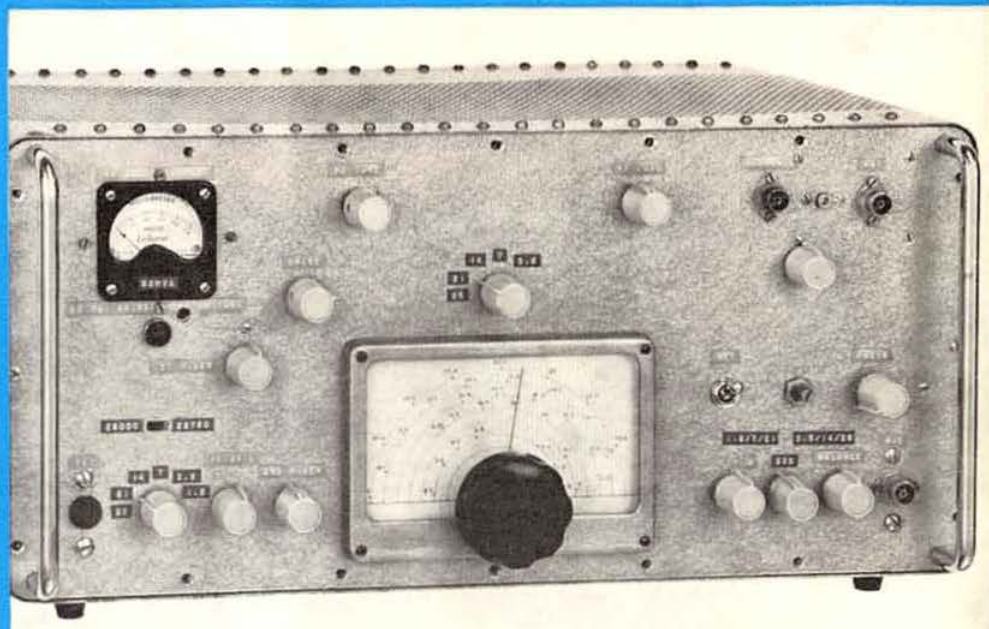
radio communication

February 1970

Journal of the Radio Society of Great Britain



D. G. PINNOCK'S TOP BAND TO TEN SSB TRANSMITTER

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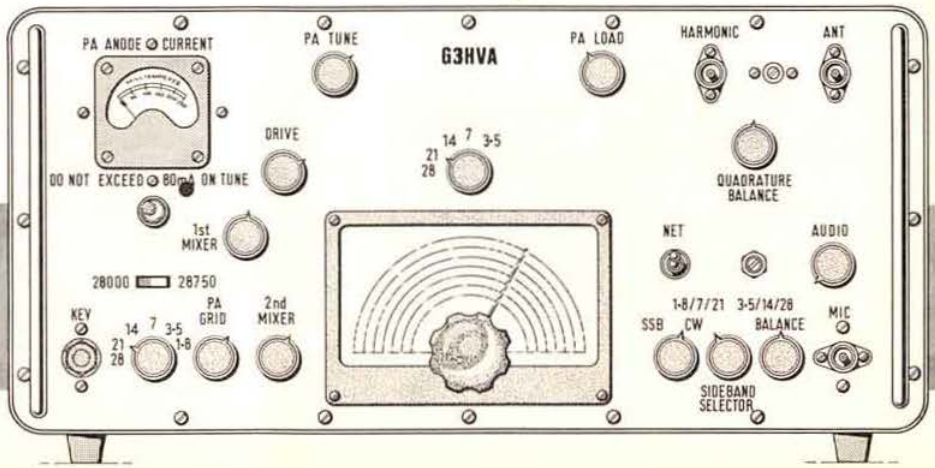

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February 1970

radio communication

Volume 46 No 2 Price 4s

CONTENTS

Radio Communication **(incorporating** *The RSGB Bulletin***) is published by The Radio Society of Great Britain as its official journal and is posted to all members of the Society on the first Tuesday of each month**

Contributions and all correspondence concerning *Radio Communication* should be addressed to: The Editor, *Radio Communication*, 35 Doughty Street, London, WC1. Tel 01-837 8688.
Closing date for contributions, unless otherwise notified: 7th of month preceding month of publication.

Advertising, other than Members' Ads, should be addressed to: Mrs P. D. Harvey, Sawell & Sons Ltd, 4 Ludgate Circus, London EC4. Tel 01-353 4353

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Wellington Street, Matlock, Derbyshire. Matlock 2817 2430 after 6 Bill G3UBO	4 Southwick Street, Southwick, Brighton. Southwick 4887 Alan G3MME	19 Ellismuir Road, Baillieston, Nr. Glasgow. No 'phone yet Sim GM3SAN

If you are thinking of dropping a line to either Alan or Sim, making tentative enquiries, technical queries, or just general dope, let me warn you that you'd be better writing directly to me, because Alan and Sim have to re-address your letter to me anyway. The reason is that they have limited office facilities, whereas at Matlock we have all office facilities centrally situated, and your letter gets an immediate answer.

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Also in the new line, take a butcher's at last month's ad. for all the bits and pieces we have lying around the joint.

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There, that should ensure some loot gets into the till this month—spend, you sinners, spend!

73 de Bill VE8DP/G3UBO

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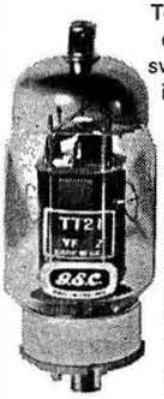

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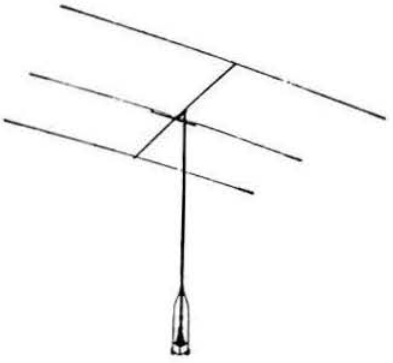

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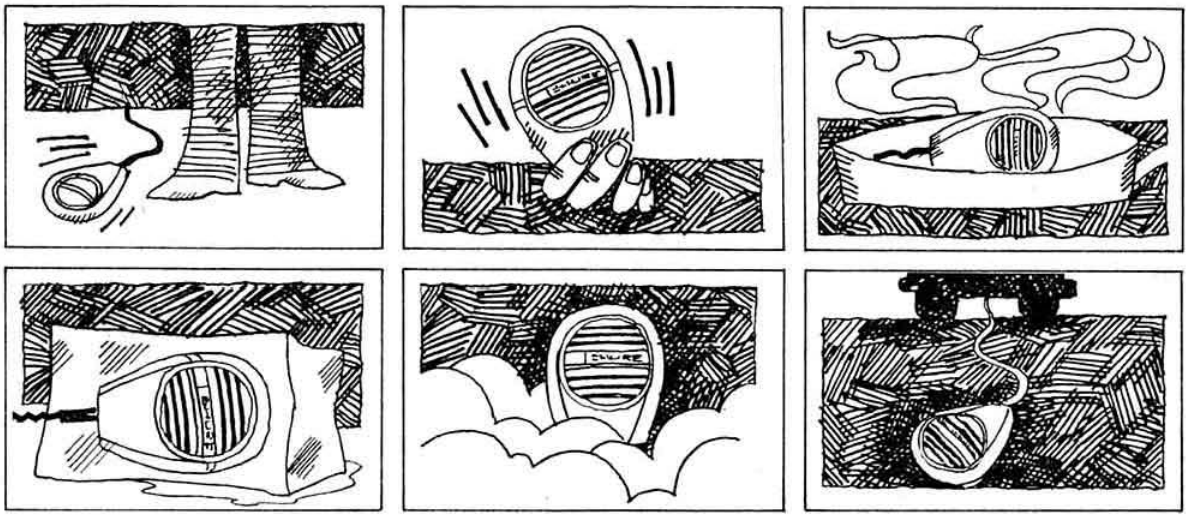

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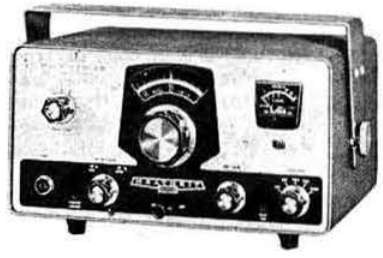

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QTC

AMATEUR RADIO NEWS

Technical Topics Mk II

LAST July the start of a new series of articles in the well-known American periodical *Radio-Electronics*, under the title Technical Topics, was noted by our own *TT* contributor. Members may be interested in the following opening paragraphs of *R-E*'s February 1970 Technical Topics by Robert F. Scott, the journal's senior technical editor:

"*Now that this column has settled down to a regular routine, let me fill you in on a little of its background and let you in on a good thing.*

"*In the April 1958 issue of* RSGB Bulletin (*now* Radio Communication), *the official publication of the Radio Society of Great Britain (the British counterpart of our ARRL), Pat Hawker, G3VA, introduced Technical Topics as a regular column. It was to be—and still is—devoted to a survey of amateur radio developments and developments in electronics of particular interest to the radio amateur. . . . .*

"*I have been a constant reader of Pat's Technical Topics and many of its items have been clipped and filed in my engineering notebook. When we decided that there was a place in* Radio-Electronics *for a similar column . . . we decided that it, too, should be called Technical Topics. First, because there is hardly a more fitting title, and secondly, perhaps as a tribute to Pat Hawker and the RSGB for their continuing contributions to amateur radio and communications.*

If you find this column useful or interesting, you will surely value a copy of RSGB's Amateur Radio Techniques. *It is 154 pages of the best selections from Technical Topics from 1958 to 1968. You can order a copy from Comtec, Box 592, Amherst, New Hampshire 03031, $2.50 postpaid.*"

The Society and G3VA gratefully acknowledge this unsolicited testimonial —one of a number which have recently helped to increase the sales of RSGB publications overseas.

Canadian QC's visit

Mr J. M. Chapman, QC, of 700 Somerset Bldg, 294 Portage Avenue, Winnipeg 1, Canada, a member of RSGB, will be visiting London between 6 and 20 March, and hopes to meet other lawyers who are also amateurs.

Non-delivery of *Radio Communication*

We frequently receive complaints of non-delivery of *Radio Communication* at an early date in the month. In many cases members fail to take account of delays in transmission by second-class mail. To avoid unnecessary correspondence, and help keep down administrative work at headquarters, UK members are kindly asked not to request replacement copies until ten days after the posting date.

All copies of *Radio Communication* are scheduled to be posted by our printers on the first Tuesday in each month. They make every effort to keep to this date, but occasional delays are inevitable.

Following posting, there really is *nothing* we can do; your only remedy is to complain to your local head postmaster.

Area representative, Shrewsbury and District Group—RSGB

The Council has accepted the nomination of Mr K. A. Linney, G3UDA, for the above-mentioned office for the period 1969–71, inclusive.

Plessey integrated circuits

The price of the SL621C integrated agc circuit used by G3PDM and mentioned in his article in *Radio Communication* is now £1 16s 3d, in small quantities. This is a very considerable reduction from the price given in the article which was correct at the time the manuscript was prepared. The Plessey Company mention that the rest of the SL600 family of integrated rf and if amplifiers and balanced modulators have similarly low prices. The address of the Plessey Microelectronics Group is Cheney Manor, Swindon, Wiltshire.

Reciprocal licensing

On 11 December 1969 the reciprocal amateur licensing arrangement which exists between the United Kingdom of Great Britain and Northern Ireland and the United States of America, was extended to include overseas territories (except the Associated States of St Christopher—Nevis—Anguilla).

Affiliated societies

The following societies are now affiliated to the RSGB:

Tonbridge School Amateur Radio Society. Secretary: C. B. Giles.

IBM Laboratories Amateur Radio Club. Secretary: J. L. Dale, G2DSY.

Solihull Amateur Radio Society. Secretary: H. D. L. Clark, G3YOY.

Can you help?

H. R. Sedge, BRS191, of 62 Guernsey Gardens, Wickford, Essex, requires the circuit diagram for the Hambander receiver. Expenses will be refunded.

Bryan Shaw, G3CRJ, is trying to trace Robert Rutherford, a war-time friend who was an RSGB BRS member. If you can help, please contact G3CRJ, The Green, Stabely, Kendal, Westmorland.

M. R. Giddings, G3XLB, of 6 Midlothian Drive, Blundellsands, Liverpool L23 3AL, wishes to contact anyone who has utilized the Gonset G76 transceiver for mobile use.

H. Vegter, PA0KPO, wishes to obtain circuits and information on the miniature oscilloscope type CT52. His address is Coppelstockstraat 16, Brielle, The Netherlands.

"Audio-Tronics 1970"

The third edition of Lasky's Radio catalogue, *Audio-Tronics* 1970, is now being distributed free of charge to Lasky's Radio customers. The print order for this edition, which features full colour illustration for the first time, was 250,000—ten times that of the first edition two years ago.

This 28-page tabloid format catalogue of electronic equipment can be obtained by post from 3/15 Cavell St. London E1, on receipt of 2s 0d to cover postage and inclusion on the customers' mailing list after which further editions will be forwarded automatically.

Silent keys

It is with regret that we record the deaths of the following radio amateurs:

L. G. Thompson, G2CBS, of Ashover, Chesterfield, Derbyshire.

E. Batty, G3DGB, of 29 Woodhall Road, Thornbury, Bradford 3.

YOUR OPINION

The Editor
Radio Communication

Sir,—In view of the recent lifting of restrictions on the use of 4 metres by RAEN and the comment in the October "Four metres and down" about "congregating towards the top end of the allocation" I would like to state the considered view of members of the Manchester RAEN Group.

This is that RAEN should continue to operate around 70·375MHz. There are many reasons for this.

1. Most groups are crystalled up for this frequency.
2. It is more desirable to be able to operate with neighbouring groups than to avoid interfering with them.
3. All amateurs would know of RAEN operation on this frequency and, as now, be helpful in keeping the channel clear.

It is also considered that the same principle of agreeing a RAEN channel for 2 metres is highly desirable before too many groups crystalize at random. If national agreement cannot be reached, this group intends to select a channel deliberately outside the bandplan frequency allocation for the north-west in order to avoid interference from high-power local stations.

The group would, however, much prefer a nationally agreed channel.

Yours faithfully,
I. D. MacArthur, G3NUQ

Mr MacArthur's letter was referred to the chairman of the RAEN Committee, who replied as follows:

Sir,—A questionnaire has recently been circulated by the RAEN Committee to all controllers to establish group channels on both 2 and 4 metres, to be followed subsequently by negotiation to establish a nationally agreed 2 metre channel and the setting up of a "group channel register".

It is not the intention of the RAEN Committee to recommend wholesale frequency changes with the inevitable high cost in the purchasing of new crystals, and disturbance of established group arrangements.

Whilst agreeing that the ability for intergroup working is often highly desirable, it may be prudent for newly formed groups to consider the establishment of their group channel towards the "top end of the band" to avoid interference from "local high power 4 metre stations".

Yours faithfully,
P. Balestrini, G3BPT
Chairman, RAEN Committee.

The Editor
Radio Communication

Sir,—Following your article in "Technical Topics" (December 1969 issue) on the G3PDM High Stability FET Vackar, we have received several enquiries concerning the OXLEY Tempatrimmer used for temperature compensation in this circuit.

This component is normally only available direct from ourselves, but to assist interested amateur constructors we are only too willing to supply these on a one off basis, waiving our normal small order charge.

The Tempatrimmer specified has a characteristic of adjustable temperature coefficient of plus 2,000 to minus 2,000 p.p.m./°C over a temperature range from —40°C to +100°C, the normal capacitance at room temperature being 6·5pF. The cost of this component is £2 16s 9d each.

We also produce a second device, the Thermo Trimmer with similar characteristics, but a more restricted temperature range. This has a nominal capacitance of 2·5pF, with a temperature coefficient continuously adjustable from +1,000 to —1,000 p.p.m./°C over a range of 20°C to 80°C, which should be adequate for most amateur applications.

The price of this Thermo Trimmer is 14s 2d each. It should be emphasized, of course, that while these will correct for normal temperature variations it is essential to follow all the other precautions referred to by Mr Martin in his article to ensure the highest stability.

Yours faithfully,
Alan Hall, G3UWA
Oxley Developments Co. Ltd.

The Editor
Radio Communication

Sir,—More than 200 years ago a bishop wrote: "Moderation is the silken string running through the pearl-chain of all virtues."

How pleasant life would be if this worthy cleric's concept were to be accepted and applied! It seems that as our civilization becomes more permissive, so it becomes more extrovert. Drivers pile up their vehicles in tens at a time, given a modest degree of fog on motorways; students rampage and wreck the colleges where they aspire to high qualification for their future careers; and the limited hf spectrum allowed us by God or nature is blocked and frustrated by megawatts of unlistened-to propaganda and its attendant jammers.

Not to be out-done, international amateur radio puts on a contest every weekend, filling the dx bands with a cacophony of pushing, ill-mannered, brash, often misadjusted transmissions, turning what used to be a quiet, friendly, and somewhat introverted hobby into a tumultuous, roaring rat race.

Today I heard an Hungarian amateur calling "CQ Contest" phoneticising his call letters as "Horrible America Five". Sitting right on top of him in fraternal frenzy was a spurious emission from a jammer which announced itself in Morse code at regular intervals as "B One". Why do jammers have callsigns? Could it be that they also run contests to discover who can produce the most inhibiting chaos in the hf spectrum?

In all seriousness, can we not exercise a little moderation in this international contest habit and leave occasional weekends clear for ordinary, non-extrovert amateurs to have the odd rag-chew with their opposite numbers on the other sides of the world?

Yours faithfully,
N. H. Sedgwick, G8WV

The President
RSGB

Sir,—You have my very best wishes. Your contribution to the December issue of the Monthly *Bulletin* came like a breath of real fresh air. Your awareness of the true situation is apparent and will be more than welcomed by all True Radio Amateurs. There are indeed others who will "suggest" that there is nothing "Wrong" within but it is they and they alone whose business it is to convince us that everything is quite "Normal". Today in this world of ours there are many who would seek to reduce and this is indeed apparent outside the Amateur Radio Context. But Amateur Radio itself is not allowed to escape. There are many within who are not of us but are among us. This indeed is the only way in which they can influence its direction.

As a sincere Member you ask for increased membership. I suggest that your contributions this month and others which I hope you will produce, and be allowed to use, in other Monthly issues will do more to promote increased interest and thereby increased membership.

The Regular Monthly issues are strangely "Negative" and show no awareness of the true position as felt by many members. It is the Duty of the RSGB to reflect Truly the opinions of its Members and yet, to judge by the non printing of Members letters no opinions in print are permitted. Opinions of members, of True Members, are of paramount importance. There should be someone relegated to Public Relations with *Members* not only to "outside Bodies".

Continued "Technical" contributions every month are themselves not just enough, unless Members can identify the RSGB as standing for the True Radio Amateur, and, being itself belonging to us, and truly aware of conditions that exist within and which many experience unless they can Identify with us then they, and us, the members are alone.

Yours sincerely,
J. J. Loudon, G3SWR

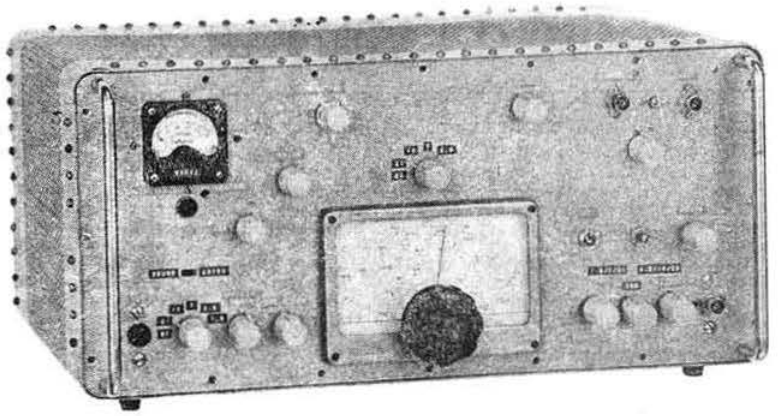
The Editor
Radio Communication

Sir,—I should like to make it known through the medium of *Radio Communication* that I regret very much any delays that occurred in delivery of EMSAC equipment over the Christmas period. When I write "immediate delivery" in the Company's advertisements, this is always true at the time of writing. However, my experience shows that the readers see this advertisement some five weeks later, and in some cases anything up to three months later it is still being read. By this time the stock position may have changed considerably. Over Christmas we had some holidays and the 'flu bug to contend with. At the time of writing, 11 January 1970, one order is outstanding from last year and we are catching up fast.

I must say how pleased I am with the results of the EMSAC advertisement in *Radio Communication*; the results reached a peak in January and we sold some 2½ times above our estimate of the 2 metre converters.

Yours sincerely,
M. Crowther-Watson, G3IAR

Where TVI is a problem



build this top band to ten ssb transmitter

(Part 2)

by D. G. Pinnock, G3HVA*

TVI—general considerations

As stated earlier, the transmitter was constructed with a prime consideration in mind—to enable the operator to use phone or cw on any band at any time. It is the writer's contention that most amateur transmitters, whether commercially or home built, are out of action during television hours. In fact, after many hours of lecturing on the subject of tvi in the London area, and discussing dozens of cases, he has rarely met anyone who is really clear of the harmonic plague. One wonders what the owners of Rolls-Royces would do if they were obliged to garage their vehicles for the greater part of the day.

To get down to the basic problem, it is one of screening—not pieces of aluminium and copper foil hung together, but genuine solid screening. To obtain some idea of what was necessary, a thorough inspection was made of a signal generator, an instrument where screening is of prime importance. This comprises physically:

1. A power input socket.
2. An rf output socket.
3. A thoroughly rf-tight enclosure.

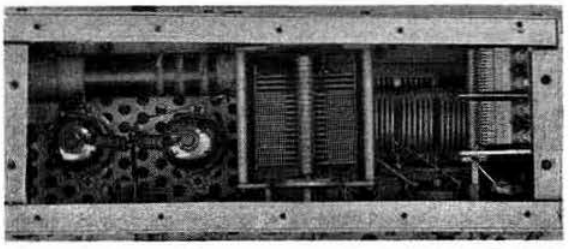
Items one and two obviously present no difficulties, but it takes little imagination to realize that item three causes the great majority of amateurs to be QRT on the hf bands during television hours.

Oh yes, many of them have low-pass filters; some have even taken the trouble to ensure a low swr for the filter by installing an atu, but inevitably their work is in vain. The harmonic gremlins know nothing of man's passionate desire to communicate, and fairly rush out of the many holes provided, thence up to the aerial by way of the outside of the filter. In a nutshell—tvi

Now, back to our signal generator. Why cannot we just take a similar completely solid box and proceed to build our transmitter? It is a question of power. The average signal generator does not produce a great deal of power, and heat is no problem. An amateur transmitter running several hundred watts is another matter, and a solid cabinet is not the answer.

The solution is a perforated case. Harmonics, given a chance, will escape through slots, gaps, hinges and any large

* 14 Mornington Close, Baughurst, Nr Basingstoke, Hants. (New QTH)



Power amplifier with cover removed—The pi-net choke is lower than photograph suggests

Table 2—Crystals for band selection

Band	Crystal frequency	ECF80 anode frequency
160m	6,075kHz	6,075kHz
80m	—	—
40m	11,272kHz	11,272kHz
20m	18,006kHz	18,006kHz
15m	17,200kHz	17,200kHz
10m(a)	32,222kHz	32,222kHz
10m(b)	32,983kHz	32,983kHz

NB. All crystals are surplus, and frequencies are flexible, except 10m ones, (unless full spread is not required on this band). If alternative crystals are used, it is better to avoid frequencies which bring dial readings into line with the 3,500 to 3,800kHz segment. This avoids two-signal operation involving harmonics of the first i.f.

holes, but not through small holes. By "small" we mean of less than 3BA diameter.

Therefore, if we use a case which is completely perforated except for the front panel, we fulfill our two requirements, which are:

1. Heat can escape easily in all directions, ie ventilation is at a maximum.
2. Harmonics are contained because they can escape neither through the solid front panel nor through the 3BA perforations.

This is, by and large, the prime consideration when selecting a cabinet, and in the writer's case prompted an immediate search through the British market for something suitable.

Transmitter cabinet

In addition to the two points outlined above, other considerations have to be made. These are:

1. No lift-up lids or hinges.
2. No slots or cracks.
3. No vents, which are really slots.
4. All joints to be welded, or bolted to a maximum of 1½in between bolts.
5. No paint between joints.
6. No holes larger than 3BA in diameter.

Additionally a ½in flange just inside the front aperture is needed for bolting the front panel to. This flange must go right round the cabinet without a gap and needs to be unpainted to make perfect electrical contact with the aluminium front panel.

The author had visions of extremely expensive cabinets, and several quotations caused a sterba curtain to fall before his eyes. Eventually, however, a vented cabinet 19in by 8⅜in by 10in deep manufactured by Philpots Metalworks of Loughborough caught his attention. The basic price of this unit was 72s, but it was not of completely perforated construction. However, Philpots supplied one modified for a very nominal additional charge and work at G3HVA began.

The golden rule from the start was—no large holes. Naturally, a few exceptions had to be made, the notable ones being the dial aperture, the meter cut-out and the rear power sockets.

The dial chosen was the Eddystone type 598 because only one circular hole was required to take the associated epicyclic drive, and the latter could be tightly fitted to such an extent that no hole resulted at all.

The power and control socket holes at the rear of the cabinet were three in number, and all were placed in close proximity. They were:

1. Octal power supply socket.
2. 750V ht socket.
3. 2-pin miniature muting socket.

Since the transmitter chassis fitted tightly against the rear wall of the cabinet, an absolute necessity, the three socket holes are not really into the cabinet itself, but into the chassis, or more precisely, into the power filter box.

The hole which was impossible to avoid was that cut out for the pa current meter. To overcome what would inevitably be a high harmonic leakage point, a neat 18 gauge aluminium box was constructed with flanges which were bolted tightly to the rear of the front panel. The meter was thus well enclosed and the ht leads passing in and out of the enclosure were by-passed at the points of entry by 1000pF disc ceramic capacitors to chassis. These were of 4kV working voltage.

Smaller holes to be cut were those for control fittings, coaxial sockets and a jack socket for the bug key. It was soon realized that a protruding control spindle became an excellent harmonic radiator, even if earthed perfectly behind the control panel. Fig 8 refers. Thus all spindles were passed through brass bushes tightly fitted to the panel. This is an important point and can make all the difference between operate and QRT.

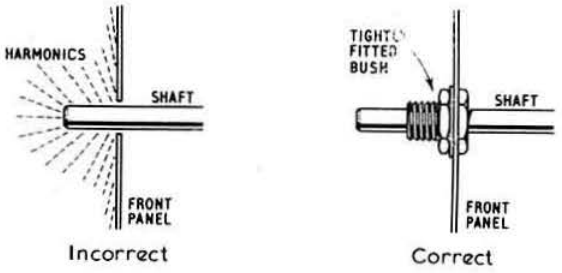


Fig 8. Front panel control mounting

Coaxial sockets tend to be "hot" as far as rf is concerned, and great care was taken to scrape the paint from the front panel before mounting to ensure perfect contact. The sockets were also bent slightly at the flanges, as shown in Fig 9, so that, on tightening up the fixing screws, the socket would be forced tightly against the panel.

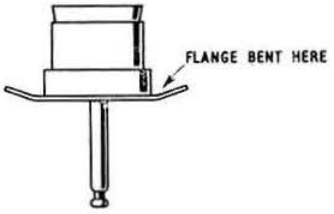


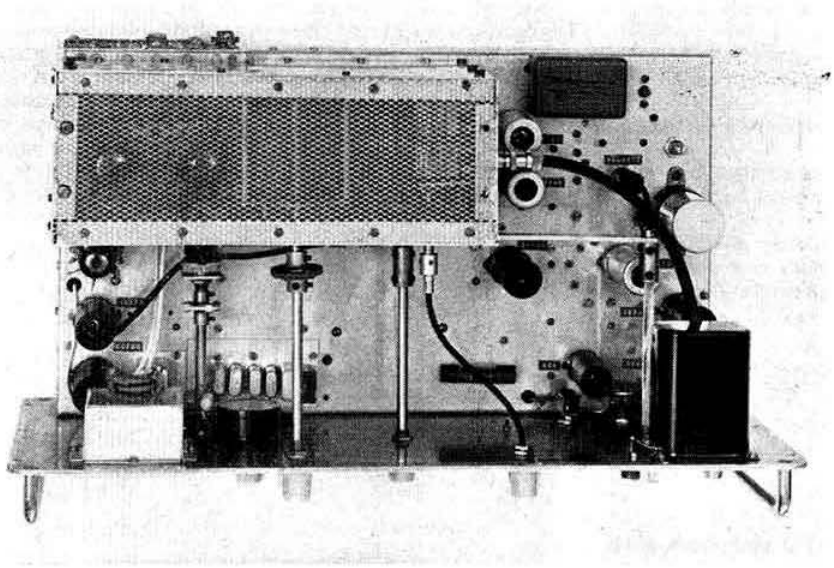
Fig 9. Method of mounting Belling-Lee sockets

Finally, although the cabinet welding was of a good quality, 132 nuts and bolts of 4BA size were fitted to avoid possible leakage.

Internal design

The aforementioned points took care of the outer casing, but what of the interior? Firstly, it was proved necessary to double-screen the pa, or in other words to build a separate pa compartment inside the main cabinet. Mention has already been made of this in the section relating to the pa.

It was found that, using powers up to 30W or so, it was possible to contain harmonics with the outer case alone. At greater power inputs, however, it was noted that the extremely concentrated harmonics content at or around the pa anode circuit could, by electro-magnetic radiation, force its way through the perforated casing directly above the pa



Top chassis view showing tvi precautions in detail, ie pa double screen, meter enclosure, control spindle bushes, and copper box containing harmonic trap

compartment and undo all the good work already carried out.

A perforated box made of old pieces of TU5 unit casing and ½in aluminium angle was therefore built around the pa. The problem was immediately cleared.

It must be stressed at this point that this inner pa compartment does not have to be tvi proof, but is merely a good shield for preventing strong rf radiation on to the outer case. If it is made tvi proof, so much the better. No shield is needed underneath the pa grid compartment.

What of the pa circuit itself? Provided that this stage is adequately neutralized, the following are the points to watch where tvi is concerned:

1. The pi-net choke must be checked with a gdo while in circuit, to ensure that no series resonance occurs at the tv frequency. This can happen due to an unfortunate value of inductance being in series with the anode—cathode capacitance of the 5B/254M valves. This is a very important point. A choke of very well-known make exhibited a beautiful resonance at 43MHz, and for a time G3HVA was in direct competition with Crystal Palace.
2. Earth returns must be carefully made. By all means tie disc-ceramic by-pass capacitors direct to cathode and earth well to the chassis at one point. The same can be said of the 470pF grid series capacitor and the 250pF anode tuning capacitor. In all cases use the shortest possible length of coaxial type braiding to ensure a good return.

   However, do not repeat the operation with the loading capacitor. Its frame should be securely bonded to earth at the aerial outlet socket. Tests have been made on a variety of transmitters and in all cases attention to this point has resulted in a reduction in harmonic output.
3. The pi-net layout should follow standard filter layout as already discussed in the section dealing with the pa.

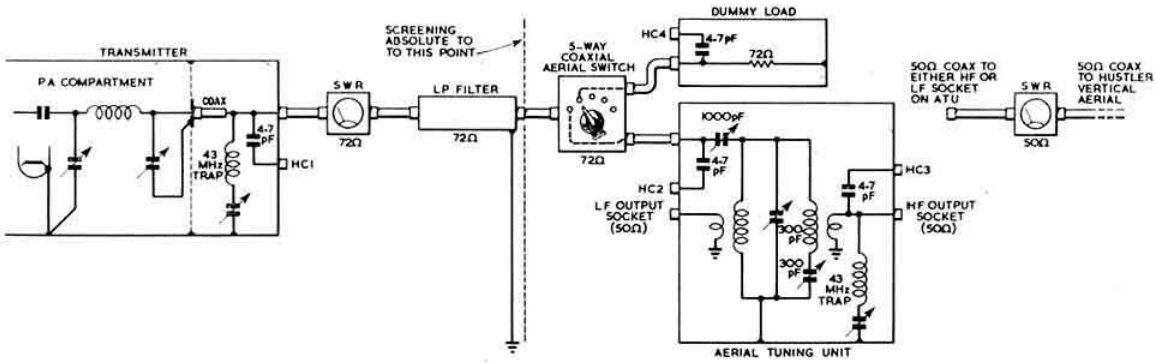


Fig 10. Station layout showing harmonic check-points

The circuit can then act rather more as a harmonic filter.

Harmonic attenuators

Great thought has been given to this subject and it appears that in the average station three main attenuators can be installed. These are:

1. A reject trap at the aerial output socket. This can take the form of either a series tuned resonant circuit at the television frequency or a coaxial stub. The writer has tried both, and finds the former far more satisfactory, especially as it can be adjusted from the front panel.
2. A low-pass filter between transmitter and atu.
3. A further trap at the output of the atu, again a series-tuned circuit.

The general scheme is shown in Fig 10. Points HC1, 2 and 3 are the check points and simply consist of coaxial output sockets connected in parallel, via a 4·7pF ceramic capacitor, with the transmitter output and with the atu input and output sockets. Thus, constant monitoring of harmonic level can be made. A further check point, HC4, is available at the 75Ω 150W dummy load.

The actual monitor in use at the G3HVA shack is a modified version of the harmonic indicator originally described in the *RSGB Bulletin** by G6LL. This uses two EF91 valves as straight amplifiers over the frequency range 35 to 50MHz, and a 50μA meter for showing harmonic level. Three sensitivity ranges, X1, X5 and X25, allow full scale readings of 50μA, 125μA and 1250μA, respectively.

Before putting the monitor into commission in the shack, it was considered expedient to take field strength readings of BBC1 television transmissions, vision and sound, although it must be stressed that these can only be used for interest purposes.

Two tv installations are available at the writer's QTH and, by plugging the tv aerial downleads directly into the monitor, the following readings were obtained:

1. House aerial—an "H" version erected in the loft at a height of 28ft above ground—45MHz vision : 100μA; 41·5MHz sound : 21μA.
2. Shack aerial—a dipole erected on the garage at a height of only 8ft above ground—45MHz vision : 17μA; 41·5MHz sound : 5μA. Readings obtained with the harmonic indicator plugged into check point HC1 were as shown in Table 3.

Table 3

Band	With trap detuned for maximum harmonic	With trap tuned for maximum attenuation
28MHz	50μA	0·5μA
21MHz	825μA	50μA*
14MHz	450μA	2μA*
7MHz	10μA	trace
3·5MHz	trace	trace

*A greater reading will be obtained if the loading capacitor is unmeshed too far.

*Also *Amateur Radio Circuits Book* (first edition), page 81.

It must be remembered that the harmonic reduction brought about by resonating the reject circuit, as shown in the first column, is not the result of a simple downward dip. In fact, on 14 and 21MHz the level of harmonic content is such that a sight detuning of the trimmer capacitor can cause a wild upsurge of harmonic level. The figures in the first column represent the worst level obtainable. A graph of harmonic amplitude versus frequency would appear as in Fig 11.

