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VOL XIV AUGUST, 1956 NUMBER 6

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FOR THE EXPERIMENTER AND THE RADIO ENGINEER

The SHORT-WAVE Magazine

EDITORIAL

Danger

We have commented several times previously in this space on the increasing pressure on VHF channels for commercial development and the opening of new communication systems. It has also been explained that the trouble would start when the PMG had to move the established mobile radio networks (" business radio ") out of Band III to make way for — yes, you've guessed it — Commercial Television.

This situation is now upon us. Not unnaturally, the Mobile Radio Users' Association is protesting with considerable vehemence. Though this Association is small in numbers, it is well represented, both inside and outside the House of Commons. Its chairman has just made a most significant statement, to the effect that " the congestion on the roads is nothing to that on the radio channels, the right to use which has become a commodity of great value." (With the sense of this, we are in entire agreement). The Association, being dissatisfied with the GPO's handling of this very difficult problem of waveband allocation, is pressing for the immediate appointment of a permanent, independent, statutory body — to be known as the Civil Frequency Authority — to go into the whole question of existing allocations and the use of wavebands not reserved for the Services.

The danger is obvious. If the PMG is stampeded, in the House of Commons, into accepting this proposal, it is certain that all amateur bands will come under the most glaring scrutiny. But we may be sure of two things. One is that Dr. Hill is not likely to be stampeded by anybody, and the other is that the Services will see to it that our bands are preserved — for, fortunately as it turns out, we share most of them and, one way or another, the Services have a direct interest in all our bands.

This whole grisly situation would never have arisen if the House of Commons had not in the first place allowed itself to be pushed, by an influential pressure group, into accepting the fatuous, frivolous, unnecessary and financially wasteful concept of Commercial Television. And that is what has been said consistently in this space for the last five years.

Austin Forbes G6FO.

What is the "ZL Special"?

DATA ON A POPULAR TWO-ELEMENT BEAM FOR TEN OR TWENTY

In response to many requests and enquiries, here are the details of a design first described by G2BCX in the July, 1950, issue of SHORT WAVE MAGAZINE.—*Editor.*

DATA on the aerial to be described came originally from New Zealand, hence the name "ZL Special." Little is known of its origin save that it was designed in the U.S.A., just prior to the late war, for commercial purposes. Since the war it has been modified and developed for amateur use by various operators, with very successful results. Claimed performance figures are as follows:

Forward Gain: *7 dB (over a dipole).*
Back-to-front Ratio: *40 dB down.*
Broad Band Characteristic: *Variation of only 6 mA at 150 watts when tuning from 14 to 14.4 mc.*

Tests have shown that a forward gain of 7 dB as claimed (equivalent to a four-element parasitic beam), can be achieved, and the forward vertical radiation angle is from 15 to 20 degrees. The aerial radiates in one direction only as a normal two-element beam, and has a horizontal radiation pattern as shown in Fig. 1. It is compact and easy to construct either as a fixed beam indoors or outside, or as a rotating array on a suitable tower. It can be cut to operate over a wide frequency band from the formulæ and measurements given, without the tedious tuning procedure normally required to obtain peak performances from the parasitic type of beam.

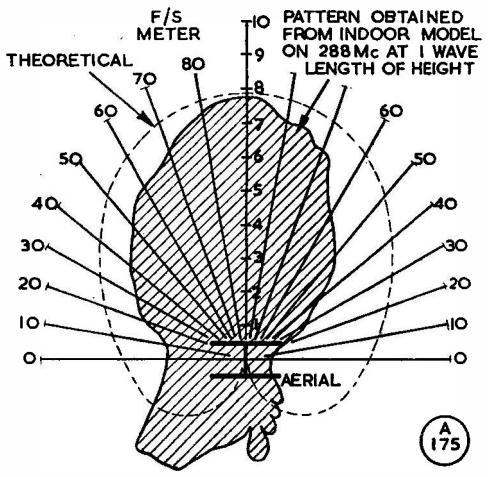


Fig. 1. Horizontal radiation pattern of the "ZL Special" as deduced from a scaled-down model. It compares well with the theoretical polar diagram.

Constructional Features

The elements can be made of either self-supporting tube, open wires or 300-ohm twin transmission line. Tubing up to 1½in. in dia.

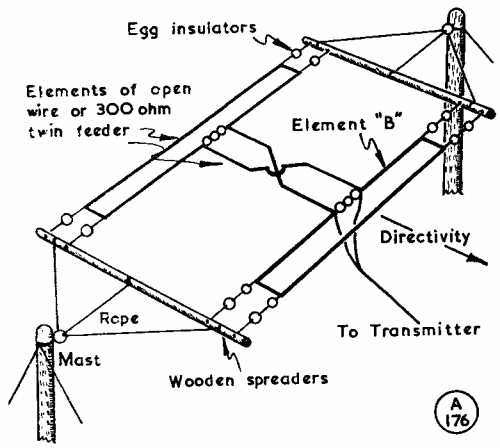


Fig. 2. Layout of the "ZL Special," full design details of which are given in the text — and see Fig. 3. Directivity can be changed simply by swinging the system right over, so that element B lies on the opposite side. At some stations, fully rotatable "ZL Specials" have been installed, to give 360° coverage.

can be used without changing the dimensions. The elements are parallel to each other and in a plane horizontal to the ground, the general construction being as suggested by Fig. 2. Apart from rotation, if set up on a fixed alignment between supports (as in Fig. 2) the directivity can be reversed by "flopping the aerial over." Very effective coverage could be obtained with the supports aligned NW-SE.

Electrical Characteristics

The aerial consists simply of two folded dipoles fed approximately 135 deg. out of phase, the impedance at the point of feed being 70-75 ohms, so that a standard 72-ohm twin line can be used for feeding (any length) from the transmitter. Alternatively, a 300-ohm line plus a Q-matching stub of 150 ohms impedance may be used (*see* dimension E in formula). Both systems have been used and each has worked satisfactorily.

The phasing line (F) can be made of 300-ohm ribbon feeder with the cross-over at the centre, or from open-wire line made of 14 SWG wire

FORMULÆ

For Diagram of Layout see Fig. 3

A. 492/F.mc × 0.95
B. 492/F.mc × 0.9
C. 984/F.mc × 0.1 *(All in Feet)*
D. 123/F.mc
E. 246/F.mc × 0.77 *(Matching stub for 300-ohm line).*
F. 123/F.mc × 0.9 *(Phasing line).*

DIMENSIONS

	10 metres	20 metres
A.	16 ft. 3 in.	32 ft. 6 in.
B.	15 ft. 5 in.	30 ft. 10 in.
C.	3 ft. 6 in.	7 ft. 0 in.
D.	4 ft. 3½ in.	8 ft. 7 in.
E.	6 ft. 7 in.	13 ft. 3 in.
F.	3 ft. 10 in.	7 ft. 9 in.

spaced 2in. If open-wire line is used the length of the phasing link should be reduced to 7ft. 6in. for 20 metres and 3ft. 9½in. on 10 metres. The dimensions for a "ZL Special" on the 21 mc band can be worked out from the Table of Formulæ given here.

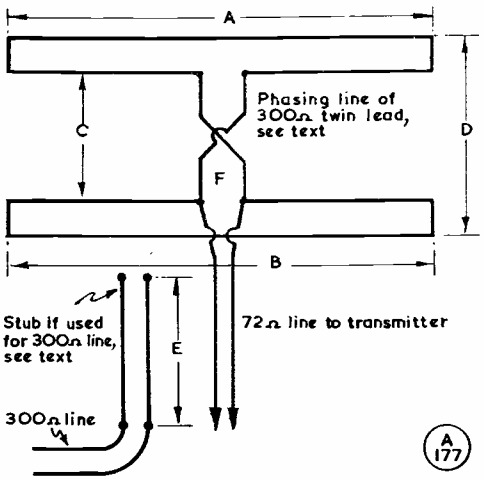


Fig. 3. Electrical layout of the "ZL Special." Dimensions for 10 and 20 metres are given in the table, and those for a 15-metre version can be calculated from the formula in the text. This simple beam, being fully driven, gives a very useful gain in comparison with any parasitic system of similar size.

Monitor Instrument for the Amateur Station

COMBINING SIGNAL GENERATOR FACILITIES

THIS frequency measuring unit has proved a valuable asset in station operation. It contains no sensational circuitry and each stage is of well-tried design, proving easy to build, adjust and operate. Another point in favour of the arrangement from the amateur aspect is that it uses standard octal-base receiving valves and no unusual components.

The equipment provides the following facilities:

(A) 100 kc crystal-controlled markers. useful up to 30 mc.
(B) 10 kc crystal-controlled markers.
(C) Signal generator for receiver calibration —the range 1,700-2,000 kc providing useful harmonics in the amateur bands.
(D) Heterodyne wavemeter.
(E) CW and 'phone monitoring.

Circuits

The circuit layout is shown in detail in the diagram, and this sequence should be followed in the construction of the instrument.

V1 is a 100 kc crystal oscillator.

V3—Interpolation oscillator, multi-vibrator circuit synchronised by V1 and providing 10-kc markers.

V2—Harmonic amplifier, into which is fed the 100 kc and 10 kc outputs. This stage emphasises and boosts the higher harmonics.

V4—Signal generator using ECO circuit. The controls are bandset C20, main tuning C19, and panel trimmer C21, to compensate for slight drift (used in conjunction with 100 kc and 10 kc outputs).

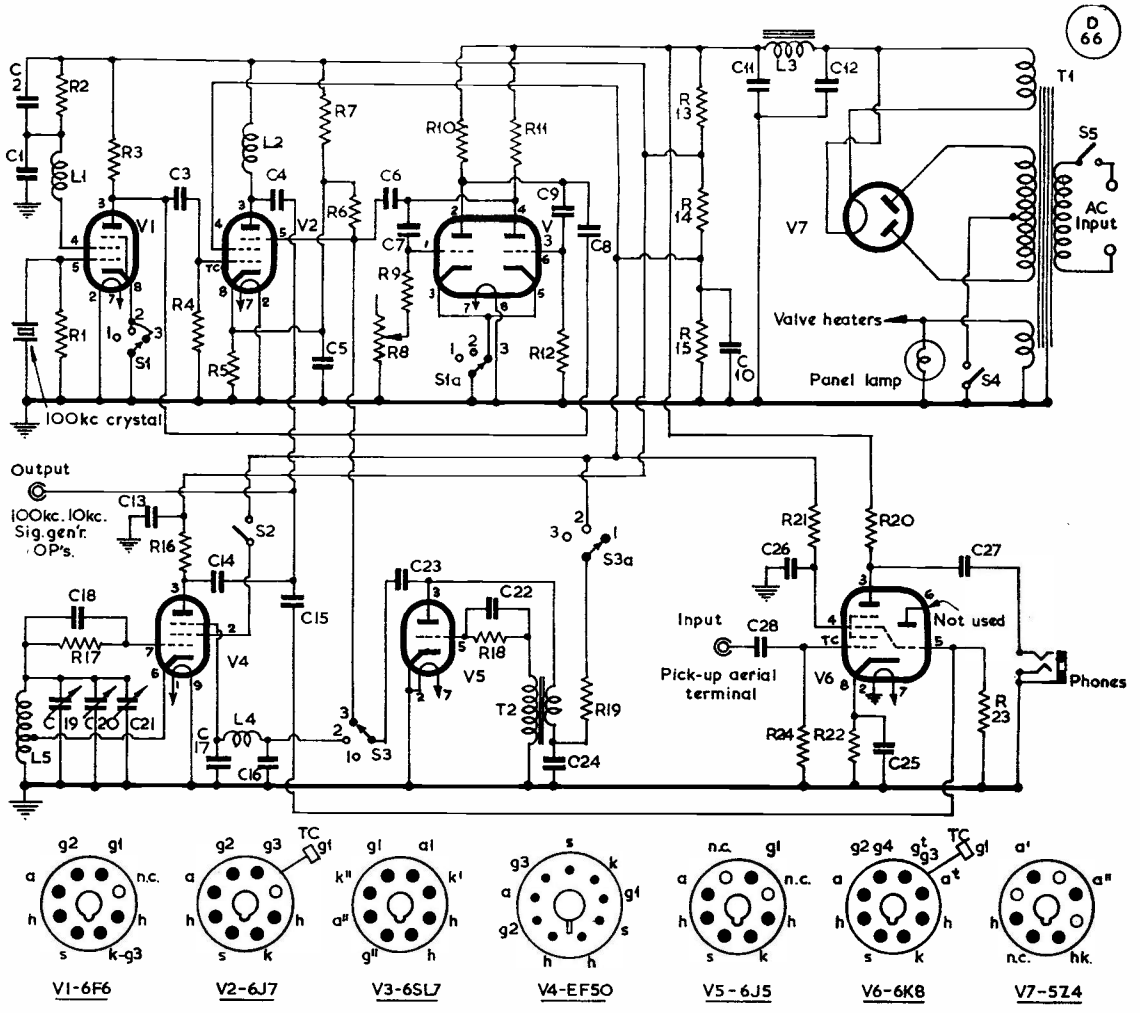
Outputs of V4 and V2 are fed to a common panel terminal and used with a 2-ft. aerial.

V5—Audio oscillator used to modulate V2 and V4 at will.

V6—Mixer stage allowing beats to be heard in telephones between *(a)* 100 kc/10 kc and signal generator, *(b)* between signal generator and received external signal (own transmitter). It is thus a heterodyne wavemeter; also, used as such, it is a good CW monitor. V6 used alone is a speech monitor.

V7 — Usual full-wave rectified power supply.

When this assembly was in the design stage it was thought desirable to provide voltage stabilisation owing to the fact that the total of valves in use at one time would differ, thereby imposing different loads on the power pack, and it was thought that this might affect the



Circuit of the combination signal generator, heterodyne frequency meter and CW/phone monitor described in the text. It is self-contained for power and all values are given in the table.

