with the heater switch off.

All capacitors must be close tolerance, 500V dc working, and, most important, be of silver-mica construction.

The crystal, 7,520kHz (25U base), is obtainable from Senator Crystals, 36 Valleyfield Road, London SW16. The price is £1.80, and delivery is given as 3-4 weeks. This will provide coverage, and direct calibration from 1·5MHz to 2MHz, with 1·8MHz = 3·8MHz on dial, when the wavechange switch is in AUX position.

The sequence of operations is as follows:

(1) Wavechange switch to AUX;
(2) Fit 7,520kHz crystal in spare socket nearest to WWV crystal;
(3) Switch wafer B, connect 500pF across trimmer TC26;
(4) Switch wafer C, connect 1,300pF across trimmer TC29; and extend/connect to 160m switch tag;
(5) Switch wafer E, connect 820pF + 470pF (1,290pF) across trimmer TC28 and extend/connect to 160m switch tag;
(6) Switch wafer G, connect 500pF + 680pF (1,180pF) across trimmer TC10 and parallel 5kΩ: extend and connect to 160m switch tag;
(7) Switch wafer M, disconnect the 80m tap that goes from switch feed point, and re-connect direct to 80m switch tag. Remove jumper joining these two tags. Re-connect to feed point, existing feed from adjacent switch wafer (L) and L9 and C28;
(8) Wind coil of 40 turns 22swg enamelled wire, on a 1¼in o/d former, close-wound, preferably ribbed ceramic, but any alternative material can be used, provided it will stand up to the heat in the pa compartment;

Switch wafer M, connect this coil, using the 22swg wire extended, one end to the 160m switch tap; other end to extreme end of pa tank coil; past the 80m tap point.

Be sure that wiring is well clear of chassis, as there is 1,500V rms present in the pa.

This completes conversion to 160m and it will now be necessary to trim the circuit as follows:

(1) Set pre-selector to between "O" and "1";
(2) Switch on 100kHz crystal calibrator;
(3) Tune vfo to 1·8MHz (3·8MHz dial reading) when the 100kHz beat note will be heard, trim TC26 and TC29 for maximum S-meter reading, which should not be less than the reading obtained on 80m;
(4) Without touching pre-selector, switch on heaters and insert carrier gradually, peaking TC28 and TC10 for maximum pa current. An external rf meter must be used, as the rf sniffer circuit in the transmitter is not operative on these low frequencies. However, the pa meter would give a fairly accurate indication.

The load resistor which is paralleled across the drive trimmer TC10, should be in the order of 20kΩ, but to achieve optimum performance on 160m it was considered neccessary to de-rate this to the 5kΩ, as fitted, in order not to exceed the rated p.e.p. output, however hard it is driven.

If an swr bridge and dummy load is available, the pa should dip to around 100mA; this being 30mA above the standing current, a good indication of the efficiency of your handiwork would be an indicated swr of 1·5 or less.

Because of the added "dead" inductance in the tank circuit, there will be a slight loss of efficiency on the hf bands, which is estimated at 5 per cent on 30MHz, which decreases as the frequency is decreased; the tank loading positions will also alter slightly, as will the sharpness of the resonant dip.

The additional inductance required can be fixed with one 2in nut and bolt through one of the ventilation slots by the fan power socket. Purists (and other equally well-versed gentlemen) will have noted that the anode dissipation more than equals the rf output. The author is sorry about that, but if they can improve on these parameters, without increasing the bias, or reducing the pa volts, he would be pleased to hear from them.

By the same token, the author would also be grateful if readers would be courteous enough to drop him a line on the successful completion of the exercise, with a note of any difficulties encountered, or improvements made.

Finally, it is suggested that as no provision is made on the FT-101 for safeguarding the pa components, that a 500mA fuse be fitted in the ht +600 line; also to safeguard the very critical mosfet, that the rf module be removed completely until all the wiring is finalized.

In conclusion the author would like to thank the many amateurs who have donated so generously to the Radio Amateurs Invalid and Bedfast Club for advance information of this facility, and sincerely hopes that subsequent beneficiaries will not preclude themselves from subscribing to this very worthy cause.

* 336 Charlton Road, Westbury on Trum, Bristol.

Comments from an FT-101 distributor

Lowe Electronics of Matlock, Derbyshire, a major Yaesu Musen distributor in the UK, was invited to comment on the modifications suggested by G3IES.

Our first, and not unnatural reaction was, "Don't do it, because it invalidates the guarantee." Although true enough, it is hardly a helpful attitude and we therefore append some comments for those who must have Top Band. We would like to make it clear at the outset that the FT-101 was not designed to cover 160m and hence any attempt to convert it inevitably smacks of compromise. The large values of capacitance required to resonate the rf section result in a less than optimum LC ratio which degrades the S/S + N ratio. However, in view of the high atmospheric noise level on 160m, this is of minor importance. In fact, a less than optimum LC ratio fortuitously proved of benefit as it reduced the rf drive to the pa and made it easier to keep the power down. This raises the point that the pa was designed around a p.e.p. input of ¼kW so that limiting the output to the legal 26·6W will give problems in measurement.

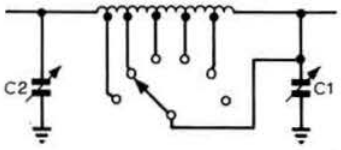
We carried out the modification exactly as described on a random sample FT-101 with the following results:

1. The rf section did not resonate. The reason for this is that slight variations in inductance from sample to sample require corresponding variations in capacitance which could not be accommodated by the limited (50pF) swing of the trimmers. It is thus advisable to allow for this by incorporating extra variable capacitance. At this point, we should mention two pitfalls to avoid:

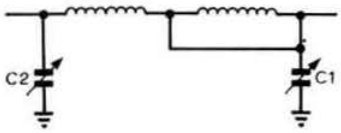
(a) Be sure the circuits actually resonate. Turning the trimmer through 360° must result in *TWO* peaks.

(b) Be wary of using a gdo around FETs—the outcome could well be a sudden loss of sensitivity.

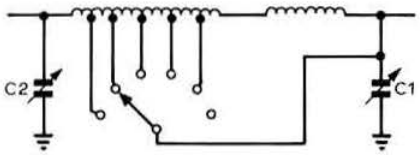
2. The behaviour of the pa stage was abnormal on 20, 15 and 10m; 10m, in fact, would not resonate. The reason for this is not hard to find—in the author's modification he omits to short out the unwanted section of the pa coil. This results in some very high rf voltages being generated which could cause damage and instability in the pa (we have already heard of one modified FT-101 owner burning out a pa switch wafer). Hence quite clearly some means of shorting out the unwanted inductance is very desirable and the first thought is simply to strap the C1 end of the 160m coil to the common switch contact. Unfortunately, it is not quite this easy. Consider the unmodified switching arrangement.



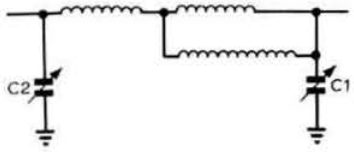
This may be redrawn as below with unwanted inductance shorted out.



If the additional 160m coil is treated in the same way:



It may be redrawn



And here the unwanted inductance, it if is appreciable, is far from being shorted out. Consideration of the simple laws of inductors in parallel explains why pa tuning would be abnormal.

In order to minimize these problems we calculated a different set of lumped constants designed around as low a 160m inductance as we could reasonably use and found the following to be feasible:

C1 = 800pF; additional 160m inductance = 5μH; C2 = 3000pF.

These lumped constants are achieved as follows:

(1) 500pF high voltage mica connected between the 160m switch tag on S1J and earth. This parallels C1 and effectively increases its value to around 800pF.

(2) Strapping the 160m tag to the 80m tag on S1L parallels both sections of C2 and a further 2000pF (disc ceramic) was added from the S1L 160m tag to earth. The combined effect is to increase C2 to nearly 3000pF.

(3) A coil consisting of 26 turns 20swg close-wound on a $\frac{3}{4}$in former was sufficient to resonate on 160m. This coil is located underneath the chassis, between the aerial changeover relay and the rf choke running from S1M and earth. The rf choke may be moved nearer S1M to make room. The coil is wired between one end of the existing pa coil and the common tag of S1M in order to short out unwanted inductance on the higher bands. Please remember that when counting switch wafers, S1K and S1L are on the same wafer.

A modification to the FT-101 carried out on the above lines works quite well with the following reservations:

(1) Keeping the power down is a problem and we must admit we have grave misgivings on this score. We would be much happier lending support to a simple and properly designed outboard pa using something considerably less powerful than a pair of 6JS6As.

(2) The reduction in power is achieved by reducing microphone gain and not rf drive. This means that carrier power is unaltered and hence carrier suppression is degraded. One possible solution to the power problem would be to use only one 6JSA on 160m either by modifying the heater wiring and using an alternative "Top Band only" auxiliary plug on the rear chassis, or by using spare switch capacity to remove the screen voltage from one valve and replace it with a negative voltage to bias off the valve.

(3) The pa tank constants are not ideal for the power used and the limited swing of C2 means that the loading is virtually fixed at 75Ω and does not allow much leeway.

These remarks would not be complete without a word on spurii. Examination with our spectrum analyser discloses several spurious emissions, but at 160m the selectivity of the tuned circuits reduces them to insignificance.

We do not think it wise to put a fuse in the +600 pa line without also protecting the screens.

All in all, then, the modification works, it works quite well, but to a purist it is academically inelegant. To those doubting their ability to incorporate the complete modification, may we end on the cheerful note that the receive side modification is both simple and trouble free.

Editor's note

Since these comments were written, Lowe Electronics have informed us that they have been to Japan and have discussed the 160m modifications with Yaesu Musen, resulting in a factory modification kit which will shortly be available. The main improvement is that the existing pa coil is replaced.

The 14AVQ aerial

by P. W. WATERS, G3OJV*

FOLLOWING a move to his present QTH the author found himself with a garden too small to erect a beam aerial for the hf bands, and in particular 20m on which most of the dx was previously worked. It was because of this that thoughts had to be turned to a form of compact omni-directional radiator, preferably capable of operation on other bands as well as 20m. After much deliberation the 14AVQ was finally selected and it is hoped that the notes that follow will be of interest to anybody contemplating purchase of this or a similar aerial.

The 14AVQ is manufactured by Hy-gain of the USA and is a trap vertical covering the four amateur bands 10, 15, 20 and 40m with a power rating of 1kw. For those who do not require 40m operation the 12AVQ is available at slightly less expense. On each band the aerial resonates as a quarter-wave vertical radiator and the manufacturers provide comprehensive instructions for assembling and tuning it. No test equipment is needed apart from an swr meter to check the matching, but in any event this should be standard in every amateur station if the pa tubes of modern transmitters are to live a useful life.

Before assembly it is necessary to decide whether the aerial is to be mounted at ground level or elevated in the form of a ground plane, and whether the cw or phone ends of the bands are preferred. Hy-gain in their instruction booklet provide a set of typical swr curves for each band. For UK operation the cw settings appear to be a good compromise for both cw and phone operation. (Remember that in the USA the 40m phone band extends from 7·1MHz to 7·3MHz and the 20m phone portion is 14·2 to 14·350MHz.)

The final height of the 14AVQ is just under 20ft but, of course, the exact dimension depends on the table of settings adopted. An important point to note is that Hy-gain state in their instructions that once a particular table of settings has been selected it must be used for all bands. Thus, one cannot select a cw setting for 40m and a phone setting for, say, 10m.

The actual assembly of the aerial is very easy, although it does involve some fairly precise measurements and it is as well to check these before the aerial is finally installed in its operating position. In its dismantled state it can easily be put in the boot of the average family car, making it ideal for portable operation. Construction is very robust, the base section being 1¼in diameter tubing which must help the bandwidth on 10m. The traps are big robust-looking devices that really inspire confidence in the 1kW rating. All element sections are constructed of heavy gauge alloy tubing and all hardware is fully rustproof. For those who live in exposed locations the wind rating is 80 miles/h with no guying. The total weight when assembled is approximately 9lb, and despite its length it can easily be lifted into an elevated position by one man.

The base of the aerial is fitted with "U" clamps designed for a maximum mast diameter of 1⅜in. A maximum diameter of 2in would perhaps have been more useful, but if a large diameter mast is used a small extension tube of 1¼in can be fitted. The feed impedance is given as 50Ω, and for this purpose an SO239 coaxial socket is fitted at the aerial base. An unusual feature of this particular aerial is that its base is at dc earth potential—achieved by means of a built-in coil across the feed input. This means that the aerial is automatically earthed to the mast or tubing to which it is clamped. The manufacturers state that the coil assists in reducing received electrical noise. An added bonus is the useful feature of being able to check continuity of the coaxial feed by putting an ohmmeter across the coaxial feeder at the station end. A small skirt around the base is fitted with four bolts and associated nuts and washers for attachment of the radial system.

The question of whether to mount the aerial at ground level or in an elevated position as a ground plane is a matter for personal preference and availability of space. For installations at ground level it is essential to install a good ground system and position the aerial well clear of surrounding objects such as buildings, trees, fences and the like. Failure to do this will result in disappointing results. A further consideration must also be the far greater chance of tvi.[1].

The author's aerial is erected at the side of the house on top of a 20ft mast. Hy-gain recommend a minimum of two

*8 Gay Bowers, Hockley, Essex.

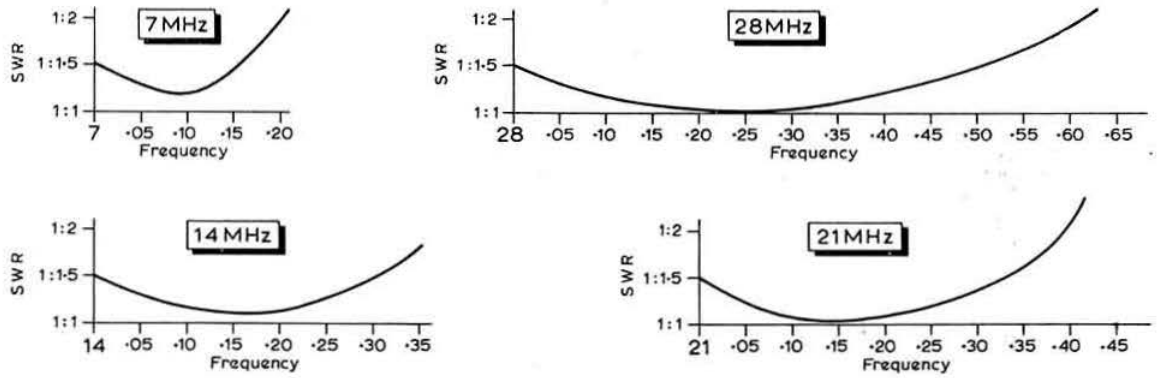


Fig. 1. SWR curves on the 7, 14, 21 and 28MHz bands

radials per band, resulting in eight radials in all. The radials are fitted with insulators and attached to the plastic guttering by light nylon cord. In the case of the 40m radials these had to be dropped down over the edge of the guttering but this does not appear to affect the performance adversely. At the author's QTH it was not possible to lay out the radials in all directions; a 110° segment of the circle having no radials.

For those who like swr figures, Fig 1 indicates the swr curves measured on a KW Electronics swr meter and confirmed by a meter of oriental origin. It cannot be stressed too much that adjustment of the radials is very critical if the best swr is to be obtained. The method adopted was to attach a single radial slightly longer than recommended. This radial was then pruned for the best swr in the desired portion of the band and was then used as a template for the second radial. The procedure was repeated for each band. Of course, the more radials the better, and on 20m the author has three radials.

As far as tvi is concerned the author was able to place his 405-line tv aerial 4ft from the 14AVQ without interference, provided filters were fitted on both the inner and outer conductors of the tv coaxial downlead; the station transceiver being a KW2000B at full input of 180W.

As for results, DXCC has been obtained in 12 months of operation (providing the QSL cards come in) using both cw and ssb. Reports from W on ssb average 5 and 8 to 9, while from VK they are 5 and 6 to 7. Perhaps the most encouraging contact recently was VK on 40m.

Reference

[1] *Radio Communication*, February 1970, p79.

RFI FORUM

by B. PRIESTLEY, BSc, G3JGO*

Radio Frequency Interference has always been part of amateur radio and at present there is an increasing number of ways by which one can suffer from it. RFI Forum is intended as a place for exchanging ideas, so brief details of any ideas which have proved useful in the fields of bci, tvi, af breakthrough, amateur to amateur interference or the rfi suppression of electrical systems, but which are not common knowledge, will be welcome by its compiler if sent to the address below.

Filter alignment generator

Correct setting up of the attenuation notch can increase the harmonic attenuation of a low-pass filter by 20dB or more. Doing this accurately demands a stable and accurate signal generator and so the following circuit was devised. This is simply an overtone crystal oscillator built with its battery in a diecast box. Only the output coaxial socket and the press switch extend outside the box. This avoids radiation from power supply leads. (Fig 1).

A filter is aligned in the manner shown in Fig 2. Interference is fed into the tv coaxial feeder via the filter, which can then be set up to minimize the effect on the television receiver. The 27Ω resistors in the T box are not absolutely essential, but without them the length of coaxial cable between the box and filter will probably need pruning.

Caution. During the test some interference is being deliberately radiated, so it is important to make tests of the shortest possible duration and then only during the tv test transmissions. An amplifier (or attenuator if the field strength permits) can be added between aerial and T box to reduce this radiation.

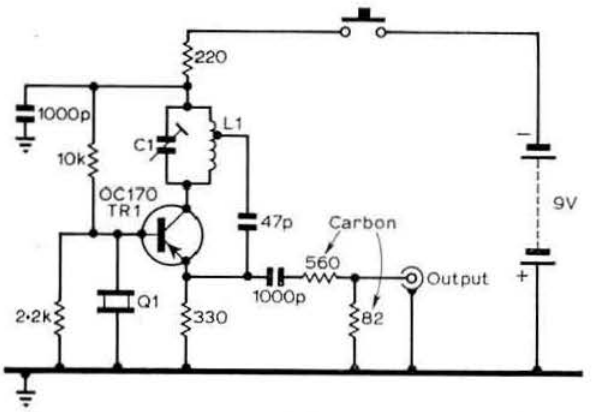


Fig 1. C1 L1 to resonate at O/T frequency. Tap about ⅓ way down. TR1, OC170 or similar; x1, 3rd or 5th O/T. See Table 1

Who has done it?

Has anyone produced a simple hpf/lpf combination to reduce mutual interference between 70 and 144MHz stations at the same site? If so, please let us know.

Table 1. Suggested crystal frequencies

Channel 1	42·5MHz
Channel 2	50·0MHz
Channel 3	56·75MHz
Channel 4	58·25MHz (Sound channel)
Channel 5	63·25MHz (Sound channel)

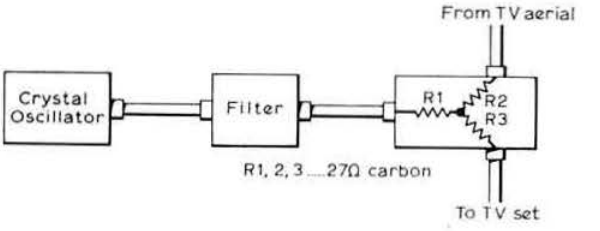


Fig 2

* 43 Raymond Road, Slough, SL3 8LN.

A clipper and filter for transistorized ssb exciters

P. J. HORWOOD, G3FRB*

IT appears to be generally believed that it is not possible to use the conventional af clipper and filter in conjunction with an ssb transmitter. This belief may have been reinforced by an article in an American publication a few years ago, when the authors showed that if an af sinewave, clipped to the point of becoming a square wave, was used to modulate an ssb exciter the resultant rf waveform contained peaks rising to a theoretical infinity. Reference to that excellent volume *SSB Principles and circuits*, by Pappenfus and others, will show that with a *restricted bandwidth* af clipping has something to offer ssb but is less effective than when used with a.m. (A3).

It is not proposed to examine the pros and cons of af versus rf clipping here, this is thoroughly treated by Pappenfus whose book is recommended to all seriously interested in ssb equipment design.

The principal reason for all speech processing is to increase the "talk power"; by restricting the bandwidth to prevent unnecessary frequencies "using up" available power, and by limiting the amplitude variations so that the mean power transmitted is a larger proportion of the peak power available. A further reason is to prevent overdrive of linear amplifiers. Without speech processing it is necessary to keep the mean level of drive well down if peaks are not to drive a linear amplifier into grid current. To avoid tvi, grid current should be prevented at all times; harmonics go up by leaps and bounds when grids go positive. Much more of the available power can be used when the output of a clipper is set so that under no circumstances can the grid go positive. One can then speak up without a wary eye on the grid current meter, safe in the thought that if one coughs it will not produce psychedelic patterns on the neighbour's colour tv.

Although it has been stated that af clipping is effective on ssb, rf clipping is much more so, as Pappenfus confirms, and it has the additional advantages that no in-band harmonics are generated, although intermodulation products do occur in-band and can be significant when large amounts of clipping are employed, but more of that later.

The alternative to clipping is limiting or vogad; whereas a clipper operates on a half-cycle-by-half-cycle basis and no transient escapes, the limiter averages its gain over many cycles and transients get through. That is unless it has an extremely fast attack time of the order of 1ms or so; to date no design exists which will achieve this.

A practical design

The circuit shown in Fig 1 provides as much as 30dB of clipping if desired; when set appropriately it allows no pa grid current to flow, no matter how loud one talks. It is unfortunate that it cannot be of universal application because the rf transformer design depends on the ssb generator frequency and the gain and sensitivity depend on individual requirements. Neither can it be used as it stands for valved exciters.

However, the author hopes it will provide more than a starting point for amateurs who have built or are designing a transistorized exciter.

Circuit description

FL1 is the existing sideband filter, R1 and R2 form a pad to correctly terminate the filter and the values will depend on the filter's requirements. VT1 is a voltage amplifier, the transistor type is uncritical, any small signal rf type with Ft of about 100 with an h_{fe} of approximately 50 will be suitable, the 2N706 is readily available and cheap. L1 must tune to the generated frequency, the collector tap should be about a quarter of the total turns from the cold end. D1 and D2 are the clipper diodes. The author used Hewlett Packard HP2800/5780 hot carrier diodes because of their low turn-on voltage, but even germanium point contacts should prove satisfactory. T1 must also tune to the generated frequency and should have a 4:1 step-down, primary to secondary. VT2 is an emitter follower, the output adjustable by RV2. R10 must be chosen to suit the source impedance required by FL2, which is an additional filter preferably identical to FL1.

Construction

The prototype was built on Veroboard and fitted in a die-cast box. Attention must be paid to layout in relation to filter inputs/outputs.

Adjustment

Unfortunately an rf valve voltmeter is required, although it does not have to be a high-sensitivity type. Alignment as a

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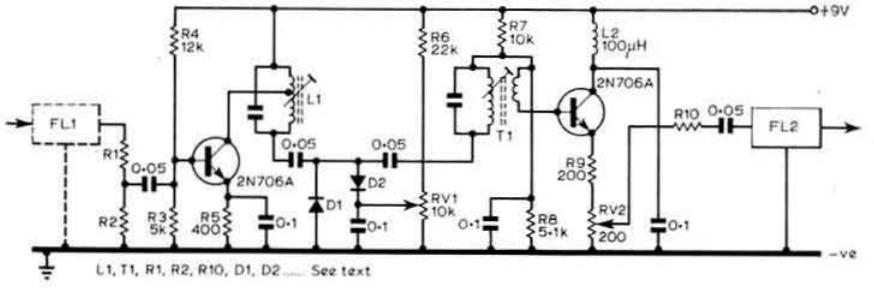
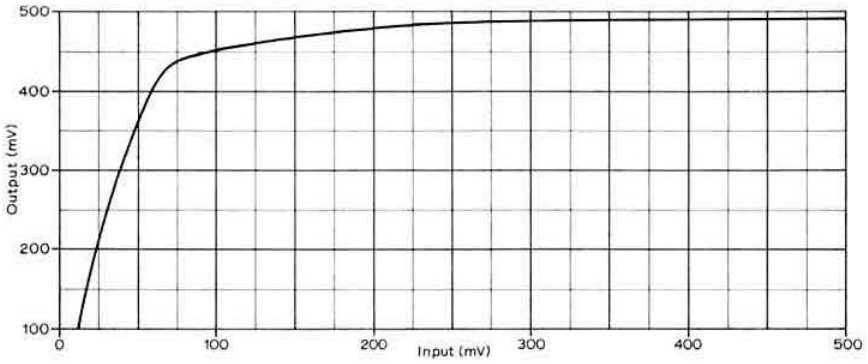


Fig. 1

Fig. 2.



unit would also require the use of an rf signal generator but it is simpler to install the clipper in your exciter, which can then be used as a source of rf provided an af generator is available.

Set RV1 for maximum bias on the diodes, set RV2 for maximum output. Connect the valve-voltmeter to the output of FL2. Inject an af tone of approximately 1,000Hz into the exciter microphone input. Keep the tone level as low as possible and with the valve-voltmeter on its most sensitive range adjust L1 and T1 for maximum output, reducing the tone input as the output rises. L1 and T1 will need no further adjustment. If you do not already know the typical signal level at the output of your existing filter (FL1) it must be measured. Remove the af generator from the microphone input and reconnect the microphone. Estimate the level on the valve voltmeter produced by typical speech, ignore peaks produced by sibilants. Reconnect the af generator and adjust its output to produce the level measured above at the output of FL1. Transfer the valve-voltmeter to the top of the diodes. VT1 will have a gain of approximately 30dB; so 0·15V drive will produce about 4·5V at the diodes. Adjust RV1 until this level falls, to correspond with the maximum amount of clipping desired. For 10dB clipping this should be one third of the unclipped level; for 20dB, one tenth. Transfer the valve-voltmeter to the output of FL2. Adjust RV2 so that the signal equals the level measured at the output of FL1. The gain of the unit is now unity. If in the future RV1 is altered, RV2 must be re-adjusted to produce unity gain.

