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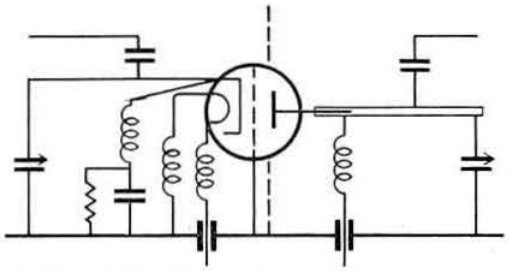

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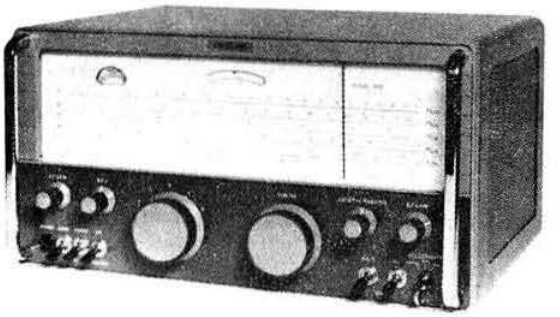

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Current Comment

discusses topics of the day

Choose Your Frequency

THE sunspot cycle being at the point it is and conditions on the higher frequency bands poor as a result, it is hardly surprising that some changes in the pattern of Amateur Radio are taking place. It was not so very long ago that 10 and 15 were practically a DX man's paradise—apart from the fact that too many people thought so, and made the QRM a bit of a problem—and even poor old 20 temporarily lost some of its glory. Those days are past, probably for some years to come, and 20 again carries the major load of DX activity during daylight hours. After dark, the hardier operators move down to what is left of 40, which, as those who took part in the R.S.G.B. 7 Mc/s DX Contest last November know, can be a very happy hunting ground indeed.

Quite a few sideband operators find there is DX to be worked on the high end of 80. And 160 has been known to turn up just a little c.w. DX once in a while! It may surprise some members to learn that overseas correspondents frequently report hearing Gs on the lower frequency bands happily talking to one another while DX operators cannot raise them!

We have already mentioned the changing habits due to the prevailing band conditions. Coupled with the well-established liking of radio amateurs for long distance communication it is a little difficult to understand why a few more fashions do not change too. Now that 10 and 15 open only rarely, why not use them for local contacts so freeing the lower frequency bands for DX? Club and group nets, in which all participants are within a few miles of each other, would find operation on either of these bands highly satisfactory. Ten particularly looks attractive—1700 kc/s virtually free of interference, apart from occasional sporadic *E* or auroral openings, simple full-size aerials and simple equipment. Even if transmitters have to be specially built, they can be crystal controlled. Now is a good time to use 10 for this type of operation—160 is noisy at the best and the equipment is not all that simpler to build. And there is no Loran on 10!

Some h.f. operators, rather than stay off the air because of adverse conditions on their favourite bands, have already moved higher in frequency to the v.h.f. ranges and are making good use of 2. This is another band with tremendous possibilities for local work, with real prospects of opening up for inter-European DX. Here again equipment is relatively simple—excellent designs appear regularly in the BULLETIN and the v.h.f. chapters of the *Amateur Radio Handbook* provide all the information necessary to build efficient equipment.

The point of this discussion is simply this: let us make the best possible use of our frequency allocations in the light of prevailing conditions. Let us not stick too firmly to preconceived notions of the most suitable band for a particular type of activity based on experience gained when propagation conditions were quite different. Let us take a leaf out of the commercials' book—choose the frequency for the type of communication in which we wish to engage.

Bulletin Articles

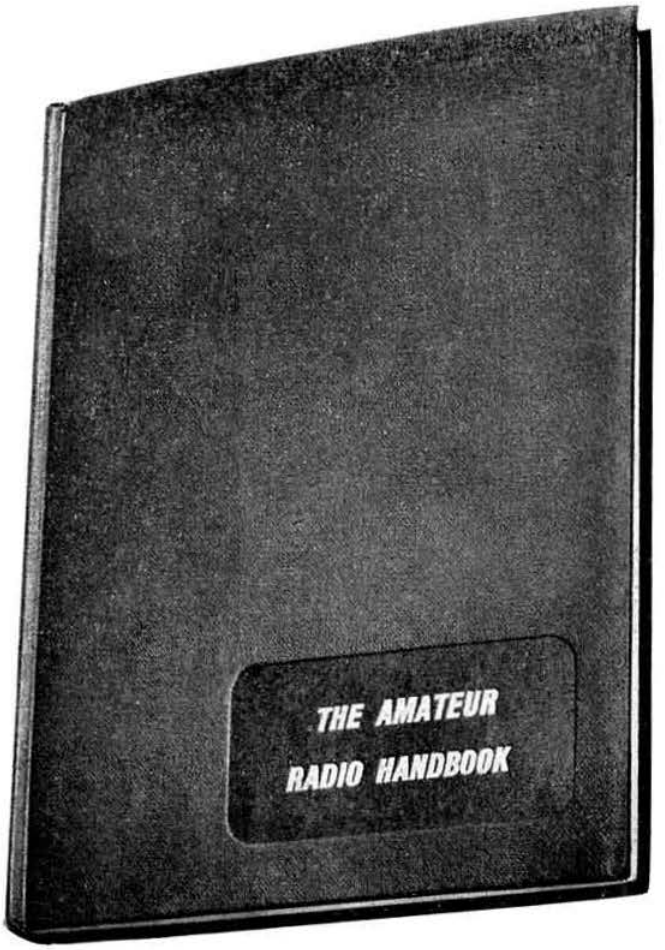
THE larger issues of the BULLETIN—now running to 64 pages every month—mean that more space can be devoted to a much wider variety of articles on all Amateur Radio subjects. Features such as *Society News*, *Forthcoming Events* and *Regional and Club News* are unlikely to be expanded, for the amount of information on the subjects covered remains more or less constant.

It is, therefore, in the technical sphere that the space available has vastly increased. The extended coverage of technical subjects in this and last month's issue is no flash-in-the-pan: the BULLETIN's consumption of technical material has doubled more or less overnight.

Judging from letters received, a great many members expect us to devote more space to what they call articles for the beginner, pointing out in justification of their pleas that not all amateurs and short wave listeners are by any means science graduates. The fact remains, however, that Amateur Radio is becoming an increasingly scientific pursuit. Indeed, it always has been —the difference today lies more in the speed of development. Nevertheless, those who look forward to seeing more articles with a down-to-earth practical approach in the BULLETIN will not be disappointed.

Many more articles on every aspect of Amateur Radio are required to maintain the new level of technical content which has been set. A simple criterion for would-be authors to apply in deciding whether an article is likely to be favourably considered is to ask: is it of Amateur Radio interest? If it is, then it is well worth while submitting it for consideration by the Technical Committee and editorial staff. While articles of all types from the most advanced constructional projects down will be most welcome, there is a particular need at the present time for short, factual articles describing the construction of simple but useful pieces of gear which will add to the efficiency or ease of operating transmitting or receiving stations. For those with little or no previous experience of preparing articles, a helpful leaflet is available from Headquarters on request.

J. A. R.



R.S.G.B. AMATEUR RADIO HANDBOOK

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Among the contributors to this 544 page Third Edition of the *Amateur Radio Handbook* are W. H. Allen, M.B.E. (G2UJ), A. J. Bayliss, B.Sc. (G8PD), G. L. Benbow, M.Sc., A.M.I.E.E. (G3HB), F. J. H. Charman, B.E.M. (G6CJ), D. N. Corfield, D.L.C. (Hons.), A.M.I.E.E. (G5CD), G. C. Fox, A.M.I.E.E. (G3AEX), D. W. Furby (G3EOH), W. E. Green (G3FBA), D. E. A. Harvey, Grad.I.E.E., J. P. Hawker (G3VA), D. W. Heightman, M.Brit.I.R.E. (G6DH), H. M. Humphreys (GI3EVU), N. G. Hyde, A.M. Brit.I.R.E. (G2AIH), J. H. Jowett (ex-G3CFR), J. Douglas Kay, Assoc.Brit.I.R.E. (G3AAE), L. A. Moxon, B.Sc. (G6XN), R. D. Nicol (G3ENQ), S. N. Radcliffe, M.A. (G3GZB), R. F. Stevens (G2BVN) and G. M. C. Stone, A.M.I.E.E., A.M.Brit.I.R.E. (G3FZL).

EDITOR: JOHN A. ROUSE (G2AHL)

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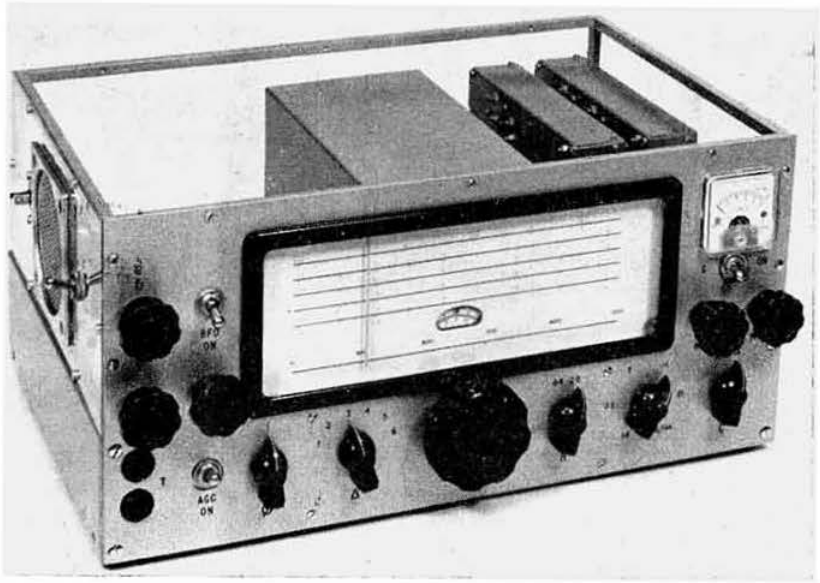


G3HBW's transistorized communications receiver covering all bands from 1·8 to 144 Mc/s, excluding 70 Mc/s. The receiver uses 34 transistors and has three crystal-controlled front-ends selected by the bandswitches (first and second from the right at the bottom of the front panel).

A Transistorized Communications Receiver

By A. L. MYNETT, B.Sc. (G3HBW)*

THE receiver to be described was originally designed to satisfy a technical need which became evident when the Radio Society of Harrow began to take an active interest in v.h.f. field days. The obvious approach to receivers for 144 Mc/s portable working is to transport the home receiver to the field, en bloc! In the writer's case, the receiver consisted of a converter with two A.2521 r.f. stages, mixer and crystal-controlled oscillator chain, working into a National HRO. Even with the latter's output valve removed, the total battery consumption on receive was considered to be rather excessive at about seven amperes. It was also found difficult to suppress vibrator hash entirely on 144 Mc/s even though suppression was complete on frequencies below 30 Mc/s.

The obvious solution seemed to be to design a transistorized receiver. It was not thought that the performance of such a device need fall significantly short of that exhibited by an all-valve receiver except possibly on the count of strong signal effects. This hope seems to have been completely justified as, in particular, the noise performance, selectivity, both frequency and gain stabilities and reliability of the receiver have proved to be comparable with those of a valve device, whilst the total power consumption is only 12 volts at 90 mA. The measured noise figure is 3·6db, using the Philco T.2028 in the first r.f. stage. There is, of course, no appreciable warm-up drift, the tuning remaining constant to within a few tens of cycles per second, for hours on end.

The addition of lower-frequency ranges, covering the 1·8 to 30 Mc/s amateur bands has made the receiver useful for l.f. and h.f. band field days and also for general mobile purposes. The complete absence of frequency-drift and excellent sensitivity have recently prompted yet another use, namely 144 Mc/s meteor scatter work, for which the receiver has proved very satisfactory.

* *52 The Rutts, Bushey Heath, Watford, Herts.*

Overall Design: Block Diagram

The initial design requirements for the receiver were considered to be:

(i) Tuning range to be 144·0 to 146·0 Mc/s, with good frequency stability, clear dial presentation and slow, backlash-free tuning.
(ii) Low noise figure over the whole range.
(iii) Low level of i.f. interference.
(iv) Freedom from self-generated beats.
(v) Freedom from excessive strong-signal effects.
(vi) Good adjacent-channel selectivity.
(vii) Good image-protection against other signals in the band.
(viii) Provision for both c.w. and a.m. 'phone reception.
(ix) Availability of effective impulse-noise limiting.

A low final i.f. with a conventional phased, single-crystal filter was favoured to provide good adjacent-channel selectivity, without the shortcomings of the *Q*-multiplier. Two frequency changes were therefore required from 144 Mc/s. The usual choice between fixed first local oscillator with tunable second oscillator and vice-versa was settled in favour of the former method, on the score of frequency stability. At this stage, it was realized that no great elaboration of the design would be required to cover the lower frequency bands as well as 144 Mc/s as a band-switched crystal-controlled converter could be introduced for the purpose. The selectivity and frequency-stability would then be quite adequate. This would render the receiver usable

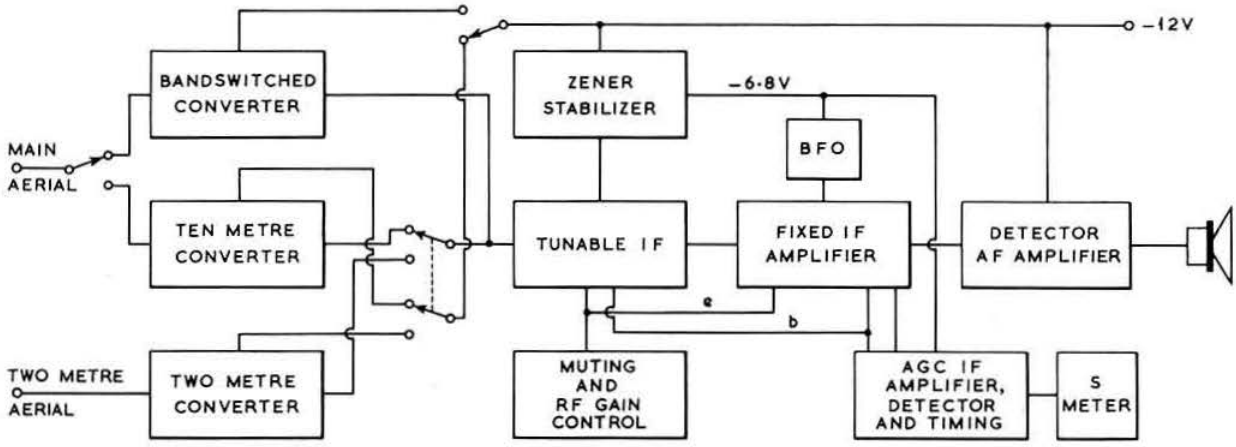


Fig. 1. Block diagram of the transistorized communications receiver.

for DX band field days and possibly also for mobile operation, if the overall size could be kept down.

To simplify the l.f. section, the tunable i.f. could be made to coincide with one of the wanted amateur bands, but, if this were done, the local oscillators must then all be on the l.f. sides of their respective signal bands, to avoid reversed tuning on some ranges. Hence, it followed that the lowest frequency band required i.e., 1·8-2 Mc/s, must be used as the tunable i.f. It was considered desirable that the l.f. ends of all ranges should coincide, consequently the tunable i.f. became 1·8 to 3·8 Mc/s. To obtain improved bandspread on the lower frequency bands, it was decided to switch the tuning range of the i.f. to cover either 1·8 to 3·8 Mc/s or 1·8 to 2·2 Mc/s. The local oscillator frequencies for the first conversion thus became:

1·7 Mc/s (for the 3·5 Mc/s band).
5·2 Mc/s (for the 7·0 Mc/s band).
12·2 Mc/s (for the 14·0 Mc/s band).
19·2 Mc/s (for the 21·0 Mc/s band).
26·2 Mc/s (for the 28·0 Mc/s band).
142·2 Mc/s (for the 144·0 Mc/s band).

Calculations showed that trouble from self-generated whistles should not be serious anywhere. The design thus resolved itself into a fixed i.f. amplifier with crystal filter, a.g.c. detectors, noise limiter, audio amplifier, b.f.o., etc., preceded by a two tunable-range i.f. amplifier into which would feed either a crystal-controlled 144 Mc/s converter or a band-switched converter for the 3·5 to 28 Mc/s bands, using the tunable i.f. direct for 1·8 Mc/s.

Minor rearrangements removed the 28 Mc/s range from the bandswitched converter, which thus covered five ranges with one spare switch position on a normal 60 degrees interval wafer switch. The 28 and 144 Mc/s bands are therefore covered by means of separate converters, both plugged permanently into the switched front-end and coming into operation on the sixth switch position with another, two-way switch to select one or the other. In this manner, other bands such as 70 Mc/s can be covered without the use of external units by replacing one of the internal converters.

Form of Construction

It was decided to build the receiver in unit form, with three sub-chassis containing, respectively, the band-switched front-end with plug-in converters, the range-switched i.f. tuner and, lastly, the complete " back-end," including the fixed i.f. amplifier. The three sub-chassis are fitted on to the main chassis to which they are fixed by screws at each corner. The main chassis has large rectangular openings to take any components mounted on the sub-chassis. The panel is bolted to the front of the main chassis but, as it was hoped that ventilation would not be required, the conventional louvred metal cabinet was not needed; instead, the main chassis and panel are made into the form of a box by adding a light framework of $\frac{1}{4}$ in. square dural bar and closing in the top, sides and bottom with thin perspex panels to exclude dust.

Design of Individual Units

The Bandswitched Converter. This was required to convert the bands 3·5 to 3·8, 7·0 to 7·3, 14·0 to 14·4 and 21·0 to 21·4 Mc/s to 1·8 to 2·2 Mc/s with good noise performance, high frequency stability, freedom from spurious signals (especially direct tunable i.f. breakthrough) and not excessive gain, to reduce strong signal effects to a minimum. It was also required to operate as a straight-through amplifier on 1·8 to 2·0 Mc/s.

A reasonably flat response in the passbands was wanted together with rapid attenuation outside them. Calculation showed that the selectivity produced by four tuned circuits of reasonable Q should be adequate, so it was decided to use two r.f. amplifier stages feeding into the mixer with pairs of slightly overcoupled tuned circuits between the stages, to give a double-humped response whose centre " dip " could be filled in with the " hump " of a single tuned circuit in front of the first r.f. amplifier. Top-capacitance coupling was used for the pairs. The choice between the common-base and common-emitter connection for the r.f. amplifiers was settled in favour of the former, to remove the need for neutralization and also as the high stage gain of the common emitter connection was not required.

The mixer was connected in the common emitter configuration as no feedback problems were anticipated, and with oscillator injection by series capacitance to the base. The problem then arose of the local oscillator arrangement to be used. The four frequencies to be generated were 1·7 Mc/s, 5·2 Mc/s, 12·2 Mc/s and 19·2 Mc/s. It was considered

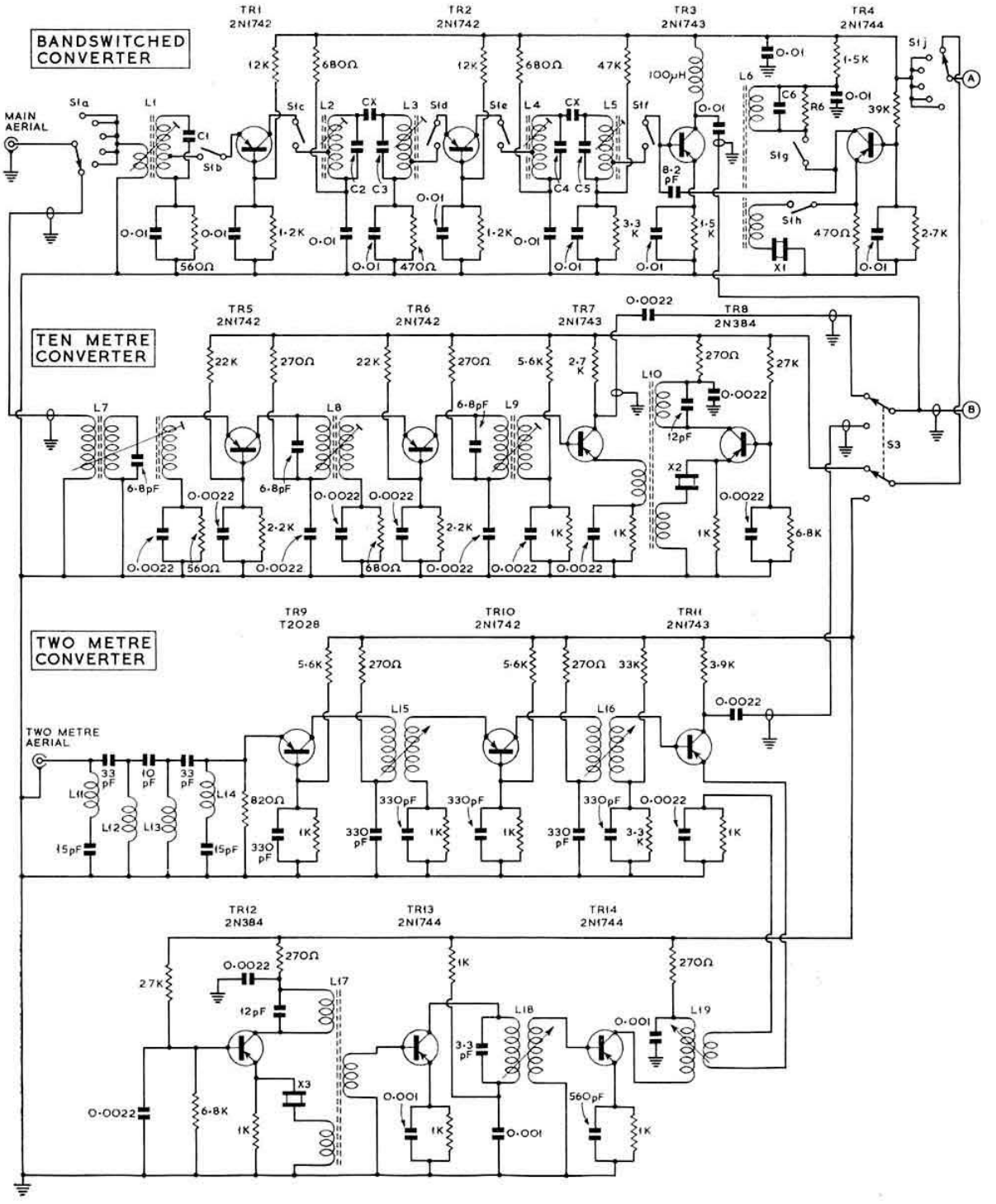


Fig. 2. The three crystal-controlled converters.

better not to use frequency multiplications by running all oscillators as fundamentals or overtones, to keep the local oscillator to a single stage and also to reduce the number of spurious responses possible. There seemed to be no real obstacles in the way of using surplus crystals to generate 5·2 or 19·2 Mc/s (third overtone of 6·4 Mc/s) but 1·7 and 12·2 Mc/s proved more difficult. A 5·2 Mc/s crystal could be obtained only in the large 10X holder and, as miniature crystals were preferred, the crystal was edge-ground on a lapping wheel until it was reduced to a size suitable for FT243 crystal lands, i.e., to about one-eighth of its orginal surface area. It was replaced in an FT243 holder and found to work perfectly after this modification! Greatly encouraged by this success, the same treatment was meted out to a surplus 10X 1·7 Mc/s crystal but, sad to say, this could never be induced to work again afterwards, as had been rather expected. Ultimately, both the 1·7 and 12·2 Mc/s crystals were ordered specially, calibrated as series resonators in miniature Style D holders. A tuned-collector, emitter feedback oscillator circuit is employed with output coupling from the collector.

The transistors used in the converter are Philco 2N1742's in both r.f. stages, a 2N1743 as the mixer and a 2N1744 as the oscillator. These are designed for use between 30 and 600 Mc/s but the noise performance of the r.f. stages is still good even as low as 1·8 Mc/s and is, of course, excellent at the top end of the converter range.

In the photograph of the underside of the receiver, the oscillator section can be seen nearest the front panel and, from outside to inside of the receiver, the tuned circuits are for the 1·8, 3·5, 7·0, 14·0 and 21·0 Mc/s bands. The pair of coils for the second r.f. stage are seen to be absent on the 1·8 Mc/s range, the collector and mixer base coils for the first r.f. stage being top-capacitance coupled through a length of screened lead. This is because the second stage is inoperative on this range, a precaution to prevent excessive 1·8 Mc/s gain. It will be remembered that the mixer operates as a straight amplifier on Top Band.

The 144 Mc/s Converter. Two un-neutralized common-base r.f. stages feeding into a common-emitter mixer are used. The local oscillator chain consists of a third overtone crystal oscillator, using a surplus 7·9 Mc/s FT243 crystal, ground to an exact frequency, driving tripler and doubler stages to 142·2 Mc/s. The multiplier transistors are forward biased by base-rectification, which has been found a very stable

COIL, CAPACITOR AND CRYSTAL TABLE

	Winding	1·8 Mc/s	3·5 Mc/s	7 Mc/s	14 Mc/s	21 Mc/s
L1*	Main	96 turns 38 s.w.g. enam.	63 turns 34 s.w.g. enam.	37 turns 30 s.w.g. enam.	21 turns 22 s.w.g. enam.	15 turns 22 s.w.g. enam.
	Aerial	12 turns 38 s.w.g. enam.	6 turns 34 s.w.g. enam.	4 turns 30 s.w.g. enam.	2 turns 22 s.w.g. enam.	2 turns 22 s.w.g. enam.
	Emitter tap	14 turns	8 turns	4 turns	2 turns	2 turns
L2*, L4*	Main	96 turns 38 s.w.g. enam.	63 turns 34 s.w.g. enam.	37 turns 30 s.w.g. enam.	21 turns 22 s.w.g. enam.	15 turns 22 s.w.g. enam.
	Collector tap	65 turns	35 turns	19 turns	10 turns	6 turns
L3*, L5*	Main	96 turns 38 s.w.g. enam.	63 turns 34 s.w.g. enam.	37 turns 30 s.w.g. enam.	21 turns 22 s.w.g. enam.	15 turns 22 s.w.g. enam.
	Emitter tap	14 turns	8 turns	4 turns	2 turns	2 turns
L6*	Main	—	70 turns 34 s.w.g. enam.	32 turns 30 s.w.g. enam.	18 turns 22 s.w.g. enam.	14 turns 22 s.w.g. enam.
	Feedback	—	10 turns 34 s.w.g. enam.	7 turns 30 s.w.g. enam.	1 turn 22 s.w.g. enam.	4 turns 22 s.w.g. enam.
C1, C2, C3, C4, C5	—	56 pF	39 pF	33 pF	27 pF	22 pF
Cx	—	15 pF	5·6 pF	2·2 pF	1 pF	1 pF
C6	—	—	220 pF	100 pF	15 pF	12 pF
R6	—	180 ohms	5·6 K ohms	—	6·8 K ohms	10 K ohms
X1	—	—	1·7 Mc/s	5·2 Mc/s	12·2 Mc/s	19·200 Mc/s (third overtone of 6400 kc/s)

L7†, 23 turns 26 s.w.g. enam., emitter winding 3 turns, aerial winding 5 turns
L8†, 23 turns 26 s.w.g. enam., emitter winding 3 turns
L9†, 23 turns 26 s.w.g. enam., base winding 7 turns
L10†, 17 turns 26 s.w.g. enam., emitter winding 3 turns, output winding 3 turns
L11, L14, 7 turns 20 s.w.g. enam., $\frac{7}{16}$ in. i.d., $\frac{7}{16}$ in. long
L12, L13, 5 turns 20 s.w.g. enam., $\frac{3}{16}$ in. i.d., $\frac{3}{16}$ in. long
L15, L16, 13 turns 20 s.w.g. enam., $\frac{5}{16}$ in. i.d., close wound, coupling 2 turns
L17†, 17 turns 26 s.w.g. enam., emitter tap at 3 turns, output winding 3 turns
L18†, 11 turns 26 s.w.g. enam., winding 2 turns
L19, 15 turns 20 s.w.g. enam., close wound, output winding 1 turn $\frac{5}{16}$ in. i.d.
L20*, 46 turns 30 s.w.g. enam., emitter tap at 8 turns, input tap at 9 turns
L21*, 46 turns 30 s.w.g. enam., collector tap at 31 turns, emitter winding 8 turns
L22*, 46 turns 30 s.w.g. enam., collector tap at 31 turns, base winding 11 turns
L23*, 36 turns 30 s.w.g. enam., collector winding 9 turns, base winding 5 turns
L24, medium wave coil (Weyrad type P50/1AC)
IFT1, 87 turns 34 s.w.g. enam., input coupling winding 50 turns, on small Aladdin dust pot-cored former
IFT2, IFT3, IFT4, IFT5, IFT6, IFT7, IFT8, IFT10, 460 kc/s i.f. transformers (Weyrad type P50/2CC)
IFT9, IFT11, 460 kc/s i.f. transformer for detector (Weyrad type P50/3CC)

† Wound on Aladdin $\frac{1}{4}$ in. diameter former. * Wound on Salford type S34 former.

MISCELLANEOUS COMPONENTS

M1, miniature S meter, 0-1 mA f.s.d. (Kyoritsu Electrical Instruments Ltd.)
T1, audio driver transformer (Rex type LT44)
T2, audio output transformer (Rex type LT700)
X2, 8650 kc/s FT243 type crystal reground to oscillate on its third overtone at 26,200 kc/s
X3, 7900 kc/s FT243 type crystal reground to oscillate on its third overtone at 23,700 kc/s
Slow motion drive, Eddystone type 898
Main tuning capacitor, reversed spindle four gang two section with maximum capacities of 133 and 312 pF. (Jackson Bros. type L.E.A.F. B.S. Part No. 5026/23963.)

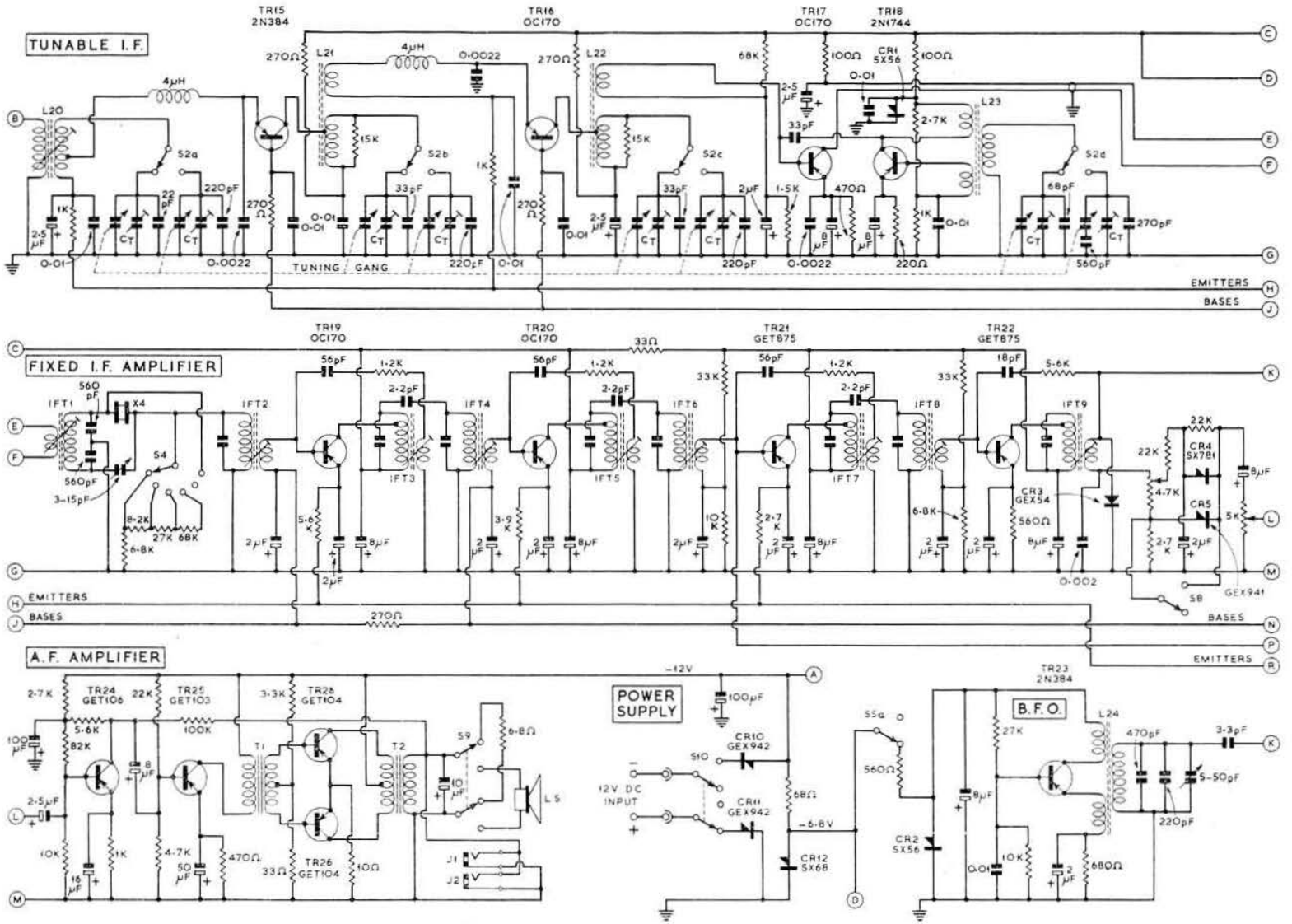


Fig. 3. The tunable i.f. stages, the fixed i.f. amplifier, audio frequency amplifier and beat frequency oscillator. Details of the inductances, i.f. and a.f. transformers are given in the table on page 398. The points marked with the same encircled letters on the diagram are joined together.

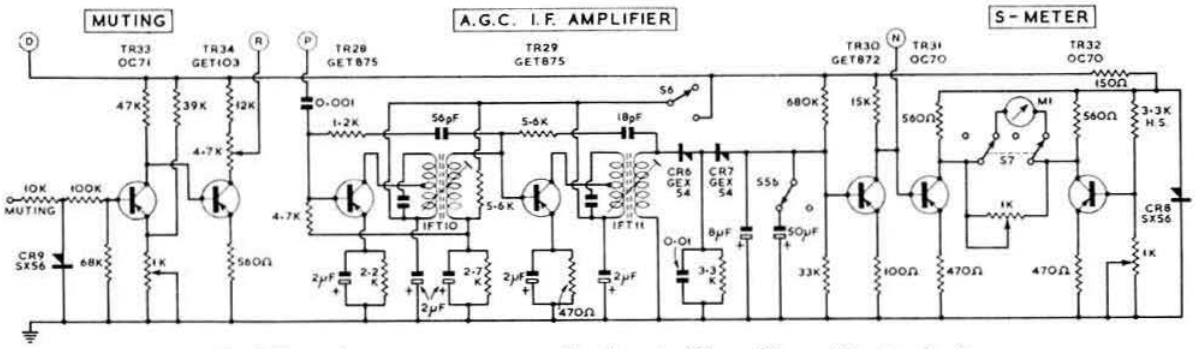


Fig. 4. The muting arrangement, automatic gain control i.f. amplifier and S-meter circuit.

mode of operation. Local-oscillator injection is by means of a coupling coil in series with the mixer emitter lead.

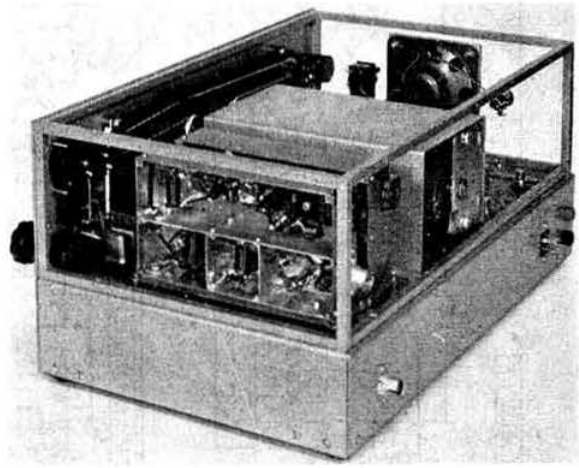
The transistors in use were originally 2N1742's in both r.f. stages, 2N1743 in the mixer and 2N384 and 2N1744's in the oscillator chain. The measured noise figure was 4·5db but this has since been improved to 3·6db by replacing the 2N1742 in the first r.f. stage by a Philco T.2028. Aerial coupling at 72 ohms impedance to the first r.f. stage is direct to the emitter through a multi-section high-pass filter to reduce interference from f.m. and TV stations. Inter-stage couplings are in the form of a single resonant circuit, using self-supporting coils, tuned by the transistor output capacitance, with an adjustable link coupling to the next stage, for bandwidth control. The output coupling system from the mixer is by series capacitance from a 3900 ohms collector load resistor. A similar arrangement is used in the 28 Mc/s converter in which the output coupling impedance of the bandswitched converter, a 100 μH inductance (a miniature Painton r.f. choke), is always in parallel with one or other of these collector load resistors, thus forming, together with the transistor and circuit shunt capacitances, a circuit of low *Q* tuned to the centre of the i.f. band.

The 28 Mc/s Converter. As in the 144 Mc/s converter, two common base r.f. stages feed into a common emitter mixer. The local oscillator has only one stage, a third overtone crystal oscillator operating on 26·2 Mc/s from an FT243 type 8·650 Mc/s crystal ground accurately to frequency. The inter-stage coupling transformers are wound on ¼ in. dia. slug-tuned Aladdin formers. When the main bandswitch is in the " 28/144 " position, the common l.f. bands aerial socket is connected to a coupling winding on the broad-band input tuned circuit, covering 28 to 30 Mc/s and a further winding on this coil feeds into the emitter of the first r.f. stage. The mixer output circuit has already been described in the previous section.