Table of Values

Monitor Instrument for the Amateur Station.

C1, C2, C24, C26 = 0.1 μF paper 300v. D.C. wkg.
C3, C18 = .0001 μF mica
C4 = .0005 μF mica
C5, C13 = .005 μF paper 300v. D.C. wkg.
C6, C8 = 10 μμF silvered mica
C7, C9 = .001 μF mica
C10 = 0.5 μF paper 300v. D.C. wkg.
C11, C12 = Dual 8 μF elect. 400v. D.C. wkg.
C14 = 50 μμF silvered mica
C15, C28 = .003 μF paper
C16, C17 = .0002 μF mica
C19 Sig. Gen. Tuning = *See text*
C20 Sig. Gen. Band Set = *See text*
C21 Midget Variable = 15 μμF
C22, C23 = .01 μF paper
C25 = 25 μF elect. 25v. D.C. wkg.
R1 = 5 megohm ½-w.
R2, R6 = 22,000 ohms ½-w.
R3 = 220,000 ohms ½-w.
R4 = 500,000 ohms ½-w.
R5 = 1,200 ohms 1-w.
R7 = 39,000 ohms 1-w.
R8 = 50,000 ohms variable
R9 = 4,700 ohms ½-w.
R10, R11 = 56,000 ohms 1-w.
R12, R23, R24 = 20,000 ohms ½-w.
R13 = 10,000 ohms 2-w.
R14 = 20,000 ohms 5-w.
R15 = 33,000 ohms 5-w.
R16 = 100,000 ohms ½-w.
R17 = 69,000 ohms ½-w.
R18 = 250,000 ohms ½-w.
R19 = 50,000 ohms ½-w.
R20 = 50,000 ohms 1-w.
R21 = 50,000 ohms 1-w.
R22 = 220,000 ohms ½-w.
S1 and S1a Two pole 3-way Yaxley type switch
S4 Stand By = Toggle on-off
S5 Mains S4 Sig. Gen. = Toggle on-off
S3 & 3a = Two-pole three-way Yaxley type switch
L1 = Eddystone Type 1066, RF choke
L2 = 2.5 mH RF choke
L3 = 20 Hy smoothing choke
L4 = Eddystone Type 1066, RF choke
L5 = 60 turns 26-gauge enamelled on ceramic former 1-in. diam., 2½-in. long, tapped ¼rd from end and shellaced
T1 = Power Transformer, Outputs 250-0-250 80 mA, 5v. 1a, 6.3v. 3-w.
T2 = Intervalve 1/3
V1 = 6F6
V2 = 6J7
V3 = 6SL7
V4 = EF50
V5 = 6J5
V6 = 6K8
V7 = 5Z4

signal generator. On test, however, it was interesting to find that the frequency setting was not changed by the number of stages in use and thus no voltage stabilisation was incorporated. This is, however, a matter for individual investigation.

Construction

The unit is built on a dural chassis (16 gauge) measuring 16in. by 9in. by 2½in. It is realised that mild steel would have provided a more robust job, but it was also realised that dural is easier to work ! The chassis is housed in an ex-Government cabinet which originally contained a relay panel. Measurements are 19in. long by 10in. high by 10in. deep. The panel is braced against the chassis by solid end brackets ; supports are also provided each side of the tuning condenser to obviate any effect due to panel "give." Chrome handles are used to protect panel controls from damage when the set is placed on the bench with the panel downwards. Ventilation holes (1in. diameter) are bored along the top of back and sides and backed by perforated zinc. The signal generator should be wired with 14 SWG tinned copper wire.

Controls

S1 (1 and 1*a*) Three position: 1 - o*ff* ; 2 - 100 kc *on ;* 3 - 100 kc and 10 kc *on.*

S2 Signal generator *on - off.*

S3 (3 and 3*a*) 1 - *off* ; 2 - Signal generator modulated ; 3 - 100 kc modulated.

A small knob for C21 under the main tuning dial is used to compensate for any drift, and to correct dial reading checked from the 100 kc and 10 kc markers by listening to beats in the headphones.

Main tuning condenser is a standard HF type cut down to three fixed and three moving vanes. Slight adjustment of end vanes may be necessary to obtain the desired band (1,700-2,000 kc). The dial can either be home-constructed, or the Eddystone panel type as used in many VFO designs would be very suitable. A great deal of the usefulness of the signal generator side of this instrument depends upon the quality of the control used for C19, and the accuracy with which its dial is marked. Time taken on this is well spent.

The capacity of the band-set condenser C20 can easily be determined by trial and error. The pre-set control on the chassis is adjusted until nine 10-kc markers are counted between two 100-kc markers. This control is then locked.

If, on checking the 100-kc crystal against WWV or MSF, it is found to be too high in frequency, a small variable condenser (30 $\mu\mu$F) in parallel with the crystal will provide a means of adjustment to exact zero beat.

CALL BOOK — Summer Edition

The Summer Edition of the *Radio Amateur Call Book* is now available, as advertised in this issue by our Publications Dept. The G Section runs to 23 pages and includes all QTH's and changes of address as published in "New QTH's" up to and including the May 1956 issue of SHORT WAVE MAGAZINE. As usual, the *Call Book* — which is now in its 34th volume of four issues per year — can be had either in the full edition (31s.) or abridged (15s.) by the elimination only of the U.S. amateur listings.

R.A.F. AMATEUR RADIO SOCIETY OFFICIAL BROADCAST

The special facilities enjoyed by the R.A.F. Amateur Radio Society have enabled them to obtain the use of two Air Ministry frequencies, 5105 and 14810 kc, for simultaneous news broadcasts on CW and phone. Intended for RAF-ARS members throughout the world, transmissions are made on both frequencies under call-sign MRM, from R.A.F. Locking, Somerset, Hq. of the R.A.F. Amateur Radio Society, at 1430 clock time on Wednesdays. It is hoped to extend the service by auto transmission at other times, and at week-ends.

These arrangements put RAF-ARS ahead of all other amateur broadcast systems, and have the additional merit of being carried out on frequencies outside the amateur bands. It is hoped that MRM's transmissions will be of value and interest to members in all parts of the world.

Membership of the R.A.F. Amateur Radio Society is open to all ranks, past and present, of the Royal Air Force. The Society publishes, twice a year, its own periodical, *QRV*, from the June issue of which we get the foregoing regarding the MRM broadcasts. Present membership of the RAF-ARS is approximately 400, serving and non-serving. Applications for membership should be addressed to: Administrative Secretary, Hq. R.A.F. Amateur Radio Society, R.A.F. Station Locking, Somerset.

REGULAR READING

To make sure of your copy of SHORT WAVE MAGAZINE each month, place a regular order with your newsagent. If he has the slightest difficulty in getting supplies through his usual wholesaler, or there is any delay, tell him he can order direct on us. All orders are cleared before the day of publication, so there should be no hold-up. Alternatively, you can have your copy delivered by post on the day of publication (in the U.K.) for 30s. for a year of twelve issues, starting any month. We also accept half-yearly subscriptions at 15s. for six months.

A Note on Noise Limiters

EVOLVING AN EFFECTIVE CIRCUIT

DURING the course of building, modifying, rebuilding, scrapping and starting again on an outboard Q5'er to improve the selectivity of the old station receiver, various types of noise limiters were incorporated. But none of them really killed ignition noise the way the limiter does in the AR88 receiver. When the Q5'er settled down into a final form the problem of why all the noise limiter circuits failed to function was more seriously tackled. Almost every circuit ever published was tried, but all ended in failure — the situation was rather desperate as the greatly improved selectivity of the Q5'er could not be used on account of ignition noise from passing cars, particularly troublesome on 10 and 15 metres.

After considering the noise limiter circuits carefully it was decided that the layout was not as good as it could be and possibly stray capacities were responsible for leakage. The whole second detector wiring was pulled out and re-wired with all the noise limiter components packed away into one corner, including the valve. The valve was an old acorn type of diode, a 9004, with the wires soldered direct to the valve pins. (This was done to prevent long leads.) It was the writer's first experience of soldering direct to valve pins and is quite satisfactory if one is quick with the iron—although one would not recommend a first attempt on a new valve costing good money !

Still no success. Next a germanium diode was tried in a modified circuit which was a little better. It was used for a time, but one found oneself going back to the AR88 alone in order to take advantage of its noise limiter. The circuit in the AR88 was next copied, but again without avail. At least ten years of back numbers of various magazines were gone through. The same circuits repeated themselves and the best article was eventually found in *Electronics* for November, 1946.

The Basic Problem

The first theory as to why no circuit worked correctly was that the selectivity was too high and that the circuits were ringing. This was easily disproved by the noise limiter in the AR88 working just as well whether the crystal was switched in or out! The next theory was that the second intermediate frequency of 100 kc was too low as the *Electronics* article refers to various frequencies at which the different types of noise limiter circuits were tried, and these were all up in the megacycle range. But again limiters work quite happily on 465 kc and so why not at 100 kc ? At 100 kc it is difficult to filter out the RF from the audio signal in the detector circuits so various types of RF filters were tried, but again without success.

The first light dawned when it was realised that despite the high selectivity in the Q5'er the reproduction of speech was " tinny " instead of " boomy." The audio circuits were very ordinary, but had been arranged to give reduced low-frequency response by using a small value of cathode condenser in the triode amplifier. The circuit is given in Fig. 1.

On measuring the response it was found the output of this audio section was only slightly down at 40 kc. (It would have been interesting to see how far it really did go, but 40 kc was the upper limit of the audio oscillator available.) The first thing to do was to kill the treble response by shunting the anode loads with condensers. After a little arm-chair engineering approximate values were calculated and then the circuit was measured again. After a couple of changes the values shown were left in and the response was as indicated by Fig. 2.

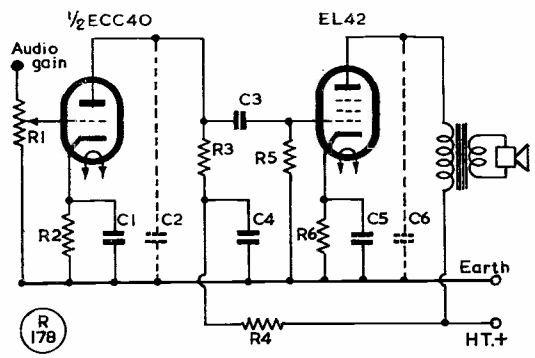


Fig. 1. First experimental circuit, values as in the table. C2, C6, were added to reduce the upper frequency response of the amplifier.

Table of Values

Fig. 1. Audio amplifier circuit used.

C1 = 0.1 μF	R1 = 2 megohm
C2 = .001 μF	R2 = 1,200 ohms
C3 = .01 μF	R3 = 47,000 ohms
C4 = 8 μF	R4 = 10,000 ohms
C5 = 25 μF	R5 = 1 megohm
C6 = .005 μF	R6 = 360 ohms

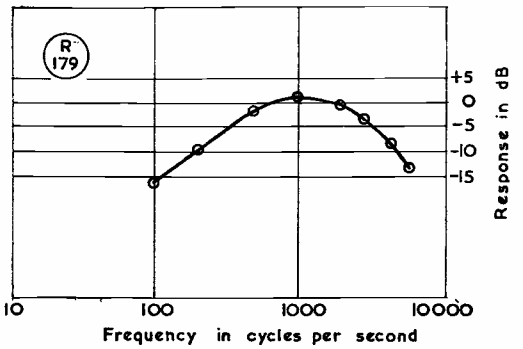


Fig. 2. Response curve of the modified audio amplifier — see text for discussion.

The limiter in circuit at the time was the new " Audio Silencer " described in *Electronics* for February, 1956. As this was a new and untried (as far as the writer was concerned) circuit it was decided to modify it to a shunt type of limiter. The circuit is shown in Fig. 3. This worked reasonably well.

Improving Limiter Action

Not being satisfied with " reasonably well " and also because the 955 was introducing a certain amount of hum which showed up badly on CW and made a T9 signal sound like T4, it was decided to remove the 955 triode (which was connected as a diode) from the limiter circuit and to find something less liable to spoil the CW reception qualities of the Q5'er. Incidentally, it is always, in the writer's opinion, a mistake to use old types of RF valves in low-level audio circuits. Usually their heater to cathode insulation is poor and they are prone to introduce hum into high-impedance circuits. Similarly, it was decided to eliminate the germanium diode from the detector, as unless the circuit is specially designed, germanium diodes are not entirely satisfactory as detectors on account of the small reverse voltage they will handle and the extra damping imposed on the last IF stage. This meant taking out the OA50 diode and replacing it by the 9004, using the OA50 as the limiter diode. Conversely, the germanium diode is not supposed to make a good limiter, on account, one presumes, of its low back or reverse resistance. It was reasoned that this could be overcome by using a correspondingly low series resistance. Looking up the curves of the OA50 (which is not specially a high reverse resistance type) gave a figure in the region of about 1 megohm. Referring to Fig. 4, the actual and equivalent circuit of the limiter will be seen. If Rx is made 10,000 ohms the potentiometer effect of the series diode, when limiting, will give a reduction of 100 times, *i.e.*, a loss of 40 dB on impulses. This was considered to be sufficient, so the circuit was wired up and tested.

Table of Values

Fig. 3. Modified Noise Limiter Circuit.

C1 = 0.1 μF
C2 = 100 $\mu\mu$F
C3 = .01 μF
R1 = 1 megohm
R2 = 100,000 ohms
R3 = 250,000 ohms limiter control

Results

The results on impulsive noise from car ignition systems turned out to be very satisfactory indeed. It is not quite as good as the AR88 noise limiter on " hash " types of noise from electric motors as it does not appear to remove the rough edges quite as well. This is probably due to the high-frequency response of the audio section still being too good despite cut-off starting at 3000 c.p.s. How far the audio response should extend is probably a very debatable question. In practice it has been found that a 3 kc wide Collins mechanical IF filter gives reasonable reproduction when the carrier is tuned to the centre of the pass band. The writer's own Q5'er gives quite reasonable quality on the BBC despite its sharpness. The response now being obtained is shown in Fig. 5. It is felt that the effectiveness of the noise limiter could be improved still further by fitting a tone control in the audio circuit in order to reduce the treble response to the minimum necessary to suit the particular conditions obtaining.