Performance

The curve, Fig 2, shows the typical transfer characteristic with a well defined knee and very little increase afterwards.

If a calibrated af attenuator is available, connect it between the af generator and microphone input. Reduce the input to the point where the output at FL2 just begins to fall (the knee). The difference in decibels between this level and the original standard level is the amount of clipping available. Measurements made with a Hewlett Packard spectrum analyser give these typical ip figures when the exciter is driven with a two-tone source.

Clipping level	3rd order IPs	
0	60dB	
10dB	25dB	below either
15dB	20dB	tone
20dB	13dB	
30dB	10dB	

Even with 30dB clipping the non-harmonic distortion gives quite acceptable speech quality, particularly on the dx bands.

As to the power gain conferred by clipping, Pappenfus states this to be 4dB for 10dB clipping and 8dB for 20dB etc. Thus the capability of the signal can be increased by almost eight times by the use of this clipper, and it could well save the cost of a high-power linear amplifier. Constructors may wish to disable the clipper by bypassing it with switching, but once having experienced the benefits, the author does not think they will do that very often.

In use on the hf bands no adverse comments have been received on degradation of quality, and it certainly helps one to compete with States-side QRM. One report received from a dx station epitomizes the advantages: "You're not very strong, but by golly you're readable!"

The RSGB News Bulletin Service

The RSGB News Bulletin, callsign GB2RS, is broadcast every Sunday morning. This bulletin can be received on either vhf or hf, which gives almost complete coverage of the British Isles. It keeps radio amateurs up-to-date about happenings in the world of amateur radio and gives information on coming events, supplementing and bridging the gap between successive issues of *Radio Communication*.

SCHEDULE

Time (bst)	Frequency (MHz)	Location and coverage (hf) or beam heading (vhf) of station
0930	3·6	Bromley, Kent (SE England)
1000	3·6	Cheltenham (SW England)
	145·8	Aberdeen (NNW)
	145·095	Farnham, Surrey (NE)
1015	3·6	Belfast (N. Ireland)
	145·8	Bangor, Co Down (N)
1030	3·6	Derby (N. Midlands)
	145·8	Aberdeen (SW)
	145·89	Bishop Auckland (N)
	145·3	Sutton Coldfield (NW)
1045	145·89	Bishop Auckland (E)
	145·095	Farnham, Surrey (SW)
1100	3·6	Bridlington (NE England)
	3·6	Aberdeen (NE Scotland)
	144·3	Sutton Coldfield (SW)
1130	3·6	Motherwell (S Central Scotland)
	145·5	Bradford (NE)
1200	145·5	Bradford (SE)

Exhibitions — Beacons — Conventions — Contests — Local events Rallies — Scientific projects — Meetings — Licensing — Clubs Propagation reports — Lectures — Field days — Expeditions

Mounting rotary beams

by J. N. Holland-Carter, G3OWB*

MOUNTING a rotary beam on the average house can present a few problems. Firstly there is the cost of a rotator that can be mounted within a system; if it is to be chimney or wall-mounted the weight may be positively dangerous, and if mounted on wall brackets, having the rotator and associated metalwork high up adds greatly to the weight. Guying may be difficult as there is often insufficient room to lead the guys a reasonable distance from the house, and guy wires can be a nuisance in the garden, particularly if there are children or old people about, and in any case tend to be unsightly.

At G3OWB it was decided that two things were desirable with a rotary beam—(*a*) that it should be rotatable from the ground by motor or 'armstrong" method depending upon availability of bits and pieces, and (*b*) that it should be as simple and as much self-supporting as possible.

Having a handy gable-end the most obvious thing was to fit wall brackets as high as possible to support the mast, the wall brackets to be equipped with bearings to allow the whole assembly to be rotated, with a thrust bearing at ground level.

Various ideas were tried out and discarded; roller bearings, ball bearings and bronze sleeves were considered, but

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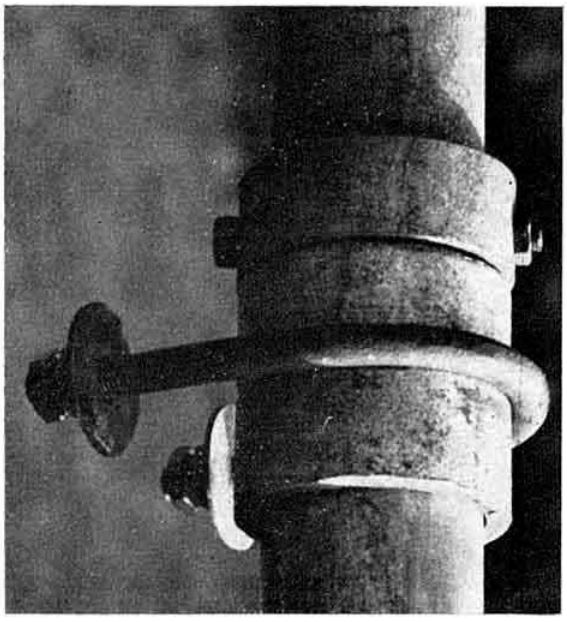


Fig 1. Close-up of the upper assembly clearly shows the bearing, the securing U bolt and the collar (bolted to the mast) which rests on the bearing and supports the weight during erection

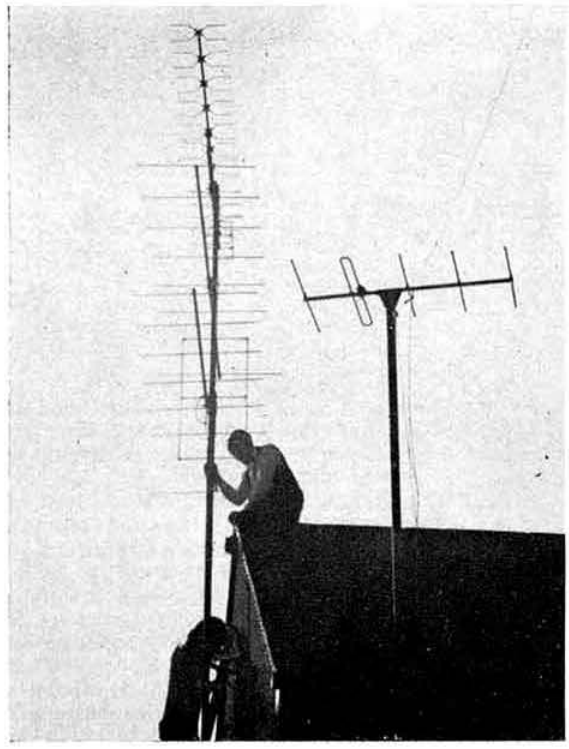


Fig 2. The professionals at work. Newcam Aerials of Cambridge, having fitted the wall brackets, lifting the 70cm and 2m aerial assembly into position

maintenance, the possibility of rusting etc ruled out most of these ideas. Many "proper" type bearings were bulky and would have required fairly complex and heavy casings and supports. Finally it was decided to try out sleeves of the same material as the mast and see how that would work out. For one thing there would be no problems from differential expansion with the considerable changes of temperature encountered.

At the local metal suppliers there is often a box of offcuts of various shapes and sizes, and therein was found an 8in length of Dural tube with an inside diameter of just $\frac{1}{16}$th under 2in, ideal for the job in hand. The cost was only about 40p.

From this length, two pieces, each about $3\frac{1}{2}$in long, to act as plain bearings, were cut. Taking $\frac{1}{16}$in off evenly was a fairly long and tedious business and a friend with a lathe would be a help. The way it was done here was to mount the bearing on a simple face plate and turn it in a slow speed electric drill fixed in a vice. The cutting tool was a coarse, half-round file worked to and fro inside. It was surprising how easy it was to keep the diameter even with a bit of care, but Dural is not a nice material to work with. Finally coarse grinding paste was used together with a short length of 2in tube to smooth off the high spots remaining in the bearings.

The next job was to cut a groove in the outside of the bearing for the U bolts to rest in when the assembly was in

position. The face plate and slow speed drill were used once more with a coarse round file as a groove-cutting tool. The complete bearing can be seen in Fig 1—nothing could be much simpler!

At this stage the author was not certain how the weather would affect the assembly and he had terrible forebodings that the whole thing would seize up solid in position on the side of the house. To see what would happen he slid the two bearings over the mast he intended to use as the top section and left the thing untouched out in the rain, snow etc for about two months. He moved it about occasionally but at no time did it seize particularly tightly although no lubrication had been applied.

The rest of this story is obvious from the illustrations, and the 70cm Multibeam with the 2m 8-over-8 below now happily rotate over the roof top. The rotator is a $\frac{1}{16}$th hp high speed motor, geared down to about one rpm through two worm gears, and is reversed by a relay operated by dc derived from the mains supply. A key switch in the shack gives forward and reverse and a selsyn is used as an indicator to show beam heading.

In order to minimize the chances of winding the feeder round the mast too many times, a cam operates a bi-directional trip switch on the selsyn operating pulley and this causes a bright warning light to come on in the shack if the mast is driven too far in either direction.

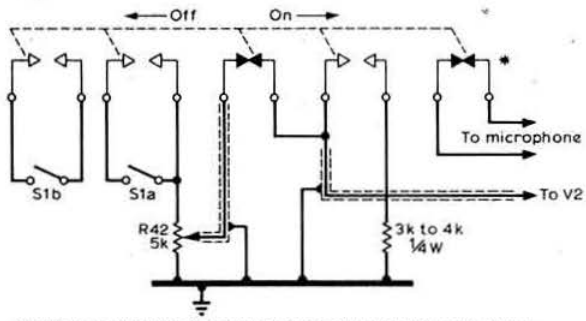
A simple modification to the Viceroy transmitter

by R. G. W. BANTOCK, G3WNT*

THE idea of a foot-operated switch to control some function of the amateur station is not a new one, and the simple modification described here indicates the benefit of using such a switch in the netting of a Viceroy transmitter (in the author's case, a Mk IIIa) to the station receiver when using ssb. The usual procedure is to turn down the audio gain, switch on the CIO, advance it about half a turn, and adjust the tuning (vfo). Assuming that the mixer input and driver controls have been correctly set, then the depression of the foot switch performs the first three of these four operations, giving an instant check on the zero-beat condition at the operating frequency.

The switch controls a relay mounted inside the transmitter which has appropriate sets of make and break contacts. Referring to the circuit diagram, S1a and S1b are shorted by one set each, while a third set disconnects the screened lead linking V2 to R42, connecting it instead to a fixed resistor via a fourth set of contacts; a final set opens the microphone lead, which has the same effect as turning down the audio gain — this is desirable to avoid the unpleasant sound which is caused by overloading the front-end of the receiver.

The relay can be mounted vertically in front of V4 and to the left of V12, above the chassis, looking from the front. Not only is there adequate space here, but the screened lead mentioned above passes this point and can, therefore, be conveniently cut for soldering to the relay contacts. The outer screening should of course be rejoined. A $\frac{1}{2}$in diameter hole in the chassis near the front panel easily allows two pairs of wires to be passed through from the relay contacts to the switches S1a and S1b, fitted to the rear of R42, and a further pair to the microphone input socket. A 2,000Ω Post Office type relay was used and the three make and two break contact sets were built up from leaves and spacers from other relays of a similar type, care being taken that all contacts opened and closed simultaneously. The supply voltage was 50V dc from an external source, but of course a more sensitive relay working from the 6·3V heater supply may be used instead.



* This set of contacts may be changed to 'make', and short-circuit the microphone input, if preferred

Two leads must be taken from the rear of the transmitter —one to the external supply (if used) and the other to the foot switch. These may be taken through the spare pins Nos 8 and 11 on the power plug or, if the aerial c/o supply is used, through pins six and eight of the octal plug, disconnecting the 6·3V supply from pin eight. The junk box should be capable of providing the necessary hardware for the construction of the foot switch itself; each operator will have his own ideas on its size and spring tension etc.

The modification entails no additions to the front panel, and only very little alteration to the internal wiring. Because the rotation of two left-handed controls is replaced by a simple foot movement, it proves an absolute boon to on-the-air operation, especially just before calling a wanted station.

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TECHNICAL TOPICS

by PAT HAWKER, G3VA

THE mixture this month includes not only a number of practical suggestions which can be tried easily in the rig but also several longer-term projects calling for further development or research—including high-gain log periodic aerials, a potentially useful new form of diversity reception for vhf mobile operation, and the ever-fascinating trans-equatorial propagation making possible dx operation up to 70MHz and of special interest to those stalwarts who maintain interest on the 28MHz band despite the falling sunspot activity.

Log periodic dipoles

One of the very few basic new aerial structures to have been developed during the past 25 years is the log periodic. But generally amateurs have made relatively little use of this form of wideband aerial array—it is not, for example, even mentioned in *Radio Communication Handbook*. The reason for this lack of interest is not particularly difficult to discover: although the advantages of a non-critical wide-band aerial are well recognized, the gain/size ratio of a log periodic is usually well down on the more conventional Yagi-Uda arrays. But the log periodic—mostly in the form of the log periodic dipole (lpd) arrangement of Fig 1(a) has been widely used in hf communications where the ability to work on a number of different, non-harmonically related frequencies is often very important. More recently, it has come into considerable use for uhf (less frequently for vhf) television reception, particularly in tricky areas where its well-defined back-to-front ratio and smooth response patterns often prove very useful in eliminating ghosts and the problem of different optimum pointing directions on different channels.

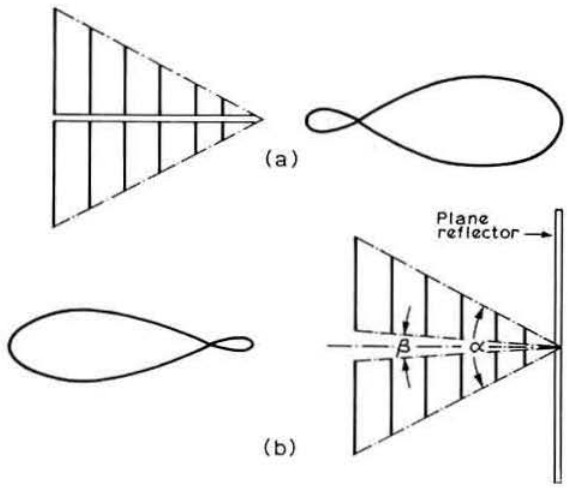


Fig 1 (a) Conventional form of a log periodic dipole array with its associated radiation pattern; (b) modified form of array showing axial displacement of elements and the plane reflector which increases gain and reverses the direction of fire; apex angle α and displacement angle β

A few amateur hf designs have appeared from time to time: some years ago, for example, G3LQC described in the RSARS journal *Mercury* a practical 13 to 60MHz log periodic using a single pole, although needing a fairly large ground area (120ft by 50ft). This array was rather similar to the military aerials produced by Granger Associates. The G3LQC design provided a forward gain of about 6 to 8dB while providing a good match to 75Ω coaxial cable throughout the range 13 to 60MHz. For the current tv receiving aerials, a typical specification for a 21-element model covering all channels in Bands IV and V (470 to 850MHz) is a claimed 9·5dB forward gain (ref dipole) with about 30dB front/back ratio.

An interesting hf design using shortened dipoles only half the normal span was developed by Rohde and Schwarz—this had a capacitance hat in the form of a rhombic at the ends of the elements. At the other extreme, there is the large TCI array using stretched, capacitance-loaded elements (extended aperture) needing masts over 200ft high but providing gains of the order of 13dB (ref dipole). Another form of construction is the log periodic vertical monopoles with ground plane, and these can retain the desirable wide-band characteristics. Another basic form is the log periodic Yagi (lpy), and an amateur lpy design for 50 to 52MHz appeared in *Ham Radio* (July 1969); this had five driven elements in conjunction with a further three parasitic elements and had an estimated gain of the order of 12dB.

In *73 Magazine* (October 1967) Hal Greenlee, K4GYO, provided information on designing vhf/uhf log periodics including a "log scan 420" array using four stacked log periodics to provide almost 15dB gain and 50MHz bandwidth. At that time K4GYO suggested: "Soon vhf log-periodic antennas will be replacing Yagi arrays of practically all types, and also replacing old stand-bys such as the collinear, helix and corner reflector". He suggested that log periodics with small apex angles with a limited 1·5 : 1 bandwidth could deliver virtually as much gain as a Yagi of the same size and suitable for bandwidths of only a few per cent. But in practice the Yagi still seems the dominant structure.

But recently two new ideas for increasing the forward gain of log periodics have appeared, based on theoretical studies carried out at the Central Electronics Engineering Research Institute in India: see two papers by Murli Dhar Singh and Shiv Prasad Kosta in *International Journal of Electronics*, 1971, Vol 31, No 6. They point out that if the gain of the lpd can be increased without sacrificing the inherent bandwidth properties it would become a more useful device for long-distance communications. They suggest two modifications which together can provide a gain improvement of from 4 to 5dB, although it would appear that these figures have yet to be proved experimentally.

The first modification is to provide axial displacement of the dipole elements, the displacement increasing as the elements are lengthened: see Fig 1(b).

The second is a more fundamental change, reminiscent of Ehrenspeck's "backfire Yagi aerials" (see *Amateur Radio Techniques*), and consists of placing a large plane reflector at the apex of the log periodic, so that the beam is shot into the reflector and then back out in the opposite direction, and it is this which provides the bulk of the additional gain. It is suggested in the papers that by using a combination of these techniques, whereas a conventional lpd of practical size might have a gain of 8 to 9dB, the modified array would be capable of 13 to 14dB, which would clearly transform the system into a high-gain array.

Obviously the provision of a large plane reflector would not be easy for amateurs at hf, but should not be particularly difficult at vhf or uhf. It could well be that concealed in these new ideas is a most useful array for amateur operation—waiting to get out!

Solid-state t-r switch

An automatic electronic transmit-receive switch using a gate-protected dual-gate mosfet device, and based on a design by W4ETO, was described by Lewis McCoy, W1ICP, in *QST* (April 1971). The unit, see Fig 2, was further protected by pairs of back-to-back 1N914 diodes across the input and output connections, and the whole unit powered from a 6·3V ac heater line by using a built-in voltage-doubler power unit. For really high-power transmitters, a rather different take-off arrangement was shown in the original article, and the value of the coupling capacitor reduced.

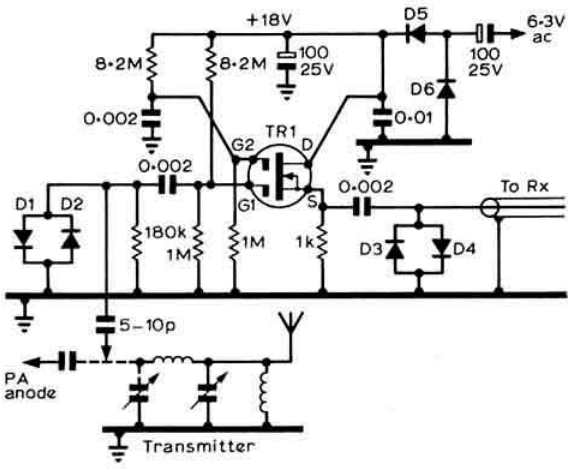


Fig 2. TR-switch described by W1ICP using a gate-protected dual-gate mosfet (eg MPF121 or 40673). The 5-10p has a voltage rating of 1,000 or greater (see *QST* of April 1971 for suggested take-off network for really high-power transmitters) D1, 2, 3, 4 are 1N914. D5, 6 any silicon diode with peak reverse rating of 100V or more, and current rating of 100mA or more

Wet-weather ribbon feeder

The 300Ω ribbon feeder remains a useful form of transmission line with a number of advantages over coaxial cable (and one or two disadvantages). One attractive feature is the easy check, with a neon, of standing waves; another is that short lengths can be used at high swr or as resonant sections

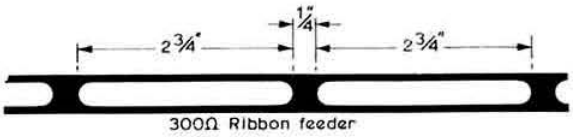


Fig 3. Modification of 300Ω flat ribbon feeder as suggested by G3WBT using a leatherpunch and fine scissors

without undue losses. A very common use is for the stub section of the popular G5RV multiband dipole.

Unfortunately, as is well known, the flat ribbon type of line undergoes significant changes during wet weather; the tubular form is much less affected but is also appreciably more expensive.

Quite a few years ago I recall an item in the *RSGB Bulletin* about cutting away a substantial part of the ribbon dielectric in order to reduce losses on vhf; in fact I spent some time converting a length of feeder in this way, although in the end too much of the ribbon got cut away with the result that the wire spacing tended to vary unless the entire feeder was kept under tension, thus defeating part of value of this type of cable.

Recently, Graham Thornburn, G3WBT, sent along a similar suggestion but with rather shorter slots, and it would seem this could make a very attractive modification. His reason for modifying the 300Ω ribbon was the change introduced in a G5RV not only by rain but also by sea spray at his site on the Cumberland coast.

He cut his ribbon rather like the well-known Dexion angle material; this was done quite easily with the aid of a leather-punch and fine scissors. With these aids, he was able to cut and pinch out slots 2¾in long, leaving ¼in ties between each slot, as in Fig 3. It took about an hour to modify 30ft.

The modified cable will, in theory, have a slightly different velocity factor, so that theoretically the stub section for a G5RV rises to about 29ft 6in or 30ft, though in practice he finds it will still usually work with about 29ft or so. Now he finds that neither rain, mist nor salt spray seem to have any effect on the aerial.

We suspect that cable modified in this way would also be useful low-loss vhf feeder. Back in January 1955, GM3BDA described how to make low-loss 360Ω balanced feeder for 144MHz using 18swg wire spaced ½in apart by means of ⅜in polythene tubing to form spacers every 9in or so, and the whole system kept under tension. The modified 300Ω cable should prove nearly as effective; it is often forgotten that at vhf and uhf even "low-loss" coaxial cable introduces quite significant losses.

Diversity reception for vhf mobile?

The problem of receiving satisfactory vhf and uhf signals in a moving vehicle in a built-up area is well known: the changing phase relationships of multipath signals can impose deep fades of the order of 20dB or so as the vehicle moves through each half-wave of distance from the transmitter. On 144MHz (ie about 2m wavelength) the fading rate is about 13·5Hz for a vehicle travelling at 30mile/h (13·5m/s) and can seriously degrade the reception of a.m. speech.

What is really needed is diversity reception using two spaced aerials, and there is good evidence that even in the limited space of a vehicle two aerials can provide useful space diversity. Unfortunately it is not sufficient just to

connect the feeders of two spaced aerials together and then feed the combined output into the same receiver. The fixed phase relationship of such an arrangement will simply convert the combined aerials into a directional array—*not* usually wanted for mobile working. Conventional diversity systems use two receivers with some complex technique for selecting the better signal at any given moment; but this type of complexity is not likely to appeal to many operators.

Now, however, M. J. Withers of Birmingham University has reported (*Electronics Letters*, 2 December 1971) a diversity system which uses only a single receiver of normal commercial mobile design with the additional equipment "relatively cheap and easily included". From the information given, it would appear to have distinct possibilities for amateur vhf mobile use.

Basically, the feeder of one of the two aerials is passed through a variable phase shifter before the signals are combined in a hybrid and fed to the receiver. In the experimental system, this phase shifter consists simply of eight lengths of cable with arrangements so that these can be switched digitally in and out of circuit, in turn, by diode logic, to produce what is virtually a linearly changing phase shift. The phase step increments are $\pi/4$ rad so that the phase shift switches through progressively from 0 to 2π rad. The whole arrangement is rather like the I1BER directional array shown in *TT* (September 1970).

The key feature is that the complete cycle of switching of phase shifts is carried out at a rate of 6kHz, or roughly twice the highest speech frequency of 3kHz. This means that the peak signal resulting from the optimum combination of two aerials will occur at a rate at least twice the highest modulation frequency. Then if the demodulator in the receiver functions as a peak detector, basic sampling theory shows that the receiver output will be based on the optimum combination of signals from the two aerials, disregarding all the non-optimum signals. In practice, the only modification made in the receiver was to increase the value of the detector load capacitor to ensure this stage functioned as a peak detector.

At the time the letter was written, the system had been tested satisfactorily at a fixed location but had not then been tried mobile; but even at a fixed site the directional characteristics of the receiving aerial resulted in "a worthwhile improvement in intelligibility when using the system compared with using either aerial alone."

It will be appreciated that the system provides what is virtually a continuously scanning beam aerial, and one wonders whether by incorporating manual selection of phase shift switching it might also prove a useful transmission aid when operating from a halted vehicle. Altogether this would seem a highly ingenious technique for improving two-way mobile working, not only for general commercial applications but even more particularly in the amateur field. Vertically polarized monopoles were used as aerials. An automatic diode switching matrix system should not present any major problems, and the stepped phase shifter, although not ideal, would need only a few lengths of coaxial cable. So here again is another topic offering possibilities for useful development work.