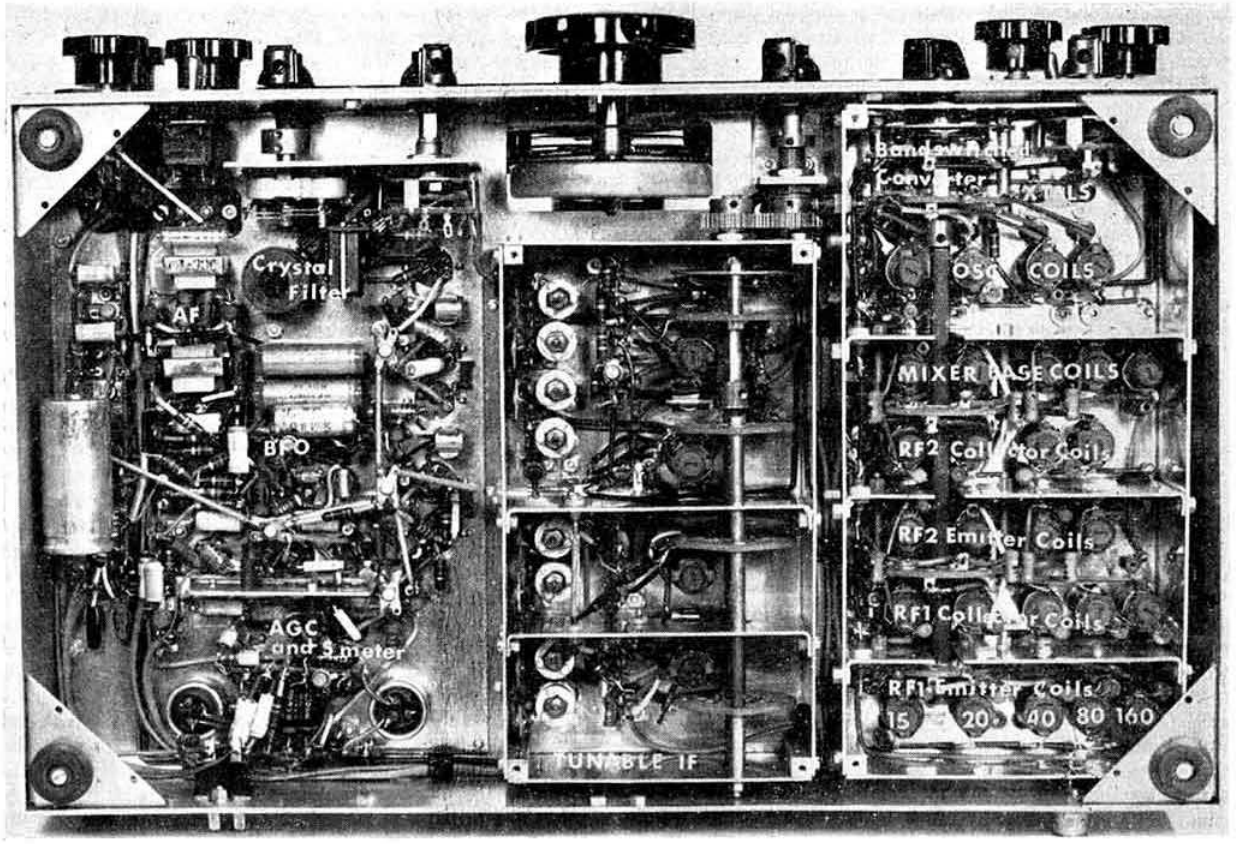
Both r.f. stages use 2N1742's, the mixer is a 2N1743 and the oscillator a 2N384. The converter, like that for 144 Mc/s, is constructed in a small aluminium chassis with a dividing screen down the centre to separate the oscillator and signal sections. Cross-screens isolate the inter-stage signal tuned circuits. One side of the chassis is bolted to an aluminium plate, just larger than the chassis side itself and the assembly is mounted on the band-switched converter sub-chassis by screwing into four hank bushes in the latter. Three home-made insulated sockets in the sub-chassis and co-operating plugs in the converter chassis serve to connect the d.c. supply, aerial input and i.f. output from the converter. Only two such pairs of plugs and sockets are needed for the 144 Mc/s converter as the Belling-Lee aerial socket is mounted directly on the end of the chassis.

The I.F. Tuner Circuit. The tunable i.f. section of the receiver consists of two common-base, un-neutralized amplifier stages using, respectively, 2N384 and OC170 transistors feeding a grounded emitter OC170 mixer, with a 2N1744 local oscillator. Single tuned circuits are employed between stages with collector taps and separate emitter or base coupling windings. Oscillator injection is by means of a series capacitor from the collector tuned circuit of the oscillator to the mixer base.

The two ranges, 1·8 to 2·2 Mc/s and 1·8 to 3·8 Mc/s, are tuned with a four-gang two-section capacitor. The lower capacity section of the oscillator gang has both shunt trimming and series padding capacitors, so arranged that reasonable scale linearity is achieved on both the bandspread and main tuning ranges and also that the l.f. ends of the ranges coincide. The signal tuning sections have parallel trimmers, separate for each range and these, together with the coil slugs, permit two-point tracking to be achieved. Gain equalization over the wider tuning range is ensured by introducing rudimentary low-pass filter sections, consisting of series 4 μH inductors (Painton miniature r.f. chokes) and shunt



A rear three-quarter view of the receiver with the crystal-controlled converters in the foreground. When this photograph was taken, the Perspex dust cover had been removed.



An under-chassis view of the receiver showing the positions of the principal sections.

2200 pF capacitors into the base leads of both amplifier stages.

An attempt to operate the amplifier stages in either neutralized or un-neutralized common emitter was a failure as it was found impossible to maintain stability over both tuning ranges simultaneously with a particular set of trimming adjustments. Use of the common-base connection solved the problem and neutralization was found to be unnecessary.

Automatic gain control voltages are applied to the bases of the amplifier stages and their respective emitters are d.c. connected to the manual r.f. gain control line. Mistuning effects are negligible.

A step-up tuned transformer with centre-tapped secondary winding matches the mixer collector into the balanced crystal filter.

The Receiver "Back-End." Four common-emitter, neutralised stages at 456 kc/s form the main, fixed frequency, i.f. amplifier. They are preceded by a balanced, phased type of single-crystal filter, using an old HRO crystal.

The interstage couplings use pairs of standard transistor i.f. transformers with top capacitance coupling to obtain a better bandpass response than with single tuned circuits and to make relative isolation of the interstage matching and the neutralizing circuits possible. The first two stages use OC170's and the final two GET875's to provide an increased power output for the detector.

In parallel with the base of the third i.f. stage is joined the base of the first of two neutralized a.g.c. amplifier stages, also using GET875's. A.g.c. is arranged by connecting the d.c. base returns of the four controlled stages (stages 1 and 2 of the i.f. tuner and also of the 456 kc/s amplifier) to the collector of a d.c. amplifier transistor, TR30, whose base is fed from the negative-going voltage output of the diode a.g.c. detector, through another series diode operating as a "hang" gate. Rising a.g.c. voltages pass through the gate with only a short time-constant delay but, as soon as the a.g.c. voltage commences to fall, the gate diode cuts off and bias is slow to leak away on the base of TR30. This voltage-decay time constant is approximately 50 milliseconds for a.m. 'phone reception, with the b.f.o. switched off, but switching it on for c.w. or s.s.b. brings an auxiliary parallel capacitor into circuit which increases the time constant to about one second. This means that a.g.c., and therefore the S-meter as well, are effective on c.w. and s.s.b. as well as on carrier-telephony, particularly as the b.f.o. is injected into the signal detector and so cannot block the separate a.g.c. i.f. amplifier.

The S-meter bridge is conventional, using two OC70 transistors mounted side-by-side on the chassis to ensure equality of temperatures, only one transistor being a.g.c. controlled.

Manual gain control is effected by introducing a variable resistor into the suitably decoupled d.c. emitter return circuits of the five controlled stages: the two tunable i.f. stages and the first three 456 kc/s i.f. stages. The d.c. path

to ground of the variable resistor is completed through the collector-emitter circuit of a current control transistor TR34 which is normally bottomed by virtue of its base being d.c. connected to the collector of an auxiliary control transistor TR33, which, having zero base bias current, carries collector leakage current only. A small negative current fed into the base of TR33 causes it to conduct; its negative collector voltage falls, reducing the collector current of TR34 and, with it, the gains of the five controlled transistors. The extent to which this occurs for a given current fed into the base of TR33 depends upon the setting of the variable resistor in its emitter. Consequently, the circuit provides an effective method of reducing the receiver gain to a level determined by the setting of the TR33 emitter resistor, when a small negative voltage is connected to the terminal marked MUTING. The Zener diode, together with the 100 K ohms and 68 K ohms resistors, ensures that the level of muted gain is independent of the voltage on the muting terminal provided only that it exceeds 5·6 volts, the Zener breakdown voltage.

The b.f.o. is of the tuned collector, emitter feedback variety, using an h.f. transistor type 2N384 to ensure good frequency stability. The b.f.o. transformer is a standard transistor medium-wave oscillator coil with a larger than normal tuning capacitance.

The signal detector feeds a conventional a.f. amplifier via an optional impulse-noise limiter. This is an " impedance scaled-down " version of the familiar Dickerts type, as used in the RCA AR88, and is very satisfactory in use, in spite of the lower circuit impedances and voltages occurring. Many reports have been received of ineffectiveness of conventional noise limiters in transistorized receivers. The writer believes that there are two major reasons for this. First, for the shunt element, a diode exhibiting a low impedance at very small forward voltage is required. The GEX941 gold-bonded germanium diode fulfils this requirement admirably. The second problem came to light somewhat accidentally. When the receiver " back-end " was originally put together for testing, the noise limiter worked very well but, after the whole receiver was finally assembled, the limiter was found to be almost completely ineffective. For a while, this remained a mystery but it was eventually discovered that the entire audio section was feebly oscillating at a few tens of kc/s. This was not accompanied by any noticeable deterioration in quality. Upon changing the phase conditions of the feedback slightly, the oscillations ceased and the noise limiter became fully operational once more. It is suspected that weak supersonic oscillation in transistor feedback audio amplifiers is fairly common and probably explains most of the cases of poor noise limiter performance.

Power Supply Circuits

The 12 volts d.c. input is connected through a double-pole on/off switch to one GEX942 series protection diode in each leg. This ensures that connecting the supply with positive and negative poles reversed will not damage the receiver! The 12 volt negative rail is fed to the bandswitched converter, the 144 Mc/s and 28 Mc/s converters and the a.f. section. The tunable i.f. and 456 kc/s i.f. sections, including a.g.c. amplifier, operate from a 6·8 volt line stabilized by a Zener diode. The b.f.o., S-meter bridge and tunable oscillator are supplied with 5·6 volts, obtained by further resistive dropping from the 6·8 volt line and sub-stabilization by means of three separate Zener diodes.

The 12 volt negative line is connected to the bandswitched converter when the main bandswitch is in any of the 1·8 to 21 Mc/s positions but, in the sixth " 28/144 " position, the supply voltage is fed to one wiper of the 28/144 Mc/s converter selector switch, which then selects the d.c. input and i.f. output of the two converters simultaneously.

Results and Performance

The receiver has been used successfully for many different purposes. It has become the main station receiver at G3HBW for all amateur bands from 1·8 to 144 Mc/s, excluding 70 Mc/s. Much DX has been heard on the lower frequency bands, from Top Band to 10m, including several W's on 160m using 10 ft. of wire thrown out of the window as the aerial! The high frequency-stability, good signal-to-noise ratio and excellent adjacent-channel selectivity make listening on the h.f. bands a pleasure.

The most severe test on the l.f. and h.f. bands was perhaps during the 1962 National Field Day, when it was used at the Radio Society of Harrow's " B " station, on 160, 20 and 10m. Some trouble was experienced on Top Band due to the proximity of the " A " station's 80m transmitter, but no other cross-band effects were noticed. Some cross-modulation was in evidence on 20m, from an exceedingly strong commercial transmission just outside the amateur band. On 160m, the old bugbear of medium wave broadcast station interference was encountered when using a half-wave aerial but the insertion of a series 47 pF capacitor in the aerial lead cured this completely without any adverse effects on performance on any of the other bands.

Although complete break-in operation had been arranged, c.w. monitoring was unsatisfactory because the signal leaking into the receiver through the T-R switch on 20 and 10m pulled, and even sometimes actually stopped, the crystal oscillator. This effect has been overcome in the present design by reducing the mixer-to-oscillator coupling and also increasing oscillator feedback somewhat from their original values.

The final disaster came when the b.f.o. commenced squegging: needless to say this occurred just after the writer (and chief engineer) had departed for lunch! This squegging effect was due to a combination of the temperature rise of the receiver to nearly 80°F. in a sun-heated tent and the accidental use of a critical value of 8 μF for the b.f.o. emitter bypass capacitance. Halving this value of capacitance cured the trouble but it has since been reduced to 0·01 μF, to provide a large factor of safety.

The receiver has been used almost exclusively during Radio Society of Harrow's 2m field days. Strong signal effects do not appear to be serious even from a high-power station one mile away on the next hilltop. No breakthrough can be found from a television repeater station, clearly visible from the site, although some trouble was experienced from Channel 9 transmissions when the receiver was used in South London.

The successful expedition to Sark (GC3PBR/A) provided another application for the receiver, the only difficulty encountered being slight interference from the Les Platons TV transmitter situated within optical range of the site.

Using the receiver at home, in conjunction with a 28 element aerial array, the Cornish Beacon Station, GB3CTC, about 240 miles distant, always seems to put in a good, readable signal and the dial calibrations for this station and also for GB3VHF at Wrotham, do not vary by as much as

(Continued on page 438)

How about 7 Mc/s?

By R. F. STEVENS (G2BVN)*

IT is an established fact that long distance radio communication is possible only because of the existence of a layer, high in the atmosphere above the earth, which reflects short wave radio signals over great distances. The reflecting properties of this layer are governed by its degree of ionization which in turn depends directly upon the amount of ultra violet radiation from the sun. It has also been established that the capability of the ionosphere to reflect radio waves varies over an 11 year cycle, and this is directly related to the number and intensity of sunspots appearing on the sun. When the number of sunspots is large then short wave radio conditions are good. The current sunspot cycle, the nineteenth since records were commenced, peaked during March, 1958, with unprecedented intensity, and following a gradual decline since that date is expected to reach its minimum in late 1964 or early 1965. In terms of activity on the various amateur bands this means that conditions on 14, 21 and 28 Mc/s will become poorer, whilst the 7 and 3·5 Mc/s bands will produce more long distance signals. For at least a further four years conditions on the 21 and 28 Mc/s bands will be no better than they are at the present time.

This state of affairs has caused many operators to consider the use of the 7 Mc/s band and suitable aerials for use on these frequencies. The horizontal half-wave dipole fed with 72 ohm coaxial cable is a simple aerial to construct and easy to adjust for minimum standing wave ratio, but, unless it is erected at least a half-wave above the ground, the results, in so far as DX working is concerned, will not be optimum. At 7 Mc/s a half-wave represents a height of the order of 70 ft., which is out of the question for most operators. The length of the dipole radiator can be obtained from the formula $\frac{468}{frequency\ in\ Mc/s}$.

Low Angle Radiation

It is generally realized that low angle radiation is necessary for long distance working and the vertical aerial exhibits this property. Provided that a vertical aerial has a good ground plane system and is reasonably clear of surrounding objects and other aerials, then generally it will be found to be satisfactory for DX working. The length of the radiator of this type of aerial is one quarter-wave which is 33 ft. 2 in. when cut for 7050 kc/s (length $= \frac{234}{frequency\ in\ Mc/s}$), and the radials are slightly longer than the vertical portion. The length of these radials may be calculated from the expression $\frac{240}{frequency\ in\ Mc/s}$.

A good match to coaxial cable of 52 ohms impedance can be obtained by mounting the aerial so that the four radials, which are insulated from earth, run downwards at an angle of approximately 45 degrees. If the site conditions are such that the base of the aerial must be at ground level, satisfactory compromise operation can usually be obtained if a good earth connection is available, and again 52 ohm cable is used to feed the radiator. If it is desired to attain a low standing wave ratio then it is suggested that a matching network should be installed in a weatherproof position at the base of the aerial. To obtain improved results it is possible to employ two or three phased vertical aerials which should show an improvement of up to one " S " point over the single aerial. One disadvantage resulting from the use of a vertical aerial is that the intensity of any man-made noise, particularly ignition interference, is greatly increased due to its vertical polarization.

Other types of aerials for use on 7 Mc/s, which may be practicable in some locations, are: (*a*) a double extended Zepp, (*b*) a fixed wire beam, (*c*) a collinear, or one of the latest devices, (*d*) a log periodic.

Any discussion on aerials will invariably bring forth comments on the desirability of a low standing wave ratio, and whilst this is obviously a desirable feature, it is sometimes doubtful if the true import of these figures is appreciated by users of the various types of reflectometer. † Obviously a s.w.r. of 1 : 1 means that the power loss by reflection is zero, but a 1·5 : 1 ratio produces a power loss of 4 per cent, and at 2 : 1 this percentage rises to 11. Although accurate matching of the aerial and the feeder should be aimed at in order to reduce the s.w.r. to as low a figure as possible, it is considered that, providing the s.w.r. is less than 2 : 1, the efficiency of the aerial system will not greatly suffer. It will be noted that the statement has been made that a s.w.r. of 2 : 1 will result in a power loss (by reflection) of 11 per cent, and this figure apparently conflicts with Table 1 on page 359 of the *Amateur Radio Handbook* where the " reflection coefficient percentage " is shown as 33. This latter figure, however, refers to *current*, and to convert the reading to a *power* loss it is necessary to make use of the expression $Watts = Current^2 \times Z_0$ of the feeder in ohms. On the assumption that one ampere of r.f. is being delivered by the transmitter to a feeder of 72 ohms impedance the reflected loss is $\cdot 33^2 \times 72 = 7{\cdot}8$ watts, out of a total output of $(1{\cdot}0)^2 \times 72 = 72$ watts, or approximately the figure of 11 per cent already quoted.

If a vertical aerial for 7 Mc/s shows a s.w.r. of 1·75 : 1, then the power loss of 7·5 watts out of an input to the aerial of 100 watts, together with any small ohmic losses, will have little effect on the strength of the signal at the receiving end. To keep losses in the feedline to an acceptable figure a suitable coaxial cable should be employed. In this service, some of the cheaper and lighter cables intended for television installations have been found to be most unsatisfactory. In the experience of the writer the vinyl sheath becomes porous after several months' exposure to the weather, and this leads to a blackening of the copper centre conductor, together with moisture in the cellular type dielectric.

A ground plane aerial for 7 Mc/s in an urban location has produced c.w. contacts with all continents, and to accomplish this it has not been necessary to operate during the small hours. Stations from Australia and New Zealand may be heard between 06.30 and 08.30 and again between 19.00 and 21.30, whilst Asian signals are likely at any time between 14.00 and 22.00. Stations from the West Coast of North America may be heard during the afternoons, whilst East Coast signals usually peak around 21.00 to 22.00, at which time South American countries are often available. With the decline of the higher frequencies do not overlook the potentialities of the 7 Mc/s band.

* *51 Pettits Lane, Romford, Essex.*

† *Amateur Radio Handbook*, pp. 359 and 482.

The Choice of Second Stage Frequency in Multi-band S.S.B. Exciters

By P. F. CUNDY, A.M.I.E.E. (G2MQ)*

THE second stage frequency in an s.s.b transmitter is defined as that from which by one heterodyne process the final frequency is achieved. There is no one optimum figure for this, but to satisfy any given set of criteria (provided of course that they are realizable criteria) there is always a best choice. The present article is intended to show that a second stage frequency of 12·25 Mc/s has some merit when used in the manner to be described, although it has not received previous consideration as far as the writer is aware.

Specification of Requirements

The particular set of criteria to be considered are as follows:

(i) The final frequency to be available over a 500 kc/s band starting at the l.f. ends of the 80, 40, 20, 15 and 10 metre bands.

(ii) There should be no inversion of the v.f.o. dial calibration; clockwise rotation should increase frequency by the same amount and at the same rate on all bands.

(iii) There should be no inversion of the sideband or if this is not possible such inversion should not conflict with the generally accepted convention (sideband inversion on frequencies below 9 Mc/s compared to those above 9 Mc/s).

(iv) There should be no signals generated in the telegraphy portions of the band.

(v) There should be no requirement for a large number of precise frequency crystals.

(vi) There should be a minimum number of wideband couplers.

Sacrifices made in the interest of simplicity are (*a*) the omission of the 160 m band, (*b*) equal tuning range on all bands which is excessive in some cases and too small in others.

Method

It is convenient to consider the v.f.o. centre frequency and to remember that this will swing plus and minus 250 kc/s, and to calculate target output frequencies 250 kc/s up from the low frequency edge of each band (criterion (i)). That is 3·75, 7·25, 14·25, 21·25 and 28·25 Mc/s respectively for the bands previously selected. The final heterodyne frequency itself may be derived by a mixer arrangement as described by G8PD.† Only one crystal and its second harmonic (criterion (v)) need be allocated to this mixer together with the v.f.o.

TABLE I

V.F.O. Centre Frequency Mc/s	Crystal Frequency Mc/s	Mixer Output Mc/s	Second Stage Frequency Mc/s	Final Frequency Mc/s
2	14 (7×2)	16 (14+2)	12·25	14+2−12·25=3·75
2	7	5(7−2)	12·25	12·25−7+2=7·25
2	-	2	12·25	12 25+2=14·25
2	7	9(7+2)	12·25	12·25+7+2=21·25
2	14(7×2)	16(14+2)	12·25	12·25+14+2=28·25

output. The only crystal required is 7 Mc/s (so satisfying criterion (iv)) and the v.f.o. centre frequency 2 Mc/s.

From these basic frequencies the following outputs are available: 2, (7 + 2), (14 ± 2) Mc/s, that is 2, 5, 9, 12 and 16 Mc/s. The 12 Mc/s output is not required and the 2 Mc/s output is obtained without crystal oscillator injection and with the mixer operating as an untuned buffer. Table I shows

(*Continued on page 405*)

* *52 Highfield Close, Amersham, Bucks.*

† "The G8PD Mixo", R.S.G.B. BULLETIN, November 1961.

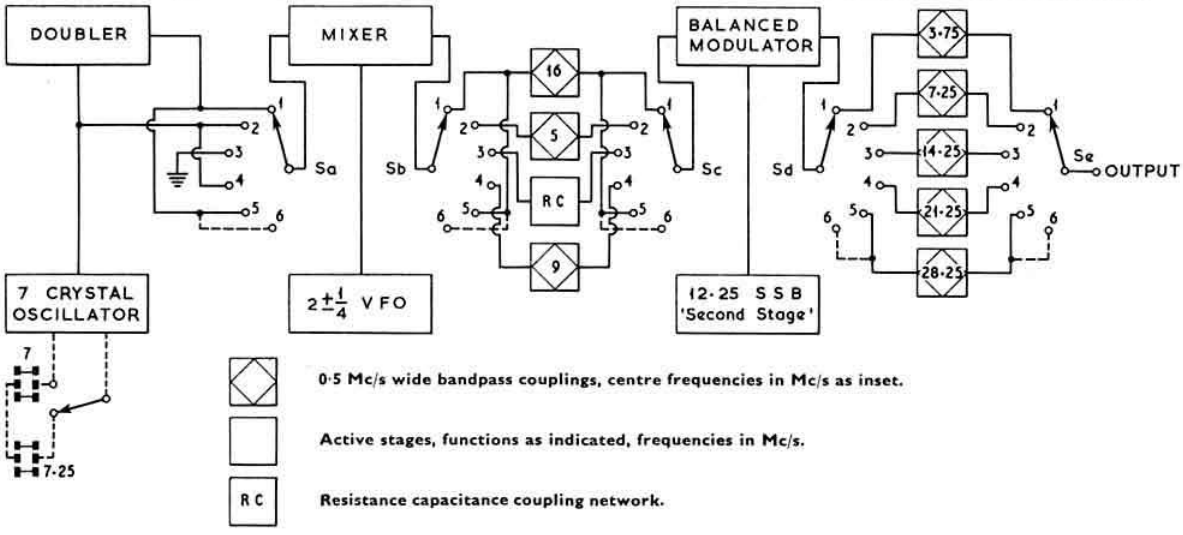


Fig. 1. Block diagram of an s.s.b. exciter using a second stage frequency of 12·25 Mc/s. If the pass bands of the 9 Mc/s and 28·25 Mc/s couplers are extended, the addition shown dotted will permit operation on the 28·5-29 Mc/s portion of the 10 metre band. Sa, b, c, d, is a band selection five pole five way switch.

An Improved T-Notch Filter

By H. O. LORENZEN
(W3BLC)*

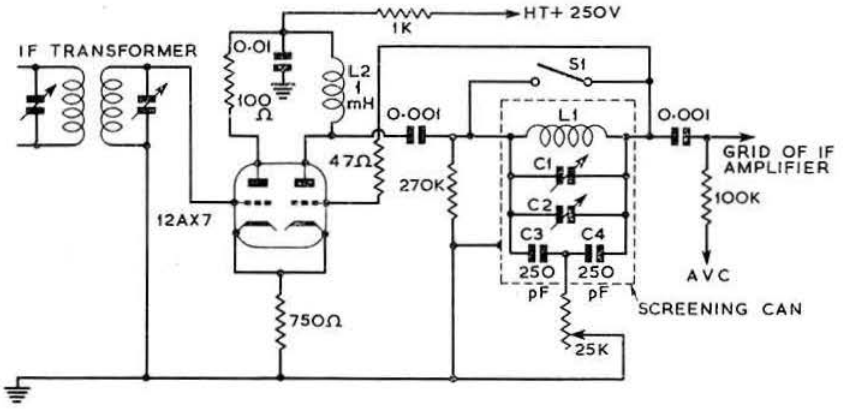


Fig. 1. Circuit diagram of an improved T-notch filter. The connection between the grid of the first half of the 12AX7 and the i.f. transformer should be as short as possible.

T-NOTCH filters have been popular with amateurs for some time and a number of commercial receivers for the amateur incorporate such circuits. On the crowded c.w. and s.s.b. bands, especially, the operators of today need a means of rejecting unwanted signals.

After experimenting with conventional T-notch filters with fair results, the writer decided to try some electronic tricks to deepen the notch and thus improve the effectiveness of the filter. The circuit finally evolved is shown in Fig. 1 and deepens the notch roughly an additional 15db.

By utilizing a double triode it was possible to make up for the insertion loss of the filter by using the gain from the first triode section of the 12AX7. This arrangement also allows the circuit to incorporate cathode coupling for the T-notch filter. The rest of the system is straightforward. The second half of the dual triode provides feedback which effectively increases the *Q* of the filter and hence the depth of the notch. Balance of the bridge in the filter is obtained by adjustment of the 25K ohms potentiometer. Once carefully set this adjustment need not be touched.

By utilizing a b.f.o. unit with air trimmers a fairly simple modification was effected. First the knob controlled trimmer C1 was reduced to just three plates (1 rotor and 2 stator) so that it would give a suitable vernier action. Next, on the second trimmer C2 all the fixed capacity plates were removed so that the variable section then gave a change in capacity of about 25 pF. Since the inductance of L1 was approximately 1 mH out of the can, the two silver mica capacitors C3 and C4 (each 250 pF) were placed across the coil and the centre point brought out to the 25 K ohms balance potentiometer. One caution should be mentioned here: the inductance of L1 outside the can and in the can varies widely. In this case it was sufficiently different to be outside the range of the 25 pF trimming capacitor C2. The writer spent a weary evening determining the correct capacity values of C3 and C4 until it finally dawned on him that the shield was causing major errors in the resonance values indicated on the grid dip meter.

C3 and C4 should be of the same value and the majority of the tuning capacity should be in these two silver mica units. S1 serves to remove the T-notch filter from the circuit. A toggle switch was utilized in the prototype but it should be quite simple to obtain the same function by causing the trimmer to short at one extreme of its tuning range.

A fairly simple way to construct such a unit would be to obtain an ordinary 455 kc/s air trimmed i.f. transformer and use one coil for L1, removing all except one rotor plate from C1. A ¼ in. brass rod should be filed to fit the slot snugly, then sweat soldered to attach it permanently to the trimmer. The other trimmer can be used for C2 after removing the fixed capacity section by sawing through the support posts with a jeweller's saw and removing the extra plates.

The second coil in the i.f. transformer should be removed by sawing through the support dowel. This coil can then be used for L2 since most 455 kc/s i.f. transformers have an inductance of about 1 mH. Care should be taken to be sure L2 is not too much larger than 1 mH or oscillation may result. All the tuned circuits in the T-notch filter should be carefully shielded.

A 12AT7 has the same base connections and a higher G_m than the 12AX7 but its characteristics apparently are not suited to this service. After numerous trials with differing component values the writer was unable to obtain the satisfactory smooth operation given by the 12AX7.

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The Choice of Second Stage Frequency in Multi-band S.S.B. Exciters **(Continued from page 404)**

how the various output frequencies can be derived by adopting 12·25 Mc/s as the second stage frequency.

It will be seen that a + sign appears in front of the 2 Mc/s v.f.o. centre frequency in every case thus ensuring positive increments on all bands (criterion (ii)). The minus sign on the 12·25 Mc/s second frequency signal in the case of 3·75 Mc/s output frequency means that there will be sideband inversion on 80 metres only, satisfying criterion (iii) in its second clause.

Since on the 14 Mc/s band the mixer operates as an untuned buffer at the v.f.o. frequency, *RC* coupling should be satisfactory and wideband couplers will be required only for 5, 9 and 16 Mc/s, apart from wideband couplers on the final output frequency which would be required for any method of generation (criterion (vi)).

Fig. 1 shows the block diagram of a possible exciter designed on the lines suggested. Some considerable progress has already been made towards the construction of a working model but it is felt that there may be sufficient interest in the basic design conception to warrant this preliminary publication.

TECHNICAL TOPICS

By PAT HAWKER (G3VA)

Electrical Interference . Noise Silencer . Suppression Components
Transistorized VXO . Two-signal Selectivity . Transistor Grid-Dipper
Series Multivibrator . Electronic Key . Squelch for Transistor Receivers
Abbreviations . Photoconductive Cells . Diode Switches

WITH so much emphasis on TVI and BCI in recent years, there seems to have been relatively little work done on the reverse problem—electrical interference to amateur reception. Yet for many amateurs and short-wave listeners, electrical interference remains an awkward problem, particularly on v.h.f. and on 1·8 Mc/s.

Television has brought some relief (although it contributes its own share of timebase and local oscillator harmonics); many of the former prolific sources of interference are now fitted with suppressors as a matter of course. But the vast increase in domestic appliances—many of which are quite satisfactory when first installed but gradually develop defective switch contacts or other radiation-producing characteristics—means an almost continuous high noise level on at least some bands.

This situation applies as much to rural as to urban areas; several years of operation in Central London showed that interference levels there were no worse than in the suburbs; while in the country we have known—in certain atmospheric conditions—bad corona discharge from high-voltage power cables, and once tracked down virulent ignition interference to a tractor at least a quarter-mile distant.

What can be done by the amateur whose reception is spoilt by electrical interference?

If it is so bad that the reception of the local broadcast or television service is also affected, then it is possible to obtain the assistance of the Engineering Branch of the G.P.O. who, without charge, will endeavour to trace the cause and offer advice on its suppression. A form of application for this service can be obtained from any main Post Office. But, generally speaking, the G.P.O. does not undertake any investigations in respect of interference which may be enough to ruin amateur-band reception but which does not affect sound or television programmes except on a repayment basis, which may well prove somewhat expensive.

Where there is only one main cause of interference this can usually be traced (portable transistor receivers are useful here) and diplomatic negotiations opened with the owner. Often, however, the trouble comes from tens or even hundreds of appliances with noise transmitted over a considerable area via the mains or similar transmission paths. Mains-borne interference (which can be reduced by fitting a mains-filter in the receiver supply leads) can be distinguished from aerial pick-up by removing the aerial feeder and replacing it by a resistor equivalent to the receiver's input impedance across the aerial sockets. Note that even if interference disappears completely this does not mean that the mains path is entirely guiltless—interference is often re-radiated from the mains to the aerial. Another form of secondary radiation occurs where the main conducting medium consists of telephone wires, gas pipes, etc.

Directly radiated interference—for example, ignition—tends to increase with increasing frequency up to about 50 Mc/s; mains-conducted interference becomes stronger with increasing wavelength. High aerials, well away from buildings, pick up much less interference—remember doubling the distance from the point of radiation normally cuts interference by a factor of four. Vertically polarized aerials tend to pick up more interference than horizontal types.

Aerial feeder lines that may be satisfactory from the viewpoint of signal transfer may be less so from the noise angle. For example co-ax connected directly into a dipole without any form of " balun " at the aerial end has been shown to pick up considerably more interference than either balanced lines or where a balun is fitted.

The conventional receiver noise limiter, though very good for some purposes, tends to lose its effectiveness with highly selective i.f. amplifiers which distort the sharp noise pulse. A more effective technique in such circumstances is phasing out the interference by means of a second noise aerial* or " noise blanking " in which a wide-band receiver provides control pulses for the normal receiver: both these techniques

*Since writing this we have come across an interesting British-designed, American-built phase-selective noise suppressor for use in front of communications receivers on these lines which is claimed to suppress individual unwanted signals or noise by up to 60db (see *Electronics Weekly*, January 16). Although this is intended for commercial applications there is clearly scope for amateur equipment on similar lines.

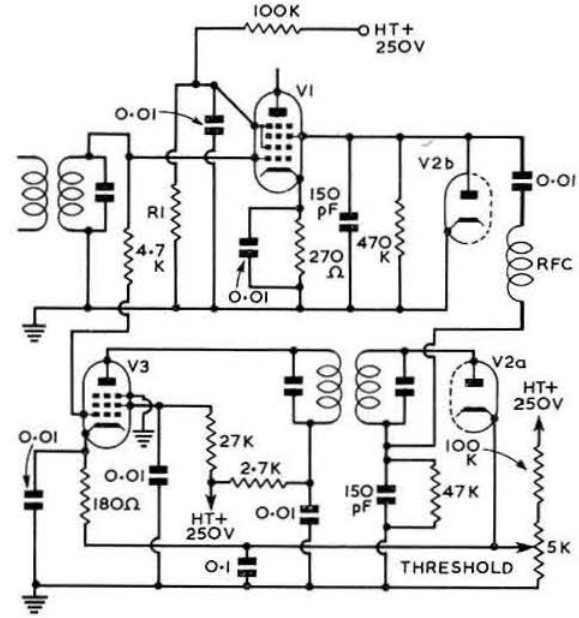

Fig. 1. Noise silencer circuit from A.R.R.L. Handbook. This can be placed before the selective i.f. circuits which render most noise limiters ineffective. V1, 6BE6 (EK90); V2, 6AL5 (EB91); V3, 6CB6. R1, 33K to 68K ohms depends on the position of V1 in receiver. RFC, preferably self-resonant at i.f. to improve filtering.

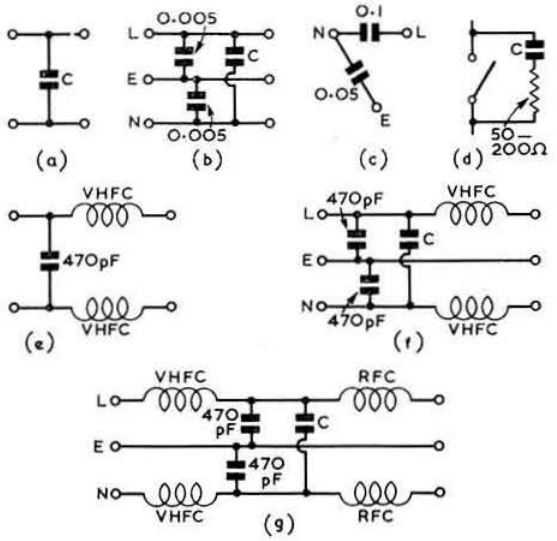

Fig. 2. Some common forms of interference-suppression filters (from *Radio Servicing Pocket Book*). (a) For two-core cable appliances. (b) For three-core cable appliances. (c) For three-pin sockets. (d) For thermostats. Types (e) and (f) are v.h.f. types intended for use at television frequencies. Type (g) is a combined m.f./h.f./v.h.f. filter. The value of C may vary between 0·01 and 0·5 μF. On type (c) the values given are the largest permissible. All capacitors must be rated for a.c. L line, N neutral, E earth.

were discussed in *T.T.* July, 1959. A noise silencer circuit which is half-way to a noise blanking receiver is given in recent editions of the *A.R.R.L. Handbook*: Fig. 1. This obtains " noise " signals immediately after the mixer and then has a 6CB6 noise amplifier followed by a 6AL5 noise rectifier controlling a 6BE6 dual-control heptode i.f. stage in the receiver proper, with one half of the 6AL5 as a clamp.

Another circuit using this technique and developed by W6ZH (President of A.R.R.L. and son of a former President of the United States) appears in *QST*, January, 1963, for the purpose of reducing 1·9 Mc/s Loran interference. Since Loran pulses are relatively short compared with the rest periods it is claimed that very effective suppression can be obtained.

Interference Suppression Components

Amateurs sometimes attempt to clean up nearby equipment by fitting suppressors using junk-box components. It cannot be stressed too often that incorrectly rated components used for this purpose represent a very real hazard to the appliance user and could result in unpleasant human and legal consequences to the amateur.

Before undertaking any such work a very careful study should be made of the relevant literature, which should be based on British Standard 613 and the associated Code of Practice CP1006. There are several useful books, which can be obtained through the local library: one up-to-date title is A. P. Hale's *Electrical Interference* (Heywoods).

We would also like to quote briefly on this subject from the writer's *Radio Servicing Pocket Book:*

" It is most important that components of adequate *a.c. rating* should be used in suppressors, and for this reason only components specifically designed for this purpose should be fitted.

" Capacitors for suppression work have particularly strict requirements, since not only must there be a large safety factor against voltage breakdown, but the insulation resistance should also be very high and the series inductance as low as possible. Further, the capacitors are often fitted in close proximity to motors, and must be capable of withstanding high temperatures . . .

" When fitting capacitor suppressors, it is also necessary to ensure that there is no danger that the user of the appliance may receive a shock due to leakage current. For example, on a portable three-wire appliance, the value of the capacitance between line and frame should not exceed approximately 0·005 μF."

It should be noted that leakage current will depend upon the voltage of the mains supplies; this means that values shown in American journals and books (and based on 117 volts) may be unsuitable for use in this country. If in any doubt whatsoever, do not attempt to carry out such work, but use one of the commercially available plug or lead filters, even though these may not be quite as effective as where the suppressor components are fitted within the appliance.