The finalised circuit is as given in Fig. 4, with Rx equal to 10,000 ohms. The poor AC-to-DC impedance of the detector circuit

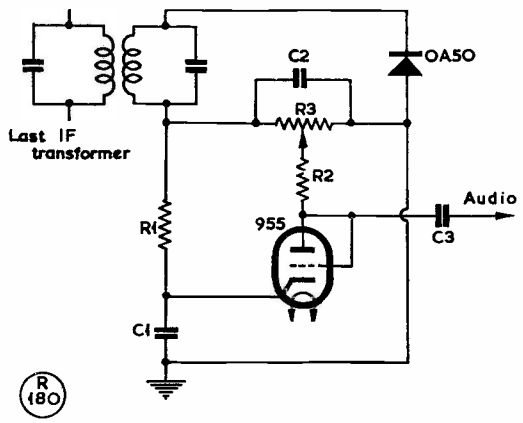


Fig. 3. The limiter circuit was modified to the arrangement above from which in turn the circuit of Fig. 4 was evolved, as explained in the article.

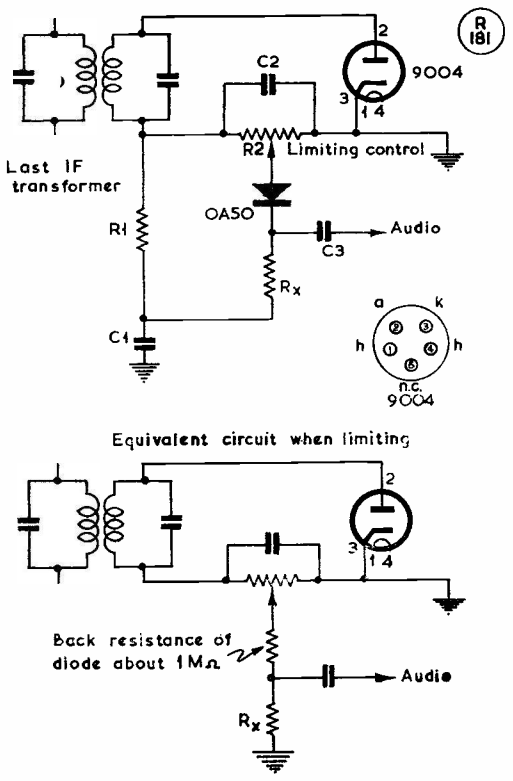


Fig. 4. Noise limiter circuit found most effective, for which values are given in the table, with the "equivalent circuit" when limiting shown below. Very good results are obtained under stringent operating conditions.

will probably raise some criticism. It was thought it might introduce some noticeable distortion but it does not appear to in practice. This is probably explained by the fact that noise limiters introduce distortion anyway and one can stand much more distortion in reproduced speech and music than the "hi-fi boys" would have us believe ! It has been said that the figure for speech is somewhere in the region of 40% total harmonic before it starts to sound really bad !

The secret of making noise limiters work successfully with low frequency (85 to 100 kc) IF strips appears to be to restrict the response of the audio section to 2000 to 3000 c.p.s. so that the audio section does not pick up the intermediate frequency direct, rectify the large noise pulses, and pass them on to the phones or loudspeaker *as* noise.

The noise pulse remaining in the audio circuits after being cut by the limiter has been examined with an oscilloscope and does not amount to more than approximately 50% of the amplitude of an audio signal ; it is virtually

Table of Values

Fig. 4. Limiter circuit as finally evolved.

C1 = 0.1 μF	R1 = 1 megohms
C2 = 100 μμF	R2 = 250,000 ohms, limiter control
C3 = .01 μF	Rx = 10,000 ohms (*see text*)

inaudible when listened to in the phones because it is that much below signal level. The potentiometer R2 has little effect on limiting except when the control is turned to the bottom end where the signal, of course, disappears. In practice it could be replaced by two resistors of equal value. When the control is turned to the top end of the diode load the effect of limiting modulation peaks is not obtained — possibly because the signal peaks are so large that the diode starts to conduct.

As a matter of interest the diode was replaced by a 9004 diode in a conventional limiter circuit. Results were no better except that with the control R2 turned to the top end of the diode load the circuit started limiting on modulation and introduced serious distortion. It did introduce some hum on CW, which is also a bad feature.

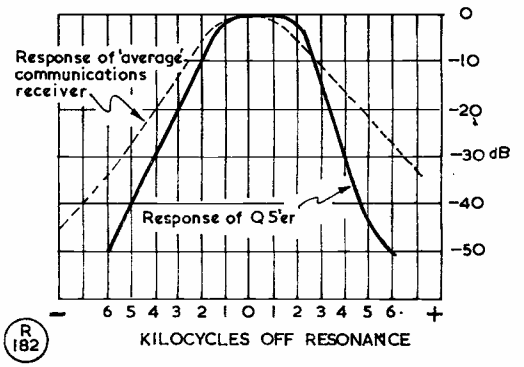


Fig. 5. Response curve (solid) when using a Q5'er, showing the selectivity gain, particularly marked on CW signals.

All in all the germanium diode is a useful and very simple limiter if the series resistance is reduced to be in keeping with the low reverse resistance and the treble response of the audio circuits is not allowed to go above 3000 cycles per second. It does introduce some loss in gain which should be allowed for when building it into a circuit.

NATIONAL RADIO SHOW

This will be at Earl's Court, London, during the period August 22 to September 1st. More than 100 firms and organisations will be represented, with a large contribution from the BBC, the ITA and the CTV programme contractors.

OPERATING FROM A DX PARADISE

EXPERIENCES OF VS4CT, VS5CT AND ZC5CT IN NORTH BORNEO

P. H. GREEN (G3DCT)

EARLY in 1954 I took employment as an electronic engineer with a British survey company and, as a result, in February of that year I set foot on Labuan Island, British Borneo, for the first time. Up till then I had held an earlier call as VU2BQ prior to getting my G call. My job was to be the maintenance and operation of a radio station as part of a navigational system which would be moved from time to time as the survey progressed, so as to cover a new section of the coastline.

The first two or three months were taken up with learning something about the equipment and setting it up, as it had been sent straight from the States and none of the operators had seen it before. When it finally became operational and all the teething troubles had been eliminated, I started to check on the possibilities of getting an amateur rig built and on the air from such a rare QTH. Transmitting gear was unheard of locally, and a communications receiver came into the same category. The station spares were sufficient to make only a start. There was some doubt as to how long we should be working in Borneo and so, to be on the safe side, I should have to have had sent out anything needed from the U.K. by air freight—which would be out of the question except for light-weight items. (At this time I had not heard of the Malayan Amateur Radio Society, whom I know now, would have helped me.) Whilst my vain search for gear was going on, I optimistically applied for a ticket for my first QTH—the State of Brunei. This did not present any great difficulty on production of my G licence, although, by virtue of the rarity of such applications, it took some considerable time before my requested call-sign VS5CT came through. My disappointment was very great at still not being in a position to use it. However, the whole thing was finally settled for me when the decision was made for all the survey crew to return to the U.K. in October until the monsoon season was over.

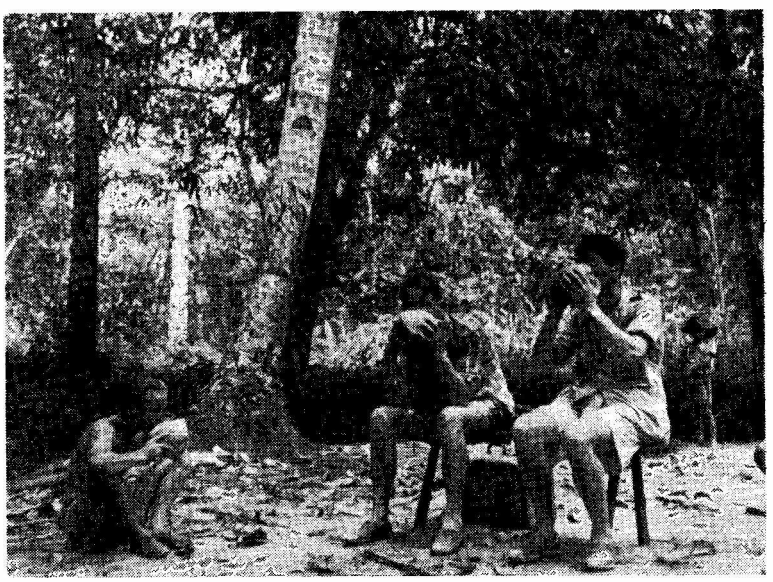
Whilst back in London, I started collecting sundry bits and pieces ready for the next trip. However, this turned out to be unnecessary, as the Company decided that R/T equipment of higher power should be supplied to the crew. Previously, low-powered transceivers had been used, and these only covered from 2 to 6 mc. The set-up decided upon for each station was a Panda PR-120-V transmitter and HRO receiver for the longer-range working that was anticipated. (The fact that I had some say in the selection, of course, had nothing to do with this particular choice!!) The Pandas were adapted for 110 volts and also for continuous operation, so that mine was running at about 90 watts input.

On the Air

Upon my return to Brunei in March, 1955, I re-applied for the licence, which was duly granted, and VS5CT came into being on 20 metres. The QTH was about 10 feet above sea-level and completely surrounded by thick jungle, with trees up to 150 feet high. The aerial was a dipole slung between a couple of very unsubstantial-looking palm trees about 25 feet high. Despite high winds, the swaying palms never quite succeeded in snapping it. My first CQ resulted in a VS6, followed by a VS2—hardly DX, but a start at least.

The first trouble encountered was very heavy interference from the station generators, which had to be within 40 feet of the main building. These consisted of 4 kVA alternators driven by 2-cylinder petrol engines. After considerable experimenting, the noise was reduced to a much more manageable level, and then I realised why I hadn't been hearing any DX.

The arrival of VS5CT on the band seems to have caused quite a stir, especially in the States. Due to the fact that we working on the job anything up to 18 hours a day, it was often not possible to get on the air before 1400 GMT, and sometimes not at all.



ZC5CT is behind the middle coconut. In Borneo, the coconut palm not only provides a drink, but its fibre makes mats for building and flooring, its leaves are used for roofing, it produces oil for cooking and the anointing of native bodies and — while VS4CT/VS5CT/ZC5CT was there — made his aerial masts as well.

The station of VS4CT, at the mouth of the Tatau River, Sarawak. From here, 59 countries were worked, with a total of 453 QSO's in three months on the site.

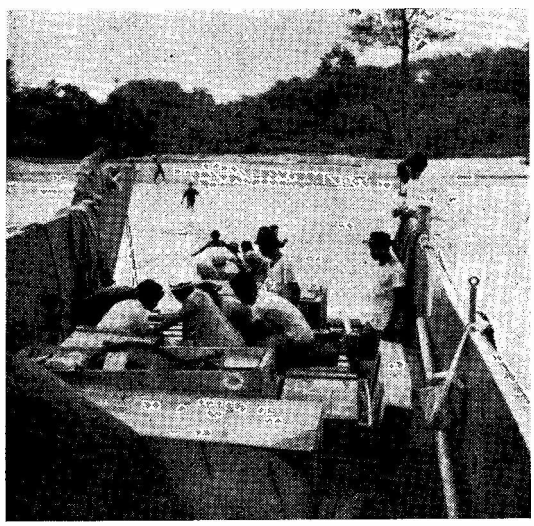
When conditions were good, I was often on 20 metres until 1800 GMT, or even later—local time being 8 hours ahead of this. After a few evenings of fairly hectic operating, the number of QSO's had started to reach sizeable proportions and I had seriously to consider the QSL situation, in view of the repeated requests for cards. It would have been almost impossible to get any cards in Borneo, and I was beginning to despair when VS2DB in Kuala Lumpur offered to get them printed for me if I sent a suitable design; he also suggested that I might like to join the Malayan Amateur Radio Society. I was very glad to accept both offers. The QSL cards arrived just before the date of our move to Sarawak was known, so I was unable to get many of them sent. I decided that, in view of the high cost of postage from Borneo, the only really practicable system for a 100% QSL effort was to send cards direct whenever some assistance with the postage bill was forthcoming. All the other QSL's were sent *via* the VS2 QSL Bureau.

When I knew the new QTH in Sarawak I wrote to Kuching, the capital, for a ticket and requested the call VS4CT if possible. About two days before the move began—in fact, on the actual boat that came to take my equipment to Sarawak—the licence arrived with the allocated call of VS4CT as requested.

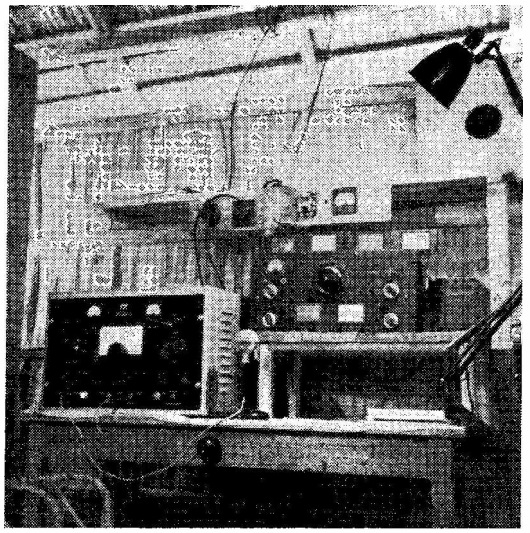
Moving to VS4

Then began one of the most trying moves that I had during my stay in Borneo. All the station equipment had to be dismantled and put into crates —those, that is, that had not been eaten by armies of white ants. With the assistance of a score of the local natives, all the crates were transported through the jungle down to the beach ready for loading on to the ship, an LCT that had been allocated for the move. Unfortunately, due to fairly heavy surf, the captain of the LCT could not beach it. This meant that everything had to be carried through the surf and put into the pitching craft. Needless to say, quite a large proportion of the gear took a dip, so I was having visions of many hours of repair work before I could get going again at the new QTH. When everything was loaded, all the natives came on board to be paid off, but the captain decided that he could not wait any longer and pulled out from shore. This meant that as I paid off each man he had to jump into the sea and swim ashore with his pay. I really think that the men earned their money that day!