FET harmonic oscillator

Tritet-type fet oscillators capable of providing local oscillator injection for 144MHz converters in a single stage have been

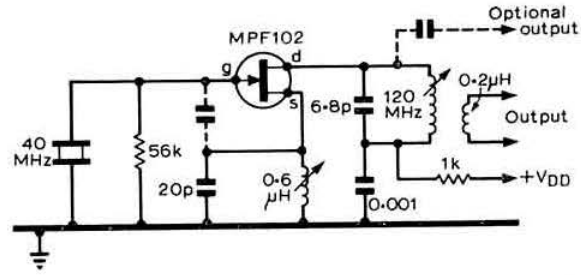


Fig 4. Tritet-type harmonic crystal oscillator using fet to minimize crystal loading. Values shown are those suggested for 40MHz crystal tripling to 120MHz

given before in *TT* and *ART3*. But another circuit of this genre has appeared in *Electronics* "Circuit designer's casebook" and has been brought to our attention by Ivan Wood, ZE3JJ (formerly G3CHP): Fig 4.

This makes use of the high gate-to-source impedance of a fet to minimize crystal loading. The originator, Fred B. Cupp, points out that oscillation at the desired crystal frequency is achieved only when the tank circuit in the source lead to the fet is tuned to about 0·7 times the frequency; when this condition is satisfied the phase lag offsets the phase lead due to the gate-to-source capacitance. The drain tank circuit is tuned to the desired harmonic, in this case the third harmonic, of the oscillator frequency. Output may be taken from either the drain tank with link coupling, or the drain lead via capacitive coupling.

Incidentally, ZE3JJ was one of several amateurs to point out that we were in error in suggesting that post-war British amateurs never experienced the full bandwidth of 7,000 to 7,300kHz of the old 7MHz band; in practice, operation in the full band was permitted for several years after the war, although by that time users were in competition with the broadcasters. We still feel that every opportunity should be taken of condemning the continued operation of broadcast stations in the range 7,000 to 7,100kHz—and American amateurs are fully entitled to protest at the use of 7,100 to 7,300kHz for broadcasts *to* Region 2 (BBC and others please note!).

Transequatorial supermode theories

On several occasions *TT* has referred to the discovery of the intriguing phenomenon of transequatorial propagation (tep) as one of the truly significant contributions made by amateurs in the post-war period. It is also a subject about which there is still a lot to discover.

Dr L. F. McNamara of the Commonwealth Centre, Sydney, in a letter to *Nature Physical Science* of 22 November 1971 (see comment also in *The Times*, 29 November) reported work carried out by the Australian Ionospheric Prediction Service in New Guinea and in southern Papua which throws further useful light on the occurrence of evening-type tep on Japan and Okinawa to Townsville, Queensland, circuits. Earlier results of Japanese observations on tep on the Japan to Darwin path were noted in *TT* (October 1970).

The new observations strongly support the theory (put forward several times in *TT*) that long-distance tep paths do not depend on intermediate ground reflection and can thus be considered a special form of chordal hop or supermode

propagation. These paths are 5,500km and 6,000km long, so that classic 2F propagation theory would pre-suppose at least one intermediate ground reflection point.

The Australian studies, using both oblique and conventional ionospheric sounders, indicate a good correlation between tep on these paths and the existence of "range spreading" (which usually denotes ionospheric tilting) at Vanimo, New Guinea: see Fig 5. Spread-F conditions, as previously mentioned in *TT*, occur fairly regularly in the ionosphere over the tropics when the upper part of the ionosphere becomes very irregular and rough, and can often be detected by deep fading and selective distortion on hf broadcast transmissions crossing the tropics.

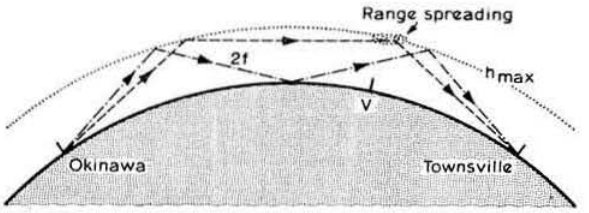


Fig 5. Showing the difference between the normal double-hop 2f path between Okinawa and Townsville, Queensland, and the suggested super-mode (chordal hop) path coinciding with range-spreading conditions above the ionospheric sounding station at Vanimo (V), 2100h

In practice, the Australians have now shown fairly clearly that range-spreading above New Guinea is a necessary, although not in itself a sufficient, condition for the existence of evening-type tep on the Japan-Townsville circuit as detected by the stepped-frequency oblique sounder. This new work thus gives important support to the chordal hop/supermode theory of tep propagation. It seems, however, rather a pity that *The Times* report, while giving full credit to amateurs for the discovery of tep, seemed to suggest that the supermode theory was being advanced for the first time. In fact it is possible to find similar suggestions in amateur literature dating back many years; what the Australians have done is to provide useful supporting experimental evidence.

Dr McNamara also reviews the various forms of tep. The first, the afternoon type, is characterized by steady signals and occurs most frequently between 1700 and 1900 lmt (ie time of signal crossing the equator). The second, the evening type, gives signals with deep flutter fading of the order of 5 to 15Hz and is most frequent between 2000 and 2200 lmt. Both types occur most frequently during the equinoxes. The best type of path for tep, he considers, is one which is symmetrical about and normal to the magnetic equator and about 6,000km in length; longer circuits tend to see only the steady afternoon mode, while places with magnetic latitudes around 30° or less usually see only the evening fluttering mode.

90° phase shift networks

Despite the emphasis in *TT* recently on digital techniques for achieving 90° phase shift networks suitable for use in ssb phasing-type generators and receivers, most users still rely on analogue type circuits.

Trevor Beamond, G3VLF, brought to our attention Patent

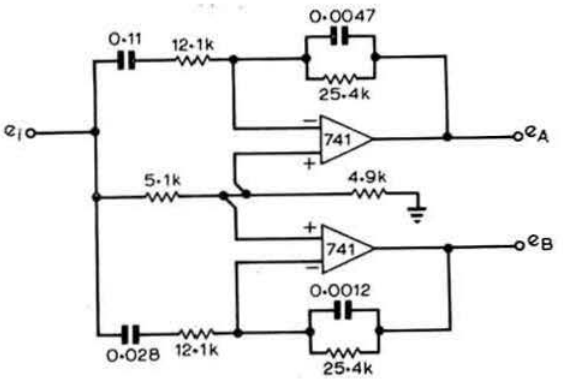


Fig 6. Realization of a fourth-order 90° phase-difference network suitable for use over the range 250 to 2,500Hz

1245163 describing a basic phase-shift circuit; although, as he later pointed out, this network would not in itself be suitable for use in ssb work, it reminded us of a practical circuit along comparable lines which appeared in *Electronic Design* (22 July 1971) ("Here's a better way to design a 90° phase-difference network", by Allan Lloyd). This used two basic op-amp circuits to provide a fourth-order 90° phase-shift over the range 250 to 2,500Hz with pole frequencies of 120, 472, 1,325 and 5,222Hz and phase tolerance of ±1·08°. The design of this category of phase-difference networks is discussed in further detail not only in the source mentioned, but also in an earlier article in the same journal: "Shift phase independently of frequency", by F. R. Shirley, *Electronic Design* (1 September 1970).

Simple valve phase modulator

Adding to the recent series of phase and frequency modulators, Martin Standby, G8DVL, sends along a simple valve arrangement, using an ECC83 (12AX7) twin triode. While he points out that there is nothing especially novel about this circuit, it has aroused quite a lot of interest among those who have listened to the results. Essentially it consists of a microphone amplifier and 3kHz slow roll-off filter, the output from which is connected to the screen grid of the first valve

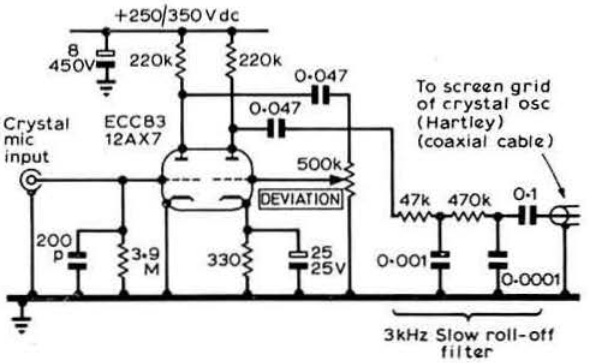


Fig 7. Simple phase-modulator using ECC83 (12AX7) valve in conjunction with 8MHz Hartley-type crystal oscillator stage of the transmitter

in the oscillator chain of the transmitter via a 0·1μF isolating capacitor. Apart from providing a useful nbfm facility, it does in fact make an extremely cheap form of modulator for any vhf transmitter, without any need for variable capacitance diodes or the like. G8DVL built his unit entirely from junk box spares in an evening, and he recommends it to anyone who has not yet tried this form of modulation.

He uses it with a 144MHz transmitter having an 8MHz Hartley oscillator. It was not found necessary to stabilize the screen volts of the first valve and no changes were made in the oscillator circuitry. An ECC83 should be used in preference to an ECC81; an ECC82 will not give sufficient deviation.

Crystal codes

Stan Brown, G3RFG, has abstracted some useful information on military-type crystals from Defence Specification DEF571-A. Under this specification, crystals have a four-letter code group, beginning with Z, in front of the frequency given in kilohertz.

The first letter is always Z, meaning "approved electronic equipment."

The second letter (A to Z but never I or O) indicates holder shape and size.

The third letter (A to Z but never I or O) indicates temperature range, frequency tolerance and load capacitance (eg A means —20°C to +70°C, ±0·02°C, load 30pF).

The fourth letter (A to Z but never I, O or S) indicates mode of operation, fundamental or overtone, series or parallel (A parallel resonance, B series resonance, C third overtone 15–52MHz, D fifth overtone over 52MHz).

A number of holder shapes and sizes are listed in *Amateur Radio Techniques*.

The following table shows the recommended drive levels for these various types of crystals:

	Fundamental frequency	
Style	Frequency range	Level mW ± 20%
B	100–500kHz	2
	800–9,999kHz	15
	10–20MHz	10
D	200–500kHz	2
	800–9,999kHz	10
	10–20MHz	5
E	120–500kHz	0·5
	800–9,999kHz	10
	10–20MHz	5
F	75–120kHz	0·5
H	10–20MHz	5
J & K	4–20MHz	5

In the above, the equivalent parallel resistance is in the region of 20Ω to 200Ω depending on the type of crystal.

For overtone oscillators the drive level is 4mW 15MHz to 25MHz (all styles), and 2mW above 25MHz. The equivalent series resistance for third overtone is not greater than 40Ω and for fifth overtone not greater than 60Ω.

FTdx560 modifications

G3FRG also sends along some notes on the cure of audio hum on the FTdx560 transceiver. These modifications have proved useful on his own equipment and also one belonging to G4ACP, both of which had been found to suffer from pronounced hum. The diagrams (Fig 8) are self-explanatory.

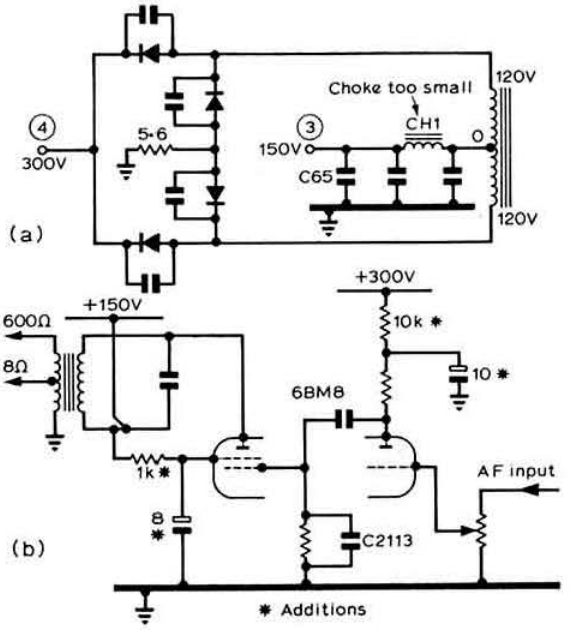


Fig 8. G3FRG's suggested cause and cure of audio hum on the FTdx560 transceiver showing how additional smoothing components can be fitted to offset the low inductance of the smoothing choke

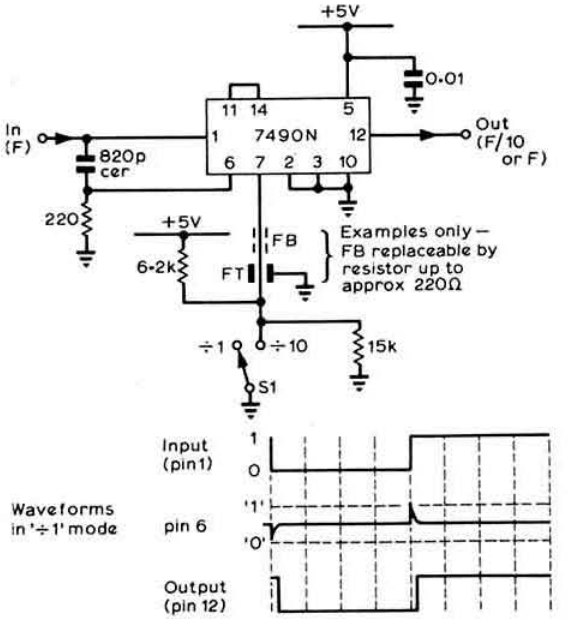


Fig 9. G8BUQ's programmable "divide-by-ten" counter. The 6·2k and 15k are necessary to back-bias the 7490N input ttl emitter in order to prevent stray capacitance from slowing the reset when operating in the "divide-by-one" mode. In practice the output waveform is not a true 1 : 1 ratio square, although it approaches close to this

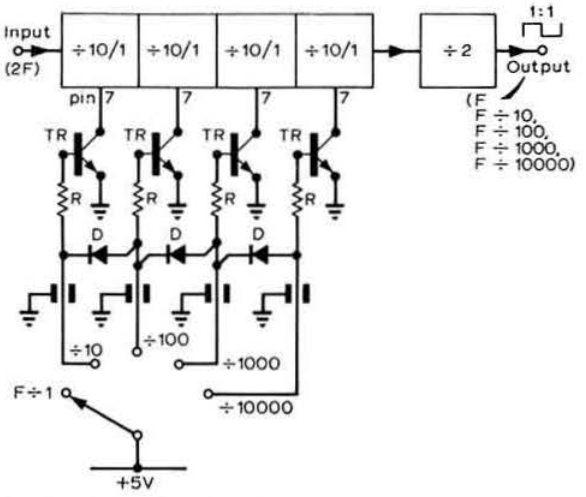


Fig 10. One way in which a four-decade programmable divider chain could be realized. TR, small signal transistor with h_{FE} at 1·6mA equal to or greater than 20 (eg BSY95A). R, typically 22kΩ; D, small silicon diode, typically 1N914. Note that the transistors should be fitted fairly near the integrated circuits

Programmable ic divider for calibrators

Andrew Stephenson, G8BUQ, mentions that although crystal calibrators are "coming out of the woodwork in swarms" now that cheap digital integrated circuits are readily available, his own contribution is a means of keeping the signal away from panel switches and confined to the circuit board without using any extra integrated circuits.

His programmable divider is shown in Fig 9. With S1 closed, the 7490N divides F by 10; but with the switch open, the ic divides by 1, in other words it provides an output at F. This is achieved by using the forced-reset facility, which puts the output back to "1" whenever pins 6 and 7 are simultaneously at "1"—the waveform diagrams explain the rest. With this technique it is possible to build a programmable divider chain as indicated in Fig 10, from which it will be seen that no ac signals need escape from the circuit board and divider box except via the orthodox wanted channel. This effectively removes one objection to built-in continuously-running square-wave sources in receivers, for example as required for digital frequency meters.

G8BUQ also indicates (Fig 11) a ttl-type buffer amplifier found worth including in a crystal calibrator.

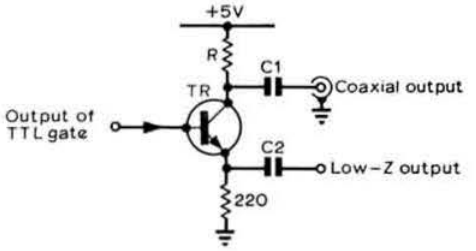


Fig 11. Buffer amplifier for use with ttl integrated circuit calibrators. C1 and C2 to suit frequency. R equal to the impedance of the coaxial cable (eg 75Ω or 51Ω). TR, TIS49 or similar high f_T transistor

Here and there

With reference to the new Plessey SL623c integrated circuit (*TT* December 1971), Brian Comer, G3ZVC, mentions that although the data sheet lists the top frequency for this combined a.m./ssb demodulator cum age generator device as 2MHz, he has found one very satisfactory at 9MHz in a 144MHz ssb/am/fm transceiver.

A number of past items in *TT* have referred to Hans Meinke's work on miniature active aerials. While not a great deal seems to have emerged recently in this field, interested readers may like to note that a considerable amount of theoretical information on these active loop-dipole aerials, resulting from work at Birmingham University, appears in *Proc IEE* (December 1971).

TT (July 1971) drew attention to a useful introductory article on commutating-type digital filters published in the American journal *Electronic Design* (25 October 1970). Les Shepherd, G3LCS, notes that a lot of the same information is reprinted in the British journal *Design Electronics* (October 1971) which may be more readily available in libraries. The article "Commutating filter techniques" shows the possibility of using this type of time-domain switching filter as a high-selectivity 100kHz i.f. filter.

MICROWAVES—1,000 MHz and up

(Continued from page 81)

Tone modulation of local oscillators

Conventional BFOs, which are so valuable in initially detecting weak signals when using narrow-band systems, are impractical for microwave systems using self-excited local oscillators, However, frequency modulating with tone one of the receiver local oscillators provides an effective substitute. Unmodulated signals received will produce a continuous tone, keyed signals interrupted tone, while tone signals produce a noise that cannot be ignored. If the oscillator for the first mixer is the one modulated, then only signals at the input frequency will produce tone. This facility offers a useful way for discriminating against break-through in later stages.

The level of modulation should be such as to produce a deviation equal to the i.f. bandwidth of the receiver. A convenient way of setting the deviation is to feed the i.f. output from the rf head into a narrow-band receiver, inject a small signal, and then increase the depth of modulation of the local oscillator until the tone sidebands generated can be heard over the appropriate range, for example, 29·5 to 30·5MHz for a 30MHz i.f. amplifier of 1MHz bandwidth. The same technique can also be used to set deviation in transmitters.

Experience to date suggests that unmodulated signals are more readily detected when tone modulated via the receiver local oscillator than are the corresponding tone modulated signals themselves. Have we an expert prepared to look into the theoretical background to see if these observations can be justified, and to look for any implications in terms of the compatibility of wide-band and narrow-band systems?

FOUR METRES AND DOWN

by JACK HUM, G5UM*

"B" into "A" equals 4

Transferring from Class B licence status to Class A often means transferring from a vhf to a hf bands condition, for one of the purposes of getting the Class A ticket is to find out what goes on in different parts of the spectrum. This need not mean hf bands only. It can also mean 4m, which if properly exploited gives nationwide coverage comparable with 1·8MHz but with a better signal to noise ratio.

"Properly exploited" is the key phrase in this context. To be more specific let us look in turn at:

Aerials. The more metal you expose to the air the better the radiation is a 70MHz version of the old long-wave axiom "Get as much wire out as you can". Just how useless are the dipoles widely employed on 4m can be discovered by simply looking up the gain figures for the neat four-element beams commercially available: 7dB advantage. Stack a couple of these aerials together and the gain over a dipole rises to 10dB; more metal is exposed yet the assembly remains visually discreet, which cannot be said of some of the mighty quads to be seen around suburbia. This is the trend—and the trend-setter was VHF NFD: of the 89 entrants on 4m last September, 21 used stacks, many others aerials bigger than the standard four-element.

Adapted commercial rigs. Old business radios come on to the market because they have ceased to meet professional specs. Only the amateur who is prepared to use professional left-overs will put them on the air as they are. But as a basis for tailoring to contemporary requirements they are excellent, even though receiver units designed for spot frequency input hardly meet the need to tune 70·025 to 70·7MHz and accept A1, A3, ssb and even occasionally fm, so are best reduced to produce and substituted by a really good front-end converter such as the G3MNQ (*Radio Communication*, August 1969).

TVI. The proximity of Television Channels 4 and 5 to the 70MHz band has inhibited its use by members living in those service areas. But the problem is abating as viewers flock to uhf, and as amateurs clean their 4m transmitters, eg G3EGE in Nottinghamshire uses link coupling between all stages of his home-built rig allied to complete screening (and incidentally a 6BW6 at 15W as a final, which should dispose of newercomers' belief that you need some fancy kind of vhf valve to make a go of 4m). Other operators advocate no multiplier stages: start on 4m with a 70MHz crystal at the input and steep sides to the output waveform.

And having referred to TVI problems at 70MHz on now to. . . .

Try cross-band, Wednesdays

Until more 4m men render their transmitters proof against tvi in Channel 4 and 5 areas, people in the south and north where this problem is of less account will continue to observe the swathe of 70MHz silence that extends from the Bristol Channel to the Wash, except on Sunday mornings and during contest times.

But even in this belt of silence a lot is being done to make Wednesday 4m Activity Night more meaningful. Many operators *transmit* on 2m announcing that they are *tuning* 4m, taking frequent looks on the 2m operating channel in accordance with the statutory requirement. The 4m men have got the message in more than one sense, and on most Wednesdays between 9 and 10pm adopt a "CQ Four and tuning Two" procedure.

As a result of this development the QSO rate per Wednesday night has now just about doubled.

"But westward look . . ."—again

"Turn beams more often to. . .". The exhortation appears frequently in *FMD* to persuade people in the more populous areas to look towards those not favoured by geography, eg East Anglia or West Cumberland, where much more vhf activity exists than may be suspected by those outside.

South Wales, too: from Newport to Cardigan a count recently made by GW3ZTH and GW8EHK showed 104 stations regularly active on 2m. Seven have ssb, another half a dozen soon will, and all of them check 145·41MHz. And although it is conceded that difficult paths exist between South Wales and parts of England, sideband and cw break them down with ease, and remain viable for communication long after a.m. and fm have dropped out.

Apart from the use of the ssb and cw areas, practically all activity in South Wales is very sensibly confined within Zone A, with constant monitoring of Zones B to D for the very good reason that calls from other zones will not be smothered by the local QRM. Especially is it a waste of time for vfo-equipped operators to call on 144·250MHz, the frequency of the South Wales beacon, or on 144·350MHz, the frequency of the regional net, where operators engaged in local contacts quite naturally have gain controls well back and do not hear co-channel dx calling them.

"Zone planning helps and does not hinder dx working", declare 'ZTH/'EHK, which is a view likely to be shared by many in Zones B-D with memories of locals who have come up in Zone A—and bang goes the dx from GW or Western England.

"Eighteenth Annual"

Book 22 April now

A reminder to get the date of Saturday 22 April into diaries now. The Eighteenth VHF/UHF Convention will once again be held at the Winning Post Hotel, Whitton, near Twickenham, Middlesex.

In response to popular demand it will be a one-day event as before, and the VHF Committee is working on the programme now. Details, and how to get tickets, next month.

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

Intelligent use of the bfo is old hat to old hands, but to newer ones the following advice from 'ZTH/'EHK may come as a revelation:

"Tune the band as slowly as possible with the bfo switched in. A weak signal can easily be missed. Many stations tune the band rapidly with the bfo switched out, and getting no takers to the first CQ call, declare 2m to be dead. Yet a check with bfo on may reveal a station off the back or sides of their aerials, down in the noise, but when peaked up with the beam capable of providing a dx contact."

Still on the subject of zonal operation. . .

When going mobile on 2m

Being flexible means does not break when bent, and is true of the British Isles 2m bandplan. Beacons, and calling channels for rtty, mobile and sideband, occur on frequency spots which a few years ago would have brought squawks from the rigid in outlook, but today are part of the routine scene. Although they remove a few hertz from certain zones, nobody minds.

But is the 145·00MHz mobile calling channel as widely known as it should be? Motoring in the south-west, G8AUU, Kris Partridge of NW London, was surprised to be told: "Oh, 145 is out of our zone. And anyway the mobiles can always tune around and find us"—which will seem strange to anybody who has tried twiddling a 2m mobile tuning knob while attempting to negotiate the winding lanes of the west.

Mobiles look to fixed stations to give them contacts. There would be more QSOs if every fixed station had 145MHz calling facilities, but took care to leave the channel clear when contact had been established, telling the mobile precisely where he will appear in zone to reduce his need to tune while on the move.

Another point made by G8AUU is that UK operators planning to go mobile on the Continent should equip themselves for 145·150MHz, which is the main fm calling channel for Europe. He adds that anyone motoring in West London will find 144·48MHz interesting. This calling channel is used by some 30 /M operators in the district, all equipped with nbfm and (usually) half or five-eighths whips. Yes, it is realized that 144·48 is in the South Wales zone (see above); the procedure therefore is to make swift calls and then transfer at once to 144·80MHz in the London zone.

Video GM-style

Being consistently asked by members where pockets of amateur television activity exist, we are glad to report that there is another one in the north of Lanarkshire. For the past 18 months GM6ADR/T (you may know him as GM3ULP) has been sending good pictures from Motherwell across to GM6AEG/T at Larkhall—and you may know *him* as GM3VQC.

Although the site at 'ADR is not ideal for uhf, there is a Versatower with the aerial at 60ft to help lay down a good signal. There must be many members within range with wide-band 70cm converters who would like to take a picture from GM6ADR/T even though, not holding /T licences, they may be unable to transmit video back to him. Call him on 2m A3 or drop a line for a fixed time schedule at The Bungalow, Broomside Braes, Camp Road, Motherwell.