On this subject of electrical safety, we were interested to read recently in *Break-in* of the very strict regulations in force in New Zealand. The only work on electricity mains that can legally be carried out by the public is the replacement of fuses and the fixing of plugs to appliances. In order to permit " radio experimenters " (who must be licensed amateurs) to carry out a limited amount of additional work such as the repair of receivers, written and practical examinations have to be taken at a total cost of £3 10s. It would be a great pity, if such regulations became necessary here.

Unfortunately, in this age of " do-it-yourself," many risks are taken unawares by persons with only a hazy knowledge of mains supply practice. Amateurs should ensure that they do not contribute to these hazards. Quite apart from the very real danger to human life (see *T.T.* August 1960), it should not be forgotten that some 10,000 fires are officially attributed every year to defective or wrongly used electrical appliances or wiring.

Transistorized VXO

Some time ago we discussed the growing popularity of variable crystal oscillators (*T.T.*, February, 1961) in which the natural frequency of a crystal is pulled by adding series or parallel reactances. Worth-while frequency variations can be obtained in this way without undue sacrifice of stability, particularly for s.s.b. and v.h.f. work.

In a letter to *QST* (November, 1962), ZE6JG gives details of a useful transistor VXO with 9 Mc/s crystal: Fig. 3. It is claimed that with this circuit some crystals will " pull " up to 5 per cent of resonant frequency, although it is advisable to keep within a 200 kc/s shift. The circuit could probably be adapted quite simply for use with alloy diffusion transistors such as the OC171. The tuned circuit in the collector

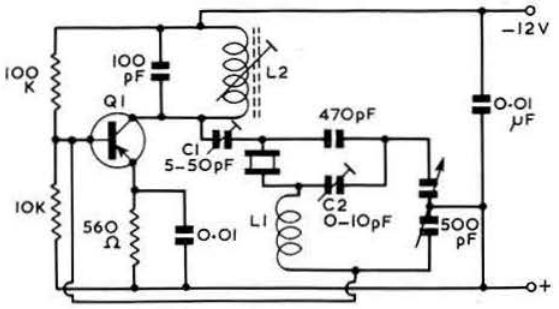

Fig. 3. ZE6JG's transistorized variable crystal oscillator with 9 Mc/s crystal. L1, good quality coil, 80 turns, 34 s.w.g. on ⅜ in. dia. former. L2, resonated to crystal frequency.

circuit is adjusted in order to obtain a reasonably constant output over the frequency range.

ZE6JG states that " The oscillator's coverage is governed by the type of crystal, the series inductance L1 and capacitor C2. As the series-resonant point of the inductance and shunt capacitance is approached, shift increases until oscillation is no longer controlled by the crystal. L1 is made large enough to shift the frequency about half the coverage required with C2 at minimum, and then C2 is adjusted to give exact frequency range."

Results reported by ZE6JG include a 200 c/s drift in the first 30 seconds; 100 c/s or less in the next five minutes; then only a few c/s per hour. Temperature variations tend to cause drift at the l.f. end (i.e. furthest away from the natural crystal frequency).

Two-Signal Selectivity

The increasing attention being paid to the cross-modulation characteristics of communications receivers has shown up the shortcomings of the conventional form of selectivity curve. Normally the response characteristics of a receiver are plotted by injecting a single signal via a stepped attenuator and plotting the response curve of the receiver. This is all very well; provided it is charted down to the —60db level, such a curve does give a useful guide to the selectivity of the receiver when tuning through an incoming signal which is on its own. In practice, of course, such ideal conditions are rare on the h.f. bands. What we really want to know is the performance of the receiver on a fairly weak signal surrounded by other S9 signals pounding away a few kc/s off tune. In *CQ* (August, 1962), W4UWA discusses the concept of " two signal selectivity measurements " which aims at producing selectivity curves related to the performance of a receiver in the presence of one other loud undesired signal. Such measurements (which have much in common with intermodulation measurements for high fidelity amplifiers) need two signal generators whose outputs are combined in a 6db " T " pad with the output of the receiver fed into a distortion analyzer. With most receivers, the curves differ appreciably from the single input measurements, showing the degradation produced by cross-modulation.

While very few amateurs are in a position to make such measurements themselves, it would be a useful service if receiver manufacturers with sufficient confidence in their own products would make and publish such performance curves. Another article giving detailed information on this subject is " Determining True Receiver Performance " by

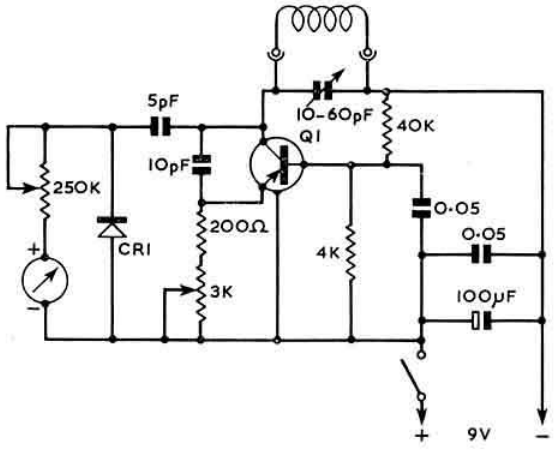

Fig. 4. DL9LT's transistor grid dip oscillator. Q1, OC170, OC614 or 2N247. CR1, OA91, OA150 or 1N34A.

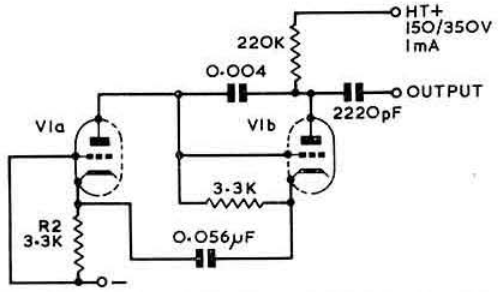

Fig. 5. DJ3NW's simple RC generator. V1, ECC81 or ECC82.

Marcus and Taylor in *Electronic Industries* (February, 1962) and we understand that reprints of this are available from The Editor, *Electronic Industries*, Chestnut and 56th Street, Philadelphia, 39, Pa.

Circuit Round-up

Some useful circuit ideas must be condensed into a few words this time.

A transistor grid-dip meter for 2 — 50 Mc/s is described by DL9LT in *DL-QTC* (December, 1962); this uses an OC170 or 2N247 transistor: Fig. 4. A 50 μA f.s.d. meter is

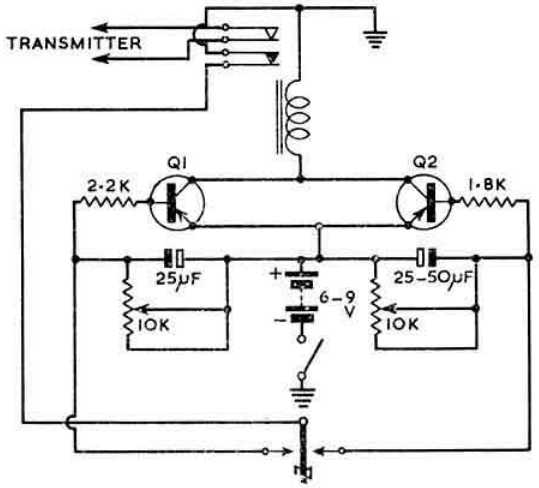

Fig. 6. ZL2AMW's transistorized electronic key. Q1, Q2 almost any type, preferably audio types. Adjustment should cover 3 to 35 w.p.m. Low impedance " junk-box " relay.

required but this could be replaced by a less sensitive meter used in conjunction with a single-stage transistor d.c. amplifier (see for example the grid dipper in *T.T.*, November 1958).

A rather unusual series multivibrator *RC* audio generator by DJ3NW is in the same journal, with the values shown in Fig. 5 suitable for an output on about 800 c/s. To key the oscillator a key can be inserted between R2 and chassis with an 0·0015 μF capacitor in parallel for click suppression.

A simple electronic key using two readily available transistors comes from ZL2AMW (*Break-in*, September, 1962): Fig. 6. A more ambitious design appears in *QST* (November, 1962).

In *Electronic Design* (November 22, 1962) L. E. Geisler describes a squelch circuit for transistor receivers requiring the addition of only two resistors, a capacitor and an a.f.

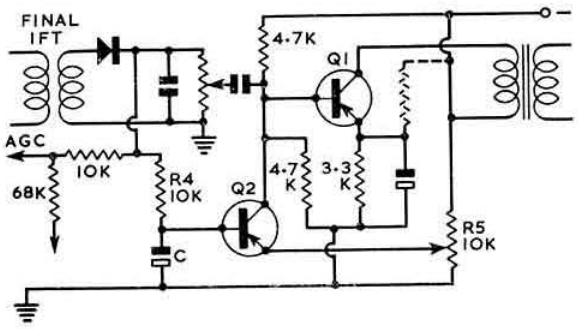

Fig. 7. Squelch circuit added to a.f. driver stage of transistor receiver.

type transistor. Fig. 7 shows the device fitted to a conventional type a.f. driver stage, the additional components being R4, R5, C and Q2. With Q2 saturated, base bias for Q1 is diverted to earth and there is little a.f. output from the set. With the arrival of a strong enough carrier to cut off Q2, Q1 will amplify normally. R5 adjusts the squelch threshold. The dotted resistor can be added to make the unit less sensitive to noise pulses. The component values where shown are merely representative and some experimenting will be needed in adapting any particular receiver.

Abbreviations

The use of Q1, Q2, etc. for transistors in circuit diagrams in the same way as V1, V2, etc. are used for valves is becoming standard American practice. It has much to recommend it since the letter T is already used for transformers and the often used TR means more work for the draughtsman as well as taking up more space.

But it is only now that the American journals are beginning to adopt the useful pF abbreviation in place of the more cumbersome mmF ($\mu\mu$F). But in case we feel superior in this matter, let us not forget that for years many Continental countries have used nF (nanofarad, 1 nF = 1,000 pF = 0·001 μF) still almost unknown here. This abbreviation is particularly useful for the drawing office, since lengthy values such as 0·015 μF simply become 15 nF, and is also convenient for general use. Incidentally, with the high value electrolytics now found in transistor circuits, we shall soon be needing also a short abbreviation for units of 1,000 μF. Why not kF? Or would that be taken as the highly unlikely kilofarads? The theoretically correct abbreviation would be mF (millifarad) but this would almost certainly be confused with microfarads.

The January issue of *QST* announces that "the cumbersome term 'micromicrofarads' (abbreviated $\mu\mu$f) will be replaced with the more compact 'picofarads' (abbreviated pf)."

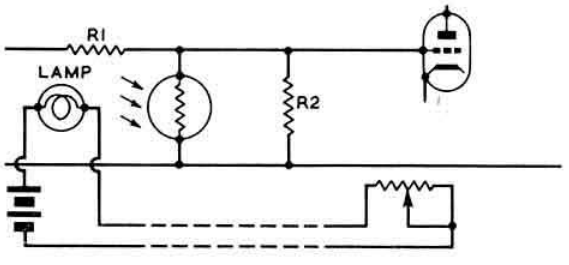

Fig. 8. Audio gain remote control system using a photoconductive cell. R1, 1 Megohm; R2, 22 Megohms.

Cadmium Sulphide Photoconductive Cells

For some time small cadmium sulphide photoconductive cells (Mullard ORP60, etc.) have been used in a number of television receivers to provide automatic contrast control with changes in room lighting. The resistance of these cells falls very rapidly with increasing light—normal changes in room lighting can produce a variation of some 0·75 Megohm.

These cells seem to offer some interesting possibilities for remote control applications (one commercial example is the Philco "Selectaflash" system for remote control of a television receiver by means of a torch).

A simple system for the remote control of audio gain (in this particular case for public address work) appeared originally in a Danish journal and is reprinted in *Radio-Electronics* (December, 1962): Fig. 8. The photoconductive cell forms one element of a potentiometer network in the input circuit of an a.f. stage. A small pilot bulb is mounted close to the cell and can be adjusted from the remote point by a variable resistor. Increasing the light reduces the resistance of the cell and hence the input to the valve, providing continuous control without any of the problems associated with long leads at audio frequency.

Another relevant use of these cells using a basically similar technique appeared in *Electronics* (March 30, 1962) for a noise-free keying circuit for transient-free switching of audio signals with controlled rise and decay times—in other words audio keying without key clicks. This could probably be adapted to transmitter keying.

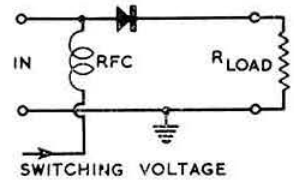

Fig. 9. Basic diode switching circuit.

Diode Switches

On the subject of remote control, new techniques are also being made possible by the development of diode switching.

More and more the mechanical functions of relays and switches are being taken over by electronic switches using cold cathode tubes or semiconductors such as the *p-n-p-n* diode. A notable example is the current development of electronic telephone exchanges such as Highgate Wood, London.

Already diode switching techniques are being applied to airborne communications equipment; a survey of these applications and systems appears in *British Communications and Electronics* (January, 1963). Some of these ideas could be used in amateur equipment. For example the remote switching of large numbers of crystals can be achieved without exceeding the standard crystal loading of 30 pF. Another application is as a quick-make/slow-break switch in muting circuits. Fig. 9 shows the basic form of diode switch which is "on" when a positive switching voltage is applied and "off" with a negative switching voltage.

Quite a few amateurs have used remote control to obtain the advantages of a compact control unit at the operating position (which can be in a living room) with the main part of the rig tucked away in any convenient position. Semiconductor switching could provide a useful technique for such set-ups.

Enquiries Regarding Bulletin Articles

MEMBERS who write to the authors of BULLETIN articles are asked to enclose stamped addressed envelopes if they require replies.

A 1300 Mc/s Narrow Band Converter

By H. L. GIBSON (B.R.S.1224)*

THE converter to be described employs the A.2521 grounded grid triode both as a signal-frequency amplifier and in the frequency multiplier chain for the local oscillator. A feature of the design is the use of simple trough-line circuits which replace the more expensive co-axial circuits normally used at this frequency. A crystal mixer is used and is followed by a series cascode at the first i.f. This is intended to be followed by a standard communications receiver providing a tunable i.f. over the bandwidth of the converter.

The complete circuit is shown in Fig. 1.

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The measured specification of the unit is as follows:

Centre signal frequency	1296 Mc/s
R.f. gain before mixer	13db
R.f. bandwidth	5 Mc/s
Overall noise factor	11·5db
Local oscillator injection frequency	1320 Mc/s
Image rejection	>45db
Output frequency	24 Mc/s

Circuit Description

The r.f. stage comprises a grounded grid A.2521 trough-line amplifier with tuned input and output lines. The input signal is fed into the converter by means of a type BN socket and the aerial impedance is matched by varying the position of the input tap along the cathode line, and by tuning the line.

The cathode line is a $\frac{3}{4}$ wavelength line short-circuited at its extreme end by a capacitor of approximately 50 pF, and tuned by a 0·5 to 3·0 pF Mullard trimmer mounted halfway along the line. The anode line is a $\frac{3}{4}$ wavelength line short-circuited and tuned by a 0·5 to 3·0 pF Mullard trimmer again mounted halfway along the line. This is isolated from

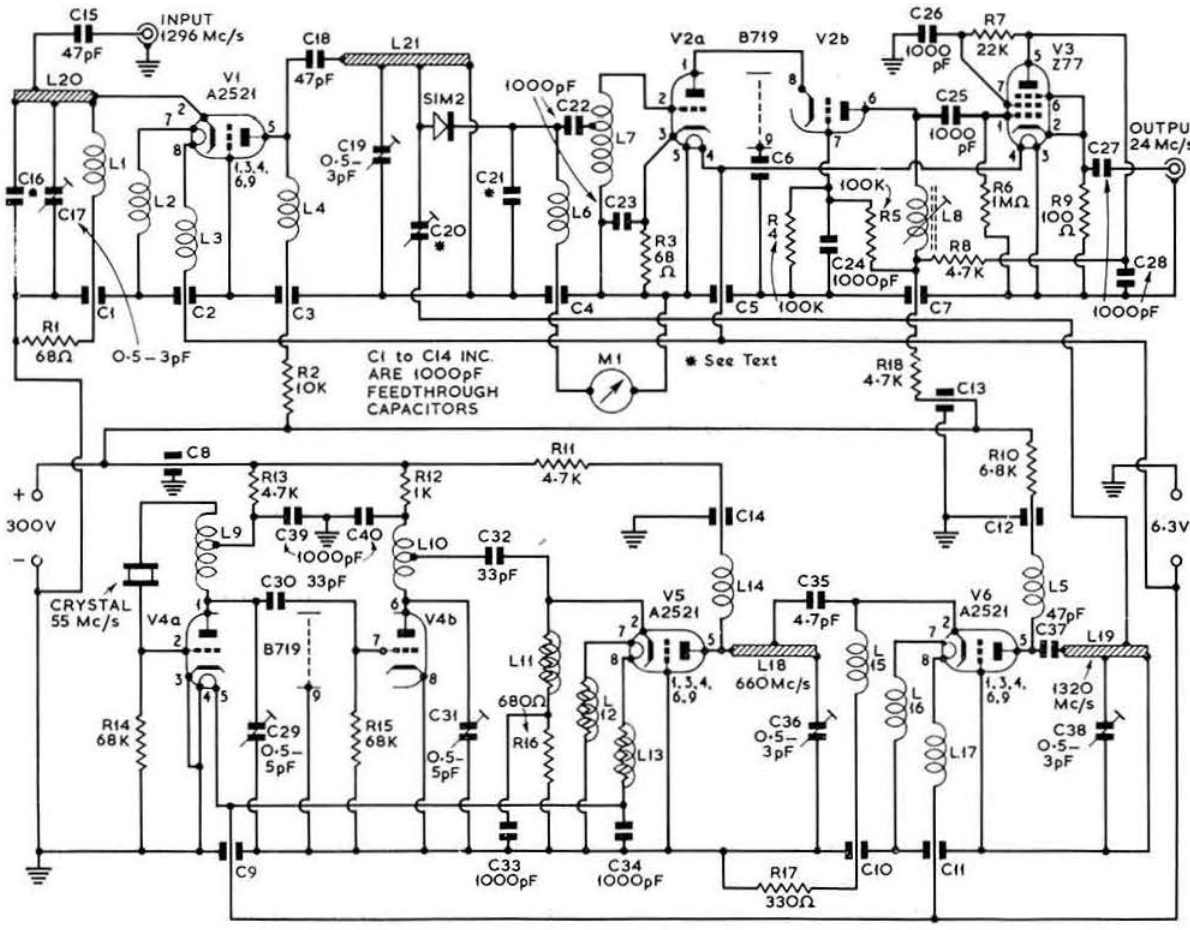
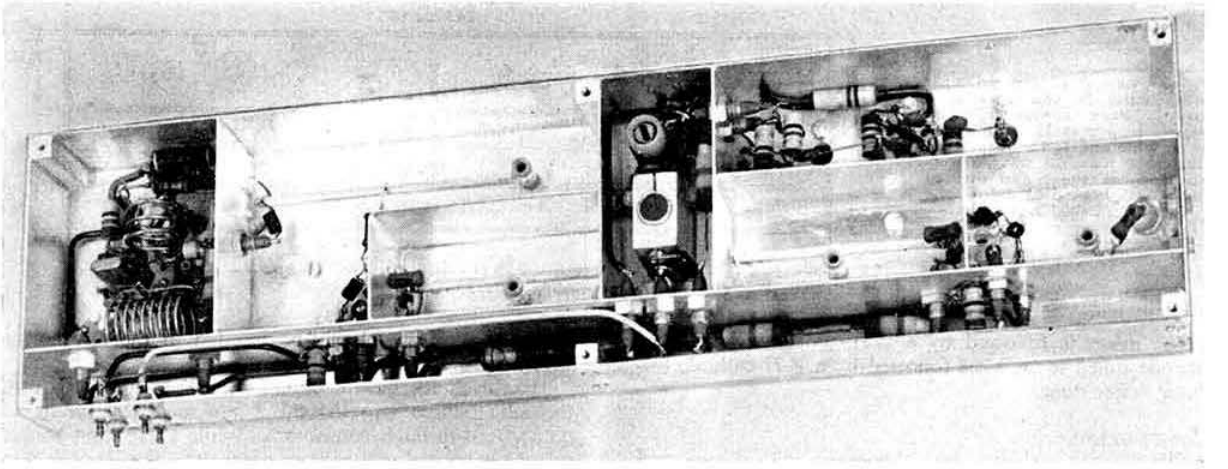


Fig. 1. Circuit diagram of the crystal-controlled 1300 Mc/s converter. Details of the inductors are given in the table on page 411.



A view under the chassis of the 1300 Mc/s narrow band crystal-controlled converter.

the h.t. by a 47 pF capacitor. The output is tapped at the mechanical short-circuit (the electrical r.f. short-circuit being somewhere in the chassis), and fed directly into the crystal mixer.

Crystal Oscillator Multiplier Chain

The crystal oscillator is one half of a B.719 valve connected in Squier circuit and controlled by a 55 Mc/s crystal. The second half of this valve is tuned to the third harmonic of the crystal frequency, thus giving 165 Mc/s output which is fed into a grounded grid A.2521 quadrupler operating in class C, the output circuit being a half wavelength line tuned at its extreme end by a 0·5 to 3·0 pF Mullard trimmer. The output from this stage at 660 Mc/s is tapped off about halfway along the line (this should be adjusted for maximum crystal current) and fed into a grounded grid A.2521 doubler also operating in class C. The anode line of this stage is a three-quarter wavelength line short-circuited to the chassis at its extreme end and tuned by a 0·5 to 3 pF Mullard trimmer, h.t. isolation being provided by a 47 pF capacitor at the anode pin. The Mullard trimmers are type COO4EA/3E. Alternatively, Erie type 3115A may be used.

The output is tapped off at the mechanical short-circuit and fed into a variable fabricated capacitor, which couples the output into the crystal.

Mixer and I.F. Stage

The mixer is an SIM2 low-noise diode mounted in a silver-plated brass holder, r.f. decoupling being provided by a 50 pF capacitor formed at the base of the crystal holder. The diode current is 0·3 mA. The output at 24 Mc/s is fed into a tapped input coil, on which the tap should be adjusted for best noise performance; this generally occurs about halfway along the coil. The construction of a holder for the mixer crystal is shown in Fig. 2.

COMPONENTS LIST

C16, ≏50 pF fabricated with 1½cm square brass plate separated from chassis by 0.003 in. mica sheet.
C20, < 1 pF fabricated by varying spacing between crystal connector and oscillator output tag.
C21, ≏ 50 pF fabricated with ⅜ in. × ½ in. brass crystal holder separated from chassis by 0.003 in. mica sheet (See Fig. 2).
C29, C31, 0·5 to 5 pF vane type trimmer.
C33, C34, C39, C40, 1000 pF stand-off capacitors.
L1, L2, L3, L4, L5, 8cm of 24 s.w.g. enamelled copper wire wound into ¼ in. dia. air-cored coil.
L6, 30 µH choke, Painton type 200154.
L7, 30 turns 30 s.w.g. enamelled copper wire, wound on ⅜ in. dia. former, tapped at centre and tuned with ferrite slug.
L8, 17 turns 36 s.w.g. enamelled copper wire, wound on ¼ in. dia. former and tuned with ferrite slug.
L9, 9 turns 18 s.w.g. tinned copper wire, wound into ½ in. dia. open spaced, air-cored coil, tapped 7 turns from anode end.
L10, 3 turns 18 s.w.g. tinned copper wire, wound into ½ in. dia. open spaced, air-cored coil, tapped 2 turns from anode end.
L11, L12, L13, 30 s.w.g. enamelled copper wire close wound onto 100 K ohms ½ watt resistor.
L14, L15, L16, L17, 16cm of 24 s.w.g. enamelled copper wire wound into ¼ in. dia. air-cored coil.
L18, 7½cm of ⅛ in. dia. silver-plated brass rod mounted ¼ in. above chassis, tuned at extreme end, tapped 3½cm from open circuit.
L19, L21, 6cm of ⅛ in. dia. silver-plated brass rod mounted ¼ in. above chassis, tuned at 3cm from short-circuit, tapped at short-circuit.
L20, 5cm of ⅛ in. dia. silver-plated brass rod mounted ¼ in. above chassis, tuned 2½cm from short-circuit, tapped 2cm from short-circuit.

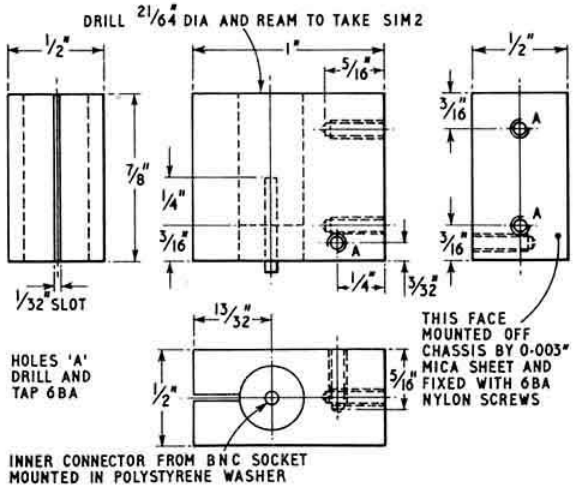


Fig. 2. Construction of a suitable holder for the crystal mixer. This is of a slightly different pattern from that shown in the photograph of the prototype.

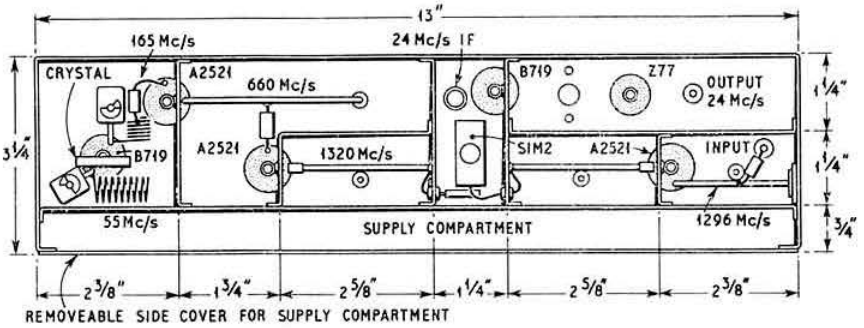


Fig. 3. Layout of the principal components in the 1300 Mc/s narrow band converter. The chassis measures 13 in. long by 3¼ in. wide and 1¼ in. deep. It is fabricated from 20 s.w.g. silver-plated brass sheet and divided into compartments with the shields soldered in position.

The mixer is followed by a B.719 connected in series cascode tuned to 24 Mc/s followed by a Z.77 cathode follower buffer stage.

Construction

The chassis is a shallow box 13 in. long by 3¼ in. wide and 1¼ in. deep, constructed of 20 s.w.g. silver-plated brass sheet. It is divided into compartments as shown in Fig. 3 and the walls of the compartments are solidly soldered to the main chassis. One wall of the chassis is made removable to facilitate the making of h.t. connections. The transverse screens across the valveholders must be made very close fitting and the grid pins solidly earthed to the screen in all cases. A wiring jig should be inserted in the valveholder whilst this is done.

The valveholders are all of p.t.f.e. and the connections from the u.h.f. stages into the mixer are made by means of p.t.f.e. feed-through connectors. While the output socket may be a normal television co-axial type, the input socket should be a special u.h.f. type. BNC type connectors were used in the original, the socket being type UG447/U and the plug type UG88c/U. These are obtainable from Greenpar Engineering Ltd., Cambridge Road, Harlow, Essex.

All power supply filter resistors and feedthrough capacitors are mounted in the power supply compartment. The converter requires an h.t. supply of 300 volts at 67 mA.

New Equipment

The Lorenson Hooper Universal Car Roof Aerial Mount

MOBILE enthusiasts employ many methods of mounting aerials on cars, most of which seem to be more or less permanent or semi-permanent arrangements employing bases bolted securely to the chassis. Others require special holes to be drilled in the bodywork. For the v.h.f. operator whose aerial is neat and unobtrusive such mechanically complicated arrangements seem unnecessary and halos and similar arrays are frequently seen mounted on roof racks or so-called ski-racks. These devices are, however, relatively expensive and take some little time to fit.

It was therefore with considerable interest that we recently examined one of the universal car roof aerial mounts manufactured by Lorenson Hooper. These units consist of three very simple parts: the aerial mount itself complete with fixings for the aerial mast, an offside bracket and a flexible luggage strap of the type used with car roof racks and scooter luggage trays. The mount and the offside bracket are padded with foam plastic to prevent scratching where they fit under the rain scuttle on the car and press against the roof. The mount is held in position on the roof by means of a small suction cup.

In use, the brackets are fitted on each side of the car and held in position by the spring luggage strap across the top of the roof. The result is a firm mount which should prove satisfactory with all the usual v.h.f. mobile aerials and possibly with such h.f. band aerials as the continuously loaded type.

The universal car aerial mount costs 15s., plus 2s. 6d. postage for any quantity up to 12. It is manufactured by Lorenson Hooper, 3 Raven Way, Mudeford, Christchurch, Hampshire.

New Collins Mechanical Filter

A 455 kc/s mechanical filter of substantially lower cost than heretofore is now available from Collins Radio Company of England Ltd., 242 London Road, Staines, Middlesex, price £15 10s.—plus postage. Based on innovations in design and manufacture and designated the type F455 FA-21, the new filter provides steep-skirted selectivity with a nominal 6db bandwidth of 2·1 kc/s and a 60db maximum bandwidth of 5·3 kc/s—a shape factor of just over 2·5 to 1.

The filter is 2½ in. long, slightly more than ½ in. wide and ½ in. high, excluding the mounting studs and terminals. It is intended for use in s.s.b. exciters and in receivers. Further information may be obtained direct from the manufacturers.

S.V.S. Masts

MEMBERS who have been experiencing difficulty in obtaining replies to letters and telephone calls to the S.V.S. Masts Section of Sound Vision Service (Electrical), 47 Loughborough Road, Brixton, London, S.W.9, will be sorry to learn that a serious accident involving a large girder resulted in the works and office being buried some weeks ago. However, production has now recommenced and a temporary office has been established at the home of Mr. F. W. Bennister (G3COX), 3 Englewood Road, Balham, London, S.W.12.

Investigation of Space by Probes and Radio

PROFESSOR SIR BERNARD LOVELL, O.B.E., F.R.S., will give his lecture entitled " Investigation of Space by Probes and Radio " at a meeting of the Radar and Electronics Association to be held in the Lecture Hall of the Royal Society of Arts, John Adam Street, Adelphi, London, W.C.2, on Thursday, February 14, 1963, commencing at 7 p.m. It will be remembered that Sir Bernard's lecture on this subject was to have been given last December but had to be postponed owing to illness.

R.S.G.B. members are cordially invited to attend the meeting but as the lecture hall is not large, early arrival is recommended. Tea, price 2s., will be served from 6.30 p.m.

Mobile Column

By C. R. PLANT (G5CP)*

DURING a recent contact with DL4GF (Darmstadt), the question of 144 Mc/s mobile operation was discussed and this inevitably brought up the types of aerials used. He has apparently had great success with an unusual design originated by K2TKN (Pluckemin, N.J.), and published in *73 Magazine*. In a letter K2TKN gives further particulars and permission to reproduce the information.

K2TKN suggests that many so-called halos are not efficient " all-round " radiators as a check with a field strength meter or rotating the aerial during reception will prove. The writer recalls that his 144 Mc/s halo had two distinct peaks at 180° positions. K2TKN also says that a well designed halo for 144 Mc/s should not have a diameter greater than 10 in. and preferably about 8 in. To resonate to the transmitted frequency, a lot of capacity loading of the open ends is required. Thus current is almost uniform at any point around the circumference, and the radiation angle is low with very little vertical radiation.

K2TKN examined the " slotted pylon " aerial used extensively for f.m. broadcasting and decided that in a modified form it might be suitable for amateur use. This aerial is a vertical pipe $\frac{1}{10}$ wavelength long which gives a uniform horizontal coverage in all directions; both ends of the cylinder are at zero r.f. For 144 Mc/s the dimensions are: 10 in. diameter, 60 in. high with a 1 in. slot running vertically from top to bottom. The ends of this slot may be shorted thus completing the circle to give greater rigidity, but this will not have any effect on the performance. Under test conditions this aerial put out a potent signal approximately 6db over a dipole. The aerial was rather unsightly and so further experiments were carried out on one of lesser dimensions and this resulted in the " Abe Lincoln," the name given to the new aerial shown in Fig. 1. It is mounted in the centre of the car roof fixed to a suitable plate which may be held in position by adhesive tape (this requires periodic renewal). It was found necessary to cover the top of the cylinder because of the steamboat-like whistle which developed at high speeds! The modified size is 10 in. diameter, 20 in. high with a $\frac{1}{2}$ in. wide slot, the slot and top being filled with sheet Perspex or similar material. Two tuning tabs 2 in. square at the top of the cylinder are clamped to permit a swinging movement. Tuning up is very simple: bring a g.d.o. close to the shorted bottom of the cylinder and a good dip will be noted at the resonant frequency; adjust the tuning tabs until the required frequency is obtained. Then attach the centre conductor of a 52 ohm impedance co-ax cable to one side of the cylinder and the outer copper screen to the other side of the slot about 2 in. up from the base. While checking the standing wave ratio on the feeder with a bridge, move the taps up or down the slot to obtain the best match; do not disturb the tuning tabs. When the aerial is resonant the impedance across the slot is resistive zero at the shorted bottom increasing with good linearity to 1,000 ohms at the top. When feeding with a 52 ohm co-ax cable it is possible to obtain a balanced feed by draping the cable round the outside of the cylinder and soldering the outer copper screen to a point exactly opposite the slot—if desired the screen may be soldered all the way to this point without any change in performance. Field tests should now show radiation in the horizontal plane only, with uniform gain (in all directions) of about 4db over a dipole.

In further notes provided by K2TKN he points out that the bottom of the cylinder may be left open provided that a heavy copper shorting strip is fitted to the slot at the base—or the base may be a solid metal plate. The unit will work satisfactorily " sitting on the ground " or on the roof of a car and raising it up or down has no effect on the tuning. K2TKN says, " The pattern holds better than any other I have ever checked, equal or better than a vertical antenna under these changes." The aerial is so broad band that almost any physical size may be made to work to some extent, but the diameter should be between $\frac{1}{10}$ and $\frac{1}{8}$ wavelength. The resonant height without a loading capacitor at the top of the slot is usually about $\frac{3}{4}$ wavelength. Reducing the height to $\frac{1}{4}$ wavelength and resonating with tabs at the top of the slot does not reduce radiation efficiency by more than 10 per cent and the bandwidth, if the aerial is properly matched, will be in excess of the whole of the 144 Mc/s band.

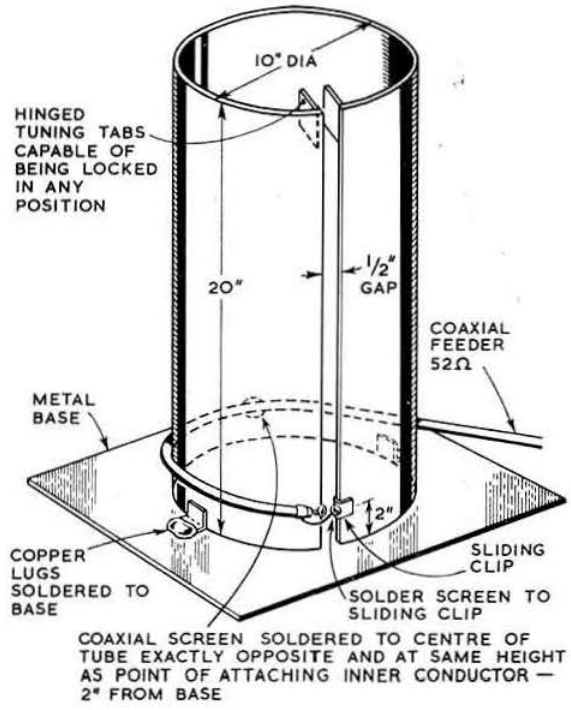


Fig. 1. Constructional details of the "Abe Lincoln" mobile aerial for 144 Mc/s.

DL4GF uses one of these small aerials on 144 Mc/s at his home station and has worked many stations at distances in excess of 60 miles. The imagination boggles at the thought of building one of these units for 14 Mc/s—dimensions would seem to be about 16 ft. high and 6·4 ft. in diameter. How about using several super sized copper hot water cylinders? Comments from anyone building an " Abe Lincoln " will be received with interest.

Operating Notes

An interesting letter has been received from G6AS (Solihull, Birmingham) who operates mobile on all bands from 3·5 to 28 Mc/s using a transmitter designed by G2ATK. The v.f.o. is remotely tuned from the driving position, the transmitter, power pack and extra battery being housed in the boot. The transmitter line-up is v.f.o./doubler (6AG7), doubler/tripler (6V6), p.a. (807). The speech amplifier

* " *Lynton*," *12 Nottingham Drive, Wingerworth, Chesterfield, Derbyshire.*

comprises a driver (12AU7), followed by a pair of 6V6s in push pull. The receiver is a Minimitter converter feeding into the car receiver. Since mobile operating commenced in July 1957 over 300 contacts have been made in five Continents, only Asia remaining for W.A.C., an outstanding performance for the low power used and whip aerials only.

GM3NRB (near Helensburgh, Dunbartonshire) decided to specialize on 28 Mc/s phone using a 3 ft. whip mounted on top of the car, with about 25 watts input. The transmitter is crystal controlled—a 5763 c.o. doubling from 14 Mc/s to 28 Mc/s and driving a 5B/254M (miniature 807), anode and screen modulated by a pair of 6BW6s in push pull. A 1,000 c/s note can be injected for calling or for m.c.w. if desired. The receiver is a superhet with two r.f. stages, three i.f.s and normal a.f. amplifier. The audio is passed to the first a.f. valve (a cascode arrangement) with an EF91 as the squelch (muting) valve. A.g.c. is applied to the grid of this valve and the voltage appearing across the anode resistance of this stage is therefore proportional to the a.g.c.