The new QTH in Sarawak was some 120 miles away and situated right at the mouth of the Tatau River. This was a great help, as the landing craft was able to come into the river and run on to the bank, which greatly facilitated the unloading of the equipment. When this had been completed—again with the help of local labour—all the crates were opened and the station re-assembled. Great was my surprise when it worked almost immediately, considering the rough treatment it had just suffered. At this new QTH there were no suitable trees for my dipole, so I sent the two natives, who were permanently in my employ, into the jungle to chop down three 30-foot trees, which were dragged to the station site. Then, with suitable guying, I had quite satisfactory masts; I erected two dipoles at right-angles to each other. These dipoles were intended chiefly for Europe and North America, and it was extremely gratifying to get S9 reports from both Continents as well as from VK and ZS. Unfortunately, the hours of work were extended and I was often working 16 or more hours per day. By the time any necessary maintenance on the station had been done after the close-down, I was left with little time to go on 20 metres. However, in my three months in Sarawak I had 453 QSO's in 59 countries, as against 536 QSO's in 60 countries during two months in VS5.



Unloading the gear from an LCT at the VS5CT station site, in the remote British territory of Brunei, North Borneo.



Station of VS5CT, in Brunei, British North Borneo. The transmitter was a modified Panda and the receiver an HRO. With the set-up as pictured here, some 536 contacts were made in 60 countries in two months on the site.

Off to ZC5

Before I had to leave Sarawak I applied to Jesselton for a North Borneo ticket, and it was forthcoming almost by return of post. Again I was fortunate in getting the call that I requested—ZC5CT. I was on 10 days' leave in Brunei when I was notified that the date of the move to British North Borneo had been brought forward. This meant that I had to return to Tatau in Sarawak immediately to dismantle the station, leaving me no time to spread the news on Twenty, as I had promised to do, that I was definitely off to North Borneo.

Once again came the sweat and tears of a move. This one was nothing like so bad, as the boat allocated for the job was much larger because of the 340-mile journey to the next QTH. Once everything had been dismantled, it was only a matter of half a day before we were ready to sail, initially for the Island of Labuan to obtain clearance for the radio gear to enter the colony of North Borneo; 36 hours elapsed before this stage of the journey was completed, and it was uneventful, apart from the fact that my cook was ill for the duration of the trip, which meant eating out of tins only. Having spent a whole day going through the necessary formalities, we sailed once again and arrived about 5 hours later off the headland of Nosong, which was to be my abode for another three months. The landing of the equipment here was not of the easiest, as the whole shore was a mass of rocks and, in addition, the water was very shallow. The only possible approach was by small aluminium boats, which were carried for just such an emergency. It took two full days to off-load all the crates into these small boats and ferry them ashore, even with the help of quite an army of the local Dusun natives. It was possible to use an outboard motor for part of the way on the small boats, but after this we had to get out and push the boats in between the rocks for about half a mile. The new site had been cleared out of virgin jungle and was almost completely surrounded by trees up to 150 feet high.

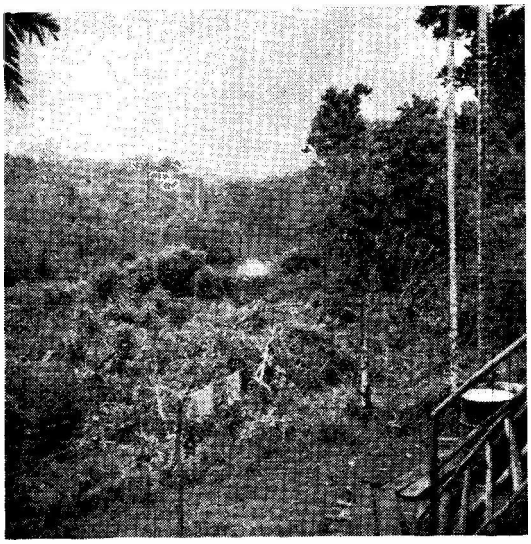
Again came the usual procedure of assembling the station, and especially the job of erecting the lattice aerial of over 100 feet. Until all this had been completed and the system was working satisfactorily, I could not even consider going on 20 metres again, and when I did get around to it a long-wire had to suffice until my dipoles could be erected. Despite the many very high trees all round, I could not use them as I had insufficient feeder line. So I had to adopt a similar method to the one used in VS4 and get trees chopped down to use as masts. On 31 August, 1955, ZC5CT was in QSO for the first time with VR2 and was on, at somewhat irregular intervals, until 2 December, when my tour in Borneo finally came to an end, and the station was dismantled and packed for the last time, to return to the U.K. in due course. During this period of operating the number of QSO's was down to 440, but the countries worked went up to 65. Before I left Borneo just before Christmas I was able to complete the sending out of cards and so keep up to the 100% standard that I had set.

Whilst I was on from ZC5 I was instrumental in bringing another member of the crew into the Amateur fraternity, and so ZC5CA came into being and created some competition for ZC5CT; he was using the identical rig and had a certain advantage in altitude.

Some General Impressions

My impression of the standard of operating was that the G, VK, and ZS stations were among the best. The bad manners of some operators was almost

The "station buildings," ZC5CT, Nosong, North Borneo. Operation commenced on August 31 last year and by the beginning of December 440 contacts had been made from here, with 65 countries worked.



Borneo jungle scenes. Above, looking out from the verandah at VS5CT. Below, a Sarawak river village. It was in these surroundings that G3DCT spent nine adventurous months last year.

unbelievable at times, and I lost count of the number of QSO's that were ruined because of this. Several other stations in the Far East agreed with me on this, and in some cases a "black book" was kept of the more persistent offenders, although this did not seem to daunt them in the slightest. These types were only in a small minority and I tried to give as many QSO's as I could. There is one particular group in the States whose standard of operating is very high, and that is the "West Gulf DX Club," of which I was elected a member during the latter days of my sojourn in ZC5.

Everyone with whom I had a QSO from Borneo should by now have received a QSL. However, as they do get lost sometimes, I will be only too glad to send a duplicate to anyone who has been unlucky and sends details to G3DCT, c/o SHORT WAVE MAGAZINE.

The reason for my being able to get around to rare DX locations was that I was a member of a crew carrying out a marine survey off the coast of British Borneo. An integral part of this survey was an accurate system of radio navigation. This was provided by four radio stations scattered over a specified section of the coastline, each station being staffed by one European radio engineer (such as myself), plus a Chinese cook and two local natives as odd-job men. When I started operating, my boys were quite intrigued and my knowledge of Malay was stretched to the utmost with explanations. Many QSO's later, however, they seemed to be more of the opinion that I should go to bed earlier—then the hut would not echo to calls of "CQ DX" in the early hours of the morning!

The stations were all self-contained, each with its own power supply, and housed in buildings made of palm leaf strips on a wooden framework. Each building consisted of five rooms plus a small generator house about 50 feet away. One room was for the equipment and sleeping accommodation for the European, one as the living *cum* dining room, one as a guest room in case of any visits by other members of the crew, one as cookhouse and one for the natives.

Supplies were ordered by radio from the base camp in the town of Seria in Brunei, and they were sent out once a fortnight by boat which did the run to all the stations. It also brought mail and took back to Seria any mail we had for despatch. This boat came in as close as possible to shore, and then the station operator, with his native boys, had to go out in a small boat to collect his supplies. Toward the latter part of the year, when the weather began to deteriorate, this became quite a hazardous operation. The off-loading was invariably done at night, as it was not possible to leave the station during working hours. As a precautionary measure, each station maintained a good stock of tinned food, just in case the weather prevented the supply boat from making its rounds. Each station also had a small kerosene refrigerator to hold fresh food, but as this type of freezer was not very reliable, the fresh food did not last long. All cooking was done on Primus stoves, and the variety of dishes depended on the ingenuity of the Chinese cook. For water we depended entirely on rainfall, and at times the shortage became acute.

Invariably the station sites were miles from even the smallest native villages, making the isolation almost complete, especially as the only means of transport was by sea. Once the few towns of any size had been left behind, roads were completely unheard of. Of course, there was plenty of opportunity for walking, if anyone fancied struggling through almost impenetrable jungle in a very steamy atmosphere and with only the wild life for company. Personally, I preferred to stay where I was and go on 20 metres!

DX COMMENTARY

L. H. THOMAS, M.B.E. (G6QB)

G3HVU

IT is hard to tell whether the shortage of reports is due to holidays or bad conditions, so let us call it a combination of the two. Conditions have not really been *bad,* but they are still in their summer doldrums, with the possible exception of the 21-mc band. Even there, the CW DX has been pretty scarce, but no one could possibly grumble about the contents of the phone band—except, possibly, to complain that they were packed too tightly.

The LF bands are being somewhat neglected at present, what with summer static and the changing conditions, but in a month or two we shall have the lot back in full cry, and contributions will no doubt be too numerous to squeeze into the allotted space.

And so to reports, starting up at the HF end.

Ten Metres

Many correspondents mention the short-skip periods which have been prevailing on *Ten,* and some do not seem to realise that things were just the same in 1946 and '47.

In those years the band gave us some terrific DX in the spring and autumn, but in the summer was crammed with DL's, I's and most of the Europeans at the 500-900 mile ranges. So make use of the short-skip conditions to fill up your country lists on this band, and rest assured that the DX will be back with us in due course.

G3HCU (Chiddingfold) worked OQ5FF for the only addition to his Marathon score on Ten, and also had QSO's with CR6, ZS and a bunch of Europeans. G3DO (Sutton Coldfield) raised ZD8SC on phone.

CALLS HEARD, WORKED and QSL'd

G3IOR (Norwich) found the band "wide open, compared with previous years," which is a fair description. For G3FPQ (Bordon) short skip was the order of the day whenever he tuned the band. G2CDI (Stokenchurch) worked UB5WF and UQ2AN for new ones, but little else was either heard or worked.

Fifteen-Metre DX

This band is a very different story, since it is liable to teem with DX at all sorts of odd times despite dull patches. "DX" means good ones, including Expeditionaries and rarities who don't yet bother with *Ten* on account of its uncertainty.

G3FPQ's best were BV1US, FS7RT, KL7ZG, KR6QV, PJ2MC, PZ1AC, TG9AD and VS4BO—as pretty a batch as we have seen for a long time. He tells us that ZD4CF is active daily (1600 GMT) on phone, and looking for G's in the London area. (He is also often on 7 and 3.5 mc CW, around 2200 GMT.)

Last month we quoted the fact that "SV1SM" on CW was said to be a maritime mobile in the Caribbean area. The "quotes" around the call implied that he was probably a pirate. G6UT (Bishops Stortford) tells us that he worked the real SV1SM, who has held the call for about ten years and does not use CW at all—so it seems that we were right.

G3JZK (Warminster) took his rig down there from Cambridge, and found *Fifteen* in full swing. He raised 24 new ones in six days and added ZD6RM, CR9AH, CT3, OA, VP6 and FS7RT, among others, to his log—all on CW. He says the lack of CW activity on the band is "appalling"; in the mornings one hears the Far East and the Pacific rolling in on