You can find him on 437·4MHz, positive modulation and 25W peak white at 625 lines—yes, to best BBC2 standards, as is suggested by this remarkable photograph of GM6-ADR/T in action, taken from the screen at GM6AEG/T.

"Anomalous" on New Year's Day

Did you notice any propagation peculiarities on New Year's Day? To us, conditions seemed slightly "up" in spite of cold humidity. That something was afoot seems evident from a 144MHz cw contact between G2UJ and G5NU (80 miles) that exhibited sudden drops in signal level accompanied by complete loss of directivity in the 8-over-8 at G2UJ and the 14-element Yagi at G5NU. Says Bert Allen, "Presumably the lower strength resulted from multi-path transmission, and the direct ray was absorbed. Increased strength was resumed when the direct ray got through. There was no fading, just sudden jumps in QRK."

Further documentation from other observers would be welcome.

M-S schedules

Meteor showers descend into the Earth's atmosphere at predictable dates, and produce super-dx for operators equipped with QRO transmitters and QRQ morse-ability. Last month came the Quadrantids, around 20 April the Lyrids will be here (small return rate per hour of 12), and around 10 June the Arietids (good return rate of 25-70 per hour). But the m-s specialists keep at it between-times, in search of fleeting returns that produce contacts on 2m far in excess of the range ever likely to occur with tropo or sporadic-E.

In the middle of Ireland, EI4AL seeks m-s schedules on 144MHz with remoter Europe, eg, DM, HA and UR, looking for stations able to receive 500 letters per minute. He has special permission to run 1kW for m-s, and this, assisted by a pair of 10-element Swan aerials (resembling long Yagis but with four driven elements and more gain), should get him into distant places: SM by m-s has already given him a good start.

At lower power levels he seeks to put 2m telegraphy into eastern G and into GM, and will welcome schedules at the bottom end of the band. Letters to Mike Burke, at Bealnamulla, Athlone, Co Roscommon. And if you have a keyboard he can offer rtty as well.

The Geminid shower of 10-15 December showed up well on the counter which Ron Ham keeps in operation 15 hours a day from the output of his 4m receiver. Here is the actual count:

10th, 2,278; 11th, 3,803; 12th, 5,014; 13th, 8,261; 14th 6,590; 15th 2,321.

The numbers represent the *total* catch of daily pings recorded by the counter during each 15-hour observation.

...and Rutland skeds

Apart from the 57 varieties of portable which visit England's rarest county every year, two stations indigenous to Rutland are G8ESX, deep in the heart of Oakham but a trier, and G3PLL, much higher at airy RAF Cottesmore. He skeds G6SG every evening at 1800gmt on 145·46. If no QSO ensues he tunes high to low, beaming south first. Alternative channels are 145 (same as G8ESX), 145·1 and 145·26. Dick Moore is on most weekends in the afternoon and evening.

DX miscellany

Believed first Austria to Wales on 144MHz was made by GW3LEW and OE5XXL/2 on 5 September 1971.

During the opening of 6 October 1971, OZ6OL worked 97 British stations on 2m a.m. phone.

"Why, oh why, do auroras seem to occur between the awkward hours of 3 and 7pm?" asks G2WS. Bill Scarr at any rate was one who profited by the Ar on 17 December: he worked three new-county GMs. And there was a 1,500 mile contact with GW3LEW 30 miles across the Bristol Channel: the signals from each, sounding like spark, travelled to the auroral curtain and back. But when beams were removed from the north heading each reverted to T9. Memo: check for more aurorae at 27-day intervals from the above.

Ron Ham, BRS15744, reports that the 17 December aurora was generated by a solar noise storm which began on 15 December. It put a T4 burble on the Gdansk broadcast station which he monitors on 4m.

The theory that EA1AB could not be worked by northerners because of the overlay of QRM from southerners was exploded on 12 December by G3PFR of Warrington, who keyed with him during the big N-S tropo. He says nearby EA1CP was up to S9 until the fade-out at midnight.

We have it from G3JHM that during the big opening of 12 December, EA1AB worked 60 British stations in a row on 2m, all on cw. What, no phone from Spain? "Not interested," replies '1AB.

Every night when BBC1 has closed, GM3VTB puts out CQs on 70·26MHz with 20W and a 3-el. He tunes 2m as well as 4m for replies. Says Victor Budas, "I would be delighted if a 'night owls' net could be formed on 4m, even if only for half an hour after television"—Offers?

Further to GM activity, a reminder to men south of the border to keep 145·85 to 145·95 clear for operators north of it, phone only. For long haul cw, monitor 144·00-144·15, which will produce G to GM communication when the phone "window" cannot.

DX is relative, and 100 miles on 70cm *is* dx. This is the QRB Derby to Dereham, G8BAV to G8BYV, every morning at 0700. "Sometimes it's hard going, but on cw would be 100 per cent" says John Tye. He is working up the cw in anticipation of exchanging G8BYV for G4BYV in due course.

Researching and writing a book on the Common Market (it was published in October) has kept Harry Wilson, EI2W, off the air these last three years. We are glad he has come up with a fine claim to insert in the vacant 2m slot in our records box. He comments on the importance of precision where m-s claims are concerned, recalling schedules he had with east European stations at about 1,000 miles range. He heard nothing of them but was subsequently amazed and amused to receive excellent reports when his transmitter had broken down and was definitely off the air.

Expeditionaries

"Tell us which rare counties you'd like us to visit and we'll go." This is the generous offer of GM3ZVB, 'ZVL and '4AIS. They are planning a Round Britain Buzz lasting about three weeks in May, equipped with high power sideband/cw gear for 2m. They will visit several North of Scotland counties, and are prepared to activate Welsh and rarer English counties on request. Letters to Roger Manners, GM3ZVL, 165 Mayfield Road, Edinburgh EH9 3AY, with your suggestions.

Another LX-pedition: G8ANQ and G8CZY will be Landrovering in the Grand Duchy from 22 to 29 July with QRO on 2m, probably also popping up from Belgium and Germany en route. An sae to Bill Burton, 18 Newland Avenue, Bishop Auckland, Co Durham, will get you on the sked list.

Farthest distance

Quite a clutch of claims for the VHF/UHF Distance Records box, some of them not topping the totals we show this month but of great interest nevertheless in showing the development of metre-wave dx, eg the neck-and-neck race for the ultimate on 70cm, first up to 650 miles, and finally—for the present anyway—G3JHM who squeezes it to 686 miles.

In all three instances the man at the other end was SM6ANR ("It seems only yesterday when I heard Rolf coming through on 432MHz cw, and nearly fell off my chair," recalls G3KEQ).

On 4m, another near-miss: Hugh Irvine, GI3TLT, covered 1,290 miles when he worked ZB2VHF on 11 June 1967. On the *same day* the late Fraser Shepherd, GM3EGW, worked the same Gibraltar station at 1,430 miles.

As for 2m, can anyone top Harry Wilson's claim of 1,387 miles? Fifteen years ago during the International Geophysical Year he worked some fantastic dx on 6m, when he pushed the EI2W signal into California on four occasions

Current VHF/UHF Distance Records

Band	QRB	Date	Participants
70MHz	1,430m	11 June 1967	GM3EGW-ZB2VHF
144MHz	1,387m	4 July 1965	EI2W-YU1EXY/P
432MHz	686m	31 August 1961	G3JHM-SM6ANR
1,296MHz	Claim awaited		
2·3GHz	124m	1 July 1969	G8AGM/P-F1RJ/P
3·4GHz	54m	11 September 1969	G3EEZ/P,G3BNL/P
10GHz	95·75m	25 September 1971	GW3RPE/P, G8APP/P

Claims for current distance records established on all bands from 70MHz upwards are invited from European stations, and will be included in this table until bettered

as the only station in the British Isles holding a permit to operate in the 50MHz band. We hope precise details of dates and QRB will become available to add to our records box in a new "50MHz" section.

At the other end of the spectrum the new record claimed by G8AGM/P for 13cm was accompanied by equipment details as follows: aerial—2ft dish, waveguide feed; receiver —hybrid-ring mixer/BFY90 l.o. into Mohican; transmitter —crystal controlled 2·5W from DET22. Says Martin Collar: "The results came from a splendid team effort by a group of south-coast amateurs who provided the essential back-up services, especially 70cm talk back equipment. As for G8ACI, his French was invaluable when working F1RJ/P." Signals were S8/9 both ways.

* * *

Claims for the dx records box should be in respect of contacts made by natural means, including m-s and all forms of anomalous propagation, but not for contacts made via satellites natural or artificial.

More FMD Awards

Since our last contribution the following claims for the Four Metres and Down Certificate have gone through: **70MHz Transmitting**: No 90, G3WOS; **144MHz Transmitting**: No 245, G8ABP.

Still no claims come in for 23cm. Did nobody at all succeed in working three countries and 30 counties during last VHF NFD? In the final table G, GW and F are represented, and PA/ON were known to be on. Nearly there is G8BYV, Norfolk; of his 17 stations collected on 23cm, five are PA0.

Further to QSLs, Sheffield's G3NHE tells us that he had to work 14 countries and 55 counties before the needful "5 plus 30" accrued, many of these on the key and all since May 1971 when he started up on 2m ("Since then I've hardly touched the hf band gear" he adds). Down in Sussex *all* of the G3DAO 5-plus-30 were worked on cw; Peter Cutler came onto 2m in September 1970 and set himself the target to achieve the FMD Award wholly on the key and without counting any contest contacts. He had to slip in a contest QSL from Wiltshire because none could be obtained from fixed stations in that county.

Here and there

Another mod to make to your copy of the 1972 *RSGB Callbook*: Norfolk's G8CVJ is now G4ATW. Using his new found key-freedom he activates the cw end of 2m every Thursday evening.

* * *

And another. G8ASR has now secured G4ASR and looks for skeds, cw only, at 100 miles plus to the north. With a 12 over 12 at 50ft on Winchmore Hill in North London, and 150W, he should be heard well up country. Sked-letters to D. J. Butler, 10 Holly Hill, London N21 1NP.

* * *

"Well, what *is* the royal plural mentioned in 'Cut the waffle' in the November *FMD*?". So many people have asked, that we had better explain. It is saying WE when the simple pronoun "I" will suffice, eg, "our rig", "our QTH". Perhaps "our car" is okay but not "our wife" (*sic*). Use the royal plural if multi-operator, use "I" and "Me" if solo.

BEACON STATIONS

Callsign	Location	Nominal frequency	Emission	Aerial direction
GB3ANG	Angus	145·95MHz	A1	SSE
GB3CTC	Redruth, Cornwall	144·13MHz	A1	ENE
GB3DM	Burnhope, Co Durham	145·975MHz	F1	N/S
GB3GW	Swansea	144·25MHz	A1	ENE
GB3GM	Thurso	70·305MHz	A1	N/S
GB3GM	Thurso	145·995MHz	A1	N/S
GB3GEC	W. London	433·45MHz	F1	N/W
GB3SC	Sutton Coldfield	433·50MHz	F1	N/S
GB3SU	Sheffield (temporary location)	70·695MHz	A1/F1*	Omni
GB3SX	Crowborough Sussex	28·185MHz	A1	E/Omni
GB3SX	Crowborough	70·699MHz	A1	N
GB3VHF	Wrotham, Kent	144·500MHz	F1	NW

* Callsign on F1 continuously, on A1 once a minute. When on A1, F1 is suppressed

"Each area has its dx merchant. If you want to cash in on his pickings it pays off to follow him around. Do not sit on his channel and call CQ, after he goes over. Note the way he is beaming, then sit back and note tuning direction of the dx, and away you go"—GW3ZTH/GW8EHK.

* * *

G3UGF/MM monitors 40m between 1000-1130gmt daily (he has an FT101) to set up 2m schedules for the evening. He will tell you on 40m where *Esso Inverness* will have reached by nightfall. Then back to 2m, to operate from 6 to 8pm and after 10pm (break in the middle for professional keying).

* * *

Tuning high to low on 2m takes a long time. Try announcing "Tuning Zone B only" or whichever geographical zone you are seeking replies from. It reduces your tuning time and the other man's calling time.

* * *

"A certain few appear only when there is an opening, work only the dx and then disappear as quickly. How do they do it? Is it an early warning system or just a telephone?" —G3DAO.

* * *

If you or your club made copies of the General Rules for Contests in 1971 scrap them. Important changes occur in the 1972 rules. See page 43—and one of them applies particularly to club entries.

* * *

"Re listeners' QSL return rates, I think there's more likelihood of getting a reply if reports are sent to mobiles, or better still, to stations using QRP rigs"—A7929, Tim England of Kenilworth.

* * *

"Certainly endorse *FMD* comments about knowing our business. Although the newer boys on 2m have got to start somewhere they should be told if their signals are not what they might be, and also should appreciate constructive criticism"—G3KEQ.

25 YEARS BACK

"The A.R.R.L. had requested the Society, at very short notice, to obtain permission for British Isles amateurs to operate in the 50-54Mc/s band in view of predicted favourable conditions for Transatlantic work. Mr Watts had made application to the G.P.O. but the request had been rejected" —*RSGB Bulletin* February 1947 (report on December 1946 Council meeting). An amplifying note added that the refusal was "... because these frequencies were assigned to television at the Cairo Conference".

THE MONTH ON THE AIR

by JOHN ALLAWAY, G3FKM*

DX news

JH1HWN has advised VE3MR that he is now QSL manager for BV1USE and BV0AA. He also reports that BV2A is active between 0700 and 1500 in the area 14,020-14,045kHz and that BV0AA favours 14,030-14,080kHz between 0600 and 1300. BV1USE is said to favour 14,195kHz ssb operation. There is a rumour that BV2A will be used by additional operators as an expedition during early 1972.

Latest news of the position in the VK0 area has been forwarded by G3KYF who was told by VK0CC (Mawson) that besides himself there would be 1972 activity from VK0MX (also Mawson), VK0RC and VK0KA (Macquarie Is), and VK0JV and VK0TM (Davis Base). Colin, VK0CC, has a HT32B and linear with a V-beam aerial, is often to be found around 14,170kHz between 1830 and 2000, and is always pleased to work G stations. VK0KA should be active for a year or so and hopes to be on the air on alternate days, his actual schedule depending on his other duties. The South African antarctic station, ZS1ANT, at Sonae Base (72S 2W) is active again and has an HW100 which feeds 180W into rhombics. G3NLY reports that VP8KV is located in the Falkland Is and is quite often to be found on 14MHz ssb—QSLs for him should be sent to the address in *QTH Corner*.

9H3WPD was a special station in Halfar, Malta, commemorating World Peace Day and actually operated from a church on 1 January. QSLs go to 9H1R, who was the operator.

W3HNK says that he is now QSL manager for a lady SU amateur—SU1MI—who is now active on 14MHz cw. Moona is the daughter of SU1IM and her transmitter only runs 10W.

The Eastern and Mountain District RC of Victoria, Australia, is celebrating the Centenary of Lillydale Shire on 19 February. Special QSLs will be sent out to those contacting VK3ER, and QSOs with this station or VK3ANE will count as two points for the Southern Cross Award.

C21TL says that his callsign is now C20DV and that QSLs may be sent to Box 32, Nauru Is.

LU5DL, LU3DGX and LU1DJU will be on the Bahia Anegada Is in early February as LU0s DL, DGX and DJU respectively. The islands count for the IOTA award and LU0 is a rare prefix but the islands count as Argentina for DXCC.

VR5FX has been heard on 14MHz cw and will be in Tonga for three years. He seems to favour 14,035-14,045kHz and asks for QSLs via ZL2AFZ. VR1W, who visited the Br Phoenix Is recently, hopes to return for further contest activity in the future.

WA6OET, who is TU2CY's QSL manager, says that he has only received logs covering the period 14/9/70 to 24/10/70 and cannot help for contacts outside this period. TT8AD has left Tchad and will be found using his F8RP call.

The Republic of the Congo (9Q5) has now been re-named the Zaire Republic.

A2CAB (ex-G3BYM) is frequently heard using his FTDX400 on 14, 21 and 28MHz. His QSL manager, W2RHK, often makes up a list of those wishing to contact him. 5H3LV was heard using the callsign 5H5LV during the first half of December, this was to celebrate Tanzania's 10th Independence Anniversary.

AC5TY seems to have made a habit of checking into the SEANET and also the British Commonwealth Net (14,170 kHz at 1530) but there are no reports of contact being made by UK stations. Bhutan has now been given the official prefix block A5A-A5Z by the ITU, so Yonten's call may be changed.

9M2IR is also VS5IR. VS5CB will leave soon, but a new Brunei recruit is VS5PW who should be on the air soon with a KWM2 and 30LI linear.

KG6ALV (K1MTJ) offers to make schedules with anyone wishing to contact him for 5BDXCC and invites interested parties to contact K1RQE (1454 Washington Avenue, Portland, Maine, 04103, USA).

News from overseas

Harry Bourne, formerly G2AH (and earlier G2KB), scientific liaison officer with the UK Scientific Mission, Washington DC, USA, for many years, who was operating in the USA under the reciprocal agreement until recently, has now retired. He is living in Auckland, New Zealand, and is licensed under the call ZL1OI. He hopes to contact his many friends throughout the world on cw or ssb. Harry now lives at 54 Whitehaven Road, Glendowie, Auckland 5.

Chris Heavens, G4AMD, has recently moved to Barbados to take up employment with Cable & Wireless Ltd and expects to be there for about two years before returning to the UK. He has the callsign 8P6EK and expects to be fairly active, on 14MHz only, both on cw and phone, with an emphasis on 14,050 and 14,200kHz. Chris has a HW32A and dipole but hopes to have a quad soon and he says that he will be looking for UK stations especially on Sundays around 1200 on about 14,260kHz. QSLs should be sent to G4AMD (see *QTH Corner*) or via RSGB.

The Cyprus Amateur Radio Society seems to be gathering strength and now has some 40 members, 14 of whom are Cypriots. The negotiations for the restoration of 5B4 licences are slowly progressing but current political uncertainties have tended to delay action. The Limassol ARC was inaugurated on 20 August and has the callsign ZC4LC—so far there are 12 licensed members (ZC4s BD, BN, DB, JD, KJ, HP, RS, TE, TR, UA, ZD and ZH). CARS ties are now available (price £1 each) from PO Box 216, Famagusta, and ex-members are invited to apply.

Roy Hearsum, W8LUZ (ex-G2HLP), retiring president of the Ex-G Radio Club, has submitted a list of other callsigns regularly present when the club meets at 1900 on 14,347kHz on Sundays. This includes VP1BH, 9G1BF, 9Q5RN, 9Q5CO, A2CAB, ZL2LH, PY2CAB, HK3CMI, OZ3TQ, VP9H, VK1QL/W4, G4s HW, MJ, AKT, G3VIP,

* 10 Knightlow Road, Birmingham B17 8QB.

GM8RY, G3TMN, G3DKK/W1, G3DKS/W4, G8KL/W6, G3PPE/W6, G2CWL/W8, G3ZCZ/W8, G3UGH/W0, G3-XPM/W1, G8NF/W4, G3FNL/W0 and many others.

I. Hacking, G3VDO, writes from Iran to say that he has been licensed to operate as G3VDO/MM from the s.t. *London Pride* since November last. He has an FT100 transceiver and twin dipole aerial for 15 and 20m 160ft above sea level. He is particularly interested in contacts with the UK during his regular run between the UK and the Persian Gulf ports (via Capetown). Ian is the radio/electronics officer on the ship, which is brand new and of 255,000dwt and the largest under the British flag at the present time—one fifth of a mile long, a beam of 180ft, and a loaded draught of 86ft!

Top Band news

G3XVX reports a contact with a pirate ZD9BM on 17 December but he was consoled by the fact that the real ZD9BM was actually on the band and copying him! Congratulations to G3TR who finally succeeded in his attempt to work into Australia—VK6NK was contacted on 11 December and '3TR has been heard in VK several times since but no more contacts have taken place. VK3CZ and VK5KO have both been received by G3TR at RST339 but no contact made, and John is listening every evening around 1,803kHz at 1900-2000, 2045-2120 and 2230-2300. G2JL reports contacts with VK6HD at 2145 on 18 December, with VK6NK on 19 December, and with VK3ARS on 2 January. W1BB reports that GM3WDF contacted VK6NK on 20 December and this is thought to be the first GM-VK QSO on the band. Stew says that the period 0000 to 0300 seems to be very good for transatlantic working this winter, and suggests using this time on Saturday mornings while trying the 0500-0730 opening on Sundays.

Dxpeditions

West Coast DX Bulletin quotes a note from JA1KSO which indicates that the Japan DX Association believes that it has the key to operation in Burma, Bhutan and Iraq, and also some hope for an operation from China. Efforts are being directed at obtaining permission to operate from the Japanese Embassies in Rangoon and Baghdad. The group are hoping for financial support from large Japanese business organizations and airlines, about £2,000 is estimated to be needed. It will be remembered that JA1KSO recently operated from JD1ABX and also that a Japanese amateur was on the air from XU1AA.

The same information source mentions that some South African amateurs are discussing a visit to Bouvet Is. The construction of the weather station which is scheduled to be built on the island has still not commenced.

5H3LV is thought to be considering a visit to Zanzibar during February. There has been no activity from the island since February 1970.

The visit to Sao Thome which was due to take place before Christmas by CR6NN and CR6XX had to be post-postponed and CR5XX may be on the air during March instead. QSLs should be routed as indicated in last month's *QTH Corner*.

A group of amateurs from Nottingham (G3's TVY, VUI, YUT and G4AFJ) will be in Andorra from 1 to 16 April. They have been issued with the callsign C31FA and will be feeding 100W of cw and ssb into a TA33Jr beam and various inverted-Vs at their location some 8,500ft asl. QSLs should be sent to G3VUI at the address in *QTH Corner*.

VK3JW has expressed interest in a visit to Mellish Reef, Turtle Is and Frederick Reef sometime in March, and has the callsigns VK9JW/M, /T and /F to cover such contingencies. The DXCC status of Frederick and Turtle Is is not yet established but Mellish Reef has already been accepted as a "country".

XE1J was planning a visit to Revilla Gigedo for mid January and a return in late February or early March. The callsign is likely to be 6D4J, this being a special call issued for 1972 in celebration of the Year of President Benito Juarez. The station may be on for 96 hours and 7,090, 14,190, 14,290, 21,290 and 21,390kHz have been mentioned as possible frequencies.

Countries List

A revised edition of the Countries List is now available from RSGB HQ. The cost to callers is 5p, or by post 9p.

Swiss cantons

Contests

The ARRL International DX Competition

The details of this event given in January *MOTA* should have indicated that the multiplier consisted of the total number of **contiguous** USA states, plus VO, and **VE1-VE8** worked on each band totalled together. Log sheets and summary sheets are still available from G3FKM (large sae, please).

Results of the **CQ 160 Contest (1971)** have been received. For the first time ever all 50 USA states were active and W9DL worked 49 of them. 1,358 stations in 38 countries took part and top world score was made by KV4FZ (134,488 points). UK scores were as follows:

GM3IGW/A	**15,997**	**points**	**GW3GWX**	**2,817**	**points**
GM3YCB	13,110	,,	G3XWZ	2,736	,,
G3VRW	**9,585**	,,	**GI3WSS**	**1,496**	,,
G3HZL/A	7,504	,,	G3NT	654	,,
G3XTT/A	5,907	,,	**GD3HQR**	**69**	,,
G2DC	4,260	,,			

Hungarian call areas

In the multi-operator section top score was W4BRB/VP7 (149,632 points). UK entrants were **GM3KMR/A** (10,780), (GM3LWS/A (9,086), and **G3WPO/A** (7,787).

The Canada Amateur Radio Federation Contest
2359 10 March to 0600 13 March.
This event is open to all. Full details have not been received but they may be obtained (sae and IRCs, please) from VE6APN, c/o 12021 67th Street, Edmonton, Alberta, Canada.

IARC Propagation Contest
0001 19 February to 2400 28 February (RTTY and CW).
0001 25 March to 2400 2 April (Phone).
Single-operator only, all-band, single-band, mobile and listener categories. Exchange RS/T plus ITU zone (UK is in zone 27). One point is scored for each contact and a multiplier of one for each country and zone worked on each band. The same station may be worked as many times as desired—QSOs lasting more than six minutes may be credited as separate contacts but must be logged separately. Official IARC log sheets (similar to those issued by *CQ Magazine* with 40 QSOs per sheet) and summary forms are available from: L. M. Rundlett, 2001 Eye Street NW, Washington, DC, 20006, USA. Certificates will be issued to winners in each zone and in each category.

World SSTV Contest
1500 to 2200 5 February and 0700 to 1400 13 February. Exchange pictures and message number (the latter by voice if desired). One point is counted for each QSO, and the multiplier is five for each DXCC country and 10 for each continent worked. Send logs to reach Prof. Franco Fanti, via A. Dallolio 19, 40139, Bologna, Italy, before 20 March.