The grid and cathode of the first a.f. stage are effectively across this resistor and the valve is biased to cut-off under " no signal " conditions. On the arrival of a signal the potential across the resistor drops, the valve conducts and the a.f. signal is passed through to the next stage. This and the succeeding amplifier are two halves of a 12AT7.

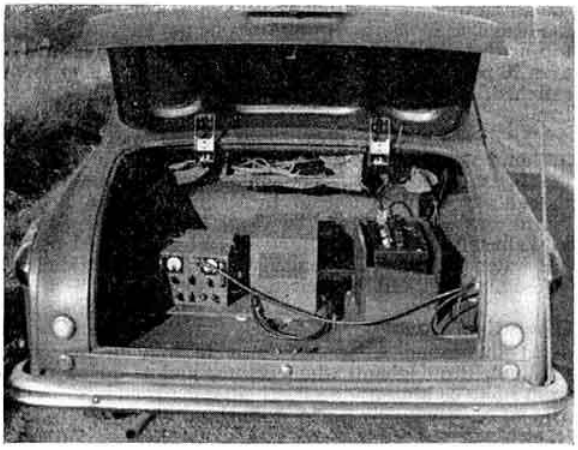
The threshold level may be adjusted from the control unit and the squelch will unlock when signals over S4/5 are received. So long as there is reasonable time constant in the a.g.c., the squelch will remain shut to ignition and other noises from passing vehicles.

The power supply for the complete mobile rig uses a Valradio vibrator unit and takes about 9 amps from the car battery—a transistorized power unit is envisaged so that this figure may be reduced. Regular local skeds are being maintained with GM3HSF/M with complete reliability; when conditions permit it is hoped that more distant contacts will be made.

G3OGL's equipment operates on 28 Mc/s only and consists of an 807 running at 15 watts input and is crystal controlled on either 28·1 or 28·51 Mc/s. The receiver is a Heathkit Mohican—DX to date includes OH, SM, ON, DL, F8 and EA.

A welcome letter has been received from GM3DIQ (Kilbarchan, Renfrew) who runs a Hillman Minx and who operates exclusively on 144 Mc/s whilst mobile. His receiver is a home-built transistorized superhet using nine transistors with an OC170 as combined oscillation/mixer in the front-end and covering 7·5 to 9·5 Mc/s across the tuning dial. The converter uses an AFZ12 r.f., AFZ12 mixer and AF111 i.f. head amplifier. The oscillator chain employs an AF111 fifth harmonic oscillator from a 4550 kc/s crystal into an OC170 doubler and AFZ12 tripler. The receiver is mounted in the left-hand glove compartment and the converter in a steel box bolted solidly to the underside of the shelf. The remainder of the radio equipment is fitted in the boot and connected to the front of the car by two coaxial cables and a 12 core screened cable. The equipment in the boot consists of a transmitter with a 12AU7 oscillator/multiplier to 72 Mc/s into a Brimar 7558 doubler and 7558 p.a. running at about 12 watts input. The modulator employs six transistors terminating in push-pull OC29s built into a large size Eddystone diecast aluminium box. A transistor power supply provides 300 volts for the units and power for the coaxial relay etc. The aerial is a folded halo mounted about 1 ft. above the car roof and it is matched to 4 per cent reflected power, about 1·1 to 1 ratio. Results obtained have been excellent, the best two way phone contact being with G3OHS/P located near Leek, Staffordshire, during the National 144 Mc/s Contest 1962. Many contacts up to 100 miles have been made—a creditable performance indeed. Whilst GM3DIQ was on holiday in Exmouth a dear old lady remarked how nice it was of him to have the car fitted so that the children could play basket ball—presumably with a small net attached to the halo! GM3DIQ, who thinks he is the only 144 Mc/s mobile operator in Scotland at the present time, will be at the Mull of Galloway for the first 144 Mc/s Contest in 1963 and the Mull of Kintyre for the others.

DL4GG (Western Germany), whilst operating an Eng. RC 19 Set in a truck with a whip tied down to the lorry frame to avoid overhead power wires, worked VK2AHM on 14 Mc/s phone with 100 watts input. It came as a great surprise to him because both signal reports were in the S6/7 region.



A view of the equipment used by G6AS/M and remotely controlled from the operating position.

MOBILE RALLIES 1963

April 21	North Midlands Mobile Rally at Trentham Gardens.
April 28	U.B.A. Rally, Verviers, Liege, Belgium.
June 2	R.S.G.B. National Mobile Rally, U.S.A.F Station, Wethersfield.
June 16	A.R.M.S. Rally, Barford St. John, Oxon.
June 23	East Yorkshire Coast Mobile Rally, Bridlington.
June 30	Longleat Mobile Rally, Longleat, near Warminster, Wilts.
July 7	South Shields and District Mobile Rally, South Shields, Co. Durham.
July 14	Chiltern Amateur Radio Society Mobile Rally, West Wycombe Park, Bucks.
August 18	Derby Radio Societies Mobile Rally, Ryknеld School, Derby.
September 8	Thames Valley Amateur Radio Transmitters' Society Mobile Rally.
September 15	Lincoln Hamfest and Mobile Rally, Kesteven Grammar School, North Hykeham, Lincoln.
September 22	R.S.G.B. Woburn Abbey Mobile Rally.
September 29	Region 9 Mobile Rally, Weston-super-mare, Somerset.

THE MONTH ON THE AIR

A CHRONICLE OF EVENTS ON THE HF AMATEUR BANDS

By R. F. STEVENS (G2BVN)*

THE members of the West Gulf DX Club recently took part in a poll to determine the DXCC "countries" which they needed to contact in order to complete their country roster. The W.G.D.X.C. includes amongst its members some of the leading U.S. DX'ers, and in view of the large number participating in the poll, the results undoubtedly provide an accurate cross-section of the requirements of that part of the world. The first three countries were head and shoulders above the remainder, and the figures in brackets represent the percentage of members needing that particular country. The top ten were: FB8/Tromelin (79); AC3 (78); AC4 (77); VK4/Willis (68); 4W1 (66); VK0/Heard Is. (63); VQ8/Rodriguez (50); ZA (50); C9/Manchuria (44), and FB8/Comoros Is. (43).

That these figures may not be representative of the requirements of European DX'ers is shown by the positions of VK/Lord Howe Is., VR1/Gilbert and Ellice Is. and VR1/British Phoenix Is. which have rankings of 5 per cent each and appear as numbers 89, 90 and 91 in the list of 93. It is believed that many operators in the British Isles would welcome a contact with these three areas.

In order that comparisons may be made with the W.G.D.X.C. list, U.K. operators are asked to send, on a postcard, a list of fifteen countries which they have not yet contacted. Please indicate *MOTA Poll* on the postcard which should be sent to R.S.G.B. Headquarters to arrive not later than **March 15.** It is hoped that all DX'ers, from those in the 300 category downwards, will participate, and the results may give valuable guidance for intending DXpeditioners.

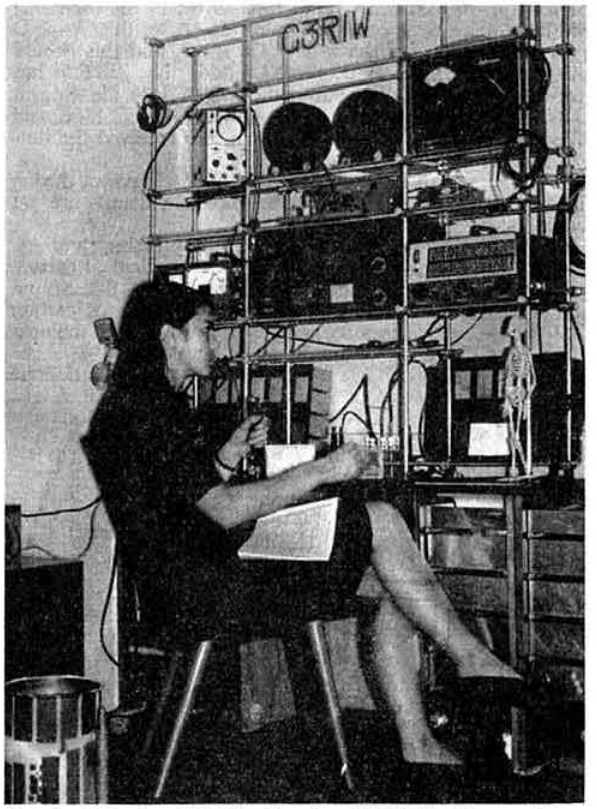
News from Overseas

The **Royal Signals Aden Garrison A.R.C.** has been formed from the former 254 Signal Sqdn, A.R.C. and is now operating under the call-sign VS9ART. At the present time the Club has four licensed members: Stan Symons, VS9ASS, Iain Scott, VS9AIS, Bob Aitken, VS9ARA and Don Prescott, VS9ADP.

From **ZB1CR** comes comment on current Malta activity: ZB1BX is operational on 1·8 Mc/s and has contacted 5B4 on this band. During a recent spell of listening on Top Band ZB1CR heard G3PU, G3FGT, G3OQT, G3PGN and G5JU, at times between 05.00 and 07.00. ZB1s BX and RM are active on 3·5 Mc/s and ZB1GR has contacted North America on this band, whilst on 7 Mc/s an inverted *V* dipole has given good results into all continents. During the period of the R.S.G.B. 21/28 Mc/s Telephony Contest, 28 Mc/s was useless for working U.K. stations, and 21 Mc/s was closed for a surprising period during daylight hours. ZB1CR clocked up nearly 1900 points in this contest, with ZB1BX over the 2000 mark.

9K2AU will be the new call of ex-G3BVP, who also holds the calls OD5CU, MP4s DAD, BDJ and QAT. Activity on a.m. and s.s.b. will take place on the h.f. bands after February 1, 1963. The new QTH is P.O. Box 528, Kuwait.

From the operators of club station **5B4PC** comes a collective comment on the operating habits of some European stations. 5B4PC is, at the present time, crystal controlled, and is forced to occasionally call "CQ DX, not Europe." To judge by the response that this evokes the call might have been "CQ Europe," and the resultant QRM completely covers any DX station that might have replied. The five operators of this station ask that their calls to DX be observed, emphasizing that in suitable conditions they are pleased to contact operators in nearer parts. It is a sad fact that stations in the British Isles are not free from guilt in this matter, but it is not too late to make another New Year resolution.



Beatrice Whitaker, G3RIW, of London, N.W.6, first became interested in radio on seeing a "do-it-yourself" transistor receiver in a departmental store when on her way to buy a large green iguana lizard for a pet. The building of the receiver was followed by a study of first principles, the construction of crystal, t.r.f. and superhet receivers and a gift of an HRO. She now operates this well-equipped station. The skeleton is presumably a permanent warning to "Switch to Safety."

* *Please send all reports to R.S.G.B. Headquarters to arrive not later than* **March 6** *for the* **April** *issue.*

Following the list of VP8 stations appearing last month, the KC4 activity in **Antarctica** is known to come from:

KC4USH Cape Hallet 14,250 and 14,300 kc/s
KC4USN South Pole 14,250 and 14,270 kc/s
KC4USB Byrd Station 7 and 14 Mc/s
KC4USV McMurdo Sound 14,250 14,265 and 14,350 kc/s.

The despatch of QSLs is very much the task of individual operators of these stations, but K1NAP acts as the QSL manager for cards going to the KC4 stations.

The comprehensive ***160 Meter DX Bulletin*** produced by **W1BB** poses the question as to whether the poor conditions experienced on Top Band during the autumn were the result of the explosion of the nuclear weapons. It is felt that the energy thus released might have caused excessive absorption in the atmosphere, but propagation expert George Jacobs, W3ASK, feels that the amount released is well below that necessary to cause such an effect. However it is a fact that since the testing ceased conditions on this band have slowly improved.

DXpeditions

At the time of writing it was hoped that W4BPD was on his way to Reunion Island having left Durban on January 18. The portable power plant was shipped direct to Reunion on December 29 but there was no room for Gus as a passenger. After Reunion Island, W4BPD will attempt to persuade one of the FR7 licensees to accompany him to the Comoros, Isle of Europa and other rare spots. Most of the travelling will have to be done by charter aircraft. After this W4BPD will attempt some of the rarer VQ8 spots, and this should carry him well into 1963. **W4ECI** adds that ZS1RM has recently completed duplicating the VQ9A logs for August and September, as well as those for VQ9A/7, LH4C and ZD9AM, and that directly the copies are received the despatch of the QSLs will commence.

It is believed that W0MLY will travel to **Navassa** during the second week of February, but no firm details are yet available.

Crozet Is. (FB8WW) is the subject of conflicting rumours, and has apparently been the receipt of piratical attention. Just what pleasure these jokers derive from this stupid activity is hard to understand. However it seems certain that there will be a station operating from Crozet in the near future, and that c.w. will be the mode employed.

Heard Island (VK0) is another rare spot on which definite news is awaited. Apparently VK0VK has proceeded direct to Wilkes Land without first calling at Heard Island, but activity may be expected from one or all of VK0s TC, JM and NL. The W.G.D.X.C. *Bulletin* reports that the Australians are rebuilding the Heard Island base and this augurs well for future operation from this spot.

"AS A MATTER OF FACT, YOU'RE MY FIRST CONTACT FROM THIS NEW QTH."

QTH Corner

ET3MEN	A. B. Shirk, U.S.A. I.D., APO 319, New York, N.Y., U.S.A.
FA2VX	W. Porter, c/o State Dept., Mail Room, Washington, D.C., U.S.A.
FR7ZG	G. Langlois, 44 rue Sainte-Marie, Saint-Denis, Reunion Is.
KC6BO	Koror, Palau, W. Caroline Islands.
VP2KZ	Box 321, St. Kitts, Brit. W. Indies.
VP8HD	via G3PEK
VQ2WM	via W2CTN
VR4CB	C. Blair, Box 53, Honiara, Solomon Is.
VR4CU	G. Vianello, c/o Catholic Mission, Honiara, Solomon Is.
VS1GC	N. G. Cooper, 69, Siglap Rd., Singapore, 15.
ZS3T	J. Laufs, Box 267, Walvis Bay, South West Africa.
4S7BR	B. Rampala, Box 355, Colombo, Ceylon.
5R8AG	B.P. 173, Diego Suarez, Madagascar.
5R8AK	R. Burdet, B.P. 180, Tananarive, Madagascar.
6O1WT	U.S. Embassy, Mogadiscio, Somalia
6W8DF	Lt. A. Juif, Boite Postale 3003, Dakar, Senegal Rep.
9K2AU	P.O. Box 528, Kuwait.

R.S.G.B. QSL Bureau: G2MI, Bromley, Kent.

The **Isle of Man** will be the scene of a trip by CHCers **G2BUL, G3FTQ,** and **G5GH.** Operation will be from April 5 to April 15, and there will be activity on all bands, including 1·8 Mc/s, mostly on c.w. QSLs may go via the R.S.G.B. Bureau, or if a direct reply is required please enclose a s.a.s.e. to the QTH in the R.S.G.B. *Call Book*.

Recent operation by **VK9XO** and **KS4AZ** was under the Jolly Roger and neither of these stations were located in the places that their prefixes indicate.

ZS6BBB will be making a holiday trip of some 3000 miles commencing around January 27 and lasting for at least three weeks. In the course of this trip he will visit **Tanganyika, Nyasaland** and **Mozambique**, and has permission to operate in all of these countries. Peter will be taking along a KWM-1, and the s.s.b. operation from ZD6 should provoke considerable interest. (Tks G2HFD).

From **ZS6BBB** comes the following description of the DXpedition to **Bechuanaland.**

"It was early on the morning of November 29, 1962, that Les, ZS6PC, and I left by road for Mahalapye some 50 miles inside the Bechuanaland border equipped with an S-line, KWM-1, 10-80m and 10-20m verticals, camping equipment and food. At Mahalapye we changed the comfort of a sedan car for the comparative discomfort of a four wheel

ZM6AW closed down on January 10 and Danny Weil was scheduled to be active from Wallis Island by about January 20. After some 10 days at FW8 the *Yasme* will sail for Fiji so that hull repairs may be effected. After this work has been completed Danny intends to activate other rare Pacific spots, and the DXpedition may be concluded at the end of 1963. On the itinerary of VP2VB/MM are New Hebrides, New Caledonia, Willis Is., Solomons Is., Nauru and Canton Is. Although there has been previous activity from these places, many operators would be glad of the chance of a QSO. Unfortunately this activity will coincide with the trough of the current sunspot cycle, and conditions may not be favourable for U.K. stations. This was unfortunately true in so far as the operation from ZM6AW was concerned when only a few British Isles stations managed a contact. The financial future of the DXpedition is entirely dependent upon subscriptions to the Yasme Foundation, and at the present time the directors of this are underwriting the whole venture, pending further income.

drive jeep and trailer on which was mounted a diesel generator. Armed with two rifles, capable of stopping an elephant if necessary, two automatics and ammunition for these, we set out across the typical flat bush country of that region in a north westerly direction, with the intention of selecting a site that was not only good from the operating point of view, but also from the point of view of studying wild life, if band conditions did not permit 24-hour operation. Selecting a site some 120 miles from Mahalapye, which can only be given as an approximate map reference 22°S-25°E, the stations were set up and operating at the scheduled time of 16.00 G.M.T. Apart from the prying eyes of a few animals during the first night, which were kept at bay by the camp fire, all went well.

It was on Friday that the troubles started, and had we known what we were in for we would never have embarked on the expedition. With temperatures above 100°F the diesel began boiling and it was not long before we realized that we would have to use the water supply to keep the diesel operating. Fortunately we had quite a supply of beer which we lived on, though warm beer is not the most palatable drink.

It was also on Friday, that I nearly lost my co-operator, when Les sat on a cobra. Fortunately he sat on its head and it was unable to deliver its venomous bite, and was later disposed of by a well placed bullet from Les's automatic.

Incident upon incident followed and on Saturday afternoon, a lion came within 25 ft. of our operating position causing us to go rapidly QRT in the middle of a contact, and to dive up the nearest tree. We decided not to shoot it for fear of only wounding it, and eventually it stalked off into the bush.

Sleep was confined to a minimum as it was too hot during the day to sleep and besides operating at night, one of us had to be on guard at all times.

We could not have picked a worse weekend, from the point of view of radio conditions, as the bands were closed most of the day and very patchy during the night.

It was a very weary couple of operators who packed up and headed for home on the Monday morning, looking more like savages after three days of being unable to wash and shave. The expedition brought forth some 3000 contacts throughout the world, and in spite of the troubles we encountered, we felt it worthwhile after reading the letters of thanks and the appreciation expressed over the air by the amateurs to whom we gave ' a new country.' "

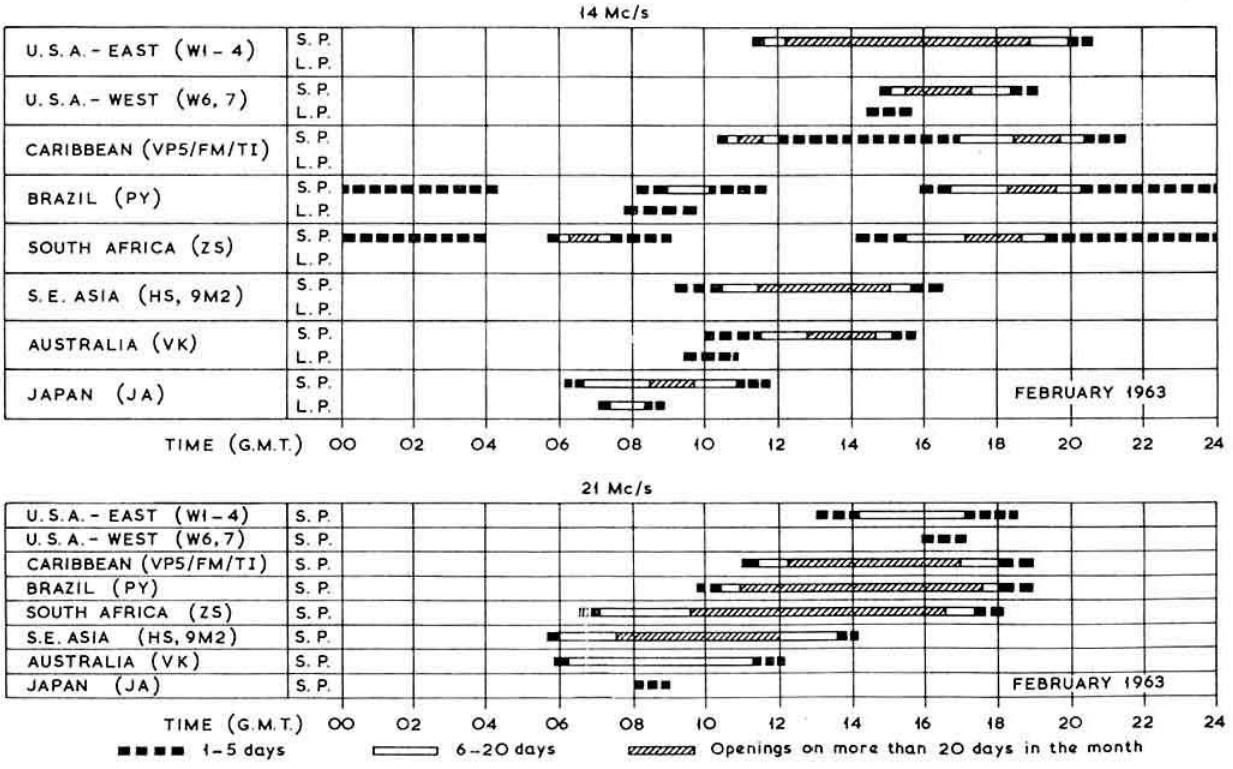
PROPAGATION PREDICTIONS

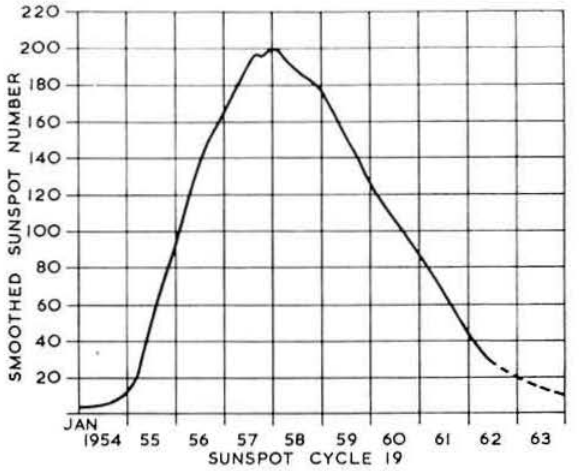
With the continuing decrease in sunspot activity there will be no worthwhile openings on 28 Mc/s, unless the m.u.f. rises to an unexpectedly high value. There will be limited openings on 21 Mc/s during daylight hours, and with the gradual lengthening of the hours of daylight the 21 and 14 Mc/s bands will remain open longer in the evening and this will be noticeable towards the end of the month. The decrease in sunspot activity also brings decreased absorption and both 7 and 3·5 Mc/s should show increasing DX possibilities. Contacts between the U.K. and the Eastern U.S.A. may be possible after 17.00-18.00 G.M.T.

It is a fact that during the periods of low sunspot activity stations located in the equatorial zones will experience better conditions than stations in the more northerly areas. These conditions will have a bearing on the results of the A.R.R.L. Contests in so far that it is most unlikely that a station in Northern Europe could win a contest of this type in equal competition with stations located in the southerly portion of the continent.

Listeners to the reports transmitted by WWV will no doubt realize that the numbers describing propagation on the North Atlantic path are relative and that the number " 7," meaning " good," will describe different types of conditions according to the stage of the sunspot cycle. It is emphasized that the forecast from WWV refers to conditions on the transatlantic path only, and other paths may well be fully open when WWV is transmitting a low number, indicating poor conditions. This happened recently when during a period described as " 3 " (bad), contacts on 1·8 Mc/s between VP8GQ and the U.K. were made at good signal strengths.

The mean Sunspot Number for December, 1962, provided by the Zurich Observatory, was 22, and a smoothed number of 20 is predicted for June, 1963.





The graph shows the progress of the current sunspot cycle, No. 19, since records were commenced. The minimum number of 5 is expected during late 1964 or early 1965.

Your scribe is indebted to G2HFD for obtaining and forwarding this story by ZS6BBB.

Contests

The results of the **R.E.F. C.W. Contest 1962** show **G3EYN** in second position, the first four stations being: W1JYH (15,576 points), G3EYN (15,120), DJ5VQ (14,448), and YO8KPA (13,224). The telephony section was won by ON4FD with 36,708 points; there was no U.K. entry.

The **Goose Bay A.R.C. Annual QSO Party** will take place during the month of April, commencing 00.01 April 1 and ending 24.00 April 30, 1963. All amateurs are invited to take part, and operators, outside the U.S.A. and Canada, submitting a list showing that they have worked three members will receive a WAG award. The list should be sent to Awards Manager, Jack Willis, VO2NA, P.O. Box 255, Goose Bay, Labrador. QSL Cards are not required, but the G.B.A.R.C. member must have received a QSL from the applicant. If desired outgoing QSLs may be sent with the application to VO2NA. The following club members will be active on bands between 3·5 and 28 Mc/s: VO2s AH, BA, NA, RN, UA, DP/VE2, 1FG/VE2 VE1MW/VO2, K5DY/VO2, K5HOJ/VO2, W5HCZ/VO2, K7ITH/VO2, W8UPV/VO2 and K0SZE/VO2.

The **CHC/HTH 1963 Annual QSO Party** will take place between 23.00 Friday May 31 and 06.00 Monday June 3. This event is open to all operators and **G5GH** has leaflets giving full details which are available on receipt of a s.a.s.e.

The **Seventh Annual CQ WW S.S.B. Contest** will take place between 12.00 Saturday March 30 and 18.00 Sunday March 31, 1963, with only 24 hours of operating permitted. Rule changes comprise (a) separate point scoring for U.S.A. and overseas stations, and (b) awards to single and multi-band operators. The rules are reproduced in full on page 422, and copies of these are obtainable with a s.a.s.e. from G2BVN. Log forms, report forms and prefix check lists will also be available.

A copy of the rules of the **Radio Day Contest** sponsored by the U.S.S.R. Federation of Radio Sports, which will take place between 21.00 on May 4 and 21.00 on May 5, has been received. A first check of the rules (which are in Russian) shows no radical changes and a summary will be published next month.

GM3IQL and GM3ENJ took part in the recent **RTTY Sweepstakes** under the former call, and worked 22 stations on this mode in very poor conditions, the best DX being YV1EU.

DXCC News

Bouvet Island has been added to the A.R.R.L. Countries List. This island is Norwegian territory located in the South Atlantic Ocean about 1600 miles south of the Cape of Good Hope. DXCC credit claims may be made for this addition commencing May 1, 1963, for contacts dated November 15, 1945, or later.

The list on this page shows the effective dates for DXCC credit for a number of the newly independent countries, in addition to countries deleted from the DXCC list.

The list of prefixes on page 419 has been compiled by **K2UTC** and covers stations located in the fifty states of the Union, together with Puerto Rico, Virgin Islands of the U.S.A. and Canton Island.

Awards

Commencing January 1, 1963, the **R6K Award** of the U.S.S.R. Central Radio Club will be awarded for two-way s.s.b. contacts as follows: one QSO with each of the six continental areas, plus three QSOs with the European section of the U.S.S.R. and three QSOs with the Asiatic section. The award is issued in three classes, viz: First class, all contacts on the 3·5 Mc/s band; Second class: all contacts on the 7 Mc/s band; and Third class, mixed band contacts. All contacts after May 7, 1962, may be counted.

Revised rules for the **R-100-O** Award, also issued by the C.R.C., are now effective. The basic requirement for this certificate is that an operator must work 100 oblasts during one calendar year, on either 'phone or c.w. There are three classes (as for the R6K Award) and contacts after May 7, 1962, may be counted.

CHC Chapter No. 8 will be giving recognition to the highest scoring European station in the 1963 **CHC/HTH QSO**

Effective Dates for DXCC Credit

CN2	Tangier	before	1. 7.1960
CR8	Damao/Diu/Goa	before	1. 1.1962
FF8	French W. Africa	on or before	6. 8.1960
FI8	French Indo China	on or before	21.12.1950
FN	French India	before	1.11.1954
FQ8	French Equatorial Africa	on or before	16. 8.1960
I1	Trieste	before	1. 4.1957
I5	Italian Somaliland	on or before	30. 6.1960
TL	C. African Rep.	on or after	13. 8.1960
TN	Congo Rep.	on or after	15. 8.1960
TR	Gabon Rep.	on or after	17. 8.1960
TT	Chad Rep.	on or after	11. 8.1960
TU	Ivory Coast	on or after	7. 8.1960
TY	Dahomey Rep.	on or after	1. 8.1960
TZ	Mali Rep.	on or after	20. 6.1960
UN1	Karelo Finnish Rep.	on or before	30. 6.1960
VO	Newfoundland/ Labrador	before	1. 4.1949
VQ6	British Somaliland	on or before	30. 6.1960
XT	Voltaic Rep.	on or after	5. 8.1960
ZD4	Gold Coast	on or before	4. 3.1957
5T	Mauretania	on or after	20. 6.1960
5U7	Niger Rep.	on or after	3. 8.1960
6W8	Senegal Rep.	on or after	20. 6.1960
9G1	Ghana	on or after	5. 3.1957
9S4	Saar	before	1. 4.1957
9U5	Ruanda-Urundi	1.7.1960 to	30.6.1962
9U5	Burundi	on or after	1. 7.1962
9U5	Rwanda	on or after	1. 7.1962

AMERICAN PREFIXES

Continental U.S.A.	
W1	W6
K1	K6
KN1 (novice)	KN6 (novice)
WA1	WA6
WN1 (novice)	WV6 (novice)
	WB6
W2	WN6 (novice)
K2	
KN2 (novice)	W7
WA2	K7
WV2 (novice)	KN7 (novice)
WB2	WA7
WN2 (novice)	WN7 (novice)
W3	W8
K3	K8
KN3 (novice)	KN8 (novice)
WA3	WA8
WN3 (novice)	WN8 (novice)
W4	W9
K4	K9
KN4 (novice)	KN9 (novice)
WA4	WA9
WN4 (novice)	WN9 (novice)
W5	W0
K5	K0
KN5 (novice)	KN0 (novice)
WA5	WA0
WN5 (novice)	WN0 (novice)
Alaska	**Canton Is.**
KL7	KB6
WL7 (novice)	WB6 (novice)
Hawaiian Is.	**Virgin Is.**
KH6	KV4
WH6 (novice)	WV4 (novice)
Puerto Rico	
KP4	
WP4 (novice)	

Party, which event is open to all operators. The form of recognition has not been finalized but an announcement will be made in the near future.

The German Chapter (No. 10) of CHC now has 32 full members and 11 associates, the Chairman being DL9KP and Secretary DJ4OP. This Chapter intend to sponsor several operating awards.

At the end of 1962 the total number of CHC members was 795, G3IFB being the recipient of that number. The growth of CHC is shown by the following membership figures: Nos 1 and 137 during 1960, Nos 138 to 430 during 1961 and 431 to 795 during 1962. The Vatican City station HV1CN was the recipient of CHC number 666. Of the U.K. members, G2GM, G3DO, G5GH and GB2SM each have credit for 100 awards.

The **WAE Awards** manager is now **DL1EE**, Igor Falster, Tillystrasse 44, Nuremburg 85, West Germany. The charges for the various classes of the WAE Award have been altered to 10 IRC, or one dollar, in each case. Contacts with 4U1ITU, although counting as Switzerland, attract bonus points, as does the OH0-9S4 combination. (Tks G5GH).

An award is being offered by Californian **K6MLS** to the first station to confirm 300 contacts on two-way single sideband. At the moment the leading contender is TI2HP with 276 confirmed. A recent count by K2MGE revealed that at the present time a total of 295 countries had been, or were now, available on s.s.b.

Around the Bands

Conditions on **1·8 Mc/s** are undoubtedly improving although far from consistent. There has been added difficulty owing to the practice of one W2 station asking operators to QSY to 1801 kc/s, thereby creating intense QRM from calling stations which masks any weaker DX signals between 1800 and 1810 kc/s. Operators are asked not to depart from the usual practice of calling above 1825 kc/s.

The Sunday morning log of **G3OQT** (Romford) shows the following stations heard on December 9: W1ME, W1TX, W2EQS, W2FYT, W2GGL, W2KHT, W2IU, W2UWD and K3BMF, whilst RST were exchanged with W1ME, W1TX, W2EQS, W2FYT and W2GGL. VO1BD, W1BB and W1ME were QSOd on December 16, and a week later VP8GQ was contacted when his signals later peaked to 569. The snow prevented any activity on December 30, but the following were logged on an indoor receiver and aerial: W1BB, W1ME, W1PPN, W2GGL, W3GQF, K8HBR/2, W8HGW and VE3AGX. W1ME, W1PPN, W1WY and W2IU were worked on January 6, and amongst those logged were VE1ZZ, VE3AGX, W8HRV, and HB9CM. **B.R.S. 20317** (Bromley) confirms the above findings mentioning that December 16, a Test Day, was rather poor with only three DX stations heard between 05.00 and 07.00. In contrast to this December 22 provided good conditions between 05.00 and 05.45 when 10 U.S. stations were heard, with W1TX peaking at S8. December 30 brought fair conditions when the band was open from 05.00 to 08.45 the North American signals averaging S6. On January 6 the band was open from 05.00 to 08.45 and conditions were good, and a total of 25 VE/W stations were active on the band. Logged by our reporter, **B.R.S. 20317,** were W1s AW, BB, BHQ, EVF, ME, PPN, TX, WY, K2CHQ, W2s EQS, FYT, GGL, IU, KHT, KQT, UWD, YIB, W3GQF, K4HJJ, W3RFA, W8GDQ, W8HGW, W8HRV, W9EWC, VE3AGX. HC1DC was heard on 1801 kc/s and VP7NY on 1824 kc/s. **B.R.S. 19107** logged VP5XG (ex-VU2XG) working Ws between 07.57 and 08.05 on 1823 kc/s. An outstanding QSO took place on December 16 when G3PU QSOd W0VXO for the second ever W0/G contact. On the same day G3PU also worked VP8GQ, although conditions on the East-West path seemed to be far from good. The last

ZS6Z of Sandhurst, north of Johannesburg, was originally licensed as FO-A6U in 1927. The present equipment includes Collins 32V3 and Hallicrafters HT32 transmitters and a Collins 75A4 receiver. All bands from 10-80m are worked.

Transatlantic Test of the season will take place on **Feburary 17** and it is to be hoped that conditions will be favourable. **A.2461** (Torquay) reports hearing a large number of those listed above, and also mentions HR3HH as being active on January 6. The country total on this band is now 27 heard and 14 confirmed, and it is wondered if a 100 countries on 1·8 Mc/s might be possible. PA0PN has been worked by many stations and told **G2BP** (Chatham) that PA0s DS, LOU and SS were active on the band. North American stations have been heard but no contacts have yet resulted, although PA0PN has worked North Africa.

Conditions on **3·5 Mc/s** appear to be improving with a lot of the DX appearing on s.s.b. **B.R.S.20317** reports that the path to the U.S.A. is rather patchy but is improving, with the mornings providing the best opportunities. Central U.S.A. is workable but the West Coast stations, heard around 07.00, have not been easy to contact. G3NEO was heard in QSO with W9HUZ on c.w. at 23.45, following this with a contact with W5CKY in Mississippi. G6ZO just failed to contact VR5AA around 08.40 when enlisting the assistance of W9ADN, and JA6AK was heard at 22.15. Outstanding signals on s.s.b. were logged from VE3BQP, WA2PV/VO2 and W1FRR, all around 06.15 whilst VE4TJ (08.35) and VE7ZM (08.00) were recorded by B.R.S.19107. EA9AZ (07.30) made a welcome appearance on this band and KP4CK was heard calling Europe at 08.55. VR3O is known to be active, but no definite reports of U.K. contacts have been received, although it is believed that perhaps G8PO may have been lucky? **G3HDA** (Stratford-on-Avon), recently active on s.s.b., worked OX3KW (23.24), UP2CG (19.20), VE3FFW/SU (21.54), W8UPV/VO2 (22.15) and W5JDX/VP9 (23.00). Stations logged by **A.2340** (Plymouth) include: EA9AZ (07.02), LX1DC (19.25, on a.m.), KP4CK (08.35), OX3KW (23.45), VE3FFW/SU (23.10), PJ2AA (24.00), UT5AA (21.05), VR3O (07.22), numerous Ws, YV5ANS (07.20), ZL1ACG (08.00), ZL2BU (08.00) and ZL4MD (08.07).

From results obtained during the past three weeks the conditions on **7 Mc/s** do not seem to have changed, and **B.R.S.20317** provides the following information on current events. *Asia:* strong signals from the rarer parts of the U.S.S.R. have been logged, despite jamming interference, and heard have been: UA0BL (11.32), UW0JG (08.43 and 15.22), a good one for prefix chasers, UM8KAA (13.47), UJ8AH (15.00) and UI8 between 18.00 and 19.00. VU2GG has been consistently heard at times between 15.00 and 19.00, whilst HL9KH (13.20), and VS9AAA (18.30) also appear in the log. Numerous Japanese stations have been heard, although the signals strengths have not been good, between 08.30 and 16.10. The *African* path was quite good and a new one logged was ZS6IF/8 (00 00 to 01.20); also heard were ZS2CP (18.20), ZS5VM (19.07), ZS5BK (01.08), ZS6BDG (18.40) and CR7IZ. *Oceania* provided VK3RW, VK3YU and VK5JE, all between 14.50 and 19.12. ZL2GS was consistent around 09.20 to 10,00, rather an unusual time, whilst KG6NAA was being called at 10.45. *North America* did not give much cause for rejoicing although W8QHM (00.20), W4DKK (09.40) and W2KQT (12.07) were outstanding amongst East Coast stations. The long path to the West Coast was open on 13 of the 16 days that our reporter was able to listen. Between 14.30 and 16.00 the most consistent stations were W6s GRX, MSM and JULS, although generally conditions were not as good as last month. The short path to W6 was only rarely open with K6LTS logged at 09.40. From *Europe*, UA1KED (08.00), TF5TP (13.20) and CT3AB (18.30) claimed considerable attention. **GW3PSM** (Cwmbran) has been active on c.w. whilst awaiting the arrival of his sideband equipment from Cyprus, and has clocked up 36 countries using a half-size G5RV aerial. These include FA3OK (00.49), VQ4IV (23.55), VS9AAA (17.00), VU2GG (17.30), ZB1BX (23.37) and many Europeans. **G3PVS** (Woking) records LU3DCJ (23.55), LX1CR (10.17), YV5KFQ (22.35), together with Europeans. G3PVS queries the UW prefix; this is now in use where the licensing authorities have presumably run out of permutations on the original UA prefix. There is no additional country significance in the UW prefix, although doubtless of interest to prefix chasers.