LIST OF COUNTRIES BY PREFIXES

Correct to July 1, 1956

AC3	Sikkim
AC4	Tibet
AG2	obsolete (*see* I1, Trieste)
AP	Pakistan
AR1	obolete (*see* YK)
AR8	obsolete (*see* OD)
BV	Formosa
C	China
C3	*see* BV
C9	Manchuria
CE	Chile
CEØ	Easter Island
CE7Z	*see* Antarctica
CM/CO	Cuba
CN2	Tangier
CN8	French Morocco
CP	Bolivia
CR4	Cape Verde Is.
CR5	Portuguese Guinea
CR5	St. Thomas and Prince Is.
CR6	Angola
CR7	Mozambique
CR8	Goa
CR9	Macao
CR10	Timor
CT1	Portugal
CT2, CS3	Azores
CT3	Madeira
CX	Uruguay
CZ	obsolete (*see* 3A)
DJ, DL, DM	Germany
DU	Philippine Is.
EA	Spain
EA6	Balearic Is.
EA8	Canary Is.
EA9	Spanish Morocco
EA9	Rio de Oro
EA9	Ifni
EAØ	Spanish Guinea
EI	Eire
EK	obsolete (*see* CN2)
EL	Liberia
EP/EQ	Iran (Persia)
ET2	Eritrea
ET3	Ethiopia
F	France
FA	Algeria
FB8	Madagascar
FB8	Kerguelen Is.
FB8	New Amsterdam
FB8	Comoro Is.
FC	Corsica
FD	French Togoland
FE	French Cameroons
FF	French West Africa
FG	Guadeloupe
FG	French Saint Martin
FI	French Indo-China (*see* Note 4)
FK	New Caledonia
FKS	*see* OE
FL	French Somaliland
FM	Martinique
FN	French India (*see* Note 1)
FO	French Oceania
FO	Clipperton Is.
FP	St. Pierre and Miquelon
FQ	French Equatorial Africa
FR	Reunion
FS	*see* FG (St. Martin)
FT	obsolete (*see* 3V)
FU	New Hebrides
FW	Wallis and Futuna Is.
FY	French Guiana
G	England
GC	Channel Is.
GD	Isle of Man
GI	Northern Ireland
GM	Scotland
GW	Wales
HA	Hungary
HB	Switzerland
HC	Ecuador
HC8	Galapagos Is.
HE	Liechtenstein
HH	Haiti
HI	Dominican Republic
HK	Colombia
HKØ	San Andres Is.
HL	Korea
HP	Panama
HR	Honduras
HS	Siam
HV	Vatican City
HZ	Saudi Arabia
I1	Italy
I1	Trieste
I5	Italian Somaliland
IS	Sardinia
JA	Japan
JY	Jordan
JZ	Dutch New Guinea
K	*see* W
KA	*see* JA
KAØ	Bonin Is. (Iwojima)
KB6	Baker, Canton, Howland and American Phoenix Is.
KC4	Navassa Is. (and *see* Antarctica)
KC6	Eastern Caroline Is.
KC6	Western Caroline Is.
KG1	*see* OX
KG4	Guantanamo Bay
KG6	Mariana Is.
KG6I	obsolete (*see* KAØ)
KH6	Hawaii
KJ6	Johnston Is.
KL7	Alaska
KM6	Midway Is.
KP4	Puerto Rico
KP6	Palmyra Is.
KR6	Ryukyu Is. (Okinawa)
KS4	Swan Is.
KS6	American Samoa
KT1	*see* CN2
KV4	Virgin Is.
KW6	Wake Is.
KX6	Marshall Is.
KZ5	Panama Canal Zone
LA, LB	Norway
LA, LB	Jan Mayen Is.
LA, LB	Spitzbergen
LI	obsolete (*see* 5A)
LU	Argentina
LU-Z	*see* Antarctica
LX	Luxembourg
LZ	Bulgaria
M1	San Marino
MB9	*see* OE
MD1, 2	obsolete (*see* 5A)
MD4, MS4	obsolete (*see* I5)
MD5	obsolete (*see* SU)
MD7	obsolete (*see* ZC4)
MF2	obsolete (*see* I1, Trieste)
MI3	obsolete (*see* ET2)
MP4B	Bahrein
MP4K	Kuwait
MP4Q	Qatar
MP4T	Trucial Oman
NY4	obsolete (*see* KG4)
OA	Peru
OD	Lebanon
OE	Austria
OH	Finland
OK	Czecho-Slovakia
ON	Belgium
OQ5, OQØ	Belgian Congo
OX	Greenland
OY	Faeroe Is.
OZ	Denmark
PA	Netherlands
PJ2	Dutch West Indies
PJ2M	Dutch Saint Maarten
PK1, 2, 3	Java

PK4	Sumatra
PK5	Dutch Borneo
PK6	Celebes and Moluccas
PK6, 7	*see* JZ
PX	Andorra
PY	Brazil
PZ	Dutch Guiana (Surinam)
SM	Sweden
SP	Poland
ST	Sudan
SU	Egypt
SV	Greece
SV	Crete
SV5	Dodecanese
TA	Turkey
TF	Iceland
TG	Guatemala
TI	Costa Rica
TI9	Cocos Island
UA1	Franz Josef Land
UA 1, 3, 4, 6	USSR (Europe)
UA9, Ø	USSR (Asia)
UB5	Ukraine
UC2	White Russia
UD6	Azerbaijan
UF6	Georgia
UG6	Armenia
UH8	Turkoman
UI8	Uzbek
UJ8	Tadzhik
UL7	Kazakh
UM8	Kirghiz
UN1	Karelo-Finnish Republic
UO5	Moldavia
UP	Lithuania
UQ	Latvia
UR	Estonia
VE	Canada (*including* Labrador and Newfoundland)
VK	Australia
VK1, VKØ	*see* Antarctica
VK1, VKØ	Heard Island
VK1, VKØ	Macquarie Island
VK9	Nauru
VK9	New Guinea
VK9	Norfolk Is.
VK9	Papua
VO	*see* VE and Note 2
VP1	British Honduras
VP2	Leeward Is.
VP2	Windward Is.
VP3	British Guiana
VP4	Trinidad and Tobago
VP5	Jamaica
VP5	Cayman Is.
VP5	Turks and Caicos Is.
VP6	Barbados
VP7	Bahamas
VP8	Falkland Is.
VP8	South Georgia
VP8	South Orkney Is.
VP8	South Sandwich Is.
VP8	South Shetland Is.
VP8	*see* Antarctica
VP9	Bermuda
VQ1	Zanzibar
VQ2	Northern Rhodesia
VQ3	Tanganyika
VQ4	Kenya
VQ5	Uganda
VQ6	British Somaliland
VQ8	Chagos Is.
VQ8	Mauritius
VQ9	Seychelles
VR1	Gilbert and Ellice Is.
VR1	British Phoenix Is.
VR2	Fiji
VR3	Fanning Is.
VR4	Solomon Is.
VR5	Tonga
VR6	Pitcairn Is.
VS1	Singapore
VS2	Malaya
VS4	Sarawak
VS5	Brunei
VS6	Hong Kong
VS7	obsolete (*see* 4S)
VS9	Aden
VS9	Maldive Is.
VS9	Oman
VU	India
VU4	Laccadive Is.
VU5	Andaman and Nicobar Is.
W	United States of America
XE	Mexico (*see* Note 3)
XW	Laos
XZ	Burma
YA	Afghanistan
YI	Iraq
YJ	*see* FU
YK	Syria
YN	Nicaragua
YO	Roumania
YS	Salvador
YU	Yugoslavia
YV	Venezuela
YVØ	Aves (Birds) Is.
ZA	Albania
ZB1	Malta
ZB2	Gibraltar
ZC2	Cocos Islands
ZC3	Christmas Is.
ZC4	Cyprus
ZC5	British North Borneo
ZC6	Palestine
ZC1, 7, 8	obsolete (*see* JY)
ZD1	Sierra Leone
ZD2	Nigeria
ZD3	Gambia
ZD4	Gold Coast
ZD6	Nyasaland
ZD7	St. Helena
ZD8	Ascension Is.
ZD9	Tristan da Cunha and Gough Is.
ZE	Southern Rhodesia
ZK1	Cook Is.
ZK2	Niue
ZL	New Zealand
ZL	Kermadec Is.
ZM	Western Samoa
ZM7	Tokelau Is.
ZP	Paraguay
ZS1, 2, 4, 5, 6	Union of South Africa
ZS2	Marion Is.
ZS3	South West Africa
ZS7	Swaziland
ZS8	Basutoland
ZS9	Bechuanaland
3A	Monaco
3V	Tunisia
3W	Cambodia
3W	Viet Nam
4S	Ceylon
4W	Yemen
4X	Israel
5A	Libya
7B	unofficial (*see* PX)
9S	Saar
Aldabra Is.	
Antarctica :	**KC4, CE7Z, LU-Z, VK1, VKØ, VP8** all apply
Bhutan	
Mongolia	
Nepal	
Wrangel Is.	

Notes :

1. *FN* (*French India*) *only counted as a separate country until November* 1, 1954, *after which it was included as VU* (*India*).
2. *VO* (*Newfoundland/Labrador*) *only counted as a separate country until April* 1, 1949, *after which it was included as VE* (*Canada*).
3. *XE4* (*Socorro Is.*) *may possibly be listed in future as a separate country. Not yet decided.*
4. *FI8* (*French Indo-China*) *only counted as a separate country up to July* 19, 1955. *After that date see XW8 and 3W8.*

phone, but no CW at all—CR9AH gave him his only break in that direction. He missed ET3AF and ZS7C, both driven off by the wolf-pack.

G5BZ (Croydon) worked PJ2MC and I1BRN/M1 on phone; CW collected EL, VP6, VU, VS1, ZD1 and ZE. G3GZJ (London, S.E.23) had a good time with EL12P, FS7RT, CR6AI, KH6AY, VS1's, KP4CC, some of the Russians, and PK2PS, who came back to a CQ but was lost. OY2Z was a gotaway.

G3IOR mentions an unusual one—ZM6CR (CW at 0130 GMT). We would like to feel he was OK, but we don't *think* ZM6 calls have got beyond the "A" series as yet . . . Phone brought in UQ2AN, CX, VS1 and 2, ZP5. He has also been working VK at all hours, including 0230.

G3HCU, on the other hand, has found ZL and VK "almost out," although other DX has been good. New ones for the Marathon were OY2Z, CR6AO, PJ2MC, KG4AN. HB9IK, I1BRN/M1 and PAØAQ. Others we note in his log are ZD8SC (1820), VS4BO (1356), CR9AH (1000), HR2WC (2225) and practically all the more usual DX. G3DO's list includes BV1US, PJ2MC, VP5RR, VP1EK, VS4BO, CR5SP, VK9DB and UA4NA (all phone).

New ones for G2CDI included PJ2MC, KG4AN, BV1US and some Europeans. Also worked were VS6, VP4, 5, 6, 7, VU, VK9, KH6, ZD8, FM7 and many others; 'CDI says daylight conditions have been very poor on both bands, with long periods of no signals at all.

Twenty Metres

Twenty has been pretty good all through the month, but our correspondents don't have a great deal to say about it this time. G3GZJ raised UA2, 3, 6 and 9, UP2, UR2, UC2, UB5 and UO5—all new for him—as well as KV4AA, VP7, VP9, PY, CE and EA9. Best time, he finds, is from 2100 onwards.

Nice ones at G5BZ were YVØAA. FG7XC, VP8BZ, BV1US and such as CE, CX, YV, AP, CR6, VK6 and VP4KL, who is ex-G2KL. 'BZ comments on what a wonderful time the Russians are having, working all and sundry. This also applies to G's licensed in the last three years or so, who now have nearly twenty new countries to go after!

G3FAS (High Wycombe) has been on Twenty in the mornings (0545-0645 GMT) and lists some of the DX around at that time. W's are too numerous to mention; Russians (all new for 'FAS) almost the same; CX4CZ, OX3KW, PY, PZ1AH, VE4 and 7, VP9DB, XE1AX and YI2AM; this with 15 watts to a dipole, by the way. G3FAS also worked "HO3KG," who said he was a Met. station and gave his co-ordinates, but no further comment.

G3FPQ booked in OA3C, VP2DJ, VP5AK and 5RR on phone, as well as FG7XC, YVØAA and 3W8AA on CW.

G3ESY (Hereford) found some nice stuff, such as VR1B, XE4A, VQ8AG, XE, VP7, HK, VP4 and 6, PZ1AH on CW. On phone he raised HH and XE2JN, whose QTH he would like (it isn't in the latest *Call Book*).

G3JZK raised PJ2MC (599 both ways, and first call), but missed ZA1A, LV1AA (?), FF8BT and ET2US. G6VC (Northfleet) worked UP2 for a new one.

G2HKU (Sheerness) is another early riser, scouring the band from 0430 GMT onwards. At this sort of time he has worked W5, 6 and 7, VE6 and 7, VP9DB, VK, LX1ML, YV4AU and OY2H; a contact with VE6VK was 579 both ways and lasted for sixty minutes with perfect copy. G2HKU runs a single 807 (50 watts) to a dipole, and wonders why his reports are seldom more than one S-point down on the chap at the other end, who often has a kilowatt and a beam. One explanation—there are a lot of inefficient kilowatts and badly-adjusted beams about the DX bands. But it isn't as simple as that, and we have often pondered on this phenomenon. (Have a good ponder, chums, and tell us what *you* think).

G3IOR raised VQ6LQ, UB5, UP2 and UA1 for new ones. G3DO worked VR1B on phone and YVØAA on CW.

Forty and Eighty

Only a negligible number of reports on these two bands, as usual. But don't imagine from that that they don't matter. There *are* sides other than DX to

FIVE BAND DX TABLE
(POST-WAR)

Station	Points	3.5 mc	7 mc	14 mc	21 mc	28 mc	Countries
DL7AA	744	102	161	221	145	113	230
W8KIA	657	61	145	258	84	109	258
G5BZ	647	64	115	238	137	93	244
G3FXB	587	67	124	190	143	63	201
G3DO	537	24	46	216	123	128	233
W6AM	495	30	58	265	85	57	265
G3FPQ	486	56	70	154	135	71	177
W1VG	450	25	113	170	88	54	178
G2YS	429	61	79	146	88	55	162
K2BZT	397	64	66	171	72	24	?
GM2DBX (Phone)	384	33	31	158	81	81	171
G3ABG	364	45	83	157	49	30	165
G8KU	364	23	52	161	53	75	170
W6AM (Phone)	328	13	32	223	39	21	223
JA1CR	280	15	49	151	55	10	152
G6VC	273	27	53	129	53	30	136
G3INR	265	43	51	101	50	20	114

Station	Points	3.5 mc	7 mc	14 mc	21 mc	28 mc	Countries
GM3EFS	209	25	39	97	27	21	107
MP4BBW (Phone)	195	1	5	50	82	57	106
G3IUW	190	30	36	54	51	19	92
G3JLB	186	31	36	51	42	26	79
G3GWO	182	6	40	88	18	30	110
G2DHV	180	19	26	114	9	12	115
ZB1HKO	153	18	25	51	39	20	61
G3JWZ	140	41	44	41	10	4	69
G3HSM	137	14	43	46	26	8	64
G3GZJ	135	18	28	45	38	6	66
G3JVJ	129	15	53	34	23	4	65
G3JZK	100	14	17	30	35	4	55
DL7AA (Phone)	87	4	6	15	46	16	62
G3HEV	55	8	19	18	8	2	33
MP4BCA	52	1	2	7	26	16	39
G3IDG	48	11	14	6	1	16	26
G3JSN	33	13	9	7	3	1	21

Amateur Radio, and these bands carry a terrific amount of local-natter these days. Now and then some DX rears its head, but rather apologetically.