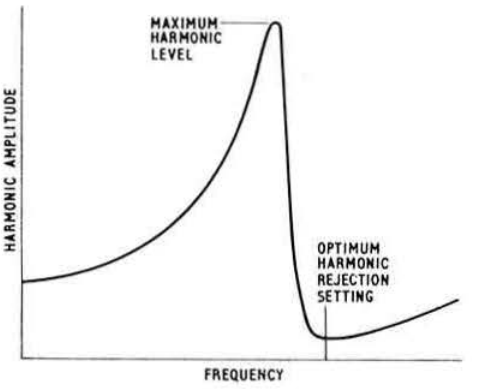


Fig 11. Graph showing relationship of harmonic amplitude to frequency as capacitor of harmonic trap is tuned

Power supply filter (Fig 12)

In the section dealing with the transmitter cabinet, it was mentioned that the three rear power sockets could not be considered as holes into the transmitter casing, but rather as openings into a filter box. This is precisely the case, since a small 18 gauge aluminium box is built at the rear of the pa grid compartment to take all incoming leads. Fig 13 shows the mechanical layout, and stresses the need for a tight fit between chassis and rear wall.

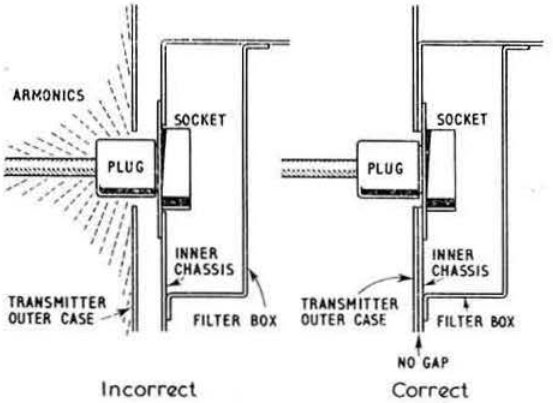


Fig 13. Method of mounting power sockets

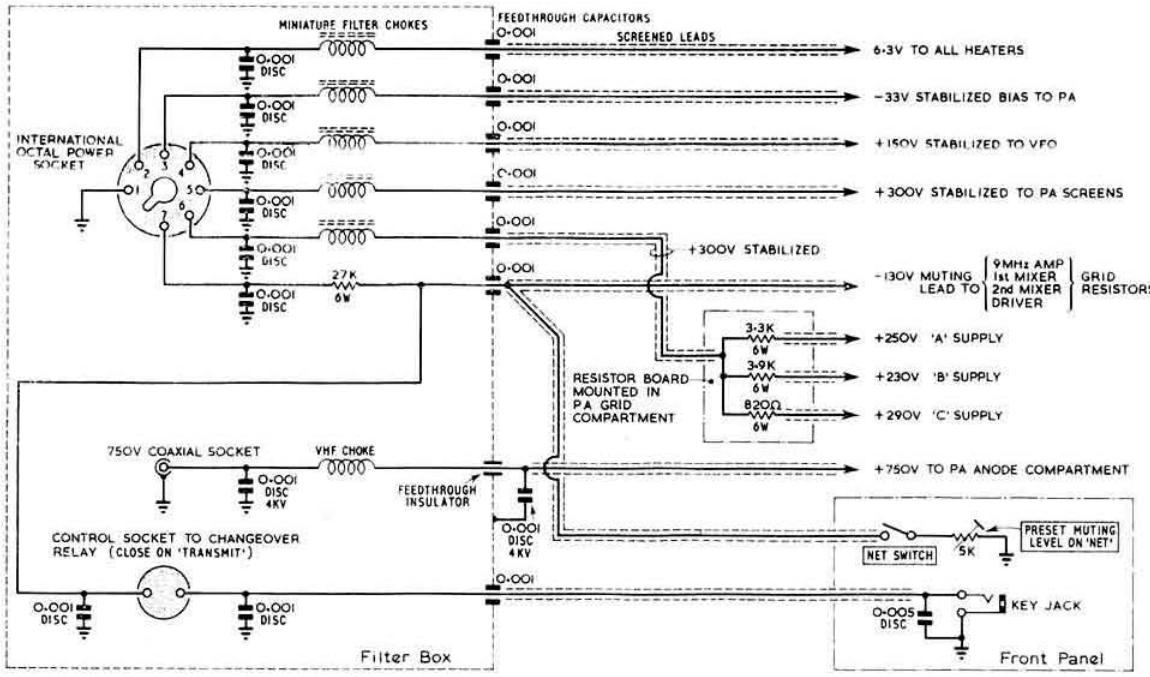


Fig 12. Power supply filter and control circuitry

The 160m low-level output does not need any special filtering and is merely fitted at the rear of the pa compartment. It is better that no cable be connected to it externally, except when operation on top band is required. This precaution will preclude the possibility of harmonics using this socket as an escape route.

Station layout

At this point it is valid to stress the importance of a rigid mechanical layout in so far as the cables and units of Fig 10 are concerned. Both the swr meter and low-pass filter are securely bolted onto a shelf just above the transmitter. This avoids movements which inevitably cause bad cable joints and harmonic leakage. The cables themselves are of the best quality, and it is of great importance that the plugs be attached very carefully to ensure perfect continuity of screening. After the low-pass filter, screening is of much less importance and it is not an uncommon occurrence to see the writer's atu out of its case during 21MHz operation.

The greatest problem in overcoming tvi is knowing where to start. The foregoing suggestions, if adhered to closely, will ensure that the transmitter itself is clean, but any attempts to ignore the screening procedure, even in part, will lead to yet another station being QRT. The old cry, "But I was clear yesterday and now look what's happened . . . . ." will once more be heard at the local club.

Assuming that one does go the whole hog and completely screens the rig—what are the possible difficulties? The answer to this question is that there are not likely to be any real problems, providing the following points are understood:

1. The harmonic indicator, whether it be the one described or a tv receiver, must be operated in conjunction with a high pass filter. Otherwise completely misleading results will occur due to fundamental blocking.
2. The old adage: "If one is clear using a dummy load, then the transmitter must be clear," is absolute rubbish. More stations are QRT through taking this point literally than from any other factor—apart, possibly, from lack of screening. The dummy load is merely for pumping power into while the transmitter case is sanitized. It does not follow that, because a tv receiver operates happily in the same room as a transmitter on dummy load, all is well. After all, harmonics are no different from fundamental signals in that they require an aerial to make themselves felt.
3. Commercial low-pass filters are fine. If they do not appear to work, fumbling fingers and a screwdriver are not going to help matters. Your rig probably needs attention to one of the above-mentioned points.
4. The total length of coaxial cable from the pa to the low-pass filter should not be an exact multiple of $\frac{1}{4}\lambda$ at the television frequency. It is best to avoid trouble. The shortest length is the best.
5. Do not try anything without an atu. It may appear expedient to run a random length of 50Ω or 75Ω feeder straight to the pa, but the low-pass filter will not

appreciate it at all. Besides, the atu gives added attenuation at the tv frequency, and ensures a 1:1 swr for optimum filter performance.

6. It is preferable to position your swr meter between the transmitter and low-pass filter. On the other side of the filter its diodes could cause trouble by generating harmonics.
7. Aerial tuning units must be solidly constructed, with rigid wiring and components well grounded where necessary. Capacitors must have adequate spacing for the rf voltages employed.
8. It is advisable to make a good earth connection to the low-pass filter; the shorter the better and preferably of good copper braiding. Earthing at this point will make no amends for poor quality screening at the transmitter.

Aerial considerations

Extensive tests over a period of years have convinced the author that no aerial is better than another in so far as tvi reduction is concerned. Of course, there is rather more danger when using a vertical aerial, but this is mostly due to vertical polarization of the fundamental signal, which causes considerably more shock excitation of nearby television receiving installations than a horizontal one. What is of prime importance for achieving harmonic reduction is the method of feeding the aerial.

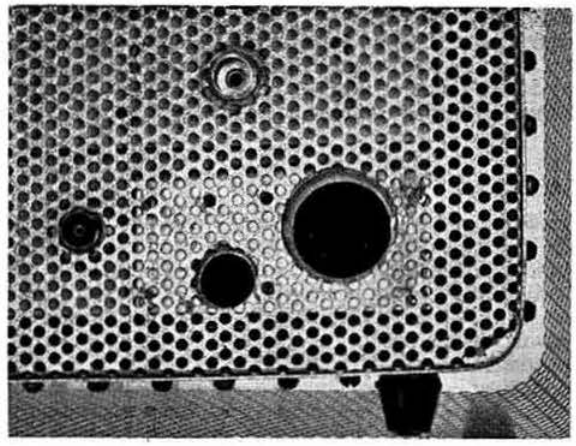
It has been found necessary to avoid any form of matching that involves a wide range of impedance. Thus, any form of feedline having an impedance greater than 75Ω is to be discouraged, including, of course, end-fed aerials in this context. The writer realizes that certain readers may have come to other conclusions. and stresses that his opinions are based on experience gained at three fringe-area QTHs over a period of 17 years. It could be that other QTHs will allow greater flexibility.

The aerials which have been tried and accepted at G3HVA include the G5RV, various dipoles and a Hustler multiband trap vertical. In each case the impedance transfer at the atu has been 75—75Ω or 75—50Ω. No problems have been encountered using these aerials. Tests have been made using high impedance zepp type feeders, and also using an off-centre-fed aerial with 300Ω ribbon feeder. Results were disastrous, in spite of drastic modifications to the atu to enable it to cope with the higher output impedances.

Aerial height is another important factor when dealing with tvi. It must be fairly obvious that the higher the aerial the greater will be its distance from nearby television installations. Any residual harmonic QRM or shock excitation effects will, therefore, be less. Again, since radio waves generally travel upwards, even if at a very low angle (from a vertical, for example), they will tend to clear the tv aerials, and much annoyance to neighbours will be avoided.

These points have been well proved by adjusting the height of the Hustler vertical. At ground level, operation on 21MHz caused severe flashing on BBC1. The same applied at base heights of 10, 15 and 20 feet, but reducing. Complete clearance began at 22ft, and after some deliberation the final base height was set at 28ft. The height of dipoles and a G5RV at previous QTHs has never been less than 45ft.

The message seems to be that the operator who aims to put a good signal into the Antipodes can expect to put less rf into his neighbour's tv installation.



A corner of the perforated back panel showing the absolutely rf-tight sockets

The orientation of an aerial can make a big difference to local tv sets. It is rare to find trouble from the man whose tv is off the end of a dipole (spaced at a reasonable distance, of course) but it is a different matter for the chap who is broadside on. Fixed installations should, therefore, be sited with care,while the guy with the beam can just swing it round at the critical hours. If a fairly long wire is used, then, naturally, the harmonics in particular will tend to radiate off the ends.

After years of trial and error, one certain fact has emerged regarding aerials and tvi. It is far, far easier to eliminate the second harmonic than the third. This may surprise many operators. Having tried their luck on 14MHz and found an almost insurmountable problem on that band, the mere thought of switching the rig to 21MHz gave them the shivers as they imagined themselves confronted by dozens of irate viewers. The fact remains, however, that, with a properly screened and filtered transmitter, no problems should be encountered on this band in the Channel 1 television area. The same applies, of course, to 28MHz transmitters located in the Channel 3 area.

G3HVA has spent many pleasant hours, afternoons and evenings, working dx on 21MHz, and he has recently been joined by G3HEO, of Luton, who has a slightly modified SB101 transceiver. Don, incidentally, uses a $\frac{1}{2}\lambda$ dipole fed with 72Ω twin feeder, and the author a Hustler ground plane at present, fed with 50Ω coax.

Why is it so much easier to obtain clearance on 21MHz? After all, the harmonic level at the transmitter output socket certainly favours 14MHz. The answer appears to be found in the fundamental aerial property whereby a centre-fed dipole will radiate both fundamental and third harmonic, but presents a complete mismatch to the second harmonic. We are all aware of the way a 7MHz dipole may be used for 21MHz operation. This same property, unfortunately, prevails at all frequencies, and a 14MHz dipole will radiate efficiently at 42MHz; a 21MHz dipole at 63 MHz, and so on.

It can be seen, therefore, that the bogey in the London area is the 14MHz band. Due to the level of attenuation achieved, cw operation presents no problems at G3HVA,

and the full 150W cw may be run up to 14,100kHz. With slightly reduced power, phone can be used up to 14,175kHz, but from this point upwards things go from bad to worse. At 14,350kHz it is barely possible to radiate 50W pep without patterning on the shack tv receiver.

Low pass filters

Readers may be interested to know which filter has given the best results. Without doubt, the KW Electronics filter comes into this category, giving complete protection on the 21MHz band and an equivalent degree of attenuation on the 14MHz band. Unfortunately, this is not enough to ensure complete freedom of operation on this band but, as explained already, this is more a property of the aerial than of the filter.

The Medco filter has also been tried, but was marginally inferior, presumably because the former is peaked for whichever television channel is in use, It is, however, well constructed and gives a useful degree of attenuation which would undoubtedly suffice in many locations.

The author has corresponded with Fytton Electronics, who also market a filter at an attractive price. The manufacturers do not claim, however, to equal the attenuation provided by the KW filter.

Concluding, it would appear that there is just no filter available commercially which can give the required third harmonic attenuation.

Harmonic checking procedure

Assuming that all the screening and filtering procedures have been carried out, there are a number of points to watch if effective suppression of harmonics is to be possible.

First, a visual indicator must be available. This can be either a harmonic indicator specifically designed for the job, or a Band 1 television receiver. If the latter, it must be used with a standard receiving aerial installation, and tests should only be carried out while a picture (or test card) is being received. Both the tv receiver or the indicator unit can be used either as a probe or as a monitoring set. Let us consider each use in turn:

1. The probe

In the initial stages, when there is no certainty that the transmitter itself is clean, the tv receiver or the indicator unit can serve as a probe for inspecting the transmitting installation and detecting harmonic leakage points. If the tv receiver is used for this purpose, a coaxial lead must be connected in parallel with its aerial socket. In the writer's case a piece of cable was soldered into the receiver and brought out through a hole in the cabinet. Care had to be taken to ensure that no direct connection was made to the tv chassis, which could be at mains potential. This cable was then cut at six inches from the receiver and a Belling-Lee plug fitted. Another length of lead was then joined on, via a high-pass filter, and a further Belling-Lee plug fitted. The probe itself, consisting of a short length of coaxial cable terminated with three turns of stiff insulated copper wire, ⅞in in diameter, connected across the inner and outer conductors, was then connected via a standard two-way adapter.

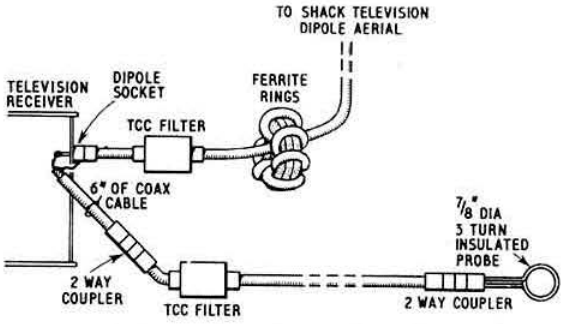


Fig 14. Shack television monitor and probe

The advantage of this arrangement is that the probe can be completely disconnected when not in use, leaving only six inches of cable protruding behind the tv receiver, Fig. 14 refers.

Certain lengths of cable tend to attenuate the BBC picture slightly, but a little adjustment of length soon effects a cure. It may be necessary to move the high-pass filter further along the cable if it causes too much attenuation close to the receiver. Naturally, if a harmonic indicator unit is available, and has adequate sensitivity, it will not be necessary to use the tv receiver. The probe and its associated cable can be plugged directly into its input socket, not forgetting the high-pass filter!

Actual use of the probe is extremely simple, it is only necessary to hold it close to the transmitter cabinet or auxiliary unit under test while watching for indications of harmonics. Special attention should be paid to cabinet joints, coaxial sockets and cables. The probe must never come into live contact, ie metal to metal, with the gear being examined. Contact rectification usually takes place and misleading results are obtained.

If leakages are found, the larger ones must be sealed first, since they will mask the others and render further search impossible.

When no further readings (or patterning, if a tv receiver is used) are obtained, the probe can be dispensed with and the transmitter considered as clean.

Under the terms of the licence, it is compulsory to carry out any such checks as the above using a dummy load. This must be used in conjunction with a low pass filter and preferably be completely screened. Otherwise harmonic radiation from this outlet will mask all other leakage points and defeat the object of the exercise.

2. The monitor

Either the tv receiver or the indicator unit may be used as a monitor. In other words, plugged directly into check points HC1, 2 or 3 using the shortest practicable length of cable and a high-pass filter to avoid fundamental blocking.

Initially it is a good idea to adjust the trap at HC3. To do this, remove the low-pass filter (in other words by-pass it) and detune the trap at HC1 for maximum harmonic output. This makes it easy to obtain a visual check of resonance at HC3.

Having set this trap for maximum attenuation, replace the low-pass filter and tune the trap at HC1 for maximum attenuation. The harmonic indicator (or tv receiver) must, of course, be plugged into the appropriate check point; it is impossible, for example, to tune the trap at HC1 while monitoring at HC3. Again, it is obvious that all tests and tuning must be done with the atu tuned for minimum swr, and preferably on the band where harmonics are strongest; in the writer's case, 21MHz.

Having now set the trap at HC1 to the point of maximum attenuation, it should be found that insertion of the monitor lead into points HC2 and HC3 shows an extremely low reading in each case, at the most 0·25μA on cw and 0·5μA on phone. The low-pass filter is doing its job!

Finally, having thoroughly cleansed the rig, the monitoring lead to the tv receiver (if a tv has been used) can be disconnected and the receiver used for visual indication of interference by way of its aerial. A harmonic indicator unit, if available, can be left plugged permanently into HC1 to give continuous monitoring of this harmonic hot-point.

Television receiver deficiencies

Now, although the writer's installation has long since been cleared by the GPO, there are five Band I aerials within 100ft and a further 24 within 200ft (actually measured), and it would be pointless to pretend that no complaints have been received at the QTH. It is fair to say that something approaching 15 high-pass filters have had to be installed at each of the three QTHs occupied in the Luton area, making some 45 in all. A very firm line has always been taken, however, and the demonstration of a good, clean picture on the shack monitoring receiver has convinced all but the most awkward characters. The aggressive types, and there have been a few, have been summarily dealt with by the Post Office, which has always been scrupulously fair.

There has been a lot written recently about the deficiencies of commercial high-pass filters and the superiority of other forms of filter. The writer finds this hard to understand, since almost all cases of fundamental blocking encountered so far have responded immediately to a standard TCC filter. The exceptions have invariably been 80m cases where the interference has entered the tv receiver via the coaxial braiding. These cases have never been located more than a few doors away, and a simple 80m braiding trap (tuned to 3,650kHz) has effected an immediate cure.

These facts seem to bear out the writer's contention that other forms of filter, such as ferrite transformers, Faraday loops and stubs, act as attenuators, in the broad sense of the word, rather than as tvi filters. In other words, they attenuate a residual harmonic down to an innocuous level, but at the same time reduce the level of the tv signal itself. It would be interesting to have readers' views on the subject.

G3HEO claims negligible attenuation of the tv signal using microminiature transformers wound round ferrite beads. They are cheap, easy to make; and, after all, Don is on 15m in the evenings, so the proof of the pudding...

While on the subject of filters, a word about the ferrite ring (Mullard type FX1588) which can be used for braiding traps. Since installing the Hustler vertical aerial, a certain amount of shock excitation has been apparent when operating on the hf bands, but only at the writer's QTH itself; the neighbours do not appear to be affected. A few turns of miniature coaxial cable wound round a pair of rings and inserted in series with the aerial downlead on the outside (in other words, aerial side) of the high-pass filter cured the trouble.

Lastly, how does one know by looking at the tv receiver whether interference is the fault of the transmitter or the receiver itself? This question can only be answered by the insertion of a high-pass filter in the receiving aerial downlead. If this clears the interference, then obviously the transmitter is blameless. If a residual patterning remains which is undisturbed when the fine tuner is adjusted, again the transmitter could well be clear. If, however, the interference is dependent on the movement of the fine tuning control, then harmonics are present which must be suppressed. At low harmonic levels it is easily possible to obtain perfect sound or perfect vision, but not both. The answer lies at the transmitter.

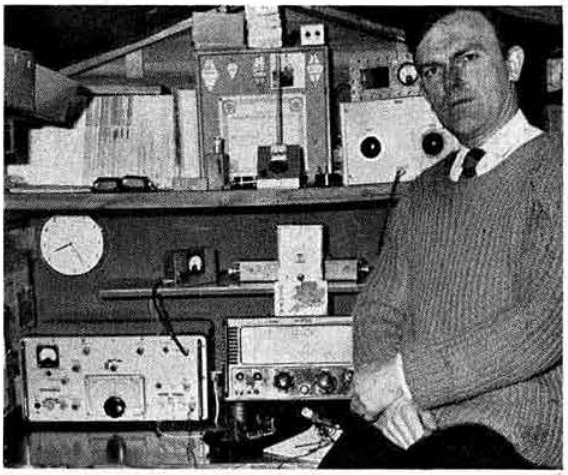


Photo of the author taken in 1967 at a previous QTH in Luton. Layout shows swr meter, low-pass filter, atu and screened dummy load

Conclusion

If you start something, finish it, has always been the writer's motto, and persistence is, without doubt, the key factor in the battle against the "Tennessee Valley Indians". At times the struggle to survive was tough, but persistent efforts to find a solution to the many problems have been very worthwhile, and several new countries have been worked which would otherwise have missed the logbook.

Attention to transmitter screening could enable a lot more amateurs to work the hf bands during afternoon and evening hours. If operators could manage just one more band, the effort in compiling the above information will not have been wasted.

Meanwhile, for the author it is a case of moving to yet another fringe area QTH...

Errata (Part 1)

Fig 2. S2a and S2b are marked incorrectly. The SSB position and CW position should be reversed in each case.

Fig 6. The value of the mica coupling capacitor at the anode of the 12BY7A should be 0·001 and not 0·01.

A self-contained linear amplifier for 144MHz

by G. R. JESSOP, G6JP*

Introduction

The use of linear amplifiers, instead of high-level modulated class C amplifiers, has largely been ignored for amateur operation except for use with ssb transmission.

It is true that the efficiency is lower than the class C amplifier, but under class AB_1 conditions a theoretical efficiency of 66 per cent is possible and 50—55 per cent realizable in the light of practical designs.

There are some advantages which a linear amplifier has over the class C amplifier that are well worth considering, and these may be summarized as follows:

(a) suitable for all modes of operation—am, ssb, nbfm and cw;
(b) harmonic generation will be significantly lower than in the class C amplifier;
(c) drive power will be lower.

From this it will be appreciated that:

(i) a significant saving in cost and weight can be realized, since a high level modulator is not required, as for amplitude modulation;
(ii) lower harmonic power will be generated which, although it will not assure freedom from tvi to vhf channels, will be an asset;
(iii) the lower drive power can readily be provided from a transistor or small power valve exciter-driver.

Valves suitable for use in linear power amplifiers should be capable of reasonably high anode dissipation and high peak emission, because better linearity can be achieved by operating well within the maximum ratings than using a valve which is only just large enough. Probably the most useful type for this frequency is the 4X150A/4CX250B, or one of this family which is freely available and capable of up to 300W pep output depending on the anode voltage used.

For most purposes the grid input circuit of a power amplifier should be such that it presents a fairly constant load to the driver stage—some form of passive grid will be found suitable. There is an advantage in having a resonant circuit loaded by an appropriate resistor in the region of 500 to 1,000Ω. It is desirable, however, that the amplifier is stable without reliance on the loading resistor for stability.

Description

The following is a brief description of a self-contained linear amplifier for 144MHz in which a conduction cooled tetrode, characteristically similar to the 4CX250B, has been used. The air cooled type could be used as an alternative but this would need the addition of a suitable blower. If this is done, the space occupied in the present design by the ht smoothing capacitors could be used for the blower, and since the whole equipment would operate at a lower chassis temperature they could be resited under the chassis. Alternatively, the blower could be attached to the back of the amplifier.

However, as this particular amplifier was not required to operate at the maximum capability of the valve, and because of the intermittent nature of average amateur use, only very limited heat sinking has been included.

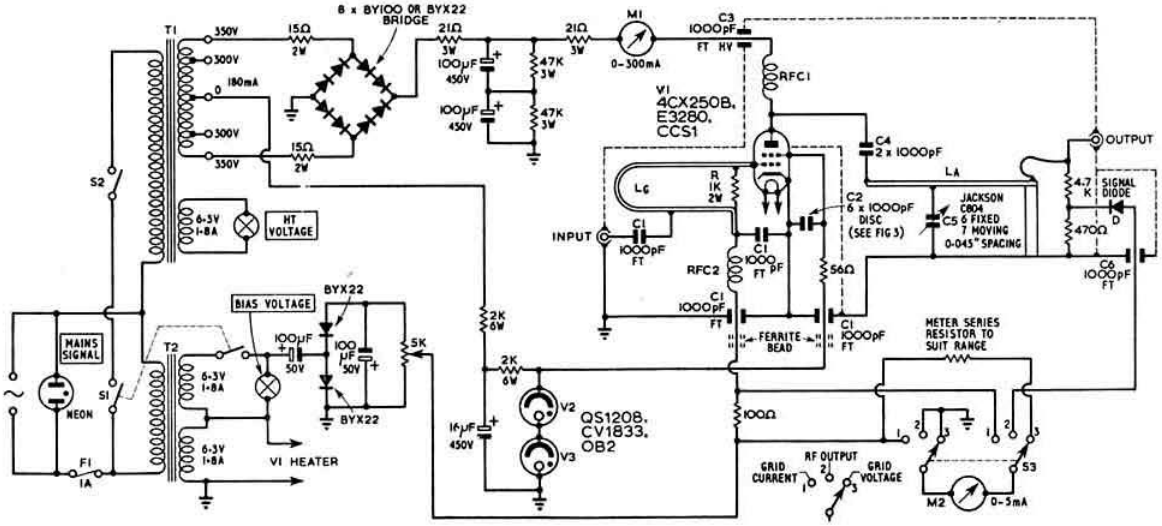


Fig 1. Circuit diagram

* 32 North View, Eastcote, Pinner, Middlesex.

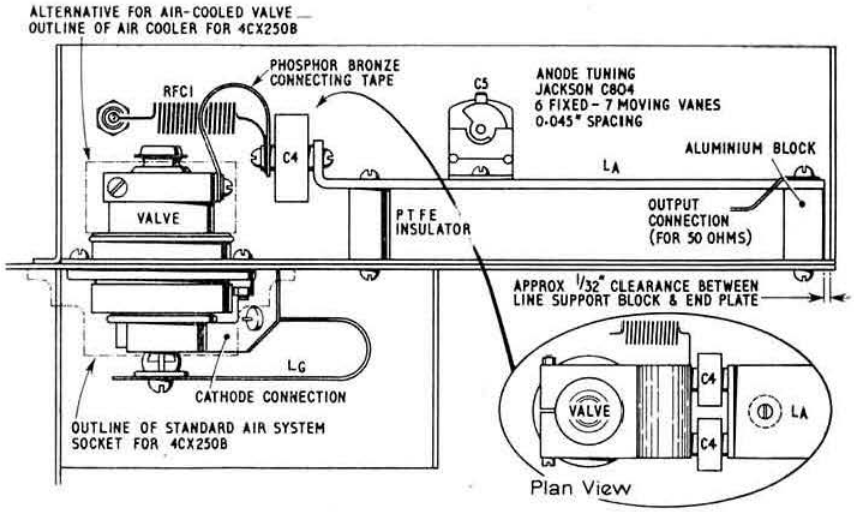
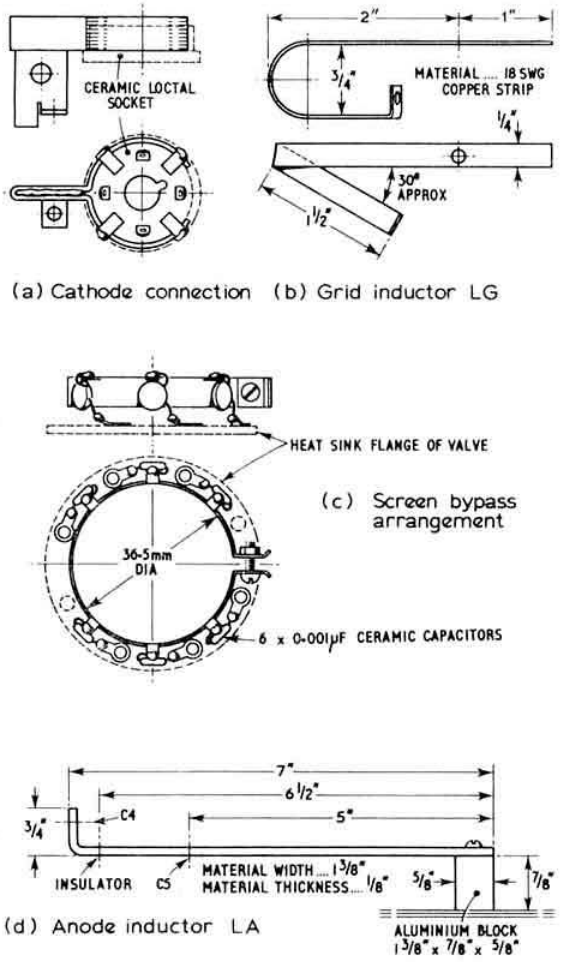


Fig 2. General layout of the anode and grid circuits

Fig 3. Circuit component parts



Construction is conventional and only a few of the details need description. The whole unit is built into a unit 17in by 5in by 5in based on an Electrokit panel and end plates.

The ht transformer is supported from the front panel, with the bridge rectifier units mounted on a perforated "pin board" above the surface of the other end (back) of the transformer and arranged so that their connections are close to the feed-through terminals of the transformer. For the protection of the user a perforated metal safety cover is fitted over the rectifiers and ht terminals.

The amplifier itself is mounted on an aluminium chassis and its strip line anode circuit is enclosed in a box (trough with ends closed) 10in by 3in by 2½in high. The grid circuit is similarly enclosed under the chassis and in neither case has it been found necessary to cover the top. If the air cooled type is used, the grid box would have to be closed to provide the necessary air flow. Nor is there any significant radiation loss from the anode circuit due to the strip line being low down in the enclosure.

The anode strip line is shunt fed through two ceramic capacitors in parallel, and the anode connecting block is connected to these by a double piece of thin phosphor-bronze strip. The rfc is connected to one of the capacitor terminals and via a high voltage feed-through capacitor to the ht supply. The general arrangement of this and the grid circuit is shown in Fig 2.

The grid circuit is a simple U-shaped copper strip attached to the grid connection (spigot) of the valve; the earthy end is connected to the cathode lead through a feed-through capacitor, and the grid bias is applied via an rf choke at this point.

In the case of the conduction cooled valve used in the prototype the normal air system socket is not suitable, and suitable screen decoupling had to be arranged. In this case it comprised a simple copper band with six 0·001μF ceramic capacitors each connected to the mounting flange to form the screen by-pass capacitor (see Fig 3c).

A low inductance cathode lead is made up in the fashion shown in Fig 3a, using a ceramic loctal socket removed from its mounting flange, and four cathode base connections are soldered directly to the cathode strip connection.

The rf input socket is an insulated television type so that the outer of the coaxial cable can be terminated at the valve cathode rather than the chassis. Whether this has any real advantage is not known, but it will reduce the possibility of trouble arising due to circulating currents in the chassis. The output connection is a standard type N 50Ω connector with the connection being made directly to the strip line at a point to match the load impedance. In the prototype this contact is made at the top corner of the line, that is, the point where the line is fixed to its earthed end support (see Fig 2).

Power output indication is obtained from a simple rf voltmeter with a resistive potential divider across the output socket through a simple diode. The three position panel switch associated with M2(0—5·0mA) shows: (1) grid current; (2) rf output; and (3) bias voltage.

Three indicator lights included on the panel are: white, to show that the heater voltage is on; yellow, to indicate when bias voltage is on; and red, to show that ht is on.

Proper matching of the input and output to the amplifier is best carried out using directional couplers, making adjustments to achieve minimum reflected power. As the amplifier operates in class AB_1, the input load is almost wholly determined by the resistor R.

The power supply consists of a readily available transformer, with a full wave bridge rectifier to provide an ht of approximately 800V. Eight 800V piv (BYX22) rectifiers are used in pairs to form the bridge. No equalizing resistors or capacitors are needed if all the diodes are of the same type. Surge limiting resistors have been included in the two leads from the transformer and in the input to the smoothing capacitor.

The screen supply is obtained from the transformer centre tap and is stabilized by means of two 110V gas-filled shunt stabilizers in series. The grid bias voltage is obtained by a voltage doubler rectifier using two 6·3V windings connected in series.

Component List

L1	Mains signal (neon)
L2	Bias voltage (6·3V lamp)
L3	HT voltage (6·2V lamp)
S1	Single pole on/off
S2	Double pole on/off
S3	3 position 2 way, wafer
F	1A fuse
V1	4CX250B or E3280 or CCS1
V2	QS1208 or CV1833 or OB2
V3	QS1208 or CV1833 or OB2
LG, LA	See separate detail
RFC1	21 turns 18swg ¼in i.d. 1in long
RFC2	3 pie 2·5mH (Electroniques)
T1	350 + 350V 180mA
T2	6·3 + 6·3V 1·8A
C1	1,000pF feed thru (discoidal type)
C2	6, 1,000pF disc (see Fig 3)
C3	1,000pF H.V. feed thru
C4	Hunts type CZ5375 1,000pF 3·5kV wkg
C5	C804, 6 fixed 7 moving 0·045in spacing
C6	1,000pF feed thru (screw fixing)
M1	0–300mA
M2	0–5mA, 3 posn: 1 grid current; 2 rf output; 3 grid voltage
D	Signal diode
R	1,000Ω 2W

Burns Electronics low-pass filters FL2 and FL4

By R. K. HEMMINGS, G3VCT*

Breakthrough on television from 70 and 144MHz becomes more likely with the expansion of the uhf tv service, so the announcement of low-pass filters for these bands is timely. Harmonics falling in other bands are also reduced, and during tests of the 2m filter there was complete absence of G????'s normal S9 signal in the 432MHz band!

It should be realized that as these are low-pass filters there is no attenuation of sub-harmonics present at the output due to insufficient selectivity earlier in the transmitter, although there is a useful amount of attenuation at 192MHz (4 × 48MHz) which could solve some tvi problems.

Bench tests showed that the specified attenuation was met with an adequate margin, so practical tests were made of the actual attenuation in the field as follows:

FL2. The filter was put in the feeder of a 50W 2m transmitter. The third harmonic, which was normally S9 one mile away, was inaudible. A test at close range produced a similar result. No loss of signal strength on 145MHz was detected at a station three miles away during tests, but the pa stage had to be retuned slightly when the filter was inserted.

The filter was inserted in the feeder of a uhf tv. It attenuated the normally very strong Ch 33, 26 and 23 to such an extent that the weak signal picked up on the coax between filter and tv predominated.