Turning now to **14 Mc/s**, on which most of the real DX has been worked, **G3HDA** records s.s.b. QSOs with KC6BK (08.45 E. Carolines), KC6BO (08.45 W. Carolines), KG1GC (12.05), KL7AIR (16.00), KP4BBW (10.28), TF2WHB (13.45), UA0SK (08.20), UD6BR (12.40), UL7JA (10.17) and W5JDX/VP9 (16.35), whilst c.w. accounted for KR6ED (08.55) and VP8GQ (19.00). **G3PVS** worked 4W1AA at 10.51 and queries his status, which at the time of writing had not been determined. There are rumours of an American QSL manager, but these arrangements have not been finalized, and it is not definitely known if the station is in fact located in the Yemen.

A.2340 logged BV1US (09.00), ET3LM (13.30), KX6BU (11.20), KR6MB (09.40), OA4CV (11.55), OX3TO (16.15), UG6AW (13.45), UM8FZ (09.43), VS9MB (13.30), 5N2HJA (15.30), 5U7AH (09.20), and other less DXotic calls. **A.2602** (Solihull) recorded signals from EL3A (16.45), FG7XT (10.24), HH2P (11.58), KP4CL (11.00), OA4DI (10.22), TI2HP (13.30), UD6BR (13.00), VKs, VP4TI (12.05), VS9APP (14.00), ZLs, ZSs and 9L1RO (10.30). QSOs are recorded with AP5KC (08.50 W. Pakistan), AP5DC (09.05 E. Pakistan), ET3MEN (15.30), KX6BF (08.05), HL9KH (09.10), LA5FI/P (10.00 Spitsbergen), UA0RV (07.30 Zone 19), VR2BZ (07.55), VK9LA (15.45), VS9MB (13.30), ZE1AB (14.20 long path), ZP5OG (11.05) and 6O1WF (11.15). All these stations were operating on the high end of the band.

DX Briefs

Readers who use Top Band should take very great care to avoid causing interference to ships and shore stations.

For the information of amateurs using the band the following is a list of frequencies in use by the Maritime Service:

Frequency	*Name of Station or Service*
1905 kc/s	Lynby
1813 kc/s	Blavand
1827 kc/s	Wick and Folkestone
1834 kc/s	Niton
1834 kc/s	Thyboroen
1841 kc/s	Cullercoats and Land's End
1848 kc/s	North Foreland and Oban
1855 kc/s	Ilfracombe, Stonehaven and Newhaven
1956 kc/s	Stonehaven
1869 kc/s	Humber
1883 kc/s	Portpatrick
1911 kc/s	Land's End, Niton and Anglesey
1925 kc/s	Land's End, Niton and Anglesey
1950 kc/s	Loran
1953 kc/s	British Ships
1960 kc/s	French Ships
1974 kc/s	Dutch Ships
1981 kc/s	British Ships
1988 kc/s	Danish Ships to Skagen Radio
1995 kc/s	Danish Ships to Roenne Radio
1998 kc/s	Dutch Ships

The following frequencies should also be avoided: 1857, 1890, 1930 and 1940 kc/s.

Following a recent reference to AC4AX, **G6YL** mentions **AC4OS** heard on the 3·5 Mc/s band during January when working DJ6HJ at 17.30. One always wonders just what satisfaction these piratical gentlemen derive from their QSOs.

5A3BC is now back in the U.K. but will shortly be resuming his overseas wanderings.

(Continued on page 422)

Empire DX Certificate Holders as at December 31, 1962

No.	Name	Call-sign
	1947	
1	R. G. D. Holmes	G6RH
2	P. Pennell	G2PL *
3	J. M. Kirk	G6ZO
4	A. O. Milne	G2MI *
5	C. G. Allen	G8IG *
	1948	
6	F. A. Robb	GI6TK
7	R. A. Bartlett	G6RB
8	W. R. Joss	G2AJ *
9	H. Caunce	G6KS
10	H. B. Gortz	PA0GN
11	J. R. Letts	G8IL
12	D. A. G. Edwards	G3DO *
13	R. W. Rogers	G6YR
14	H. A. M. Whyte	G6WY
15	L. F. Coursey	G4JZ
16	G. Brown	G5BJ
17	D. Brown	ZL1HY *
18	W. H. Dyson	G8TD
19	L. H. Thomas	G6QB
20	J. Clarricoats	G6CL
21	G. Howard-Williams	G3BI
	1949	
22	J. A. Hunt	G2FSR
23	W. T. Pickard	G8KP
24	H. A. G. Shepherd	G8II
25	H. S. Bradley	W2QHH
26	E. S. Cole	G2EC
27	G. F. Cole	VK2DI
28	T. W. Copleston	GW4CX
29	J. Mathis	W3BES
30	S. M. Gambles	G4GI
31	C. Amundsen	LA7Y
32	F. B. Jones	G2AKQ
33	R. L. Glaisher	G6LX
34	K. Hopkinson	G8QX
35	L. F. Viney	G2VD
36	H. Beaumont	G5YV
37	A. C. Simons	G5BD
38	S. Herbert	G3ATU
39	H. Scholz	VK4HR *
	1950	
40	R. Palmer	G5PP *
41	T. Martin	G2LB
42	H. J. Hunt	G5HH
43	D. R. Macadie	GM6MD
44	H. J. Gratton	G6GN
45	I. Hamilton	GM3CSM
46	W. W. W. Peat	GM3AVA *
47	D. A. V. Williams	G3CCO *
48	C. R. Shaffer	W3JKO
49	S. Southgate	G8FF
50	H. W. Green	ZS6CT
51	J. M. Reed	HC2JR *
52	F. Hooson	G3YF
	1951	
52	J. Hunter	G3AZ
54	J. M. Gady	VP9G *
55	H. A. Chenik	ZS6Q *
56	L. Hardie	GM2FHH
57	B. H. Stephenson	G2ZF
58	W. Schreuer	G3DCV
59	W. G. Johnson	G2BJY
60	P. R. Solder	G5FA
61	C. D. Abbott	G6TA *
62	F. Cropper	G6XS
63	T. F. Hall	ZD4AB
64	H. LeDain	GC4LI
65	L. W. Ensor	ZS6BJ
66	A. H. B. Bower	G3COJ
	1952	
67	G. Webster	G5GK
68	R. G. Wilson	W3GHD
69	D. E. Davies	GW3FSP
69a	P. J. Broom	G5DQ
70	D. J. Beattie	G2WW
71	G. A. Bird	G4ZU *
72	B. Case	W5FNA
	1953	
73	P. A. Tremaine	G8PB
74	A. E. J. Cooper	G5VT *
75	J. M. Ivison	G3BKF
76	T. A. St. Johnston	G6UT
77	A. J. Perkins	G6KP
78	J. E. Bazley	G2BOZ
79	J. Bieberman	W3KT
80	F. J. North	VP6CDI
81	R. F. B. Featherstone	VQ4RF *
82	S. R. Baxter	VK4FJ *
	1954	
83	J. M. Ahumada	LU8CW
84	Rev. J. A. Stone	EI4Q
85	B. M. Scudamore	G6BS
86	J. W. Swinnerton	G2YS
87	R. Faessler	HB9EU
88	G. W. D. Brown	GM3DHD *
89	Rev. A. B. Trewin	ZS2AT
90	W. F. Meyer	ZS6DW *
91	A. H. Mason	GM6MS
92	A. Sachs	ZS6BW *
93	A. M. Hix	W8PQQ *
94	C. R. Perks	G4CP
95	E. G. Bright	G3JW
	1955	
96	H. V. Wilkins	G6WN
97	F. H. Cooper	G2QT
98	M. W. Weeks	W6ZZ
99	A. J. Slater	G3FXB
100	J. H. duBois	K2CPR
101	G. L. Brownson	G5CR
102	L. J. McDougall	GM3CIX
103	W. H. McGee	ZL3LR
104	J. Drudge-Coates	DL2RO
105	T. Higginson	GW3AHN
106	E. W. Mayer	KP4KD
107	J. B. Castenera (ex- K4ESH)	KP4CC
108	J. S. Nicholson	VU2JP
109	J. D. Kay	G3AAE
110	T. E. Wilson	G6VQ
111	J. Mahieu	ON4AU
112	V. G. Mellor	G5MR
	1956	
113	H. Biltcliffe	G5HB
114	J. Drudge-Coates	G2DC
115	G. A. Wafer	VQ2GW
116	D. E. Scarr	G6XX
117	D. L. Courtier-Dutton	G3FPQ
118	E. Neal	G8GP
119	J. N. Walker	G5JU
120	H. L. Wilson	EI2W
121	F. Suter	HB9MQ
122	V. J. Williams	VE3KE
123	D. R. Aston	G8DR
124	F. W. Garnett	G6XL
125	S. L. Hill	G8KS
126	R. F. C. Crowther	G3DOG
127	J. D. Wightman	ZL1AH
128	F. G. Jupe	G3EYN
129	J. Knight	W6YY
130	W. D. Manson	G8PW
131	K. E. Walters	G8FW
	1957	
132	G. F. C. Layzell	G3AMM
133	G. C. Eyre	G8OJ
134	S. E. Fraim	W3AXT
135	R. J. Boal	GI3AXI
136	J. Hunter	G3IMV
137	L. Parker	G5LP
138	E. M. Wagner	G3BID
139	G. Hutson	G6GH
140	S. G. Mercer	G2DPY
141	J. Mann	G3AAM
142	H. Swift	G3ADG
143	F. J. Devenish	VE3ADV
144	J. C. Pershouse	VS2DQ *
145	Rene Dumas	HB9MU
146	E. J. Allaway	G3FKM
147	L. A. Morrow	W1VG
148	R. H. Webb	G6XY
149	F. Robathan	G2CNW
150	F. G. Bail	VK3YS
151	C. Des Portes	W4ANE *
152	R. P. Cole	G6RC
153	J. Orr	G8JO
154	H. Lowe	G2HPF
155	T. A. Maguire	G4TM
156	J. S. Bell	GM3WO
157	S. A. Mann	K2CJN *
158	E. J. Hancock	G3BHW
159	A. N. Ringler	W2SAW
160	N. P. Haskins	G8JR
161	J. M. Heisey	W3MDE
	1958	
162	A. E. Sinclair	GM3EST
163	G. C. Newby	G3EBH
164	L. Hamilton	GM3ITN
165	G. F. Barrett	ZC4IP
166	T. M. Moss	W4HYW
167	E. R. Boothroyd	G3GYH *
168	P. B. Briscombe	G8KU
169	H. F. Lewis	G3GIQ
170	H. J. Lawn	G3HLY
171	F. Bissett	VE3AIU
172	J. Burgess	G3KKP
173	D. Roberts	G3FKH
174	K. T. Whithorn	G3BDS
175	D. E. C. Lockyer	G3HCL
176	T. A. Hurley	EI3R
177	C. J. Morris	G3ABG *
178	J. D. Clement	W6NTR
179	W. W. Simpson	W8KPL
180	D. R. Payne	G3GFG
181	R. Shadlock	G3US
182	F. Johnstone	VS1FJ
183	C. F. Sherrit	GM3EOJ
184	N. L. Carpenter	GW3BNQ
185	F. H. Chambers	G2FYT
186	J. C. van Wyk	ZS6R
187	W. N. Burgess	9K2AZ
188	C. P. Ross	W9ABA
189	A. Brown	G2WQ
190	J. S. Tempest	G3GSZ
191	T. K. Stewart	ZL1RD
	1959	
192	B. King	G3CEG
193	E. D. Wills	ZB2I
194	H. W. Stark	W3CGS
195	W. E. Waring	G3GGS
196	W. W. Jones	G3CSL
197	F. D. Cawley	G2GM
198	Lee R. Scott	W3PGB
199	C. C. Olley	G3AIZ *
200	F. H. Bliss	G3IFB
201	H. A. M. Whyte	VE3BWY
202	C. C. Usher	G2CCD *
203	H. O. Sills	G8QZ
204	R. H. Newland	G3VW
205	V. H. S. Curling	G6VC
206	J. P. Vesper	VK2PV
207	A. E. Dowdeswell	ST2AR
208	J.W. Booth	G2AJB
209	H. Leishman	GM2TW
210	W. J. Vincent	G4OI
211	H. J. Withers	G6XA
212	H. W. McNeill	VO3X
213	P. A. Hobbs	G3LET
214	J. P. Hawker	G3VA
215	L. J. Coupland	G2BQC
216	F. J. King	W7NRB
217	J. Thorpe	G5TO
218	J. B. M. Stewart	GM3EDU
219	D. V. Newport	G3CHW
	1960	
220	N. C. MacPhail	W8DLZ
221	R. N. Lawson	G5ZK
222	C. J. Oliver	GW5SL
223	I. Cable	MP4BBW *
224	M. R. Hassall	G3EMD
225	E. Wolheim	W3MUM
226	F. K. Parker	G3FUR
227	R. W. McCarty	W9KA
228	L. F. Crosby	G3FGT
229	C. J. Scott	W8AYS
230	C. J. Curtis	G3AGN
231	Howard W. Green	W3DHM *
232	A. H. Trigell	G3JAF
233	J. Gonzalez	KP4YT
234	J. Paul Caboche	VQ8AD
235	R. J. Galloway	VQ2RG

No.	Name	Call-sign
236	R. F. Stevens	G2BVN
237	R. G. Wyatt	G3HFJ
238	S. W. P. Henton	G5VU
239	D. Cox	G3KHZ
240	R. Otterstad	LA5HE
241	A. Edward Hopper	W2GT
242	E. Wake	G5RP
	1961	
243	J. M. White	ZL2GX *
244	D. M. George	VE3BMB
245	A. J. Rourke	GI3JIM
246	M. E. Bazley	G3HDA
247	W. E. Steverson	G3JEQ
248	R. V. E. Walsh	GI4RY
249	R. Gibson	GI3NPP
250	H. Schleifenbaum	DL1YA
251	M. Geddes	ZE3JO
252	L. A. Jeffery	W8WI
253	R. E. Baird	W9NN
254	J. A. C. St. Leger	MP4BBE
255	Dady S. Major	VU2MD
256	G. R. McKercher	W0MLY
257	Roy W. Weisbach	W9UX
258	Charles C. Corne, Jr	K9EAB *
259	K. V. Franklin	G3JKF
260	A. G. Anderson	GM3BCL
	1962	
261	Gan A. Baker	W6CHY *
262	Sid Coosner	ZS4MG
263	E. N. Cheadle	G3NUG *
264	Norman O. Merz	W9YNB
265	G. Bussler	DL1IB *
266	C. R. Emary	G5GH
267	James W. Ringland	W8JIN
268	Zaw Yee (Soe Ya)	XZ2SY *
269	P. K. Baldwin	W1ZW
270	A. C. Doty	K8CFU
271	A. E. Tupman	G3ID
272	J. A. Steele	G3KZI
273	N. A. S. Fitch	G3FPK
274	Michael Solomon	W3AYD
275	Charles W. Boegel, Jr	W0CVU †
276	Richard Johnson	G2FFO
277	D. Webber	G3LHJ
278	P. Bailey	VQ4KPB
279	C. R. Goodall	G2AFQ *
280	H. W. Merideth	W5PQA *
281	E. Pickering	G3LPS
282	R. C. Paulson	W1UOP
283	D. L. McLean	G3NOF *
284	P. I. Cleveland	WIOHA
285	T. Jack E. Winter	ZS5PG *
286	P. J. Danthony	K2OEA
287	Stanley Read	VS1FZ
288	S. N. Crabtree	VQ4GQ
289	Michael Dransfield	5N2JKO
290	Kenneth Grimm	K5KBH
291	Ragnar Otterstad	LA5HE
292	Claude Ronsiaux	F9MS
293	Anton Meller	OE3ME *

* Denotes telephony endorsement
† Denotes first two-way s.s.b. telephony

Telephony only

	1948	
T1	D. Lamb	GM2UU
T2	E. Robson	VQ4ERR
	1950	
T3	S. W. Bridges	WINWO
T4	K. Wydler	HB9DS
T5	C. Collins	VQ4SC
	1952	
T6	M. H. Carragher	MF2AA
T7	W. J. Prestidge	G2BXP

The Seventh Annual CQ World Wide Single Sideband Contest 1963

I. Contest Period: 1200 GMT, Saturday, March 30, to 1800 GMT, Sunday, March 31, 1963 *with only 24 hours of operating permitted.* The six hours of non-operation must be consecutive—at the beginning, end, or any six hours during the middle of the contest—and must be clearly designated in the Contest log. Contestants may, of course, operate less than 24 hours if desired, but must show a minimum of 100 contacts if they wish to be considered eligible for an award. Logs not indicating a 6 hour rest period will be disqualified!

II. Participation and Bands: The Contest is open to all sidebanders in all parts of the world and all authorized amateur frequencies may be used. Only one transmitter may be in operation from any station at any one time and *only the licensee of the station may operate* (except at a club station where one duly-designated club member may operate at any one time).

III. Object: The object of the contest is to work as many stations and as many different prefixes on two-way single sideband in the world as possible. (A " prefix " is considered the two or three letter/numeral combination which forms the first part of any amateur call. The following would all be considered *different* prefixes: W2, K2, WA2, WB2, WA6, 5AI, 5A2, DJ1, DJ2, DL2, etc.) Each different prefix may only be counted once during the Contest!

The *same* station may be worked *once* on *each* band (1·8, 3·5, 7, 14, 21, and 28 Mc/s) for purposes of accumulating points and, therefore, separate log sheets for each band must be submitted. For example, if you work G8KS on 20 metres, you may also work him again on 10, 15, 40, 80, and 160 metres, adding the proper points each time. However, once you have counted the G8 prefix on one band, you cannot count it again.

IV. Serial Numbers: The Contest exchange shall consist of the usual R- and S-report, followed by a three-digit serial number of the contact. For example, the first contact might be 59001; the 89th contact would be 59089, etc.

V. Points: 1. For stations outside the USA:

a. Contacts with stations in different countries but on your own continent will count 1 point each on 10, 15, and 20 metres; 4 points each on 40 and 80 metres.

b. Contacts with stations in different countries on different continents will count 3 points each on 10, 15, and 20 metres; 6 points each on 40 and 80 metres.

c. Contacts between stations in the same country will be permitted for the purpose of gaining a prefix multiplier but no points can be credited. (In other words, U.S.A. stations, for example, cannot count other W/K/WA/WB stations for points but they may work these other stations for the different prefixes in use in that country. For purposes of this Contest, Alaska, KL7, and Hawaii, KH6, count as separate countries; Alaska is on the North American Continent and Hawaii is in Oceania.)

VI. Scoring: 1. The score of each single band will be the sum of the different prefixes worked multiplied by the total contact points for that band.

2. The total all band score will be the sum of the different prefixes worke on all bands multiplied by the sum of the contact points on all bands.

3. Those sending in logs for a single band will be eligible for a single band award only. If a log is sent in for more than one band, indicate which band is to be judged, otherwise it will be judged as an all band entry.

4. A station will not be eligible for more than one award.

VII. Awards: Certificates will be awarded as follows:

1. To the highest scoring station on each single band in the following areas:
   (a) Each call area of the United States, Canada, and Australia.
   (b) All other countries.
2. To the highest scoring station operating on more than one band in the following areas:
   (a) Each call area of the United States, Canada, and Australia.
   (b) All other countries.

VIII. Special Awards: In addition, the following special awards will be made:

1. A cup will be awarded to the highest scoring station, using more than one band, in the world. (*The K2HEA-K2MGE Trophy.*)
2. A cup will be awarded to the highest scoring multi-band station in the U.S.A. (*The W2SKE Trophy.*)
3. A cup will be awarded to the highest scoring station using single band outside of the U.S.A. (*The W1ONK Trophy.*)
4. A cup will be awarded to the highest scoring U.S.A. multi-band station using under 175 watts p.e.p. (*The W8YIN Memorial Trophy.*)
5. A cup will be awarded to the highest scoring non-U.S.A. multi-band station using under 175 watts p.e.p. (*The W0NFA Trophy.*)

IX. Disqualification: Violation of the rules and regulations pertaining to amateur radio in the country of the contestants or the rules of this Contest will be deemed sufficient cause for disqualification.

X. Log Instructions: 1. In keeping a log, indicate a prefix only the *first* time it is contacted.

2. Use a separate sheet for each band and a tally sheet or report form.
3. All times indicated must be in GMT.
4. All contestants are expected to compute their own scores. Logs should be checked for contact and prefix duplication and proper point credit before they are submitted.
5. Make sure name and address are clearly noted on each log. PRINT or TYPE!
6. Log sheets, report forms and prefix check lists are available from G2BVN, 51 Pettits Lane, Romford, Essex, by sending a large size s.a.s.e.

XI. Rules Changes: 1. Separate point scoring for U.S.A. and overseas stations (Sec. V).

2. Awards to single and multi-band operators (Sec. VII).
3. Mandatory prefix check lists (Sec. X).

XII. Deadline: All logs must be returned *directly* to the CQ Sideband Editors, 12 Elm Street, Lynbrook, New York, to be received no later than June 15, 1963.

The Month on the Air (Continued from page 420)

In connection with International Reply Coupons users should note that these are not exchangeable in the country of origin. In the world wide traffic in these coupons they may easily find their way back to the area in which they were purchased.

* * *

The assistance of numerous correspondents is gratefully acknowledged and also information from the *DX'Press* (PA0FX), the West Gulf DX Club *Bulletin* (K5ADQ), and *The DX'er* (K6CQM). Please send items for the **April** issue to R.S.G.B. Headquarters to arrive not later than **March 6.**

Single Sideband

By G. R. B. THORNLEY (G2DAF)*

SO far as the United Kingdom is concerned there is not as yet any source of supply of ready made and pre-aligned crystal filters. There is of course the alternative—the mechanical filter—currently available from Collins Radio Co. of England Ltd. However, mechanical filters are still relatively expensive and beyond the means of many amateurs. Additionally, many constructors of sideband equipment prefer to experiment with low cost surplus material so that if damage is sustained due to lack of experience, the monetary loss is not of great importance. Because of this the large majority of filters used in home-constructed transmitters and receivers are made up using standard readily obtainable i.f. transformers and surplus FT241 low frequency crystals, generally in the range 400 to 500 kc/s.

Considerations in regard to the selection of active crystals and the method of moving these crystals on to the required frequencies and the use of a BC221 frequency meter and a valve voltmeter, have been dealt with already in *Single Sideband*. This is the practical work necessary to build the filter. The final stage is the adjustment of the associated coupling transformer tuned circuits, so that the required unwanted sideband rejection and the required passband are actually obtained.

Filter Alignment with a Valve Voltmeter

The procedure will be more clearly understood by taking a concrete example. Accordingly it will be assumed that the equipment is a G2DAF transmitter with an asymmetrical filter using two half lattice sections with two shunt crystals.

Switch on the transmitter, the valve voltmeter and the BC221 and allow to warm up and stabilize for at least 30 minutes. Remove the carrier and the two shunt crystals from their holders. Connect the diode probe to the anode of the filter amplifier valve and switch the V.V. to the 10 volt range. All the tuned circuits will be considerably off resonance and it will be quite impossible to get any signal through the filter from the balanced modulator end—it is necessary to line up the circuits in stages, starting from the filter amplifier side. A screened lead is connected directly to the BC221 output terminal and the case, and the other end clipped on to the transmitter chassis and the grid pin of the filter amplifier valve. The BC221 output is set exactly to the centre passband frequency (i.e. exactly halfway between the two crystal frequencies). Peak the anode i.f.t. for maximum deflection—move the " hot " lead from the grid pin to the junction of the first pair of half lattice crystals and peak the tuned circuits between this point and the filter amplifier valve. Move the " hot " lead to the live pin of the carrier crystal holder and fully unbalance the modulator by turning the potentiometer right round to one end of the slider travel. Peak the remaining i.f.t. circuits for maximum V.V. deflection. Now go over all circuits again and make certain that they are all tuning correctly and are accurately set to the maximum resonance point. Should the V.V. have reached full scale deflection before this stage is reached, reduce the output to the transmitter by placing a Philips 3-30 pF trimmer between the BC221 terminal and the output lead, reducing the trimmer capacity as required.

Using the method described last month plot the filter response curve. The curve should be symmetrical with the two " shoulders " of equal height. If they are not, this indicates that the crystals have not been selected very well and have differing *Q* values. Resist the temptation to pull the response curve to the right shape by " fiddling " the tuned circuits and try interchanging the four crystals. Remember that a filter does not have a " high frequency side " and a " low frequency side," and provided that there is always a h.f. and an l.f. crystal in each half lattice leg, it is immaterial which is which. With four crystals in the filter there are 16 possible combinations as shown in Fig. 1. One of the combinations should produce a reasonably level shoulder response.

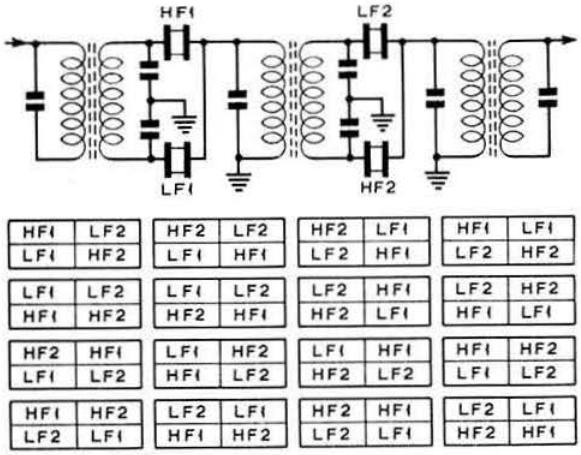


Fig. 1. Circuit diagram of a two half-lattice section crystal filter. Each half-lattice section has a crystal above the centre passband frequency and one below the centre passband frequency. In the first section these are marked " HF1 " and " LF1 ". In the second section " LF2 " and " HF2 ". The first block shows the crystals as they are positioned in the theoretical circuit. The remaining blocks show alternative crystal positions and in all cases it will be noted that there is a high frequency and a low frequency crystal in each half-lattice leg. With four crystals in the filter there are 16 alternative positions.

Having obtained a satisfactory curve, insert the two shunt crystals in their holders. Two of the tuned circuits will now have been pulled off frequency due to the additional shunt capacity—realign these for maximum V.V. deflection with the BC221 still on the original centre passband frequency.

That completes the filter alignment and if the shunt crystals have been correctly set in regard to frequency, the final filter response curve plot should show a steep slope on the shunt crystal (carrier) side, the required 2·7/3·0 kc/s bandwidth at the 6db points, and a complete absence of side lobes to a least 50db down.

The final requirement is to position the carrier crystal so that a modulating frequency of 300 cycles is in the filter passband at the 6db point on the response curve. To do this draw a line vertically downwards from the 6db point until it cuts the horizontal scale. Read off the dial reading and using the BC221 calibration graph convert this reading to kilocycles. The carrier is therefore this frequency plus 300 c/s, or this frequency minus 300 c/s, depending which sideband the filter is designed to pass. This is shown in Fig. 2. If the filter slope is steep—around 500 cycles in a drop of 40db—this will bring the carrier frequency about 30db down the response curve. If the filter is not so good—say 750 c/s in a drop of 40db—the carrier will be higher up the response curve, somewhere around the 20db position. Remember that shunt circuit capacity has no effect on the series resonant frequency of a crystal, but does have considerable effect on the parallel resonant frequency.

As the carrier crystal is oscillating on its parallel resonance in a Colpitts circuit with at least 30 pF shunt capacity it is most important that when edge grinding to get it on to the

* *5 Janice Drive, Fulwood, Preston, Lancashire.*

required frequency it is measured *in situ*, using the BC221 with a pick-up lead placed against the oscillator valve or tucked into the crystal holder wiring, and a pair of headphones and setting the dial for zero beat in the usual heterodyne measurement manner.

Receiver Filters

A receiver filter is usually constructed to have a symmetrical response curve to enable high or low sideband reception as required, using switched carrier crystals. Normally three half lattice sections are necessary to give adequate suppression. A three section filter using FT241 crystals should give a slope of about 1000 c/s in a drop of 54db (6 to 60db points). Alignment consists of peaking all associated tuned circuits for maximum response at the centre passband frequency (i.e. halfway between the two half lattice crystal frequencies). If the response is not symmetrical, try interchanging the crystals. If the filter slope is not too good—more than 1·5 kc/s in a 54db drop—it is possible to steepen the skirts by putting a small amount (not more than 1 pF) of capacity across the highest frequency crystal in each half lattice section. It must, however, be clearly understood that this expedient produces side lobes and that these lobes may only be 40 or 45db down—maybe not that! It is then possible to finish up with a steeper skirt response—but with a poorer unwanted sideband suppression. Because of this the writer's advice is as follows: *Do not use any form of " neutralizing " capacity across filter crystals as a means of manipulating the filter response characteristics.* Capacity should be used only as a means of balancing each half lattice section to prevent r.f. leakage across the sections as described in the December 1962 issue of the BULLETIN. The filter response is directly dependent on the *Q* of the crystals used. If yours is not giving the expected results and you have completed the alignment correctly, your batch of crystals is evidently poor. The sensible procedure is not to waste time fiddling around, but to replace the crystals with something better.

Filter Alignment with a Ganging Oscillator

It will have been noted that throughout the alignment procedure that has just been given, there has been no mention of any possibility of manipulation of the passband characteristics by means of the associated resonant circuits. In fact the instruction given has been quite specific and that is to peak all circuits to the centre passband frequency—and leave it at that! This is neither an omission nor the result of some mental aberration. There are six associated tuned circuits in a simple two section transmitter filter and eight in a three section receiver filter. To attempt to manipulate these, one by one, each time making a laborious plot of the response curve from the V.V. readings, is a time consuming and virtually impossible undertaking.

Think, though, how different this would be if it was possible actually to see the response curve traced out on the face of an oscilloscope and at a speed equivalent to 25 complete plots every second. It would be possible to adjust the slug of one of the tuned circuits while visually observing the exact effect on the passband shape—in fact the input and output circuits of each half lattice section could be adjusted simultaneously—and the whole filter could be completely aligned in less than five minutes. As many sideband workers already know, this is no mere flight of fancy, but is a procedure that is possible for any experimenter who has available an oscilloscope with a linear time base that can be set to some speed between about 10 and 30 times per second, and in addition a frequency modulated ganging oscillator.

The equipment at G2DAF comprises a home-built oscilloscope using a 5 in. diameter tube and a Cossor Model 3343 Ganging Oscillator. This instrument was produced in the 1930s for service engineer and manufacturer's use as a means of speedy and visual alignment of domestic superheterodyne receivers. It has been available on the surplus market for a number of years and may be purchased from dealers advertising in current radio periodicals for about £10. It is also possible for the home constructor to make his own ganging oscillator and a suitable circuit and constructional details are given in the *CQ* publication *Single Sideband Techniques* by J. N. Brown (W3SHY) under the title " The Ferri-Sweeper."

Briefly a ganging oscillator is a signal generator whose output can be frequency modulated so that the frequency is made to vary or " wobble " at a given rate over a band of frequencies on each side of its mean frequency while its amplitude is kept constant. The frequency modulation is controlled by a voltage obtained from the sawtooth output of the oscilloscope time base. (On most oscilloscopes this is brought out to a terminal on the front panel marked " X " or " X1.") Therefore the electron beam moves across the tube face at the same speed and in step with the frequency modulation of the oscillator.

The filter to be tested or aligned is connected between the output of the ganging oscillator and the input of the oscilloscope *Y* amplifier. At any moment of time the oscilloscope vertical deflection will be directly proportional to the amplitude of the r.f. passing through the filter. As the oscillator frequency and the oscilloscope beam are moving in step with the *X* deflection, the oscilloscope will trace out a

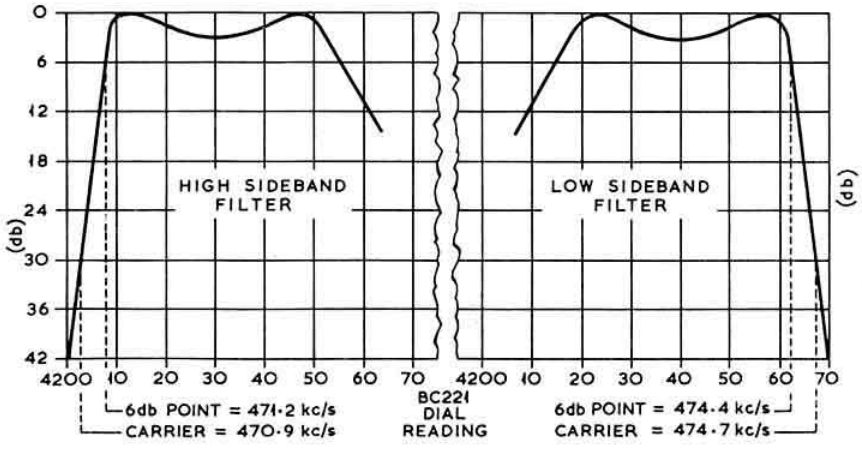
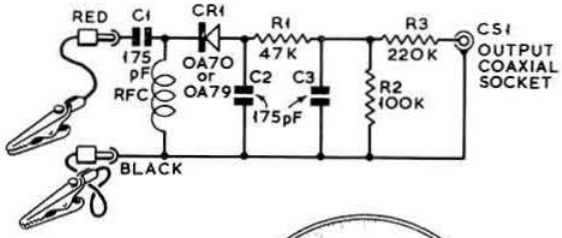


Fig. 2. The correct method of carrier positioning with single sideband filters. The lowest modulating frequency is 300 c/s and this should be at the 6db point on the filter response curve. The required carrier frequency is therefore the 6db point frequency plus or minus 300 c/s as shown.



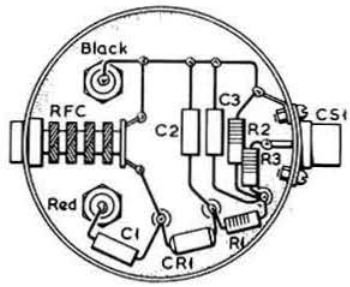


Fig. 3. Envelope demodulator for use with a frequency modulated oscillator and an oscilloscope. The input " fly " leads shown are about 6 in. long and terminated with wander plugs and crocodile clips—this enables the unit to be clipped to any part of the transmitter or receiver as required. The components can be built into a 1 oz. tobacco tin as indicated in the layout diagram on the right.

band of light that is an exact representation of the filter passband. The 'scope beam is of course following the output voltage from the filter at radio frequency and the trace will appear as a complete band of light with a mirror image of the passband below the " zero line "—in fact it will look very like the picture of a section of a modulation envelope. It is much more convenient in practice to get rid of the r.f. and feed only the " modulating " frequency to the *Y* amplifier. This will then give a line trace—exactly like a plot on graph paper—with the " zero line " at the bottom of the response curve.

The process is exactly the same as the a.m. " detector " in a receiver—a diode rectifier and a slow time constant output that will not follow the r.f. excursion but will follow the " modulating " frequency. Fig. 3 shows the circuit of the unit used at G2DAF and this is built into a circular 1 oz. tobacco tin with co-axial cable feeding into the *Y* amplifier input socket. An oscilloscope cannot differentiate between " up " and " down " or between the positive or negative halves of a sine wave—it is therefore possible for the response curve on the scope to appear inverted. If this happens it is only necessary to reverse the diode connections in the " detector " unit.

With regard to oscilloscope sweep speed, it is generally stated that a long persistance c.r.t. and a slow time base of not more than five sweeps per second is essential. In the writer's experience this is not so. A standard tube with the normal green or blue phosphor and any time base speed between 10 and 30 c/s is quite satisfactory. In practice the lower limit is set by the amount of flicker the eye will tolerate and the upper limit by " ringing " and distortion of the filter response. A sweep speed of 25 times per second appears to be an excellent compromise with the least flicker and a complete absence of ringing and is the speed normally used by the writer.

The second point of importance is the requirement in regard to *Y* amplifier bandwidth and many amateurs ask, " Is my oscilloscope amplifier good enough for this work? " With a few scratch pad calculations it is a simple matter to answer this question and the fastest rise time ever likely to be encountered is well within the capabilities of the normal serviceman's oscilloscope. The Cossor Type 339 or 3339 Oscilloscope is available on the surplus market and is very suitable for any filter alignment work an amateur is likely to undertake. Any other scope with a *Y* amplifier response up to about 100 kc/s is quite satisfactory.

All the published articles the writer has seen dealing with frequency modulated oscillator and oscilloscope alignment of bandpass crystal filters state that only the top of the response curve is visible and that it is not possible to see below the 20db point. This statement is in fact incorrect and the plot seen on the tube face is the filter response right down to the base line—in fact exactly the same as a static plot taken with a BC221 and an output meter. However, it is most important to realize, (i) that the normal method of plotting on graph paper, and illustrating filter response curves in print, is to a decibel (that is a logarithmic) vertical scale; (ii) the oscilloscope *Y* amplifiers are linear, therefore the vertical 'scope trace is directly proportional to amplitude—the visual filter response is then to a linear vertical scale. The effect this can have on a response curve is shown clearly by the two examples shown in Fig. 4. If you already have some filter response curves you have plotted in the usual way against an equal db scale, try re-plotting these with the vertical axis scaled in linear voltage increments. Once you have familiarized yourself with the new shape, you will know what to expect when you use the oscilloscope. The thickness of the beam on most oscilloscopes makes a display 40db down the practical limit of resolution. However, this is adequate for amateur use.

After alignment with the ganging oscillator the final filter response down to 60db can be measured with a BC221 and valve voltmeter in the usual way.