G3JHH (Hounslow) worked UP2PR on Eighty, and is still anxiously looking for an SM1 station—on any band. G2HKU collected himself a new one on Forty when ON4TQ/LX suddenly showed up . . . he also heard some PY's on the band, around 0500. G6VC encountered LX1AC and an OE6 for a couple of new ones on Eighty.

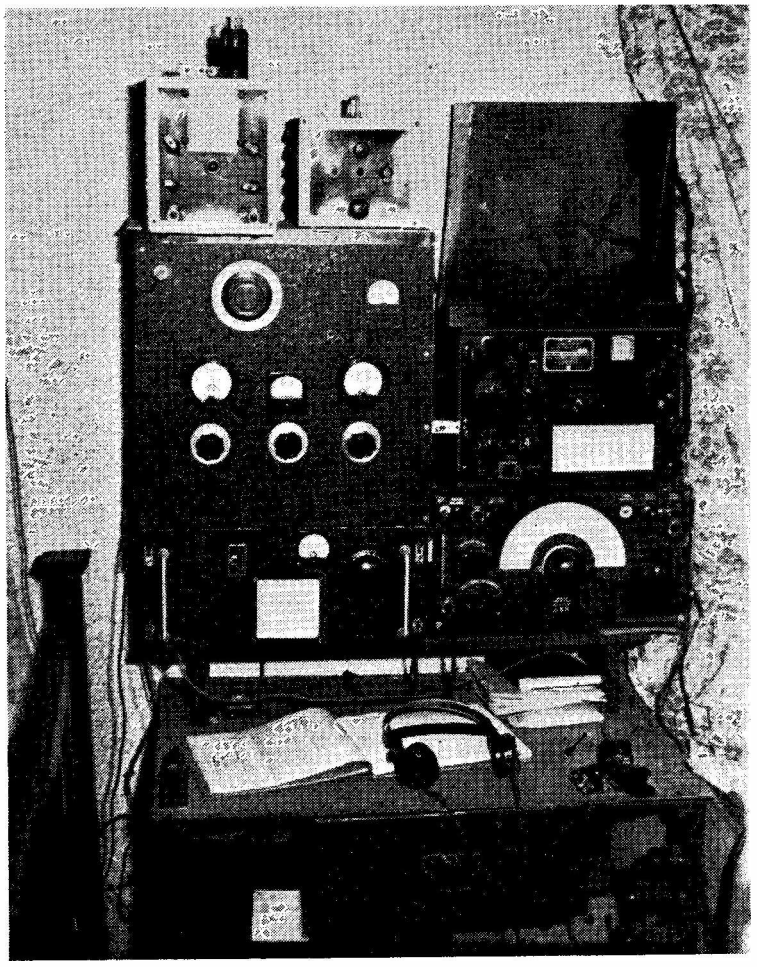
G3ESY, on Eighty, had one or two contacts with "that outstanding DX King" VK5KO. Late in May they had a sixty-minute QSO on 3502 kc, with G3ESY using a B.2 and 20 watts — so who says Eighty is finished as a DX band? (VK5KO is moving to VK2 shortly, and will be off the air until he retires in about three years' time).

G3FPQ raised UQ2, UO5, VQ4, VP9, YV and ZD4 on Forty; on Eighty CW he collected PJ2AA, PY6AK, LU3MAH and ZD4's.

G3IUW (Hounslow) would like to know who was operating phone from MF2AL on Eighty in November 1954, as he is still out after a QSL for that contact. Can anyone help him?

21-28mc MARATHON, 1956

Station	28 mc	21 mc	Total
VQ4RF	80	74	113
G2CDI (Phone)	76	139	146
MP4BBW (Phone)	57	74	92
G3HCU (Phone)	42	114	119
G5BZ	38	74	87
G2DC	33	57	69
G3GGS	33	30	52
G3KHE (Phone)	19	71	75
GM2DBX (Phone)	19	59	63
ZB1HKO	19	39	42
G3GZJ	6	30	30
G3JVJ	4	23	23
G3JWZ	4	10	14



Station of G3JMH, Liverpool, 7, is accommodated in restricted space, both inside and out. Activity is mainly on 80 and 160 metres, into a 66-ft. "multi-bent" aerial (about seven times) finishing up with "one turn round the room"! Nevertheless, even on this unpromising aerial OK has been worked on Top Band, and nearly 350 contacts made on the two LF bands. Construction is in hand for 7 and 14 mc, and G3JMH also operates GW/P.

The Overseas Mail

MP4BCA (Awali) sends a packet of news from the Gulf, where 21 mc seems to be the band. He heard VS2DQ working VK9BS and broke in, with a three-way and "nines" all round. Later they were joined by JA1ANG and VU2JP, and several other new ones were worked, for 15 metres. Twenty has been very noisy, but open for DX in the mornings (0100-0400 GMT). Forty was really bad, and 'BCA only raised MP4KAC, giving him a grand total of two countries up there! MP4BBF is on vacation in Norway, '4QAL is in the U.K., and '4BBW will have left for home by the time this is published. Personal QSO's were made with W6JIE/MM, W5UPM/MM and YI2DK.

VS2DQ (Box 600, Penang) is anxious to contact the following, for whom the Bureau holds many cards but no addresses: S. E. Aspinall (ex-VS2DJ); I. Bevan (ex-VS2EM); Cpl. Gibson (ex-VS2ES); and P. J. Reeves (ex-ZC2PJ). He is also receiving cards for the following stations, for supposedly recent contacts: VS4AD, VS5NN, VS5PM, ZC5AB and ZC2FM.

'DQ says that a lot of pirates

seem to choose VS call-signs, and tells us that the VS2 calls have only got as far as VS2FE at present, with the sole exceptions of VS2RO and VS2UW, who are active and genuine. There is no ZC2 licensed just now, ZC3AC has returned to Christmas Island, and VS1's find it impossible to obtain a VU5 licence for operation on Car Nicobar. VS4BO is very active from Sarawak on 21 mc, with excellent results; VS4BA and 4NW are rebuilding and hope to be on shortly. There is no genuine VS5 activity, VS5AT being on U.K. leave.

Finally, cards for VS1GN, VS4BD, VS5BS and ZC5GN should all go to G3JFC; for VS4CT, VS5CT and ZC5CT to P. H. Green, G3DCT, c/o *Short Wave Magazine;* for VS5KU to G2KU; for ZC5CA to I. Harris, 24 Braid Hills Road, Edinburgh, 10; for ZC5VM to B. Mills, Bleauval, Wise Lane, Borden, Sittingbourne; and for ZC3AB to VK2DI. Many thanks to Jim, VS2DQ, for all the above.

TOP BAND COUNTIES LADDER

(Starting Jan. 1, 1952)

Station	Confirmed	Worked
G5JM	97	97
G2NJ	97	97
GM3EFS	96	96
G6VC	94	94
G3JEQ	94	94
G2AYG	88	89
G3HEK	86	89
G3GGS	86	88
G3JHH	85	85
G3BRL	83	83
G3KEP	79	81
G3AKX	74	77
G3DO	74	74
GI3JEX	72	77
G3HZM	70	71
G3FNV	69	80
G2FTK	66	83
G2CZU	66	67
G3KOG	65	69
G8KU	63	65
G3DVQ	62	63
G3KOC	61	67
G3EJF	57	64
G8CO	56	69
GM3JZK	54	55
G3KLP	48	52
G2HDR	45	54
G3ICH	38	55
G3JSN	26	30
G3KMQ	24	54
G3JZP	20	42
G3JME	16	25

From *Hams' Haywire News,* published in ZS5-land, we note the following items. The ZS5's have been asked to furnish a radio link for the Veteran Cars run from Durban to Pietermaritzburg . . . They also assisted at a recent "Comrades' Marathon," with ZS5QR's transmission coming over the speakers more clearly than the official PA system . . .

Further items from Malaya, out of the *Malayan Radio Amateur* this time: A VS1 (nameless) spent a lot of fruitless time calling DX on Twenty, and eventually noticed that he still had his 10-metre PA coil in position. A rapid receiver QSY revealed a pile-up on his frequency which would have done credit to VR9ZZ! The former VS1AB is now in West Australia and hopes for a VK6 call; pre-war VS2AK is ZS6TP; ex-VS1AZ is VK2ABC.

Phone on 21 mc is the main pastime in VS2-land, with conditions maintaining a high level . . . VK2RU worked Japan on 50 mc, and VK4NG worked a JA on cross-band (50/56 mc) . . .

How many Old Timers reading this remember VS3 stations (in the Unfederated Malay States, pre-war)? We were surprised to read, in the *Malayan Radio Amateur,* that VS3AB and G6QB are credited with the first VS3/G contact (April 7, 1929); G5XD also worked VS3AB on the same day. VS3AC, who was, like VS3AB, in Johore, made a later appearance and became a very active and well-known DX station.

The late Eric Megaw (GI6MU) worked the very first Malayan amateur, VS1AB (formerly SS2SE) on 22.2 metres *on phone* in 1927; the first contact with the Federated Malay States seems to have been between G6WT and VS2AF in 1930.

W6AM (Long Beach) puts his already phenomenal scores up to 265 (20-metre Phone and CW) and 223 (20-metre Phone) with the assistance of AC5PN and PJ2MC. He says "No wonder AC5PN's cards are so hard to get — he makes such a project out of it, two-page letter, photo *et al* . . . " This conjures up a vision of a DX-peditionary on a far-off island deciding that it's hardly worth returning home to face the prospect of writing two thousand letters, printing two thousand photographs and filling in two thousand QSL's — not even for two thousand bucks! And this poses a problem: once it became known that he was staying on his lonely island for ever and had no intention of doing anything about QSL's, how long would it be before he found it quite difficult to get a solitary reply to a CQ? (Plot a curve and do not use both sides of the paper at once.)

Further news from The Gulf comes from MP4BBW (Awali), who found conditions down on the previous month. However, on Fifteen he raised HR1LW, VP5DX, HC1ES, YN1PM, VP9L, PJ2MC, CM9AA and VQ3ES, so they weren't all that bad. He has now worked 106 countries in 1478 QSO's, taking just under eight months on 40 watts, crystal-controlled.

Miscellany

Referring to the current hoo-ha on the subject of payment for DX QSL's, G5BZ asks whether people don't sometimes forget that the sole purpose of Amateur Radio is not the working of new countries. As he says, there are certain stations that one never hears on the air unless a new one shows up, and they would probably give up radio if there were no expeditions laid on for their benefit. (But, he adds, the loss would be theirs, not amateur radio's.)

G3ESY calls attention to a rather nice ad. in the June *QST.* W7HYW, 7PSO and 7UFB proclaim that they are available for Wyoming contacts, monitoring 14050 and 21050 kc daily at 1400 and 1915 GMT. This is a tidy way of sewing things up, and if any other DX stations like to advertise their movements in this

way, we will gladly give them space—free! G3ESY tells us that he is the first holder of the "Picardie-16" Certificate, for which one has to work 16 stations in the Picardie district of France. He also holds DPF, Phone and CW.

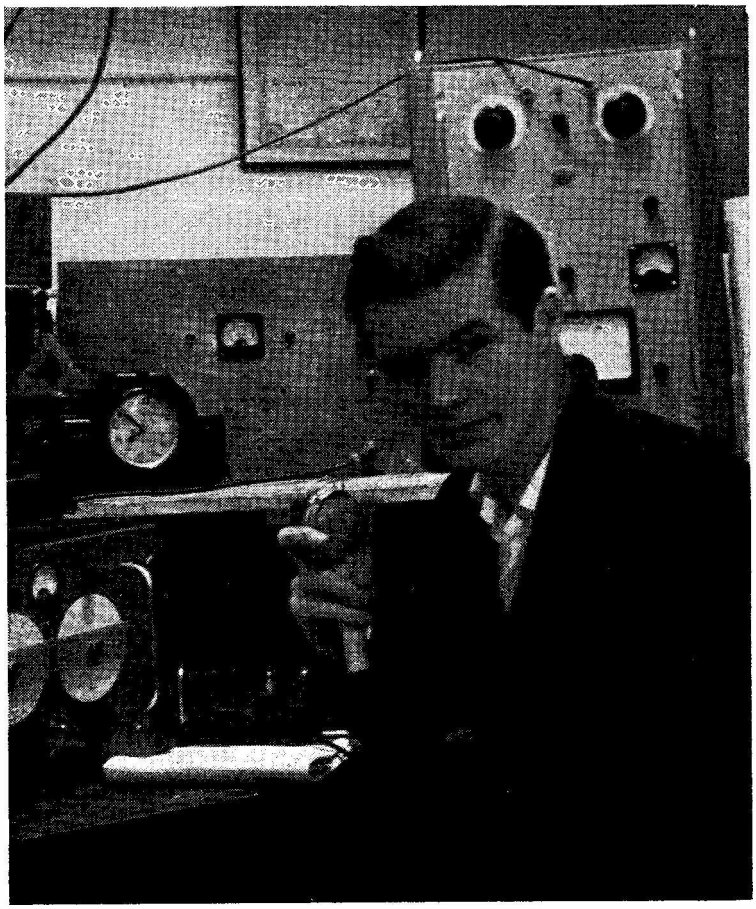
We are informed, *via* VK1AIL and G3BES, that VK1ACA will be the official call for the Commonwealth Radio Exhibition at Canberra, during August 13-16. They will be on the air on 3.5, 7, 14 and 21 mc, and will issue special QSL's for all contacts. G3BES himself is leaving his present QTH at Harrow Weald and going first to VK and then to ZL, where he will join his eldest son, formerly G3KON and now ZL2AUW. We wish him *bon voyage* and happy days in New Zealand.