FL4. A 2m converter was used to monitor the second harmonic of a 4m transmitter at close range. With the FL4 in the transmitter output the second harmonic was considerably reduced. When the FL4 was placed in the feeder to the 2m receiver, S9 signals became barely detectable.

Conclusions

The FL2 and FL4 have a useful performance which should considerably attenuate harmonics in the uhf tv bands (and the annoyance of third harmonics in the 432MHz band). The specification was met with a good margin on the review filters, and the practical tests gave comparable results.

Specification

Impedance	50 or 75 ohms, to order.
In-band loss	½dB or less.
Stop-band loss	FL2—50dB min above 200MHz.
	FL4—50dB min above 105MHz.
Terminations	Belling & Lee standard.
	BNC, So259 or N, to order.
Price	£6 each, p and p 4s.

Burns Electronics, The Cottage, 35 Beulah Hill, London SE19.

* 107 Chalklands, Bourne End, Bucks.

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Two-metre mosfet converter

by A. L. MYNETT, G3HBW*

A considerable amount of experience has been gained by the author with the two- and four-metre mosfet converters since publication of his article under the above heading in the June 1969 issue of Radio Communication. *Quite a few people have experienced troubles with the converter, particularly with the local oscillator arrangement employed. These troubles have been found to be almost entirely due to either crystals of low activity being used or, and more commonly, to the instructions in the article not being correctly followed. It is hoped that the following notes may help those experiencing difficulties.*

Local oscillator

Correct operation of the local oscillator will almost certainly be obtained if the following steps are carried out:

(1) If the converter is of the printed circuit variety, remove the common connection of the crystal, R12 and the mosfet gate from the board and "stand it up" in the wiring. Many crystals will not tolerate the extra few pF to earth of the board connection when used in this circuit.

(2) Ensure that the oscillator coils are wound with the correct gauge of wire. If they are close-wound with thinner wire in error, the inductance will of course turn out to be much too high. Several converters have failed to operate simply because L1 had too high an inductance. It is probably safer to pull out L1 to a length of about $\frac{7}{16}$in or so to ensure resonance, instead of leaving it close-wound.

(3) If the oscillator still will not perform, reduce the value of R9 from 330Ω to 180Ω, or even to 150Ω. To a certain extent the operating conditions of TR3 are a compromise between good oscillator operation, requiring linear gain and a high drain current, and good doubler performance, which needs a square-law mode and therefore low drain current. The original value of source resistance leads to a set of operating conditions in which the linear gain of the 40602 can be a bit on the low side and 180Ω produces a rather better compromise.

(4) The final stage in the proceedings involves removing the oscillator gate$_2$ and feed resistors R11 and R13 from the discoidal bypass capacitor C13 and, instead, bypassing the gate$_2$ and its resistors directly to the source with an extra 1,000pF disc ceramic capacitor. This produces a large increase in feedback which will accommodate even quite poor crystals that will not oscillate in other circuits. This circuit arrangement was not used in the original design as the degree of feedback so obtained usually causes instability with a crystal of average activity. It should be noted that R11 is always 220kΩ. The error in the original article concerning this resistor was pointed out in a subsequent issue of *Radio Communication.*

* 10 Prior Grove, Chesham, Bucks.

RF amplifier stage

Genuine Mullard BF180s have very low feedback capacitances and are normally stable in the common-base arrangement employed, even with the aerial loading removed. However, there do seem to be some BF180s of unknown manufacture which have much larger feedback and these may require shunt damping of the collector coil (T1 primary) to attain stability even with the aerial connected. Resistors from about 33kΩ down to about 10kΩ are required; use the highest value that will keep the stage stable. In really difficult cases, short-circuiting the emitter choke RFC1 usually helps, at the expense of a small increase in noise figure.

IF output coil

For the 4 to 6MHz i.f. version of the converter, an Osmor QO8 coil has been found to work somewhat better than the QA8 specified, as the primary to secondary coupling is closer in the QO8. Otherwise the existing coupling winding may be removed from the QA8 and replaced by about ten turns of 28 or 30swg enamelled wire wound tightly over the "cold" end of the main winding.

If, after the steps suggested have been carried out, success is still not obtained, the author will reluctantly respond to cries of distress. However, please write only if all else has failed, as the high level of received mail has already threatened to curtail all other radio activities at G3HBW!

The RSGB News Bulletin Service

Every Sunday morning the RSGB News Bulletin, GB2RS, is broadcast. This news bulletin can be received on either vhf or hf, which gives almost complete coverage of the British Isles. It keeps radio amateurs informed about the latest happenings in the world of amateur radio and gives notice of future events.

The schedule for the RSGB News Bulletin is as follows:

Time (bst)	Frequency (MHz)	Location of station
0930	3·6	SE England
1000	3·6	Severn area
	145·1	SE England (beaming N)
	145·8	Aberdeen (beaming W)
1015	145·8	Belfast
	145·8	Belfast (beaming S)
1030	3·6	N Midlands
	145·8	Aberdeen (beaming SW)
	145·3	Birmingham area (beaming NW)
1100	3·6	NW England
	145·3	Birmingham area (beaming SW)
1130	3·6	SW Scotland
	145·5	Leeds (beaming N)
1200	3·6	NE Scotland
	145·5	Leeds (beaming E)

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

Eavesdropping on 'Eighty'

Our anonymous correspondent reports

"TALK about tvi, Joe? Why? It doesn't really exist any more, does it? I mean to say, I think all these articles in *Radio Communication* over the last few months are going a bit too far, and it's all so unnecessary anyway. With television going uhf we have nothing to worry about, all our problems have been solved for us.

"Yes, I know the GPO said there were 1,000 cases a year, but I don't believe all I hear. That was probably an exaggeration.

"Well, you never hear anyone saying they've got it, do you? So I'm sure there isn't much about. It is a thing of the past and we needn't worry about it any more.

"In fact, you know we are in a good racket here. The licence fee has been £2 ever since I was licensed—it never goes up. Television licences keep going up but they'll never put ours up.

"£10! Don't be ridiculous! Though now you mention it, my last ticket did say £3. That must be a mistake.

"I must remember to write to the Ministry of Posts and Telecommunications about that. It's not likely that anyone would want tighter controls on us, after all we are not professional operators. Thank goodness we have a Council wise enough to see there is no need for incentive licensing on this side of the pond. You don't need to know much about it at all now that it's so easy to buy ready-made gear, just plug it in and away you go. There are always rumours about one band or another that we are going to be losing, but it never happens, does it? We've got the GPO Liaison Committee, you see, and they tell the Post Office what to do and what not to do. But if we do lose a few bands it wouldn't matter much, would it? After all, no one uses them.

"In the unlikely event—well, I never go on the air in television time anyway—but if someone did complain I would just tell them straight, 'Get the Post Office to fix it.' It's their job after all. They are paid for it, aren't they? And I am only an amateur. As a matter of fact they could put me a few extra plugs in while they're here. And clean the dead flies out of the back of the rack. It would do the place good to have a spring-clean, I'll even lend them our vacuum cleaner—it causes lovely interference and they would probably like to test their gear on that! Needn't think they could shut me down for a month, or for a minute. It's probably a fault in the 79 television sets, all transistorized no doubt. After all I don't get tvi on our set because we haven't got one, so why should I worry?

"Bill was complaining the other day that he could hear my key clicks on the two-metre band, but he doesn't bother me. When you are after a VR1 or whatever, what's a few key clicks among friends. The VR1 wasn't complaining, anyway. Of course I didn't tell old Bill about the 10kW linear in the attic. He'd find something to complain about in that, say that I had an unfair advantage or something. But I've had a licence since 1934, I'm not going to fight for the dx.

"I reckon I'm fireproof. I bought all my gear in a shop. None of this do-it-yourself lark for me. No, thank you! Pay for the best and that's what you'll get, I always say. Mind you, some of these transceivers are shockingly overpriced. You wouldn't get me paying £250–£300, no fear. There isn't a piece of gear built that is worth that much. But commercial gear is so well finished, the cabinet I mean. I wouldn't dream of messing about taking the back off or delving inside it. When you've paid a lot of money for something, you don't want to go mucking it about. All this talk about filtering the leads out of the cabinet, and so on—some folk like making a lot of unnecessary work for themselves.

"As for filters, well they are a sheer waste of time. No filter will give you more than 10dB attenuation at any frequency; I know that's a fact, because a Post Office man told me. All this talk of 80–90dB is just rubbish, it's impossible. I'll tell you another indisputable fact, too. If you get second harmonic you can't get rid of it. There isn't a filter made that will touch it, the second harmonic just goes round it as if there was nothing there.

"All this technical jazz makes me sick, I leave all that to the Technical Committee. I don't want to spend all my leisure time with a soldering iron in my hand—nasty hot things they are, too, if you get 'em wrong way round. And no one wants to waste their money on grid dip meters and signal generators and such like. What do you use them for anyway, I'd like to know. Just give me a transceiver, a 60ft tower and a TA33 senior, and I'll tell you whether it's raining in Tokyo or Hawaii or some other place in two shakes. Like Tony Hancock used to say, 'I've got friends all over the world—none in this country—but friends all over the world.' Isn't that what amateur radio is all about?

"Now there's this TVI Clinic. That's a laugh, that is. Anyone would think we were sick or something! The latest thing is they want to know about television sets. Well why don't they do the job properly, test all the sets like the Consumers Association does. We would all be glad to pay a contribution—say £2 a head to buy all the sets and test equipment and pay a couple of engineers to do the job for us.

"QSL cards are a bore anyway. I got DXCC years ago, and enough others to fill two walls of the shack, so it's all so much waste paper as far as I am concerned now. As for the flipping model number of your television set—well, that is real technical stuff for the television serviceman I think, it's not my job at all. Anyone can send Kay Priestley a card who wants to, but I'm not—that's for sure. There are always plenty of volunteers for those sort of jobs. Anyway I don't need the TVI Clinic.

"Just a minute, Joe, someone at the door.

"Sorry, Joe, I've got to sign out now, that's the GPO man just arrived. He says all amateurs are being closed down as of now. . . ."

TECHNICAL TOPICS

A monthly feature by PAT HAWKER, G3VA

ONE of the most encouraging lessons that anyone writing regularly in *Radio Communication* soon learns is that there can be remarkably few ideas that someone, somewhere, among its many readers cannot cap or has not thought of in some form or another. Over the years an incredible number of ideas must have been tried-out in amateur stations, often well in advance of the supporting technology which will subsequently allow them to be widely accepted. There is an immense fund of expertise and operational experience, and it is a source of considerable satisfaction to the present writer that *TT* sometimes succeeds in stirring up or tapping into this storehouse of useful knowledge.

Variable bandwidth filters

In the December issue, the principle of the high-performance Rohde and Schwarz continuously variable filter was described: it soon became clear from the postbag that some at least of the same basic principles have been used for many years by some amateurs.

For example, R. A. Parrott, G3HAL, digs into his notebook (a valuable reminder that a scrap-book of ideas and circuits can be extremely useful) and comes up with Fig 1 which he recalls as coming from *QST* February 1955. He considers that the German filter could be regarded as an elaboration of this system, perhaps necessary to prevent mutual coupling between the various sections via the oscillator. Otherwise, he feels that the earlier arrangement would be much more viable as a homebrew project.

Reference back to the 1955 *QST* shows that the idea comes from an article "A variable bandwidth filter", by H. E. Thomas, W6CAB, which included a complete circuit for such a filter using four 6BE6 mixers. Even this early reference contains a hint that some at least of the principles could be found, even earlier, in an MCL-50 Signal Shifter unit, though W6CAB is credited with originating the idea of using a single variable oscillator to provide both fundamental and harmonic outputs to simplify the tunable oscillator arrangements. Although his unit used bandpass rather than lowpass filters, he made it clear that by using shunt crystals each filter could be designed with one extremely steep-sloped response curve. In practice he used two bandpass crystal filters, each using a bandpass pair plus three shunt crystals. He also suggested that mechanical filters could provide the necessary steep sides if the funds were available.

Also, since writing the December notes, I recall that there is a continuously variable filter (–6dB bandwidth variable from 800Hz to 8kHz, symmetrical about the centre frequency and having a response slope of about 27dB per kHz) designed into the Redifon R408 marine receiver. I feel certain that this also is based on adjusting the relative position vis-à-vis the signal of bandpass filters by means of passband tuning.

The G6LX filter

This brings us to an informative letter from Ron Glaisher, G6LX, which shows how he (and also G3FPQ) have in fact been using a related technique for many years. The system used by G6LX is shown in Fig 2. While he points out that in the German filter the signal stays put as selectivity is narrowed, he considers that in practice his system, with its sideslip technique, does not present any operational problems and is a good deal easier to implement. G3FPQ also uses a sideslip arrangement but with several detailed differences which tend to impose more stringent screening requirements.

G6LX's filter is based on the use of two 3·1kHz mechanical filters (either or both of which can be switched out of circuit), and he describes the action as follows:

Since "difference" mixing is used (oscillator tuned around 705kHz), the sideband is inverted in the first mixer, and also in the second mixer. Thus, at the centre frequency (oscillator 705kHz) both filters overlap exactly resulting in an i.f. bandwidth of about 3kHz. But as the oscillator frequency is increased (or decreased) the passband of the second filter moves away from the centre frequency of the first filter, thus narrowing the overall passband. The overlap can be further decreased until, with the oscillator on 702 or 708kHz, it drops virtually to zero bandwidth.

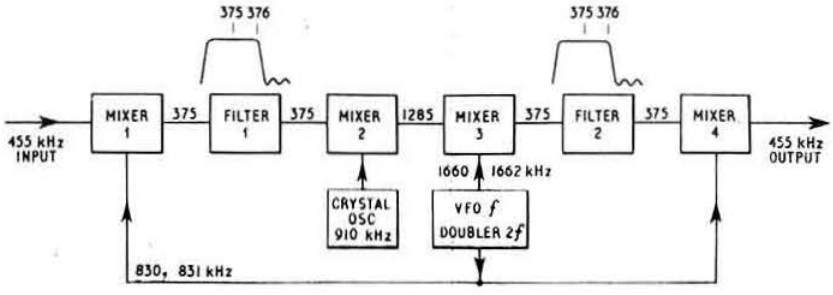


Fig 1. Basic outline of the continuously variable filter developed by W6CAB (*QST*, February 1955)

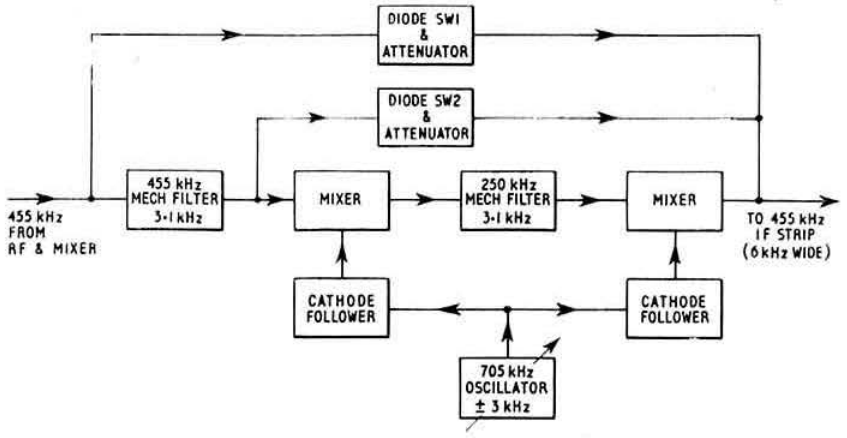


Fig 2. The G6LX filter. With diode switch 1 closed, receiver has 6kHz bandwidth; with diode switch 1 open and diode switch 2 closed bandwidth is 3·1kHz; with both diode switches open bandwidth is variable from 3·1kHz to very sharp. The variable oscillator forms the bandwidth control, being tuned by shunt diode across part of the capacitance. The tuning diode is controlled by a panel mounted potentiometer and provides a ±3kHz tuning range permitting "sideslip" to either side of passband

As the bandpass is "sideslipped" the receiver has to be retuned in order to hold an incoming signal, but this is not difficult once the technique has been mastered; this is proved by its use during NFD when several operators without previous experience of the system were quite happy after about ten minutes. While it is essential only that the variable oscillator should be able to tune to one side, the electronic tuning diode used by G6LX provides a 7kHz swing for a 0 to 9V change: he therefore centres the frequency to 705kHz in the middle of a linear potentiometer which forms the bandwidth control.

He reports that spurii have not been found a problem, and no unwanted signals can be heard on any amateur band. Very careful screening and bypassing are required to avoid leakage around the filters. The diode switches used are fairly sophisticated since simple types were found to leak. The unit less oscillator is built into a diecast box, with the oscillator in a second similar diecast box alongside; the boxes also contain internal screens. The diode switches and tuning diode are fed from zener regulated potentials; high stability of the tuning diode supply line is essential when using very narrow bandwidths.

The diode switches incorporate fixed attenuators in the switch leg to balance signal paths as the filter unit introduces some attenuation of the signal; this loss is different for each switched bandwidth (ie. none, one or two mechanical filters) but is constant when the variable filter is in use.

The mixers currently being used are 12AT7 valves in balanced configuration; cross-modulation has not proved a problem. Previously, G6LX used 6BE6s and 6U8s entirely satisfactorily, and the change was made when the receiver was rebuilt, in order to standardize on fewer valve types. A transistor version has also been built but did not prove fully satisfactory, although this may have been because no further 250kHz mechanical filter was available, and instead the modified arrangement of Fig 3 was used; in this case a high frequency crystal filter was followed by a Japanese 455kHz mechanical filter with only one mixer. With this system, problems were encountered from spurii and oscillator drift, though G6LX believes that these might have been overcome if more time had been spent before changing to a conventional 455kHz bandpass filter in conjunction with a 455kHz sharp crystal filter for cw.

G3FPQ uses closer spaced frequencies (of the order of 450/465kHz) and also eliminates the second mixer as his second filter directly feeds i.f. in conjunction with a crystal controlled oscillator and switched bandwidths, but this calls for more sophisticated screening.

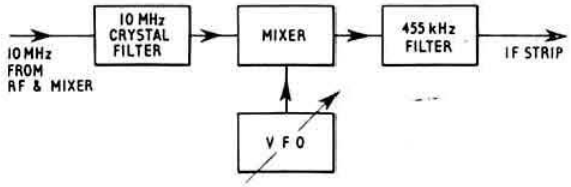


Fig 3. A modified form of variable filter tried but not fully developed by G6LX in a transistorized receiver

SSB generation with CA3020 LIC

Nick van Weede, G3VNC, has recently built a solid state ssb exciter for 1·8MHz operation using a very interesting—and possibly unique—method of generating the lower sideband signal at 455kHz. His system revolves around an RCA CA3020 linear integrated circuit which is used as both balanced modulator and microphone amplifier. The CA3020 is usually described as a multi-purpose wide-band power amplifier; the circuit is a stabilized direct-coupled amplifier and includes a temperature-tracking voltage regulator to facilitate stable operation over a wide temperature range. The device is readily available in the UK for about 25 shillings; G3VNC points out that while possibly a cheaper ssb generator could be made using discrete components, the gains in simplicity, size and stability surely outweigh the slight extra cost.

He lists points to note as follows:

(1) Carrier suppression is excellent, being limited mainly by stray reactance, decoupling etc.

(2) Excellent stability.

(3) Suitable for printed circuit lay-out but note that symmetrical lay-out improves carrier suppression.

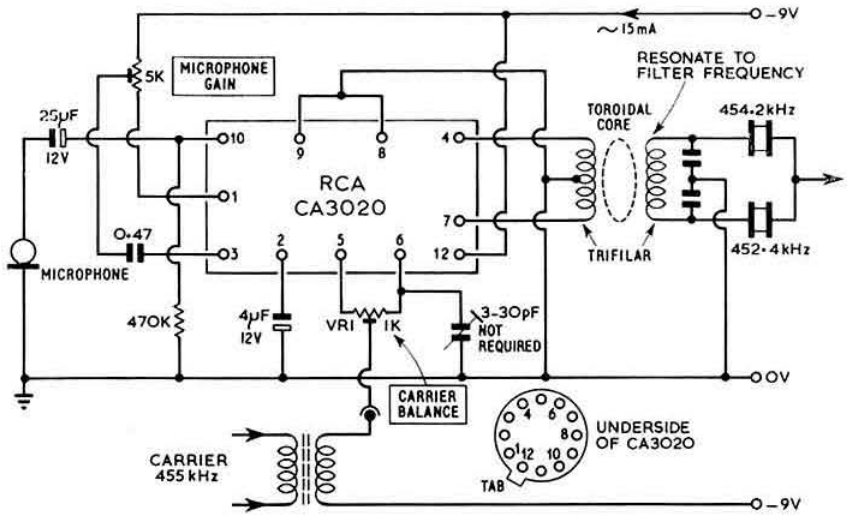


Fig 4. Simple ssb generator using CA3020 as both microphone and balanced modulator developed by G3VNC

(4) The output transformer has a primary impedance of 130 ohms and a secondary winding to match the filter in use.

(5) A carrier voltage of 0·2V rms has been used, but this value has not been optimized.

(6) The current consumption at 9V is about 15mA.

(7) The setting up is simple, but VR1 must be kept near mid-track to avoid excessive dissipation in one or other half of the output transistors; no capacitive balancing was needed in the prototype.

(8) Good quality carbon track trimmer potentiometers should be used.

(9) A similar circuit could probably be used as i.f. amplifier/mixer for conversion to top band (in practice the G3VNC exciter uses a conventional half-Cowan mixer immediately following a half-lattice filter).

(10) A trifilar wound output transformer is recommended to ensure tight coupling.

(11) Higher carrier frequencies could be used, although this would depend on the frequency response of the CA3020 (RCA list a typical 3dB bandwidth of 6MHz in wideband amplifier application).

(12) The arrangement has sufficient gain for use with most dynamic and crystal microphones.

(13) When setting up, it is advisable to include a milliammeter in the lead.

G3VNC says that the dsb output appears to be free of harmonics, unless the audio is too high, when limiting may result in the production of harmonics.

The CA3020 is often used as an audio amplifier, and in this role can supply an output of about 200mW with a 6V supply. In *Break-in* November 1968 R. Milam, ZL1WL, indicated how with the addition of an MPF104 fet preamplifier to increase the input impedance it could take care of the audio requirements of a typical receiver from diode-detector onwards. At 9V it can deliver about 550mW. At the higher power levels, a heat sink should be used; the device is a TO-5 type package with 12 leads. ZL1WL found that connecting wires to the closely spaced pins presents problems and using long-nose pliers he carefully bent the leads at right angles, leaving 0·3in between the bend and the ic base; if this seems too drastic he suggested bending the leads only 45 degrees.

Static protection

The description recently of the Mullard miniature spark-gap technique as a device to protect semiconductor equipment from aerial static (*TT* December 1969) has brought in some informative comment from George Jessop, G6JP. While he agrees that the spark-gap described by Mullard engineers is ingenious he points out that air spark-gaps are notoriously unreliable and the absolute maintenance of an 0·001in gap is difficult. It is for this and some other reasons that spark-gap protective devices are now fast being replaced in telephone line and signalling installations by the more reliable (and lower striking voltage) gas-filled surge arresters.

He believes that a spark-gap rated at 400V could easily in practice require twice this voltage to operate, and suggests that probably the most satisfactory protection of equipment connected to hf or mf aerials is the AEI type 15A arrester or its equivalent. This has a striking voltage in the range 150-250V with the low inter-electrode capacitance of 0·5pF. However, this device is too large for incorporation in most amateur equipment, though very suitable for connection to feeder lines.

G6JP suggests that for small equipment there is probably nothing better than the NE2 miniature neon (Hivac 3L or 7L series) with a striking voltage of around 70V when operated without a series resistor. Neither the 15A nor the NE2 type of device will introduce any cross-modulation or tracking problems. But he points out that the completely satisfactory protection of semiconductors in equipment connected to lines or aerial feeders subject to high surges has yet to be resolved. He quotes a New Zealand friend that "the transistor is the fastest fuse on three legs known to man!"

Colpitts overtone oscillator

From Barry and Kay Priestley of the G3JGO/G3XIW TVI Clinic comes a form of overtone oscillator which appears to overcome the common difficulty that such oscillators tend

to be more tricky to adjust compared with the fundamental Colpitts arrangement. They indicate that it is possible to modify the conventional Colpitts circuit so that the crystal oscillates on a required overtone, by damping the crystal on its fundamental or unwanted lower overtones. Practical tests showed this to be simple and straightforward with no adjustment and no worries about self-excited oscillation.

In Fig 5 the addition of L to the conventional circuit results in the tuned circuit C2L. If this is resonated to the geometric mean of the fundamental and (say) third overtone, then the combination looks like a coil at the fundamental but a somewhat reduced capacitance at the third overtone frequency. The circuit will then be degenerative at the fundamental but regenerative at the overtone frequency, and provided there is sufficient gain, will result in overtone oscillation. The L,C2 values depend on keeping the correct resonant frequency, and so it is more convenient to alter C1 to adjust the excitation. Table 1 shows the effect on C2 if the resonant frequency is at its "ideal" value (geometric mean of wanted and nearest unwanted frequencies).

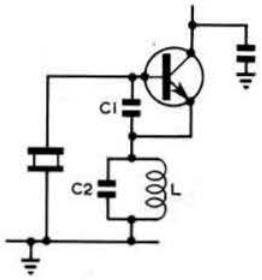


Fig 5. Colpitts overtone oscillator

Table 1—Colpitts overtone oscillator

Overtone	Effective value of C2 relative to actual value	L.C2 resonance as percentage of working frequency
3rd	66%	58%
5th	40%	77·5%
7th	28·6%	84·5%

Those of us who are rusty on maths may like reminding that the geometric mean of frequencies *a* and *b* is $\sqrt{(ab)}$.

Low-voltage square-wave oscillator

It was indicated last month that, ideally, product detectors and diode-quad balanced modulators should be fed or switched with a square-wave rather than a sine-wave signal. Whether in practice this results in a significant improvement in performance must be left to others to decide, but Fig 6 provides a crystal "clock" providing about 1V of 500kHz square-wave output when powered only by a 1·35V mercury cell. This circuit stems from Robert Billion in *Electronic Design* 8 November 1969.

Frequency-divider oscillator

To complete a trio of crystal oscillator circuits, Fig 7 shows two ways in which a crystal can be used to stabilize an astable-multivibrator at frequency division ratios up to 10:1

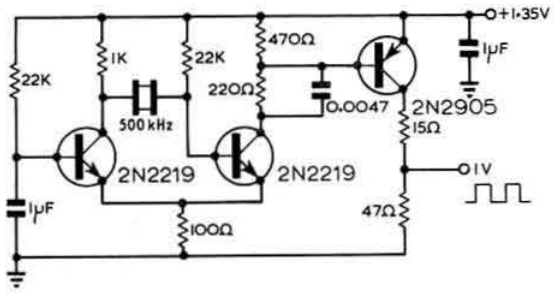


Fig 6. Low-voltage square-wave generator

(eg a 100kHz crystal could be used to synchronize directly a 10kHz multivibrator). This system is described in some detail in *Electronics Letters* August 1967.

The time-constants of the multivibrator must be designed for the required output frequency, and in the diagram the values are intended for an output of 10,331Hz from a 61,986Hz crystal. When the crystal is connected between terminals A and B, locking is possible when the crystal is an integer multiple of the multivibrator frequency. Alternatively, with the crystal connected between A and C, rather more reliable synchronization is possible, but only for symmetric multivibrators and for odd division ratios.

In practice, first the RC time constants of the multivibrator are arranged so that the frequency, without the crystal, is close to the desired output (it will be very unstable); then the trimmers are adjusted for synchronized output. It is stated that a stability of ± 2 parts in 10^6 was achieved with a division ratio of six without special precautions or temperature-controlled oven.

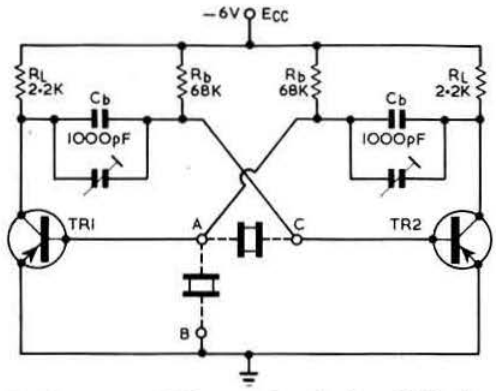


Fig 7. Frequency-divider synchronised multivibrator oscillator

Ultrasonic cleaning

In the *TT* (December 1969) description of the G3PDM high-stability Vackar oscillator, the suggestion was made that "all variable capacitors should be cleaned with carbon tetrachloride or similar solvent, preferably in an ultrasonic bath". G. H. Ireland (ex-G3CCL) is a little concerned that this advice could result in some risks being taken unbeknowingly. He points out that in his instruction book for a

60W ultrasonic bath is a note "carbon tetrachloride should *not* be used due to the risk of generating phosgene". This hazard, he believes, could exist with any chlorinated solvent (except chlorofluorocarbons). His recommendation is to use something like petrol with *very* good ventilation to keep down the fire risk.

New Marconi high-performance receiver

Almost exactly two years ago, some of us began to hear rumours of a new high-grade hf receiver being developed by The Marconi Company for point-to-point and other applications which impose very stringent requirements; the receiver, it was hinted, would use up-conversion techniques and have a frequency synthesizer providing incremental steps of only 1Hz rather than the 100 or 1000Hz steps of most synthesizers. Now the first detailed description of this remarkable receiver (H2900 series) has been published by B. M. Sosin under the title "A breakthrough in hf receiver design" in Marconi's *Point-to-Point Communications* (January 1970).

Now nobody suggests that amateurs could hope to run these complex receivers, but there is no reason why we should not benefit from considering the implications of some of the design features. Incidentally, this dual diversity triple conversion synchronous detector independent sideband receiver with digitally controlled oscillators occupies 7 by 17·5 by 22in, instead of the full 7ft rack cabinet in which such commercial point-to-point receivers would have been housed until recently. It makes extensive use of integrated circuits (flat packs). Despite the use of sub-units there are no internal plugs and sockets (with their unfortunate reputation for unreliability) and wire-wrapped or solder joints are used. Frequency selection is in 1Hz steps from 1·25MHz to 30MHz, selectivity is given as equal to that of the best available receivers, intermodulation products better than 85dB, cross modulation 105dB and blocking 100dB (reference 1μV). Stability is better than 0·5Hz under all conditions! This degree of stability is required for optimum performance with such systems as Lincompex and Piccolo. The signal path is indicated in Fig 8.

No attempt has been made to bring the noise factor below about 10bB as it is pointed out that in any amplifier or mixer there is an inter-relation between noise, intermodulation products and cross-modulation: improvement in noise figure usually implies a reduction in IPS and crossmodulation. Receiver blocking is also related to the noise and IPS but is also influenced by the noise generated in the heterodyne oscillations (we have referred on several occasions to this question of noise sidebands and "jitter" in oscillators).

The rf tuner has a double-tuned input, using a variable capacitor linked to the digital switches: this may seem surprising in view of the availability of non-mechanical systems. It is stated that alternative systems investigated by the designers included sub-octave filters, slot filters, permeability tuning and electronic varactor tuning. Wideband input circuits were rejected because of the number of large interfering signals that are always present, and which impose extremely difficult linearity requirements on the rf amplifier and mixer. With varactor diodes, it is claimed that performance was limited by non-linearities being introduced and the system was more costly than mechanical tuning. A manually-set aerial attenuator is included since it is considered that attempts to automate attenuators (by means of feedback loops) "have not been very satisfactory, primarily because no information is available within the receiver to determine whether the attenuator should be in use or not". The preliminary 30MHz narrow-band filter is described as a "roofing filter" as this term is now being applied to a filter of narrow bandwidth, at an early stage in the receiver, intended to give protection against adjacent frequency interference, but where final selectivity characteristics are determined by filters at a later stage in the receiver.

Up to the roofing filter, very little signal amplification is used, other than that needed to avoid the introduction of noise by other than the first stage and to compensate for the losses in mixers and filters; even after the filter, signals are maintained at a fairly low level until after the 2MHz filters.

The first and second frequency converters are a combination of fet linear amplifiers and diode bridge mixers using hot carrier (Schottky) diodes which give better linearity and lower noise than conventional diodes. This is yet another indication of the soundness of the semiconductor approach advocated a couple of years ago by Walter Schreuer, K1YZW/G3DCU, whose company, Comdel, market the HDR10/CM100 combination of special fet amplifier and double balanced mixer which has been mentioned before in *TT*. If you are going to use semiconductors in the front end of a receiver rather than, for instance, a beam deflection tube,

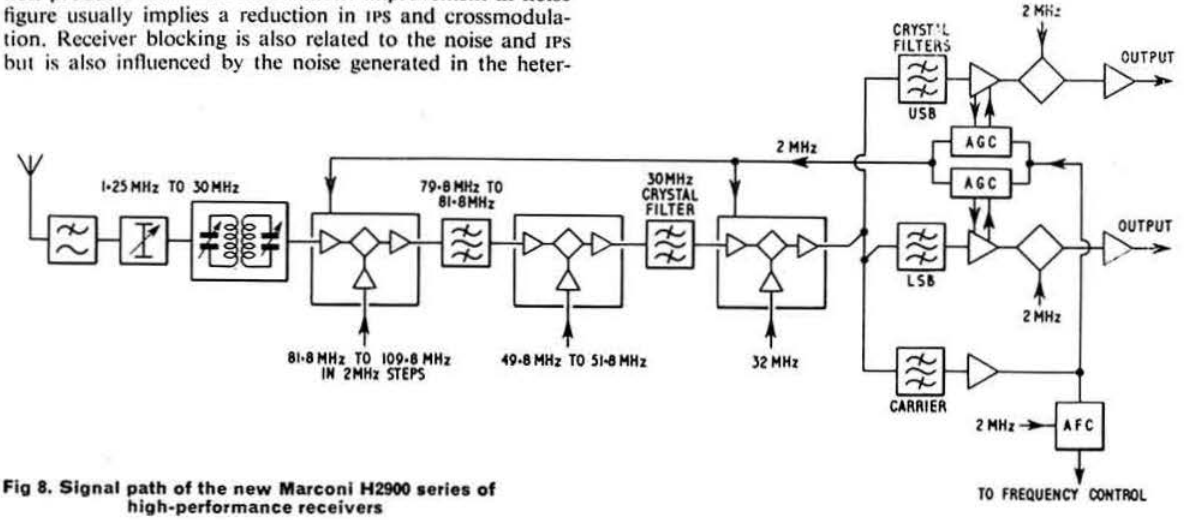


Fig 8. Signal path of the new Marconi H2900 series of high-performance receivers

then this is probably the most linear system so far, unless you are prepared to tackle the complications of the paramp up-converter.

The Marconi design is required to meet a cross-modulation specification as follows: "Without the use of aerial attenuation, with a wanted signal of 40dB (ref 1μV) and an unwanted signal of 105dB, situated 15kHz away and modulated 30 per cent, cross modulation of only -20dB relative to wanted output is permitted."

There are many other interesting features mentioned in the Marconi article but most have little direct connection with amateur reception; the synthesizer, for example, controls and corrects a highly stable LC oscillator, by means of an assembly and subtraction of pulses, rather than the more usual variable divider technique.