Converting radio frequency to light opens up completely new horizons for the keen experimenter. For instance it is

(Continued on page 430)

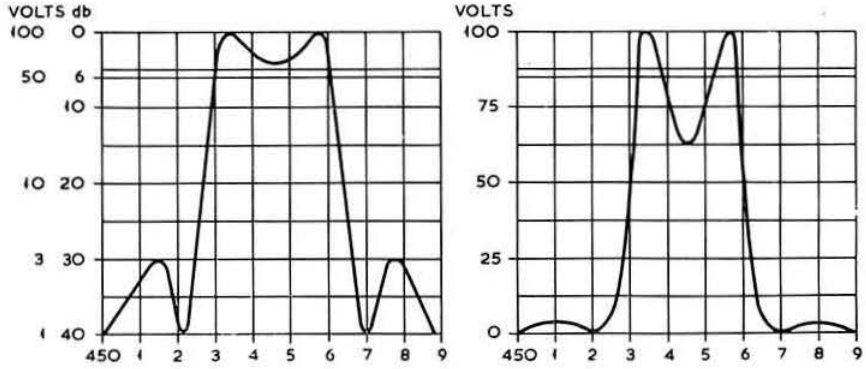
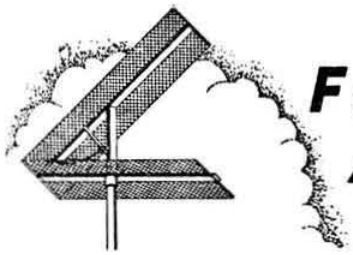
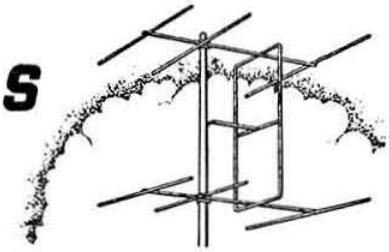


Fig. 4. Filter response characteristics, showing how two plots of the same filter can have differing shapes. The left-hand graph shows the curve of a single section filter plotted in the usual manner against a decibel scale. On the right, the same filter response is plotted against a linear voltage scale. The oscilloscope deflection is in linear relationship to the voltage input, therefore the 'scope trace will appear as in the righthand diagram. It will be noted that the dip in the passband centre appears much deepsr, and the side lobes appear much smaller, than they really are. With a 5 in. diameter tube the total display depth could be 10 cm; the 40 db point would be one hundreth of this or 1 mm—about the thickness of the beam on most oscilloscopes.



FOUR METRES AND DOWN



By F. G. LAMBETH (G2AIW)*

IT is a great pleasure in these wintry days to hear of a burst of activity apart from openings, and accordingly the news of G3LTF's QSO by meteor scatter with OH1NL (Quadrantids, January 2) is very welcome. The distance is about 1,080 miles, and as in the case of the G3CCH/OH1NL QSO, it took place when the shower had officially set. It started at 18.15 and finished at 22.40 G.M.T. Reports were S2/3 each way, but later bursts from OH1NL were strong and some were remarkably free from flutter.

OH1NL used 800 watts input (his signals peaked S6/7) and a *52* element long Yagi. G3LTF used 250 watts input and a 12 element Yagi at 50 ft. Congratulations to both! Whilst on this subject we have a letter from PA0QC, who reports that PA0OKH finally succeeded in working OH1NL during the Geminids in December. This was a first, and at the same time a Dutch DX record for 144 Mc/s, the distance being approximately 970 miles. A Geminids sked between PA0OKH and UR2BU was partly successful. PA0OKH received the report and UR2BU received both calls, but no complete QSO was made. Better luck next time!

Wrotham Beacon Station GB3VHF

The V.H.F. Committee, who are responsible for the running of the beacon station GB3VHF, are anxious to clear up any misunderstanding which may have arisen from the recent variation in signal level which has been apparent to members.

In October of last year, as stated in the November, 1962 issue of the BULLETIN, advantage was taken of the temporary removal of main power by the B.B.C., to remove the beacon transmitter from service for a complete overhaul. This move was prompted by a gradual reduction of the output power over a considerable period. As a result of this overhaul, carried out under laboratory conditions, a few components and some valves were replaced, and an exhaustive soak test on dummy load proved the transmitter to be satisfactory.

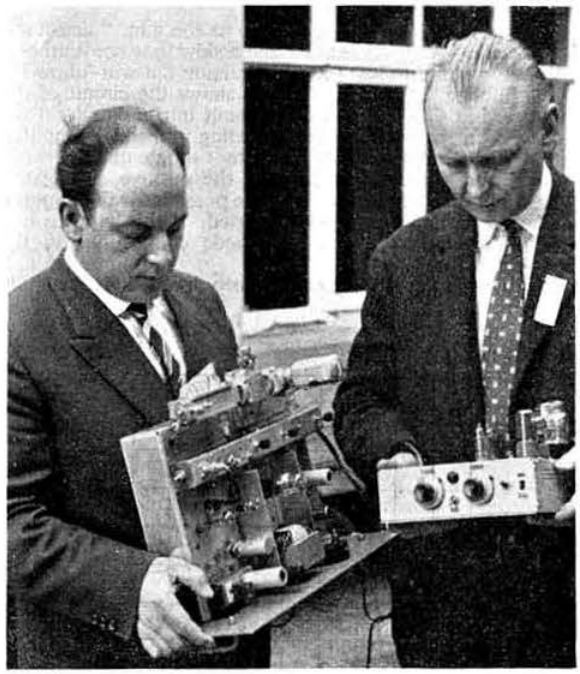
The transmitter was reinstalled at Wrotham and the beacon transmissions recommenced on October 21, 1962. Almost immediately the southern part of the country was subjected to severe winds, and it became immediately apparent that a fault had developed in the aerial and feeder system. In view of the intermittent nature of the fault, it was decided to leave the beacon in service pending the making of necessary arrangements to inspect and repair the aerial system. However, in the first week of January the fault became permanent, and as a result of this, the transmitter was closed down to prevent further damage. Arrangements are in hand to effect the necessary repairs, but are being severely delayed by the adverse weather conditions.

On January 19, 1963, at 08.00 G.M.T., a temporary beacon station at Shooters Hill, South London, was brought into service under the call-sign GB3VHF using a transmitter generously loaned to the R.S.G.B. by the Pye Telecommunications Radio Group (G3PYE). The aerial is similar to that used at Wrotham (a five element Yagi) and the directivity is the same. The identification signal is also similar to that used at Wrotham but without the minute marker, i.e. the transmission comprises an unmodulated carrier for four minutes followed by the call-sign GB3VHF sent once in Morse code.

The alternative arrangements have been made because the severe weather conditions prevent the mast at Wrotham being climbed to make the repairs to the aerial system.

Reports on signals from the transmitter at Shooters Hill, particularly those comparing signal strengths with those from Wrotham, will be appreciated and should be sent to Headquarters for the attention of the V.H.F. Committee.

Throughout the period involved, announcements have been made, through the medium of the Society's News Bulletin Service, GB2RS, regarding the operation and closure of the beacon, and statements have been published in this column. Members are assured that everything possible is being done to restore the service on a sound footing as soon as possible.



DL9GU (left) and HB9RG examining the parametric amplifier and converter to be used by the combined Swiss-German EME group.

* *R.S.G.B. V.H.F. Manager, 21 Bridge Way, Whitton, Twickenham, Middlesex. Please send reports for the* April *issue to arrive by* March 6.

Finnish Beacon Station

The Finnish beacon station, OH3VHF on 144·909 Mc/s is located at Ylojarvi, near Tampere, Finland, and is now in operation. The transmitter is a 10 watt TW Electronics rig followed by a QQE06/40 in the p.a. Input power at present is 45 watts but this will soon be increased to 90 watts. The aerial comprises six 4-over-4 J-Beam arrays which are selected by a co-axial switch. The aerials are on a TV tower 200 ft. above ground, the total height above sea level being 650 ft. The station is active daily from 06.00 to 24.00 G.M.T. Reports to S.R.A.L. will be QSLd.

Contests in March

The Contests Committee draws attention to the 144 Mc/s Open and V.H.F. Listeners' Contests, which will be held on March 2-3 1963. Please do the best you can to produce a bumper entry. This contest will coincide with I.A.R.U. sub-regional contests held in many Continental countries, so that given a little luck with conditions, there should be a large number of stations on.

The rules for the R.S.G.B. contests were published on page 374 of the January BULLETIN. Log sheets are available from Headquarters on request.

The PZK Trophy

The promised PZK V.H.F. Trophy which is a silver cup, has been received by DL3FM. This will be one of the prizes in the September I.A.R.U. V.H.F. Contest.

Yugoslav Contest

The Students' Radio Club of Belgrade (SRKB) hold an annual contest during the first week-end of April. This year the date is April 6-7. Operation will be on both 2m and 70cm.

Cyprus Activity

The 144 Mc/s band continues to be popular in Cyprus, especially in view of its usefulness for inter-island working and for QSOs to Lebanon, Israel and elsewhere, as opposed to 7 Mc/s " with all the QRM on it." We shall be glad to hear of any new QSOs which we are confident will be worked sooner or later with so much enthusiasm as is evidenced by a report from Mr. G. Bateman.

Parametric Amplifier

There is more news about G3CCA's parametric amplifier. A cavity has been constructed for 2m signals and a wave guide used for the pump oscillator. The Ferranti ZC20C crystal is placed between the two cavities and the pump oscillator consists of an overtone crystal shunted with a capacity diode which pulls the crystal frequency about 80 kc/s The crystal is ground for 40 Mc/s and is trebled to 120 Mc/s then by four to 480 Mc/s and then to 960 Mc/s. This means that the pump frequency can be varied over a 2 Mc/s range once the optimum has been found. Using the equipment, G3CCA has worked into Kent, Surrey, Dorset, Somerset and Gloucester at times when most stations have complained of lack of activity. Reports of 58 and 59 were possibly regarded with suspicion until the equipment was described and then QSOs became lengthy due to the interest shown in the parametric amplifier. On the evening of January 6 London area stations were heard working each other and complaining about conditions – they were being received at Oadby at a good S7/8, the best being G3EVV (Gravesend) who was heard at S9+. On January 7 G3ZW (Gillingham) was worked without any difficulty.

An article describing the construction of G3CCA's parametric amplifier is being prepared.

A 70cm rig is in course of construction using a cavity tuned 4X150A and a parametric amplifier as the r.f. section of the converter, the oscillator stage of which is a tunnel diode.

The A.2521 as a Multiplier and Power Amplifier

The A.2521 grounded grid triode is well known as a low noise amplifier for 2m and 70cm converters, but it may not be realized that it is also a very useful multiplier and power amplifier up to at least 900 Mc/s.

Above 500 Mc/s it is necessary to employ trough line tuned circuits, but at 420 Mc/s and below, lumped elements can be used. Care should be taken to ensure that the grid dissipation is not exceeded and that the d.c. grid current is limited to a maximum of 5 mA. A well fitting screen across the valve holder should be carefully bonded to the chassis and the grid pins on the base. This is important in both multiplier and amplifier applications to prevent instability.

A typical example, using two A.2521 valves, is shown in Fig. 1, the first as a trebler from 145 to 435 Mc/s, and the second as a power amplifier. For an input of approximately 300 mW at 145 Mc/s, this arrangement will give an output of 2·5 watts at 435 Mc/s. Fig. 2 shows the appearance of the unit, the chassis of which measures 4 in. long × 2 in. wide × 1½ in. deep.

The 145 Mc/s input is tapped approximately half a turn from the earthy end of L1, C1 being used purely as a d.c. blocking capacitor. The anode tuned circuits for trebler and amplifier are similar, and consist of a piece of ⅛ in. diameter copper rod bent into a loop of ¾ in. internal diameter. One end is soldered directly to the anode pin, and the other to a flat piece of copper sheet measuring 1 in. × ¾ in., which is fixed to the underside of the chassis by nylon screws with a small piece of mica, 1 to 2 thou. thick, placed between them. One of the nylon screws in a P.T.F.E. bush is replaced by a brass screw, to facilitate the external connection of h.t. to the anodes. A miniature variable capacitor is connected from anode to chassis to tune the circuit.

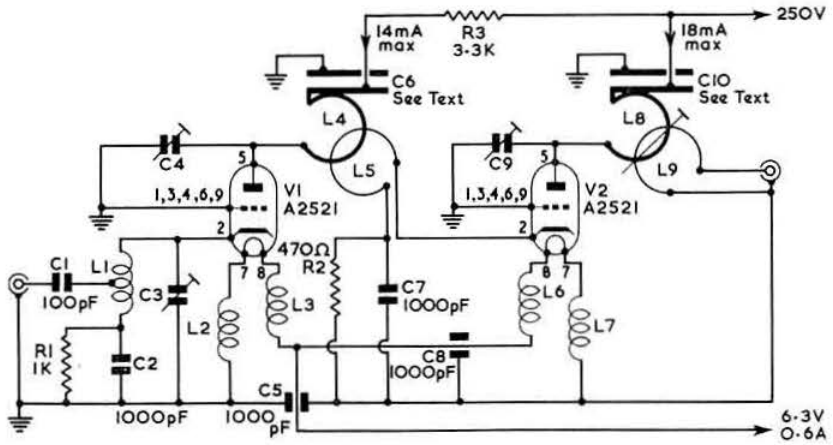


Fig. 1. Circuit diagram of the A.2521 multiplier and p.a. The unit requires 300 mW input at 145 Mc/s for 2·5 watts output on 432 Mc/s.

C1, 100 pF ceramic; C2, C7, 1,000 pF disc ceramic; C3, C4, C9, Polar type C.32-01 10/0.0075 in.; C5, C8, 1,000 pF feedthrough; C6, C10, see text; L1, 2 turns 18 s.w.g. ¼ in. i.d.; L2, L3, L6, L7, r.f. chokes (20 turns 26 s.w.g. enam. wire wound on 100 K ohm Erie resistor type 9); L4, L8, see text; L5, single turn 18 s.w.g. enam. wire ⅜ in. i.d.; L9, single turn 14 s.w.g. enam. wire ¾ in. i.d.; R1, 1·2 K ohms 10 per cent Erie type 9; R2, 500 ohms 10 per cent Erie type 9; R3, 3·3 K ohms 10 per cent Erie type 8 (may be increased to 8·2 K ohms for longer valve life).

In operation, the drive is increased until the A.2521 amplifier draws 18 mA. With correct adjustment of the coupling coil between trebler and amplifier, the trebler anode current should be 12 to 14 mA, the latter figure being a maximum. The output coupling should be adjusted to give maximum output of some 2·5 watts.

These notes and the accompanying illustrations were provided by G6JP.

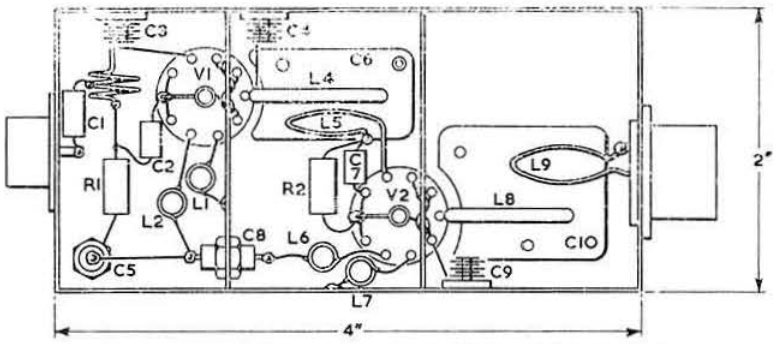


Fig. 2. Layout of the components in the A.2521 multiplier/p.a. unit.

Seventy Centimetres

During the opening of December 4, 1962, LA9T made the first LA/PA contact with PA0LWJ at RST579 each way. After this G3LQR was heard and worked (579 both ways). G3LTF was also worked at 569 both ways. LA4YG, who sends this report, says that LA stations are always looking for Gs on 144 and 432 Mc/s when the conditions appear favourable.

GM3ENJ (Dunfermline) writes, "The terrible three, of whom I am the quiescent member, GM3FYB, GM3EGW and GM3ENJ, continue to battle it out in the v.h.f. spectrum with Harry (GM3FYB) doing great things on 70cm, having collected the first GM/G and the first GM/EI."

As from January 2, 1963, the F.C.C. has granted **American** amateurs permission to use a kilowatt input on the 430 Mc/s band, save for certain areas where 50 watts remains the maximum power.

The Band Plan

We make no apology for including the Band Plan Map this month. There has been a great deal of out-of-zone operation lately, especially during the openings, which is to be greatly deplored. The correct thing for all operators to do is to *tune the whole band please*, not slip out of the correct zone! Will Continental operators who may see this please also tune the whole band, and tell their friends to do likewise?

Two Metre News and Views

We learn that **SP3GZ** was in evidence during the December, 1962 opening and was worked by **G3FCY** (Hull, who reports) and several other northern G stations. G3FCY worked seven countries during the opening

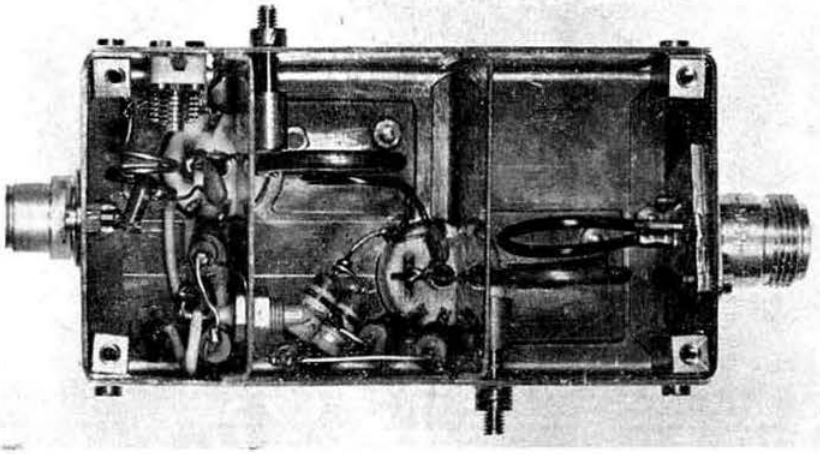
G3FAN (Ryde, I.o.W.) reports on a contact with G3OSS on December 4, 1962, and says that Angus called on the "matchbox" using an input of 18 milliwatts to a pair of AF102s —it is true that conditions were above average, but nevertheless it proves the rig works! The phone report was RS43.

During a QSO with **OZ5AB** on December 3, 1962, **G3JLA** (Stevenage) was told that Danish amateurs will be out portable during all the 144 Mc/s portable contests this year. Incidentally, G3JLA's country score was thus brought up to 11.

Apropos G3EMU's letter in the November BULLETIN it should be stated that QRA Locator Maps, by arrangement, are published by the countries concerned but a composite map of Western Europe has been produced in Belgium and can be obtained from Emil Tielemans (ON4TQ), V.H.F. Manager, U.B.A., Grote Goddaert 12, Antwerp, for Belgian Frs. 31 to cover cost and postage.

B.R.S.20732 (Bollington, Macclesfield) was delighted with listening results during the December opening, especially as, although in a fairly high position, he is tucked away at the foot of the Pennines, being closed in normally to all except the North West. On this occasion, however, a GC was S9+ with similar strengths from Penzance, along the Bristol Channel, Somerset and mid-Wales. The usual north-west stations were very strong, even off the side of the beam. Two Danish stations were also heard. Altogether a very heartening experience.

LA4YG reports that during the December 3 opening the following Gs were worked by LAs: G2JF, G3IAS, G3BLP, G3HQ, G3EVV and G5OX (all by LA9T); LA8MC worked G5MA, G3OHD, G2JF, G3OGX, G3GHI and G3KKK. A few PAs, OZ and DL were also worked.



An under-chassis view of the A.2521 multiplier/p.a. unit.

G3LTF (Galleywood) has now transistorized the local oscillator for his 2m and 70cm receivers and also the oscillator for his meteor scatter transmitter on 144·975 Mc/s. This has appreciably improved the stability of the system, and eliminated the warming-up time. G3LTF is using s.s.b. on 2m, with a phasing exciter giving 9 Mc/s output driving two 5763s as a high level mixer, followed by a QQV03/10 buffer amplifier and a 4X250B in the p.a.

G3GVV (Haywards Heath) has found things rather dull lately with QSOs limited to the Home Counties except for one with G3JNQ (Hungerford). F2XO was heard and called, but not worked. The score since late September is 17

BRITISH ISLES 2 METRE AND 70 CM BAND PLANS

Two Metre Guard Channels

The following frequencies in the 144-145 Mc/s portion should be avoided as they are allocated to Service use: 144·0, 144·09, 144·18, 144·27, 144·36, 144·45, 144·54, 144·63, 144·72, 144·81 and 144·9 Mc/s.

Zone	2 metres	70 cm.	Area
1	144·0-144·1	432·0-432·1	Cornwall, Devon, Somerset.
2	144·1-144·25	432·1-432·25	Berkshire, Dorset, Hampshire, Wiltshire, Channel Isles.
3	144·25-144·5	432·25-432·5	Brecon, Cardiganshire, Carmarthenshire, Glamorganshire, Gloucestershire, Herefordshire, Monmouthshire, Pembrokeshire, Radnorshire, Worcestershire.
4	144·5-144·7	432·5-432·7	Kent, Surrey, Sussex.
5	144·7-145·1	432·7-433·1	Bedfordshire, Buckinghamshire, Essex, Hertfordshire, London, Middlesex.
6	145·1-145·3	433·1-433·3	Cambridgeshire, Huntingdonshire, Leicestershire, Norfolk, Northamptonshire, Oxfordshire, Rutland, Suffolk, Warwickshire.
7	145·3-145·5	433·3-433·5	Anglesey, Caernarvonshire, Cheshire, Denbighshire, Flintshire, Merionethshire, Montgomeryshire, Shropshire, Staffordshire.
8	145·5-145·8	433·5-433·8	Derbyshire, Lancashire, Lincolnshire, Nottinghamshire, Yorkshire.
9	145·8-146	433·8-434	All Scotland, Northern Ireland, Isle of Man, Cumberland, Co. Durham, Northumberland, Westmorland.

V.H.F./U.H.F. BEACON STATIONS

Call-sign	Location	Nominal Frequency	Emission	Aerial Direction
GB3CTC	Redruth, Cornwall	144.10 Mc/s	A1	North East
GB3VHF	Wrotham, Kent	144.50 Mc/s	A1	North West
GB3GEC	Hammersmith, London	431.5 Mc/s	A1	East

R.S.G.B. V.H.F. BEACON STATION GB3VHF

The frequency of the Society's v.h.f. beacon transmitter at Wrotham Hill, Kent, when measured by the B.B.C. Frequency Checking Station, was as follows (nominal frequency 144.50 Mc/s).

Date	Time	Error
January 1, 1963	11.56 G.M.T.	1970 c/s high

(Station temporarily closed down on January 5, 1963).

counties. G3GVV notes with some concern the growing practice of running unmodulated carriers on 2m. On one recent evening there were three. Operators should really not have to be reminded of the requirements to identify themselves.

G3OCB (near Truro) says conditions have been generally poor and has been doing some rebuilding. However, several locals have been on from time to time including G3OJY, G5ZT, G3EKM (Truro), G2DOT, G3LMG and G3XC from the new QTH. The aerial at the Cornish beacon station, **GB3CTC**, has been repaired and operation is back to normal.

GI3OFT (Belfast) says that the big news is of the first GI/OZ QSO during the opening of December 2-4 (subject to counter claims). OZ5CE was worked by GI3OFT on the 3rd, and this was followed by a partial QSO with OZ5AB (860 miles) at RS58 at 870 miles. OZ5AB was a consistently strong signal from 19.00 G.M.T. until after midnight. However, one great complaint was that few of the European stations heard and called were tuning above 145·5 Mc/s. In the list were SM7LF and DL1FF. At the same time G3KEQ, G3FZL and G5MA were S5 and S7/9 off the side of GI3OFT's beam when working Europeans—which gives some idea of the strength of the opening! GI3RNO and GI3RMD both recently licensed and in Co. Antrim, are proving just how popular that county is with the " hunters." Both are using 100 watts input, slot beams and Nuvistor converters.

Twenty-three Centimetres

G3LTF is building 1296 Mc/s equipment. The converter is a crystal mixer trough design with a hi-*Q* break and an oscillator chain ending in a DET22 with no cavities. It seems to work—signals were heard from the east during the opening using a 4 ft. dish at about 8 ft. The transmitter is low-powered, about 1 watt from a DET22 tripler in a co-axial cavity. When the better weather arrives a dish of some sort will be fixed on the mast and tests will be made. The present snag is transmission line losses, and G3LTF may use a surface wave transmission line or an open wire. Has anyone done any *practical* work on surface wave transmission lines for 1296 Mc/s. If so, G3LTF would be very grateful for their help.

First Senior " Four Metres and Down " Award

The first Senior " Four Metres and Down " certificate for 144 Mc/s work has been awarded to John Stace (G3CCH). This is a fitting tribute to his meteor scatter work.

B.B.C. Experimental Stereophonic Transmissions

UNTIL the end of March, the B.B.C. will carry out a second series of field trials of the Zenith-GE stereophonic system using the Wrotham Third Programme transmitter on its normal frequency of 91·3 Mc/s. There will be three regular morning transmissions of stereophonic programmes each week, at the following times: Sundays, 10.00 to 10.30; Wednesdays, 11.00 to 11.30; Saturdays, 11.00 to 11.30.

During the five minutes preceding each programme a tuning signal will be radiated, consisting of two tones of different pitch, the one of lower pitch being on the A (left-hand) channel. This signal will last for four minutes and will be followed by one minute with no modulation. At the beginning of each programme there will be a stereophonic announcement for setting-up purposes.

Later in the series there will be weekly radiations of test tone transmissions on Wednesdays in addition to the stereophonic programme material.

No decision has been made whether regular stereophonic broadcasting will be introduced in the future. Many problems have to be solved before such a decision can be taken and it is desirable that international agreement should be reached in Europe about the technical standards to be used. The results of experiments carried out in this country and in other European countries are being studied by the European Broadcasting Union.

QRA Locator Maps

COPIES of the British Isles QRA Locator Maps are now available from Headquarters, price 2/6 post paid.

Rules for the B.E.R.U. Contest Receiving Section, 1963

THE rules for the Receiving Section of the B.E.R.U. Contest 1963 are as follows:

1. **Eligible Entrants.** The contest is open to all fully paid-up members of the R.S.G.B. resident within the United Kingdom and to all British subjects outside the United Kingdom, but resident within the British Commonwealth and British Mandated Territories. All entrants agree to be bound by these rules. Only the entrant may operate his receiving station for the duration of the contest. Holders of amateur transmitting licences are **not** eligible to take part.

2. **Duration.** The contest will commence at 00.01 G.M.T. on Saturday, **February 16, 1963,** and end at 23.59 on Sunday, **February 17, 1963.** The B.E.R.U. Contest for transmitting amateurs will take place during the same period.

3. **Entries.** (*a*) To count for points, a station outside the entrant's own call area must be heard in a contest contact and the following details logged in columns headed as follows: (i) Date/Time (G.M.T.); (ii) Call-sign of Station Heard; (iii) Report and Serial Number sent by Station Heard; (iv) Call-sign of the Station being worked; (v) Band in Mc/s; (vi) Bonus Points Claimed; (vii) Points Claimed. CQ or Test calls will **not** count for points.

(*b*) Entries must be sent out on ONE SIDE ONLY of foolscap or quarto paper. Entries must be postmarked not later than **March 11, 1963,** and must be addressed to the Contests Committee, Radio Society of Great Britain, 28-30 Little Russell Street, London, W.C.1.

(*c*) All entries must contain the following declaration:

I declare that this receiving station was operated strictly in accordance with the rules and spirit of the contest and I agree that the decision of the Council of the R.S.G.B. shall be final in all cases of dispute. I do not hold an amateur transmitting licence.

Date..... Signed.....

4. **Scoring.** Each complete log entry will score 5 points. In addition, a bonus of 20 points may be claimed for the first station heard in each new Commonwealth call area (as defined in the Appendix on page 254 of the November, 1962, BULLETIN) on each band. The British Isles (G, GB, GC, GD, GI, GM and GW) count as one call area only as indicated in the Appendix to the rules of the Transmitting Section. A station may be logged only once on each band for the purpose of scoring. Where both stations in a contact are heard, they should be logged separately; points may be claimed for both entries.

5. **Awards.** At the discretion of the Council a trophy or miniature will be awarded to the winner and a certificate of merit to the runner-up in each of the I.A.R.U. continents.

Single Sideband (Continued from page 425)

possible to feed the ganging oscillator input into the carrier oscillator of the complete single sideband transmitter—connect the oscilloscope to the aerial terminal and inspect the resultant passband through the various frequency translation and amplifying processes—just as it is when you are " on the air." This is a most searching test of any transmitter. If your filter passband looks much the same when you look at it at the transmitter output terminal, you can sit back and congratulate yourself on a job well done!

F.J.L. goes S.S.B.

By LEO LABUTIN (UA3CR)

This is a first-hand story of a DXpedition beyond the Arctic Circle with an s.s.b. rig in March, 1962

IT was rumoured that I was going to Franz Joseph Land long before I finally made up my mind, arranged for my holiday and straightened out financial matters with the sponsor, the Central Radio Club. Although I did not spread it, I was responsible for the rumour because I let slip that I had such a wish. It seemed rather like a dream at the time, and to tell the truth, I strongly doubted the feasibility of an Arctic trip. But what made such a trip doubly alluring was that Franz Joseph Land, part of the Soviet Union, was a country for DXCC and had never been represented on sideband. The one amateur station there, UA1KED, was a rare catch at all times, and only on c.w. at that.

As time went on things took shape, and by early 1962 my prospective DXpedition looked like a certainty. I had a month's holiday coming in March and was planning to make F.J.L. in time for the *CQ* S.S.B. Contest. The Central Radio Club had promised material support, and as for the radio equipment, there was no problem there since I was taking a ready-made s.s.b. exciter. It was the same portable rig with three fixed frequencies on 20 which had travelled in 1961 all around the Soviet Union and provided many new countries on s.s.b. It only needed a thorough check-up and after that I was all set to start off. I thought it wouldn't be a bad idea to prepare myself for the trip physically and so did a lot of skiing in the woods near Moscow.

Since I was determined to be in F.J.L. at contest time, I allowed myself a wide margin, a week or so, against bad weather and made an air-line reservation for March 15. It was not to be a straight air route from Moscow to F.J.L.; the liner would only take me as far as Dickson Island and there I would have to wait for another airlift. On the eve of my departure I had a long-distance call from UC2AA, Ben, a top-notch sidebander in Minsk, Byelorussia. He was willing to sacrifice what was left of his holiday and join me on my Arctic DXpedition. He said he was starting out right away, even if he had to sell his shirt to raise the necessary funds!

The vagaries of weather shortened the time it ordinarily takes to reach Dickson. The plane could not land and stop for the night where we were scheduled to stop, and flew right on to our destination.

On Dickson

We landed at 1 a.m. local time (18.00 G.M.T.) and there was a bus waiting to take the passengers home or to the guesthouse, as the situation required. I was going to the home of UA0AZ, Val, at his invitation. A fellow-passenger said he knew Val and would take me. There was a snowbank on the road, which the bus could not clear, three or four hundred yards from Val's home, and we had to make it on foot. I offered to carry the luggage for my fellow-passenger who was wading through the snow out in front, and so, what with my equipment and other belongings, I had about 100 lb in each hand. Although it was 20° F. below zero, I was steaming by the time we reached Val's home.

Val—Valintine Ignatchenko—is the leading amateur operator on Dickson Island. The other amateurs there work the club rig—UA0KAR. Although it was getting on for 2 a.m., I found Val having his evening tea, and to my apology for the late hour he replied that he went by the Moscow time, and so it was 10 p.m. as far as he was concerned—not at all late. The building in which Val lived, a two-storey log structure, also houses UA0KAR which occupies a room 10 ft. square and Val suggested that I should have that room to myself. I accepted gladly, and was provided with a cot and bedding. I was pleased no end to find that besides electricity there was central heating and running water.

While in Franz Joseph Land, UA3CR (right) tried dog-sled transport.

Early next morning I began taking stock of the club's gear. There were two excellent communications receivers and a transmitter. But it turned out that somebody was working on the transmitter, and so it was temporarily inactive. It was a pity because I had planned to use it as the p.a. for my s.s.b. station. I mentioned this to UA0AZ later that day, but he said that I could use his transmitter any time.

The local radio club, I found, had a membership of 30 or so, and those who already could operate a station were for the most part c.w. men. I gave them a few talks on s.s.b. and made a present to the club, a set of crystals and a phase-shift network, for an exciter. I also showed them how s.s.b. worked in practice . . . and had a few surprises myself. For one thing, I hadn't suspected that UA0KAR on sideband would be so much in demand. Dickson is Zone 18, which at the time was represented by at least five other calls, UA0BP, UA9HG and UA0WC among them. But it seems they had not been active enough, because many of the chaps, especially in the Western hemisphere, ending our QSO thanked me for completing WAZ. I was also pleasantly surprised to find propagation on Dickson much better than it had been in Moscow. Coming in very loud were North America, Oceania, Australia, New Zealand and the Far East. Conditions for Europe were not so good, and as for Africa and South America, they came through only once a day for an hour or so, and the latter came in by the long path —from the East.

Stranded

If propagation was good the weather was just the opposite. A series of blizzards cut air communication with F.J.L. Half of my four-week holiday was almost up and the contest was approaching on wings. Shortly before it started, UC2AA (Ben) arrived, and we began making preparations for spending contest time on Dickson. Between the three of us—Ben, Val and myself—we worked my rig with Val's p.a., using two mikes and the call UA0KAR. As the published contest results indicate, we did quite well—UA0KAR was placed

first in U.S.S.R. with 991 points and 139 multiplier. All in all, during my Dickson stay, I made some 1,600 contacts with 80 countries using the club's call and several dozen as UA3CR/UA0. The contest came and went but I was still stranded on Dickson. However, there were signs that the weather was improving. I was hopeful because I still had plenty of time, but Ben's leave was dangerously drawing to an end, and so he had to pack up in a hurry. We left Dickson almost simultaneously, he flew South, I North.

F.J.L. at Long Last

Two hours before take-off I contacted VE7ZM, with whom I had regular skeds, and asked him to tell everybody that I was about to hop a plane to F.J.L. at last, that I would be in flight five hours, and that I would be on the band that very evening, March 28, 1962.

Val saw me off and insisted that I should take along his transmitter, just in case, and one of the receivers, as UA1KED (the only amateur station in F.L.J.) was not equipped for s.s.b. reception. Luckily, I was not to carry all that heavy gear alone. The chief-operator of UA1KED, Nick Tyurkin, had come to Dickson to fly with me to F.J.L. So between the two of us we managed all right.

At 11.00 G.M.T. we touched down at Nagurski harbour, so called after a pilot in the old Russian army, before 1917. Mr. Nagurski, a Pole by nationality, is still living and occasionally corresponds with the old-timers at Nagurski harbour.

I was impatient to get on the band, and around 14.00 G.M.T. tried to work my portable "barefoot." Just as I tuned in I was both distressed and delighted to hear some of the more imaginative amateurs already "exchanging" RS (3-3 or 4-4) with not-yet-existing UA3CR/UA1. These doubtful QSO's unnerved the more balanced OM's, and soon there was a pile-up over nothing. My attempt to work "barefoot" created a havoc on medium wave where professional communication was in progress, so I had to close down at once and continue to hook up the p.a. which gave a much better filtered output. Two hours later, fully armed, I pumped out a loud CQ. There were some UA2 boys on the frequency, and I made my first three contacts with them—AO, AW and BD, in that order. After that I had to break for supper. It wasn't because I was hungry, but I had to go then if I was to get any supper at all that evening. They had a very rigid schedule up there and if I was late I would, more likely than not, find the dining-room closed! I ate my supper in a hurry, and in 15 minutes was back on the air. My first contacts outside the Soviet Union were LZ1WD and G3AWZ. Then North America began pouring in. During the first 20 minutes I made 20 contacts, and my QSO total that evening was 170.

UA3CR/UA1 logging his 100th country.

Excitement was high and kept growing the next day, reaching contest pitch. I was scoring 70-80 QSO's per hour, and my total for that day sky-rocketed to 500. My operating was greatly helped by such vigilant DX-ers as VE7ZM, W1LLF, W1YDO and W3AYD who kept the frequency clear, shooing off all unwelcome intruders. Working North American stations, I did my listening 5-10 kc/s below or above my transmitting frequency, and after each QSO announced the frequency where I was going to look for my next contact. Still, I had a hard time keeping those pile-ups down. I could usually distinguish three levels of calling stations: the upper crust came in at nine plus; beneath it were S6-7 stations, and deeper underneath were S3-4's. The latter were more numerous than the rest and merged in a continuous buzz.

My portable worked without a hitch, except when voltage changes occurred, which was once in a while when they swapped power generators, and then my VOX issued barking noises instead of speech. Once I had to stop altogether because of man-made interference on the floor above—someone was using an electric shaver. When the party was cleanly shaven and I returned on the air I had to explain the interruption to VE7ZM. He was greatly surprised to hear of an electric shaver in F.J.L. and I had to repeat what I said before he believed what he heard. He probably thought that Arctic land was inhabited only by white bears. Speaking of that animal, I've seen several of them. I myself had two orphaned cubs for company for a few days, and of course, I heard lots of funny, and not-so-funny, stories about polar bears. Once a large shaggy fellow walked into the kitchen and scared the cook out of her wits. The poor woman could not speak for several days. Another time, a hunter dropped through the snow and into a bear cave and landed on top of a she-bear. The animal was scared no less than the hunter and rushed out into the open with the hunter riding on her back.

W100

On the fourth day of my stay in F.J.L. band conditions began to deteriorate rapidly. There were fewer Oceania stations coming through, which had been aplenty and very loud at the beginning, Africa and South America started to fade out altogether. It was becoming harder and harder to maintain my regular skeds with UA3CG and UA3DR in Moscow, UB5WF in Lvov, UA1CK in Leningrad, and VE7ZM in British Columbia. On the fifth day I got down to filling in my log book and found that I had worked 95 countries. That galvanized me into action once again, since I had to dig up only five more countries to make 100. I discovered that I didn't have the Soviet republic of Georgia and sent a telegram to UF6FB, fixing a sked for the next day. Meantime, I worked three more countries, so UF6FB was No. 99. Then G3KFM brought on the band No. 100 and UB5WF introduced No. 101, for good measure. Now I could sit back and relax.