G2YS (Filey) has kindly translated a passage from *Radio Rivista* concerning the "Columbus Marathon," to be run by the I1, IS and IT amateurs—to commemorate the discovery of America by Columbus! The Columbus Institute of Genoa has instituted two gold medals and diplomas to be awarded each year for a contest running from August 3 until October 30. They will be awarded to the Italian who works the most foreign stations, and to the foreign station working the most Italians. (All bands, 420-3.5 mc, with HF band contacts counting 1 point, 144 mc 2 points and 420 mc 4 points. Only one HF-band contact is allowed, on any band from 3.5 to 28 mc, but not more than one.) The address is Civico Instituto Colombiano, Premio Radioamatori, Columbus Marathon, Palazza Tursi, Genoa. In the event of a tie, the station using the lower power will be the winner.

Top Band Topics

G3IOR says he understands that Norfolk is getting rare again, for the WABC chasers. He himself is no longer on Top Band, but G4KO and the Norwich Club station G3JGI (Friday nights) are keeping the county on the map.

G3ICH (Leighton Buzzard) reports low activity owing to holidays and such-like, but he will now be keeping Beds. on the air again.



G3IUW of Cranford, Middlesex, runs a Labgear LG.300 with a Denco DCR-19 receiver and is active on all bands 10 to 80 metres. With a 3.5 mc aerial consisting of two half-waves in phase, he is after the DX on that band and would like to arrange phone schedules.

G3JHH maintains his excellent score of 85/85, but reports no additions. During the recent "/A" activity, he says, the GM's were badly hindered by QRN.

G3IDG (London, S.W.12) tells us of an Anglesey expedition, between August 5 and 19. GW3IDF/A will be on phone, GW3IDG/A on CW. Cards sent direct to Llys-Awel, Brynteg, Anglesey, before August 19 will be answered direct; others from London or *via* the Bureaux. The frequency will be 1809.5 kc, the rig a CO-PA and the aerial 175-ft., end-fed, which may be modified as circumstances dictate. No definite operating times guaranteed —it's supposed to be a holiday!

Another expedition planned will interest those who want Co. Armagh for WABC—GI3JEX/P will be there from 2000 GMT on September 8, prepared to stay on all night, and assisted by GI3AV and GI6TK, as additional operators. Snappy QSO's only will be given and 100% QSL'ing *via* bureaux is guaranteed.

For those wanting Co. Down, GI3JEX and GI6TK are on regularly. And for himself, GI3JEX would like Oxford, Cambridge and Suffolk.

G8CO (Gray) worked Pembroke and Suffolk for two new ones, but found conditions not too good and activity rather low.

Trans-Atlantics, 1956-7

Once again, we do not propose to attempt to organise special

week-end tests for Top Band Trans-Atlantics, but we hope that Sunday morning activity next winter will continue as before. We gather that there will be even more North American stations on in the coming season, and will be giving full particulars of calling frequencies (and frequencies to be avoided) in plenty of time for the DX sessions. On the present evidence, conditions should be somewhat down on last year's, but the keen types will still have a go, and the more of them the better. In another year or two we shall really know something about the eleven-year cycle as regards Top Band DX.

Sunspots

While we are on the subject of the eleven-year cycle, let us mention a note from G3IOR. He draws attention to the fact that the forthcoming sunspot maximum will be highest ever known, dwarfing the last one in 1947. The MUF is said to be up to 60 mc in tropical latitudes already. If we only had our old five-metre band to play with, who knows what records might not be smashed? (*See* brief note in "The Overseas Mail" concerning 6-metre JA/VK contacts.)

The Country List

Appearing with this Commentary is an up-to-the-minute list of countries, as agreed upon by the various bodies who are responsible for the issue of Certificates. Various countries in the list are barred to U.S. amateurs for DXCC credit purposes, and there have been quite a few minor shuffles. Our previous list, printed four years ago, gave Sicily (IT) as a separate country, at a time when the matter was being debated; but it was not allowed, and so we are at least one short.

Another one under consideration at present is XE4 (Socorro Is.). The XE4A Expedition brought in plenty of publicity, but it still seems highly doubtful whether the pundits will award it "country status." (We often wonder what the politicians would think of us, airily deciding what is and what is not a country!) For the moment we have *not* listed XE4 separately.

We hope that this new and up-to-date Prefix List will enable all the DX fraternity to get their positions clear.

". . . . Anyway, it looks illegal, so when 'e comes back, book 'im . . . ."

DX Strays

It isn't everyone that managed to QSO Swan Island (KS4) when they first came on the air. KS4AS will be active for four months, with 50 watts to 807's . . . G6ZO will be in Chile for two years or so, and hopes to come up with a CE call . . . FW8AB is leaving Wallis Island, but should probably be replaced by another amateur, who may have more time for it . . . The recent activity from FS7 was genuine enough, W6ITH having returned for a second quick trip . . . Easter Island is represented again, by CEØAD (14 mc CW, around 0500 GMT).

ACØAA is said to be in Unamchi, Mongolia . . . VK1RW is said to be a future station on the Cocos Is. (every VK1 will have to be quizzed for his QTH until these things get settled).

HC1ARE was the station of the Quito Radio Club, celebrating its 25th anniversary on July 14-15. The station was set up exactly on the Equator and used all bands from 6 to 80 metres.

ZE3JO will be signing VQ1JO from August 13, as promised . . . activity from AC-land includes AC5PN (CW only), AC4NC (likewise), AC3SQ (phone and CW) and AC3PT (both, but not very active) . . . VK1's in Canberra are still causing a stir and reaping a rich harvest from their change of call. It's those who work them that get the disillusionment!

Nice ones being worked from the States include ZD9AE, FE8AE, VR3B, UAØCD, ØKQB, ØKCA and ØKJA, CR10AA, YJ1RF, BV1US and ZS2MI—all on Twenty CW . . . VQ8CB is just about to leave Chagos with no amateur population—he has been the only station ever to operate therefrom . . .

W6ITH, who ran such successful expeditions at FS7RT, plans to visit ZC3, VQ9 and VU5 . . . VQ5GC, as we have already noted, hopes to be in VQ9 late in the year . . . VR1B, who should by now be VK9TW (Nauru), has

announced his next ports of call as VU5 and VQ9 . . . There looks like being quite a crush around the Seychelles area if all these materialise.

Other buzzes concerning the future are that W6NJU may be making for Navassa Is. (KC4); that KT1UX and others from Tangier will have a shot at Ifini; and that certain I1's will make the perennial sortie into San Marino (M1). All attempts at getting a real HV on the air from Vatican City have, as yet, met with complete failure.

The YVØAA affair was given tremendous advance publicity as the "Radio Expedition of the Radio Club Venezolano to Birds Island," and sheets were circulated round the States giving the operating times and frequencies, particulars of whether to call HF or LF, how to QSL . . . the lot! It certainly seems to have been a highly-organised and very successful expedition, and although Birds Island is only 38 miles from the Venezuelan mainland, the ARRL had no hesitation whatever about granting it "country status"!

Another *possible* new one is Jan de Nova Island (off Madagascar), which may be populated amateur-wise by a VQ8 or an FB8 before long. *We* are seriously thinking of moving to the Isle of Wight and starting a violent local agitation for self-government! A nice "GV" prefix (V for Vectis) would bring 'em in . . . And a case *could* be made out for separate prefixes for Jersey and Guernsey!

VK/ZL Contest

The dates for this year's VK/ZL Contest, always one of the more popular events with the G's, are October 6-7 for Phone and October 13-14 for CW. Beginning and ending, in both cases, at 1000 GMT. Serial numbers as usual—separate logs for each band, to be posted this year to NZART, Box 489, Wellington.

And that's the lot for this month, except to remind you that the deadline is **first post on Friday, August 17.** Overseas readers, please note that the following one is *September 14.* Address everything to "DX Commentary," *Short Wave Magazine,* 55 Victoria Street, London, S.W.1. Until next month, Good Hunting, 73 and BCNU.

THE RADIO AMATEURS' EXAMINATION—1956

MORE CANDIDATES SIT — PASS RATE HIGHER

Through the courtesy of the Director of the Department of Technology, we received on July 5 the results of the R.A.E., held on May 4 last under the *ægis* of the City & Guilds of London Institute.

The outcome of this year's Examination will be gratifying to all concerned. Not only does the number of candidates taking it show a sharp increase —from 428 in 1955 to 518 this year — but the percentage of failure is the lowest yet recorded: Only 11.6%, or 60 candidates of the 518 who sat. This means that the 1956 Examination has produced more qualified candidates (458) than the total who sat last year (428), when the failures were 12.8%. Putting it another way, 89 more qualified candidates for a U.K. radio amateur transmitting licence have emerged this year than last. Unless exempt, all they have to do now to get on the air with CW and phone is to pass the Morse Test.

On the general standard of candidates this year, the Examiner's comments are very favourable, particularly as regards the formulæ questions and those involving calculations. The weakest answers were given to Question 3(a), but this is his only real criticism.

All who strove last May may well feel very pleased at these results—the candidates themselves and their teachers, and those like we of SHORT WAVE MAGAZINE who have devoted space and effort to the encouragement of the beginner in Amateur Radio. It would be a fair claim that A. A. Mawse's series of last year, "Amateur Radio for the Beginner," together with all that we published during 1955 by way of preparation for the R.A.E., has had a marked effect on the number of candidates coming forward, and their success. At any rate, it is significant that the 1956 totals are better than any in the three previous years.

It must also be said—as the Examiner himself points out—that there is ample evidence that more candidates are taking advantage of the excellent R.A.E. study courses now offered by many local technical colleges and evening institutes up and down the country. Here again, through SHORT WAVE MAGAZINE, we have been able to show how these courses can be arranged.

Of the 518 candidates who took this year's R.A.E., we are informed by the examining authority that four were blind students and two bedridden; for these candidates, the City & Guilds of London Institute made special arrangements to enable them to take the Examination at home — a most generous and helpful attitude on the part of the authorities concerned.

In previous years, it has been a matter of waiting up to six months for the results to come through, which was both frustrating and disappointing for candidates. This year, the City & Guilds of London Institute are to be congratulated in getting the results out so soon after the Examination. And we are informed by the Department of Technology that they hope to maintain this standard of promptitude for future years.

The Next Examination

The Question Paper for the May 1956 R.A.E. is given here as a matter of general interest and for

the guidance and information of those who will be taking the Examination in May next year. It will be agreed that the standard demanded is fair and reasonable, and that the questions themselves have a practical bearing on Amateur Radio techniques and procedures as we know them today.

Before the 1957 sitting comes round, however, the G.P.O. itself will be holding a Radio Amateur Examination—provided that enough candidates come forward. This will be on October 6 next, in London, Edinburgh and Cardiff only. The sitting fee is 25s., and applications to take this examination *must* be received by August 31, addressed: Wireless Telegraphy Section, Radio & Accommodation Dept., Union House, St. Martin's-le-Grand, London. E.C.1.

Morse Test Arrangements

The G.P.O. announces that Morse Test sessions are being arranged for the first week in September at head post offices in Birmingham, Cambridge, Derby, Leeds and Manchester. Forms of application should be sent for *immediately* to the address in the paragraph above; they have to be returned, with the fee of 10s. to take the Test, by August 20. Candidates will be given details of time. date and place with the form.

Learning Morse

Successful candidates at the recent R.A.E. who have yet to pass the G.P.O. Morse Test finally to obtain their licences—and those aspiring to learn the Code—are reminded that useful, practical articles on self-tuition in Morse appeared in the April 1955 and April 1956 issues of SHORT WAVE MAGAZINE. In these, the next-best approach is suggested where there are no local facilities for organised Morse tuition, or it is not possible to find a qualified operator able to take a beginner up to the required standard of 12 w.p.m. for the Test.

QUESTION PAPER

55.—RADIO AMATEURS' EXAMINATION

Friday, 4th May, 6.30 to 9.30 p.m.

Eight *questions in all are to be attempted, as under:* All four *in Part 1 (which carry higher marks) and* four *others from Part 2.*

Part 1.

All four questions to be attempted from this Part.

1. Licence Conditions. What are the requirements in respect of the following:—
   (a) Operators and access to apparatus.
   (b) Inspection,
   (c) Retransmission of recorded messages,
   (d) Types of messages which may and may not be exchanged between amateur stations? *(15 marks.)*
2. If the DC feed to the final stage of a transmitter is 500 volts, 80 mA and the RF current in the artificial aerial load resistor of 750 ohms is 0.2 ampere, calculate:—
   (a) The power input,
   (b) The power output,
   (c) The efficiency of the stage,
   (d) The anode dissipation. *(15 marks.)*
3. *(a)* State what precautions should be taken in a radio transmitter to avoid:—
   (i) Radiation of harmonics,
   (ii) Key clicks and thumps.
   (b) With the aid of a diagram describe a simple form of detector circuit for checking harmonic radiation. *(15 marks.)*
4. *(a)* What are the relative advantages and disadvantages of a variable frequency oscillator over a crystal controlled oscillator for use in an amateur's transmitter?
   (b) Describe, with the aid of a diagram, a varible frequency oscillator for generating a stable frequency. *(15 marks.)*

Part 2.

Four questions to be attempted from this Part.

5. Describe two types of feeders used in a transmitter aerial system. State what steps must be taken to ensure maximum transference of energy to the aerial. *(10 marks.)*
6. Explain the meaning of the following terms as applied to a radio receiver:—
   (a) Selectivity
   (b) Bandwidth
   (c) Sensitivity *(10 marks.)*
7. Two capacitors of 4 and 12 picofarads are connected in series; two others of 8 and 24 picofarads are also connected in series. What is the equivalent capacitance if these series combinations are connected in parallel? *(10 marks.)*
8. Explain with the aid of a circuit diagram and characteristic curves the action of one form of valve detector circuit. *(10 marks.)*
9. Define the following and state briefly their uses:—
   (a) Auto-bias,
   (b) De-coupling. *(10 marks.)*
10. What value of inductance is required in series with a capacitor of 500 picofarads for the circuit to resonate at a frequency of 400 kc/s? (Assume no resistance). *(10 marks.)*

SSB Topics

TECHNICALIA, ACTIVITY & OPERATING RESULTS

Conducted by **R. L. GLAISHER, G6LX**

THE recent appearance of several rare countries on SSB has highlighted the problems connected with the satisfactory reception of Sideband on the conventional AM/CW communications receiver.