Slow-scan DX TV

In *TT* (November 1968) we referred to the potentially interesting developments possible in long-distance slow-scan television, following the agreement by FCC that American amateurs holding extra or advanced class licences could transmit SSTV using tone on ssb transmitters in the hf bands. It seemed likely then that SSTV based on the American standards proposed in 1961 would soon be making quite an impact on the dx scene. To some extent this is the case; there are now quite a few amateurs in the United States and Canada, as well as others in Sweden, Belgium and Italy, equipped to send and receive pictures with a read out of 7·2 seconds. But, rather surprisingly, many of these stations are still anxiously awaiting a first "video" contact with the UK.

Grant Dixon, G6AEC/T, G8CGK (and one-time 2DBQ), who looks after the slow-scan activities of the British Amateur TV Club, tells me that he has received letters from overseas amateurs such as SM0BUO and I1LCF asking for details of British SSTV amateurs active on hf bands with cameras and monitors to the American standards. But, unfortunately, there appear to be none. Grant Dixon believes that at present the only people in the UK who can resolve such pictures are active either on closed-circuit or vhf only.

Briefly these SSTV standards are 120 lines, 1·1 aspect ratio, 16Hz horizontal time base, 7·2 seconds vertical time base, 5msec horizontal sync pulse, 30msec vertical sync pulse. The tone subcarrier is frequency modulated with 1200Hz corresponding to sync level, 1,500 Hz black level and 2300Hz peak white. Most SSTV equipments draw heavily on surplus components and long-persistence radar tubes. The video can be sent through any normal bandwidth phone channel and can be recorded on audio tape recorders.

Fig 9 is one of a series of photographs taken of 1966 SSTV transmissions from W9NTP, Indiana—this one received at HC1WD, Ecuador. Excellent pictures, portraits and captions can be passed over hf circuits to anywhere in the world (just think of all the first SSTV contacts waiting to be chalked up).

SSTV presents a definite technical challenge and is likely to be a developing form of communication, with its merging of tv and facsimile techniques, and offers a good deal of promise for the future. Surely there must be some hf types in the UK willing to take a crack at it? If so, Grant Dixon, Kyrle's Cross, Peterstow, Ross-on-Wye, Herefordshire, would be glad to pass on further details. Let us hope that it will not be long before *MOTA* is able to record some notable British "firsts" in this fascinating and worthwhile field.

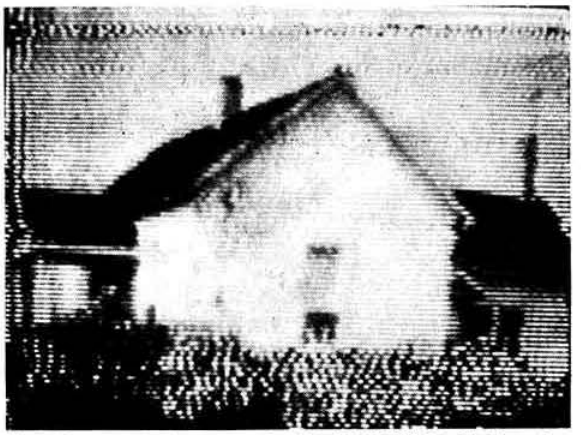


Fig 9. Slow-scan picture received by HC1WW, Quito, Ecuador, from W9NTP, Indiana, on 14MHz (Courtesy of British Amateur Television Club)

Component failure rates

In recent years there have been many investigations made to determine the relative failure rates of different components. Unfortunately, most of the resulting lists of failure rates have had little immediate relation to the types of equipment used in amateur stations. However, the list given in the accompanying Table 2—and kindly passed on by G2BVN—is a current one based on a one-year sampling by a major communications concern operating many radio stations. The figures are comparative, and scaled up to avoid small fractions. It provides an informative commentary on the present state of component technology.

Table 2—Component Failure Rates

Resistors		**Diodes**	
Composition	1·7	Germanium	15
Wire-wound	6·3	Silicon	4
Deposited Film	10		
Metal Oxide	3·5	**Inductances**	
Resistors, variable		All Coils and Transformers	12
Composition	9·5		
Wire-wound	30	**Soldered joints**	
Capacitors, fixed		Each Component Termination	0·9
Silvered Mica	1·0		
Ceramic	1·0	**Plugs and connectors**	
Paper	2·5		
Plastic Foil	1·5	Per Contact (Gold Plated)	25
Tantalum Foil	12	Per Contact (Other plating)	30
Tantalum Solid	10	Valves	1000
Aluminium Foil (Electrolytic)	45	**Mechanical devices**	
Capacitors, variable			
		Relays	25
Mica and glass	7	Switches per contact	45
Ceramic	6		
Air-Dielectric	3	**Miscellaneous**	
Transistors		Crystals	30
		Thermistors	95
Germanium	30	Fuses	150
Silicon	8	Attenuators	6
		Meters	300
		Lamps	200

FOUR METRES AND DOWN

A monthly account of vhf activity and news compiled by JACK HUM, G5UM*

How far the horizon ?

Further to last month's comments about site take-off at vhf, the following figures show the distance of the horizon from various heights:

Height	Approx horizon range
20ft	6 miles
50ft	9½ miles
100ft	13 miles
500ft	30 miles
1000ft	41½ miles

These are *visual* ranges: as every metre-wave user knows, his signals scatter over the horizon for some distance beyond them, assuming normal radio propagation conditions, which is the assumption adopted by such people as planners for television transmitter programme coverage, or vhf point-to-point services, where 100 per cent reliability must be the target, and none of this dx nonsense.

(It does not do to dogmatize on this point: the extension of vhf range beyond the horizon was discussed as long ago as 1951 by our present President in an important paper on "The propagation of metre waves beyond the horizon." See *Proc IEE*, 98, part 3.)

The line of sight figures go to show why well-sited portable stations in contests romp away with the points, and why the Society's VHF Contests Committee wisely places such stations in a separate scoring category from fixed stations operating from more cluttered home locations.

The figures assume a clear getaway from the observer's vantage point. Picking a portable site on a map can be an exercise in self delusion if the "anti-getaway" lumps and bumps in the vicinity of that "ideal" location are not taken into account.

Still *in re* sites. . . .

"Stroke P" problems

Picking a portable site can be an exercise in something else, too; *congestion!* Someone may have got there first.

This in the nature of things is bound to happen. Portable operation increases in popularity every year. More people make for the favoured mountains, and if this does not actually lead to co-sited operation by competing groups it *can* lead to *near*-sited operation by stations perhaps on adjoining hilltops, each putting out a hefty erp from high gain aerials.

Co-siting is already with us. Go to Dunstable Downs in Bedfordshire during one of the more popular 2m events and you will find three or four separate "Stroke P" teams in operation, all in happy competition, each hopping into the others' vehicles from time to time to see how they are doing.

Or, as has happened more than once high up in the Peak District, two teams converging on the same spot, surprised to meet one another on the mountain top, decided to join forces in a combined effort. Result: double the operating expertise became available, and larynxes were less extended than they would otherwise have been.

There are two features of portable operation which have developed over the last couple of years. One of them is groups' willingness to venture further afield than the same old hilltop they have occupied for the last umpteen years. By trying a new terrain a portable group is enabled to acquire the feel of a band in a different locality, perhaps even promoting vhf activity where it may have been sparse, and offering on occasion rare counties to fixed stations seeking a "Four Metres and Down" award (the grateful thanks expressed to portables by G3MCS in this last context will be echoed by many. See "Here and there", December).

The other notable "Stroke P" development is in the direction of valveless rigs. At least one group with an exceptionally good site at their disposal decided last year to see what could be done not by "blowtorch tactics" but by micropower from all-transistor transmitters. The results obtained from 3,500ft were quite remarkable. Others, inspired by such articles as those by G8ARV (December 1969), and GW3DFF (the famous "Snowflake" of last February) have got down to the necessary constructional work with every intention of demonstrating that the operative word is *portable*.

* * *

As for the useful accession of counties which portable operations give to the fixed station man, on now to—

Another thirty-eight

A record increase of 38 callsigns goes into the operating awards table, for which we are glad there is space available this month. Most, as might be expected, are for 2m operation, with a goodly intake of G8B—callsigns now in the honour roll, eight of them in the 144MHz clip and five in the 432MHz one. We hear that there is some competition to see who will be the first G8C— to gain an RSGB operating award. May their cards roll in quickly.

Special congratulations should go to the seven new holders of the senior award, all of them exceptionally well known on their respective bands.

* Houghton-on-the-Hill, Leicester, LE7 9JJ. **Send reports for the March issue to arrive not later than 9 February, and for the April issue not later than 9 March.**

Several dozen class B licensees have joined the Society since the rules for the "Four Metres and Down" operating awards were last printed here, so the following information may be of use to them:

To claim the 2m award send QSL cards from 30 British counties and five countries to G3GMY, Frank Green, 48 Borough Way, Potters Bar, Herts, with a large sae for their return. To claim the 2m senior, send cards from 60 counties and 15 countries. For the 70cm award, 20 counties and three countries; for the 70cm senior, 40 counties and nine countries are required. The 23cm requirement is also 20 plus three. Include a check sheet, counties written down in alphabetical order, with the claim sent to G3GMY.

Class A operators claiming the 4m certificate should send cards for 20 plus three (ordinary award) or 60 plus six for the senior.

Separate claims may be made for home QTH, "Stroke A", "Stroke P" and "Stroke M", but categories cannot be mixed.

If you hold three senior awards or two seniors plus the 23cm ordinary, you can claim the supreme award (for fixed stations and "Stroke A" only). Nobody has done so yet. Nor for the 13cm one—15 plus three. Soon, maybe.

Beaconry

Thanks go to members who contributed spares for the GB3VHF beacon following the request made here. A few more 829B valves for the pa and an EY82 for the psu would be welcome. To avoid breakage in the mails it might be preferable to bring them along to the VHF/UHF Convention in April and press them into the hands of beacon keeper G3BPT then.

Three new UK beacons are in the air, one of them almost on it. If you had wondered what GB3SX was doing in the "Beacon stations" box in "Four Metres and Down" when there were no evident signs of it in operation, the answer is that closed-circuit tests have been in operation on 70·699 MHz ahead of its on-air commissioning. These have now developed to the stage of low-power radiation tests from a site on the South Downs. Any moment now this new Sussex beacon should be in full song from a hand-picked high-up site that will make it a useful southern complement to its northern companion, GB3SU at Sheffield, which is 4kHz lower in frequency.

The two other proposed beacons will give 23cm spot markers for the first time. A proposal to have one on an elevated site in South London will bring pleasure to the hearts of all 23cm users whose need for a reliable continuous signal is especially important for putting new converters to work, and, you never know, prompting others to take an interest in this exceptionally fascinating band.

But do not expect a beacon service on 1,298MHz instanter. To give a 100 per cent beacon service on the lower frequencies is a difficult enough task; on "23" it is an even tougher assignment.

Now to 70cm. Probably by now GB3SC will be in operation at the top end of the new communications band of 432–433·5MHz, the few legal tapes that needed tying up having been attended to. This marker should, on the basis of earlier tests, give an extensive service area from its aerials high up on the Sutton Coldfield television mast. Reports at long range would be useful.

From Mike Walters, G3JVL, comes news of the Iceland-bound beacons which have been in course of overhaul by the South Coast VHF Group. There will be three of them, radiating on 70·275, 145·13 and 50·010MHz, the last named operative only when local tv is off, the other two continuous. Callsign TF3VHF, site up in the mountains by the television transmitter, installation by the Icelandic Posts and Telegraphs, and commissioning in the next month or two.

All three give the opportunity to UK listeners of reception at extreme vhf range, and by a variety of propagation modes, including meteor scatter. Which brings us to a further piece of interesting news about Mike Walters. . . .

BEACON STATIONS

Call-sign	Location	Nominal Frequency	Emission	Aerial Direction
GB3ANG	Craigowl Hill, Dundee	145.950 MHz	A1	S
GB3CTC	Redruth, Cornwall	144.13 MHz	A1	NE
GB3GW	Swansea	144.250 MHz	A1	ENE
GB3GM	Thurso	70.305 MHz	A1	N/S
GB3GEC	W. London	434.000 MHz	F1	N/W
GB3SC	Sutton Coldfield*	433.50 MHz	A1	N/S
GB3SU	Sheffield (temporary location)	70·695 MHz	A1	Omni
GB3SX	Crowborough,Sussex*	28.195 MHz	A1	E/Omni
GB3SX	Crowborough *	70.699 MHz	A1	Omni
GB3VHF	Wrotham, Kent	144.500 MHz	F1	North-West

* Not operational

M-S on "Four"

A carefully planned series of meteor-scatter tests on 4m between G3JVL on the south coast and GM3UAG at Banff (Jim Davidson was the subject of VHF Personalities No 10 last year) was crowned by success on 3 January during the Quadrantids meteor shower.

The tests, beginning last October, were first concerned with commoning-up frequencies on 70·303MHz—and would-be meteor-scatterists are well advised by the experiences of people like G3JVL and GM3UAG, G3CCH, G3LTF and others to give this factor high priority, for unless you are "spot on" when using the narrow band reception technique required by m-s, you might as well save your time.

The JVL-UAG contact began at 2140gmt on 3 January with bursts of increasing length until at 2200gmt a 20second burst allowed the passing of a lot of information by very rapid cw to bring the QSO to completion by 2210gmt. Signals peaked S9 at times.

Path distance is about 480 miles; from Banff to Reykjavik, about 800 miles, putting into the mind of GM3UAG the possibility of opening up the 4m path to Iceland already blazed by G3JVL and G8LY with TF3EA last year.

And on "Two"

Following his success in opening up the UK-to-Faeroe Islands path on 2m via the Leonids meteor shower in November, G3CCH of Scunthorpe arranged a schedule with OY2BS during the Geminids of December. Although no contact was made, three separate stations were heard within the very narrow receiver passband used (cw in the bottom end of "Two", of course). First EA4AO pinged up, then a signal which came and went so fast that it could not

be identified, immediately followed by OY2BS. This phenomenon is put down to the probability that the very long ionised trails produced by the meteors gave a line of sight path between each station and G3CCH in turn.

It was the Geminids that gave Ron Ham, BRS15744, some exceptionally good bursts from Radio Gdansk, the Polish fm broadcasting station on 4m. He says: "The peak on Saturday 13 December was so intense that the chart recorder pen was gobbling up ink as it drew the bursts from Gdansk." The observations produced a triplex chart 13ft long covering three days at five hours per day.

What are the chances of meteor scatter success for Class B licensees who do not have the cw facility? Well, there *have* been sideband contacts via m-s, but it is the ability to send and receive very fast Morse in the bottom end of 2m or 4m that brings the results. One who is very interested in m-s reception is G8CDP of Middlesbrough, who remarks that it would be no bad thing to remind readers to get ready for the next two showings, the Lyrids, 19-23 April (which he describes as a "moderate shower") and the Aquarids of 1-13 May (". . . very swift meteors with long paths").

Video news

The very attractive technical journal *CQTV*, published by the British Amateur Television Club for its members, is back in circulation again. Any BATC members who have not had a copy lately, or who have not heard from BATC, should drop a line to the hon treasurer, Malcolm J. Sparrow, G6KQJ/T, G8ACB, who promises to see that they are reinstated on the club's mailing list. His address: 64 Showell Lane, Penn, Wolverhampton, Staffs.

It would be well worth while writing to G6KQJ/T on another account, and that is to arrange television schedules on 70cm. If a good signal is heard from G8ACB—and it seems to be a pretty potent one over much of the Midlands—there should be a chance of resolving his video. One of his more satisfying contacts recently was with G6AEC/T down at Ross-on-Wye, a 46-mile path over a broken and, in part, industrialized built-up terrain.

Work is in hand to evaluate a pair of the new J-Beam 46-element aerials, which seem to be catching on very effectively with 70cm operators—though this is the first time we have heard of an attempt to stack them.

* * *

The man at the Hereford end of the G6KQJ/T contact was C. Grant Dixon, whose name needs no emphasis to those with long memories who know him as one of the earliest of enthusiasts for amateur television in this country and a pillar of BATC.

He says: "I would be glad to hear from anyone in the Midlands who can give a reception report on vision transmissions—even more glad to hear from anyone who can send pictures back!"

To arrange 70cm teleskeds with him, write to him at Kyrle's Cross, Peterstow, Ross-on-Wye, Herefordshire.

Someone else willing to provide video when required—and this should please home counties operators—is Robert Skegg, G6ADJ/T, of Acton, who runs a 4CX250B in a box cavity, control grid modulated by push pull 6CH6 and driven to 60W by a "Two Six". The system is 625 lines negative modulation, random interlace at present, full interlace being worked on, and the picture source can be a 1in or a ½in vidicon camera. With BBC-style 6MHz sound separation, his video carrier is well up the band. Look for him on 439·9MHz most evenings from 7.30 clock time. Customarily, he beams SE on to Bexley. Write to him if you wish to have his Parabeam turned your way instead. His tuning intentions are given by caption: the tv transmitter stays on if he searches 432 to 433·5MHz but is of course off if he tunes broadband over the whole of 70cm.

G6ADJ/T can be reached at 18 Eastbourne Avenue, London W3, or if you want to phone him dial 01-992 3805.

* * *

Writing from Abingdon, Kevin Erents, G8AGY, sends details of his regular television operating times by his *alter ego*, G6SSW/T. Look for him, literally, after 8pm on Thursdays and 2pm on Sundays, both clock time. He puts out video on 434·6MHz, ". . . with the pa tuned to the high side of this to give a rapid cut-off in the lower sideband," he says. In accordance with the new bandplan he uses 433·5MHz to put out initial CQ calls on A1, starting east-about from the 18-element Parabeam, and trying other directions as circumstance dictates. He can offer 30W of peak white on 405 or 625 line standard from two 1in vidicon camera units. For schedules write to him at Rushcommon House, Abingdon, Berks.

Contest commentary

The circles are more linear. This sounds like a contradiction in terms, but is not. A look at the scoring rings for vhf/uhf contests printed last month will show why. Changes have been made to effect a more even—near linear—gradation of points scored against distance. It is a good plan to have page 47, January, copied and kept in the log for use throughout this contest year.

A suggestion for quick computation of contest points. Prepare a perspex rod with marks at 50km intervals spaced according to the map scale used in the radio room. Skewer this pointer to the map locality of the home QTH. Swing it round to the QTH of each station worked and it gives instant QRB readout in conjunction with the scoring rings.

A proviso at the end of "General rules for VHF/UHF contests" states that QTH must be given as a point identifiable on the Ordnance Survey 10 mile map. Not everybody has a 10 mile map for the very good reason that it is not a good route map for motoring families.

In consequence there is a tendency to quote very large towns as datum points from a contestant's home, when nearer and smaller ones would do, and would probably be more accurate as well. Says G3JKY, hon sec of the VHF Contests Committee: "If any member is not sure of the QTH to give in contests, and will send me a stamped self-addressed postcard, listing neighbouring towns, I will tick those that appear on the 10 mile map. I have only the map showing south of a line Scarborough to Ramsey, IoM, but no doubt someone could fill in any other QTHs required north of that line." And the QTH of G3JKY: 60 Merlin Grove, Beckenham, Kent.

Two up and three to go: this is the situation with the 432MHz Cumulative Contest. The three to go are 11 February and 3 March, which are a Wednesday and a Tuesday, and 23 March, the final leg, which is on a Monday. Select the best three out of the five for your entry, but put

Four Metres and Down Certificates

70MHz Transmitting Section

1 G3EHY
2 G3PJK
3 G2AIH
4 G3OHH
5 G3KEU/P
6 G3NUE
7 G3IUD
8 G6NB
9 G8PD/A
10 G5FK
11 G3NDF
12 G3IMV
13 GI3HXV/P
14 G3SKR
15 GJOUF
16 G3BNL
17 G3PMJ
18 G3PHG
19 GC3OBM
20 G3TLA/P
21 GI3HXV
22 G5UM
23 G3OJE
24 G3SEK
25 G3RWM/P
26 G3FDW/P
27 G3PPG
28 G3FIJ
29 G3GGL
30 G3RDQ
31 G3NJF/P
32 G3RWM/P
33 G3NUE/P
34 G3AZI
35 G3PDW
36 GI3HCG
37 G3LAS
38 G3HRH
39 GM2UU
40 GI3PGG
41 G3VPK
42 G3RLE
43 G3UFS
44 ZB2VHF
45 G3OUL
46 G3UUT
47 G5NU
48 G3OZJ
49 GI3HCG/P
50 GI3PGG/P
51 G3UBX
52 G3VSA
53 G3NKL
54 G3THQ/P
55 G3JHM/A
56 GI3VJS/P
57 G3EKP
58 G3JHM
59 G3VOF
60 ZB2BO
61 G3JHM/P
62 G3NNO
63 G3WQP
64 G3OXD/A
65 GI3WEL
66 G3OHC
67 G2WS/P
68 G3JEQ
69 G3RZK
70 G8LY
71 G3TDH
72 G3GZJ
73 G3XLH/P
74 G3HBG

70MHz Senior Transmitting Section

1 G3SKR
2 G3RWM/P
3 G3FDW
4 G3TCT
5 G5NU
6 G6HD

70MHz Receiving Section

1 BRS15744
2 BRS15822

144MHz Transmitting Section

1 G3HBW
2 G3BLP
3 G3MTI
4 G5YV
5 G3BNL
6 G3MCS
7 G3LAR
8 G3CO
9 G3BA
10 GW3MFY
11 G3DFL
12 G3NAQ
13 G3NNG
14 G3OJY
15 G3KPT
16 G3JYP
17 G3KMT
18 G3OHD
19 G3BBR/A
20 G3HRH
21 GM3EGW
22 GI3OFT
23 G3OBD/P
24 G2HIF
25 G3JDN
26 G8VZ
27 G2AXI
28 G3JYT
29 G5UM
30 G3EJO
31 G3PBV
32 G3FDG
33 G3OSA
34 G3JLA
35 GC2FZC
36 G3BOC
37 G3MTI/M
38 G3OJY (new QTH)
39 G3JWQ
40 G3NOH
41 G3PSL
42 G3LBA
43 G3FUR
44 G2BJY
45 G3MRA
46 G3AGN
47 G3MDH/P
48 G3GMY
49 G3GGK
50 G3MDH
51 G3NLR
52 GM3LDU
53 G3CKQ
54 G5HZ
55 G3NNK
56 G6GN
57 G5ZT
58 G2PL
59 G3FZL
60 G3SAR
61 G3NUE
62 PA0EZ
63 G3AHB
64 G3PTM
65 G3LAS
66 G3RMJ
67 G2CDX
68 G3ORL
69 G2DHV/P
70 G3FIJ
71 G3CXM
72 G3HRH/P
73 G3BDS
74 G3FNM
75 G3IMV
76 G2BQ
77 G3KHA
78 G3OHC
79 G3SHZ
80 G3PKT
81 G3UFA
82 G3RST
83 G5NU
84 G2BHN
85 G3OZP
86 GW3KYT
87 G3ICO
88 G3ETH
89 G2WS
90 G3NJF/P
91 GW3CBY
92 G3TLA/P
93 G3JFO
94 G3TDR
95 G5UM/P
96 GM2UU
97 G3UUT
98 G3BNC
99 G3SZX
100 G3UKV
101 GC3OBM
102 G3FVC
103 G3BJD
104 G3PWJ
105 G2ATM
106 G3ISX
107 G3USF
108 G3OUL
109 G3UIK
110 G3GZJ
111 G3EJA
112 G3JHM/A
113 G8AAZ
114 G3EHR
115 G8ATK
116 G3WW
117 G8APZ
118 G3TR
119 G3WZT
120 G2WS/P
121 G3EHM
122 G3WSN
123 G3RZK
124 G3ILO
125 G3RQI
126 G3OXD/P
127 G3WQG
128 G8APO/P
129 G8BQX
130 G8BJK
131 G6LK
132 G8AYN
133 GI5ALP
134 G8BHI
135 G8ATK(new QTH)
136 G3UQK
137 G8BSH
138 G8BWW
139 G8AUN
140 G8AEJ
141 G3WDG
142 G8BCP
143 G8ABA
144 G3WUW
145 G3YUA
146 G8VN
147 G8BCA
148 G3OHC/P
149 G8BEO

144MHz Senior Transmitting Section

1 G3CCH
2 G3FAN
3 G5MA
4 G3BLP
5 G3CO
6 G3BA
7 G6NB
8 G3EDD
9 G3HRH
10 G8GP
11 G3LAS
12 G3IMV
13 G3PTM
14 G5NU
15 G6GN
16 G3KHA
17 G3AOS
18 G3MRA
19 G3BHW
20 GW3MFY
21 G3DAH
22 G3JEQ
23 G6RH

144MHz Receiving Section

1 BRS22550
2 BRS22322
3 BRS15822
4 BRS15744
5 NL687
6 BRS20108
7 A3470
8 A4048
9 BRS21667
10 A4871
11 BRS23140
12 BRS7323
13 A3942/P
14 A3942
15 BRS24550
16 BRS30352
17 A5032

144MHz Senior Receiving Section

1 BRS15744

432MHz Transmitting Section

1 G3NNG
2 G3KPT
3 G3LHA
4 G3BNL
5 G3MCS
6 G8AAZ
7 G8ABP
8 G3AHB
9 G5UM
10 G8ACQ
11 GW8ACG
12 GW8ACG/P
13 G8AHQ
14 G8AEJ
15 G8AGG
16 G8AGU/P
17 G3PTM
18 G8AAY/A
19 G8AGQ/A
20 G3HRH
21 G8AJU
22 G8ARM
23 G8ADP/P
24 G8AUE
25 G6GN
26 G8AQA
27 G8AWO
28 G8AXP
29 G8AHE/P
30 G8AOD
31 G8AWW
32 G8AKT
33 G8ANS
34 G8ARD
35 G8AIE
36 G3PKT
37 G8ATK
38 G8ACP
39 G8AQZ
40 G8ARC
41 G8AVL
42 G8ART
43 G5NU
44 G3FIJ
45 G3XEB
46 GW8AHI
47 G8AVX
48 G8AKQ/P
49 G8ABB
50 G8ADC
51 G8ADC/P
52 G8ATL
53 G3UBX
54 G8AZO
55 G2WS
56 G8ALM
57 G8AYN
58 G8BGQ
59 G8AWS
60 G8AWS/P
61 G8BYV
62 G3UQK
63 G8BAK
64 G8BCA
65 G8BIL

432MHz Receiving Section

1 BRS 15744

432MHz Senior Transmitting Section

1 G3MCS
2 G8AKE
3 G3KEQ
4 G2XV
5 G8AWS/P

1,296MHz Transmitting Section

1 G3MCS

in your log for *all* those you go in for. Should the score look lowly to you remember you are not alone in this; the great thing is to *put in an entry* to show that at least *you* were on and by that token proving the existence of one more occupant of our 70cm band.

For Class A stations this coming Sunday 8 February is a date to keep free for the 70MHz Fixed Station Contest. It is habitual for a lot of cw to be used in contests on "Four", especially during the closing hours: moral, as always, polish up the brasses.

All vhf/uhf listening enthusiasts will wish to congratulate Colin Baker, A5032, for his prowess in heading the 1969 VHF Listeners' Championship table, where he moved up from third place the previous year. Although he has had good training from G8AIF and G3XEB, his father and brother, respectively, the fact that all three use the same QTH (Brookmans Park, Herts) in close proximity to one another means that Colin does not always find it easy to put some receiving time in when one or both of the other two may be transmitting.

The GD expedition

With its emphasis on 70cm and 23cm, the expedition which the Cambridge University Wireless Society is mounting to the Isle of Man next month looks like being of decided scientific value. Says Steve Cripps, G3TPF, who is organizing it: "We will probably arrange 23cm schedules according to the strength at which we receive stations on 70cm. So if 23cm operators would write to me stating that they have 23cm available, we can decide whether to try 23cm as and when we work them on 70cm."

It is intended to keep long haul cw schedules on both 70cm and 2m. Single sideband will also be in use on "Two".

The callsign will be GD6UW/P, the site Mull Hill, right at the southern tip of the island, with clear sea take-offs all round. And, most important, the dates will be 16 March to 24 March, which means that sked-requesters should write very soon to S. C. Cripps, Jesus College, Cambridge CB5 8BL, to help the team slot all the schedules into the programme well in advance.

News-reading news

Heavily engaged in other directions these days, Ron Vaughan, G3FRV, has had to give up reading the Sunday morning GB2RS news on "Two". Another station with a signal equally as potent takes over for the south country coverage, that of Jim Foster, G2JF, no less.

Beacon-like "John Fox" is certain to give an extensive coverage from the south up—and by quite a long way.

As from 8 February he will be putting out the GB2RS bulletin at 10am clock time for London and East Anglia, and 10.30am for the westbound transmission. This time-change should please most of the people most of the time, ie those who feel that the earlier 9.30am transmissions were a *bit too early* for a Sunday, and those to whom 12noon was running on a bit late.

Tech corner

From G8AYY (Paul Gaskin of S Yardley, Birmingham)
I was interested to read that G8ARM and G8AYN are using the dual Londex 7026 relay unit for 70cm aerial and transmitter changeover. (See Tech corner, December, page 865). I have been using one of these units for 2m aerial and transmitter changeover since 1968, and drive a 1N4387 varactor diode tripler from a 3/20A pa via the unit. The only difference from the method advocated by G8ARM/G8AYN is that I have the aerial changeover relay energized on receive, which I consider to be safer.

Although when using these relays above 200MHz they may appear to be satisfactory from the swr point of view, there is probably rather a high level of cross-talk to the open contact, which may or may not matter.

Incidentally, I would not recommend "on load" transmitter changeover switching.

From G3MNQ (Eric Goodwin, Dunton Bassett near Rugby)
Although no claim is made for originality in suggesting the use of a fet as a camera head amplifier, it is felt that the circuit shown below may interest "Stroke T" operators.

The output impedance of a video camera is very high, and the fairly common practice of presenting it to the base circuit of a bipolar transistor has little to recommend it,

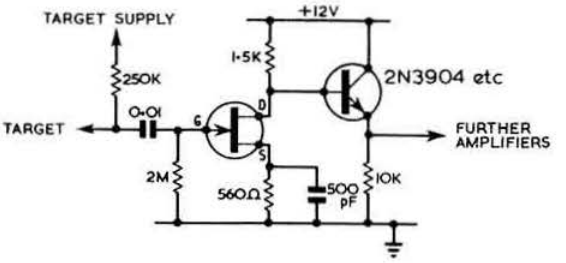


Fig 1. The fet input camera head amplifier described by G3MNQ. The fet should be an audio type such as the U1281 or the 2N3368; rf types are not quite so good

except convenience. Certainly a sizeable mismatch is produced by this arrangement. The high input impedance of a fet, however, allows a much better match to be achieved, and this can offset the lower inherent gain of the fet compared with a bipolar device.

A further obvious advantage of a fet as a post-camera head amplifier is its low noise figure. This is something which allows the minute video signals provided by the camera to show up quite literally to better advantage. Experience with the use of a home-constructed video system has shown that the fet-assisted camera will produce good pictures with considerably less illumination of the subject than that required when a bipolar preamp is used. There is an improvement of approximately a factor of four.

Put another way, this means that with a subject having a given illumination intensity, the camera may be stopped down by a factor of four, ie less light is required.

From G8AYN (Roger Whitbread of Croydon)
The circuit diagram shows a 70cm converter using two BF180 silicon transistor rf stages which has been in use for the last 15 months at G8AYN. The original circuit was given to me by G8AQC.

The converter is constructed on a sheet of double copper clad laminate 5¾in by 4¼in. The oscillator using a 35MHz crystal is followed by three doublers to provide injection at 420MHz from TR8 into the TIS88A mixer TR3. The output of the final multiplier goes to a length of pvc-covered wire, which is L5, to couple to another length of pvc-covered wire to provide injection into the TIS88A mixer.

The oscillator-multiplier chain is accommodated in compartments to the left of the pc board, with the rf and mixer stages to the right, each well screened from the other. The screens are fashioned from double copper-clad laminate 1in deep. A simple case made from tinplate, with a flange at each edge for the chassis to sit on, will provide complete screening.

It will be noted that both BF180 transistors as well as the mixer are each suspended in a slot cut in the dividing screen so that output circuitry cannot see input circuitry.

All trimming capacitors are Mullard tubular ceramic types. The fixed capacitors "C" are not feed-throughs but the special leadless 100pF types, connections to them being kept as short as possible.

The i.f. head amplifier may be necessary where breakthrough is a problem.