Final 1971 Countries Table

	1·8 MHz	3·5 MHz	7 MHz	14 MHz	21 MHz	28 MHz	Total
G3YHB	—	36	42	128	128	69	**403**
G8VG	2	19	41	45	62	35	204
G3YWX	—	14	19	89	26	—	148
BRS27263	—	102	91	217	166	115	**691**
BRS25419	—	130	109	180	150	103	672
A7466	11	64	56	127	109	62	**429**
A7531	1	39	28	122	120	82	392
A6220	11	53	57	141	88	20	370
BRS27880	6	41	46	102	101	71	367
A7082	12	29	52	91	105	37	326
BRS30694	5	11	17	83	72	35	223
A7681	9	35	15	87	47	1	194
A7511	3	38	15	36	36	8	136

QTH Corner

C21TL	Box 32, Nauru, Pacific Ocean.
C31FA	M. R. Harris, 20 Durham Crescent, Bulwell, Notts, NG6 9AH.
CR9AK	(Op'n by KR6s only) via WA0FLD, 13517 Belmead Avenue, Grandview, Mo, 64030, USA.
G3VDO/MM	R/O I. Hacking, s.t. *London Pride*, L & O Freighters Ltd, 8 Balfour Place, London, W1Y 6AJ.
HB0XHS	via DK3SF, Dieter Koblenz, Steinstr. 16, 7112 Waldenburg, Germany.
HH2ZZ	via WA0FAA, K. Regelmen, RFD 3-Box 10, Red Wing, Minn, 55066, USA.
JW7FD	via LA3UC, S. B. Maarnes, Skjerstadvn 4, 8000 Bodo, Norway
KG6SW	via W7YBX, 5632 47th Avenue SW, Seattle, Wash, 98116, USA.
SU1MI	via W3HNK, Box 14, Norwood, Pa, 19074, USA.
TY3ABF	via DL8OA or to PO Box 504, Cotonou, Dahomey.
VP2GI	PO Box 421, St Georges, Grenada, BWI.
VP2VAM	via VE3GMT, J. Reed, 82 Acton Avenue, Downsview, Ont, Canada.
VP7CK	Clarence King, 26 Hollywood Avenue, North Bay, Ont, Canada.
VP8KV	PO Box 144, Port Stanley, Falkland Is.
VP8MH	M. Hinchincliffe, 40 Elmwood Drive, Thornton Cleveleys, Lancs.
VR5FX	via ZL2AFZ, 48 Nuffield Avenue, Napier, New Zealand.
WM1NSA	Box 310, Boston, Mass, 02101, USA.
WO8HIO	via WB8CWD, 2800 Eastmoreland, Columbus, Ohio, 43209, USA.
XE1PJL/XF4	(see 6D4J).
ZD8TS	via G3WDV, 36 Low Green, Gainford, Darlington, Co Durham.
3A0GB	via VE3MR, 161 Old Forest Hill Road, Toronto 10, Ont, Canada.
5R8AB	Colin McRae, G3WRN, 9 Portal Close, Barnham, Thetford, Norfolk.
5V7GE	PO Box 2, Bassori, Togo.
5X5NK	via DJ3JV, C. Beissner, Rappenberghalde 20, 74 Tuebingen, Germany.
6D4J	via XE1J, Box 200, Colima, Col, Mexico.
8P6EK	G4AMD, 21 Leatherhead Road, Chessington, Surrey.
9H1DG	E. Rodgers, Dar Ghall-Kwiet, Ghajn Melel Street, Zebbug, Gozo, Malta.
9H3WPD	9H1R, 1 Jasmine Path, St Lucia, Malta.

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

Awards

The Paris Award
For contacts with stations in Paris (excluding mobiles). Class 1 requires QSLs from 20, Class 2 from 15, and Class 3 from 10 Arrondissements. QSLs and 12 IRCs should be sent to the Award Manager, F6AZN, Andre Noel, 31 rue Deparcieux, 75 Paris 14, France. This award is printed on silk—a silk scarf is offered with Class 1! When applying for endorsement for a new class, send additional QSLs and four IRCs.

City of Gwelo Award
Requirement is certified list of contacts with five Gwelo stations since 1 January 1971 plus six IRCs. Same station worked on different bands counts as separate QSO and a report from a Gwelo listener can be counted. Send application to: The Awards Manager, PO Box 605, Gwelo, Rhodesia.

Odds and ends

G3URA's call is being used by an unauthorized person on 14MHz cw. Peter is only active on ssb at the present time.

Mr J. E. Kasser, G3ZCZ, who has been in Chicago, USA, for about 18 months and expects to be there for some time to come, reports that his callsign is being pirated on 20, 80 and 160m, presumably from somewhere in the Lancashire area.

The callsign of 5R8AB was given as 5R8AS in December's *QTH Corner*.

G4ADN reports that his F0WW callsign is being pirated and that he has cards from F1ATP (2m) DK5SI and UK 3DBG (both 20m).

Band reports

All correspondents report a serious falling off of the hf bands but this is compensated for by the interesting happenings on 160 and 80m. The latter band has been opening into the Far East in the late afternoon and VS6DO has been peaking at S9 on some days.

Very many thanks to all correspondents, and especially to the following from whose logs the callsigns listed below have been obtained: G2BJY, G2HKU, G2JL, G3GVV, G3HB, G3KYF, G3LPS, G3TR, G3UKH, G3XVX, G3YHB, G3YWX, G5JL, G6GH, G8VG, BRS2098, BRS17567, BRS25429, A6148, A7056, A7531 and A7681.

Stations listed were on ssb except those in italics which were on cw.

1·8MHz. 0300 *HB9s CM, NL.* **0030-0230** and **0615-0800** *W1BB/1*, W1HGT, K1PBW, W1WQC, K2ANR, W2s *FD, IU, HCW, UEZ, W3ARK*, K3MBF, *WA4SGF, K8RNE, W8BT, PY1DVG, VE3EK.* **2300** *OKs, ZD8AY* (now GW3UPK).

3·5MHz. 0000 CO2FA, CT2BC, EQ2WB, VP2s LI, LY, 3V8BB. **0100** TG9DA, VP2s AA, MM, YN3AAA, ZC4IS, 4X4NJ, 9Y4VU. **0300** *ZD3Q* **0600** 9L1VW. **0700** *HB0XHW, VE7DT*, XE1KB, 9Y4T. **0800** ZLs. **1500** DU1FH, KG6JBD, VS6DO (usually on 3,802kHz), **1700** HV3SJ, ZL4KE, ZS5LB. **1800** JX1AL, 5Z4MO. **1900** DU1FH, EA8HA. **2000** CT3AW, FL8MM, YA1OS, ZC4RS. **2100** CN8BB, MP4MBC, OX3JW, OY5NS, ZS5LB, 5X5NA. **2200** EA6BN, JY9AC, PY3CGP, TU2XP, 5H3MB, 9H1BX. **2300** VB1MSA, ZC4BJ.

7MHz. 0100 EA9EO, *YV7GN.* **0600** *FL8HM, HK5GT*, PYs, *PZ1AH, VP1AV.* **0800** *FG7XF.* **0900** *HP1IE, JAs, K6TZX,UK0KAA* (Wrangel Is).**1600** *K6OC* (LP), *SV0WOO, VK6CT.* **1700** CR6TP. **1900** *VK3MR, ZD3Q, 3D6AH.* **2000** *3B8CR.* **2300** JY9AC, JY9DC, 9H1CE.

14MHz. VK audible 0700-1600. **0800** JY1B, KS6SC. **0900** KL7s, M1D. **1000** 8R1W. **1100** VP2MM, VS6CA. **1300** *6Y5SR.* **1500** 5H3LV, 9V1s. **1600** OX4AG, VE6/VE7, W6/W7. **1700** *EA9EO*, KH6s BB, BDR, VK0MX, *VQ9SM*, ZL2CE, 6Y5SR. **1800** FR7ZG, HR1RF/KS4, W6MPE/KS4, VK0CC, VP9GE. **1900** A2CAL, TU2DI, 5T5DY, 5X5NA (LP). **2000** KL7AGU. **2100** KL7HCN, ZD8KO. **2200** CPs, 9L1VW. **2300** TJ1BA, TJ2AL.

21MHz. 0800 EQ2JA, *KR8UK* (KR8 prefix changed to JD6 wef 1/1/72). **0900** MP4TDA, *ZL1DE.* **1000** DU1KJT, FL8HM, KG6SW, VQ9R, VS6DA, 9N1MM. **1100** VK1AV (non QSLer), VS5TW, YA2KO. **1200** HR1RSP, JY6BM, 5X5NK, 7X0WW. **1300** CR4BS, TY3ABT, VK6s, VK8TH, 5VZJS. **1400** *FP8FU.* **1500** KS4CJ, VK0PF, *ZP9BG*, 7Q7BC. **1600** *TG4SR*, ZD3D, *WA7DED* (Utah). **1700** W6s, W7TNA/MM (*Chamaru* near Grenada), *ZS3XQ*, 3D6AO, 5U7AS, 9Y4OT.

28MHz. 1000 *VK3XB, VK6SA.* **1100** CR4BS, FL8MM, ZD3Q. **1200** OD5FM, 4W1AF. **1300** FM7AA, KV4AD, 5R8AP. **1400** VP9GE, ZSs. **1500** FG7XT, KS4CJ, TG9DX, W0. **1600** 9L1VW.

Many thanks to the following publications for material reproduced in *MOTA:* **The 29 DX Club Newsletter** (*VK6PG*), **QUAX** (*G3DME*), the **DXers Magazine** (*W4BPD*), **NARS Newsletter** (*5N2ABG*), **Long Skip** (*Nick Sawchuk*), **CARS Newsletter** (*ZC4RS*), the **West Coast DX Bulletin** (*WA6AUD*), the **Ex-G Radio Club Bulletin** (*W3HQO*), **DX'press** (*PA0TO*), and **DX News Sheet** (*Geoff Watts*).

Please send all items for **March** issue **to reach G3FKM no later than 9 February,** and for **April** by **6 March.** Readers may care to note the closing dates for the rest of 1972 which will be as follows: 5 April, 8 May, 7 June, 5 July, 5 August, 8 September, 4 October, and 8 November. It will not be possible to include any material received after these dates.

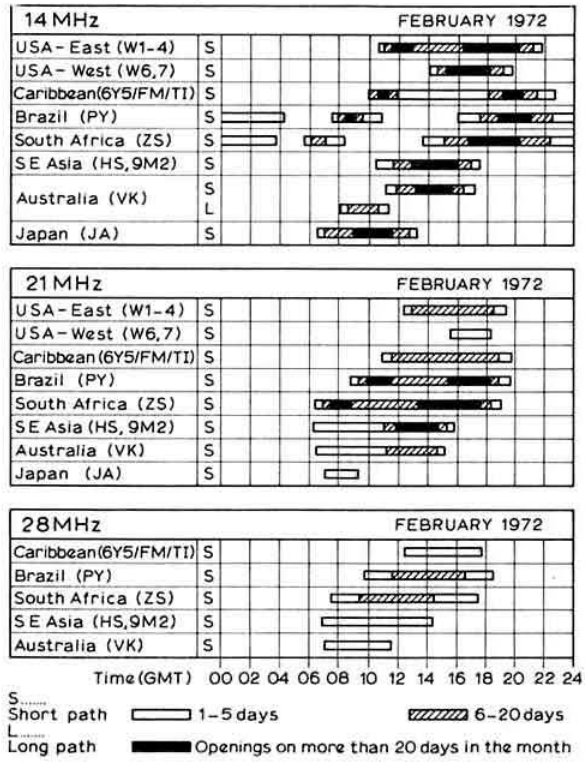
Propagation Predictions

During February the days slowly lengthen and especially towards the end of the month the 14, 21 and 28MHz bands will remain open longer than during the previous month. Solar activity has decreased markedly during 1971, so that even the present high F2 MUFs do not ensure certainty of dx traffic on **28MHz.** Therefore this band will usually be dead on most days in February, and only be open very rarely. Decrease in solar activity will also be noticeable on **21MHz,** but not as much as on 28MHz. It will probably be difficult to reach all continents with certainty. Traffic will be more difficult from Northern Europe than from the more southerly countries.

It is uncertain whether the present very low solar activity (monthly average R=40 to 60) will remain at this level or decrease still further. It is quite possible that a sudden increase in activity to about 100 will occur and continue for several months, as happened during the penultimate cycle during the spring of 1951. Such an increase would improve conditions on 21 and 28MHz, and, if the increase took place in the months October to April, the bands would be open again for dx traffic for a few months. It is hoped that the sun will provide a "late season" before 28MHz becomes dead to dx traffic during the period of low solar activity.

The lengthening days will lead to **14MHz** being open longer for dx in the evening. It will close about 2300gmt for dx. From April-May and for the rest of the summer this band will be open all night. During February the main dx traffic will be as in previous winter months, on **7MHz** and in part on **3·5MHz** from a few hours before midnight till dawn. DX on 7MHz will be possible when the greater part of the path lies in darkness. Traffic on 3·5MHz will be interrupted by the dead zone during the latter half of the night.

The provisional sunspot number for December 1971 was 90·3 with solar activity reasonably well distributed throughout the month. The predicted smoothed sunspot numbers for April, May and June are 47, 45 and 44 respectively.



COUNCIL PROCEEDINGS

A brief report of the Council meeting held at Society HQ on 2 December 1971

Present: *Mr F. C. Ward (President in the Chair), Dr E. J. Allaway, Messrs J. Bazley, J. O. Brown, R. J. Hughes, E.G. Ingram, G. R. Jessop, W. F. McGonigle, A. C. Morris, L. E. Newnham, C. H. Parsons, J. R. Petty, W. A. Scarr, A. W. Smith, R. F. Stevens, G. M. Stone, E. W. Yeomanson, (members of Council), D. A. Findlay, general manager, A. W. Hutchinson, editor.*

Apologies for absence were received from Mr B. D. A. Armstrong, G3EDD, and Dr J. A. Saxton.

Raynet frequencies
It was agreed that a note should appear in *Radio Communication* that the list of Raynet frequencies published in the July issue were frequencies in use by local groups as advised to RSGB HQ by their controllers.

Accounts
The Income and Expenditure Account for the four months to 31 October 1971 together with the approximate statement of net assets at that date was considered.

Membership and affiliation
It was resolved:
(i) to elect 133 corporate members and 35 associates;
(ii) to waive the subscriptions of 11 members on the grounds of blindness or other disability;
(iii) to accept reduced subscriptions from two members;
(iv) to grant life membership to two members;
(v) to grant affiliation to the Sharmans Cross Amateur Radio Society, the University of Exeter Radio Soicety and the Ipswich Radio Club.

Post Office Users National Council
Mr Stevens reported that he had attended a meeting of the Post Office Users National Council on 22 November last. It seemed that increases in the effective postal charges proposed for February 1972 had in fact already been agreed and that the meeting was therefore a formality.

Scottish NFD Trophy
Council agreed that Mr A. W. Smith should present the Scottish NFD Trophy at a function to be held in Scotland during December 1971.

Honoraria
Council agreed to grant QSL Bureau and other honoraria to 31 members in recognition of their services.

Election of Council members for 1972
The following were elected:
G. R. Jessop, G6JP;
G. M. C. Stone, G3FZL.
Spoilt votes: 16. Disallowed: 40. Total accepted: 2,223.

VHF repeater stations
The Council received a report from Messrs Stevens and Stone regarding a proposal for a 144MHz in-band talk-through system received from the Pye Telecommunications Amateur Radio Group and a further proposal for a 144MHz/432MHz system just received from the Farnborough and District Radio Society. After a very long discussion on the merits of and problems associated with talk-through systems it was decided to take no action with the Ministry of Posts and Telecommunications at that time but to give further consideration to the matter in view of its importance.
(*Editor's note:* The subject was discussed again at the January Council meeting—report to follow.)

VHF NFD 1971
A complaint was received from the Radio Society of Harrow regarding the disqualification of G3EFX/P at VHF NFD 1971 by the VHF Contests Committee (under Rule 16—defective signals). Their submission was that they had no knowledge of their allegedly defective ssb signal and that complainants' receivers were equally likely to be defective. Mr Stone explained to Council how the committee had analysed a number of independent written complaints received not only from stations local to G3EFX/P but further afield also, to ensure their objectivity and technical validity, and had unanimously agreed in consequence that disqualification was justified. After deliberation Council expressed full satisfaction that the VHF Contests Committee had acted correctly and endorsed its action accordingly.

Meeting of Welsh radio societies
Council noted that Mr Parsons had been invited to address a meeting of Welsh University and other Welsh radio societies at Aberystwyth on 23 February.

ROTAB Trophy
A suggestion that the terms of reference of this trophy should be altered so that it could be awarded on the results of a proposed hf contest championship was discussed, but it was decided not to proceed with the idea.

President
Mr Ward expressed to Council members his appreciation of the assistance that he had received during his term of office.

OBITUARIES

Mr J. C. de Carteret, GC3KAV
John (Jack) de Carteret of Guernsey died some time ago. He was often heard on 80m, and of recent years on 2m. He was a keen supporter of the Guernsey Radio and Electronics Society from its foundation.

Group Captain H. W. Evens, G6CH
Bill Evens died on 4 December 1971 in an Essex nursing home. He was vice-president of MARTS (Medway) and of Southend RS (Essex). He had a distinguished career with the RAF.

Mr B. W. Garnham, G3SJO
Basil (Gus) Garnham died on 1 December 1971 at the age of 39. He was a founder-member and past-chairman of the Colchester Radio Club and played a large part in local amateur activities, including the Anglian mobile rallies. He was active on ssb on the hf bands and on 2m.

Mr G. A. Muirhead, G4SM
George Muirhead of Streatham died on 27 November 1971. At one time he was a member of the London Short Wave Club but was not very active in recent years.

Mr T. B. Orr, G3IV
Themie Orr of Sunderland died at the age of 68 on 9 December 1971. He was licensed in 1936 and, war years apart when he was commissioned in the Royal Corps of Signals, he was always on all bands 160 to 10m. He was a founder member of both the old and the present Sunderland Radio Club.

Mr A. V. Spray, G2AVR
Vic Spray died on 3 December. He was a radio enthusiast for much of his life, a member of the Royal Signals Society, and of recent years a frequenter of the 80m evening nets.

Looking ahead

22 February—RSGB lecture at the IEE.
22 April—VHF Convention.
20 May—BARTG Convention.
23-24 September—NW Amateur Radio Convention; University of Lancaster.

RAYNET

by S. W. LAW, G3PAZ*

Now that the worst season for weather is upon us it is gratifying to note that the matter of preparedness is pointed out in many of the group manuals and newsletters which we are privileged to receive. Many thanks to those controllers who keep us so well informed, and our apologies for not being able to quote from all in the space available. One thing worth a mention, however, is the growing tendency for controllers to expect more than vague promises from prospective members; in fact one controller goes so far as to remind new applicants that "fanatics and prima donnas are not welcome".

Overseas news

We are always pleased to pass on information on activities which are relevant to our aims, and listeners on 40m may well tune to 7·255MHz for the USA emergency service WCARS, the West Coast Amateur Radio Service which started in 1963 and now has a membership approaching 1,000. A formal net session is held at noon, Pacific Local Time, lasting about 45min but the band is monitored daily from 0730 to 1700 local time and longer if required. Liaison is maintained on an official basis with the California Highway Patrol and the group works in co-operation with the Mexican Red Nacional de Emergencia, a comparable amateur radio emergency network, and DHEW the official net of the Department of Health, Education and Welfare. An interesting point in on-the-air procedure is the use of triple-break for emergency only and double-break for priority or urgent traffic. It is claimed that from 10 to 20 emergencies are handled in most months over the area covered.

The east coast

The group centred on Lowestoft under the leadership of G3YDZ (QTHR) numbers only 17 at present but has already had an excellent coverage in the local press although only two years old. The area is roughly bordered by Bradwell, Bungay, Halesworth and Southwold. Regular exercises are held with the three user services, and G3YDZ would be glad to receive applications from prospective members in the area so that a good pool is available to draw on. Remember, the 1953 floods that started Raynet on its way were in the east coast area.

Raynet Committee

At its meeting on 1 January 10 members of the Raynet Committee were present. G3IIR confirmed that the use of the term "Raynet" had been approved as long ago as 1962 and the increasing adoption of the term was an excellent trend. Satisfaction was expressed at the steady flow of information from several of our most active groups coupled with the obvious amount of hard work shown by the compilers of the various group manuals and newsletters. Concern was felt for the plight of some controllers who, due to illness or private troubles, were finding the going difficult.

The regrettable lack of news from several of the Scottish areas was deplored and hopes expressed that the position would be clarified as early as possible. It was agreed that certain other areas appeared to have become moribund as far as the provision of information went, and again it was hoped that there would be an improvement in this respect in 1972.

Since 30 October 1971, 51 new members have joined and 70 have re-registered.

Raynet frequencies

It should be noted that the Raynet group frequencies listed in the July 1971 issue of *Radio Communication* and in the 1972 edition of *RSGB Amateur Radio Call Book* are frequencies used by local groups as advised by their controllers to RSGB HQ and are not allocated specifically for Raynet purposes.

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

*130 Alexandra Road, Croydon, Surrey, CR06EW.

CONTEST NEWS

Rules for NFD 1972

1. The General Rules for RSGB HF Contests, published in the January 1972 issue of *Radio Communication*, will apply.

The provisions of General Rule 4b are amended by NFD Rule 7 below. General Rule 8 is amended by NFD Rule 13 below.

2. Applications—Each group intending to compete must send in a properly completed application form to the RSGB HF Contests Committee, c/o J. C. Graham, G3TR, The Willows, Church Road, Lowfield Heath, Nr Crawley, Sussex, not later than 30 April 1972. Application forms are obtainable from RSGB headquarters; entries made other than on those forms will *not* be accepted.

The information required on the application form includes the following:

i Callsigns of stations, together with the bands to be used.
ii Full name and address of the RSGB member responsible for each entry.
iii Exact site location six figure National or Irish grid reference. In addition, entrants are required to give full site access information to enable a site to be located by station inspectors, who may not be familiar with the district. Incorrect or inadequate information may be grounds for disqualification.

3. When. From 1700gmt Saturday 3 June to 1700gmt Sunday 4 June 1972.

4. Eligible entrants. All clubs, affiliated societies and RSGB groups within the prefix zones G, GC, GD, GI, GM and GW. NFD is a multi-operator contest as provided in General Rule 5b.

5. Contacts. A1 (cw) only in the 1·8, 3·5, 7·0, 14·0, 21·0, 28·0MHz bands.

6. Sections

(a) *Double station*—Each competing group must operate two portable stations; the one using the lowest frequency shall be called the "A" station and the other the "B" station.

Each "A" station may operate on a maximum of three of the above bands; and up to three of the remaining bands may be allocated to the "B" station.

The "A" and "B" station need not be operated from the same site, provided that they are located within the same RSGB region.

(b) *Single station*—Each competing group must operate one portable station on any of the above six frequency bands.

7. Apparatus. General Rule 4(b) for RSGB HF Contests applies, and in addition the site must not be used for any portable activity for the seven days prior to the commencement of the period specified by General Rule (4b).

8. Aerials. These are subject to the following restriction:

(a) No part of any aerial shall be higher than 45ft above the ground.

9. Equipment. At any one station this must not exceed three transmitters and one receiver. Reserve equipment may be kept available, but not connected.

10. Power input. The total dc input power to the valve or valves, or other devices, energizing the aerial, or to any previous stage of the transmitter, shall not exceed 10W.

The valve or valves energizing the aerial shall have a total maximum rated anode dissipation not exceeding 13·5W.

Where semiconductor devices are used, the total maximum rated dissipation (at an ambient temperature of 25°C) of the device or devices energizing the aerial shall not exceed 20W for the purpose of this rule. Manufacturers' published ratings only will be accepted for this purpose.

11. Scoring. Points will be scored on the following basis:

(a) Fixed stations in the British Isles	1 point
(b) Fixed stations in the rest of Europe, including Eire	2 points
(c) Fixed stations outside Europe.....	3 points
(d) Fixed stations in the British Commonwealth	6 points
(e) Portable and mobile stations in the British Isles ..	3 points

(*f*) Portable and mobile stations in the rest of Europe, including Eire ..... 4 points
(*g*) Portable and mobile stations outside Europe..... 6 points
(*h*) Portable and mobile stations in the British Commonwealth ..... 12 points

A multiplier of two will be applied to the claimed score for contacts on the 1·8MHz band only.

12. Group contacts. Points must not be claimed for contacts made by a competition station with members of its own group, whether fixed, mobile or portable.

13. Entries. These are to be in accordance with General Rule 8, with the following exceptions and additions:

(i) The normal cover sheet will *not* be used. Special cover and summary sheets are provided for this contest, and these will be sent to the person submitting the application (see Rule 2).
(ii) Points claimed must be separately totalled for each band.
(iii) Entries should be sent to the RSGB HF Contests Committee at the address notified to entrants. **ENTRIES SENT TO RSGB HEADQUARTERS WILL NOT BE ACCEPTED.**

14. Trophies

(*a*) National Field Day Trophy to the group obtaining the highest combined score.
(*b*) Gravesend Trophy to the group obtaining the second highest combined score.
(*c*) The Scottish NFD Trophy to the Scottish Group scoring the highest number of points.
(*d*) The Frank Hoosen Memorial Trophy to the group with the highest score on the 14MHz band.
(*e*) The Bristol Trophy to the group having the highest score in the single station section.
(*f*) Commemorative certificates to the groups having the highest scores on the 1·8, 3·5, 7·0, 21 and 28MHz bands.

15. Check logs. While overseas stations are not eligible to enter NFD, check logs are very welcome. A certificate will be awarded to the overseas portable station in each continent whose check log shows that he contributed the most points to competitors.

16. Inspections. All stations are subject to inspection by nominated representatives of the HF Contests Committee.

These representatives will make every endeavour to interfere as little as possible with the stations' operations, and to assist in this, entrants should make it easy for the inspector to see the final stage(s) of the transmitters.