Farewell Arctic

My DXpedition in F.J.L. was going into its second week. The fun of operating was running out as fast as the propagation was worsening, maybe faster, but not nearly as fast as my holiday. I still went on the air regularly, but QSO's began to duplicate. When I looked through my log later I found three and four time repeats, and there were several operators who had worked me seven and eight times. Between my on-the-air spurts I gave some coaching on s.s.b.

(Continued on page 435)

Society News

Visit of Mr. Herbert Hoover, Jnr., W6ZH

ON January 9, 1963, the President, Mr. Norman Caws, G3BVG, and members of the Council entertained Mr. Herbert Hoover, Jnr., W6ZH, president of the American Radio Relay League and the International Amateur Radio Union, at an informal dinner held at the Russell Hotel, London. Among those present were the Immediate Past President, Mr. E. G. Ingram, GM6IZ, Council Members R. C. Hills, G3HRH, J. Douglas Kay, G3AAE, A. O. Milne, G2MI, L. E. Newnham, G6NZ, F. K. Parker, G3FUR, R. F. Stevens, G2BVN, J. W. Swinnerton, G2YS, and E. W. Yeomanson, G3IIR. Also present were the General Secretary, Mr. John Clarricoats, O.B.E., G6CL, and Mr. John A. Rouse, G2AHL.

During the evening many problems of mutual interest were discussed with Mr. Hoover, who was presented by Mr. Caws with a signed copy of the *Amateur Radio Handbook*.

The Scheme of Representation

AS announced in the June 1962 issue of the R.S.G.B. BULLETIN the office of Area Representative has now replaced the office of Town Representative. Those members who held office as Town Representative on December 31, 1962, should now regard themselves as Area Representatives and sign correspondence accordingly.

The office of County Representative ceased to exist as from December 31, 1962. As from January 1, 1963, the London Regional Representative was authorized to appoint two Deputy R.R.s (one for North and the other for South of the River Thames). All other R.R.s were authorized to appoint Deputy R.R.s as required. The Deputy R.R.s will assist the R.R.s in the administration of their respective regions.

Although the office of County (or District) Representative has now disappeared, the Council hopes that the majority, if not all, of the 1962 C.R.s and D.R.s will be invited to take office as Deputy R.R.s. Unfortunately up to the time this issue closed for press very few Deputy R.R.s had been appointed.

Affiliated Society Representatives

As from January 1, 1963, it became a condition that every United Kingdom Club or Society applying thereafter for affiliation shall be required to appoint an Affiliated Society Representative.

Affiliated Society Representatives must be nominated by five Corporate Members of the R.S.G.B. and every A.S.R. must be a Corporate member of the R.S.G.B. A.S.R.s enjoy the same status as R.S.G.B. Area Representatives.

London Lecture Meeting

THE London Lecture Meeting at the Institution of Electrical Engineers, arranged for March 29, 1963, will not now take place.

Golden Jubilee Celebrations

DETAILS of the preliminary programme of events to celebrate the Society's fiftieth anniversary during the period July 1-5, 1963, were given on page 371 of the January issue of the BULLETIN.

Trophy Winners

IN the report of the presentation of Society Trophies in the January issue of the BULLETIN, the special certificate presented to members of the Cornwall R.S.G.B. Group and the Cornish Radio and Television Club was accepted by Mr. R. J. Penrose (G3NUJ). It is regretted that Mr. Penrose's name was given incorrectly in the report and in the caption to the photograph on page 367.

R.S.G.B. Approved for Purposes of Section 16 Finance Act, 1958

MEMBERS may like to be reminded that the Commissioners of Inland Revenue have approved the Society for the purposes of Section 16, Finance Act, 1958.

The circumstances and manner in which members may make claims to income tax relief are as follows:

A member who is assessable to income tax under Schedule E in respect of the emoluments of an office or employment is entitled to a deduction from those emoluments of the whole of the annual subscription which is due and payable by him to the Society in the income tax year provided that:

(a) *the subscription is defrayed out of the emoluments of the office or employment, and,*

(b) *the activities of the society so far as they are directed to all or any of the following objects:*

  (i) *the advancement or spreading of knowledge (whether generally or among persons belonging to the same or similar professions or occupying the same or similar professions).*

  (ii) *the maintenance or improvement of standards of conduct and competence among the members of any profession.*

  (iii) *the indemnification or protection of members of any profession against claims in respect of liabilities incurred by them in the exercise of their profession;*

are relevant to the office or employment, that is to say, the performance of the duties of the office or employment is directly affected by the knowledge concerned or involves the exercise of the profession concerned.

A member of the Society who is entitled to the relief should apply to his tax office for Form P.358 on which to make a claim for adjustment of his PAYE coding.

Applications to sit the Radio Amateurs' Examination, May 1963

MEMBERS who wish to sit for the Radio Amateurs' Examination, to be held on Friday, May 10, 1963, should apply immediately to their local technical college who will make the necessary arrangements with the City and Guilds of London Institute. **The closing date** for making such arrangements is **February 24** but in exceptional circumstances entries may be accepted, subject to a late fee of £2, up to March 21, 1963. In cases of difficulty candidates should apply to the Director of Education for the county concerned.

The fee for the examination is £1 10s., plus, in some cases, a small local accommodation fee.

Members are reminded that semiconductors are now included in the syllabus for the Examination.

More Pirates Fined

ON December 10, 1962, at East Ham Magistrates' Court, James George Shaw of 106 Seventh Avenue, London, E.12, pleaded guilty to a charge of using wireless telegraphy transmitting apparatus without the necessary licence. He was put on probation for one year, ordered to pay £3 7s. costs and to forfeit the apparatus to the Postmaster General. On December 20, 1962, at Romford Magistrates' Court, Cyril Forrister of 368 Rush Green Road, Romford, pleaded guilty to a similar charge. He was fined £20 and ordered to pay £2 2s. costs.

On December 28, 1962, at Harrow Court, Keith David Monk of 165 Exeter Road, South Harrow, Middlesex, pleaded guilty to a charge of using transmitting apparatus without the necessary licence. He was fined £3, ordered to pay £2 costs and to forfeit the apparatus to the Postmaster General.

During the dinner given in his honour the President of the A.R.R.L. (Mr. Hoover, W6ZL) discussed a wide variety of topics of mutual interest. In this informal picture he is seen with R.S.G.B. President Norman Caws, G3BVG, and Past Presidents, Ted Ingram, GM6IZ, and Leon Newnham, G6NZ. Back to camera, left, J. Douglas Kay, G3AAE, and, right, Ray Hills, G3HRH.

(Photo G6CL)

Notes on the Nuvistor 144 Mc/s Converter

IN the photograph on page 286 of the December BULLETIN, the markings of L3 and L4 are shown transposed. L3 is immediately behind C3. The link is L4 and is located between L2 and L3. The two 4BA studs to the right of V1 each retain a brass pillar. The longer supports the earthy end of L1 and the shorter the earthy end of C1. The longer pillar can be seen in the photograph immediately below L1.

Direct substitution of a 6DS4 semi-remote cut-off nuvistor for the 6CW4 causes no noticeable change in the cross-modulation characteristics of the converter. It could be that by adjusting the operating conditions of the 6DS4 some improvement could be effected. Work to determine this will be carried out.

In Fig. 1 on page 154 of the October, 1962, issue of the BULLETIN, a 22pF capacitor should be connected from the anode (pin 6) of the first section of V2 to earth.

R.S.G.B. Log Book

A WELL-BOUND 120 page log book may now be ordered from Headquarters, price 15s., plus 3s. postage and packing.

Past President Leon Newnham, G6NZ, describing an ancient coherer from his antique collection to A.R.R.L. President Herbert Hoover, with Norman Caws in the foreground. To the right of G6NZ are Eric Yeomanson, G3IIR, and Ray Hills, G3HRH.

(Photo G6CL)

Mr. Herbert Hoover, Jnr., W6ZH, President of the American Radio Relay League and the International Amateur Radio Union, with Mr. H. L. Wilson, EI2W, President of the Irish Radio Transmitters Society, at a dinner in Mr. Hoover's honour at the Wicklow Hotel, Dublin, on January 7, 1963. Earlier, the President of Ireland, His Excellency Mr. Eamonn de Valera, received Mr. Hoover and Mr. Wilson and officers of I.R.T.S. at his official residence.

(Photo by courtesy of Independent Newspapers Ltd., Dublin)

The General Secretary, John Clarricoats, O.B.E., G6CL, with A.R.R.L. President, Herbert Hoover, W6ZH, outside the entrance to New Ruskin House. During his visit to Headquarters Mr. Hoover accepted a complete set of R.S.G.B. publications.

(Photo May Gadsden)

Deputy Regional Representatives

THE following are additions to the list published in the December 1962 issue:

REGION 7

NORTH OF THE THAMES
M. McBRAYNE (G3KGU), 25 Purlieu Way, Theydon Bois, Essex.

SOUTH OF THE THAMES
W. D. GILMOUR (G2VB), 35 Grangeliffe Gardens, London, S.E.25.

Area Representatives

THE following are additions to the list published in the December 1961 issue.

REGION 11

DENBIGHSHIRE
S. JONES (GW3HHF), 14 Charles Street, Wrexham.

SOUTH CAERNARVONSHIRE
A. ELLIS (GW2HFR), Rhydwenfa, Portmadoc.

NORTH CAERNARVONSHIRE
M. WILLIAMS (GW3LCQ), 12 Penrhos Avenue, Llandudno Junction.

FLINTSHIRE
J. E. THORNTON LAWRENCE, (GW3JGA), Perranporth, East Avenue, Prestatyn.

F.J.L. goes S.S.B. **(Continued from page 432)**

operating to four local hams, c.w. men exclusively, who worked UA1KED. Nick Tyurkin, the chief operator, whom I have already mentioned, even tried his hand, or rather his vocal cords, on sideband. I prefaced his debut by stating that those who wanted a QSO with UA1KED on s.s.b. had to call it in Russian. And believe it or not, there were many DX-stations speaking Russian as best as they could, evidently making a hasty use of dictionaries and text-books.

On April 6, 1962 I left for Dickson. One hour before we landed I had a thrilling experience watching the aurora or polar lights. Again I had to stop on Dickson longer than I planned and again on account of the weather. Having marked time on Dickson another five days and having approached my holiday deadline date dangerously closely, I finally was home again on April 12. Assisted by my QSL manager, UA3CG (Nina), I reckoned my F.J.L. haul to be 2,300 contacts with 101 countries in 37 zones. The pleasure trip was over, we now had a big job ahead of us, the job of sending out all those QSLs.

Victor, one of the operators of UA1KED, with UA3CR just before take-off for Dickson Island.

CONTESTS DIARY

February 9-10	—	A.R.R.L. DX (phone) Contest. (For details see page 356, January 1963).
February 16-17	—	B.E.R.U. Contests (For rules see November 1962, and page 430).
February 23-24	—	A.R.R.L. DX Contest (C.W). (For details see page 356, January 1963).
March 2-3	—	YL/OM Contest (phone).
March 2-3	—	144 Mc/s Open and Listeners' V.H.F. Contests.* (For details, see page 374, January 1963.)
March 9-10	—	A.R.R.L. DX Contest (phone). (For details, see page 356, January 1963).
March 16-17	—	First 1.8 Mc/s Contest (For details, see page 374, January 1963).
March 16-17	—	YL/OM Contest (c.w.).
March 23-24	—	A.R.R.L. DX Contest (c.w.). (For details, see page 356, January 1963).
March 23	—	Pakistan Day DX Contest.
March 30-31	—	CQ W.W. S.S.B. Contest. (For details, see page 422).
March 30-31	—	R.E.F. (c.w.).
April 6-7	—	Low Power Contest. (For details, see page 440).
April 6-7	—	PZK (c.w.) Contest.
April 13-14	—	PZK (phone)
April 21	—	D/F Qualifying Event.
April 20-21	—	R.E.F. (phone).
April 20-21	—	Helvetia 22
April 27-28	—	PACC (c.w.).
May 4-5	—	PACC (phone).
May 4-5	—	U.S.S.R. DX (c.w.) Contest.
May 5	—	First 144 Mc/s Portable Contest. *
May 12	—	D/F Qualifying Event.
May 19	—	D/F Qualifying Event.
May 26	—	First 420 Mc/s Contest. *
June 1-3	—	CHC/HTH QSO Party.
June 8-9	—	National Field Day. (For rules, see page 308, December 1962).
June 15-16	—	70 Mc/s Contest.
June 23	—	1250 Mc/s Tests.
June 30	—	D/F Qualifying Event.
July 6-7	—	Second 144 Mc/s Portable Contest.*
July 21	—	D/F Qualifying Event.
September 7-8	—	V.H.F. National Field Day (For rules, see page 373, January 1963).
September 15	—	D/F National Final.
September 22	—	Low Power Field Day.
October 6	—	R.A.E.N. Rally.
October 19-20	—	7 Mc/s DX Contest (phone).
October 27	—	Second 420 Mc/s Contest.
November 2-3	—	7 Mc/s DX Contest (c.w.).
November 9-10	—	Second 1·8 Mc/s Contest.
November 16-17	—	R.S.G.B. 21/28 Mc/s Telephony Contests.

** To coincide with Region 1 I.A.R.U. Contest dates.*

Television and Broadcast Interference

MEMBERS with television or broadcast interference problems are invited to write to Headquarters for a copy of the TVI/BCI Committee's interference questionnaire. This form is designed to give the Committee a comprehensive picture on which to base their advice to a member.

Broadcast Receiving Licences

DURING November, 1962 the number of combined television and sound licences throughout Great Britain and Northern Ireland increased by 57,125, bringing the total to 12,224,303. Sound only licences now total 3,395,090, including 522,192 for sets fitted in cars.

1250 Mc/s Tests 1962

THE logs of the 1250 Mc/s Test held on June 23-24, 1962, show a welcome increase in activity on this band. Five entries were received representing activity in the South East of England and the Midlands and contacts involving 15 stations are recorded in these logs. As no contact was made between the two centres they will be treated separately in this report.

Midlands Area

A composite log was submitted by G3HAZ, G3JZG and G3KPT giving a clear and concise account of their activities during the test period. For these tests G3JZG operated mobile assisted by G3OAF and contacts were made cross-band with G3HAZ and G3KPT. The two fixed stations used transmitters on 1296 Mc/s and G3JZG/M had a receiver in the car while 144 Mc/s was used for two-way communications and talk-back.

On the Saturday, G3JZG/M went to Walton Hill about eight miles s.s.w. of G3KPT (West Bromwich) and five miles West of G3HAZ (Northfield, Birmingham). This site gave an optical path from G3KPT and very strong signals were received: S6 with no aerial on the converter and S9+ with a horizontal quarter wave monopole. The path from G3HAZ was not good and G3JZG/M received him at S5 on a corner reflector. G3JZG/M then worked G3KPT cross-band during the run back to West Bromwich. During this trip deep and rapid flutter was experienced much as has been reported on 430 Mc/s but about three times as fast.

On the Sunday a similar series of tests took place to higher and further ground starting at Romsley (north of Kidderminster) and progressing via Clee Hill (near Ludlow) to Cefn Hill (near Hay). These sites are all to the south-west of G3HAZ and G3KPT and about the same distance from each; Table 1 shows the results obtained. Fig. 1 shows the profiles of the ground over some of these paths, though the heights on the drawings are exaggerated compared with horizontal distances; since refraction in the atmosphere bends radio waves even under very bad conditions a high value of approximately 5,300 miles has been taken for the Earth's radius. This value (4/3R) is usually taken for v.h.f. and u.h.f. propagation studies. The especially difficult path from G3HAZ to Clee Hill should be noted and the better but still obviously non-optical path from G3KPT to Cefn Hill. The last profile is of the path from G3HAZ to Cefn Hill and illustrates the type of obstruction which could not be overcome with the present equipment. These results are particularly valuable in that they compare two sets of paths, under comparable conditions, one set much more difficult than the other. During the Sunday tests, the nearest obstruction to G3KPT was Rowley Regis 2½ miles distant and 270 ft. above station level; this gives a horizontal angle of approximately + 1·1°. Similarly the main obstruction at G3HAZ was Romsley 3½ miles distant and 400 ft. above him; the horizon angle in this case is approximately 3·6°. This additional screening cost G3HAZ five "S" points on the Clee Hill contact and made the Cefn Hill contact just impossible.

London Area

The three logs received from the London area cross check well and show a pattern of propagation across and around the Thames basin. Several stations on the northern slopes of the North Downs, notably G2RD, G3FP, G5DT, G6NF and G8RW, work each other regularly and they no longer consider such contacts of more than passing interest. G2FCA, G3GDR and G8AL, who are north of London, are somewhat separated and though each works across the valley at good signal strength contacts along the high ground

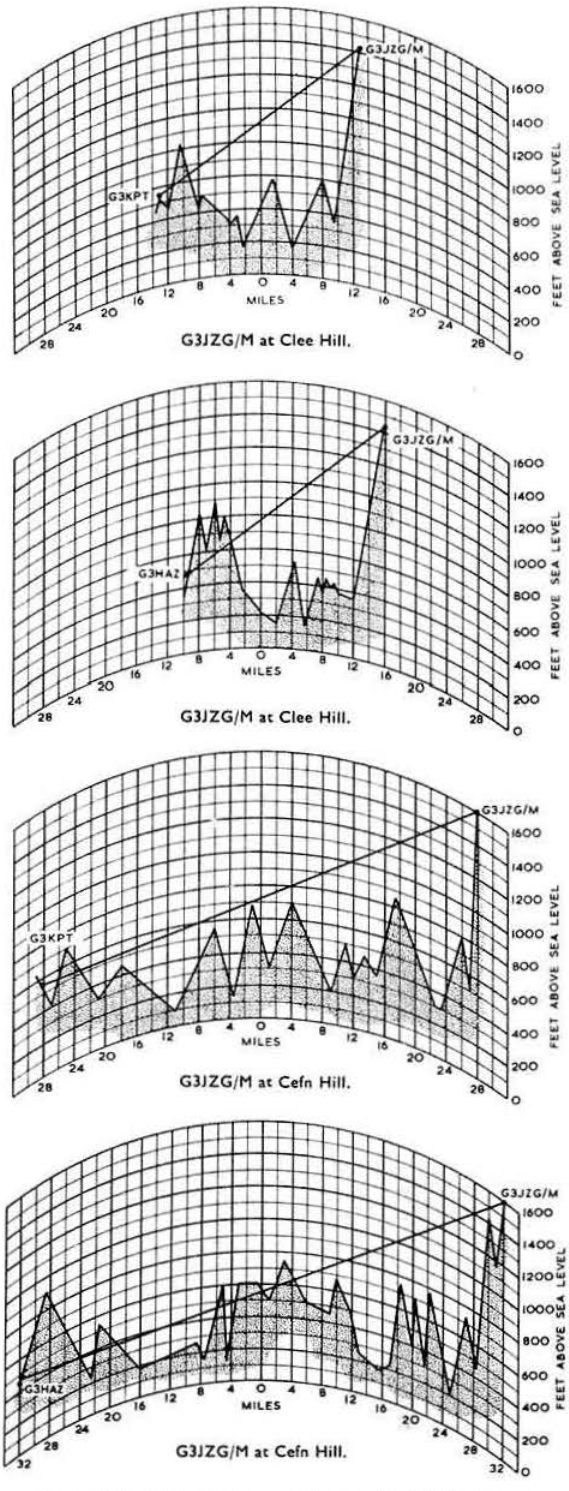


Fig. 1. Path profiles between stations in the Midlands area.

between them, though possible, are much more difficult.

Activity during the tests consisted of a series of routine contacts on the Saturday and an expedition by G2RD/P on the Sunday involving a trip to Reigate Hill 750 ft. up on the North Downs and to a much lower spot near Bagshot. Signals were exchanged with G3FP and G8AL from the first site while an attempt to contact G5DT failed. Fig. 2 illustrated the profile of two of these paths; the heights shown are at ground level and obstructions due to buildings are not indicated.

Contact with G3FP from the second site was not difficult but the contact with G8AL was marginal. Fig. 2 also shows the profiles over these two paths.

The third centre of activity was represented by a log from G3FEX who, assisted by G2DDD, operated portable on Chantry Hill near Storrington in Sussex. Unfortunately they were not able to make contact with any stations, though they could hear stations in the London area on 430 Mc/s but these operators were not listening for anyone outside their immediate neighbourhood. There seems no reason why this group should not work into the Home Counties on 1296 Mc/s and we are looking forward to hearing from them again next year; it is also known that there are several other operators in West Sussex with an experimental turn of mind.

While G3FEX/P was vainly trying to attract the attention of the London stations G3JZG/M was receiving a tone modulated signal on about 1298 Mc/s originating to the s.s.e. No reference was made to this transmission in any other reports and no call-sign was sent during the periods (10.44 to 13.14 G.M.T.) when G3JZG/M received it. If this was in fact a test transmission from the Home Counties somebody missed a near 150 mile contact!

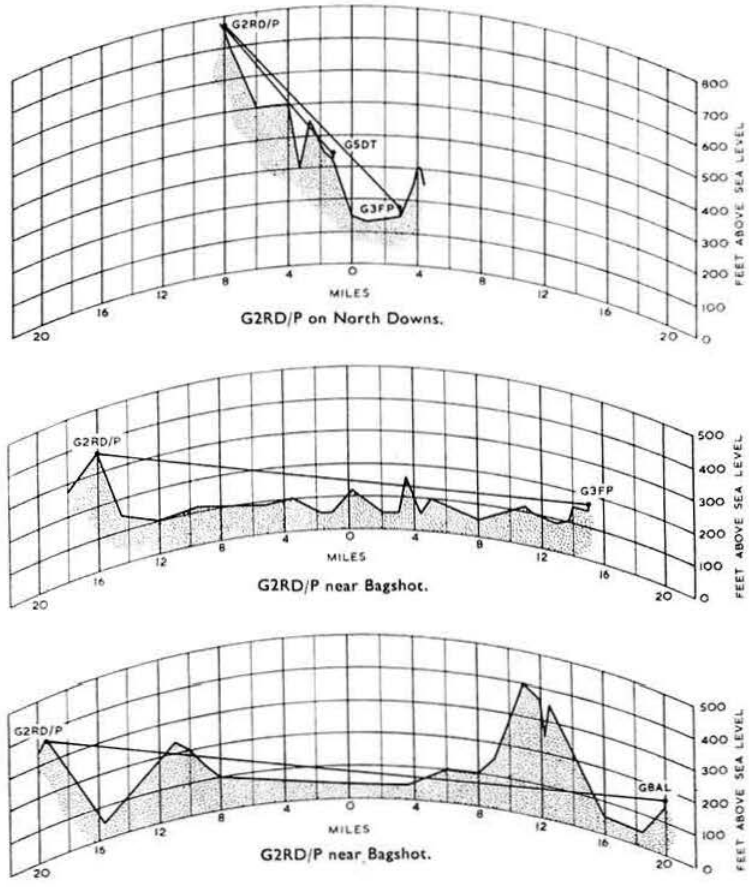


Fig. 2. Path profiles between stations in the London area.

G3KPT transmitted towards London for five minutes at the following times on the Sunday but no reports were received: 09.55, 13.25, 13.35, 14.25, 15.10, 17.15, 17.45 G.M.T. G3KPT is on 1297·1 Mc/s and G3HAZ is on 1297·17; no other entrant quoted his frequency.

Conditions

Conditions were bad and all entrants reported difficulty in keeping high gain aerials steady in strong winds. Those who took part can take some consolation that the results obtained represent what can be done under adverse conditions and this is far more valuable in the long run than results obtained under freak conditions.

TABLE I

Summary of Contacts between G3JZG/M and G3HAZ and G3KPT

Site of G3JZG/M	Height A.S.L.	G3HAZ		G3KPT	
		Distance	Report	Distance	Report
Walton Hill, Clent	900 ft.	5 miles	R5 S5	8 miles	R5 S9+
Romsley, nr Kidderminster	550 ft.	No test		15 miles	R5 S6/7
Clee Hill, nr. Ludlow	1,400 ft.	26 miles	R2 S1/2	26 miles	R5 S6/7
Cefn Hill, nr. Hay	1,600 ft.	64 miles	nil	56 miles	R5 S4/6

It is likely that contact can be made between the four known centres of activity (there was no entry from the Dunstable/Luton area this year). How about Storrington or Wrotham to the Malvern Hills for a start, with some one on the Chilterns* to act as a "go-between?"

Aerials

All three Midland stations used corner reflectors. An excellent discussion of these aerials will be found in the V.H.F. Aerials chapter of the *R.S.G.B. Handbook*. G2RD/P used an 8-over-8 slot fed Yagi, G3FEX/P a 16 element stack while G3FP and G8AL both had paraboloids. Other stations are known to be using aerials of various types but the large reflectors have the obvious advantage of a simple feed arrangement.

Receivers

G2RD, G3JZG and G3FEX are using germanium diode triplers for the local oscillators. G2RD uses a mixer cavity described in *QST* for September 1959 while G3JZG is probably using the design in *QST* for March 1961.

Equipment—Transmitters

G3HAZ and G3KPT both used DET24 grounded grid triplers, 2C39s were used by G2RD, G3FP and G8AL while

* Since this report was prepared, contacts between the London and Midlands area have taken place between fixed stations.

G3FEX used a CV90. G2RD provided information on the rectangular box (Fig. 3) he uses for the tripler. This is fabricated from sheet metal and involves no lathe or other difficult metal work. The stage is driven on the cathode without tuning; the anode cavity is tuned by a square paddle and output taken via an adjustable loop.

G3HAZ reports an effect which was also known during the early days of 430 Mc/s work: his 1296 Mc/s tripler gives more r.f. with no h.t. on the anode. If any of the old timers on 430 Mc/s can explain this phenomenon, information would be of interest. When operating portable G2RD runs his tripler without modulation, only the driver being modulated. The result is quite readable and would certainly serve anyone who wants to get going on the band without too much complication.

Conclusions

Given comparable equipment any contact possible on 430 Mc/s can be duplicated on 1296 Mc/s. The difference in signal strength noted at present is largely due to the less efficient equipment on the higher frequency.

Most stations on 1296 Mc/s are using frequency triplers with no amplification at the output frequency. Such equipment can give powers of 3 to 5 watts but many stations are actually obtaining much less than this. Receivers using silicon diode mixers (e.g. 1N21 and CV2154) and a crystal controlled oscillator should give a noise factor near 10db which is satisfactory for local contacts. One station in Surrey has a parametric amplifier, which shows a very worthwhile improvement over his crystal mixer. Except for those of a few fortunate individuals, aerials are limited by mechanical problems; a 3 ft. paraboloid or 4 ft. × 4 ft. corner reflector is typical.

The main needs at present are a simple r.f. power meter which can be calibrated at lower frequencies, a V.S.W.R. meter and a standard for testing receivers. These essential items of test gear could lead to a great improvement in performance in the 1296 Mc/s band and the Editor will be pleased to receive information on such equipment for publication.

In view of the increased interest shown in the band operators are reminded that the sub-band 1296-1298 Mc/s has been agreed with other countries in I.A.R.U. Region 1

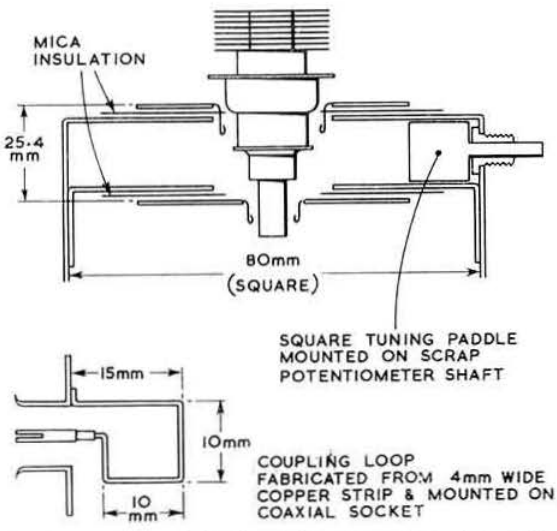


Fig. 3. Constructional details of the rectangular cavity used by G2RD for his 1296 Mc/s tripler. The valve is a 2C39. The cavity is similar to that used and designed by G3FP.

G3KPT in his home station at West Bromwich. He was the joint winner with G2RD of the Arthur Watts Trophy.

for crystal-controlled equipment with DX capability. Many operators are aware of the difficulty of searching the 430 Mc/s band for stations operating outside the agreed sub-band. On 1296 Mc/s the potential difficulty is much greater —the 2 Mc/s band agreed is quite large enough to search and there is little risk of QRM at present. Some stations operate on the third harmonic of their 70cm frequency and while this is convenient for a fast band change, all are invited to obtain crystals in the band 1296-1298 Mc/s for use at least during activity periods.

Arthur Watts Trophy

In recognition of the enthusiasm in their respective areas and in particular the work done by the portable stations in trying weather conditions, the Contests Committee have recommended that the *Arthur Watts Trophy* be awarded to G3KPT on behalf of G3HAZ and G3JZG and to G2RD, each to hold the trophy for six months. The Committee also thank Messrs. R. E. Dabbs (G3FP), B. C. Oddy (G3FEX) and R. Faulkner (G8AL) for their logs which have been drawn upon in the above notes.

This year the 1296 Mc/s tests will be held on June 22-23, and contacts in the band during the V.H.F. National Field Day on September 7-8 will also count for points.

* * *

References

R.S.G.B., Chapters 5, 7 and 14, *Amateur Radio Handbook*.
" A Crystal Controlled Converter for 1296 Mc/s," by D. K. Goshay (W6MMU), *QST*, September 1959.
" U.H.F. Co-axial S.W.R. Bridge," by R. W. Burhams (W8FKC), *QST*, June 1960.
" A 1296 Mc/s Converter without Complications," by G. M. Knivohlarek (K6AXN), *QST*, March 1961.

A Transistorized Communications Receiver

(Continued from page 402)

1 kc/s, even after 70 miles of travelling to a portable site and back!

As stated earlier, the transistorized receiver is always used for meteor-scatter work, for which purpose the 3 to 4 kc/s warm-up drift of the station HRO was rather embarrassing. The new receiver is " on frequency " as soon as it is switched on and there is never any need to use auxiliary calibrating devices. Using the 28 element aerial, good meteor-bursts can be heard on the Dresden TV carrier frequency at any time when that station is in operation.

CONTEST NEWS

— RESULTS — REPORTS — RULES —

Second 420 Mc/s Contest 1962

THE Second 420 Mc/s Contest held on October 20-21, 1962, proved unexpectedly popular; some 75 stations appeared on the band and of these 31 submitted entries or check logs. Conditions on the Saturday evening were quite good and many contacts were made. G3ILD and G5YV in the North of England both gave valuable points to stations farther South and EI2W contacted 7 G's in the Midlands; but G3BIK was not able to work Essex stations he could hear. Also of interest are three entries from the Bournemouth area from stations better known in 144 Mc/s events. The conditions were quite overshadowed of course, by the big opening early in December but it is very lucky if a contest strikes such a good patch as it did.

Two unfortunate difficulties marred an otherwise very successful event; many entrants logged contacts with /T stations, which are not licensed for telephony contacts other than in connection with their television experiments. Contacts with /T stations could not therefore be counted for points.

Results—Second 420 Mc/s Contest 1962

Posn.	Call-sign	Scoring Contacts	Points	Posn.	Call-sign	Scoring Contacts	Points
1	G3LTF	50	3497	16	GW3ATM/P	10	751
2	G3JMA	32	2984	17	G3NAE	11	742
3	G2CIW	34	2406	18	G3OBD/P	9	719
4	G3KEQ	43	2396	19	G5DS	28	691
5	G3LQR	31	2304	20	G3EGV/P	12	633
6	G3KPT	35	2284	21	G2HDJ	22	618
7	G2XV	28	2145	22	G5UM	18	552
8	G3LHA &/P	28	1913	23	G3LTN	9	469
9	G3BNL	21	1682	24	G3NOH	6	284
10	G3PYE/P	21	1564	25	G3EKP	6	247
11	G3JWQ/P	22	1438	26	G3BIK	3	265
12	G8AL	36	1037	27	G3JDM/P	6	214
13	G3FD/P	24	957	28	G3HWR	14	194
14	G5NF	23	915	29	G3OSA	3	27
15	G2RD	32	882				

The other point arises because some entrants operate their fixed station for part of the time and go out portable for the remainder of the contest. On 420 Mc/s they are entitled to combine their scores but so far as the other stations are concerned R.S.G.B. General Rule 4 applies and only one contact can count for points, e.g., if G4ABC works G4XYZ and G4XYZ/P then *both* stations can only claim *one* of these contacts for points. They need not claim the same contact though usually they will claim that giving the greater number of points and so *all* QSOs should be logged. It is noteworthy that several entrants logged "rag-chew" contacts made towards the end of the Contest with a note that contests' information was not exchanged. This sort of supplementary information is very valuable in giving a picture of the activity level at the end of the day.

A miniature cup has been awarded to the winner, Mr. P. K. Blair (G3LTF), with a certificate of merit to Mr. J. M. Appleyard (G3JMA) as runner-up. Both these operators are well known on the v.h.f./u.h.f. bands and are often in the lead in these contests.

Valuable check logs were received from EI2W and G3MI. No listener logs were received.

Second 1·8 Mc/s Contest 1962

THE Second 1·8 Mc/s Contest held on November 10-11, 1962, attracted 67 entries, an increase of nearly 30 per cent compared with 1961, and provided a very close fight for first place, which went to H. J. M. Box (G6BQ) who, with a score of 729, had a single point margin over M. G. Whitaker (G3IGW). Congratulations to G6BQ for his continued success in this contest, being first last year and second in 1960. G3IGW, sixteenth last year and third the year before, managed to gain second place by working, from his QTH in Yorkshire, a greater proportion of stations giving him 5 points. He had 162 contacts with 40 carrying 3 points while G6BQ, in Kent, had 66 worth 3 points out of his 173 contacts. Third place, with 715 points went to D. G. Alexander (G3KLH). From Oxfordshire he had 152 contacts, with only 19 scoring 3 points.

W. Robertson (GM6RI) was the leading Scottish station with a score of 548 points, and goes into the second half of the contest for the Maitland Trophy with a lead of 189 points over T. Heslop (GM3KMR).

The Contests Committee were pleased to receive comments from nearly half of the entrants. Of those that expressed an opinion on the rules, the majority were in favour by a ratio of over 4 to 1 but as was expected there were a lot of complaints about having no county indicator. Due to a misunderstanding and a chapter of accidents the county indicator did not get written into the rules and when this was discussed it was too late to advise members that it was intended to use *letters* and not figures as will be seen in the rules for the First 1·8 Mc/s Contest 1963. Nearly 300 British stations were mentioned in competitors' logs and it is hoped stations who gave quite high serial numbers but did not send entries were only deterred by having to look up station addresses in the *Call Book*. The Committee hopes to have a much larger entry for the first 1963 contest.

Equipment

In this contest, the most important part of the equipment seems to be the aerial. Transmitters and receivers vary very

Results—Second 1·8 Mc/s Contest 1962

Position	Call-sign	Points	Position	Call-sign	Points
1	G6BQ	729	33	GM3NYY	357
2	G3IGW	728	34	G3POM	350
3	G3KLH	715	35	G3AHB	344
4	G3MXJ	672	36	G3JFY	343
5	G3FM	637	37	G3GWX	339
6	G2MJ	630	38	G3PVK	324
7	G3LHJ	621	39	G2XP	314
8	G3ORH	617		G3PSB	314
*	G3FYE	613	41	G3PHG	312
9	G3OZF	612	42	G3OKJ	299
10	GW3JI	594	†	G2HR	291
11	GM6RI	548	43	G2HBA	284
12	G3NOH	541	‡	G3KUG	272
13	G3RBP	523	44	G3PEO	267
14	G2DC	505	45	G3PLQ	265
15	G3KLT	502	46	G3OYU	264
16	G3JLE	498	47	GM3KLA	254
17	G3DCZ	497	48	GM3AEY	253
18	G3OLN	495	49	G3PJB	246
19	G3NHE/A	476		G3LHZ	246
20	GI3LZS/A	452	51	G3RDQ	245
21	G3JKY	439	52	G3LPT	215
22	G2BLA	436	53	G3FHN	209
23	G3KDV	431	54	G2BCI	207
24	G3BIK	416	55	G3MWZ	197
25	G3LAS/A	402	56	G3EMO	189
26	G3TR	393	‡	G3PRT	182
27	G3ILO	391	57	G3ONX	177
*	G3PJX	384	58	G2ABK	164
28	G3NBL	380	59	G6OO	133
29	G3KZZ/A	378	60	G2VV	104
30	G3OJI	369	61	G2DHV	66
31	G3OVL	366	62	G6NK	59
32	GM3KMR	359			

* denotes late entry † denotes multi-operator entry
‡ denotes no declaration

little between stations, with the basic v.f.o.-b.a.-p.a. and HRO, Eddystone and AR88 receivers. For his aerial, G6BQ used a 274 ft. centre-fed Zepp, the middle being 65 ft. high. G3IGW had a 260 ft. end-fed running east-west and 30 ft. high, while G3KLH's aerial was a half-wave end-fed. Other aerials ranged from a 68 ft. indoor to various lengths of L-shaped and M-shaped arrays.

Special mention, however, must be made of G3NBL's transistor transmitter. He used six transistors with an RCA 2N1905 in the p.a. The input of 0·8 amp at 12 volts to the p.a. gave him 5 watts r.f. output for a *total* input of 12 watts, i.e. an overall efficiency of 40 per cent. Surely this must be a record. G3NBL in Co. Durham operated for only 7 hours and had 81 contacts, only 11 of which were, as he put it, " in the penalty box."

Logs

The general standard of logs was very good. There was only one entry that was difficult to read and the Contests Committee thank all competitors for their efforts.

In the list of results it will be noted that the entry of G2HR has been marked " multi-operator." The application for transfer to Corporate membership of G3RKJ had not been before Council at the time of the contest and he shared operating with G2HR in order to gain contest experience. Many thanks, G2HR.

Intending competitors in the First 1·8 Mc/s Contest 1963 are asked to note that the date has been altered to ***March 16-17, 1963*** so as not to clash with the A.R.R.L. DX Contest (C.W. Section).