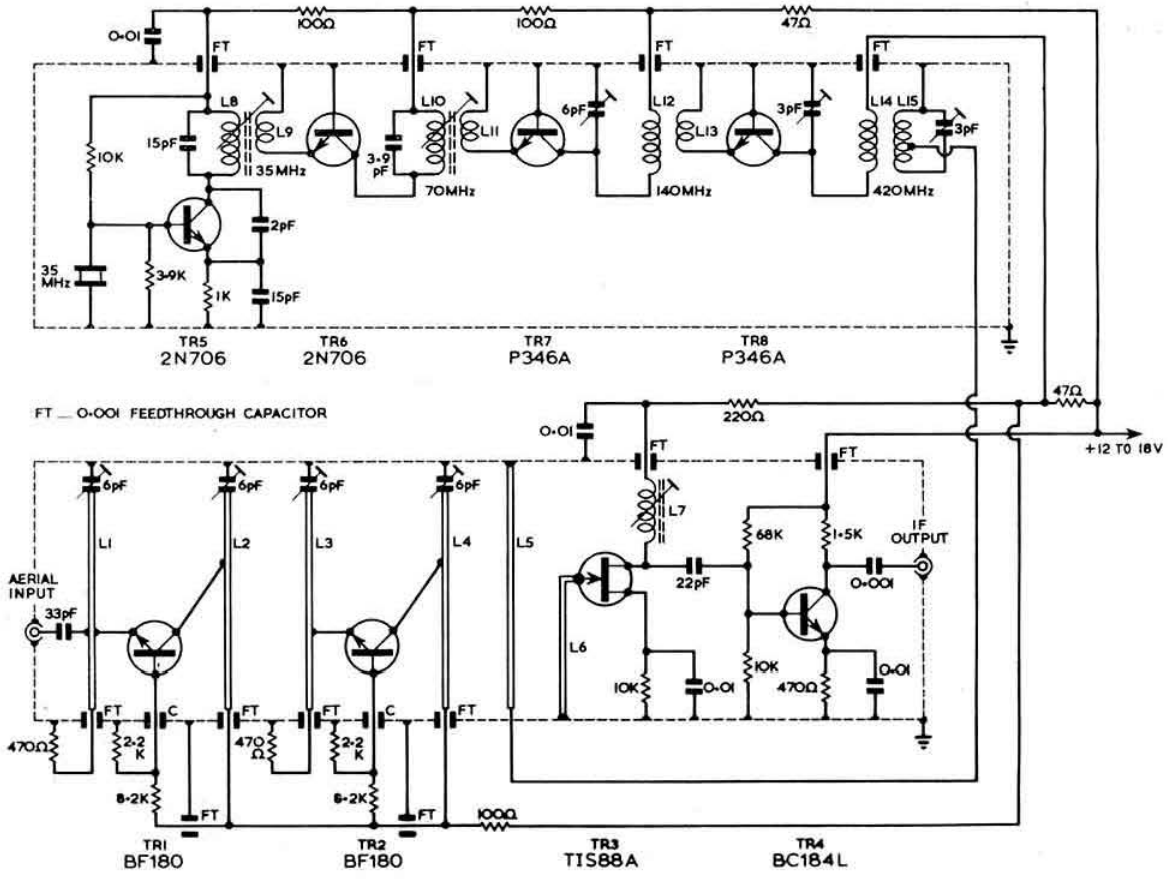


Fig 2. The 70cm converter described by G8AYN

Components list

Inductors

L1 3in silver plated copper wire ¼in od. Tap ¼in up
L2 3in silver plated copper wire ¼in od. Tap 2in up
L3 3in silver plated copper wire ¼in od. Tap ¾in up
L4 3in silver plated copper wire ¼in od. Tap 2in up
L5 pvc-covered wire—see layout diagram
L6 pvc-covered wire—see layout diagram
L7 IF coil 0.3in Neosid former with core to suit IF
L8 10T 22swg ecw on 0.3in Neosid former with core
L9 1T pvc covered wire link
L10 5T 22swg ecw on 0.3in Neosid former with core
L11 1T pvc-covered wire link
L12 2T 18swg tcw
L13 1T pvc-covered wire link
L14 2T 18swg tcw
L15 3T 18swg tcw tapped 1T up
tcw=tinned copper wire, ecw=enamelled copper wire

Transistors

Tr1 BF180
Tr2 BF180
Tr3 TIS88, TIS88A, TIS34, 2N4416, 2N5245 etc
Tr4 BC184L or similar silicon npn
Tr5 2N706 or similar
Tr6 2N706 or similar
Tr7 P346A or similar
Tr8 P346A or similar

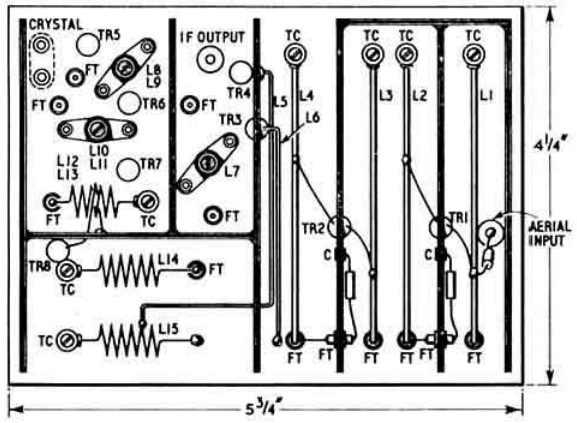


Fig 3. 70cm converter layout

Here and there

"The metre wave man's code" (see this column last May) suggests that beam heading and tuning direction should be stated during the course of a CQ. Now that the new four-zone bandplan is in operation on "Two" the statement of tuning direction is simplified; all that need be said is "Tuning zone B" or ". . . zones C and D," or whatever frequency area it is intended to look at. It is much more precise than saying "Tuning high to low" and should be a time-saver in contests.

* * *

From G3ABG comes a reminder that this year's "Worked all Britain" contests will include at least two on vhf, booked for 19 April (cw) and 28 June (phone) on all bands above 70MHz. Send him a large sae for full particulars (John Morris, 24 Walhouse Street, Cannock, Staffs: the WAB Award scheme is operated by Cannock Chase Amateur Radio Society, and, says G3ABG, ". . . any profits from this award are going to RAIBC and RSGB Building Fund").

The results of these contests in two worthy causes will be given here in due course.

* * *

G3JVL reports that the 50MHz band has been withdrawn from use by Rhodesian amateurs. The 70MHz band remains available to them, and ZE2AZE still operates there.

* * *

In answer to enquiries, we are able to state that the licensing authority have confirmed that Class B licensees are permitted to use artificial satellites in the 144MHz band.

* * *

There are 519 additional G8-plus-three callsigns in the 1970 *RSGB Amateur Radio Call Book*, now out. They reach G8CRZ. By now the allocations are well into the G8D-series. The locations of these later licensees will not be known generally unless they are announced over the air. Always state yours when putting out a CQ and perhaps when in QSO. This will help the other man to orientate his beam aerial to best advantage.

What they say

"I have tried religiously to QSL 100 per cent for contacts with G8BQX and G8BQX/P. If anyone has not received a card from me, I shall be very happy to send one by return.

"I had an interesting comment on a card from a well-known Midlander: 'Tnx for sae. A very rare thing.' I should have thought the sending of an sae was the rule rather than the exception."—G8BQX, St Leonards-on-Sea.

* * *

"I have one of the new J-Beam 46-element jobs for 70cm and it is very good . . . three of us are investigating the one-third scale possibilities. Calculations suggest that it might be about 3dB better than a 3ft dish at 23cm!"—G3YJC, Christchurch.

* * *

"More basic information on 13cm required. Have been trying to find mechanical details of 13cm pa in past handbooks but there are only block diagrams. Can anyone oblige in respect of a 13cm pa using 2C43 lighthouse?"—G8ACJ, Guildford.

"The idea of publishing a list of active Stroke T stations is indeed an excellent one."—G6SSW/T, Abingdon.

* * *

"This must be the worst vhf site in Europe. Cannot contact another GM8 who is 28 miles away, but would still like skeds on 2m."—GM8APX (W. H. Jarvis, Rannoch School, via Rannoch Station, Perthshire).

* * *

"I rather tend to agree with recent comments that it takes a really good transistor converter to beat a good valve one on 50, 70 or 144 MHz."—ZB2BO.

Wedding bells for G3LGK—and his xyl

For those who are wondering at the silence of Brian Sandall, G3LGK, on Two lately, the accompanying photograph reveals all—or nearly all.

Brian says that the desertion (of Two) is, he hopes, only temporary since marrying Ann at Chesterfield on 15 October 1969, and subsequently moving to Chesterfield. The happy couple send best 73 to all their friends.

IARU

Region 1 calling

INTERNATIONAL AMATEUR RADIO UNION

by R. F. STEVENS, G2BVN

Membership

The world-wide membership of the IARU comprises 83 Member Societies, of which 35 are subscribing members of the Region 1 Division. The International Telecommunication Union now includes 137 member nations.

Denmark

OZ1BP Bernhard Pedersen, has been elected chairman of the Danish National Society, EDR, in succession to OZ6PA who has retired after serving as chairman for 18 years. The official address of EDR is Postbox 79, 1003 Copenhagen K, Denmark.

EDR announces an international meeting to be held at Nyborg from 16 to 18 May inclusive. A full programme of events has been announced and there are facilities for camping in addition to hotel accommodation. Enquiries should be addressed to: J. Joergen-Johansen, OZ9DA, Hammershusvej 43, DK-8210 Aarhus V Denmark.

Germany

DARC has announced plans to build a new society headquarters at Baunatal, near Kassel. This will include offices, QSL bureau and meeting rooms. It is hoped that the building will be completed in 1971. Region 1 committee member Herbert Picolin, DL3NE, has the responsibility for co-ordinating the project.

Beacons

A new beacon station, **DL0IGI** is now in operation on 28·200MHz using a vertical dipole and a power of 200W. The location is 49° 08′ N, 13° 08′ E. Reports will be welcome and should be sent to the RSGB Scientific Studies Committee for onward transmission to DARC.

The beacon station **SM4UKV** is now out of service. It is hoped that new stations **SK1VHF** and **SK2VHF** will be operational later this year. **OK1KVR/1** and **OE3XAA** are radiating on 145·960 and 145·950MHz, respectively, and may be heard in the UK under favourable propagation conditions.

G2YS, G2BVN and PA0TO enjoy a personal QSO during the annual VERON "Day of the Amateur" at Utrecht. PA0TO is the editor of Dx press, the Dutch weekly dx news bulletin which is widely read throughout Europe

A limited number of copies are available of the booklet listing the characteristics of beacon stations in Region 1. These booklets may be obtained from G2BVN. Reply postage of 6d would be appreciated.

A Region 1 QRA Locator map, size 12in by 8in, printed on card is available from RSGB Headquarters for 1s plus 4d postage. This map should be found suitable for use at the operating position, particularly during contests.

Czechoslovakia

The first Czech DX club was recently formed by a group of amateurs from Slovakia. Dr Harry Cincura, OK3EA, was elected Club president and OK3IR became Club secretary. OK3-DX Club has 28 full members and 37 others and to promote interest a weekly DX bulletin, *DX-NT* has been established. The editor of *DX-NT* is Joko Straka, OK3UL. Dr Cincura, OK3EA, was a member of the Czechoslovak delegation to the 1969 Region 1 Conference at Brussels. This news of the formation of OK3-DX Club was sent by Tibor Polak, OK3BG.

Contests

The following list provides brief details of the contests organized by Region 1 societies during 1970:

Title	Date and Times (z) From	To	Bands	Modes	Restrictions	Organized by
FRENCH phone	28 Feb 1400	1 Mar 2200	80-40-20-15-10	phone	No	REF
UBA phone	28 Feb 1400	1 Mar 2200	80-40-20-15-10	phone	No	UBA
BERU	7 May 0001	8 May 2359	80-40-20-15-10	cw	British Commonwealth only	RSGB
INTERNATIONAL SP DX contest	4 Apr 1500	5 Apr 2359	80-40-20-15-10	cw	No	PZK
HELVETIA 22	18 Apr 1500	19 Apr 1700	160-80-40-20-15-10	cw/phone	No	USKA
WAEDC RTTY	25 Apr 0000	26 Apr 2359	80-40-20-15-10	rtty	No	DARC
13th OZ-CCA	2 May 1200	3 May 2359	80-40-20-15-10	cw	No	EDR
NATIONAL FIELD DAY	6 June 1700	7 June 1700	160-80-40-20-15-10	cw	Yes	RSGB
EUROPA FIELD DAY	6 June 1700	7 June 1700	80-40-20-15-10	cw	No	DARC USKA/UBA
YO DX contest	1 Aug 1800	2 Aug 2359	80-40-20-15-10	cw/phone	No	RARF
WAEDC cw	8 Aug 0000	9 Aug 2359	80-40-20-15-10	cw	No	DARC
SUMMER FIELD DAY	5 Sept 1700	6 Sept 1700	80-40-20-15-10	phone	No	DARC
WAEDC phone	12 Sept 0000	13 Sept 2359	80-40-20-15-10	phone	No	DARC
28MHz phone	10 Oct 0700	11 Oct 1900	10	phone	No	RSGB
7MHz dx cw	24 Oct 1800	25 Oct 1800	40	cw	No	RSGB
7MHz dx phone	7 Nov 1800	8 Nov 1800	40	phone	No	RSGB
MALTA INDEPENDENCE DAY	20 Nov 0000	21 Nov 2359	160-80-40-20-15-10	cw/phone	No	MARS

THE MONTH ON THE AIR

A monthly feature by JOHN ALLAWAY, G3FKM*

THOSE who despise the use of single sideband telephony and the chasing of dx have had a great deal of evidence to use for their case during the last few weeks. The expected expedition to Revilla Gigedo duly appeared on the dx bands and proved to be the cause of some of the worst possible operating, the majority of contacts apparently being made with stations operating zero beat with the expedition and with most European contacts being made by courtesy of a "Master of Ceremonies". Surely this technique is not needed when propagation makes signals fully readable and when the operator at the far end insists on refusing to work anyone on his own frequency? No doubt the popular transceivers now on the market are largely responsible for the current state of affairs, but surely any operator who is really interested in dx working should have some means of transmitting away from the frequency which his receiver is tuning. The second demonstration of amateur radio bad manners was heard during the OJ0 expedition. Although repeated requests were made for European stations not to call when the bands were open to other parts of the world, they were utterly ignored, and many of our friends in the Pacific and other areas must have been deprived of a contact. Unfortunately some British stations were heard taking part in this incident and one can only regret that those whose native tongue is English are sometimes unable to understand that language.

Roger Brown, G3LQP, is now QSL manager for 9H1AZ (as from 1 November 1969) as well as for 9V1PA (since 26 August 1969). He will deal with requests as soon as he receives the relevant logs.

G3VSA is having his callsign pirated on 80m ssb, mostly on Sunday nights after 2300. The pirate appears to prefer working Swedish stations. G3VSA has no equipment for the hf or lf bands. GW3VFZ has received a report from a listener in the US of his signals on a frequency well removed from those upon which he is allowed to transmit, and this again appears to be the work of an unauthorized person.

News from overseas

A further letter from HH9DL confirms that his callsign is still being pirated on cw. Don lists a further 19 British stations from whom he has received QSL cards for contacts with the pirate and points out that he is often to be found at 2300 on 14,215kHz on weekdays only, and using ssb.

John, YJ8JM, is suffering from a considerable amount of difficulty due to the large amount of commercial QRM around his crystal frequency of 14,040kHz and would be most grateful to anyone who could supply him with one or two alternative crystals. His transmitter uses a 1,170kHz crystal which trebles to 3,510kHz and is then doubled to 7,020 and 14,040kHz. He thinks that 14,088 and 14,015kHz would be good frequencies to use and this would require crystals on 1,174 and 1,168kHz, respectively. The size needed is FTC—ie ½in pin spacing (Defence spec style C). He will be pleased to refund any reasonable costs and asks that they should be sent to him c/o Supt, Radio Station, Santo, New Hebrides, and clearly marked "crystal for transmitters" to satisfy customs requirements. YJ8JM's contract lasts until 1971 although he would like to return home sooner, and he asks all those waiting for QSLs to be patient. Please do not send self-addressed envelopes as the humidity causes them to be well and truly stuck down before they arrive! At least three IRCs are needed for second class airmail reply.

The latest list of stations for whom DL7FT acts as QSL manager includes EA6s, AR, AS, BH, F9UC/FC, HB0LL, HS1CB, KH6GQW, KL7EBK, KR6JT, KZ5EK, OY2A, TF5TP, TU2AY, TU2BB, XW8BP, 3A2CN, 3A2EE, 3A0CU, 3V8BZ and 5L8RL. Frank requests that not more than three QSLs are asked for for each sae and irc supplied.

Barry, the operator on Snares Is (ZM1BN/A), says that the island is administered from Campbell Is and is part of the New Zealand Antarctic Territories. He is not sure of the DXCC status but some reports say that his QSLs will count for New Zealand, although the fact that Campbell Is administers the area suggests to the writer that it should be under the Auckland and Campbell Is heading.

VQ8CFB, in a letter to G2FYT, says that his operating hours are usually between 1200 and 1830. His transmitter is a Heath DX40U crystal controlled on 14,012 and 14,028kHz, and his receiver an Eddystone 740. Jacky has worked a number of European stations already and says that he is anxious to work everyone who would like a contact with St Brandon.

Awards

The Mayflower 70 Award.

Award manager: W. M. Clarke, G3VUC, Fillace Park, Horrabridge, Yelverton, Devon, PL20 7TE.

Instituted by the committee governing the Cheshire Homes Amateur Radio Network Fund to commemorate the 350th Anniversary of the sailing of the Pilgrim Fathers from Plymouth for America. All profits will be directed towards providing amateur radio equipment for the Homes. (No member of the committee will receive payment or reward for his services.) Overseas applicants require proof of contact with five Plymouth stations; British Isles, with five Plymouth and five other stations in Devonshire. Similarly, listeners require proof of having heard the same number of stations. All QSOs/reports must be after 1 January 1970. Any band or mode may be used and stations cannot be contacted more than once for credit. Applicants should submit a list of

* 10 Knightlow Road, Birmingham 17.

QSLs certified by two licensed amateurs that they have checked the cards against the entries in the station log book. Listeners should have their cards checked by two members of an amateur radio club. The fee is 8s 6d or $1 which covers despatch by surface mail. Overseas applicants are asked to submit the fee in the form of an International Money Order which should be made payable to the CHARN Fund and crossed.

The Jubilee Award.

Central Radio Club of the USSR, PO Box 88, Moscow.

This award marks the centenary of the birth of Lenin and for European applicants requires proof of contact with 50 different Russian amateurs, including at least three stations in each of the call areas UA1, UA2, UA3, UA4, UA9 and UA0, between 1 January 1970 and 31 December 1975. Amateurs located outside Europe need only 25 contacts, including one in each district. Any type of emission may be used and a certified log extract (certified by the applicant's national radio society) should be sent to the above address no later than 31 March 1976. There is no charge. Listeners may apply on a "heard" basis.

The WCPR-50 Award.

Issued by IARC. Custodian: W2JXH, 20 Pocono Place, Holiday City, Tom's River, NJ, 08753, USA.

Available to those who submit proof of contact with 50 CPR (= ITU) zones since 1 April 1968. Stickers are available for 60, 70, 75, 80 and 85 zones. Endorsements will be given for phone, cw, two way ssb, rtty or mixed modes, and also if all contacts are made by a mobile station. A signed list of QSL cards, verified by a radio club official or two other amateurs, should be sent to W2JXH, together with ten IRCs or $1. Three IRCs should be sent when applying for stickers. Two points seem worthy of note: contacts in the IARC CPR Contest may be used in claiming this award, in which case it is not necessary to hold QSL cards; the award is to the operator, not the station callsign (ie the applicant can count contacts made when operating from different locations). There is no charge to blind applicants. In the case of /MM contacts being used for credit, QSLs showing the ship's position clearly marked must be submitted for scrutiny to W2JXH. The **WACPR Award** is issued on similar lines to those having worked all 90 zones.

The Rome Centenary Award.

ARI, PO Box 361, Rome, Italy.

European stations need 12 points, others eight. Each QSO with a Rome station during 1970 counting one point, except on 20 September when they count three points. Available also to listeners. Applicants should send certified list plus eight IRCs to the address above.

G3ABG points out that w.e.f. 1 January 1970 contacts for **WAB** need not be QSLd if the station's area numbers are exchanged and recorded and if full QSO details are entered (in chronological order) on the WAB check sheets and certified by those certifying the application as being correct. This move has been made to relieve the QSL Bureau load.

Stations working for the **Prince of Wales Award** who have worked GB2HRH but still need more GW contacts now have until 1 July 1970 to obtain these. This is the first anniversary of HRH the Prince of Wales' Investiture. G3WET, who gives this information, also says that he is able to operate from Merioneth and/or any rare WAB areas in that part of Wales by request on any band 10 to 160m. Those interested are invited to write to John at 104 Stonnall Rd, Aldridge, Staffs.

Elected to a second term of office in the Northern California DX Club were: Don Schliesser, WA6UFW, Vice-president; Walt Cooper, W6CDJ, Secretary-Treasurer; Hugh Cassidy, WA6AUD, President. (WA6AUD is a member of RSGB.)

New prefixes

There would appear to have been some changes in the use of callsigns in the USSR as from 1 January 1970. In future all club stations will use a UK prefix and their suffix will indicate their oblast or country—eg UQ2KAA has now become UK2QAA. New licensees will receive three letter calls in future, but it is understood that existing two letter calls will not be changed.

The HT prefix is being used by Nicaraguan stations who are celebrating the 25th anniversary of the Managua Radio Club in 1970. IR0 stations are located in Rome and are using the special prefix to commemorate one of that ancient city's anniversaries. Stations in Yugoslavia are currently using the YT prefix to mark the twenty-fifth anniversary of their country's independence.

Reciprocal licensing

The UK/US reciprocal licensing agreement has now been broadened to include the following areas: Bahamas (VP7), Bermuda (VP9), British Honduras (VP1), British Virgin Is (VP2V), Cayman Is (ZF), Falkland Is (VP8), Fiji (VR2), Gibraltar (ZB2), Hong Kong (VS6), Montserrat (VP2M), Seychelles (VQ9), St Helena (ZD7), Turks and Caicos Is (VP5), British Solomon Is (VR4), New Hebrides (YJ8), Gilbert and Ellice Is (VR1), Antigua (VP2A), Dominica (VP2D), Grenada (VP2G), St Lucia (VP2L) and St Vincent (VP2S).

Contests

The 1970 IARC Propagation Tests

0001 28 February to 2400 15 March (CW/RTTY).
0001 28 March to 2400 19 April (Phone).

The objective is to work as many different CPR countries and zones as possible. The IARC country and zone list will be used. Each QSO between fixed stations counts one point,

fixed to mobile two points, and mobile to mobile four points. No QSO points are counted for contacts with stations in one's own zone. A multiplier of one for each zone and each country worked on each band and mode is counted, and in addition to the countries listed on the IARC list, each state of the continental USA, each Canadian province, and each republic of the Soviet Union also counts as a multiplier. Stations may be worked any number of times during the contest period and contacts lasting more than six minutes may be scored separately for each six minutes or fraction. These should be logged as separate contacts. Listener participation is encouraged and those interested are invited to write to Mr Stewart Foster, G-10173, Manager SWL Contest Activities, 68 Goldsmith Walk, Lincoln, for rules and logs. Transmitting amateurs may obtain logs and summary sheets from IARC, PO Box 6, 1211 Geneva 20, Switzerland. Entries may be single or multiband and QSOs may be used to earn credit for applying for the WCPR-50 Award (see *Awards*).

Final 1969 Countries Table

	1·8 MHz	3·5 MHz	7 MHz	14 MHz	21 MHz	28 MHz	Total
G3LNS	—	**102**	**123**	**186**	**163**	**131**	**705**
G3UML	1	93	86	178	125	124	607
G3TZU	9	42	67	133	143	167	561
G3XYP	—	40	69	197	137	104	547
G3KDB	—	70	103	158	115	79	525
G3TXF	10	66	63	126	74	119	458
G2MI	1	45	51	138	122	75	429
G3HCT	—	85	73	47	61	111	377
G3KS	1	36	29	101	93	91	351
G3XBY	3	44	58	68	71	76	312
G3VUM	4	22	19	107	84	64	300
G3JVJ	12	76	27	114	18	29	276
G3VLM	1	16	26	72	53	53	221
G8VG	3	28	28	30	62	49	200
G4RS	4	25	10	63	66	21	189
G3PEJ	4	6	23	47	62	44	186
G3VPS	3	15	19	84	30	33	184
G3WPO	18	14	38	56	20	31	177
G3ING	8	17	21	38	22	20	126
G3IAR	2	23	21	25	23	26	120
G3VJG	—	9	26	13	10	54	112
G3JHI	—	18	16	20	20	16	90
G3PQF	6	13	12	30	8	5	74
A5390	**10**	**90**	**69**	**186**	**172**	**108**	**637**
BRS25429	4	93	107	174	133	121	632
A6148	8	102	82	138	113	135	578
BRS26870	5	76	66	139	110	108	504
A6254	6	53	26	128	160	98	471
BRS31164	4	52	47	127	107	81	418
A5662	18	31	31	127	114	86	407
BRS31427	—	3	14	170	118	87	392
BRS30694	9	31	40	98	129	67	374
A6590	3	63	5	89	103	11	374
A6337	5	52	43	104	108	51	363
A6143	4	40	50	79	112	64	349
A5489	—	59	33	103	95	55	343
BRS28198	2	46	60	109	61	63	341
A5154	2	35	18	111	83	62	314
A6431	11	36	33	95	89	47	311
A6278	2	30	32	130	75	20	289
A6023	7	44	20	76	72	42	261
A5466	8	46	38	58	36	69	255
A6003	5	25	24	46	93	61	254
A6553	2	16	8	52	102	63	243
A6242	2	23	13	88	70	43	239
BRS31172	8	26	30	74	62	37	237
BRS27806	6	35	20	67	64	4	236
A6593	7	17	14	75	74	45	232
A6201	1	43	31	60	37	31	203
A6444	3	28	29	86	33	23	202
A6220	1	16	24	95	15	18	169
A6923	4	29	14	54	40	27	168
A6098	5	18	30	55	40	18	166
A6179	4	18	15	65	35	9	143
A4255	1	14	8	32	31	15	101
A6144	—	4	15	62	—	—	81
A6498	4	14	4	35	9	11	77

Congratulations to **G3LNS** and **A5390** who have each been forwarded their copy of the Amateur Radio DX Handbook. Many thanks to all who took part.

The 1970 Worked All Britain Contests
0900 to 2100 15 March (HF Phone).
0900 to 2100 29 March (HF CW).
0900 to 2100 5 April (LF Phone)
0900 to 2100 12 April (LF CW).

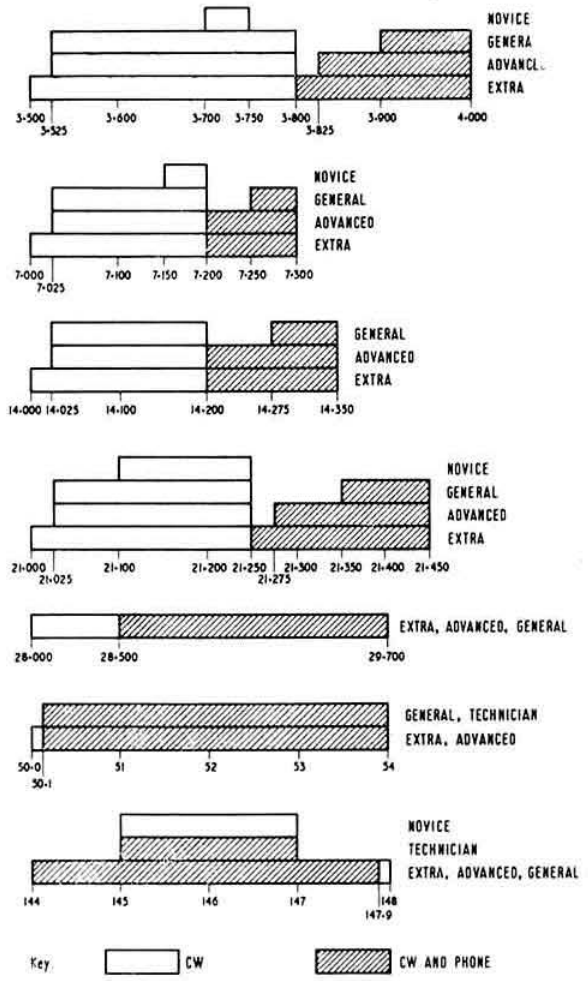
LF contests cover 1·8, 3·5 and 7MHz, and HF cover 14, 21 and 28MHz. Each QSO counts five points and stations may be worked on each band for further points. The multiplier for UK stations is the total number of different WAB areas plus the total of different ARRL countries worked. Overseas stations use the number of WAB areas as a multiplier. (Note that for these contests the different US, Canadian and Australian call areas count as country multipliers.) Entrants should exchange reports, and serial QSO number; in addition, UK stations should give their county and WAB area number. Licence and band planning regulations must be observed by all participants, and contest logs must be sent to G4CP, 74 Long Lane, Newtown, Bloxwich, Staffs, to arrive within 50 days of each contest. A certificate of merit will be awarded to the leading competitor in each country. Where more than 20 entries are received from one country or licence area, second and third place certificates will also be awarded. Listeners working for the HAB Award may use reports on stations taking part in the contest in place of QSL cards when making claims, and the top three listener logs will receive certificates.

The 1970 **Islands on the Air Contest** began on 1 January and will finish on 31 December. This is a dx contest with a difference, the participants trying to work as many different islands/island groups as possible during the year. Official IOTA lists may be obtained from the organizer, Geoff Watts, 62 Belmore Rd, Norwich, NOR 72-T, price 4 IRCs or equivalent.

Dxpeditions

The recent trip to **Cocos Is** by TI8PE/TI9 was unfortunately not able to provide as many with contacts as had been hoped. A difficult landing in high seas caused the loss of various items of equipment, including antennas. However, it is now reported that a further expedition will take place between 8 and 13 February. This will be undertaken by TI2CMF, K9KNW, K6JGS/HK3 and several others. Two transmitters will be on the air continuously and making full use of 160 to 10m. Their callsign will be TI9CI and four of the operators intend to proceed to Serrana Bank (KS4B) for a two-day operation on 14 and 15 February. Possible operating frequencies have been given as 1,805, 3,505, 7,005, 7,085, 7,095, 14,005 and 14,195kHz. Others may be 21,005, 21,295, 21,305, 28,005, 28,550 and 28,600kHz. It is also rumoured that K5QHS has an interest in visiting Serrana Bank and/or Bajo Nuevo (HK0) some time during spring this year. QSLs for TI9CI should be sent with sae and IRCs to TI2CMF.

Revised USA frequency allocations



TU2BB was due to visit **Dahomey** at the end of January and is reported to have a TY licence but no equipment available. Some gear which was en route for TY6ATE before his recent return to the US (on account of illness) has now arrived in the country and a fellow missionary is trying to clear it through customs. Ted hopes to be able to reactivate his TY6ATE call in the autumn.

According to the *DX'ers Magazine*, Herman, TJ1QQ, will be going to Fernando Poo in the near future and expects to be given a callsign with a 3C1 prefix. TJ1QQ is a very excellent operator and should be able to make a lot of contacts. QSL cards will be dealt with by W4DQS.

GM3s FSV and OGJ are hoping to remedy the lack of activity from the county of **Kinross** during the weekend of 6 to 8 February. They hope to operate continuously as far as conditions allow on 160, 80, 20 and 15m throughout the 48-hour period.

There is a strong rumour that Vlad, UA1CK, will be visiting **Franz Josef Land** in the near future. April or May are the most likely months and the operation may last for five days. The whole affair depends on suitable transport being available.

Further information concerning the visit to **Qatar** by MP4s BHH, and BHV, together with SV0WI, OD5BZ and MP4QBK, has now been received. The group will leave Bahrain on 19 February and will arrive at Dohar on 20 February. Operations should commence on the 21st and an attempt will be made to provide 24-hour operation for the duration of the seven-day stay. They will concentrate on 14, 21 and 28MHz but have facilities available for 7 and 3·5MHz if conditions and demand warrant their presence on these bands. Frequencies given are 14,020 (listening 14,030kHz), 14,185-14,190 (listening 14,275-14,285kHz), 21,020 (listening 21,030kHz) and 21,185-21,190kHz (listening 21,275-21,285kHz). During the first five minutes of each hour they will listen especially for yl callers, and for the five minutes after each half-hour for low power stations.

KA9RC is said to be planning another visit to **Torishima Is** (formerly Marcus Is) during late spring or summer. His callsign may be KA1B.

News of the visit by a group of Finnish amateurs to **Market Reef** was received too late for inclusion in an earlier *MOTA*. The reef, situated between the Aaland Islands and Sweden, is administered by Finland and is 100 by 40 metres in size. There is a lighthouse on it from which the expedition operated. According to OH2BH it has already been accepted by ARRL as a new country and it is very likely that it will be activated again this year, possibly in June.

A second expedition which was publicized too late to appear in *MOTA* was the Spratley Is operation by W4AMG/Spratley. However, the owner of the *Exodus* intends to spend the next year or two cruising in the Pacific and Indian Oceans and hopes to be able to operate from a number of unusual locations, some of which may qualify for new country status. Another ship, the *Mia Mia*, is at Hong Kong and is equipped with an FTDX400 and FL2000. Its owner may also be operating from some rare places. QSLs for the Spratley trip should be sent to the address in *QTH Corner* accompanied by an sae and five IRCs.

DX news

There now appears to be two stations on the air from Macquarie Is; VK0KW, who has been worked on 14MHz cw and who asks for QSLs via VJ7KJ, and VK0LD who uses ssb and should be QSLd via ZL2AFZ. VK0HM (Heard Is) will remain on the air until March but seems to prefer working into the west coast of the US with his 14MHz ssb signals. QSLing will be delayed until his return to WA6EAM in June.

It is understood that the expected suspension of amateur activities in Iran has been averted due to the timely intervention of the Shah. This would seem to indicate that at least one country is fortunate in having individuals with sense and vision in high office.

Les, VP8KO, was due to leave S Orkney early in January on board the *John Biscoe*. However, the ship was unable to land due to thick ice and he now awaits the arrival of the *Perla Dan* which should reach there in early February. Les says that as far as he is aware there will be no activity during 1970 from S Orkney, Argentine or Adelaide Is, and also that VP8JV (S Georgia) is off the air with equipment trouble.

Both sides of one of the special cards being provided for Australian amateurs during 1970 to celebrate the Captain Cook Bi-centenary Celebrations. They are multi-coloured, most attractive, and well worth acquiring.

French reciprocal licensing is now said to extend to overseas territories as well as metropolitan France. This should considerably increase the likelihood of activity from Clipperton Is in the near future.

5H3KJ advises that stations in Zanzibar are likely to use a 5H1 or 5I1 prefix in future. He may be on the air from 9U5, 9X5 and 5X5 soon with his HW100 transceiver.

Reciprocal licensing between Thailand and the USA is still not agreed but several Thai nationals are reported to be active on the bands. It is said that the US and Honduras have now agreed over the sovereignty of Swan Is (KS4) and that in future it will be administered by Honduras who will respect the US installations on the island. Callsigns in future will most likely use the HR7, HR0 or HQ0 prefix.

Considerable change is now taking place among the operators in the French territories in the Indian Ocean area. A new operator, Robert, has been on from FB8WW since 21 December and he will be active mostly on cw. The relief crew at FB8XX will include four new operators among whom will be Maurice, F6APG, who has been on the island before. QSLs will continue to be dealt with by F2MO who hopes to have received all the 1969 logs by February.

QTH Corner

AC3PT	(Op'n by W1FLS) F. Lieberman, Music Dept, Brown University, Providence, RI, U.S.A.
CT2AK	via VE7BWG, V. L. Larson, 488 East 4th St, North Vancouver, BC, Canada.
DU1ZAW	Wm. Long, 1941 Kamios St, Dasmarinas Village, Makati, Rizol, Philippines.
EL2BE	WB8ABN, Box 62, Rochester, Mich, 48063, USA. (sae + 2 IRCs.)
FB8WW	(Op Robert) via F5QE, 45 Av, J-Jaures, 94 Vitry, France.
HS3NT	Sawad Chaikuna, N Technical College, Chiangmai, Thailand.
KJ6CD	via W5HM, John Johnson, Box 16, Mtn Homes Estates, Tijeras, NM, USA.
ex-MP4BHD	J. C. Eastaugh, G3YUN, 13 Dale View, Headley, Epsom, Surrey.
MP4BHM	R. Scarrow, PO Box 144, Bahrain, Arabian Gulf.
MP4QBK	via MP4BHH, Tom Jordan, PO Box 155, Manama, Bahrain, Arabian Gulf.
OJ0MR	via OH2NB, Armas Valste, Lansipellontie 12, Helsinki 39, Finland.
ON QSL Bureau	UBA, PO Box 634, Brussels, Belgium.
PJ1AA	PO Box 383, Willemstad, Curacao.
PJ9VR	PO Box 383, Willemstad, Curacao.
TI8PC/TI9	via WA5GFS, George Black, 1404 S Cliff St, Decateur, Texas, USA.
TI9CI	via TI2CMF, PO Box 3367, San Jose, SJ, Costa Rica.
VK0KW	via VK7KJ, G. C. Johnston, 3 Inglis St, New Town, Tasmania, Australia.
VK0LD	via ZL2AFZ, G. Studd, 48 Nuffield Avenue, Napier, New Zealand.
VP2VL	via W0DX, R. W. Denniston, Box 73, Newton, Iowa, USA.
VQ8CFB	S. Mandary, Meteo, St Brandon, via Mauritius.
W4AMG/Spratley	PO Box 16321, Hong Kong.
WX3MAS	Delaward Lehigh ARC, 1719 Callone Av, Bethlehem, Pa, 18017, USA (large sae please).
XF4KS	Agustin Oritz M.L., Montanas Calizas 535, Mexico 10, DF, Mexico.
ZD3D	(after 1/10/69) via VE2DCY, 8900 Lacordaire, St Leonard de Port Maurice, Quebec, Canada.
G3KHK/4X	D. Connolly, c/o UNTSO Radio, Box 140, Tiberias, Israel.
5U7AR	Box 442, Niamey, Niger Republic.
5V4AH, 5V4AP, 5V4EG, 5V4EW, 5V4GF	via DL1HH **(New QTH)**, Ander Bahn 5, D-6231 Niederhoechstadt/Ts, Germany.
9H1AZ	via G3LQP, 56 Combe Rd, Tilehurst, Reading RG3 4NE, Berks.
9U5DL	PO Box 92, Bujumbura, Burundi.