HF contest entries

Some years ago it was decided to discontinue the acknowledgement of individual hf contest entries. This action was made necessary by increasing postal costs and the need to reduce the amount of work carried out by headquarters staff and members of the HF Contests Committee. From time to time members ask why acknowledgements are not sent for contest entries and we would like to draw attention to Rule 8(f) of the General Rules for RSGB HF Contests.

The committee would like to suggest that members take advantage of the recorded delivery service operated by the Post Office when sending contest entries.

70MHz Contest Rules

Date: 9th April
Time: 0900-1700gmt

All entries to be sent to the adjudicator at: VHF Contests Committee, c/o L. V. G. Turner, G8CUT, 59 Harewood Road, Chelmsford, CM1 3DH.

The following General Rules, published in the January *Radio Communication*, will apply: 1, 2, 3, 4a, 5a, 6a, 7a, 8a, 9a, 10a, 11-24.

144/432MHz Open Contest Rules

When. From 1800gmt 4 March to 1800gmt 5 March.

All entries and check logs must be sent to: VHF Contests Committee, c/o G3VIR, 14a Roman Way, Farnham, Surrey.

The following General Rules, published in the January issue of *Radio Communication*, will apply: 1, 2, 3, 4a, 5a, 6a, 7a, 8b, 9a, 10a, 11–24. A multiplier of six should be applied to the total score on 432MHz.

BERU 1972

Members proposing to enter the BERU event are requested to read the rules carefully in view of changes which have been incorporated. The most significant are the alteration of the contest timings and the change to a 24-hour contest.

October UHF/SHF Contest

The October 1971 UHF/SHF Contest was well supported in terms of activity, weather and conditions being good, but this is not reflected by the disappointingly low entry. It may be that some would-be entrants were deterred by the necessity to calculate their scores in kilometres for the purposes of the IARU Region 1 Contest. The rules as published were ambiguous on this point, but only two entrants used the RSGB radial method; their scores have been multiplied by 25 for comparison with points per kilometre, but the logs are unfortunately ineligible for IARU. The higher shf bands were represented on this occasion by 2,300MHz and 10GHz; about 10 stations were active, most of whom worked both bands.

All logs which conform to the Region 1 Rules will be forwarded to Norway, who are this year's organizers of the International UHF Contest. Certificates of merit will be awarded to the leading G stations in each section, and to the Mid-Essex VHF/UHF Group which had the highest combined score. I. F. W.

432MHz Portable

Posn	Callsign (/P)	Score	QSOs	Best dx	km	Pwr	Ae
1	G3LTF	18511	81	F9NL	880	25	18
2	G3NNG	14861	104	PA0MS/A	491	5*	2×46
3	G8AZM	8896	69	F8MM	372	22	18
4	G8BXC	7575†	51	PA0MS/A	380	17*	18
5	GI8AYZ	6328	22	G8ATS	509	15	18
6	G3CMH	5382	32	G3KMS	297	32	2×46
7	G3YPP	5255	57	PA0EZ	382	24	18
8	G3RPE	4964	50				
9	G8ADP	383	11	G3RPE/P	91	15	9

432MHz Fixed

Posn	Callsign	Score	QSOs	Best dx	km	Pwr	Ae
1	G4AGQ/A	11775†	74	PA0VZL	426	95	18
2	G3ZYC	8630	58	PA0VZL	406	52	46
3	G8BYV	5613	28	ON5EW	412	25	8/8
4	G5DF	5238	53	PA0EZ	425	100	46
5	G3COJ	4756	20	F8OD	480	150	14
6	G8CIT	3508	35	PA0EZ	394	25	18
7	G8ERW	3363	37	PA0EZ	365	26	18
8	ON4HN	2780	17	GW8AWS/P	510	150	64
9	G3WFM	2035	30	PA0JNH/P	325	30	8/8
10	G2WS	1106	14	G3KMS	252	72	11
11	G8BKR	465	10	G3KMS	237	25	46

* Power output
†Kilometre score calculated from RSGB radial score

1,296MHz Portable

Posn	Callsign (/P)	Score	QSOs	Best dx (km)	Pwr	Tx	Ae	Rx
1	G3LTF	3,110	17	F8WN, 277	6	1N4386	Dish	Para-metric
2	G8AZM	691	15	G3ZYC, 220	15	2C39	34el	
3	G3YPP	643	9	G3ZYC, 152	20	2C39a	Dish	
4	G3RPE	543	8	G3ZYC, 138	15	Det24	Dish	IN21e
5	G3EEZ	235	4	G3YPP/P, 78	2	Var.	Dish	1N21
6	G8ADP	93	2	G3BNL/P, 52	12	3CX100	Dish	1N21
7	G3WDG	19	1	G8DEK/P, 19	2	2C39a	8/8	1N23e

1,296MHz Fixed

Posn	Callsign (/P)	Score	QSOs	Best dx (km)	Pwr	Tx	Ae	Rx
1	G3ZYC	1,657	12	G3LTF/P, 274	54	2C39a	Dish	1N23e
2	G8BYV	1,501	9	PA0MS/A, 299	10	QQV03-20a	Dish	MA417
3	G3THQ/A	782	10	G3ZYC, 173	20	2C39a	Dish	SIM2
4	G3WFM	131	4	G8AZM/P, 47	15	2C39a	Corner	
5	G5FK	54	1	G3THQ/A, 54	35	2C39	Dish	SIM2
6	G8CIT	27	1	G8AZM/P, 36	35	2C39a	24/24	1N23

2,300MHz Portable

Posn	Callsign (/P)	Score	QSOs	Best dx (km)	Pwr	Tx	Ae	Rx
1	G3RPE	234	5	G3BNL/P, 65	7½	Det29	Dish	CV2154
2	G3EEZ	157	3	G3THQ/A, 70	2	Var.	Dish	1N21
3	G3YPP	35	1	G3RPE/P, 35	1	Var.	Dish	—
4	G3WDG	19	1	G8DEK/P, 19	0·4	Var.	Dish	1N23e
5	G3LTF	Nil						

2,300MHz Fixed

Posn	Callsign(/P)	Score	QSOs	Best dx (km)	Pwr	Tx	Ae	Rx
1	G3THQ/A	234	4	G3BNL/P, 77	5	Det22	Dish	SIM2
2	G5FK	115	2	G3RPE/P, 61	10	EC157	Dish	SIM2

10GHz Portable

Posn	Callsign(/P)	Score	QSOs	Best dx (km)	Pwr	Tx	Ae	Rx
1	G3RPE	197	4	G3BNL/P, 65	1	Gunn	Dish	CV2154
2	G3ZGO	61	1	G3RPE/P, 61	1	Gunn	Dish	1N23we
3	G3EEZ	42	1	G3RPE/P, 42	—	723/A/B	Dish	1N23
4	G3WDG	19	1	G8DEK/P, 19	—	723/A/B	Horn	—

10GHz Fixed

Posn	Callsign	Score	QSOs	Best dx (km)	Pwr	Tx	Ae	Rx
1	G3THQ/A	159	3	G3BNL/P, 77	0·75	TWX23	Dish	—
2	G5FK	4	1	G3ZGO/P, 4	23	TWX	Horn	SIM2

Mobile Rallies Calendar

16 April	North Midlands, Drayton Manor Park, Near Tamworth, Staffs.
7 May	Spalding Tulip Time.
25 June	Bristol City & County RSGB Group, at Longleat Warminster, Wilts.
2 July	South Shields & DARC.
16 July	Worcester & DARC, at Hill County Secondary School, Upton-on-Severn, Worcs.
6 August	Woburn Abbey Rally
24 September	Harlow & DARS.

Contests calendar

12–13 February—First 1·8MHz (Rules in January issue)
5–13 February—2nd World SSTV (Rules in January issue)
19–20 February—ARRL DX CW
19–28 February—IARC Propagation CW/RTTY
26–27 February—REF Phone
4–5 March—ARRL DX Phone
4–5 March—144/432MHz Open (Rules in this issue)
11–12 March—BERU
18–19 March—ARRL DX CW
25–26 March—CQ WW WPX SSB
25–27 March—BARTG Spring RTTY (Rules in December issue)
25 March–2 April—IARC Propagation Phone
9 April—80m LP
9 April—70MHz (Rules in this issue)
6–7 May—432MHz
21 May—144MHz
3–4 June—NFD (Rules in this issue)
10–11 June—70MHz
24–25 June—Summer 1·8MHz
25 June–Microwave Contest
1–2 July—144MHz
8–9 July—HP Field Day
23 July—432MHz
13 August—70MHz
20 August—144MHz SSB
2–3 September—VHF NFD
2–3 September—IARU VHF
10 September—80m Field Day
7–8 October—21/28MHz
7–8 October—IARU UHF
21–22 October—7MHz CW
4–5 November—7MHz Phone
5 November—144/432MHz CW
11–12 November—Second 1·8MHz
November–December—70MHz Cumulative

CLUB NEWS

Items for inclusion in this section should be sent to regional representatives before the first of each month for inclusion in the following month's issue. They should not be sent direct to the editor.

The date of publication of the following month's issue, first Tuesday in the month, should be borne in mind so that events are not, in fact, history when the details are published. While regional representatives are pleased to receive club's events calendars for several months ahead, they still require monthly events lists so that entries can be confirmed or amended.

REGION 1 — RR B. O'Brien, G2AMV

Merseyside Luncheon Club—First Monday of month, 1230 for 1245, HMS *Landfall*. Please advise G3VQT or G2AMV if you wish to attend.

Ainsdale (ARC)—Members should contact N. Horrocks, G2CUZ, QTHR, for details of the changed meeting arrangements.

Allerton (Liverpool) Scout ARS—North-west region—Thursdays, 8pm, 1st Allerton Group Headquarters, Aigburth Vale, Liverpool 17. All Scouts interested in amateur radio are welcome.

Blackburn (East Lancs ARC)—First Thursday of month, 7.30pm, Edinburgh House, Shearbank Road, Blackburn. Please note new secretary is W. E. Baxendale, G8FDG, "Juverna", 28 Westland Avenue, Darwen, Lancs.

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

Bolton (B & DARS)—First and third Wednesdays of month at Bolton Recreation Club, Kensington Place. Full details from G3ZQS.

Bury (B & RRS)—8 February (Talk on Raynet by G3MBQ), George Hotel, Market Street, Bury. At the AGM in December the following officers were elected: Chairman G3VVQ; secretary G3RSM; treasurer G3FLR; committee members G3SUI, G8DHT and G4ATK. Secretary F. S. C. Burnett, G3RSM, 13 Rhiwlas Drive, Bury.

Carlisle (C & DARS)—Mondays, 7.30pm, Currock House, Lediard Avenue, Currock. Secretary A. R. Harper, 23 Roman Way, Stanwix.

Cheshire (Mid-Cheshire ARC)—Wednesdays, 7pm, Technical Activities Centre, Winsford Verdin Comprehensive School, Grange Lane, Winsford. Morse practice from 1900 to 2000 hours and on the air working, 160 and 2m, extending later to 80m. Net night on 160m starting on Monday at 1900 hours, Tuesdays on 2m at 1900 hours. 2000 to 2130gmt. Further details from G3JWK.

Chester (C & DARS)—Tuesdays, except the first Tuesday of month which is net night, 8pm, YMCA, Chester. Further details from G8AYW, QTHR.

Crewe—Local members continue to meet at the QTH of R. Owen, 10 Circle Avenue, Willaston, Nantwich, from whom further details may be obtained.

Douglas (IOM) (D & DARS)—Every Monday and Thursday, 7.30pm, rear of Douglas Holiday Centre, Victoria Road, Douglas. Club callsign GD3ZCM. Secretary J. Parnell, Cronkbane, Quines Hill, Port Soderick, IOM.

Eccles (E & DARC)—Tuesdays, 8pm, Bridgewater School, Worsley, Lancs. Thursdays, Club Top Band Net, 2030gmt.

Leyland Hundred Amateur Radio Group—Net nights: Thursdays at 2000gmt on 1,915kHz, Saturdays at 1900gmt on 145·8MHz.

Liverpool (L & DARS)—Tuesdays, 8pm, Conservative Association Rooms, Church Road, Wavertree. Secretary K.Wood, G3WCS, 90 Childwall Valley Road, Liverpool 16.

Liverpool (NLRC)—11, 25 February, 10 March, 8pm, Labour Party Headquarters, 13 Crosby Road South, Liverpool 22. Secretary M. Graham, G3XMG, 14 Albert Road, Waterloo, Liverpool 22.

Manchester (M & DARS)—Wednesdays, 7.30pm, 203 Droylesden Road, Newton Heath, Manchester 10. Secretary G3IOA, QTHR.

Manchester (SMRC)—Club meets on Fridays. 4 February ("Aerials", by E. Taylor, G2ALN), 11 February (" 'El-bug' using ICs", by T. Winter, G4AOK), 18 February ("Some thoughts on TVI", W. R. Parkinson, G3FNM), 25 February (Tape/slide lecture "DXpedition to St Pierre and Miquelon Island 1959"), 3 March (Frequency meters and measurement), 8pm, Sale Moor Community Centre, Norris Road, Sale, Cheshire. The vhf/uhf activity night is Monday, with operation of G3UHF at 8pm from the club shack, "Greeba", Shady Lane, Manchester 23. Visitors are welcome on Mondays and Fridays. Secretary G3WFT.

Manchester University (ARS)—This club runs a series of visits and lectures and tuition for the RAE and morse test. G3VUM is now operational on all hf bands with a KW2000A into a 6 element beam, G5RV, or 160m dipole at 100ft. G8FUM operates on 144MHz with 40W to a 6/6 at 100ft. Further information from G8BVF, G3ZNS or GM3YOK, University Union, Oxford Road.

Preston (PARS)—3, 17 February, 2 March, 7.30pm, Windsor Castle (private room), St Paul's Square. Morse practice at 7.30pm, main meeting at 8pm. Secretary G. Earnshaw, G3ZXC.

Salford (Dial House RS)—A society of PO engineers who meet on Wednesdays, 6pm, 8th floor (river end), Dial House, Chapel Street, Salford 3. Further details from the secretary at this address.

Stockport (SRS)—Second Wednesday of month (Discussion night), fourth Wednesday of month (Lecture night), 8pm, Blossoms Hotel, Buxton Road, Stockport. Secretary G8BCG.

Thornton Cleveleys (TCARS)—First and third Wednesdays of month. 2 February (G3UIG—homebrew videotape), 16 February (Junk sale—large items. Details in advance to G3WFY please), 1 March (G3TTN/VNX—well-known XYL/OM team of certificate hunting), St John Ambulance Brigade HQ, Fleetwood Road North, Thornton. All welcome.

Warrington (Culcheth) (CARS)—Fridays, 7.30pm, Chat Moss Hotel, Glazebury. All visitors welcome. Secretary K. Bulgess, 32 Hendon Street, Leigh, Lancs.

Westmorland (WRS)—First Monday of month, New Allen Technical College, Room 377 (top floor), Milnthorpe Road, Kendal. All visitors welcome. Secretary E. P. Goonan junr., "Longridge", Storth, nr Milnthorpe, Westmorland.

Windscale (Cumberland (WAR & SE)—Fridays, 7pm, c/o Falcon Club, Falcon Field, Egremont. Further details from N. Ramsden, G3RHE.

Wirral (WARS)—First and third Wednesdays of month, 7.45pm, Sport and Indoor Recreation Centre (Old Drill Hall), Grange Road West, Claughton, Birkenhead. Secretary G3WSD, 34 Glenmore Road, Oxton, Birkenhead.

Wirral (Wirral DX Association)—Last Thursday of month at members' homes. February meeting at QTH of G3VUY. Secretary G3OKA, 219 Prenton Dell Road, Prenton, Birkenhead.

REGION 2 — RR R. W. Fisher, G3PWJ

Birmingham (MARS)—No meeting February, Exhibition station GB3BBS at the Birmingham Boat Show, Bingley Hall, Broad Street, *G8BHE*.

(Slade)—No information. Church House, High St, Erdington G8EYL.

(South)—First Wednesday each month 8pm, Hampstead House, Fairfax Road, West Heath.

Bromsgrove (B & DARC)—No information. Club meets at Royal Oak, Barley Mow Lane, Catshill.

Cannock (CCARS)—No information. Club meets at Bridgtown Social Club, Walsall Rd, Bridgtown.

Coventry (CARS)—4 February (Night on the Air), 11 February (Hi-fi lecture) 18 February (Night on the Air), 25 February (DF films), 8pm, Coventry Scout Hd, 121 St. Nicholas St, Radford Road, Coventry.

Dudley (DARC)—1, 15, 29, February, 8pm, Central Library, St James's Road, Dudley, *G3PWJ*.

Hereford (HARS)—4 February (AGM), Civil Defence HQ, Gaol Street, Hereford.

Leamington Spa (MWAE & RS)—Every Monday, 8pm, 28 Hamilton Terrace. Leamington.

Lichfield (LARS)—No information. Club meets at Swan Hotel, Lichfield, *G8CNB*.

Nuneaton (NARS)—No information. Club meets at 7.30pm, Room 43, Nuneaton Technical College. *G8ERM*.

Redditch (RRC)—10 February (AGM), 8pm, Old People's Centre, Park Road, 24 February (Annual Dinner). *G3EVT*.

Rugby (R & DARAEC)—No information. Club meets at 10 Drury Lane, Rugby.

Solihull (SARS)—No information. Club meets at Manor House, High Street, Solihull. *G3XPY*.

Shrewsbury (SARS)—Every Thursday, 7.30pm, Harlescott Youth Centre, Sundorne Road, Shrewsbury. *G3VZG*.

Stoke (NSARS)—No information. Club meets at Harold Clowes Community Association, Centre.

(SoTARS)—No information. Club meets at 2a Race Course Road, Oakhill, Stoke.

Stourbridge (STARS)—No information. Club meets at Longlands School, Stourbridge.

Stratford (SuA & DARC)—No information. Club meets at Halls Croft, Old Town Stratford. *G3OOQ.*

Sutton Coldfield (SCRS)—14 February (Annual junk sale), 8pm Clubhouse, Sutton Town, Football Club, Coles Lane. *G8AVH.*

Telford (WARS)—Every Wednesday, 8pm, Ketley Bank Youth Club, Main Road.

Wolverhampton (WARS)—7 February (Lecture meeting), 14 February (Natter night), 21 February (Discussion on aerials), 6 March (Display of slides and photographs in connection with fiftieth anniversary), 8pm, Neachells Cottage, Tettenhall, Wolverhampton. *G3UBX.*

Worcester (W & DARC)—First Monday and third Saturday of month), 7 February (Talk on PO telecommunications), 19 February ("Life in Fiji", by G3HZG), 6 March (To be arranged), 7.30pm, Crown Hotel, Broad Street. *G8ASO*, telephone Worcester 29208.

REGION 4 — RR T. Darn, G3FGY

Chesterfield (CADARS)—Wednesdays, 7.30pm, Mount Zion Methodist Church, Chatsworth Road, Chesterfield. *R. Nelson.*

Derby (DADARS)—Club meets every Wednesday. 9 February (Basic Radio), 16 February (Film show), 23 February ("introduction to power supplies", by T. Beaumond, G3VLF), 1 March (Bring and buy sale), 7.30pm, 119 Green Lane, Derby. *G2CVV.*

Grimsby (GARS)—17 February (Discussion on club equipment), 2 March (Visit to the Scunthorpe Club). The new clubrooms are at the Red Cross Rooms, Rowston Street, Cleethorpes. Further information from Mike Barratt, G8EDK, 13 Rudham Avenue, Grimsby, Lincs.

Heanor (SEDARS)—8 February (Bring and buy sale), 15 February (Open Night), 22 February (Amplifiers), 1 March (Forum), 7.30pm, South East Derbyshire College of Further Education, Ilkeston Road, Heanor, Derbys.

Loughborough (LARC)—11 February (Members equipment), 18 February (Swl night and slow morse), 25 February (Junk sale). Details of this club obtainable from G3XAZ, QTHR.

Melton Mowbray (MMARS)—18 February ("Radio receiver troubleshooting", by Bert Reeves). Club meets at St John Ambulance Hall, Asfordby Hall, Melton Mowbray. Club net on Top Band, 1,910MHz, on Sunday at 11am and Thursdays at 8pm. *G3NVK.*

Newark (NARS)—2 March (Round Table discussion on aerials). For further information on this club contact the club secretary Daishidh Dhuglas, 35 Beacon Hill Road, Newark, Notts.

REGION 6 — RR L. W. Lewis, G8ML

Cheltenham (RSGB Group)—First Thursday of month, 8pm, "Royal Crescent", Clarence Street, Cheltenham. *G2FWA.*

Gloucester (GRS)—First Thursday in each month, 7.30pm, RAFA Club, Spa Road, Gloucester, and each following Wednesday at the Drill Hall, Chequers Road, Gloucester. *G3MA.*

South Bucks VHF Club—1 February (Evening on the air), 7 March (Planning a df exercise), 8pm, Bassetsbury Manor, High Wycombe.

REGION 7 — RR R. S. Hewes, G3TDR

Acton, Brentford & Chiswick (ABCRC)—Tuesday 15 February (Vhf discussion), 7.30pm, Chiswick Trades & Social Club, 66 High Road, Chiswick. *G3GEH.*

Addiscombe (AARC)—Second and fourth Tuesdays, 7.30pm, Prince George Hotel, High Street, Thornton Heath.

Ashford (Echelford ARS)—Monday 14 February (Mr Smilie of RCA will give a talk and film show on radar), 24 February (Surplus equipment sale), 7.30pm, St Martin's Court, Kingston Crescent, Ashford, Middlesex. *G8EDL, QTHR.*

Barking (BR & ES)—Thursday 10 February (Film Show), 7.30pm, Gascoigne Recreation Centre, Gascoigne School, Morley Road, Barking. *G3FZP, QTHR.*

Bexley Heath (NKRS)—Thursday 10 February (Talk by G3RPE on 3cm), 24 February (Tape lecture), 7.30pm, Congregational Church Hall, Chapel Road, Bexleyheath, Kent. *G8EJH, QTHR.*

Cheshunt (CDRC)—First Friday of month, 7.30pm, Methodist Church Hall, opp Theobalds Station, Cheshunt.

Chingford (RSGB Group)—Fridays, telephone 01-524 0308.

Chingford (SRC)—Fridays, 7.30pm, Friday Hill House, Simmonds Lane, Chingford, E4.

Croydon (SRCC)—Third Tuesday of month, 7.30pm, "Swan & Sugarloaf", South Croydon.

Crystal Palace (CP & DRC)—Saturday 19 February (AGM), 8pm, Emmanuel Church Hall, Barry Road, SE22. *G3FZL, QTHR.*

Dartford (DF Club)—Friday 4 February (Mr Ainley of MPT to lecture on "The television detector"), 7.45pm, 18 February (Club night), 8pm, Clubroom, Broomhill Road, Dartford, Kent. *G3XVC, QTHR.*

Dorking (DR & DRS)—Second and fourth Tuesdays in each month, "Wheatsheaf", Dorking.

Ealing (E & DARS)—Tuesdays, 7.30pm, Northfields Community Centre, Northcroft Road, W13.

East London—Sunday 20 February (Panel of experts—radio brains trust), 3pm, Wanstead House, The Green, Wanstead, E11.

Edgware & Hendon (E & DRS)—Second and fourth Mondays of month, 8pm, St George's Hall, 51 Flower Lane, Mill Hill, NW7.

Farnham, Bucks (Burnham Beeches RS)—Fortnightly on Mondays, 7.30pm, Buffaloes Hall, Victoria Public House, Victoria Road, Farnham Common.

Gravesend (GRS)—Wednesdays, 8pm, Northfleet Recreation Centre, Springhill Road, Northfleet, Kent.

Greenford (GARS)—Alternate Fridays, 4, 18 February, 8pm, Greenford Community Centre, Oldfield Lane. *G3OHX, QTHR* (telephone Uxbridge 33861).

Guildford (G G DRS)—Second and fourth Fridays, 8pm, Guildford Engineering Society, Stoke Park, Guildford, Surrey.

Hampton Court (TVARTS)—First Wednesday of month, 7.30pm, The Three Pigeons, Portsmouth Road, Long Ditton.

Harlow (DRS)—Every Tuesday, 8pm, Mark Hall Barn, First Avenue, Harlow, Essex. At the AGM held on 16 November the following officers were elected: President L. F. Cox, G3PRN; treasurer B. W. Nappey, G3YDI; chairman D. Rands; secretary V. Heard; assistant secretary J. Petters, G3YPZ. Contact V. Heard at 106 Vicarage Wood, Harlow, Essex.

Harrow (RSH)—Every Friday, 8pm, Harrow County School for Boys, Sheepcote Road, Harrow.

Havering (H & DARC)—Fortnightly, 8pm, British Legion House, Western Road, Romford.

Hemel Hempstead (HH & DARS)—First and third Fridays of month, 7.30pm, "Addmult" Sports Club, Hemel Hempstead.

Holloway (GRS)—Mondays (RAE), 7pm; Wednesdays (Morse), 7.30pm, Fridays (Club) 7.30pm. Club meets at Archway School Annex, Whittington School, Highgate Hill, N19.

Hounslow (BEAARS)—Last Wednesday of month, 7pm, BEA Training Centre, Southall Lane, Heston, Hounslow. (This club is open to non-BEA employees by invitation—contact David Evans, G3OUF, telephone Amersham 3257 for details.)