Check logs are gratefully acknowledged from G3HTI, G3MEH, G3OPD, G4VF, G8NN, GM3PBA, DL1VW, OK1AAI, OK1AGV, OK1ZC, OK2BBJ, OK2BCA, OK2BEL, OK2KOJ, OK2QX and OK3CEA.

Notes on Listener Logs in R.S.G.B. Contests

THE Contests Committee receive check logs from B.R.S. and Associate members for most h.f. and v.h.f. contests. These vary from a list of stations heard, without times or any other information, to detailed logs of activity during the period of the contest. Certificates of merit are awarded from time to time to the members who, in the opinion of the Contests Committee, submit the best check logs, but more often than not, *no* log is thought to qualify for such an award. These notes are therefore offered as a guide to listeners who may be wondering why no award has been made for a particular event.

The log should show contacts only (no CQ or test calls) and be tabulated one side only of foolscap or quarto paper with headings in this order: (i) Date and time (G.M.T.); (ii) Call-sign of station heard; (iii) RST and serial number he sends; (iv) Call-sign of station he is working; (v) other contest information sent.

In column (i) times should always be in G.M.T. Care should be taken to distinguish between the two call-signs and the correct one entered in column (ii). The report and serial number in column (iii) are sent by the station heard and nothing transmitted by the other station is to be entered in this space.

If both sides of the contact are heard, there should be two entries in the check log on separate lines. Such entries are very valuable for checking purposes. If R.S.G.B. log sheets are used column 4 should be left blank.

The most important consideration in a listener check log is accuracy. A comprehensive log with even a small number of errors is of *no value at all* since it cannot be trusted to decide any doubtful points: a short accurate log is of far more use. Finally, if any apparently incongruous information is heard, please log it. Often this information will avoid a contestant losing points, e.g. if a QTH is accidentally sent in error in a v.h.f. event and not corrected, a note in a listener's check log may well save the station being worked many points.

Low Power Contest 1963

THE rules for the Low Power Contest to be held on April 6-7 are given below. The bonus to encourage the use of wholly transistorized transmitters is again included.

1. When: 18.00 G.M.T. to 23.00 G.M.T. on April 6 and 08.00 G.M.T. to 20.00 G.M.T. on April 7, 1963.
2. Eligible Entrants: All fully paid-up members of the R.S.G.B. resident in Europe.
3. The General Rules relating to R.S.G.B. Contests, as published in the January 1963 issue of the *R.S.G.B. Bulletin*, will apply except as superseded by the rules of this Contest.
4. Contacts: Must be made on c.w. (A1) only between 3500 and 3600 kc/s.
5. Scoring: Points will be scored on the following basis:

Watts input to p.a. stage	Up to 0.5	To 1	To 2	To 3	To 4	To 5
Points per contact	20	10	5	3	2	1

A bonus of 20 points may be claimed for the first contact with each different county code area listed on page 376 of the January issue of the *R.S.G.B. Bulletin*. **Bonus for the use of wholly transistorized transmitter: double points.**
6. Contest Exchanges: RST reports followed by the contact number starting at 001 and the county code letters, e.g. 559061SX or Sussex.
7. Logs: (a) Must be tabulated in columns headed (in this order) " Date/Time (G.M.T.)," " Call-sign of station contacted," " My report on his signals and serial number sent," " His report on my signals and serial number received," " His County," " My input power," " Points claimed."
(b) The cover sheet must be made out in accordance with R.S.G.B. Contests Rule 5 and the declaration signed.
(c) Details of the transmitter and power supply must be given. Entrants claiming bonus points for use of transistors must enclose a block diagram of the transmitter.
(d) Entries must be postmarked not later than **Monday, April 23, 1963.**
8. Awards: At the discretion of the Council, the **1930 Committee Cup** will be awarded to the winner and **certificates of merit** to the runner-up and to the non-transmitting member submitting the best check log in the opinion of the Contests Committee.

SAMPLE CHECK LOG ON STANDARD R.S.G.B CONTEST LOG SHEET

Contest: Second 420 Mc/s Open 1962 Sheet No. 1 of 4 Call-sign B.R.S.98765

Date & Time (G.M.T.)	Call-sign of Station Heard	His report on signals and Serial No. SENT		Call-sign of Station Worked	Location	
20/10/62						
1810	G4AAA	589001		G4BBB	Harlow Essex	
1909	G4CCC	59006		G4DDD	3 miles S Oxford	
1909	G4DDD	59005		G4CCC	Hendon, London	
1916	G4ABC/P	59002		G4CCC	10 miles N Cambridge	
1916	G4CCC	58008		G4ABC/P	3 miles S Oxford	
1930	G4HHH	59013		G4ABC/P	3 miles S Chelmsford	
1933	G4HHH	59014		G4BBB	" "	
1933	G4BBB	56004		G4HHH	Banbury	

Forthcoming Events

Details for inclusion in this feature should be sent to the appropriate Regional Representatives by the first of the month preceding publication. T.R.s and club secretaries are reminded that the information submitted must include the date, time and venue of the meeting and, whenever possible, details of the lecture or other event being arranged. Regional Representatives are requested to set out the copy, preferably typed double spaced, in the style used below. Standing instructions for more than three months ahead cannot be accepted.

LOOKING AHEAD

April 21.—Midlands Mobile Rally and Region 3 O.R.M. at Trentham Gardens.
April 28.—U.B.A. Mobile Rally, Verviers, Liège, Belgium.
May 3.—R.A.O.T.A. Reunion, Horse Shoe Hotel, London, W.1.
May 4.—Northern Ireland Golden Jubilee Year Celebrations.
June 2.—R.S.G.B. Golden Jubilee Mobile Rally, Wethersfield, Essex.
June 10-15.—Region 1 I.A.R.U. Conference, Malmö, Sweden.
June 16.—A.R.M.S. Rally, U.S. Air Force Base, Barford, St. John, Oxon.
June 23.—Bridlington Mobile Rally.
July 5.—R.S.G.B. Golden Jubilee Dinner.
July 7.—South Shields Mobile Rally.
August 18.—Derby Mobile Rally.
September 8.—G6UT's Ham Party.
September 15.—Lincoln Mobile Rally.
September 22.—Woburn Abbey National Mobile Rally.
September 22.—Surrey Radio Contact Club 144 Mc/s D/F Hunt.
September 29.—South West Mobile Rally, Weston-super-Mare.
October 30-November 2—R.S.G.B. Radio Communications Exhibition.

REGION 1

Ainsdale (A.R.S.).—February 6, 20, March 6, 37 Hawthorne Grove, Southport.
Blackburn.—Fridays, 8 p.m., West View Hotel, Revidge Road.
Blackpool (B. & F.A.R.S.).—Mondays, 8 p.m., Pontins Holiday Camp, Squires Gate.
Bury (B.R.S.).—February 12, March 12, 8 p.m., Knowsley Hotel, Kay Gardens.
Chester.—Tuesday, 8 p.m., Y.M.C.A.
Eccles (E. & D.R.C.).—Tuesdays, 8 p.m., The Congregational Mission Church, King Street.
Liverpool (L. & D.A.R.S.).—Tuesdays, 8 p.m., The Gladstone Mission Hall, Queens Drive, Stoneycroft.
Macclesfield.—February 5, 19, March 5, 42 Jordongate.
Manchester (M. & D.A.R.S.).—Wednesdays, 7.30 p.m., 203 Droylsden Road, Newton Heath, Manchester 10. **(S.M.R.C.).**—Fridays, 7.45 p.m., Rackhouse Community Centre, "Rackhouse," Daine Avenue, Northenden.
Morecambe.—February 6, March 6, 125 Regent Road.
Preston.—February 12, 26, March 12, (All meetings start with Morse practice at 7.30 p.m.), St. Paul's School, Pole Street.
Southport (S.R.S.).—Wednesdays, 8.30 p.m., Sea Cadets Camp, The Esplanade.
Stockport.—February 13, 27, March 13, 27, 8 p.m., The Blossoms Hotel, Buxton Road.
Wirral.—February 6 ("Two Metres" by H. M. Synge, G3BOC), February 20 ("Symposium on Power Supplies" opened by H. Schroeder), March 6 ("The DX Bands" by L. Goldsbrough, G3ERB), March 20, 7.45 p.m., Harding House, Park Road West, Claughton.

REGION 2

Barnsley.—February 22 ("Transistor Theory," Part 1, by W. W. Williams), March 8 ("Workshop Practice," Part 2, by J. Walker, G3GNK), 7.30 p.m., King George Hotel, Peel Street.
Catterick Camp.—Tuesdays and Thursdays, 7.30 p.m., Club Room, Vimy Road.
Halifax (Northern Heights.).—February 13, 27, ("TVI and BCI" by G3ADG), March 13 (Junk Sale), 7.30 p.m., Sportsman Inn, Ogden.
Heckmondwike (Spen Valley A.R.S.).—February 7 ("Converters, Receivers and Transmitters" by T. H. A. Withers of Withers Electronics), February 21 ("What's New," by S. Marsden of Richard Allen Radio Ltd.), March 7 ("Direction Finding," by J. Belcher of Regional G.P.O.), 7.15 p.m., Grammar School, Heckmondwike.
Scarborough.—Thursdays, 7.30 p.m., Chapman's Yard, North Street.

REGION 3

Birmingham (M.A.R.S.).—February 21, 7.30 p.m., Midland Institute, Paradise Street. **(Slade).**—February 22, 7.45 p.m., The Church House, High Street, Erdington.
Coventry (C.A.R.S.).—Mondays, 8.0 p.m., Willenhall Scout H.Q., Little Farm Buildings, Littlethorpe, St. James Lane, Willenhall, Coventry.
Cannock (C.C.A.R.S.).—February 7, 7.30 p.m., "The Tavern", Bridgtown.
Lichfield.—First Monday and third Tuesday in each month, Swan Inn, Lichfield.
Stourbridge and District (S.T.A.R.S.).—February 5, March 5, 7.45 p.m., Foley College, Stourbridge.
Wolverhampton (W.A.R.S.).—February 4, (R.A.E. Class), February 11, 28, 8.0 p.m., Neachells Cottage, Stockwell End, Tettenhall.

REGION 4

Burton-on-Trent (A.R.S.).—First Wednesday in each month (R.A.E. Lecture), 7.30 p.m., Club Rooms, Stapenhill Institute, Burton-on-Trent. February 13 ("Single Sideband Transmission," by W. Hazelden G3KBE), March 13 ("Waveform Shaping," by A. H. Bailey).
Chesterfield (C. & D.A.R.S.).—February 13, 27, March 13, 7.30 p.m., Newbold Observatory, Newbold Road, Chesterfield.
Derby (D. & D.A.R.S.).—February 6 (A.G.M.), February 13 (Film Show), February 16 (Annual Dinner and Dance), February 20 (Open Evening), February 27 (Demonstration of Measuring Apparatus for Junior Members), March 6 (Surplus Sale), March 13 ("Car Radio Interference Problems" by R. Barrell), 7.30 p.m., Room No. 4, 119, Green Lane, Derby. **(D.S.W. Exp. Soc.).**—Fridays, 7.30 pm., Sundays, 10.30 a.m., Club Rooms, Nunsfield House, Boulton Lane, Alvaston, Derby.
Grantham (G. & D.A.R.S.).—Mondays, 7.30 p.m., Club Rooms, rear of Manners Arms Hotel, London Road, Grantham.
Grimsby (G. & D.A.R.S.).—February 12, 26, March 12, 8 p.m., R.A.F.A. Headquarters, Abbey Drive West, Grimsby.
Lincoln (L.S.W.C.).—Wednesdays, 7.30 p.m., Lincoln Technical College, Cathedral Street, Lincoln.
Loughborough (A.R.S.).—Fridays, 7.30 p.m., Corporation Hotel, Wharncliffe Road, Loughborough.
Melton Mowbray (A.R.C.).—February 14 (R.S.G.B. Recorded Lecture on "Aerials"), 7.30 p.m., St. John Ambulance Hall, Asfordby Hill, Melton Mowbray.
Northampton (N.S.W.C.).—Thursdays, 7 p.m., Allen's Pram Works, 8, Duke Street, Northampton.
Nottingham (A.R.C.N.).—Tuesdays (R.A.E. Lecture), Thursdays (Lecture), Room No. 3, Sherwood Community Centre, Woodthorpe House, Mansfield Road, Sherwood, Nottingham.
Peterborough (P. & D.A.R.S.).—March 1 (Film Show), 7.30 p.m., Room No. 14, Technical College, Peterborough.
Retford & Worksop (N.N.R.C.).—Tuesdays (Beginners), Thursdays (Informal) 7.30 p.m., Club Rooms, Victoria Institute, Eastgate, Worksop, Notts.

REGION 5

Cambridge (C. & D.A.R.C.).—Fridays, 7.30 p.m., Club Headquarters, Corporation Yard, Victoria Road, Cambridge.
March (M. & D.A.R.S.).—Tuesdays, 7.30 p.m., Police Headquarters, High Street.

REGION 6

Cheltenham.—First Thursday in each month, 8 p.m., Great Western Hotel, Clarence Street.
Stroud.—Wednesdays, 8 p.m., Arundel Mills, London Road, Stroud.

REGION 7

Acton, Brentford and Chiswick (A.B.C.R.C.).—February 19 (New Members' Night), 7.30 p.m., A.E.U. Club, 66 High Road, Chiswick.
Bexleyheath (N.K.R.S.).—February 28 (Lecture) 8 p.m., Congregational Hall, Clock Tower, Bexleyheath.
Barnet (B.R.C.).—February 26, 8 p.m., Red Lion Hotel, Barnet.
Croydon (S.R.C.C.).—February 12 (Mr. Gregory, of Mullard Ltd. on "U.H.F. Front-ends,") 8 p.m., Blacksmiths Arms, South End, Croydon.
East Ham.—Tuesdays fortnightly, 8 p.m., Leigh Road, East Ham.
East London.—February 17, 2.30 p.m., (G4KD on Regional Organization), Lambourne Room, Ilford Town Hall, Ilford, Essex.
East Molesey (T.V.A.R.T.S.).—February 6, 8 p.m., Carnarvon Castle Hotel, Hampton Court.
Edgware & Hendon (E. & D.R.S.).—February 11, 25, 8 p.m., John Keeble Hall, Church Close, Deans Lane, Edgware, Middx.
Enfield.—February 26, 7.30 p.m., George Spicer School, Southbury Road.
Gravesend (G.R.S.).—Thursdays, 7.30 p.m., R.A.F.A. Club, 17 Overcliffe, Gravesend.
Harlow.—Tuesdays, 7.30 p.m., rear of G3ERN (G. E. Read), High Street, Harlow.
Harrow (R.S.H.).—Fridays, 8 p.m., Roxeth Manor County School, Eastcote Lane, Harrow.
Holloway (G.R.S.).—Mondays and Wednesdays (R.A.E. and Morse), 7 p.m., Fridays (Club) 7.30 p.m., Montem School, Hornsey Road, N.7.
Hounslow (H.A.D.R.C.).—Mondays, 7.30 p.m., Isleworth Town Hall, Twickenham Road, Hounslow.
Ilford.—Thursdays, 8 p.m., 579 High Road, Ilford (near Seven Kings Station).
Kingston.—Alternate Thursdays (Lectures), 8 p.m., Y.M.C.A., Eden Street, Kingston. (Morse classes weekly at 2 Sunray Avenue, Tolworth.

LONDON MEMBERS' LUNCHEON CLUB

will meet at the Bedford Corner Hotel, Bayley Street, Tottenham Court Road.

at 12.30 p.m. on Friday, February 15, March 15 and April 19, 1963

Telephone table reservations to HOL 7373 prior to day of luncheon. Visiting amateurs especially welcome.

Mitcham (M. & D.R.S.).—February 15 (A.G.M.), 7 p.m., "The Canons," Madeira Road, Mitcham.
New Cross (C.A.R.S.).—Fridays, 7.30 p.m., 225 New Cross Road, S.E.14.
Norwood & South London (C.P. & D.R.C.).—February 19 (Lecture), 8 p.m., C.D. Training Centre, Bromley Road, Catford.
Paddington (P. & D.A.R.S.).—Wednesdays, 7.30 p.m., Beauchamp Lodge, 2 Warwick Crescent, W.12.
Purley (P. & D.R.C.).—February 15, March 1, Railwaymen's Hall (side entrance), Whytecliffe Road, Purley.
Reigate (R.A.T.S.).—February 16 (Film Show), March 16 (T. Withers on V.H.F. Equipment), 7.30 p.m., The Tower, High Street, Reigate.
Romford (R. & D.R.S.).—Tuesdays, 8.15 p.m., R.A.F.A. House, 18 Carlton Road, Romford.

Science Museum (C.S.R.S.).—February 5 ("Measuring and Fault Finding Instruments" by J. Thomas of Avo Ltd.), February 19 (Informal) March 5 ("The A.A. Communications Network" by D. J. A. Stevenson, Communications Manager of A.A.), 6 p.m., Science Museum, South Kensington.
Sidcup (C.V.R.S.).—February 7 ("I.T.U. Conference, Geneva 1959" by G2MI), Congregational Church Hall, Court Road, Eltham.
Southgate and District.—February 14 (Lecture), March 14 (Lecture on "Oscilloscopes."), 8 p.m., Arnos School, Wilmer Way, N.14.
Slough (S.A.R.S.).—First Wednesday in each month, 8 p.m., United Service Club, Wellington Street, Slough.
Sutton and Cheam (S.C.R.S.).—February 19, "The Harrow," High Street, Cheam.
Welwyn Garden City.—February 14, 7.30 p.m., Conference Room, Murphy Radio, Bessemer Road, Welwyn Garden City.

REGION 8

Canterbury (E.K.R.S.).—Tuesdays, 7.30 p.m., Technical College, Canterbury. February 12 ("Tape Recording" by B. Luff), February 26 ("V.H.F. Propagation," recorded talk by E. Tilton, W1HDQ), March 12 ("TV Servicing" by D. Williams).
Crawley (C.A.R.C.).—February 27 ("Amateur Radio in Nigeria," by Dr. M. Dransfield, 5N2JKO), 8 p.m., West Green Centre, Crawley. March 2 (Annual Dinner, for details contact G3FRV.) March 13, for details contact G3FRV.
Folkestone.—First Tuesday in each month, 7.30 p.m., Sea Cadet's H.Q., Castle Road, Sandgate, Folkestone.

REGION 9

Bath.—February 20, 7.30 p.m., Committee Room, Technical College, Lower Borough Walls, Bath.
Bristol.—Fourth Friday in each month, 7.15 p.m., Royal Fort, Bristol University, Woodland Road, Bristol 8.
Burnham-on-Sea.—Second Tuesday in each month, 8 p.m., Crown Hotel, Oxford Street, Burnham-on-Sea.
Camborne (C.R. & T.C.).—First Thursday in each month, Staff Recreation Hall, S.W.E.B. Headquarters, Pool, near Camborne.
Exeter.—First Tuesday in each month, 7.30 p.m., Y.M.C.A., St. Davids Hill, Exeter.
Plymouth (P.R.C.).—First Tuesday in each month, 7.30 p.m., Guild of Social Service Building, Plymouth. Other Tuesdays, Virginia House Settlement, St. Andrews Cross, Plymouth.
South Dorset (S.D.R.S.).—First Friday in each month, 7.30 p.m., alternately at Waverley Hotel, Westham, Weymouth and Labour Rooms, West Walks, Dorchester (March meeting at Dorchester).
Torquay (T.A.R.S.).—Second Saturday in each month, Club H.Q., Belgrave Road, Torquay.
Weston-super-Mare.—First Tuesday in each month, 7.15 p.m., Technical College, Lower Church Road.
Yeovil (Y.A.R.C.).—Wednesdays, 7.30 p.m., Park Lodge, The Park, Yeovil.

REGION 10

Cardiff.—March 11 ("H.F. Propagation," by F. J. Church, GW3HCH), 7.30 p.m., T.A. Centre, Park Street, Cardiff.
Port Talbot.—February 12 (Social), March 12, 7.30 p.m., 8/10 Jersey Street, Velindre, Port Talbot.

REGION 11

Prestatyn (F.R.S.).—February 25 ("Night on the Air," GW3JGA/A), 8 p.m., Railway Hotel, High Street, Prestatyn.

REGION 13

Edinburgh (L.R.S.).—March 14 ("History of Automobile Communications," by Mr. Russell). March 28 ("Electronics," by Tom Spiers, GM3OWI and John Hughes, GM3LCP). April 11("Ancient Radio at Sea," by Tom Spiers, GM3OWI), 7.30 p.m., Y.M.C.A., 14 South St. Andrews Street, Edinburgh, 2.

REGION 14

Ayrshire.—Third Sunday in each month, 7.30 p.m., Royal Hotel, Prestwick.

REGION 16

Basildon (B. & D.A.R.S.).—February 7 at Billericay, March 5 at Wickford, 8 p.m. Further details from Hon. Sec. G3RQT, 472 Long Riding, Basildon.
Chelmsford (C.A.R.C.).—First Tuesday in each month, 7.30 p.m., Marconi College, Arbour Lane, Chelmsford.
Southend (S. & D.R.S.).—Alternate Fridays, 7.30 p.m., Canteen of E. K. Cole Ltd., Priory Road, Prittlewell (February 8, 22, March 8).

Area and Town Representatives and club secretaries are asked to note that information for inclusion in *Forthcoming Events* should reach Regional Representatives by the first of the month preceding publication.

Regional and Club News

Barnet Radio Club.—The Annual Christmas Party held on December 22 was a most successful event, attracting about 120 members and visitors. During the evening John D. Kay presented the G3AAE Cup jointly to R. C. Hills, G3HRH, and D. E. Bootman, G3MWG, for DX achievements during the year on the v.h.f. and h.f. bands respectively. The club wishes to thank all those who donated raffle and spot prizes with special acknowledgement to F. Barnes, G3AGP, who acted as m.c. and to Mrs. Susan Purchese, XYL of G3LXP, who was in charge of the excellent catering arrangements. A pamphlet giving details of the club's activities together with full details of forthcoming events may be obtained from the *Hon. Secretary:* F. E. A. Green (G3GMY), 48 Borough Way, Potters Bar, Middlesex.

Crawley Amateur Radio Club.—At the A.G.M. the following were elected: *Chairman*—J. C. Graham (G3TR); *Hon. Secretary:* R. G. B. Vaughan (G3FRV), 9 Hawkins Road, Tilgate, Crawley, Sussex; *Hon. Treasurer*—J. Parsons; *Committee Members*—D. Mauchal (G3OVC) and A. J. Gibbs (G3PHG). Increased membership during the year was reported as well as increasing success for the various activities. At the Annual Dinner on March 2, the Guest of Honour will be Stanley Vanstone (G2AYC). Visitors from other clubs will be welcome and details may be obtained from G3FRV. Details of other meetings are given in *Forthcoming Events.*

Cray Valley Radio Society.—Both the December and January meetings were cancelled due to fog and snow. The Top Band net on Christmas Day was a great success with G3FS acting as the control station. On February 7, Arthur O. Milne (G2MI) will give a talk on the Geneva Conference 1959. There will also be a meeting on March 7. *Hon. Secretary:* S. J. Coursey (G3JJC), 49 Dulverton Road, London, S.E.9.

Dorking and District Radio Society.—At the A.G.M. on January 8, the following were elected: *Chairman*—B. L. Bonehill (G3LHC); *Hon. Secretary*—J. Greenwell (G3AEZ), Eastfield, Henfold Hill, Beare Greene, Dorking; *Hon. Treasurer*—R. P. R. Sparks (G3PIQ); *Committee Members*—W. J. Walsh (G3HZJ) and F. H. Hearnden (G3IAM). The retiring Hon. Treasurer, W. R. Steverson (G3JEQ), was especially thanked for his many years of service to the society. A Junk Sale is to be held at the Star and Garter, Dorking, on March 26, commencing at 8 p.m. Visitors will be most welcome.

East London R.S.G.B. Group.—After the business session of the A.G.M. in December, Mr. Norman Caws (G3BVG), President-elect of R.S.G.B., addressed members and answered many questions. Attendance was somewhat lower than usual, due no doubt to the proximity to the Christmas holiday. Details of future activities in the area may be obtained from the *District Representative*—M. McBrayne (G3KGU), 25 Purlieu Way, Theydon Bois, Essex.

Edgware and District Radio Society.—At the A.G.M. the following were elected: *President*—P. A. Thorogood (G4KD); *Chairman*—D. A. Findlay, D.F.C. (G3BZG); *Hon. Treasurer*—S. E. C. Fryer (G3ERO); *Hon. Secretary*—R. H. Newland (G3VW), 10 Holmstall Avenue, Edgware. The club has now been in existence for 25 years.

Flintshire Radio Society.—The annual Christmas Party was held on December 17 at the Railway Hotel, Prestatyn. Among those present were J. S. Owen (GW3QN), chairman of the Conway Valley Amateur Radio Club, and R. Jones (GW3JI), Region 11 Representative. Alan Autley acted as m.c., and excellent refreshments were provided by Mrs. Lawrence (XYL, GW3JGA). *Acting Hon. Secretary*—Alan Autley, Fairholme, Fairfield Avenue, Rhyl, Flints.

Harrow, Radio Society of.—On February 15, R. Ray (G2TA) will give a lecture on modulation, and on March 1, Heath Rees (G3HWR) will describe a simple 'scope. February 8 and 22 will be Practical Nights when 2 and 4m converters designed by G3HBW will be built. *Hon. Secretary*—A. C. W. Biddell (G3GNM), 114 Kingshill Avenue, Kenton, Harrow, Middlesex.

London Members' Luncheon Club.—There was a record attendance of 99 at the Christmas Meeting at which the guests of honour were Mr. E. G. Ingram (GM6IZ) and Mr. Norman Caws (G3BVG), President-elect of the R.S.G.B. Overseas visitors included W0RNO, K7BGS, 4S7IW and VK2AMA. The toast to the ladies was proposed by Clem Jardine (G5DJ) and replied to by Mrs. Caws. Details of future meetings are given in *Forthcoming Events. Hon. Secretary*—Frank Fletcher (G2FUX), 11a Ickenham Road, Ruislip, Middlesex.

Northern Heights Amateur Radio Society.—Meetings continue

The President, Mr. E. G. Ingram, GM6IZ, presenting the Region I Field Day Trophy to Mr. N. Kendrick, G3CSG, who accepted it on behalf of the Wirral Group. This photograph was taken at the Merseyside Lecture Meeting in Liverpool on November 16, 1962. In the background is the late Philip Wade, G2BPJ.

to be held at the Sportsman Inn, Ogden, on Wednesdays at 7.30 p.m. On February 27, G3ADG will give a talk on TVI and BCI while a Junk Sale is arranged for March 13. *Hon. Secretary*—Arthur Robinson (G3MDW), Candy Cabin, Ogden, Halifax.

North Kent Radio Society.—Details of future arrangements may be obtained from the *Hon. Secretary*—Barry Reynolds (G3ONR), 49 Station Road, Crayford, Kent.

Paddington and District Amateur Radio Society.—At the A.G.M. in January the following were elected: *Chairman*—W. Bailin (G3NOZ); *Vice-Chairman*—A. W. Summers (G3AWS); *Hon. Secretary*—B. R. Timms (G3MLE), 7 Nottingham Street, London, W.1; *Hon. Treasurer*—S. W. J. Legg (G3KNL); *Committee Members*—J. E. Alban (G3JEA), E. W. Holt (G3MHQ), S. Acton, R. Woolf. The Annual Beauchamp Lodge Award was presented to G3MLE in recognition of his services to the society during the past year. Meetings continue to be held on Wednesdays at 7.30 p.m. at Beauchamp Lodge, Warwick Crescent, Harrow Road, London, W.2. The programme for 1963 includes Morse classes and a series of lectures designed to help prospective amateurs to pass the Radio Amateurs' Examination.

Reading Amateur Radio Club.—At the December meeting, G8SC presided over a " Questions and Answers " session, while the A.G.M. and election of officers was due to take place on January 26. G3OLA will give a lecture/demonstration of transistor equipment for Top Band on February 23 at the Palmer Hall, West Street. *Hon. Secretary*—R. G. Nash (G3EJA), 9 Holybrook Road, Reading.

Reigate Amateur Transmitting Society.—A film show is to be held at The Tower, High Street, Redhill, on February 16 at 7.30 p.m. and members of local clubs are invited to attend. Films from the A.E.I. Library will include *Network* and *The World of Semiconductors*. *Hon. Secretary*—F. D. Thom (G3NKT), 12 Willow Road, Redhill, Surrey.

Surrey Radio Contact Club.—On February 12, Mr. Gregory of Mullard Ltd. is to give a talk on " U.H.F. Front-ends " at the Blacksmith's Arms, South End, Croydon. Future arrangements include a Surplus Sale next month, the A.G.M. in April and the Constructional Contest in May. Details of other activities may be obtained from the *Hon. Secretary*—S. A. Morley (G3FWR), 22 Old Farleigh Road, Selsdon, South Croydon.

Thames Valley Amateur Radio Transmitters' Society.—At the A.G.M. last month, the president, Leslie Cooper (G5LC), and all other officers were re-elected. In his report, Mr. Cooper commented on the society's continuing success and thanked members for their support. The first mobile rally, held in 1962, had been a great success and it was proposed to hold another during 1963—see *Mobile Column*. Membership continues to increase but new members, particularly of the younger generation, are always welcome. A special dinner is to be held later in the year to celebrate the society's 30th anniversary. *Hon. Secretary*—Ken Rogers (G3AIU), 21 Links Road, Epsom, Surrey.

Torbay Amateur Radio Society.—The first meeting at the enlarged and re-decorated headquarters at Belgrave Road, Torquay, took place on December 15. The president, W. B. Sydenham (G5SY), thanked all members who had worked so hard on the new headquarters where future monthly meetings will be held. A quiz contest resulted in a win for the Plymouth Radio Club by 44 points to 26. At the January meeting, Mike Mathews (G3JFF) gave an illustrated talk on his recent two-year voyage as a member of the survey team aboard H.M.S. *Cook*. On February 9, G3OGH is due to give a talk on the Decca Navigator System, illustrated with film.

York Amateur Radio Society.—The society has new headquarters at the British Legion Club, 61 Micklegate, York, where meetings are held on Thursdays at 7.30 p.m. *Hon. Secretary*—H. Ferguson (G3HSZ), 29 Victor Street, York.

Wirrall Amateur Radio Society.—At the January meeting, P. Jones (G3PUU) described the construction of a clover-leaf aerial for 2m. Details of future meetings are given in *Forthcoming Events*. *Hon. Secretary*—A. Seed (G3FOO), 31 Withert Avenue, Bebington, Wirral, Cheshire.

Can You Help?

- M. S. Vann (G3RLV), Eagle House, Hurstpierpoint College, Hassocks, Sussex, who requires information on the Motorola f.m. transmitter model FPT25V and the Identification Unit RDF1 (ZC13312)?
- G. N. Dale (G3PZF), 18 Lezayre Road, Green Street Green, Orpington, Kent, who wishes to borrow for a few days the circuit diagram and/or operating manual for the Transmitter-Receiver Type Z.C.1 Mark II?

R.S.G.B. Slow Morse Practice Transmissions

The following Slow Morse Practice transmissions are sponsored by the R.S.G.B. Those responsible for the transmissions have a duty to the membership to adhere to the schedule but if they cannot do so for any reason they should notify the Honorary Organizer, Mr. C. H. L. Edwards (G8TL), 28 Morgan Crescent, Theydon Bois, Essex.

Time	*Call-sign*	*kc/s*	*Town*
Sundays			
09.30	G3HNJ, G3OFP, G3OMJ	1840	Doncaster
09.30	G3KZZ	1920	South Shields, Co. Durham
10.15	G3CGD	1875	Cheltenham
10.30	G3NCZ	1920	Blackburn, Lancs.
11.00	G3GZE	1840	Blackburn
11.00	G2FXA	1900	Stockton-on-Tees
11.00	G3NXQ	1850	Warndon, Worcs.
11.00	GW3PCK, GW3PEX	1850	Cefncoed, Breconshire
12.00	GM3HBY	1903	Glasgow
12.00 †	G3HVI, G3IVB, G3OGD, G3ONQ	1920	Stoke-on-Trent
12.00	G3IGW, G3NBI	1900	Halifax
12.00	GI5UR	1860	Belfast
Mondays			
18.30	G3NC	1825	Swindon
18.30	G3NCZ	1920	Blackburn, Lancs.
19.00	G3EEL	1960	Peterborough
19.00	G3KTP	1850	Heanor, Derby
19.00	G3MXS	1915	Wirral
20.00	G3KLT	1838	Birmingham
20.00	G3GZE	1840	Blackburn
20.00	G3HJG	1825	Manchester
20.00	G3NIM	1910	Southampton
20.30	G3AGN	1875	Felixstowe
21.30	G3HZG	1870	Redditch, Worcs.
21.30 †	G3IRM, G3MWO	1981	Bury St. Edmunds
22.00	G3PRM	1916	Alvaston, Derbys.
Tuesdays			
18.00	G3GZE	1840	Blackburn
18.30	G2FXA	1900	Stockton-on-Tees
18.30	G3REG	1920	Blackburn
19.00	G3ONB	1850	Kirkby-in-Ashfield
19.00	GW3BQY, GW5VX	1918	Port Talbot
20.00	G3NBV, G3PJI	1910	Southampton
20.00	G3NHR	1900	Hounslow
20.30	G3MEH	1900	Old Coulsdon, Surrey
20.30	G3NKX	1915	Loughton
21.00	G3LSC, G3MKN, G3NUN	1875	Poole
21.30	G3HZG	1870	Redditch, Worcs.
21.45	G2UK	1875	Lowestoft
22.00 †	G2CZU, G3LLM	1820	Bath
22.00	G3AWL	1980	Wingate, Co. Durham
22.30	G3KWH	1900	Welwyn Garden City
Wednesdays			
19.00	G8RQ	1850	Chesterfield
19.30	G2BSQ	1930	Ashtead, Surrey
19.30	G3NQR	1875	Harrow Weald
20.00	G3KFE and G3FAU	1980	Stevenage
20.00	G3IBJ	1910	Southampton
20.00	G3GZE	1840	Blackburn
20.30	G3LCK	1910	Canterbury
20.30	G3KGU	1920	Theydon Bois, Essex
21.00 †	G3HVI, G3IVB, G3OGD	1920	Stoke-on-Trent
21.00	G3LSC, G3MKN, G3MXF	1875	Poole
21.00	G3AGX	1920	Hull
21.30	G3HNJ, G3OFP, G3OMJ	1840	Doncaster
21.30	G3HZG	1870	Redditch, Worcs.
22.00	G3NXQ	1850	Warndon, Worcs.
Thursdays			
18.30	G3NC	1825	Swindon
19.00	G3EEL	1960	Peterborough
20.00	G3NBV	1910	Southampton
20.00	G3NHR	1900	Hounslow
20.00	G5XB	1890	Reading
21.15	G3LGK	1916	Ilkeston, Derbys.
21.30	G3HZG	1870	Redditch, Worcs.
21.30 †	G3IRM, G3MWO	1981	Bury St. Edmunds
22.00 †	G2CZU, G3LLM	1820	Bath
22.00	G3AWL	1980	Wingate, Co. Durham
22.00	G3HZM	1825	Manchester
22.30	G3KWH	1900	Welwyn Garden City
Fridays			
18.30	G3DMN, G3FVP	1880	Ipswich
18.30	G3NCZ	1920	Blackburn, Lancs.
19.00	G3PGS	1850	Kimberley, Notts.
20.00	G2BOJ, G3NXZ	1840	Doncaster
20.00	G3JQS	1915	Totton
20.00	G3NYB, G3NXZ	1980	Doncaster
20.30	G3ICX	1915	Sutton Coldfield
20.30	G3PED	1920	Goodmayes, Essex
21.30	G3HZG	1870	Redditch, Worcs.
21.30 †	G3OVU, G3KSS	1900	Bradford
23.00	GM3HBY	1903	Glasgow
Saturdays			
13.00	G2FXA	1900	Stockton-on-Tees
14.30	G3NQA	1925	Birmingham
19.30	G3KPO	1900	Peterborough
19.30	G3KPO	1960	Peterborough
20.30	G3HZG	1870	Redditch, Worcs.

† *Alternately*

Alterations and additions to this list should be sent to the Honorary Organizer at the address given above.

R.S.G.B. Morse Practice Tape

A MORSE code practice tape, recorded at 3¾ in. per second, is now available from Headquarters, price 17s. 6d. post paid. The speed of sending on the 450 ft. tape is approximately 14 w.p.m.

The exercises are not intended to teach the code but by running the tape at 1⅞ in. per second useful practice is available for beginners. The recording can also be run at 7½ in. per second for high speed practice.

Bulletin Stencil Plates

IT occasionally happens that a stencil plate used for the preparation of a particular BULLETIN wrapper becomes worn or loses ink, with the result that the Post Office experience difficulty in tracing the address.

Members who notice that the address on the wrapper used for their copy of the BULLETIN is indistinct, or in any way faulty, are asked to advise Headquarters.

FOR YOUR BOOKSHELF

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The Amateur Radio Handbook	36/6
R.S.G.B. Log Book (120 pages)	18/-
Radio Data Reference Book	14/-
Radio Amateurs' Examination Manual	5/6
R.S.G.B. Amateur Radio Call Book	5/-
A Guide to Amateur Radio	4/-
Service Valve Equivalents (Fifth Edition)	3/6
Communication Receivers	3/-
The Morse Code for Radio Amateurs	1/9
R.S.G.B. Morse Practice Tape (450 ft., 3¾ i.p.s.)	17/6

AMERICAN PUBLICATIONS

Radio Amateur's Handbook, 1962 (*A.R.R.L.*)	38/6
CQ Sideband Handbook (*Cowan*)	25/6
Mobile Manual for Radio Amateurs (*A.R.R.L.*)	25/-
CQ Mobile Handbook (*Cowan*)	24/6
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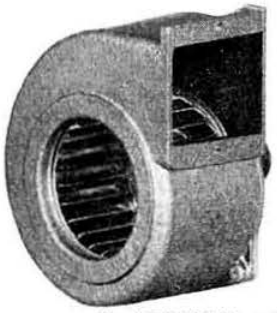

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