RSGB QSL Bureau, G2MI, Bromley, Kent.

A new operator at FB8YY is also due to arrive soon and F9MS (who is still waiting for the 1969 logs) will continue as QSL manager. Gilbert, the 1969 FB8ZZ operator, was relieved by Georges on 8 January and QSLs will continue via F8US.

ZS2MI, Marion Is, now appears to have some ssb available and has been heard almost daily between 1600 and 1800 around 14,150kHz.

AC3PT has been operated recently by W1FLS during a visit to Sikkim. QSLs for any of these contacts should be sent to W1FLS direct and not to Sikkim.

Stephen Cole, A6148 (1 David Walk, Rogerstone, Newport, Mon. NP1 9HD) and Dave Noble A6481, (Red Lion Inn, Isham, Kettering, Northants) offer their services to anyone looking for a QSL manager.

G3SKI is still receiving QSLs for "G3SKI/A" who allegedly operated from Sark last summer. Would the pirate please send his address and Ron will arrange for the MPT to deliver them?

The **Tartan Net** is a net for expatriate Scots or those with close Scottish connections. GM3CSM acts as net control at the European end, and VE2DGS or VE3GKW at the transatlantic end. It takes place on 21,220kHz at 1500 on Sundays, and more stations would be welcome to join in.

Propagation Predictions

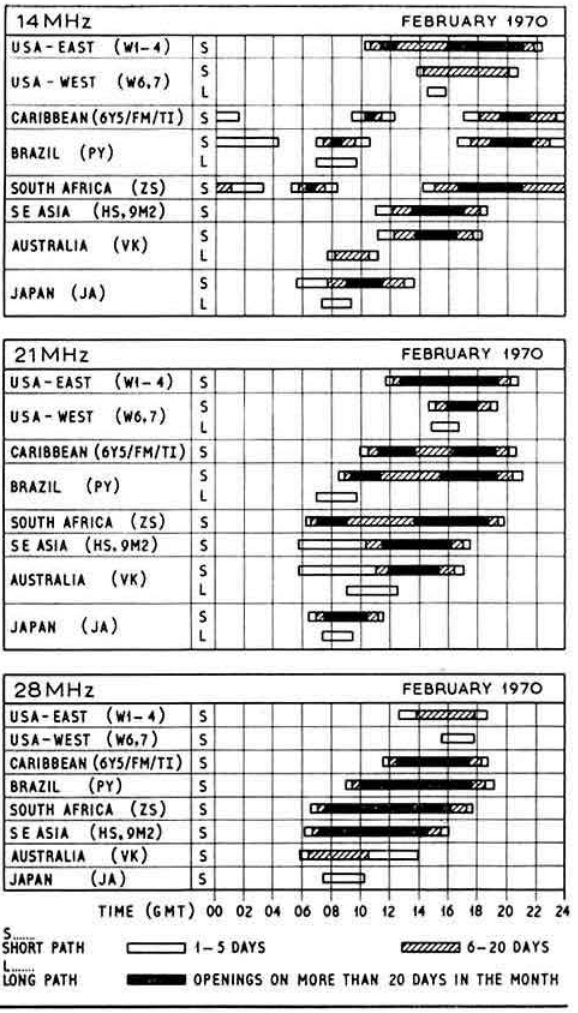
The days slowly lengthen during February, so that towards the end of the month the 14, 21 and 28MHz bands will remain open longer than during the preceding two months.

Solar activity is still decreasing and this will lead to a worsening of conditions on **28MHz**. On this band only traffic with Central and South America, Africa and South East Asia will be certain.

On **21MHz** the decrease in solar activity will not be so noticeable as on 28MHz. Contacts with all continents should be possible. The possibility of dxing on the indirect path will lessen with the effect of the forthcoming springtime conditions. Towards the end of the month **14MHz** will remain open almost till midnight. DX traffic in the second half of the night will only be possible under exceptional conditions. In the forthcoming ARRL DX contest conditions will be best for stations in Southern Europe.

On **7** and **3.5MHz** the propagation conditions will differ little from those of last month. Contacts with the USA on 7 MHz will probably be possible from shortly before midnight till one to two hours after sunrise. On 3·5 MHz conditions will be most favourable from about four to five hours before sunrise until dawn.

The provisional sunspot number for December 1969 from the Swiss Federal Observatory was 93·8 with a period of intense solar activity during the last ten days of the month. It is anticipated that the present sunspot cycle will take a period of some 6·5 years to reach a minimum from the estimated peak in November 1968. Predicted smoothed sunspot numbers for April, May and June are 83, 82 and 81, respectively.



Top band news

Congratulations to G3IGW, whose patience for a number of years was rewarded by a contact with VK6NK at 2045 on 13 December. This is believed to be the first ever VK6–Europe contact on 160m and was Mike's WAC. His signals were RST 589 at times in Perth and were audible for over one and a half hours. A second QSO took place on 23 December. Signals were heard from Europe on eight out of nine consecutive nights' listening by SWL George Allen in Perth, and G3IGW was heard by VK5KO for four minutes on 15 December. Other stations heard included G3RPB, G4QD, GI3OQR, DL9KRA and EI8J. A number of western sunset transatlantic QSOs have also been made, including those with VE3EK, VP9GJ and KV4FZ (between 2230 and 2245), and G3SED has worked K2GNC as early as 2120. Another "first" was scored by G3IGW with a contact with 9X5SP, who has been brought on to the band by the generosity and encouragement of DL9KRA.

The transatlantic tests on 7 December produced contacts with HR2HH for G3s OLI, OQT and RKJ, and also G4CP, with conditions peaking at 0715. VE3EK reports that 14 December was very poor and that he only heard G3OLI; his antenna is a 120ft top-loaded vertical with 16 radials of thick copper wire buried a foot beneath the ground and 250ft long. This is fed with 600Ω open line terminating in a bifilar link winding on a series tuned circuit. December 21 appears to have been very good with W0s DX, NFL and RFT working into Germany.

ZS6BT (E. R. Cook, 32 Grove Rd, Gardens, Johannesburg, Rep. of S. Africa) is now on the band and anxious to make skeds with anyone wishing to try the ZS/G path. He is to be found on 7MHz between 1800 and 2100 and will QSY to 80 or 160 on request. ZS stations are permitted to use 1,930 to 1,970kHz only and he favours 1,969kHz. The best months appear to be February to June, with March/April the peak. ZS6BT's output is 6W to a Marconi "T" with a 134ft top.

HB9CM will be in Lichtenstein as HB0CM on 21 and 22 February. He will be on 1,850 or 1,827kHz between 0430 and 0730 each day and will listen between 1,808 and 1,812kHz for replies.

Band reports

As is to be expected at this time of year the lf bands have been producing a great deal of interesting dx with 80m showing interesting openings into the Far East as early as 1700. 15 and 10m are not at their best just now, but 20m continues to carry the bulk of dx signals for more than 12 hours daily.

Many thanks to the following for providing the information for this section: G2CDT, G2FYT, GW3AX, G3AAE, GM3CSM, G3HB, G3HCT, GM3IAA, G3TXF, G3UAA, G3UML, G3WNT, G3WPO, G3XYP, G3YHB, G5JL, G8VG, BRS2098, BRS25429, BRS26870, BRS28198, BRS30694, A5489, A6098, A6143, A6148, A6553 and A6658.

All calls listed in italics were cw, the rest ssb.

3.5MHz. 0000 CR4BC, TA2SE, VP2VI, VS6DO **0100** 4S7PB. **0200** *CR6BX, UH8CS.* **0300** CR7FM, *UJ8BE.* **0400** HC1RF **0500** VE4EG, YN1HF, ZF1GC, 6Y5CC. **0600** CO2FA, *LX1BJ, PY2SO,* XEs, XF4J, 8P6AH. **0700** C31AP, WA6ZZK. **0800** *LU2ECO, VP2VL* (QSL via W0DX), *W6s, K7LD/7* (Utah), ZLs **1900** *UA9DN.* **2000** JA1JPJ,

OX3BX, UK0B, 4S7PB, 5Z4s. **2100** FP8AP, XW8BE, 9G1FF, 9L1RP. **2300** KV4FZ.

7MHz 0000 *5H3KJ*. **0200** *PY7AWD/0* (QSL via PY7PO, Box 843 Recife). **0500** *KG4DS* (QSL via VE3BYN), TI2WR, *XE2DV*. **0600** XF4KS. **0700** XE1LLS. **0800** HC4BS, *PZ1DD*, ZM3GQ, etc. **1800** 9G1DY, **2300** *3V8CA*.

14MHz 0500 CE0AE, YS1PL. **0600** OA8BA **0700** EA9AI, FL8MB, TI8PE/TI9, *UA0YT*. YK1AA, 5VZAG. **0800** VQ8CR, 5T5AD. **0900** ZD3K (ex-G3JPE), ZM1AAT/K (L.P.), ZM3PO/C. **1000** OJ0MR, ZM1BN/A. **1100** HI8XEK (Box 1492, San Domingo). **1200** JW3XK (QSL via LA6RL), YA0CDRC (Camel Driver's Radio Club). **1600** AX9KY, FB8XX, FR7ZQ/E, TN8BK, VK0HM. **1700** HS1CB, KH6s (especially on 20 December), *VQ8CFB*, VQ8CW (QSL via RSGB). **1800** VU2VAE, 5H3KJ (QSL via W7VRO). **2000** HI8LA, VP2VI, VP7NO, (PO Box 5849, Nassau), VP8KO, *ZD8DB*, *9L1RP*. **2100** VP2KM. **2200** *8R1J*.

21MHz. 0800 *VS6DL*, *9G1HM*, *9J2RQ* (QSL via G3VYF). **1000** UA9VH/JTI, WA5CYY/KG6, KR8CA. **1100** 8P6DG (QSL via VE2JS). **1200** VR6TC, *VS6AA*. **1400** FY7YQ, VP5GM (S. Caicos. G3WOV there until April). 5V4JS (PO Box 33 Atakpami, Togo). **1500** HK0BKX, HT1MAV, XF4KS, YB1BM. **1800** CR3KD, EA8GK (QSL via K6GAK) YN2JS.

28MHz 1000 DU1FH, HL9WJ, *HS3AL*, VKs *VK8HA*, XW8BP. **1200** CT2AP, CP1GN, TJ1AU, VP8HZ, *ZL1DC*. **1300** VP2LX (QSL via G3FGP). **1400** CP2AW, *VP2MU* (QSL via VE2YU). VQ8CV (QSL via RSGB), VP7CG. **1500** *TA2E*, 9J2XZ. **1700** CO2DC.

Many thanks to all correspondents, and especially to the following for information extracted from their publications: **On The Air** (*ON4AD*), the **West Coast DX Bulletin** (*WA6AUD*), **DX'press** (*PA0TO*), **DX News Sheet** (*Geoff Watts*), **the DX'ers Magazine** (*W4BPD*), the **Florida DX Report** (*W4FRO*), **CQ DX** (*ARI*), **NARS Newsletter** (*5N2AAF*) and **Long Skip** (*VE3DLC*).

Please send all items for **March** issue **to reach G3FKM not later** than **11 February**, for **April** by **7 March**, and for **May** by **13 April**. Please note the **earlier closing dates**, material received earlier would be much appreciated.

TVI TIPS

by B. Priestley, G3JGO

Spurious outputs and balanced mixers

When two signals are fed to a mixer the output contains (a) the original two inputs, say fo and fs, (b) the desired sum and difference frequencies fo+fs and fo−fs, and (c) many other spurious outputs such as 2fo+fs; 3fo−2fs.

Generally, only the sum or difference is required and all other outputs must be reduced to negligible proportions by making their generation inefficient and/or filtering the output to attenuate them.

To give a specific example, consider the once popular system of mixing 9MHz ssb with a 5 to 5·5MHz vfo. The table is constructed by working out all the multiples of both input frequencies up to the 5th and labelling rows with one and columns with the other. Each square is divided into two to accommodate the sum and difference of the appropriate factors.

Examining the results we see that as well as the desired 14MHz there is a component at 13MHz (2 × 9−5). This is too close to 14MHz to get much attenuation from a filter so it is better to reduce its generation as well. There are also several "anti-social" frequencies: 45, 41, 50, 40, 46, 55, 51, 60, 47, 56, 65, 43, 52 and 61MHz which can be removed by a good lpf, and also 36, 32, 31, 37, 35, 33, 38 and 34MHz which fall in or near the tv i.f. band of 33 to 40MHz (625 line) but will not be greatly attenuated by the average lpf. These can give tvi particularly when the tv set has no i.f. trap. A manufactured transmitter is no guarantee of safety, indeed one equipment seems to have been "designed" to produce as many spurii in the tv i.f. band as possible! Even a well filtered design is not proof against a resonant rfc boosting the unwanted product.

Fortunately all spurious products are not of equal strength. First order products, fo and fs, tend to be stronger than second order products 2fo, 2fs and fo + fs which in turn tend to be stronger than third order products 3fo, 3fs, 2fo+fs, 2fs+fo and so on. Also, with the oscillator drive typically ten times the peak signal, fairly obviously terms like 2fo+fs are correspondingly stronger than 2fs+fo although belonging to the same order. This means it is possible to select frequencies so that strong low-order spurious products do not give objectional products.

Further relief is provided by balancing. A single balanced mixer is one in which the oscillator frequency current from two sources cancel in the output. It can be shown that all terms of the type nfo±mfs also balance when n is an odd number and m an even number, provided the circuit is balanced throughout the frequency range. In a double balanced mixer, terms with m odd and n even also balance; and in some systems with four devices, such as the diode

	9	18	27	36	45
5	14 / 4	23 / 13	32 / 22	41 / 31	50 / 40
10	19 / 1	28 / 8	37 / 17	46 / 26	55 / 35
15	24 / 6	33 / 3	42 / 12	51 / 21	60 / 30
20	29 / 11	38 / 2	47 / 7	56 / 16	65 / 25
25	34 / 16	43 / 7	52 / 2	61 / 11	70 / 20

This table is a convenient way of calculating the output of a mixer by taking the sum and difference of all multiples of the two input frequencies. The removal of harmonics from either inputs will not prevent the generation of spurious outputs, although it may reduce it.

ring modulator, n and m both even balance. This reduces three quarters of the spurious products by the balance ratio of say 30dB.

An aerial filter which passes everything up to 29·7MHz and attenuates by, say, 80dB above 30MHz would be an ideal way to combat spurious tvi but it is just not possible. Filters which cut off rapidly have large insertion loss, and 3dB loss at 400W is a lot of power to dissipate A filter with a cut-off frequency of 27MHz, however, could have high attenuation at 33MHz and up without prohibitive loss at 21·45MHz. Alternatively, filters in the mixer or driver stages can have a large insertion loss without excessive power dissipation.

Spurious products are not a common cause of tvi but should be borne in mind as a possibility when harmonics seem to be remarkably persistent. A calibrated wave trap at the tv set and/or the effect of the fine tuning on the herring-bone pitch will confirm their presence at a serious level.

SOCIETY AFFAIRS

A brief report of the Council meeting held at Society HQ on 4 December 1969

Present: *Messrs J. W. Swinnerton (President, in the Chair), B. Armstrong, J. Etherington, J. C. Graham, R. J. Hughes, A. F. Hunter, E. G. Ingram, H. E. McNally, L. E. Newnham, J. R. Petty, R. F. Stevens, G. M. C. Stone, F. C. Ward, E. W. Yeomanson (Members of the Council); Dr J. A. Saxton (President elect); R. G. B. Vaughan, general manager, and A. W. Hutchinson, editor.*

Apologies for absence were received from Messrs N. Caws, G. R. Jessop and G. Twist.

Calcutta Key
The general manager was instructed to write to Mr R. Broadbent, G3AAJ, and thank him for refurbishing the Calcutta Key in time for the AGM.

CW for Class B licensees
The general manager reported that he had written to Mr G. Rogers, G8ABB, concerning the refusal of the Ministry of Posts and Telegraphs to grant a cw facility for Class B licensees. No reply had been received.

Morse tests in the Channel Islands
Mr Stevens stated that he was still making enquiries into the possibility of Morse tests being undertaken by operators from the Channel Islands coast station.

RSGB Slow Morse Service
The general manager reported that he had written to Mr D. Butler expressing the Society's thanks for his work in the past. Mr McNally said that he understood Mr Butler had received this letter, together with one from the President.

President's visit to Utrecht
The President reported that he had attended the VERON meeting at Utrecht on 16 November 1969. He had been given a cordial welcome and felt his visit had created considerable goodwill.

1970 is the VERON anniversary year, and the Dutch society had expressed the hope that RSGB could provide a special lecture for the anniversary function. Dr J. A. Saxton agreed to consider giving this lecture.

Membership and affiliation
It was resolved:

(i) To elect 94 corporate members and 34 associate members;
(ii) To grant corporate membership to 22 associates;
(iii) To waive the subscriptions of seven members due to blindness or other disability;
(iv) To grant affiliation to the IBM Laboratories Amateur Radio Club, Winchester; Solihull Amateur Radio Society; Radio Society of Bermuda, and Tonbridge School Amateur Radio Society (G3GVV).

Council was advised that four deaths and 22 resignations had been notified. The general manager agreed to provide information on reasons for resignation for future Council meetings.

Nomination of area representative
Council approved the appointment of Mr K. A. Linney, G3UDA, as area representative for Shrewsbury.

"Short Wave Magazine"
Council noted the correspondence which had passed between the President and Mr A. Forsyth, editor of *Short Wave Magazine*.

Honoraria
Council considered the contents of a letter from Mr A. O. Milne recommending honoraria to be awarded to QSL sub-managers in recognition of their work during 1969. After discussion, Council approved the award of these and other honoraria for 1969.

Votes of thanks
Mr Swinnerton said that he wished to thank Mr Yeomanson (as executive vice-president) and all other members of Council for their support during the last year. In particular he wished to thank Messrs Etherington, Graham and Twist for the work done during their term as Council members.

A vote of thanks to Mr Swinnerton for his work as President during 1969 was carried unanimously.

Minutes of committee meetings
Council approved the minutes of the following committee meetings:

VHF Contests Committee (4.11.69)
In connection with this meeting, Mr Stone reported that draft rules for VHF field day had now been prepared and would be circulated shortly. He asked that Council agree to co-opt Mr R. Whitbread, G8AYN, to the committee. Council agreed to consider Mr Whitbread for inclusion in the committee at the January meeting of Council.

HF Contests Committee (6.11.69)
Mr W. E. Russell, G5WP, had agreed to circulate BERU rules to overseas amateurs and societies, and Council expressed its appreciation of this action.

Membership & Representation Committee (7.11.69)
Finance & Staff Committee (10.11.69)

Reports
Mr Hughes reported that 135 entrants took the Radio Amateurs' Examination at the Society's London centre.

Mr Stevens reported briefly on the present situation concerning publications. The new edition of *The Morse Code for Radio Amateurs* was now in stock at headquarters. Reprinting of *A Guide to Amateur Radio* and *The Radio Amateurs' Examination Manual* was in progress and delivery was expected shortly. Work was going ahead on the revision of the latter publication.

Mr Yeomanson drew attention to Mr Thorogood's difficulties in fixing a date for the 1970 International Radio Communications and Electronics Exhibition. Due to other bookings at the New Horticultural Hall, it might be necessary to fix the date for late August.

In closing the meeting, the President offered seasonal greetings to members of Council.

Council was in session for 3¼ hours.

Obituaries

Victor Newport, G3CHW

Vic died suddenly of a heart attack on 12 December, leaving a shocked amateur radio fraternity in the County of Bristol and the south-west as he was so well known on the air, at radio events, rallies and in the professional world of electronics.

Having served in the second world war in aircrew as a wireless operator/air gunner, Vic came into amateur circles with enthusiasm and determination which were with him until his untimely death. He was a keen member of the Royal Air Force Amateur Radio Society, and wrote many articles for their journal *QRV*.

Bristol amateurs were always served with information when Vic gave one of his many talks on technical matters—he was a stickler for getting his facts straight and always did his homework before attempting to pass anything on to others. He was always prepared to travel to other clubs and give them a talk. Amateurs in the west country will miss his good natured chaff at their meetings for a long time to come.

Moving to various locations in the Bristol area, Vic was well able to give a good account of himself on the hf bands and 144MHz. He believed difficulties were meant to be overcome, and helped many others to overcome theirs. He was one of a team that won the NFD Shield for Bristol in 1952, 1953 and 1954 and was always active in further NFDs. One of his likeable attributes was his complete confidence, in the face of breakdowns and malfunctioning equipment, that patience and determination would win through—and he was usually right.

As an historical note, G3CHW was town representative for Bristol in 1950 and 1951, in the latter year getting recognition for Bristol as a county and a city. Thereafter he was county representative in 1957 and 1958.

Radio amateurs can be proud of one of their strongest supporters and upholders of tradition—Vic Newport, G3CHW. He leaves a widow, Marjorie, and a son, Keith, to whom we offer our sincere condolences. J.T.

Frank R. Neill, ex GI5NJ

Many real old-timers, of the 1925 era, will be sorry to hear of the death of Frank R. Neill, one-time GI5NJ; a pioneer of amateur radio, and a contemporary of Marcuse, Megaw, Goyder, Simmonds, and others of that distinguished company.

After a period as a sea-going operator he entered accountancy, and was the first licensed transmitting amateur in Northern Ireland, only beating Megaw by a day or so. Frank Neill wrote the "Irish Notes" in the *RSGB Bulletin* from 1926, and contributed much as Northern Ireland Area Manager for the RSGB; he was co-opted on to the T & R Committee in 1926.

'5NJ made many British and Irish first contacts on 90, 45, 32 and 23 metres, phone and cw, and his callsign was known the world over. His was the main shore station working with GX6MU on Megaw's historic trips across the Atlantic to prove the range and reliability of short waves for maritime mobile communications.

Frank Neill was a founder member of the Radio Transmitters' Union of Northern Ireland, but of recent years he had not been an active amateur. He will be remembered as a noteworthy operator, a true amateur, and a real pioneering dx man in those days when the difficulties were so great.

T.P.A.

Looking ahead

20 May—Lecture at the IEE by Dr J. A. Saxton, President RSGB.

25–26 July—British Amateur Television Club Convention. Cambridge.

19–22 August—RSGB Exhibition. New Horticultural Hall, London.

Contests calendar

7–8 February—ARRL Phone Contest, (first part).
8 February—70MHz Fixed Station.
11 February—432MHz Cumulative Third Round
14–15 February—1st 1·8MHz.
21–22 February—ARRL CW Contest (first part).
28 February–1 March—1970 French Contest, Phone.
28 February–15 March—IARC Propagation Research Contest (cw and rtty).
3 March—432MHz Cumulative Fourth Round.
7–8 March—ARRL Phone Contest (second part).
7–8 March—BERU
7–8 March*—144MHz Open
21–22 March—ARRL CW Contest (second part).
23 March—432MHz Cumulative Fifth and Final Round.
28 March–19 April—IARC Propagation Research Contest (Phone).
5 April—Low Power 80m.
11–12 April—70MHz Open.
26 April—DF Qualifying Event.
2–3 May*—144MHz Portable Long Section
3 May—144MHz Portable Short Section
17 May—DF Qualifying Event
30–31 May—432MHz Open.
30–31 May—1,296MHz Open.
6–7 June—HF NFD.
14 June—DF Qualifying Event.
21 June—70MHz Portable.
28 June—DF Qualifying Event.
4–5 July—Summer 1·8MHz.
4–5 July*—144MHz Open.
11–12 July—High Power HF Field Day.
19 July—DF Qualifying Event.
26 July—432MHz Open.
9 August—DF Qualifying Event.
10 August—144MHz SSB.
15–16 August—70MHz CW.
5–6 September*—VHF NFD and IARU Region 1 VHF Contest.
13 September—80m Field Day.
20 September—Final DF Qualifying Event.
3–4 October*—IARU Region 1 UHF/SHF Contest.
10–11 October—28MHz.
24–25 October—7MHz CW.
7–8 November—7MHz Phone.
7–8 November—144MHz CW.
14–15 November—Second 1·8MHz.
6 December—144MHz Fixed Station.

* To coincide with IARU Contests

Mobile Rallies calendar

19 April—North Midlands Mobile Rally.

10 May—Ealing and District Amateur Radio Society Rally, Hanwell Community Centre, Westcott Crescent, Hanwell, London W7.

14 June—1st Elvaston Castle Mobile Rally, Elvaston, Derby. Organized by the Nunsfield House Community Association Amateur Radio Group, G3EEO. Further information from P. Neal, G3WFU, QTHR.

20–21 June—Anglian Mobile Radio Rally, Suffolk Showground, Ipswich. Further information from D. W. N. Thomas, G8BVE, QTHR.

21 June—University College of Swansea Amateur Radio Society's annual Rally, Singleton Park, Swansea.

28 June—Longleat Safari Mobile Rally, Longleat House, Near Warminster. Organized by the City & County of Bristol RSGB Group.

5 July—1970 South Shields Mobile Rally.

12 July—Worcester and District Amateur Radio Club Rally.

26 July—White Rose Mobile Rally, Allerton High School, King Lane, Leeds 17. Organized by the Pudsey & District Radio Club. Further information from K. Wells, G3WIX, QTHR.

CONTEST NEWS

Rules for National Field Day 1970

1. The General Rules for RSGB HF Contests, published in the January 1970 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 14 below.

2. Applications—Each group intending to compete must send in a properly completed application form to the RSGB HF Contests Committee, 35 Doughty Street, London,WC1, not later than 30 April 1970. Application forms are obtainable from RSGB Headquarters; entries made other than on these 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 6 June to 1700gmt Sunday 7 June 1970.

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 not more than three of the above frequency bands.

7. Apparatus—No apparatus, and this includes aerials, aerial fittings and station tents, may be erected on the site prior to 1200 gmt on Saturday 6 June 1970. This does not apply to a tent used only for storage purposes.

8. Tents—Stations must be operated from tents.

9. Aerials—These are subject to the following restrictions:

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

(b) Except for vertical radiators (which may be of any construction) all aerials must be constructed from wire of a size not greater than 14 swg cross sectional area.

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

11. 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.

12. 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

13. 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.

14. 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 an address to be advised to the person submitting the application. **Entries sent to RSGB Headquarters will not be accepted.**

15. 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 awards to the groups having the highest scores on the 1·8, 3·5, 7·0, 21 and 28MHz bands.

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

17. 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.

80m Low Power Contest

1. **The General Rules for RSGB HF Contests,** as published in the January 1970 issue of *Radio Communication*, will apply.
2. **When:** 0900gmt to 1600gmt on Sunday 5 April 1970.
3. **Contacts:** Cw (A1) only in the 3·5—3·6MHz band. The location of the station must be sent.
4. **Scoring:**

Max. Power input to PA	0·5	1	2	3	4	5	watts
Points	100	50	25	15	10	5	

5. **Logs** (Column 5) must be headed "Location as received" and (6) "My Power". Entries **must** be addressed to HF Contests Committee, c/o D. Thom (G3NKS), "La Collinette," 6 Bracken Close, Copthorne, Crawley, Sussex.
6. **Trophy:** The 1930 Committee Cup will be awarded to the winner.

BARTG Spring RTTY Contest

When: 0200gmt Saturday 21 March until 0200gmt Monday 23 March 1970. The total contest period is 48 hours but not more than 36 hours of operation is permitted. Times spent in listening periods count as operating time. The 12 hour non-operating period can be taken at any time during the contest, but off-periods may not be less than two hours at a time. Times on and off the air must be summarized on the log and score sheets.

Bands: 3·5, 7, 14, 21 and 28MHz amateur bands.

Stations: Stations may not be contacted more than once on any one band, but additional contacts may be made with the same station if a different band is used.

Country status: ARRL Countries List, except KL7, KH6 and VO to be considered as separate countries.

Messages: Messages exchanged will consist of:
(a) Time gmt;
(b) Message number and rst.

Points: (a) All two-way rtty contacts with stations within one's own country will earn TWO points.

(b) All two-way rtty contacts with Stations outside one's own country will earn TEN points.

(c) All stations will receive a bonus of 200 points per country worked, including their own. *NOTE:* Any one country may be counted again if worked on another band but continents are counted once only.

Scoring: (a) Two-way exchange points times total countries worked. (b) Total country points times number of continents worked. (c) Add (a) and (b) together to obtain your final score.

Sample score:

(i)	Exchange points (302) × countries (10) =	3020
(ii)	Country points (2000) × continents (3) =	6000
(iii)	(a) and (b) added to give a score of	9020

Logs and score sheets: Use one log for each band and indicate any rest periods. Logs to contain band, time gmt, message and rst numbers sent and received and exchange points claimed. **All Logs must be received by 25 May 1970 to qualify.**

Awards: Certificates will be awarded to the two top scorers in each country. The final positions in the results table will be valid for entry in the "World Champion of RTTY" championship.

The judges' decision will be final and no correspondence can be entered into in respect of incorrect or late entries.

Send your contest logs to: Ted Double, G8CDW.,

BARTG Contest Manager,
33b, Windmill Hill,
Enfield,
Middlesex
England.

The committee of BARTG wish to thank readers of *Radio Communication* for their past support of rtty events, which are organized in order to promote interest in the mode as used by radio amateurs. They hope that the group will continue to enjoy the continued participation of readers in any future rtty contests that the group may organize, and Ted Double looks forward to receiving readers' logs or comments in connection with future rtty contests.

Listeners' VHF/UHF Championship 1969

Once again the number of logs submitted has fallen, the number received this year being 38 as against 44 for 1968 and 61 for 1967.

In spite of this however, the number of actual entries for this contest is the same as last year with a total of 12, and of these there are seven names which did not appear last time.

The winner this year is Colin Baker (A5032) who pulled away from Terence Cooper (BRS28005) largely as a result of his very good showing with VHF NFD where he made full use of both the 144 and 432MHz bands.

On 144MHz, the winner used a valve type converter with quite modest type valves such as ECC84 and 12AT7 with a 6 element yagi at 43ft, and on 432MHz a transistorized converter was employed with an 18 element yagi at 45ft. His location at Brookmans Park, Herts, is 280ft asl.

Subject to approval by council, the Hanson Trophy will therefore go this time to Colin Baker (A5032), and a well earned certificate to the runner-up Terence Cooper (BRS28005). Comments from contestants were few but all seem to be agreed that conditions were only about normal for most of the events. A5032 suggests that there should be a separate section for those stations operating portable, similar to the transmitting members, thus giving the contestant who operates from home a better chance in his particular category. BRS28005 feels that some of the 144MHz phone stations should look to their modulation. Ron Thomas gained third place in spite of only using an indoor antenna for most of the time, which is worthy of comment. Stephen Spencer, who is aged 13, says he enjoyed the contest very much, and can certainly be counted on for support in the future.

Position	Entrant	1st 144 ssb	2nd 144 cw	1st 70 Fixed	3rd 144 Open	2nd 70 Open	4th 144 Portable	June 1st 432 Open	June 70MHz Portable	5th 144 Open	July 432 Portable	Aug 144 ssb	Aug 432 Open	4th 70 cw	VHF NFD 144	VHF NFD 432	Oct 432 Open	Nov 144 ssb	5th 70 MHz cw	Total of Best Six
1.	C. J. Baker A5032	115			367		244			542		160	102		590	462	162			2,367
2.	T. M. Cooper BRS 28005			127	408	123	256	135	59	295	150		90		591		225	172		1,925
3.	R. W. Thomas BRS 15822		144			70		96						123	236		48	159		776
4.	S. Spencer A 6054									223					474					697
5.	R. Reed BRS 29813														273					273
6.	J. L. Wood BRS 30506									173										173
7.	M. Costello BRS 30013									118										118
8.	M. L. Marshallsay A 6245									91										91
9.	G. Haslip A 6119					52														52
10.	J. Y. Brewer A 6421					46														46
11.	R. Gape A 5162									37										37
12.	M. G. Toms A 5662	31																		31

Second 1·8MHz Contest 1969

The Second 1·8MHz Contest 1969, held on 15–16 November, attracted 57 eligible entrants. Conditions were quite good during the five-hour contest period, and a quick analysis of the leading logs revealed that over 200 stations took part. Many OK stations were on the band and were quite easily worked. Competitors also QSOd DJ, DL, EI, HB9 and K1. Also around were W1 and ZS8GN/ZS1.

The leading station was G3IGW, operated by Mike Whitaker of Halifax, with a score of 791 points, and subject to Council approval he will receive the Victor Desmond Trophy. 15 of Mike's 146 contacts were three pointers, and 47 were made during the first hour, about one every 77 seconds—some going! Mike worked DL9KRA, EI9J, and 18 OK stations. His equipment consisted of a homebrew transmitter with a 5763 pa, an Eddystone EA12 receiver, and a half wave semi-vertical aerial.

In second place was Ron Smith, G3SVW, who operated /A from Manchester. His score of 755 points came from 138 QSOs, nine of which were three pointers. Ron worked 16 OK stations, and he used a modified KW Vespa, an AR88D, and a five-eighths wave end-fed aerial 45ft high.

Brian Jones, GW3WRE, worked /A from Nash Point Lighthouse to take third place. He keyed 137 contacts worth 750 points using a modified DX100, an HQ170, and a half wave horizontal aerial at 90ft. With this set-up Brian exchanged 459/569 reports with K1PBW at 2250gmt.

G4CP took fourth place with 734 points, just beating Fred Curtis with 730 points who this year appeared as GD3SVK.

The first round of the Maitland Trophy competition has been won by James Christie, GM3FXM, with a score of 602 points. His nearest rivals are GM3NCS with 460 points and GM3WDF/A with a score of 450.

Judging by the comments accompanying the entries most people found it a very enjoyable contest and only a few made adverse remarks about the rules. The adjudicator is pleased to report that the standard of the logs was an improvement over last year. Tidy, neat and uniform entries do make the judges' task much easier. Thank you for your co-operation. To those few who did not use the standard paperwork, a reminder that contest log sheets and contest entry cover sheets are available, free of charge, from RSGB HQ—but please enclose a large stamped addressed envelope with your request.