Ilford—Every Thursday, 8pm, 50 Mortlake Road (off Ilford Lane), Ilford.

Kingston (K & DARS)—Wednesday 9 February (Aerials), 8pm, Penguin Lounge, 37 Brighton Road, Surbiton. Contact R. S. Babbs, 28 Grove Lane, Kingston, Surrey.

Loughton—Fortnightly on Fridays, Loughton Hall, Rectory Lane (nr Debden Station).

New Cross (CARS)—Wednesdays and Fridays, 8pm, 225 New Cross Road, SE14.

Paddington (P & DRS)—Wednesdays, 8pm, Beauchamp Lodge, 2 Warwick Crescent, W2.

Purley (P & DRS)—First and third Fridays, 8pm, Railwaymens' Hall, Side Entrance, 58 Whytecliffe Road, Purley.

Reigate (RATS)—First Wednesday of month, 7.45pm, Nutley Hall, Nutley Lane, Redhill (200 yards NW of Red Cross). *G3NKS, QTHR.*

Romford (R & DRS)—Tuesdays, 8.15pm, RAFTA House, 18 Carlton Road, Romford.

Scouts (ARS)—Thursday 17 February, 7.30pm, Baden Powell House, Queensgate, Kensington, SW7. Contact A. Watts for details.

Southgate (SRC)—Second Thursday of month (10 February), 7.30pm, Civil Defence Hut, Bowes Road, N11.

St Albans (Verulam ARC)—Wednesday 16 February (Dxpedition to Shetlands—films and slides by F. L. Curtis, G3SVK), 7.30 for 8pm, Town Hall, St Peter's Street, St. Albans. *G3YHY, QTHR.*

Sutton & Cheam (SRCS)—Tuesday 15 February ("Marine operation", by Alex Ward, G3HSP), 8pm, The Harrow Inn, High Street, Cheam. *G2DMR, QTHR.*

Welwyn (Mid-Herts ARS)—Second Thursday of month (10 February), 8pm, Welwyn Civic Centre, Welwyn.
Wimbledon (W & DRS)—Second and last Fridays, 8pm, St John Hall, 124 Kingston Road, South Wimbledon, SW19.
Wembley (GECARS)—Thursdays, 7pm, c/o GEC Hirst Research Centre, Wembley. (This club is open to non-GEC employees by invitation, telephone Dain Evans at 01-904 1262 for further details.)
Woolwich—Contact G3ZOJ—re-forming this society.

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

Brighton (BTCARC)—Details of future meetings from the hon. secretary G2CMH, QTHR.
Canterbury (EKRS)—12 February (Annual dinner and dance). Tickets for dinner and dance and further details of meetings from the hon secretary G3MDO, QTHR. Monthly meetings held at Westgate Hall, Canterbury.
Dover (SEKYMCAARC)—Meetings held every Thursday at YMCA, Leylands Road, Dover.
Maidstone (MYMCAARS)—Meetings held every Friday at "Y" Sports Centre. First and third Fridays of month primarily devoted to beginners. Further details from the hon secretary *G3WXL, QTHR.*
Mid-Sussex (MSARS)—Meetings held at Marle Place, Leylands Road, Burgess Hill. Further details of future meetings from the hon secretary *G3RXJ.*
Thanet (TRS)—Meetings held every Friday at Hilderstone House, Broadstairs.
Worthing (W & DARC)—Meetings held every Tuesday, Rose Wilmot Youth Centre, Littlehampton Road, Worthnig.

REGION 9 — RR H. W. Leonard, G4UZ

Bristol (City and county RSGB Group)—28 February (Weather pictures from satellites by Rev Paul Sollom, G3BGL. An invitation is extended to members of all clubs in the district as this will be the only visit by G3BGL to the south west this year), 7.30pm, Becket Hall, St Thomas Street, Bristol 4. *G3ULJ.*
Bristol (BARC)—Tuesdays and Thursdays, 7.30pm, 41 Ducie Road, Bristol 5.
Bristol University ARS—Every Saturday, 2.30pm, Dept of Physics, Royal Fort, Tyndall Park Road, Bristol 1.
Burnham on Sea (BoSRC)—Contact J. Robertson, G3ZOR, telephone 2333.
Cornish (CRAC)—First Thursday of month, 7.30pm, SWEB Social Centre, Pool, Camborne. *G3UCQ.*
Exeter (EARS)—Club HQ, Community Centre, St David's Hill, Exeter.
Newquay—Club meets at Treviglas School, Newquay. Further details from G3NKE, telephone Camborne 2419. *G3THT.*
North Devon (NDRC)—Club meets at "Grinnis", High Wall, Sticklepath, Barnstaple. *G4CG.*
Plymouth (PRC)—Club HQ, Virginia House, Batter Street, Bretonside, Plymouth.
Saltash (S & DARC)—Club meets at Burraton Toc H Hall. Contact G3XWA.
Taunton (T & DARC)—Fridays, 7.30pm, Club Room, Jelalabad Barracks, The Mount, Taunton.
Torbay (TARS)—Tuesdays and Fridays. 26 February (W1YUP talking on "amateur radio in the States"). Christmas Quiz Cup won by Plymouth. *G3NQD.*
Weston-super-Mare (WsMRS)—Contact G3GNS for details.
Yeovil (YARS)—Meetings every Thursday, 7.30pm, Youth Centre, Park Lodge, The Park, Yeovil. *G3NOF.*

REGION 10 — RR D. M. Thomas, GW3RWX

Blackwood (ARC)—Fridays, 7.30pm, Oakdale Community Centre, Oakdale, Monmouth. *GW3TUG.*
Barry College of Further Education (ARS)—Thursdays, 7pm, College of Further Education, Colcot Road, Barry, Glam. *GW3VKL*
Cardiff (RSGB Group)—Monday 14 February, 7.30pm, BBC Club, Llandaff, Cardiff. The annual Christmas Social held on 13 December was a very successful occasion. Most South Wales clubs were represented, and the Wozencroft Trophy for home-constructed equipment was awarded to David Thomas, GW3RWX, and the Vic Bartlett Memorial Tankard was awarded to Cyril Parsons, GW8NP, for his work on behalf of the RSGB. *GW3GHC.*
Glamorgan Raynet Group—Details of meetings and exercises from GW3ZFG, telephone Cardiff 62411.
Haverfordwest (ARS)—Tuesdays, 7.30pm, HQ Rosemary Lane, Haverfordwest, Pembs. Club callsign GW3XZT. *GW3YBB*
Hoover (ARC)—Mondays, 7.30pm, Hoover Social Club, Hoover Works, Pentrebach, nr Merthyr, Glam. Secretary, Mr F. E. Tribe.
Port Talbot (ARC)—Second Tuesday of month, 7.30pm, Trefelin Club & Institute, Trefelin, Port Talbot, Glam. *GW5VX.*
Pontypool (ARC)—Tuesdays, 7pm, Educational Settlement, Rockhill Road, Pontypool, Monmouth *,GW3JBH.*
Pembroke (ARC)—Last Friday of month, 7.30pm, Defensible Barracks, Pembroke Dock, Pembs. *GW3LXI.*
Sully & District Shortwave Club—Tuesdays, 7pm, The Annexe, Sully Bowls & Social Club, 59 South Road, Sully, Glam. Club callsign GW3ZIT. The Christmas Social was very well attended by members of other local clubs, and also by the zonal representative. A very full programme is in hand for the coming year and all local amateurs are invited to meetings. *GW3ZSV.*
Rhondda (ARS)—Meets at Rhondda Transport Employees Club & Institute, Porth Rhondda, Glam. *GW3PHH.*
Swansea Telephone Area (ARS)—Tuesdays, 7.30pm, Telephone Engineering Centre, Gors Road, Swansea. Secretary, Mr D. E. Connor, 7 Glanmon Road, Sketty, Swansea. Glam.
University College, Cardiff (ARS)—From a rather indifferent start this society is now a centre of enthusiastic activity. Club callsign GW3UWC. Details from the secretary, c/o Students Union, Dumfries Place, Cardiff.
University College of Wales, Aberystwyth Radio & Electronics Society—This term Mr W. Davies will be speaking on amateur radio in Nigeria, following his visit to that country.

On 23 February there will be a meeting of Welsh University Radio Societies at Aberystwyth. The meeting in the University Physics Block will begin at 1545gmt (following a reception from 1500gmt onwards), and continue at 1900gmt after a meal, with demonstrations of equipment, etc. The meeting will be attended by Council representative Mr C. H. Parsons, GW8NP. It is hoped that the Barry College of Further Education Radio Society, United College of the Atlantic Radio Society and the Cader Idris Radio Society will also attend. An invitation is extended to other amateurs who may be interested. Further details from the secretary Miss Ruth Bury, c/o Students Union, University College of Wales, Aberystwyth, Cards.

REGION 12 — RR A. J. Oliphant, GM3SFH

Aberdeen (AARS)—Fridays, 7.30pm, 6 Blenheim Lane, Aberdeen. *GM3HGA*, telephone Aberdeen 33838.
Inverness (IRS)—Thursdays, 4 Falcon Square (nr railway station) Inverness. Miss A. Veitch, telephone Drumnadrochit 266.
Lerwick (LRS)—Tuesdays and Thursdays, 8pm, Annsbrae House, Lerwick. *GM3XPO*, telephone Bixter 249.
Lhanbryde (MFARS)—Wednesdays. 7.45pm, St Andrew's School, Nr Lhanbryde, Morayshire. *GM3UKG*, telephone Clochan 225.
Thurso (CARS)—Second Tuesday in each month, 7.30pm, Scapa House, Thurso. *GM3JUD.*
Dundee (KTCARS)—Wednesdays, 7pm, Kingsway Technical College, Dundee. *GM3VEY.*

REGION 17 — RR L. N. G. Hawkyard, G3ZKR

Chippenham (CDARC)—Club meets every Tuesday. 8 February ("The early days of amateur radio", by K. T. Harvey, G5KT), 7.30pm, Boys High School, Hardenhuish Lane, Chippenham. Further details from the secretary P. J. Tuck, telephone Bromham 274.
Harwell (AERE ARC)—Meetings on the third Tuesday in each month, also informal gatherings and junk sales every Friday lunchtime, 7.30pm, Social Club, AERE, Harwell, Berks. *G3NNG.*
Maidenhead (MDARC)—7 February (Informal), 15 February ("TVI", by D. G. Pinnock, G3HVA), 7.30pm, Victory Hall, Cox Green, Maidenhead, Berks. *G3VMR.*
Southampton (RSGB Group)—Monthly meeting on 12 February (Amateur radio quiz devised by G3HKT), Lanchester Building, Southampton University. Club meets every Wednesday, 7.30pm, Clubroom, Kent Road, Southampton. Telephone 73378.

MEMBERS' ADS

The conditions of acceptance below, and on the order form, are effective on all Member's Ads received after 4 February 1972. Until then the former conditions will still apply.

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.

FOR SALE

For Eddystone 358 rx coils sets B, C, D, F. (2·1-22MHz + 600-1,250 kHz), £1.25 + post. G3NUA, QTHR. Tel Hartlepool 5643.

Star SR700A, £60. Shure 444T, HRO S meter, HRO orig manual, offers. Wanted: 300V ac moving coil meter. G2UZ, QTHR.

KW1000, mint cond, little used, £100 ono. G4AMF, 4 Hall Street, Hoyland, Nr Barnsley. Tel Barnsley 743414.

Marconi sig gen TF144G, £10. Stroboscope, £8. Plessey mic + rx test set No 4, £10. Kelvin & Hughes 4 channel paper tape recorder CPS50, £15. RCA audio freq meter, 5Hz-50kHz, £12. Homer, 32 Iron Mill Lane, Crayford, Kent. DA1 4RR. Tel Crayford 24625.

New /M or /P telephone handset by well-known maker, £1.50. Miniature ovens, 6/12V 80°C for 4C6U xtals, with base socket, 50p ea, add 5p post. "Cambridge" /Ms, modded, sae for dets. Jeapes, 165 Cambridge Road, Great Shelford, Cambridge.

Comp *QSTs:* 1957-8, 1961-2, 1964-9 inc; 1956 except May. G6XL, QTHR. Tel 0423 81360.

Teleprinter Creed 7B commercial tu and psu, £20. GI5ABZ, 27 Glengoland Gardens, Dunmurry, N.I.

Codar CR70A with PR30 and RQ10X, all in gd wkng cond, £18. 19 Set tx and rx, OK, £4. Could del London area. G8CZB, QTHR. Tel 01-907 2638.

AR88D with S meter, £30. TW Communicator twomobile w/ac psu, £30. G2DAF rx, £30. KW Viceroy w/ac psu, KW linear, £65. Hallicrafters Skyrider 23 w/bndsprd, £15. Homebrew ssb tx, needs attntn, £10. De Carteret, La Mare Denis Saints, St Martins, Guernsey, CI.

Vanguard tx/rx, hi-band modded 144MHz to hndbk spec, comp even with whip, six channel type xtals for 145·00 inc, £27.50. Also hi-band base and Vanguard less cables, unmodded with cnvrsn gen. G3VZV, QTHR. Tel Toddington 2470 (05255).

AT5 + dc psu, perf cond, £19. Coil or pp 75p. G3ZLH, Bronheulog Cottage Lane, St Martins, Oswestry. Tel Chirk 2414.

Two 4CX250Bs with bases, chimneys etc, £6 ea. 24V Dowkey coaxial relay, £2. Coaxial relay, £1. Meters: 2½in 300μA, 30p. 3½in 40V dc, 50p. 1·0A rf thermo couple, £1. 3½in 1mA, 50p. G3SVD, 15 Paynesdown Road, Thatcham, Nr Newbury, Berks.

2m tx, compact, been used as /M rig, 25W, £12. 4m tx "surefire" 15W, £5. Modulator trnsfmr, 12AX7, 6SN7, pair 807s, £1.50. RSGB *Amateur Radio Handbook*, £1.25. Offers Marconi tx, 4m, collect. Seymour 25 Ryde Buildings, Webb Street, London SE1 4RX.

Valves, new or as new: DET22 (4), 25p. DET24 (4), 50p. 2C39 (4), 40p. WE416B (2), 50p. TT15 (3), 40p. 6AM4 (5), 20p. 6V6GT (4), 10p. 5675 (1), 25p. 6442 (1), 25p. All + pp. G6XM, 8 Bydemill Gardens, Highworth, Swindon, Wilts.

Vhf comps, FT243, 8045, 8,075kHz, 75p ea. Vhf power transistor BLY74 4W o/p, data sheet, unused, £1.50. Mosfet 3, 3N128, 45p. Unused TW minihalo, 69p. 5B254M, unused, £1 pair. Wanted: 52Ω HLR250 resistor. G3ROG, QTHR. Tel Maidstone 26997.

AR88D, manual + spare valves, £30 or part exch for smaller tx of sim coverage. 4m 4 ele Yagi, £2. CV2184 crt, 50p. TU6B case, 50p. TR1986 i.f. strip, £1. Carr extra. G3WQM, QTHR. Tel York 73672.

CR100, £14. Rtty—Creed 7B with hndbk, paper, £15. 19in colour tv tube AA9-11X (seconds), £12, 2 only. Wanted: Heathkit HP-23A ac psu or sim. Partridge, 232 Chamberlayne Road, London NW10 3LG. Tel 01-459 2169.

Storno /M radio telephones type 33C, fm, less xtals, comp with valves, control unit, cable and ptt mic, transistor inverter, boot mntng, low band, £3 ea. Buyer coll, phone before calling. G3VQE, QTHR. Tel Farnborough 48194.

Unused 26in colour tv tube Mullard type A66-120X, £45. Brand new Philips 26in tv cab comp with legs, type G26K522, £18. Pair of Redifon tx/rxs, £15. Heathkit rf sig gen, RF-1U, £9. Hall, 7 Victoria Road, Ellesmere Park, Eccles, Manchester. Tel 061-789 2505.

Ribbon mic magnet with ribbon clamps, 50p, only needs some aluminium foil and a case. Mann, 45 Old School Lane, Milton, Cambridge.

Joystick lightweight vfa, £5. Joymatch LO-Z tuner, £6. Two together, £10 inc post. Revill, 46 Abbey Road, Witney, Oxon. Tel Witney 3792.

Anglian 20-2-2 2m trnsvrtr, output 40W p.e.p., comp with psu built-in, cost £88, cond as new. Del up to 50 miles. Offers to G2ATM, 44 Birkland Avenue, Plains Road, Mapperley, Notts. NG3 5LA.

Rtty terminal unit for AR88 rx, £25 ono. Wanted: *Radio Communication* mags from Jan 1971 to July 1971. Boyd, 18 Meadows Road Lower Willingdon, Eastbourne, Sussex. Tel Eastbourne 52721.

BC453 (190-550kHz), £5. Crude psu for BC453, £3. Codar RQ10X Q mult (for i.f.s. 450-470kHz), £5. Will del Portsmouth or Leeds areas. Hall 30 Montagu Crescent, Leeds 8, Yorks.

KW2000A, perf, mtchng ac psu + hndbks, £142. Variable ic cw audio fltr, £1.50. *Radio Designer's Handbook* by Langford-Smith, £2. Heath OS-2 scope, mint, + hndbk, £24. Carpenter, 10 Avenue, Road, Frome.

Property of late G3JWB. 1000·1000 trnsfmr, £1. BC221T, int psu, £8. Wilcox Gay vfo, £2. Coaxial relay, 75p. G2ZZ, QTHR. Tel 01-472 2153.

Trio TS510 tx/rx, 100kHz xtal, hardly used, £140. Oscilloscope, Solartron CD523S2, dc, 10MHz, 1mV sensitivity, t/b 1S-0·1μS, £25. Hanson, G3RBD, 207 Grant Road, Liverpool, L14 OLG. Tel 051-228 0144.

Eddystone EC10 Mk2 with type 924 psu, perf cond, manual + circ, £50 ono. Clampin, 12 Kersey Drive, Clacton on Sea, Essex.

Fltrs ssb, 455kHz, b/w 1·8kHz at 6dB, £4.75. Vhf/uhf transistors: 2N3375, £3.75. 2N3866, 70p. 2N3053, 20p. BF378 low noise 70cm or 23cm ft 2,300MHz, 70p. Stamp for list. Elliott, "Oatlands", Southend Road, Howe Green, Chelmsford, Essex. Tel Chelmsford 71604.

DX100U + SB10U, vgc, £47 ono. AR88D, exc cond, £35 ono. Together £75. Codar PR3OX preselector, £5. Denco coils, 550kHz-30MHz for transistor rx (aerial, rf and oscillator), £2.50 carr by arrangement. G3YHG, QTHR. Tel 0722 28457 (w/ends).

Heathkit Q mult QPM-1, £5. 12V invertors, 240V ac, 40W, £4. 600V 300V-70V, £10. Sundry Valves, meters, 2 and 4m xtals. Sae list. G5RP, QTHR. Tel East Hendred 384.

Trio TS510 tx/rx, little used, as new, orig packing, £150. G3TRB 48 Newland Road, Droitwich, Worcs. Tel 4806.

CR100 S meter noise limiter, manual, fb, £15. BC221, cw, charts, psu, £16. Carr extra, sae dets. G3LLX, QTHR.

Xtals: HC6U (2); 6250·0, 7833·0, 7666·0, 8000·0, 9000·0, 10000·0, 15000·0, 34444·4 (1); 20000·0, 35050·0kHz, B7G type 12666·0kHz, FT243, 8075·0, 8073·333, 8,100kHz, all 60p each. G8ATF, QTHR. Tel Downtown Castle (072581) 244.

Two 18in lengths brand new 3cm copper waveguide + Klystron CV323, £2 the lot. G3WGF, QTHR.

Heathkit SB-10U ssb adaptor, gd cond. G3ZEN, QTHR. Tel 01-684 6157.

AT5, T28, 250/S, 12/MS, 12R/C cables, manuals, £32. G3CDC, QTHR Tel Nottingham 264057.

Canadian 52 rx, £7. Marconi sig gen, 20–80MHz, vry accurate, £40. Command tx, 40m, £5. Constant voltage trnsfmr, 230V, £6. Spanish guitar, £5. Many trnsfmrs, valves + junk. Sae dets, offers, etc. Hunter, Dalesview, Gebdykes, Masham, Nr Ripon, Yorks. Tel Masham 353 (evenings).

Yaesu Musen FTDX100 tx/rx, 120W p.e.p. output, perf cond with homebrew extnl vfo, transistorized for /M remote control of tx/rx inc spkr, £170 ono. G3KLF, 12 Aveland Road, Ketton, Nr Stamford, Lincs. Tel North Luffenham 241, xtn 406 (wkng hours).

Homebrew 2m gear; QQVO3/10 tx + psu in cab, £10 ono. QQVO3/20 tx + psu, £8 ono. Cascode Nuvistor cnvrtr, built-in psu, 2-4MHz, i.f., £8 ono. CR100 n/l sig strength meter, £14 ono. CT378 sig gen, exc cond, offers? Sae for full dets. G8DLT, 17 Cadnam Close, Strood, Rochester, Kent. Tel Medway 77405.

Trio JR500S, vgc, over 200 countries wrkd, £40. YD844 desk mic, as new cond, £6. G3ZAY, QTHR. Tel Orpington 23558.

Heathkit SB101 with mtchng ldspkr/ac psu, prof built in immac cond with spare valves, any trial, £150 ono. GW3KAJ, QTHR. Tel Wenvoe 454.

Pair Pye Bantams, mint cond, low band, £30. Pair transistor Rangers, one /M, one modded to mains, both on 2m, £10. Wanted: Heath HFW.1 tv wobbulator or similar Newnes tx servicing, 65p. G3SYK, 16 Stonehouse Park, Thursby, Carlisle, CA5 6NS. Tel Dalston 512.

LG50, £10. KW160, £10. G3VAH, QTHR. Tel North Shields 72379.

CR100 rx noise limiter manual re-aligned and serviced, £14 ono. G3FM, QTHR. Tel Redhill 64836.

Hammarlund HQ-129X rx, £8. Codar preselector, mains powered, £4. Joymatch aerial, £3.50. Coll or post extra. Write in first instance pse. Watson, 78 Albion Avenue, Acomb, York.

Trio TS510 + ac psu, vgc, £140 ono. GW3WXA, QTHR. Tel Llandovery 330.

Avo electronic testmeter with dc multiplier + hndbk. Table top cab, new, takes 19in panel. 200 valves, all types, offers. Also other radio parts. G3DFS, QTHR. Tel 021-354 7769.

Heathkit HW17 modded to HW17A, hardly used, £40. G8DCR, St Catherine's College, Oxford.

Austin Westminster car, 1961, with Top Band rig, towbar, new tyres, fb family car, MOT, any trial, taxed February, £160. G3MCL, QTHR. Tel 61334.

R1155A, PCR3, rxs + psus, £15 the lot or exch for hd spkrs or disco gear, may cons splitting. Buyer coll. Coast, 14 Segrave Road, Folkestone, Kent. Tel Folkestone 56489.

Sphinx tx, £50 ono. Hartley 13A scope, £15. G3UDA, QTHR. Tel Shrewsbury 51733.

DX100U + SB10, factory built, grid block keying ssb tx, £60. RA1 with ldspkr, £25. G3FLS, QTHR. Tel Loughborough 4700.

Transistor rf output stage for 2m, will give 10W rf or 7W a.m. tuned for best modulation, 12V, built on pc board, £5. Spare output device, £4. Suit modulation trnsfmr, £1. G8CHC, QTHR.

Trio JR310, mint cond, £55. Also AR22 rotator with 8 ele 2m Yagi, £15. Phone West Auckland 577 (after 7pm). G3ZMO, 115B High Etherley, Nr Bishop Auckland, Co Durham.

OAP1 wavemeter oscillator, 144–360MHz, Marconi TF909 covers, 144–146MHz, large ht psu 475V 400mA, £7.50 ea or why 70cms? G8BBO, QTHR. Tel Stevenage 55361.

Mast (2 sctn) 32ft high comp with guys + pulpit, £8.50. Also STC wavemeter comp, all coils in case with charts, £7.50. G3ZLO, QTHR. Tel Horley 3123.

Quad electrostatic spkrs, one needs attntn, £35 for pair. Also two 10W amps. G3UYT, QTHR. Tel 01-584 0187.

Two heater trnsfmrs, SX7·5V 5A ct, 2X4V 5A with high voltage insulation + normal 4V 5A winding usual primary, rugged constrctn counting feet paxoline top suit TZ40 and GU50s, weight 12lbs, £2.50 ea + carr. GM3JHL, QTHR.

Trsnfmrs Woden potted or de-luxe 1250/1000V ct 300mA, sw choke 25/5H 50/350mA. Choke 12H 350mA, 550V ct 250mA 5V 3A 6·3V ct 5A. Choke 20H 250mA, UM2, Parmeko F/shrouded 620/550V ct 200mA 375C ct 250mA 5V 3A twice, chokes potted 10H 250mA. GW3HEU, 97 Ruabon Road, Wrexham. Tel Wrexham (0978) 4507.

Vswr bridge KW 75/50Ω, £4. Low-pass fltr KW, £2.50. Wanted: KW p.e.p. power meter, Heath spkr, SB600—case only reqd. Would exch for SB101 case or sell. Powell, "Wits End," Lower Odcombe, Yeovil, Somerset. Tel 093 586 2712.

Trio 9R59DE rf i.f. agc mods as per *Radio Constructor*, £30 ono. Also preselector, £4 ono. Boorman, 23 Whitmore Road, Beckenham, Kent. BR3 3NU. Tel 650 5129 (after 6pm).