Many entrants have had points deducted from their claimed score. Usually errors in callsigns and serial numbers received were the cause. A few stations, however, claimed points for duplicate contacts. One such entrant should study 1970 General Rule 11 (e) before he enters another contest; in future, a log in which more than 5 per cent of the entries are unmarked duplicate contacts for which points have been claimed will *not* be accepted by the HF Contests Committee. Be fair, chaps, the onus should be on you to sort out your duplicate contacts—not on the adjudicators. Another gentleman will find his score has about doubled; he should read the scoring rule more carefully next time.

Comments from competitors: "My last attempt for three years. By the time the results come out I will be working from VP8 on all bands,"—G3SVW. "Thanks for excellent contest. Great fun, roll on the next one,"—GW3WRE. "Scoring system fair at last, although perhaps a few more points for overseas contacts,"—GD3SVK.

"Think 2100gmt start is too early,"—G6BQ. "Aerial 200 ft dangling out of bathroom window and tuned against bath tap!"—G3OLB. "Have people forgotten the symbol KN meaning, 'Only the station I have called to reply'?"—G3PWY. "Terrific signals. Great operating "—G3GMK.

Certificates of merit will be sent to G3SVW and GW3WRE in due course. Check logs from the following stations are acknowledged with thanks: G3TZM, OK1OO, OK1AQR, OK1AVN, OK1DAS, OK1DIM, OK1DVK, OK1FAB, OK1IAR, OK1KYS, OK1JMF, OK1MAO, OK2BJJ, OK3CCC, OL1ALM, OL5ALY, and OL6AME. Multi-operator check logs have been included in the list of entries not accepted for the sake of completeness. Thanks also go to them.

Position	Callsign	Score	County
1	G3IGW	791	YS
2	G3SVW/A	755	LE
3	GW3WRE/A	750	GN
4	G4CP	734	SD
5	GD3SVK	730	IM
6	G6BQ	654	KT
7	G3TNO	627	SX
8	G3HVX	621	HD
9	G3TIR	611	SX
10	GM3FXM	602	FE
11	G3JEQ	597	SY
12=	G3GGS	579	LE
12=	G3TAA	579	LD
14	G3SJE	572	MX
15	G3OLB	553	GR
16	G3YEL	548	MX
17	G3OVL	546	SY
18	G3XAR/A	535	CL
19	G3XAP	509	SF
20	G3SKC	480	MX
21	G3WPO	477	SX
22	G3ILO	476	GR
23	G2DC	464	HE
24	GM3NCS	460	MY
25	G3XTJ	453	LD
26	GM3WDF/A	450	DU
27	G3PWY	426	HD
28	G3XDY	420	LN
29	G3RQI	410	BE
30	G3WSN	402	EX
31	G3VIP	398	LN
32	GM3PFQ	396	FE
33	G3VFI	390	HE
34	G3IGU	378	YS
35	G3UFW	354	WE
36	G3JSK	314	WE
37	G3VGZ	312	DH
38	G3XIP	308	WK
39	G3YGR	306	LD
40=	G3RSD	300	LN
40=	G3YRO	300	HE
42	G3KLT	278	BS
43	G3GMK	270	HE
44	G5DZ	258	HE
45	GW3JI	252	CV
46	G3XDL	248	KT
47	G8RZ	246	CD
48	G3MGL/A	225	KT
49	G3TPJ	222	EX
50	G3XFG	195	KT
51	G8QZ	156	DY
52	G3PYC	134	SX
53	G3GOX	114	MX
54	GM3YOR	110	FE
55	G3RPJ	84	WK
56	G3WDS	66	CD
57	G2AVC	24	MX

Entries not accepted:

Callsign	Claimed score	Reason
GW3UCB	534	Multi-operator. General Rule 5(a)
G3YKV	414	
G3UFY	360	
G3YMH	288	
G3JBR	366	Late. General Rule 8(f)
G3TKX	348	

April 1970 70MHz Open Contest

1700 gmt on 11 April to 0900 gmt on 12 April

All entries and checklogs must be sent to the adjudicators addressed to: VHF Contest Committee, c/o G3USB, 32 Harbour Avenue, Comberton, Cambridge CB3 7DD

The following general rules as published in the January issue of *Radio Communication* will apply: 1, 2, 3, 4a, 5a, 6a, 7a, 8a, 9a, 10, 11, 12a, 13-24.

December 1969 70MHz CW Contest

Many of the comments received on this contest held on 7 December, contained some reference to bad propagation conditions. However, the evidence of distances covered did not support this view. Most of the regular stations in the "far-flung outposts" seemed to be making QSOs over reasonable distances, and a number of contacts of over 400km were recorded. The main feature of the entry was its small size, only 21 stations in the three sections. Obviously the weather discouraged many of the regular portable expeditionaries, being cold enough to keep even the adjudicator from trekking the five yards to his outdoor shack until the final two hours. It was also evident from the comments that a return to the "midnight oil" burning of the previous 70MHz event would be popular, especially among the operators plagued by the dreaded Tennessee Valley Indians.

The honours were again shared by several of the stations who have become regular contest supporters, it being particularly pleasant to record a victory for G3RLE, who for some time has seemed to be ploughing a very lonely 70MHz furrow from the heart of Yorkshire. Bryan won Section A from another regular, G3VPK, and also made the highest overall score. Section B went to G3OXD/A yet again, while the frostbite award for the portable section goes to GW3TXR with the help of G8BHY.

Comments have in the main been covered above, but one more deserves a mention: G6HD has our sympathy for being blessed(?) with a daughter who will insist on christening his granddaughters on contest Sundays, though if he persists in giving our Committee Secretary a QTH of "200 miles ESE Ysbyty Ystwyth", we think he deserves all he gets.

Posn	Callsign	Score	QSOs	County	Best dx (km)
Section A					
1	G3RLE	215	27	YS	332
2	G3VPK	204	33	EX	450
3	G3JVL	163	28	HE	370
4	G3DAH	124	22	KT	395
5	G3FDW	114	17	NM	456
6	G3GZJ	102	7	CL	450
7	G3JXN	76	25	LD	270
8	G6HD	71	20	KT	285
9	G5UM	68	15	LR	185
10	G2WS	43	6	ST	248
11	G3JKY	35	20	KT	108
12	G3HBG	31	12	SY	290
13	G3UNV	18	12	MX	84
Section B					
1	G3OXD/A	214	35	WR	340
2	GW3UCB/A	180	25	DB	317
3	G3OGY/A	90	21	LE	330
4	G3WSC	82	19	SX	350
5	G3WMR	60	25	LD	280
Section C					
1	GW3TXR/P	198	31	DB	338
2	G3PIA/P	135	25	BE	247
3	G3VFD/P	97	14	HD	185

BARTG 1969 VHF Contest Results

70MHz No logs received for this band.

144MHz

Posn	Callsign	Points	QSOs	Countries	Farthest QSO in km
1	DJ8BT	452	3	2	310
2	PA0PWG	448	7	2	310
3	ON5BV	422	2	2	210
4	DL8CX	212	2	1	125
5	G8BNW	207	3	1	75
6	PA0YZ	207	5	1	52

As well as the above, the following stations were active during the contest and were giving points but did not submit contest logs: DK1NS, DL2QH, G6CW, G8CUO, ON5HB, PA0CRX, PA0DLC, PA0IF, PA0JHM and PA0LAN.

432MHz No logs received for this band.

RADIO AMATEUR EMERGENCY NETWORK

By S. W. LAW, G3PAZ

A thought for the month will inevitably lead the mind to the problems of flooding (see the traditional Old Saws about February). In this connection it could be that the present trend to "one-upmanship" could be of some interest to groups in flood-prone areas. Many people now go in for trailer-borne boats and roof-rack dinghies and it might well be a help for controllers to make a note of the possible availability of these in the event of need in an emergency. Remember that the instant production of this type of information could make a great impression on a user service and boost our image.

Unwelcome clanger

We were deeply perturbed to read an item in the evening paper in early January in connection with widespread interference to the police radio channels in a county adjacent to London in which a "Police spokesman" was alleged to have told a reporter that "It may be some ham who has left some equipment switched on and forgotten about it". Since it was found later that a police car transmitter had been left running for several hours undiscovered, we wonder how the RAEN Group for this area felt about this uncalled-for slur on amateurs as a whole and RAEN in particular?

RAEN Committee

The meeting which was to have taken place in mid-January was deferred to 31 January owing to other commitments. A report of the proceedings will appear next month.

At a previous meeting the 4m band was discussed, and it was decided that notwithstanding the proposed "Band plan" put forward elsewhere for 4m RAEN operation, the existing frequencies should be maintained for existing groups. New groups, when formed, should consult the RAEN Committee as to the best use of this band in their area having due regard to local requirements.

Nice thought

We were delighted to receive a card at Christmas beautifully hand-tinted in four colours which turned out on inspection to be a December newsletter from a RAEN group! Our gracious thanks to the Liverpool and SW Lancs Group for this, and we hope the idea catches on. We note that a training exercise was held on 8 December and also note the items on the very rainy exercise held by Manchester on 14 December (70·362MHz) by G3MBQ and his indefatigable colleagues, and the information on the work of G3XEN and his assistants G3MNL and G8AFJ of the Cumbria Group. Re the latter item, please note that G3XEN is not QTHR.

Red face department

It has been pointed out in connection with our report last month of the visit of G3MBQ to Yugoslavia that we have done less than justice (by implication) to the first-class work of our friends in that country. May we hasten, therefore, to commend to your attention the photograph on the front cover of the IARU booklet *Amateur Radio* which depicts one of the emergency amateur radio stations set up after the earthquake at Skopje, Yugoslavia, in 1964. Our apologies for the omission. For those with the gift of tongues the Yugoslav magazine *SRJ* carries a recent account of emergency work in YU-land.

Honorary Registrations Secretary:
Mrs. Jane Balestrini, "Merrivale", Willow Walk, Culverstone, Gravesend, Kent.
Honorary Secretary, RAEN Committee:
Mr. E. R. L. Bassett, 57 Upper St. Helens Road, Hedge End, Southampton, SO3 4LG.

CLUB NEWS

Region 1 RR B. O'Brien, G2AMV

Merseyside Luncheon Club—First Monday in each month. HMS *Landfall*, 12.30 for 12.45 meal. If you wish to attend please advise *G3VQT* or *G2AMV*.
Airdale (ARC)—4 and 18 February, 4 March, 8pm, "Morris Dancers", Scarisbrook.
Allerton (Liverpool)—Scout Amateur Radio Society, North West Region—First and third Thursdays each month, 8pm, Liverpool County Scout Headquarters, Richmond Street, Liverpool.
Blackburn (ELARC)—5 February (Surplus equipment sale), 5 March (Film show: Shell Mex & BP, "The Titans" and "A light in nature"), 7.30pm, Edinburgh House, Shearbank Road, Blackburn. Further details from *G4JS*.
Blackpool (B & FARS)—Mondays, 8pm, Pontins Holiday Camp, Squires Gate. Morse tuition at 7.30pm.
Bury (B & RRS)—10 February, informal meeting on 24 February, 8pm, The George Hotel private room, Market Street, Bury. Club Secretary, *G3VVQ*, 411 Holcombe Road, Greenmount, Bury.
Cheshire (Mid Cheshire ARC)—Wednesdays 7–9.30pm, Club Headquarters, Technical Activities Centre, Winsford Verdin Grammar School, Grange Lane, Winsford. Beginners and rae instruction on Wednesdays, 7–8pm, send sae for club programme from *G3JWK* or *G3SIG*.
Chester (C & DARS)—Tuesdays, 8pm, YMCA.
Crewe & District—Local enthusiasts should keep in touch with Ray Ewen BRS26847, at his home address: 10 Circle Avenue, Willaston, Nantwich, Cheshire.
Douglas (D & DARS)—Second and fourth Wednesdays each month, 7pm, 19 Rosemount, Douglas. Further information from W. T. McEvoy at the same address. Telephone Douglas 6146.
Eccles (E & DRC)—Tuesdays, 8pm Bridgewater School, Worsley Lancs. Thursday—Club top band net, 2030gmt.
Leyland Hundred Amateur Radio Group—Thursday night net at 2000gmt on 1·915MHz.
Liverpool (L & DARS)—Tuesdays, 8pm, Conservative Association Rooms, Church Road, Wavertree. Secretary H. James, *G3MCN* 448 East Prescot Road, Knotty Ash, Liverpool 14.
Liverpool (NLRC)—13, 27 February, 8pm, Labour Party Headquarters, 13 Crosby Road South, Liverpool 22. Secretary: Peter Jeffs, 38 College Road North, Liverpool 23. Telephone 051 924 3020.
Macclesfield (M & DRS)—10, 24 February, 10 March, 8pm, The George Hotel, Jordansgate.
Manchester (M & DARC)—Wednesdays, 7.30pm, 203 Droylesden Road, Newton Heath, Manchester 10. Secretary: G. Tillson, *G3TJK*, 95 Kelverlow Street, Oldham, Lancs.
Manchester (SMRC)—Fridays, 8pm, Conservative Association Divisional Office, 449 Palatine Road, Northerden, Manchester.
North West VHF Group—Mondays, 8pm, in the Club Caravan, Greeba, Shady Lane, Manchester 23.
Preston (PARS)—5, 19 February, 5 March, 7.30pm, (Private room), "Windsor Castle", St Pauls Square. Secretary, George Windsor, 26 St Gregorys Road, Preston.
Salford (Dial House Radio Society)—A Society formed by GPO Engineers meets Wednesdays, 6pm, 8th Floor, River end of Dial House. Any GPO Engineer who is interested should contact the Secretary at Dial House, Chapel Street, Salford 3.
Southport (SRS)—Wednesdays, 8pm, Sundays, 2.30pm. The Esplanade. Secretary: S. Miller, 72 Station Road, Banks, Southport.
Southport (73 SSB Society)—Thursdays at 8pm. All meetings start with a talk on part of the rae syllabus and are at 73 Avondale Road, Southport.
Stockport (SRS)—4 and 18 February, 4 March, 8pm, Brookfield Hotel, Wellington Road, South Stockport. New members welcome. Secretary: D. I. Lunn, *G3LSL*, 4 Farnham Avenue, Macclesfield (Tel. 7903).
Warrington, Culcheth (CARC)—Fridays, 7.30pm, Chat Moss Hotel, Glazebury. All visitors welcome. Secretary: K. Bulgess, 32 Hendon Street, Leigh.
Westmorland—Fridays, 7.30pm, at 24 Park Road, Milnthorpe. All meetings include a Morse practice conducted by Brian Shaw G3CRJ. Please note the Club's new call G3YWR. Secretary: Jim Forrester, 44 New Street, Carnforth, Lancs.
Wirral (WARS)—First and third Wednesdays each month, 7.30pm, Former Civil Defence Headquarters, Upton Road, Bidston, Birkenhead. The re-establishment of the club's field power supplies is almost complete and rapid progress is being made with the 70cm station in preparation for the summer activities. Secretary: Alf Fisher, *G3WSD*, 34 Glenmore Road, Oxton, Birkenhead.
Wirral (Wirral DX Association)—Meets on the last Wednesday in each month at members' houses.

February; at G3VUY, where Dave will describe and demonstrate his transistor 160 and 20 metre ssb transceiver.

March; at G3VVA, who will talk and show slides on his visit to British Columbia (VE7).

Region 2 RR K. Sketheway, BRS 20185

Barnsley (B & DARC)—13 February ("Integrated circuits in amateur radio", by G4JJ), 27 February ("Review of American amateur radio scene", by G6LZ), 7.30pm, King George Hotel, Peel Street, Barnsley. 7 February is the date of the annual dinner of the club. *G3LRP*.
Bradford (BRS)—3 February ("The blacksmith and his art", by H. Moore, G3WVD), 17 February ("Time lapse line photograph", by G. F. Firth, G3MFJ), 7.30pm, 10 Southbrook Terrace, Gt Horton Road, Bradford. Secretary's new address: R. J. Cockerham, G3WTF, 7 Beechwood Grove, Moorehead Lane, Saltaire, Shipley, Yorks. *G3HJP*.
Durham (DCARS)—12 February ("Directional wattmeters", by G3PDM), 26 February (Brains trust), 7pm, Durham University's Elvet Riverside Arts Block, New Elvet, Durham.
Mexborough (MSTCARS)—It has been decided to branch out, following successes in VHF field day and scout jamboree. G3FDW gave a lecture on his experiences in the VHF NFD on 18 December. This was very well attended. It has been decided to attend the College separately from the rae night (Wednesday) and meet on Thursdays as well. Everyone welcome, 7pm to 9.30pm. We feel that our pass rate is good, student members good (29), yet where are all the amateurs we have trained over the past five years? The feeling is that some centre must be available where they can be advised and assisted by locals who have "suffered" themselves. Meetings take place in the Mexborough Scofield Technical College, Park Road, Mexborough.
Northern Heights (NHARS)—11 February ("CW procedure on the amateur bands", by J. S. Denby, G3TSA), 25 February (Constructors evening), 11 March ("RTTY", by D. Pratt, G3KEP), 7.45pm, Peat Pitts Inn, Ogden, nr Halifax. The main event during December was the annual dinner. *G3MDW*.
Scarborough (SARS)—Thursdays, 7.30pm, c/o RAF Association, Fulbeck House, Westover Road, Scarborough.
Sheffield (SARC)—24 February (Junk sale and display of ham gear), 7.30pm, Cross Scythes Hotel, Totley. 23 February (SARC top band contest, rx and rx contestants must be resident within the Sheffield telephone area No 94 as indicated in the Directory under *correct postal addresses*. Entry form and rules from G8NN at February meeting, or sae to 84 Marcliffe Road, Sheffield, S6 4AG. *G8NN*.
South Shields (SS & DARC)—13 February ("Linear and digital integrated circuits", by G3UWL and G3XAO), 20 February ("DXing the hard way"; W1BB's tape and slide lecture), 8pm, Trinity House, Laygate, South Shields. *G3KZZ*.
Spen Valley (SVARS)—5 February ("Oscilloscopes", by L. M. Dougherty), 12 February ("Transistorised transmitter for 144MHz", by G8AXY and G3UII), 26 February (Film show), 7.30pm, The Grammar School, High Street, Heckmondwike.
Sunderland (SARS)—17 February (W1BB's tape and slide lecture on top band dxing), 7pm, Sunderland Polytechnic. Meetings first and third Tuesdays each month. A warm welcome extended to all

T. F. (Fossey) Rendall, G6TR, died suddenly on 15 December. aged 71 years. Licensed early in the 1930's he was a keen cw man prior to the second world war. He was a member of the first Sunderland Radio Club held at the local Technical College. *G3XID*.

Wallsend on Tyne—A new club is to be formed in Wallsend very shortly and any members on the north side of the River Tyne should contact Charles Morgan, 4 Park Villas, The Green, Wallsend.

York (YARS)—Thursdays, 7.30pm, in the British Legion, 61 Micklegate, York.

Region 3 RR R. W. Fisher, G3PWJ

Mobile Rally—North Midlands Mobile Rally organized jointly by Midlands Amateur Radio Society and Stoke-on-Trent Amateur Radio Society, 19 April 1970, Drayton Manor Park, nr Tamworth, Staffs. *G8ASW*.

Birmingham (MARS)—10 February (QRA Locators', by G. Farrance), 7.45pm, Midland Institute, Margaret Street, Birmingham 3. The Club has moved to a new venue at the West Heath Community Association, Hamstead House, Fairfax Road, West Heath, Birmingham 31. Alongside the meeting room on the second floor is the shack, a 12 × 12ft room; aerials are being installed; the shack is available 24 hours a day, 365 days a year. Further information from the Secretary Mr. E. A. Burke, 236 Beamont Road, Bournville, Birmingham 30.

Bromgrove (B & CARS)—13 February ("Antenna's", by G3YKO), the Royal Oak, Barley Mow Lane, Catshill, Bromsgrove.

Coventry (CARS)—6 February (Night on the air, rae lecture), 13 February (Transistorized transmitters), 20 February (Night on the air, morse practice), 27 February (University Challenge type quiz), Scout HQ, 121 St Nicholas Road, Radford, Coventry.

Dudley (DARC)—10, 24 February, 8pm, Central Library, St James's Road, Dudley. Club station at Old Windmill, Vale Street, Upper Gornal, Dudley, Worcs. *G3PWJ*.

Hereford (HARS)—First and third Friday of each month, Civil Defence HQ, Goal Street, Hereford. *G3RJB*.

Lichfield (LARS)—First Monday and third Tuesday of each month, The Swan Hotel, Lichfield. *G3NAS*.

Redditch (EWARG)—No meeting February. Instead, Annual Dinner, 12 February at 8pm, Village Inn, Beoley. Contact *G3EVT*. Tel Alcester 2041.

Shrewsbury (SARS)—5 February (Club station), 12 February (Film show), 19 February (Club station), 26 February ("Aerials", by G3RME), 7.30pm, Shrewsbury School Signals Hut. *G3UDA*.

Stourbridge (STARS)—17 February (Informal at Shrubbery Cottage), 8pm, 3 March (AGM), 7.45pm, Longlands School. *G8CVK*.

Wolverhampton (WARS)—2 February (Film show), 2 March ("Video", by M. Sparrow, G6KQJ/T G8ACB), 8pm, Neachells Cottage, Stockwell Road, Tettenhall. *G3UBX*.

Worcester (W & DARC)—Every Wednesday and Saturday evening, 7.30pm, Perdiswell Park, Droitwich Road. The date of the annual Worcester Mobile Rally will be Sunday, 12 July, 1970. *G3VJN*.

Region 4 RR T. Darn, G3FGY

The 13th Derby Mobile Rally event will be held at Rykneld Schools, Derby, on Sunday 16 August 1970.

Derby (D & DARS)—4 February (Annual General Meeting), 11 February (Practical printed circuits for the home constructor", by R. E. F. Street), 14 February (Annual dinner and dance at the "Derbyshire Yeoman"), 18 February (Open evening for the swl in the sub-basement), 25 February ("Passing the RAE", by F. C.Ward), 7.30pm, Room 4, 119 Green Lane, Derby. Tickets for the Society's annual dinner and dance can be obtained from the secretary at 27/6d. each. *G2CVV*.

Derby (NHCAARG)—6 February ("Film show", by G3ALA), 13 February (Night on the air with the groups KW2000A), 20 February ("Three phase supply", by G3VKH), 27 February (Visit to the Victor Buckland studio in Derby to hear a recital of "Music Corporation of America" records). All meetings take place on Friday evenings in room 7, Nunsfield House, Boulton Lane, Alvaston, Derby. All visitors are welcome. *G3WFU*.

Grimsby (GARS)—5 February (Construction project: Club 2m converter, alignment and testing), 19 February (Extraordinary General Meeting to elect a new Chairman as the present Chairman is leaving the district), 5 March (Modification of commercial equipment for 2m). All meetings at the usual time and place, North Lincs Photographic Society Clubroom, rear of 50 Welhule Road, Grimsby. *G3XDY*.

Heanor (SEDRS)—Meetings will take place every Tuesday evening during February at 7.30pm, in the South East Derbyshire College of Further Education, Ilkeston Road, Heanor, Derbys. Visitors are welcome.

Leicester (LRS)—Meets every Sunday morning and Monday evening at the club-house, Gilroes Cottage, Groby Road, Leicester. Hon Sec: F. D. Rawcliffe, *G3UGM*, 215 Glenfield Road, Leicester.

Melton Mowbray (MMARS)—20 February ("Transistor receiver servicing", (by B. Reeves), 7.30pm, St Johns Ambulance Hall, Holwell Works, Ashfordby Hill, Melton Mowbray. *G3NVK*.

Nottingham (ARCON)—5 February (Committee meeting and natter night), 12 February (A film on motoring), 19 February (A talk the subject of which has yet to be decided), 26 February (Bring and buy sale). All meetings at Woodthorpe House, Mansfield Road, Nottingham. All visitors are welcome.

Region 5 RR S. J. Granfield, G5BQ

Bedford (B & DARC)—Club meets on Thursdays at the Dolphin Inn, Broadway, Bedford at 8pm. (Morse classes at 7.30pm).

Bishop's Stortford (BS & DARC)—Meetings held monthly at the British Legion Club, Windhill, Bishop's Stortford. Particulars of meetings from Peter J. Toynton, *G3RGA*, "Wildhern", Old Mead Lane, Henham, nr Bishop's Stortford, Herts.

Cambridge (C & DARC)—Club meets on Fridays, 7.30pm, Club Headquarters, Corporation Yard, Victoria Road, Cambridge.

Dunstable Downs (DDRC)—Meetings held on Friday evenings at Chew's House, High Street, Dunstable, Bedfordshire. Further particulars from *G8BWZ*, 51 Manor Park, Houghton Regis, Dunstable, Bedfordshire.

March (M & DARS)—Club meets on Tuesday evenings at Old Police Headquarters, High Street, March, Isle of Ely.

Peterborough (P & DARS)—Meeting at 7.30pm on first Friday in the month, in the Electronics Section, Peterborough Technical College, Eastfield Road. On other Friday evenings meetings are held at 8pm, in the Club Headquarters in the Old Windmill, behind the Peacock Inn, London Road, Peterborough.

Shefford (S & DARC)—5 February (Quiz and surplus sale), 12 February ("Portable power supplies", by G3ROL), 19 February ("Elementary propagation", by G3TDW), 26 February ("Capacity bridge", by G3VMI), Thursdays, 8pm, Church Hall, Shefford, Bedfordshire.

Stevenage (S & DARS)—Meetings on first and third Tuesdays, 8pm, Hawker-Siddeley Dynamics, Gunnels Wood Road, Stevenage, Hertfordshire.

Region 6 RR L. W. Lewis, G8ML

Cheltenham (RSGB Group)—First Thursday, 8pm, Great Western Hotel, Clarence Street, Cheltenham.

Gloucester (GRS)—Meetings on second and fourth Thursday, 7.30pm, RAFA Club, 6 Spa Road, Gloucester.

South Bucks VHF Club—3 February (Talk on amateur television), 8pm, Bassetbury Manor, High Wycombe. 2m net, 8pm, every Tuesday except club nights.

Region 7 RR P. A. Thorogood, G4KD

All Clubs and Groups are now receiving lists of new members in the Region 7 area and these will be supplied as received from HQ when the January list arrives. I will report the numbers you are all helping to get.

Acton, Brentford & Chiswick (ABCRC)—17 February (Film show), 7.30pm, Chiswick Trades & Social Club, 66 High Road, Chiswick.

Addiscombe (AARC)—Second and fourth Tuesdays, 7.30pm, Toc H Hall, 158 Lower Addiscombe Road.

Ashford, Echelford (ARS)—Last Thursday of month, 7.30pm, St Martins Court, Kingston Crescent, Ashford, Middx.
Barking (B&DREC)—Tuesdays and Thursdays, 7.30pm, Gascoigne Recreation Centre, Gasgoigne School, Morley Road Barking.
Bexleyheath (NKRS)—Second and fourth Thursdays. 12 February ("Direction finding", by G3JKY), 26 February ("The RSGB", by G. M. C. Stone, G3FZL, a past-President). At the last meeting L. Randall gave an interesting talk and demonstration on the art of short wave listening. 23 RSGB members and seven others turned up, 7.30pm, Congregational Church Hall, Chapel Road, Bexleyheath.
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, 8pm, Friday Hill House, Simmons Lane, Chingford E4.
Civil Service (CSRS)—First and third Tuesdays. 3 February (Informal meeting), 17 February ("Marine operating in the hey-day of Morse", by Tave Critchley), 6.30pm, Civil Service Recreation Centre, Monck St, Westminster.
Croydon (SRCC)—Third Tuesdays. 16 February ("Mobile operation", by N. A. Fitch, G3FPK). 20 members turned up last meeting to Mullard Talk on Varactors (where are the other 78 members). See you I hope in the '70s. 7.30pm, Swan & Sugarloaf, South Croydon.
Crystal Palace (CP & DRC)—21 February (Annual general meeting), 8pm, Emmanuel Church Hall, Barry Road, SE22.
Dorking (DR & DRS)—Second and fourth Tuesdays, 8pm. 10 February (General activity; fitting up Club shack), 24 February (Coming up to become "airborne" with club callsign G3CZU as soon as gear installed). All future '70s meetings at Wheatshaft.
Ealing (E & DARS)—Tuesdays, 7.30pm, Northfields Community Centre, Northcroft Road, W13.
East London—15 February ("TVI and Planning Permission", by R. F. Stevens, G2BVN), 2.30 for 3pm, Wanstead House, The Green, Wanstead, E11. Adjoining Wanstead Station (Central line). New Secretary for '70s: G3RYF.
Edgware & Hendon (E & DRS)—9 and 23 February (New members night and HQ station; also net activities), all welcome, St Georges Hall, Flower Lane, Mill Hill, NW7.
Farnham, Bucks (Burnham Beeches RC)—Fortnightly, Mondays, Farnham Common, Village Hall, Victoria Road.
Gravesend (GRS)—Wednesdays, 8pm, Community Centre, Cedar Avenue, Kings Farm Estate, Gravesend.
Guildford (G & DRS)—Second and fourth Fridays. 13 February (GPO talk and lecture on TVI & frequency measuring), 27 February (Mystery night? Where, what, when?). At last meeting a large company enjoyed the G3OLM antenna lecture and demonstration. Sale of electronic equipment at coming meeting, see G3SLH. 7.30pm, Guildford Engineering Society, Stoke Park.
Hampton Court (TVARTS)—First Wednesday, 7.30pm, The Three Pigeons, Portsmouth Road, Surbiton.
Harlow (DRS)—Tuesdays (general), Thursdays (CW practice), Fridays (junior), 7.30pm, Mark Hall Barn, First Avenue.
Harrow (RSH)— Every Friday, 8pm, Roxeth Manor School, Eastcote Lane, Harrow.
Havering (H & DARC)—Fortnightly, 8pm, British Legion House, Western Road, Romford.
Hemel Hempstead (HH & DARS)—First and third Fridays 7.30pm, "Addmult", Sports Club, Hemel Hempstead.
Holloway (GRS)—Mondays (RAE), 7pm; Wednesdays (Morse), 7.30pm, Fridays (Club), 7.30pm; Montem School, Hornsey Road.
Ilford—Every Thursday, 8pm, 50 Mortlake Road, (off Ilford Lane) Ilford.
Kingston (K & DARS)—Second Wednesday, 8pm, Penguin Lounge, 37 Brighton Road, Surbiton.
Leyton & Walthamstow—Tuesdays, 7.30pm, Leyton Senior Institute, Essex Road, E10.
London (UHF Group)—First Thursday, 7.30pm, Whitehall Hotel, Bloomsbury Sq, Holborn, WC1.
Loughton—Fortnightly, Fridays, Loughton Hall, Rectory Lane (Near Debden Station).
Maidenhead (N & DARC)—Third Tuesday of month, 7.30pm, Victoria Hall, Cox Green, Maidenhead.
New Cross—Wednesday and Fridays, 8pm, 225 New Cross Road, SE14.
Paddington (P & DARS)—Thursdays, 7.30pm, Beauchamp Lodge, 2 Warwick Crescent, W2.
Purley (P & DRS)—First and third Fridays, 8pm, Railwaymans Hall, Side Entrance, 58 Whytecliffe Road, Purley.
Reigate (RATS)—First Wednesday. 4 February (Discussion on annual dinner to be held next month). Last meeting Geoff Stone, G3FZL, and Bob Burns, G3OOU, spoke to us about nbfm for use on vhf and uhf. Very informative evening. 7.45pm, George and Dragon, Cromwell Road, Redhill.
Romford (R & DRS)—Tuesdays, 8.15pm, RAFTA House, 18 Carlton Road.
Scouts (ARS)—Third Thursday of month. 19 February ("BBC control room", by Jeff Bottom, G3SDG), 19 March ("Aerials", by John Carter, G3KYH). 12th Jamboree on the Air, bigger than ever entry. Four stations in London area active. 7.30pm, Baden Powell House, Queensgate, South Kensington, SW7.
Sidcup (CVRS)—5 February ("UHF colour television", by I. R. Lever, G8CPJ), 19 February (Natter night), 8pm, Congregational Church Hall, Court Road, Eltham, SE9.
Southgate (SRC)—Second Thursday of month, 7.30pm, Civil Defence Hut, Bowes Road, N11.
St Albans (Verulam ARC)—18 February. New committee elected on 10 December, and last month's meeting, "TVI—the complete treatment", by B. Priestley, G3JGO, was a great success. Town Hall, St Peters Street, St Albans.
Sutton & Cheam (SCRS)—Third Tuesday, 8pm, The Harrow Inn, High Street, Cheam. The Club's annual dinner is to be on 14 March, 1970, at the "Crown Inn", London Road, Morden. Tickets will be 35/- each and available from R. G. McDonald, G3DCZ, 60 Dudley Drive, Morden.
Welwyn (Mid-Herts ARC)—Second Thursday of month, 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, Sports Club, St Augustin Avenue, North Wembley. (This Club is open to non-GEC employees by invitation. Telephone 276 1262 for details).

Region 8 RR D. N. T. Williams, G3MDO

Worthing (W & DARC)—10 February (Constructional contest), 17 February (Ragchew). 24 February ("Simple d/f equipment", by G3JKY). Clubs annual dinner on 28 February. Tickets available in advance.
Brighton (BTCARC)—5 February (Film night), 19 February ("Colour television", by R. A. Bravery, G3SKI). Meetings held at 7.30pm.
Eastbourne (SARS)—Meetings held every Tuesday, 8pm, at Victoria Hotel, Latimer Road, Eastbourne.
Mid-Sussex (Mid SARS)—5 February ("Non-professional construction", by Dr G. Rockwood, G3JGR), 19 February ("4m affairs", by Don Haytor, G3JHM). All meetings at 7.30pm, Marle Place.
Maidstone (M YMCA ARS)—Tuesdays and Fridays, 8pm, "Y" Sports Centre, Melrose Close, Loose, Maidstone.
Canterbury (EKRS)—Information of meetings from D. N. T. Williams, *G3MDO*.
Dover (SEK YMCA ARC)—Thursdays, 7.30pm, Leybourne Road YMCA, Dover. Details of meetings from *G3YQR*.
Thanet (TRS)—Fridays, 8pm, Hilderstone House, St Peter's, Broadstairs.

Region 9 RR J. Thorn, G3PQE

Barnstaple, Bideford, North Devon area—A club is in the process of formation named the "Barnstaple and District Radio Club" and will in future meet on the second and fourth Wednesdays in each month from 7.30pm. 11, 25 February, "Grinnis" High Wall, Old Sticklepath Hill, Barnstaple. *G4CG*.
Bristol, City & County (BARC)—Every Monday and Thursday, 7.30pm, Club HQ (G3TAD) University Settlement, 41 Ducie Road, Barton Hill, Bristol 5. *G3SXY*.
Bristol (RSGB Group)—23 February (Lecture and meeting), 7.30pm, Becket Hall, St Thomas Street, off Victoria Street, Bristol 1. Harold Leonard, G4UZ, takes over from G3JMY as Chairman of the Group for 1970, with Ken Otway, G8AGT, as Vice Chairman. *G3ULJ*.
Shirehampton Radio Club (SRC)—Every Friday, 7.30pm, Twyford House, Shirehampton. *G3YIQ*.
University of Bristol ARC—Meetings on Saturdays, 2.30pm, Dept of Physics, Royal Fort, Woodland Road, Bristol. *G8ADP*.
Burnham-on-Sea (BOS ARS)—Contact *G3GIW*.

Cornish (CRAC)—5 February ("How to use ICs", by G3OCB. "Home brewed 24 hour digital clock", by G3VGO), 7.30pm, SWEB Clubroom, Pool, Cambourne. *G3UCQ*.

VHF Group—Third Thursday in each month, 7.30pm, The Peoples Palace, Pydor Street Truro. *G3XC*.

Falmouth Group—3, 17 February, Laburnham Drive Mission Hall. *G3OJN*.

Newquay Group—4, 18 February, Treviglas School. *G3THT*.

Exeter (EARS)—3 February, YMCA, St Davids Hill, Exeter. *G3HMY*.

Plymouth (PRC)—3 February ("DxTV", by Reg Roper), Club HQ, (G3PRC), Virginia House, Bretonside, Plymouth. *G3YDU*.

Saltash (S & DARC)—6 February (Radio darts quiz), 20 February (2m versus 160m: A practical demonstration) 7.30pm, Burraton Toc H Hall, Warraton Road, Saltash. President of the Club for 1970 is Joe Pengelly of the BBC SW unit. *G3XWA*.

South Dorset (SDARS)—6 February. Room E2, South Dorset Technical College, Newstead Road, Weymouth. *G3RZG*.

Taunton (T & DARS)—Every Friday, 7.30pm, SEVO HQ, Taunton Barracks, The Mount. *G3WPJ*.

Torbay (TARS)—Every Tuesday and Friday, Club HQ (G3NJA), Bath Lane, rear 94 Belgrave Road, Torquay. 28 February (Talk by G3ABU and presentation of construction cups). Party held recently with Plymouth and Exeter during which a quiz was held. Plymouth RC won by 34 points, Exeter second with 31 points and Torbay 28 points. The "Quiz Kup" was presented to PRC by G3LHJ, Chairman of Torbay. *G3NQD*.

Wells (WARS)—Contact *G3MQQ*.

Weston-Super-Mare (WSM RS)—6 February ("Principals of ssb", by Ted Halliday, G3JMY), 7.30pm, Westhaven School, Ellesmere Road, Uphill, WSM. John Crowther gave an interesting talk on integrated circuits and a digital frequency meter to a crowd last month despite the weather and the dreaded bugs. *G3GNS*.

Yeovil (YARS)—Wednesdays, 7.30pm, Park Lodge, The Park, Yeovil. *G3NOE*.

Region 10 RR C. H. Parsons, GW8NP

Blackwood (ARC)—Fridays, 7pm, Blanch Cottage, off High Street, Blackwood, Mon. After many set-backs with their new building, the Club is going well and welcomes visitors to all meetings. *G6BK*.

Barry College of Further Education (ARS)—Thursdays, 7pm, College of Further Education, Colcot Road, Barry, Glam.

Cardiff (RSGB Group)—Monday, 9 February, 7.30pm, T.A. Centre, Park Street, Cardiff. *GW3GHC*.

East Glamorgan Raynet Group—First Tuesday in each month, 7.30pm, Cardiff Emergency Services HQ, Womanby Street, Cardiff. *GW3VNO*.

Hoover (ARC)—Mondays, 7.30pm, Hoover Social Club, Hoover Factory, nr Merthyr, at which all interested will be welcome. Secretary: Mr Tribe.

Port Talbot (ARC)—Meets on second Tuesday of each month at 7.15pm. Morse classes are held with the possibility of rae classes in the near future. Trefelin Club & Institute, Port Talbot. *GW5VX*.

Pontypool (ARC)—Meets on Tuesdays at 7pm during school terms, at the Educational Settlement, Rockhill Road, Pontypool, Mon. *GW3JBH*.

Pembroke (ARC)—Last Friday of each month, 7.30pm, Defensible Barracks, Pembroke Dock. *GW3LXI*.

Rhondda (ARS)—Meets at the Rhondda Transport Employees Club and Institute, Porth, Rhondda, Glam. Full details available from *GW3PHH*.

Sully & District Short-Wave Club—Tuesdays, 7pm, at the annexe, Sully Bowls & Social Club, 59 South Road, Sully, Glam. *GW3SLA*.

Swansea Telephone Area (ARS)—Fridays, 7.30pm at Telephone Engineering Centre, Gors Road, Townhill, Swansea, Glam. Activities include Morse practice, rae preparation and constructional work. Secretary: M. D. E. Connor, 54 Tally Road, Penlan, Swansea, Glam.

University College, Cardiff (ARS)—Meetings in Geology Dept, Main College on Tuesdays at 8pm. Shack located behind the Computer Centre, Park Place, Cardiff. Details from Secretary, c/o Students Union, Dumfries Place, Cardiff.

University College, Swansea (ARS)—4 February ("Experiences on off-shore radio"). Further details of this talk available from Robert Wilcox, *GW3TSH*, 520 Neuadd Lewis Jones, University College, Swansea.

Region 11 RR M. Williams, GW3LCQ

Conway Valley Amateur Radio Club—19 February ("Open forum". This type of meeting is to enable our members to ask questions on subjects which they do not thoroughly understand, and to discuss and enlarge on their own pet theme). Parade Hotel, Church Walks, Llandudno. At the January meeting the rae quiz proved most instructive and full of interest, and the short talk given on the KW 2000A also gave full value.

Rhyl and District Amateur Radio Club—10 February ("Aerials", by F. R. Pardy), The Mona Hotel, Market Street, Rhyl. Last month the talk on transistorized receivers was once again full of interest due to our favourite lecturer John Lawrence from the University of North Wales, Bangor. Alan Cobb, GW3YIH, who has been shouldering the responsibilities of both treasurer and secretary to this club. met with a serious accident just a few days before Christmas having been knocked down by a car whilst cycling to work. It is certain that should any RSGB member consider dropping him a line it would be gratefully received.

Bangor (UCNWARS)—6 February (Annual dinner), 19 February (RTTY lecture on tape), Electronics Dept, Dean St, Bangor. Club active on all bands; 160 to 2m.

Region 12 RR A. W. Smith, GM3AEL

Aberdeen (AARS)—Fridays, 7.45pm, 6 Blenheim Lane Aberdeen. *GM3HGA*. Aberdeen 33838.

Lhanbryde (MFARS)—Mondays, 7.30pm, St Andrews School, Lhanbryde, by Elgin, Morayshire. *GM3UKG*. Clochan 225.

Dundee (RSGB Group)—Thursdays, 8pm, 3 Magdalen Place (off Roseangle), Dundee. *GM3KYI*.

Lerwick Radio Club (Shetland)—Tuesdays and Thursdays, Annsbrae House, Lerwick. *GM3XPQ*. Tel Bixter 249.

Region 13 RR V. W. Stewart, GM3OWU

Edinburgh (Pentlands ARC)—Last Friday each month, 7pm, Iona Hotel, Strathern Road. For further information apply to *GM3OXX*, QTHR.

Greenlaw (Border ARC)—First Sunday each month, 3pm, Cross Keys Hotel. For further information apply to *GM3WIG*, QTHR.

Lothians Radio Society—12 February (Brains trust), 26 February (CW evening: contests for beginners and advanced types, tx and rx), 7.30pm, YMCA, St Andrew Street, Edinburgh.

Region 14 RR N. G. Cox, GM3MUY

Ayrshire (Ardeer Recreation Club ARC)—3, 5, 10, 12, 17, 19, 24, 26 February, 7.30pm, Ardeer Recreation Club, Amateur Radio Section, Stevenston, Ayrshire. Details from J. F. McCreight, GM3DJS, 10 Auchenharvie Road, Saltcoats, Ayrshire.

Ayrshire (AARG)—8, 22 February, 7.30pm, ATC HQ, Kilmarnock.

Glasgow University (GURC)—Enquiries to Colin Weston, GM3VAP, 46 Manchester Drive, Glasgow W2. Tel 041 339 2074.

Greenock (G & DARC)—6, 13, 20, 27 February, 7.30pm, Watt Library, Union Street, Greenock.

Mid-Lanark (RSGB Group)—21 February, 7.30pm, YMCA. Brandon Street, Motherwell.

Region 15 RR J. Thompson, GI3ILV

City of Belfast YMCA Radio Club—Wednesdays and Saturdays, 8pm, City YMCA (third floor), 12 Wellington Place, Belfast, BT1-6GE. Information from YMCA General Office.

Region 16 RR W. J. Green, G3FBA

Basildon (VARS)—Vange ARS meetings every Thursday, 7.30pm, at the Scout Hall, Fairview Road, Vange, Basildon. *G3VOP*.

Chelmsford (CARS)—First Tuesday in each month, 7.30pm, Marconi College, Arbour Lane, Chelmsford. *G3OZF.*
Colchester (CARS)—Every Wednesday, 7pm, room 40, NE Essex Technical College, Colchester. *G3YAH.*
Gt Yarmouth (GYRC)—Meetings fortnightly, 7.30pm, at 98 South Market Road, Gt Yarmouth. All interested in amateur radio and electronics very welcome. Details from *G3HPR*. Tel 62008.
Ipswich (IRC)—25 February ("Loudspeakers", by Rola-Celestion), 7.30pm, Red Cross HQ, Gippeswyk Avenue, Ipswich. *G3UJR.*
Maldon, Essex (*MYCRG*)—Every Thursday, 7.30pm, The Friary, Chequers Lane, Maldon, Essex.
Norwich (NARC)—2 February (Junk sale: Auctioneer, Arnold Tomalin, G3PTB), 12 February (Informal Meeting), 16 February (Programme formulation evening), 23 February (Ragchew). All meetings 7.30pm, The Brickmakers Arms, Sprowsten Road, Norwich. *G3PTB.*
Southend (SDRS)—13 February (Radio amateurs exam: Examples by G3NPF), 27 February (Subject to be arranged). Meetings begin at 8pm in the canteen of Messrs EKCO Electronics. Further details from *G8BSB.*

Region 17 RR C. Sharpe, G2HIF

Chippenham (C & DARC). 24 February (Discussion). Other Tuesdays in the month, the club project (a 2m transmitter) will get going. 7.30pm, Boys High School, Hardenhuish Lane, Chippenham. *G3UTO.*
N. Berks (AERE, Harwell, ARC)—Meetings on the third Tuesday in each month, 7.30pm, Social club, AERE, Harwell, Berks. All local amateurs welcome. *G2HIF.*
Southampton (So'ton Group)—14 February (Special meeting of RSGB members to discuss Society business), 7pm, Lanchester Buildings, Southampton University.
(SRC)—Meetings each Wednesday and Friday at the clubroom, 14 Nightingale Grove, Southampton. *G3GOY.*

MEMBERS' ADS

These advertisements are free to members. The number of words is limited to 32, not including your name (or call-sign) and address. All ads must be clearly written or typed on the Order Form or on a postcard. Each ad must be accompanied by a recent *Radio Communication* wrapper, the address of which must agree with the address on the ad. No trade or business ads can be accepted. The RSGB cannot accept responsibility for errors, for the quality of equipment offered, or guarantee inclusion. Ads must reach RSGB HQ during the first seven days of each month for the next month's issue. Ads which are not printed will *not* be held over, they must be resubmitted. We advise members to enclose a stamped addressed envelope when replying to ads. For further details of these ads see the current Order Form. No correspondence concerning non-appearance, etc, can be entered into.

KW2000A, vry little used, £180. Buyer can have 1st refusal of KW trap dipole, E-Z match and dummy load. G3VSG, QTHR. Tel Chest. 6512.

Transistor Ranger PTC2007V 12V /M transcvr comp with mic, xtals, hdbk. Good cond suit for 4m or convtble for 2m, £20. G3WRG, QTHR. Tel Ashford (Mx) 56019.

KW Valiant tx, 50W, 10–80m, ac psu, £30. MR44 amateur bands rx, 10–80m, £20. R209 rx, 1–20MHz, £9. 160m tx + psu, £5. /M psu 200V dc 150mA, £4. Psu 240V dc 180mA, £3. Ac psu, 600V 150mA, £4. D. Wilkinson, 35 Street Lane, Leeds 8. Tel 664823.

Labgear companion mod and psu for LG300 in exc cond, £25. G4IV, QTHR.

HW12A, HP23A ac psu and mic, aligned by Heathkit, £85, ono. All bands rx G3HTAs design (SW mag Dec 64) quoilpax, new comp cost £60, offers over £20. Student—no time to cont. G3XGN, QTHR.

JXK convtrs: 2m, if 28–30MHz; 4m, if 4·1–4·7MHz, both as new, £12 ea inc carr. Creed 7B printer, both carriages, exc cond, £17 inc carr. Eagle hdphones type HMA209, unused, £5. G3OUF, c/o G3XPU, RSGB HQ. Phone or write.

AR88D + match spkr, £40. KW Vanguard Mk 2 tx, exc, £30. Buyer coll. G3WFB, QTHR.

Heathkit RA1 and RG1, £20. G3PIX, QTHR. Tel Newcastle 665334.

Laboratory equip: Airmec rf sig gen type 201, Airmec audio sig gen type 702, Sullivan standard resistors, Pye decade resistance box, Weston standard cell. Offers pse. G6TA, QTHR. Tel 01 769 1038.

Pair PT15s 10s ea. Pair new 866Jrs with filament transfr, offers. Metvick type 244 min CRO, wkg, £5. Wanted, mod wobbulator, also CRT tester and Odhams Newnes tv servicing pre 1965. G8SP, QTHR. Tel Silchester 513.

17in Pye slim-line tele. Fault in video, £5 ono. 2m transcvr, QQVO2-6 o/p, minus meter, convtr not wkg, £10 ono. PCR rx, psu and non-wkg bfo + Smeter, £10. 2½in scope partly dismantled but comp, £5 ono. Buyer coll. G8BHJ, QTHR. Tel Billingshurst 2463.

Comp G3HSC Morse course, three 3 speed lp records with bks, £3. S. Wilders, 45 Tabors Ave, Gt Baddow, Chelmsford, Essex. Tel Chelmsford 71754.

New unused CV7361 transistors, equ BUY11, TK203A, 10s ea. G3AAE, QTHR. Tel 01 508 3669.

Sommerkamp FR100B, mint, £90 ono. Heathkit multimeter MM10, £5. G3PBW, QTHR.

BC221-AK, rarer mod: model, brand new, £30. Command rx, 1·5–3MHz, £10. Q5er, £7 10s, new in cartons. 230V 6A variac, £5. J Beam 2m 8+8 slot, 90s + post, or coll. G3GUU, QTHR.

Transistor rx TK848L, covers usual ranges + 103–174MHz for 2m. Cost 42gns, as new, 2 mths old, £38. Transportable Stella tape recorder, 4 trck, £10. Wanted, HW32, buy or exch for above. G3VFP, QTHR. Tel 061 998 6574.

KW Vanguard tx and Minimitter MR44 rx, £50. Mains transfmrs and chokes, var metal cabs, buyer coll. G6CS, QTHR.

Unused QP166, £8 ono. G3UEY, QTHR.

Collins KWM2 transcvr, 516F2 psu, 30L1 lin. All in exc cond, £695. J. Crutchfield, 32 Eldorado Rd, Cheltenham, Glos.

KW2000 + ac psu, exc cond, £130 ono. Del free reasonable distance London. E. Taylor, G3SQX, QTHR.

Equip of late G3TER, lttle used. FL200B tx, £90. FR100B rx, £85. DX40 + VF1, fair cond, £22. RA1, requ attention, £20. Vibroplex key, £6. Avometer model 7, £10. Medco lpf, £3. Del carr free, pref inspect. H. Groves, G3UYM, 3 Halsey Drive, Hitchin, Herts.

LG300 + comp mod/psu, immac. HRO5T with 9 gc coils, new cond. Reasonable offers wanted. SB10U, as new, unused, £20. B44, mint, unused, £12 together with mic, phones and dipole ant. Cash + carry only. G2BYM, QTHR.

Minimitter 44/11 needs slight atten, £18. Lafayette HE30, £15. Coll or carr. G3SFV, QTHR.

Philips EL3558 tape recorder, gd cond, £20 ono. G3YEL, QTHR. Tel Uxbridge 30137.

Heathkit HW17A 2m transcvr, exc cond & appearce, 9 months old, £70 ono. Temp qrt for exams. G8CQH, QTHR.

TW 2m communicator Mk 2 with spkr, power leads etc, gd cond, £40. Evershed Vignoles pen recorder, dual 1mA movements, 250V motor, unused with box of spare papers, offers. G8BCP, QTHR.

2000A comp, £165. PR30, £4. RQ10X, £5. EK9X, £5. TO3 scope, mint, £25. AVO sig gen, £4. Marconi VTVM, £4. C3005 pwr swr ind, £5. Pair 6146Bs, £3 10s. Carr extra. G3UOF, QTHR.

AR88D exc cond, £40. BC221, built in psu, £15. AVO 8 with hv adapt, hardly used, £10. F. Harris, 3 Ray Lodge Mews, Lassell Gdns, Maidenhead, Berks. Tel Maidenhead 26847.

Ships nav lamp (1 only), 25s. Parcel of useful comps etc, £1, post extra. G2ATD, QTHR.

Echelford 4m tx + convtr, £17 10s. Solartron CD513-2, offers, Hb psu AT5, £3. BC221 + psu, £15. Wanted hdbk for Cossor CC12, 3B240M, RV2P800 lin comm'l or home brew (or part built). G3VVB, QTHR. Tel Slough 28014.

KW2000, mint cond, both ac and dc psus, latter unused. Also TW 2m convtr, output 28–30MHz, £150 the lot or will split. G3LOV, QTHR. Tel Repton (Derbys) 3404.

KW2000A and ac psu offered in part exch for Eddystone EC10 rx with suit cash adjustment. Also 10XJ xtals or sim in range 1·8 to 2·0MHz. G3PZF, 18 Lazayre Rd, Green Street Green, Orpington. Tel Farnboro 54512.

R1155B rx, ideal for swl. Covers 80, 40 & 20, extra output stage to drive spkr, var bfo, built in mains psu, exc results, £10, carr pd. T. Price, Greenbanks, Cuckney, Nr Mansfield, Notts.

Lafayette HE30, vy gd, £20. Heathkit RA1, brand new, £30. Joystick + 3A atu, £4 10s. A. Cameron, Coombe Cottage, Pitchcombe, Stroud, Glos. Tel Stroud 3081.

Basic scope unit, 240–2000V psu, gain, focus controls, suitable VCR97, £4. Pair RCA transfmrs 115/230V input, 6000V output, £3 ea £5 pair. 6V Carter genny 500V 200mA output, £2. Details sae. G3IUD, QTHR.

RCA AR88D vgc, £35 ono. B40, vgc, comp 100kHz xtal, air tested, £15. Club rxs insp qth. Wanted info wavemeter W1631, will purch or copy & refund expenses. G8BJR, QTHR.

CR100 exc cond, little used since purch due to bus commit, may need new valve, £10 ono to clear. C. White, 19 Castalia Squ, Isle of Dogs, E14.

KW Viceroy Mk 2 tx, used few hrs only, new cond, extra ½ latt filt, £95 ono. GM6XW, QTHR. Tel Carbert 2604.

Many bargains in transfmrs, chokes, meters, PO type relays, paper condsrs, lektrokit parts, valves, 1W h.s. 1% new restrs, 1s ea, most values to 3m, sev psus. Send sae for list. Kilner-Smith, 101 Oxford Rd, Marlow, Bucks.

BC453 (Q5er), £3. Class D wavemeter, unmodified, £4. FL-8 af filt, 15s. GEC BW456 min 100kHz xtal cal, imac, £4. Pye Reporter PTC118, 4m, 12V and mains, £5 10s. Wanted, Hallicrafter Skyrider 5–10 rx. Cockle, 14 Leewood Way, Effingham, Surrey. Tel Bookham 5439.

3cm Klystron CV323, data avail, 30s. 50-0-50 microammeter, 3½in diam face, 25s. Mc voltmeter, 0–160V, 3in diam face (new), 18/6. Eddystone 870A, as new, £12. G2WS, QTHR.

Eddystone 840A overhauled, new valves, exc cond, £30. G. Goodwin, G3MNQ, 4 Elfin Grove, Dunton Bassett, Rugby, Warks.

Collins TCS12 tx, £9. Heathkit vfo with hdbk uncal, £6. Tx 1154, offers. G3MLN, QTHR.

4m xtals, 1000, 1875, 1981, 3645, 7090kHz and 30 other xtal freqs. Wearite P coils. Xtal cont RF24, 10, 15 & 20m convtr, hdphones etc. Sae for list. Wanted, RA1 unmod with man. M. Powell, G3NNO, QTHR.

Radcom hdbk, radio hdbk, Londex coax relay with plugs, all at £1 ea. ARRL ant bk, 1967 ARRL hdbk, 10s ea. All plus post. Var other comps sae pse. J. Barton, Farm View, Wood Lane, Hailey, Witney, Oxford. Tel Ramsden 269.

BC221 + charts, new, £15. Marconi-Ekco TF114F, 85kHz–25MHz peice gc, £5. Marconi precision sig gen No 13, am-fm, 20–80MHz, £10. Hartley 13A scope, db, new cond, comp, £17. G3PDT, 239 Hagley Rd, Edgbaston, Birm'ham 16.

US army BC950–A130 2m tx, £6, req psu. Minimitter atu, metered output, 10–8m, £5. Psu type 104, 12V input, ht lt output, £1. Valves: 813 (2), £2 ea. 807 (5) at 3/6, QVO4/7 15s. 1000kHz xtal for freq meter, £1. 463·7 xtal, 5s inc post. TT15 £2. G3JNY, QTHR. Tel Garforth 3058.

Anglian 1000 transcvr, split freq wkg, 160–10m, loafs at 400W pep. Pair of 4CX250B's in final, first £230 secures, buyer coll. G3KUM, QTHR.

2 televisions: Ultra 17in slimline, £7 10s ono, HMV 17in non slimline, £4 10s ono. G8CCE. QTHR. Tel Iver 1409.

KW160 top band tx, little used, £15. Class D wavemeter, £6. Call by appointment. G3WXT, QTHR.

Minimitter 150W tx, £15. Codar AT5 with psu, £15. Canadian C52 tx with man, £8. CT53 sig gen, no charts, £10. Two CT54 vom, £5 ea. G3YAP, QTHR. Tel 021 429 3268.

Collins 75A3, immac cond with autoxfmr, cal, spares, hdbk, offers? 100W mod suit qro 2m tx, class B, 6GJ5 UM3, built in psu, £10. G3YFK, 10 Woodfield Rd, Shrewsbury, Salop. Tel Sy 55673.

Mosley CM1 + 160m convtr, buyer coll, £25. G3CSE, QTHR. Tel Welwyn Gdn City 28831.

BC221 with charts, £16. Vintage wavemeter, 50s. Spectrum analyser 800–900MHz, needs tube £7 10s. HRO MX, coils, psu, spkr, £20. Wanted: C45 circ, G3XNH, QTHR. Tel East Horsley, Surrey 3982.

KW Viceroy Mk 3, £75. SCR522 tx/rx comp, case and data, £4. BC221 with charts, £12. Hb combined vv meter, audio osc and 100kHz xtal cal, with psu, £4. Sae for particulars, G3WBT, QTHR.

Lafayette HA600, £35 ono. Matching spkr £2. Wanted: Bfo coil for R107; 23cm convtr. G8CIX, QTHR. Tel 01 989 4588 (after 6pm).

Eddystone EA12, as new cond, best offer. 240V pe gen, 300W, gd cond, £20. 100C xtal stick mic, 25s. 800V 850 mA transfmr-ideal 6HF5 lin, 50s. Transport can be arrang. G3SME, Windrush, Hail Weston, Hunts.

DC /M psu: Labgear E5141 12V dc in 300V at 120 mA out. As new, £6. G3RB, QTHR.

Collins TCS12 tx, 160, 80, 40m with atu, exc cond, £12 ono. Mepham, 79 Woodland Drive, Hove 4, Sx. Tel Brighton 504088.

Trio TS510 transcvr + psu, new, unused, £195. BC221 + psu, £15. G3JPS, QTHR.

Katsumi elbug EK9X, little used, new cond, £4 + 4/6 pp. G8DV, QTHR.

Equip late G8IJ: DX4OU, VF1U vfo, ½in xtals 1820–1894, six between 3500–3600, ten between 7000–7050 + 7130, 7300, 7420, 10500, 2 × 5550, 2030, 2700kHz. Also 4050 ½in. Fair offers welcomed. G2BDR, QTHR. Tel Bridgnorth 2844.

2 stage preamp, steel case inc 240V ac psu. One ea 28 & 21MHz, 55s, post inc. Pair naval ship lamps, new, 55s + post. 807s, 5s. G5CP, QTHR. Tel Ashover 253.

AR88LF, £20. BC604 fm rx, 20–29MHz, mains psu, £6. Prefer buyer coll. Wanted: facsimile rx. G8ABB, QTHR.

BC342 tx comp with all accessories & spare valves, £15. Pitt, G3VRY, 13 Crombie Close, Lovedean, Portsmouth, Hants.

Heathkit SB620 panoramic adapt with coils up to 6MHz i.f. with man, little use, £49 ono. Heathkit Mohican all transistor rx with man, £20 ono. G8BI, QTHR.

Codar CR70A, PR30, both as new. £10. BRS 30986 17 St Georges Crescent, Dover, Kent. Tel Dover 2839.

BC221, ac; 50A alternator; 10, 15, 20m Qubical quad; 811A, 6146A valves; meters; lab audio freq meter. Wanted: PR walkie talkies. G2MF, QTH.

Comp /P tx/rx: 160, 80, 40m, tuneable rx, xtal controlled tx. Hdbk, ants, xtals, headset, mic, key, atu, £15. G3SDK, QTHR. Tel OLU 2 55001.

Eddystone 888A, imac comp with mounting blocks & S meter, £65 ono, buyer coll. G3NCZ, QTHR. Tel Blackburn 56532.

Pair 813s with bases, £2 + post. G3ELT, Claypole, Newark, Notts.

Pye HF58 hi fi amp, 7 watts, sep inputs for mic radio tape & pickup, £8 10s, buyer pse coll. G3AG, QTHR. Tel 021 354 4642.

Superb fully sol state 160m /M tx, 12V, 10W, £28. Eddystone EC10, new ,£40. B44 tx/rx, new, £6. Joystick with 4RF tuner, £9. Eddystone 680X with accss, £60 + carr. G3AOS, 5 Prespect Drive, Hale Barns, Ches. Tel 061 980 2415.

Galvanzd lattice steel mast sim BXI, triangular, telescopes 42ft to 25ft, 2 winches, takes HamM rot, ball races etc, very prof job any demo, photos on app, £45. Carr arranged. G5FH, QTHR.

EC10 with anl, 250KHz calib, S meter, £40. KW Viceroy 3A, extra filt with KW77 500Hz cw filt. £150 or will split. Calib Mk 7, £2. Erskine 13A scope with hdbk, £20. G3RUG, QTHR. Tel 061 439 7183.

Comp rtty rig: Creed 7B, TU FSY 1.1, psu's, paper, tuning fork strobe, fsk unit, plugs, cables and xtal ready to run KW2000, £27. Oscilloscope No 10, double beam, £3. G3RHP, QTHR.

TCS6 tx, 1·9-12MHz. Canadian 52 rx with psu 1·75-18MHz inc man, offers. G3WJR, c/o 13 Feather Dell, Hatfield, Herts.

2m ssb transcvr, fully solid state, 2N4440 final, 8W output, lin vfo with digital read-out, single convrsion with phaselock oscil comp with ni-cad batteries, 1969 trophy award, £140. G5AHK, QTHR. Tel Walton 29044.

Eddystone 640 rx, vgc with man, £14 ono. Trio rx, JR60 ·55-30MHz 142-148MHz, prod detector, Qmult, amateur band spread etc, £27 ono. P. Lucas, 2 Castle Drive, Reigate, Surrey.

Trio TS500 transcvr with extra vfo, mains psu, and mic, 10 months old, as new, £125. C. Wiles, 5 Burnside, Morpeth, Northumberland. Tel Morpeth 4903.

HA350, first class rx, 230V model, £45 ono. G3IZJ, QTHR. Tel Farnborough 48561.

Microscope old type, many lenses, £4. Hi fi reflex spkr W.B., dems given, £8. Furzehill oscilloscope, 2½in crt, wkg order, £7. 100 valves, all ok, mainly miniature, £3. New convector radiator, Murphy-R, £5. G8APS, 177 Dower Rd, Four Oaks, Sutton Coldfield. Tel 021 308 3044.

HRO mx+psu, b/s coils, man, exc cond, £18. Buyer coll. W. Stampton, 67 Medhurst Crescent, Gravesend, Kent.

Good 160/80m 10/20W tx with internal vfo, psu mod and ht supply, £10. G3OGR, QTHR. Tel Upton on Severn 2244.

Exc Brush xtal mic, £2. Heavy duty smoothing chokes, rectifiers GU50, cheap. Wanted; xtal 6·5MHz, small mains transfmr 100V 50mA, aerial stay wire strainers. G3KH, 133 Station Road, Cropston, Leicester. LE7 7HH.

Hammarlund SP600, £80 ono. CDR TR11A rotator + control, £10, ono. Green & Davis Mk 4 2m convtr 28/30 if, £7 ono. G3PMH through G8BJZ, QTHR.

CR100 with S meter, rf and if gain controls, gd cond, £13 10s. D. Bunyan, 20 Gayhurst Dr. Sittingbourne, Kent.

Codar CR70A rx, gd cond, £12, pp 7/6. Valves, transfmrs, chokes, capacitors, sae for list. G3YTU, 48 College Road, Ardingly, Sussex. Telephone Ardingly 486.

Swan 350, calib, ac psu, perf cond, £170. CR300, calib, spkr, £10. Class D wavemeter in case, with spares, looks unused, £7 Pair 12V /M uhf tx/rx, comp, £4 each, carr extra. GM3BQA, QTHR. Telephone North Berwick 2519.

Nombrex 27 sig gen, 150kHz–350MHz, as new, £5 10s. Wanted: hdbk for CR300 rx; Heathkit OS1(2) oscilloscope. G3PJN, QTHR. Telephone Chesterfield 6040 (after 6.30pm).

Codar PR30X, exc cond, £5 ono. G3WUD, 32 Syddal Green, Bramhall, Cheshire, SK7 1HP. Tel. 061–439 5570.

Lab gear 50, no mods, mint cond, EI7BS, QTHR. Telephone Clones 97.

UHER 440, ac unit batt car harness, cost £160, sell £100. Omega 18KT constellation, cost £189, sell £120. Zeiss Contax 2A Tessar 9.5 ERC, £50. Weston Master 3, £5. 9GICC, 2 Poltisko Terrace, Penryn, Cornwall. Telephone Penryn, 3240.

WANTED

P2642 aud trnsfmr + 12in Wharfedale or Goodmans ldspkr. J. Adams, Neuadd Emrys Evans, Menai Ave, Bangor, Caerns,

Early wireless bks, mags, catalogues, pics, certs, QSLs, valves, Morse keys, small pts. Buy or swap. AWA, QCWA member. K8IKO, Box 222, Worthington, Ohio, 43085, USA.

HRO bs coils & man, or loan of man requ. Also lpf. G3YGB, 6 Lynchefs Rd, Amesbury, Salisbury, Wilts.

Beam ant. CR100 coil pack, also mod detls. 2m convtr. Detls of Pye Ranger rx mods for 2m. R. Reynolds, 6 Church Way, Lower Stratton, Swindon. Tel Stratton St Margaret 2055.

Poverty-stricken swl needs surp type amateur bands rx. If poss, suit for ssb and in wkg or repairable cond. Must be vry cheap. J. Naulls, 31 Hamilton Rd, St Albans, Herts.

Purchase or borrow, hdbk or any info on Marconi CR150/2 rx. C. Debney, 111 Penn Lea Rd, Bath, Somerset.

2m 4 over 4 or 6 over 6. Coils for 28 to 30MHz with 455kHz if. G. Peck, "Pexholme", Lowes Wong, Westgate, Southwell, Notts. Tel Southwell 3418.

Sommerkamp FT100. Transistorized car radio with LW/MW/SW D. Ramsey, G3UUA, 28 Loxley Road, Glenfield, Leicester. LE3 8PB.

Creed 7B teleprinter in wkg order. G8AWN, QTHR.

HRO 500. G3UXA, QTHR.

Table top transcvr, either am or ssb, Z match and lpf. D. Wilkinson, 35 Street Lane Leeds 8.

Racal RA 17, L model pref. History, particulars etc to G3VPI, QTHR.

Dets for modifying RF 26 to 2m conv for use with HRO. All post costs met. HRO b/s coils. M. Swift, 341 Walsall Road, Stone Cross, West Bromwich, Staffs.

AR88 Cab. Eddystone 898 dial. G3GCO, QTHR.

Working 2m converter, i.f. anywhere between 2–8MHz, valve or semiconductor. Anything reasonable considered. Write or phone. S. Freedman, 3 Avenue Terrace, Crowfield Avenue, Newsbury Park, Ilford, Essex. Tel 01 590 0324.

10V 10A htr trnsfmr, alternatively htr trnsfmr ex LG300 tx. Also pi-net choke suit lin amp pref ex LG300. Pinnock, 14 Mornington Close, Baughurst, Hants. Tel Tadley 4445.

Television and SW world, Feb 1935 to Aug 1937. G3IDG, QTHR.

Rf wattmeter, rf ammeter 2·5 or 3A, hd rotary switch from TU9B or sim, Feb 59 SW Mag, RSGB Bulls for 61, 62, 63, 64, G3XER, QTHR.

Z759 valves, E4205/B/7 crt, 898 dial. F. Cook, The Old Lodge, Seven Hills Road, Cobham, Surrey. Tel Cobham 3117.

Radio mags: SWM 56–57, WC 64–67, PW 57–59, 63, PE 69. Luxton, 8 Twyford Crescent, W. Acton, W3.

To get in touch with any 2m op in VE7. Reason, proposed visit to Vancouver in summer 1970. Also 8MHz xtals for 2m new zone C. G8CVS, 26 Blenheim Drive, Oxford, OX2 8DG.

Test equip: gdo, scope, multimeter, xtal cal or wavemeter. R1224 man. 1·915MHz xtal. Offers pse. G. Foster, 3 Egerton Rd, Leyland, Preston PR5 1YB.

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TW 2m communicator. G3CTP, QTHR. Tel Pound Hill 2560.

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Variable induct ex Canadian Marconi 52 set or sim for SWM May 1964, page 144. Jackson, 31 Elmwood Avenue, Forringbridge, Hants.

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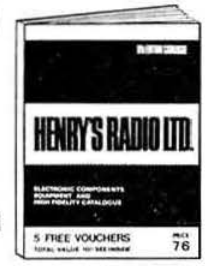

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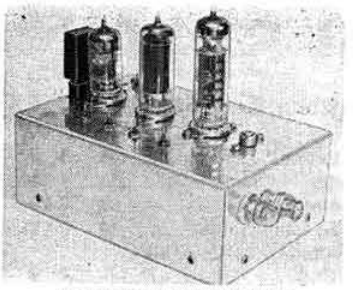

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