Trio TS-510 tx/rx, cw filter with PS510 + remote vfo 5D in mint cond, £170. Will del rsnble dist, dets on request. G3JBU, QTHR. Tel 0604 43020.

Exch Codar AT5 tx with psu (160–80), fb cond, for 2m a.m. tx capable of at least 20 miles radius operation, or sell, £10. Watson, 101 Birmingham Road, Lichfield, Staffs.

Codar CR70A with preselector and spkr, £20 ono. Del rsnble dist. Mitchell, 5 Hill Park Road, Gosport, Hampshire.

Boot mount Ranger with cables, controls, spare psu, partly modded for 2m, £8. Command tx, mint, £1. CT82 noise generator, £2. Pref buyer insp. G8CBE, QTHR.

CR100 comm rx with manual, in gd cond, unmodded apart from noise limiter, buyer must coll or arrange transport. Correct mains cable and connector inc, £21 ono. GM3VOX, QTHR.

Sentinel dual gate mosfet 2m cnvrtr, 4–6MHz, £8.50 ono. Rackham, 1 Rosedale Avenue, Sandal, Wakefield, Yorkshire. WF2 6EP. Tel Wakefield 50778.

Heathkit SB10, £15 ono. Wanted: 2m gear inc cnvtr, long Yagi, tx, etc. G5YV, 8 Ashfield Avenue, Morley, Leeds LS27 0QD. Tel Morley 7412.

KW2000 6146B ac psu KW Q mult, £130. Pref buyer coll or pp extra. Valves 3X811, 50p ea. New and boxed QY3-65, £2. G2COP, "Iona", Sherwood Lane, Worcester. Tel Worcester 25008.

National NC100X rx, built like a rock with xtal filter and other extras, also Codar preselector and psu, £20 ono for both. Flatman, 44 Dryden Road, Ipswich IP1 6GP.

Yaesu FRDX 400, mint cond, 3 hrs use only, 160–2m with spkr, offers + carr? Eddystone EC10 Mk 2, mint, hardly used, offers + carr? Lake, Seascape, Parkham Road, Brixham, Devon. Tel Brixham 4504.

Used Electroniques GC166T, £10. Pye Ranger, slight attntn + xtal reqd, £6. JXK mosfet 2m cnvtr, i.f. 28–30MHz, used but OK, £12 ono. Pair of xtals for RA1 fltr, £3. G3TON, 88 Upper Richmond Road W., London SW14. Tel 01-876 4965.

Marconi No 13 sig gen am/fm 20–80MHz film scale xtal check, £15. Audio sig gen 10Hz–50kHz, £10. RCA mod, pair KT66, UM1, £4. Pulse gen 33μs-33ms PW 20Hz–5kHz prf. G8AYN, 32 Iron Mill Lane, Crayford, Kent. DA1 4RR. Tel Crayford 24625.

/M whip by Tavasu Top Band through to 10, 5 coils, fits standard car aerial mounting, £8. G3RYI, 20 Vale Road, Wilmslow, Cheshire. Tel Wilmslow 24574.

Homebrew psu, variable, metered high tension, various low tension, £11, 19 Set, £3. Control box, £1. Connectors, £1.50 pair. Mic and headset, £1. Japanese hdphns, 2000Ω, 50p. Lightbody, 42 The Uplands, Harpenden, Herts. Tel Harpenden 61383.

Murphy B40 rx, £20. Marconi CR150 rx, £20. G3DCN, QTHR. Tel Hemel Hempstead 56196.

Comp stn: SB101, SB600, BC221, VTVM trap dipole, valves, comps, *Radio Communications*, books, buyer to clear everything, £200 no offers. G3MLP, QTHR. Tel 09334 2469.

Pye tv sync pulse gnrtr for 625 line system with hndbk type 2516, £10. Colour tv scan coils convergence assembly and blue lateral coils, £7. Teletype 19 set, comp, £20. Post extra. Robertson, Toll House, Wilburton Road, Stretham, Cambs.

AVO valve characteristics meter, manual, Marconi TF428B, manual, offers. Exch for teleprinter + terminal units or anything pertaining to rtty. Wanted: 125kHz bandwidth 455kHz i.f. fltr. G8DDM, QTHR. Tel Penn 4483.

Hammarlund super-pro rx, psu + hndbk, gd cond, £25. Imhof table cab also available. Pye reporter PTC116, 12V + hndbk in gd order, offers. G3DJK, 31 Croindene Road, Norbury, London, SW16. Tel 01-653 5528.

JR500SE rx no mods, £45. LG300 tx, spare 813s, circ instrctns, £15, TTC swr bridge, twin meters, £5. New labgear wide band multiplier. £3. KW lpf 50Ω SO-239 sockets Ch 1, £3. Stone, 39 Purrett Road, Plumstead. London SE18 1JR. Tel 01-854 6646.

Free wkng 25in USA tv, suit for modification for tvdx, 28V 4-way coaxial switches, 50p. Used 2BP1 crts, 20p. Buyers coll (Windsor) evenings only. G8DPH, QTHR.

Xtals: 6006·67kHz, FT243, 25p ea inc post. Fitton, 29 Okus Grove, Swindon, SN2 6QA.

G2DAF Mk 1 (modded) rx, cw, sep psu, £35. Mod trnsfmr UM3, £3. Two 14 ele Yagi, 70cm, nearly new with phasing, £6. G3FRV, QTHR.

Honda E300E p/e gene, £50. G8BBA, QTHR.

Comp stn: G2DAF Mk 2 tx with psu. G3HTA rx, mic, new commercial comps, exc cond, inside and outside, £75, or £55 tx, £25 rx. Buyer insp and coll—carr extra. G3VXV, 24 Broomground, Winsley, Nr Bradford-on-Avon, Wilts. Tel Bradford-on-Avon 2220.

Home-built cw tx, 4ft 6in rack, 10-160m, Franklin vfo, twin 807 pa, space for modulator, £20. Del possible or carr extra. Brunton 15 Darris Road, Inverness. Tel. 38232.

BC221 with charts + spare valves, £11. G3OSE, QTHR (1972 callbook). Tel Nuneaton 67992.

Sentinel 2m 14–16MHz cnvrtr. Codar PR30X preselector. KW 3 position coaxial aerial switch. Joymatch 3A aerial tuner. Jumbo Jira /P fm/am psb air band radio. All mint. Offers? Ireland, Carnhell Green, Camborne, Cornwall. Tel Praze 236.

HRO 5R psu with spkr, 7 gen cov coils and 2 bandspread, £20. Buyer coll. Anstey, 15 St John's Road, Bletchley, Bucks.

FL1000 Sommerkamp linear amp, perf cond with handbk + packing, £70. Some spare valves. G3HCU, Timbers Ridge, Franks Field, Peaslake, Nr Guildford, Surrey. Tel Dorking 730 215.

Partly built psu with oil-filled trnsfmr + meters, spkr, suit for Heathkit tx/rx, £6.50. G3UBL, 7 Beamish Drive, Bushey Heath, Herts. Tel 01-950 3443.

KW 75Ω low pass fltr for channel 1, fitted with 50239 sockets, almost new, £3. G4AEZ, 48 Morley Hill, Enfield, Middlesex.

APR4 rx, comp with three tuners, 38–1,000MHz, offers around £50. R220 two rxs in case inc extra valves, £15. Ockelford, 43 Great Lane, Bierton, Aylesbury, Bucks. Tel Aylesbury 4226 (before 6pm).

Eddystone S640 rx with handbk + spare set of valves, gd cond, £28 ono. Cunningham, "Roseburn", Station Road, Carluke, Lanarkshire. Tel Carluke 3251.

4CX250B, £4,50. Pair 2E26, 75p ea. 6146, £1 ea. HRO (rack mounting) psu coils, £10. Zenith 3000–1 + extras, £90 or exch stereo tuner/amp BC221 comp, charts, not orig, £5. G3OPF, 10 Milford Avenue, Stony Stratford, Bucks.

Heath HW32 with HP23p/p, fb cond, GH12 push-to-talk mic and manuals, £55. G3FTA 10 Old Harrow Road, St Leonards, Sussex. Tel Hastings 3828 (evenings).

Two 15ft steel poles, three 50ft steel guys, buyer coll, £9. Codar Q mult RQ 10X, £6.50 post pd. Martin, 80 Carrant Road, Tewkesbury, Glos, GL20 8AA.

SB101 with homemade solid state psu and mic, property of the late E. Dedman, G2NH. G3GHS, 164 Hook Rise, North Tolworth, Surrey. Tel 01-949 4242.

Selling cheap: base for 813. Mains trnsfmr secondary 110V ½A. 23MHz wideband i.f. strip. Wanted: chimney only for 4X150A. Coaxial c/o switch. Omega impedance noise bridge. G3KH, 133 Station Road, Cropston, Leicester, LE7 7HH.

Marconi H4000 ssb/a.m./cw tx/rx, 1·6-15MHz, 100W p.e.p. output, transistor rx, hybrid tx. comp with ac + dc psu and atu, £80 ono. G3YOM, QTHR. Titchfield 3421.

Eddystone 740 rx, £20. Brand new meter and shunt KW2000A, £2. Meters, xtals, Minimitter /M whips, toggle switches, fuse holders, trnsfmrs, blowers, books, all cheap. BC221M, metal cab, psu, charts, £20. G3IDW, QTHR.

Trio 9R59DE with manual + makers box, fitted stab valve, vgc, vry little used, £25 ono. Post extra. Hurrell, 63 Tennyson Avenue, King's Lynn, Norfolk.

HRO rx, orig handbk + 3·5–3·8 b/s coil, sold together, pp inc, £3. Darkin, 3 Adrian Close, Tagwell Road, Droitwich, Worcs. Tel Droitwich 4624.

HRO with 5 gen cov coils + national psu, modded with min valves and Collins mech filtr for ssb, tatty appearance, £25. G3TCU, QTHR. Tel 0483 65607.

KW2000A, mic and EK9X keyer, realigned July, gd cond, 2½yrs old, £145 ono. HA500, hardly used, £38. G3ZZJ, 90 Childwall Valley Road, Liverpool L16 4PF. Tel 051-722 1693.

Low-pass filtr type 12, cut off 30MHz, price £2 + 25p pp. GM3YBQ, QTHR.

KW201 with xtal calib, mint, £70 ono. G3VLX, 17 The Weald, Chislehurst, Kent. Tel 01-467 8093.

Joystick cw tuner, £5. 2m preamp, £4. HW17 modded to 17A cw dc psu, £60. Eddystone rx dipole, new, £3. All in gd cond. G3ZZS, QTHR. Tel Plymouth 31707.

Pair 4CX250Bs, as new, £6 pp. Spare set valves for G2DAF rx, mostly new, £4 pp. G3VAG, QTHR. Tel Wivenhoe 2243.

HW30 with isolating trnsfmr, 240V + xtals all zones, £20. Eddystone 840C, as new, £5. Solatron stab psu, 600V 400mA variable with 170V neg and 6/12V heaters, £7.50. G8CEW, 95 Norfolk Gardens, Littlehampton, Sussex. Tel Littlehampton 5313.

Xtal calib No 7 Mk 2, mint cond, £5. Two Mullard 3-3 amps, £5 ea Post extra. G3KEP, 30 Lyndale Road, Bingley, Yorks. Tel Bingley 3699.

WANTED

AR88LF rx, pse state cond and price. Brockie, Tobermory, Isle of Mull, Argyll.

Pair of 813 valve bases. G3EBH, QTHR. Tel Lincoln 50637.

Antique rxs, xtal sets, horn spkrs, comps, books, catalogues, mags, etc for museum—not resale. Also Hartley Turner or Voight spkr, collection arranged. G3KPO, "Alverstone", 32 Luccombe Road, Shanklin, IOW. Tel Shanklin 2586.

Cadet unit req eqpmnt inc 53 Set or any other tx, must be rsnbly cheap. Any other junk why, readily accepted, rxs etc. Can arrange coll but pref del if poss. Walker, 48 Carver Hill Road, High Wycombe, Bucks. Tel 0494 28038.

RCA AR88D or sim hf rx, pref ham bands only, up to £30 according to cond. Also 2m 6/6 skeleton-slot yagi. Baldock, 1 The Parks, Burwarton, Bridgnorth, Shropshire.

Cheap radio rx for 160 and 80m, price from £5-£10. Hart, Sandeford, 1 Glover Street, Horwich, Bolton, Lancs BL6 7DF.

Borrow or buy circ for Green & Davis linear amp PGLA1. GM3HWN, QTHR.

/M psu for HW17A pse state cond and price. G8DVC, QTHR. Tel Letchworth 4561.

Mullard high speed valve tester, test cards reqd. Manuals for same. Beamec CR tube tester + Cossor 1039 oscilloscope. GW3SWQ, Crugybar, Llanwrda, Carmarthenshire. Tel Pumpsaint 281.

Donations of back issues of *SWM* for college radio club library, surface post refunded. Price, W4DQD, Post Office Box 2067, Georgia Southern Branch, Statesboro, Georgia 30458, USA.

HP14 dc /M psu for HA14 linear in mint wkng cond, fair price, no junk. Components consd. 9G1GT, Rosaburn, Garelochhead G84 OEJ. Tel Garelochhead 225.

UM1, 2, or 3. Also driver trnsfmr. G3SCW, QTHR.

Cossor 41 STH valve or equivalent, old bright emitter valves, early type tx valve without base about ½kW. Mansell, "The Jays", Glen Road, Oadby, Leics. Tel Oadby 2531.

R1082, R1084 with coils. G2FXA, QTHR.

Pye "Bantam" or sim hi band hand-held a.m. tx/rxs, 3 urgently reqd for project, pref wkng, any rsnble cond consd. Will pay up to £30 ea. GM3OFT, QTHR. Tel 041-339 8855, xtn 7241 (daytime), or 041-956 4333 (evenings).

Vertical aerial hygain, 14AVQ or sim. G3RWF, 65 Russell Avenue, Wollaton, Notts. Tel 283270.

Heathkit RA1 am bands rx must be in gd cond. Turtle, 88 Hawton Lane, New Balderton, Newark, Notts. Tel 0636 3484.

Valves: 5678, DF60+1AD4, DF62. Cook, The Old Lodge, Seven Hills Road, Cobham, Surrey. Tel Cobham 3117.

HA14 Heathkit linear amp with or without psu. G3IKN, 14 Willow Drive, Bracknell, Berks.

KW600 or KW1000 linear. G3AAE, QTHR. Tel 01-508 3669.

Manual circ for TF888/3. G3IFV, QTHR.

Heavy duty resistance 40,000 or 30,000Ω, 85W (believed ex 1154). Urgent pse help. Wyatt, 17 Harbour View Road, Parkstone, Poole, Dorset. Tel Parkstone 2368.

High freq sig gen, 100kHz-30MHz with 1V output into 75Ω and 120dB stepped attenuator in 1 or 2dB steps. G3THY, QTHR. Tel 01-551 1467.

Diode mount for WG15 waveguide. G3RZG, 9 Connaught Road, Weymouth, Dorset. Tel 03057 5749.

Hy-gain Tribander beam. G3TQE, QTHR. Tel 021-783 6822.

Coaxial c/o switch or valve Dowkey t/r switch or circ diag or c/o relay system, suitable KW Viceroy Mk 1. GM4AGL, 103 Elm Drive, Johnstone, PA5 9PR. Tel 50 25650.

Eddystone 770R Mk 2 vhf rx, also gen cov uhf rx. GW5ZL, QTHR.

"X" band radar eqpmnt especially waveguide and associated comp, all letters answd. G3FOQ, QTHR. Tel Cambridge 870882.

Heath multi-band tx/rx, other ssb rigs consd. G3HGY, QTHR.

Can any swl/G8 help? Recently moved QTH to London and need bedsit etc+bit of sky over garden. Please write G3YDX, QTHR, or telephone 01-606 4906 during week.

Wireless World April 1970, outer pages unimportant as wanted for bound vol. G3UI, QTHR. Tel Halifax 60574.

Jan, Feb+March 1971 *Radio Communication*, will pay £1+post. Mappin, 39 Clarence Drive, Filey, East Yorkshire.

Ex RAF hf tx/rx type TR9, circ cond not important. G3TLG, QTHR.

Buy or borrow for copying mods to convert Ranger 2107V to 2m. Manual or info on GEC miniscope. G8FKZ, 51 Astor Crescent, Ludgershall, Nr Andover, Hants. Tel Ludgershall 359.

Subminiature valves—(mfg. by Marconi and Philps). Types: 5672, 5678, 1AD4, 2E32, 2E36, 2E42, CK573AX. CK6029. Will pay rsnble price+post for good units. Shrimpton, 7708 Davies Street, Burnaby 3, BC, Canada.

Sept+Oct 1970 *Radio Communications* for binder. G3SHQ, High Banks, Keymer Road, Burgess Hill, Sussex. RH15 0AH.

723A/B or sim, 3cm Klystrons, also 2 or 3 solid dish, rsnble prices pd. G8CIU. QTHR. Tel 01-304 2541.

Scope. Selling: EC10, mint, £35. G3XVH, QTHR.

Buy or borrow manual for R206 Mk 2 rx. G3ZKW, 60 Beaumont Road, Barrow-on-Soar, Leics LE12 8PJ. Tel Quorn 3181.

Worked Radio Calculations by A. T. Witts (Pitman). Spokes, 18 Woodhill Road, Northampton NN5 6SQ. Tel Northampton 53202.

Dets for building single channel radio control tx and rx + servos. Will buy or borrow. Also will cons buying built eqpmnt if cheap. Johnson, 29 Chatburn Road, Clitheroe, Lancashire B87 2AW.

Wide band couplers, 14, 21, 28MHz, Labgear or similar. G5SU, QTHR.

KW coaxial switch xtals, 3·5, 7, cw, FL8, AVD10 fltr. GM2HFV, QTHR.,

Info on HWA-17-2 fm adaptor, buy or borrow hndbk, also 8MHz or 12MHz xtals, FT243 or HC6U for all 2m bands. G3MYY, QTHR. Tel Farmland 2841.

Mains trnsfmr for DX40U cw/fone tx. GW2FBG, 125 Dunvant Road, Killay, Swansea SA2 7NN. Tel Swansea 25352.

2m eqpmnt to make comp stn +/M. G8CCS, 7A Netherhall Gardens London NW3 5RW. Tel 01-435 2902 or 01-435 2782.

Crt 2AP1, 3AP1, 913, DG7-5, E4205/C/7 or sim. G3JMR, QTHR.

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Tubes type UV201-A or C301-A (five), circa 1924, to comp my FADA Neutrodyne rx. Your price. Neale, 11 Pine Drive, Wokingham, Berks. RG11 3LD. Tel Eversley 2626.

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FT243 xtals, 8250kHz, 8375kHz, 8500kHz, 8625kHz. G3KNA, QTHR.

Borrow manual + service sheet for Philips tape recorder model 3573A/15. G3NUA, QTHR. Tel Hartlepool 5643.

FT241 xtals channel 33, 431·48kHz, buy or borrow hndbk or circ for EM1 WM1 oscilloscope. G3XZK, 1 Miserden Road, Cheltenham, Glos. GL51 6BN. Tel Cheltenham 59528.

Buy or borrow hndbk or circ diag of Panda Cub tx. G3CVX, 25 Old Fallings Lane, Wolverhampton, Staffs.

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Manual for Rees Mage marine rx ADM: Patt: 100339, year 1953 or info as to where it can be obtained. Brocklesby, 34 Littlecote, Petworth, Sussex. Tel Petworth 42630.

Aerial rotator, motor or comp system, 10 ele skybeam, dials for AR88D or lf. Perrott, 1 Melbury Grange, Mavelstone Road, Bickley, Kent. Tel 01-467 6030.

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College club stn req 2m tx with modulator, mains psu, 3-10, 3-20 or why. Must be in full wkng order. London area. G3UCL, QTHR.

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PLEASE NOTE we shall shortly be changing our business premises and our new Birmingham address will appear in next month's issue of *Radio Communication* together with full details of its location in relation to our present premises. During the transition period we regret that some delay will be inevitable in dealing with postal enquiries and orders but we shall do our best to keep this to a minimum. If any difficulties occur in contacting us by telephone during the changeover, our Southern agents, Messrs. J. H. Associates Ltd. are geared to handle all enquiries and, as previously advertised, their address is as follows: J. H. Associates Ltd., Cricketfield Lane, Bishop's Stortford, Herts. Phone: 0279 56347 (24-hour answering service). Telex: 81553.

All enquiries to our agents will be handled by Jeff Harris (G3LWM) who will give these his personal attention.

Owing to the impending move our stocks of used equipment are somewhat lower than usual and most items advertised last month have now been sold. The following top quality items are available at the time of going to press and prospective purchasers are strongly advised to telephone to reserve items of interest, in view of the demand that our advertisement usually engenders.

Please note that our existing telephone numbers will still be operative when this advertisement appears.

SOMMERKAMP FT-101 TRANSCEIVER, with FV101 remote VFO. Fitted CW filter, This is only 4 weeks old and is in perfect mint condition with no hidden snags. Genuine reason for sale by original owner... .. .. **£262.50**

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COLLINS 75S-1 RECEIVER. A most excellent specimen and unusual in that it is fitted with the Waters Rejection Filter/Q Multiplier and Waters gain controls. (Collins approved, of course). **£185.00**

SWAN 500 TRANSCEIVER. In excellent condition and fitted new finals. Complete with Shure 401A microphone **£197.50**

SWAN 380 CYGNET TRANSCEIVER. In absolutely mint condition .. **£177.50**

EDDYSTONE EA12 RECEIVERS. Several in stock in most excellent condition. From **£140.00**

YAESU MUSEN FTDX 560 TRANSCEIVER. Unmarked and mint .. **£170.00**

HALLICRAFTERS SR-500 TORNADO TRANSCEIVER. Fitted new Finals. First class in all respects **£135.00**

EDDYSTONE 840C RECEIVERS. Choice of three. Slight variation in external condition but all are first-class electrically. Prices: **£46.50; £48.50; £50.50**

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EDDYSTONE 940 RECEIVER. Another set in mint condition **£110.00**

HAMMARLUND SP600-JX RECEIVER. Fitted Johnson Xtal calibrator and complete with case (not the set advertised last month).. .. .. **£102.50**

HEATH MOHICAN RECEIVER. Less mains PSU but factory built .. **£37.50**

EDDYSTONE EC10 MKII RECEIVER. Very slight superficial marks otherwise perfect **£67.50**

SOMMERKAMP FL1000 LINEAR. Again exceptional condition **£76.50**

AR88D RECEIVER. Fitted "S" meter (not original) less case but with dust covers. Callers only **£37.50**

TRIO JR500SE RECEIVERS. Further sets now available. All with 3 months warranty, excellent externally. **£56.50**

TRIO 9R59DS RECEIVERS. 2 only, as above. **£38.50**

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SHURE 444 MICROPHONE. Excellent unmarked condition **£11.50**

DOW KEY RELAYS MODEL DK60. 220v AC 52 ohm coaxial fitting 1 Kw capacity few only. **£6.75**

AR88 Wavechange switches. Brand new and boxed **£1.25**

All items of G-WHIP, HAMGEAR & MEDCO available from stock and as previously advertised. Full details upon receipt of your S.A.E. Stop press. Owing to bulk purchase High Pass Filters FH40 now reduced to £2.10 post paid.

All items listed above are priced this month to *include* carriage which is deductible on goods collected of course.

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3·500 in HC6/U	£1·75	35·000 in HC18/U *	£1·75
5·000 in HC25/U *	£1·60	35·500 in HC18/U *	£1·75
7·000 in HC6/U	£1·50	38·666 in HC18/U *	£1·35
7·520 in HC25/U	£1.80	40·000 in HC18/U *	£1·60
7·755 in HC6/U	£1.80	42·000 in HC18/U *	£1·60
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44·7666 MHz in HC6/U for RX × 3 + 10·7 MHz = 145·000 MHz 2M Mobile **£1·80**

8·100 MHz in HC6/U for TX × 18 = 145·800 MHz for RAEN **£1·25**

45·0333 MHz in HC6/U for RX × 3 + 10·7 MHz = 145·800 MHz for RAEN **£1·80**

12·975 MHz in HC6/U for RX × 12 — 10·7 MHz = 145·000 MHz 2M Mobile **£1·60**

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12·0833 MHz in HC6/U for TX × 12 = 145·000 MHz 2M Mobile **£1·60**

8·7825 MHz in HC6/U for TX × 8 = 70·260 MHz 4M Mobile **£1·60**

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You'll find the above frequencies may be suitable for your PYE Cambridge, Ranger, Vanguard and other makes of ex-commercial R/T gear for the well-used mobile call channels. Check up with crystal multiplication data and crystal spec. in equipment manuals for suitability.

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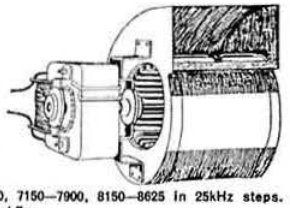

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Printed in Great Britain for the RADIO SOCIETY OF GREAT BRITAIN, 35 Doughty Street, London WCIN 2AE
by The Garden City Press Limited, Letchworth, Hertfordshire SG6 1JS.

IF UNDELIVERED Return to:— RSGB, 35 DOUGHTY ST, LONDON WC1N 2AE

IF UNDELIVERED Return to:— RSGB, 35 DOUGHTY ST LONDON WC1N 2AE