Many of the advantages of single-sideband originate from the suppression of the carrier before the signal is radiated. It is therefore necessary to "replace the carrier" on the signal before it reaches the detector in the receiver, otherwise a readable signal will not be obtained.

The detector in the normal communications receiver is nearly always of the diode type, designed to demodulate A3 type signals correctly by detecting the difference in frequency between the sidebands and carrier. As far as the detector is concerned, it does not matter if the carrier is an integral part of the received signal or if it is inserted somewhere in the receiving chain.

For SSB reception it has become established practice to provide the missing carrier at the intermediate frequency from the BFO in the receiver. This method is commonly used, but is not always satisfactory, due to the inadequacies inherent in the diode detector and BFO arrangement used in many of the more popular types of commercial receivers. These shortcomings, combined with the unfamiliar receiver adjustment procedure, are largely responsible for the criticism of the SSB mode of operation by the non-sideband fraternity.

The carrier can also be replaced at the signal frequency by injecting the output of an auxiliary oscillator, such as a BC-221, into the receiver front-end. The transmitter VFO can also be used for this purpose and provides an accurate net on the sideband signal in addition to supplying the missing carrier. In practice, this method offers several advantages and will often produce results far superior to those achievable with BFO injection.

Setting Up

The tuning procedure is as follows: The external oscillator is coupled into the receiver aerial circuit and the output amplitude adjusted to provide an S7-8 signal on the band in use. With the receiver adjusted for normal AM reception (AVC on, max. RF gain and normal LF setting), tune an SSB signal for maximum loudness on speech peaks, or for the greatest S-meter "kick." The external oscillator should then be set roughly on frequency and tuned *slowly* through the sideband signal until at one point the voice will sound natural. If the signal distorts on peaks, or the S-meter continues to kick, the signal is overmodulated and the ratio of carrier-to-signal must be increased by providing more output from the oscillator. Increasing the carrier level above the 100% mark will also help to clean-up adjacent channel interference. The "artificial carrier" should, however, never be allowed to exceed the overload point of the receiver.

While on the subject of receivers, mention should be made of the Product Detector, which offers many advantages for SSB and CW reception. In contrast to the normal diode-type detector, the output from a product detector is proportional to the sum of signal and BFO voltages, and no output is available until a carrier is locally injected. As a result, the audio output consists of beats with the BFO and not cross-modulation beats between signals.

The circuits of two typical product detectors, as used in the Collins 75A-4 and National NC300, are shown in Figs. 1 and 2. Satisfactory plug-in adaptors using both these circuits have been constructed for operation with the AR88 and TCS receivers in use at G6LX.

For those wishing to know more about product detectors, a useful article appeared in the May issue of *QST*: "Reception with Product Detectors," by Murray G. Crosby, W2CSY.

VHF Single Sideband

According to a report from W1HDQ (May *QST*), the first two-way SSB contact on 144 mc was made between W3HWN and W2JJC on 27 March last. The path was 153 miles over difficult terrain, and results were reported to be excellent.

This claim may, however, be incorrect, as several U.K. amateurs were experimenting with sideband on

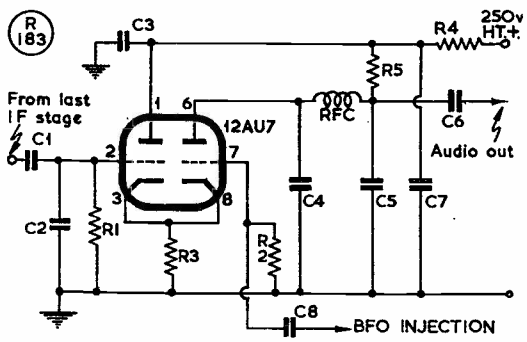


Fig. 1. The product detector circuit incorporated in the Collins 75A4 receiver for SSB reception, as discussed in the text.

Table of Values

Fig. 1. Product Detector in Collins 75A-4.

C1	= 10 $\mu\mu$F	R1, R2	= 100,000 ohms
C2, C8	= 100 $\mu\mu$F	R3	= 100 ohms
C3, C6	= .01 μF	R4	= 15,000 ohms
C4, C5	= 220 $\mu\mu$F	R5	= 47,000 ohms
C7	= 40 μF, elect.	RFC	= 2 mH.

Table of Values

Fig. 2. Product Detector in National NC-300.

C1 = 5 $\mu\mu$F	R1, R3 = 68,000 ohms
C2 = 10-100 $\mu\mu$F	R2 = 100,000 ohms
C3 = 100 $\mu\mu$F	R4 = 10,000 ohms
C4, C5 = .05 μF	

Two as far back as early 1954. British stations reported to be at present interested in VHF sideband include G3BFP, G3CCH, G3ILI and G6LX.

T-R Switches

Many thanks for all the letters on this subject—it seems that others are also experiencing difficulties with T-R switches above 14 mc! Two interesting circuits have been suggested, a diode bandswitched type by G3AOO, and a double cathode-follower type by G3IRP. Both these types are under test and results appear to be very hopeful.

Filter-Type Exciter

In response to the many enquiries about G3BFP's 85 kc filter rig, mentioned in the last "SSB Topics," he is preparing, in conjunction with G3KGA, a short article on it for appearance in a future issue.

W2EWL Transmitter

The recent article, "Cheap and Easy SSB," in March *QST* has aroused considerable interest amongst the mobile fraternity. This transmitter is a phasing type on 9 mc, heterodyned into 3.8 or 14 mc. and is built round the VFO and PA in a BC-458 Command Transmitter. Most of the components needed for the conversion are readily obtainable, with the exception of the miniature audio transformers in the driver and twin-channel amplifier stages.

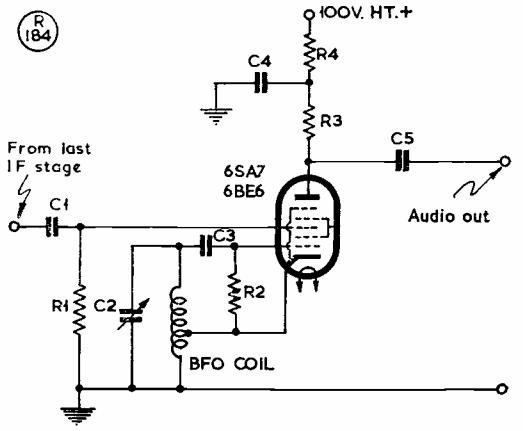
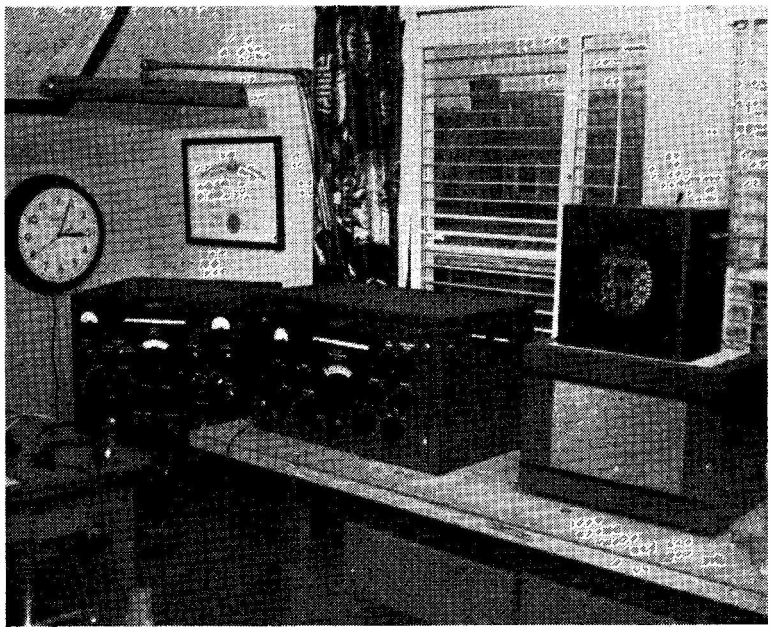


Fig. 2. In the National NC-300 receiver, the product detector circuit for SSB reception is as shown here; values are given in the table.

This point was discussed with W2EWL during a recent 14 mc contact, and it seems that the same difficulty is also being experienced in certain parts of the States. On making further tests with the transmitter, W2EWL has found that the ratios specified are *not* at all critical, and satisfactory results can be obtained by using normal anode to voice-coil transformers of the type used in midget BC sets (not personal receivers). All three transformers can be of the same type and should have as high a primary impedance as possible. Shunt feed as suggested in the original article is recommended.



The SSB equipment at K2GMO, New Jersey, who is in partnership with W2OHF — see p.140 May issue "Short Wave Magazine."

News and Views

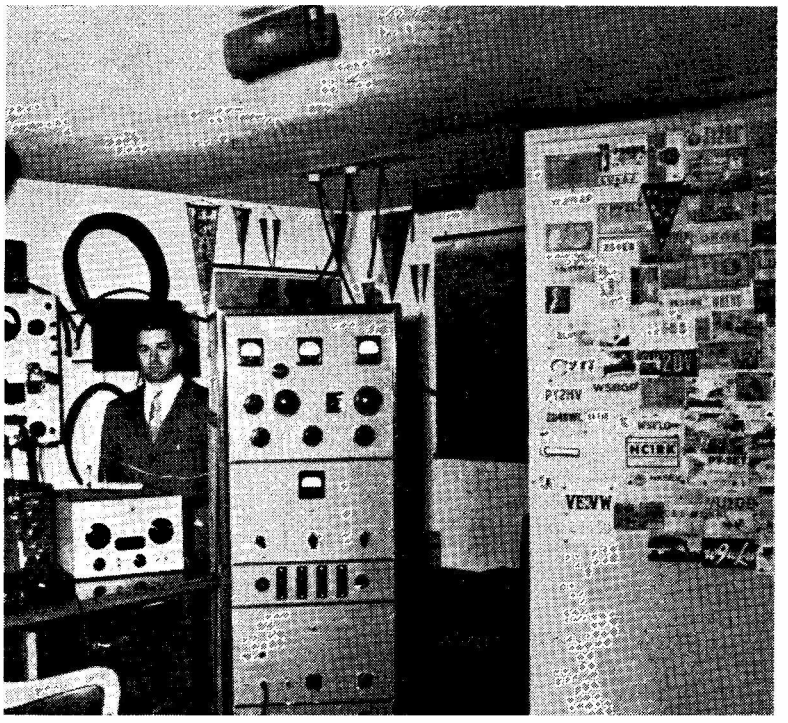
G3MY (Sheffield) has been on Sideband for two years, and until early this year operation has been limited to 3.8 mc. With the advent of better conditions on the HF bands, a change has been made to 14 mc with very good DX results. Operation is also planned on Fifteen and Ten when suitable receiving equipment has been built. The transmitter in current use is a crystal-filter type. based on the W1JEO circuit which is used to drive an 829B linear on 80. A separate mixer-amplifier with 4-807's in parallel is used on the HF bands. G3MY is also interested in mobile SSB and has started work on a filter-type transmitter for /M use.

GW3EHN (Swansea) is a newcomer to Sideband, having

recently received a Multiphase 20A exciter from the States. A prospective Sideband is G3KXT (Shirley), who has a phasing exciter under construction. G2MA (Rotherham) is building a filter-type exciter based on a 465 kc mechanical filter.

Two sideband transmitters are in use at G3AOO (Manchester): a phasing type based on the SSB Junior and a crystal filter job using cascaded half-lattice sections. Both exciters are used to drive mixer-amplifier units providing output on 14, 21 and 28 mc. With ground-plane aerials, excellent DX results have been obtained. Another station using similar transmitters is G3CWB (Kilburn), who has recently completed a phasing rig as a supplement to the filter job which has given him such fine results on 80 metres.

From Holland, PAØKC reports that SSB activity is on the increase, with six stations now operating on Eighty. He mentions that he has been on 7 mc with little or no success, due to lack of Sideband activity. DL4YU (Kaiserlauten) pleads for more sideband operation on the 21 and 28 mc bands. He favours the ARRL recommendation for SSB, calling frequencies around 21440 and 28650 kc. This seems a good idea, worth general observance.



Of the Italians on SSB, one is I1BAO. His transmitter, home constructed, runs push-pull 4-125A's in the final and receivers are a 75A4 and an HRO. The station is located on the top storey of the highest building in Milan, on the roof of which I1BAO has a 20-ft. tower carrying 3-element beams for 15 and 20 metres; the feeder and beam control outlets can be seen in the ceiling, just above the transmitter. The QSL cards bear testimony to the quality of the DX worked.

Two sidebanders are regularly active from Kirkwall in the Orkneys: GM2DAU and GM3FSV. Both stations put excellent signals into the London area on 3.8 mc. In Eire, EI4E (Killarney) and EI6W (Galway) continue to represent their country on 80-metre Sideband.

Apologies to G2ALN (Manchester), whose call was incorrectly reported in the June "Topics."

DX Notes

Following his successful FS7RT visit earlier this year, W6ITH made another trip to Saint Martin in June. In addition to operation from the French side, some time was spent in Dutch St. Martin. Many British stations were amongst the hundreds of sideband QSO's recorded by W6ITH from FS7RT and PJ2MA. Reporting on his first expedition, W6ITH is full of praise for the effectiveness of SSB under poor propagation conditions.

As reported in "Dx Commentary" in the June issue of SHORT WAVE MAGAZINE, a new Gatti expedition is *en route* for Africa and is fully equipped for SSB operation with a B & W 5100/51SSB. Operation is planned from VQ2, VQ3, VQ4, ZD6, ZS6, ZS7, OQØ, OQ5 and FQ8. (Thanks also to W2AOX for additional information.) Liberia is another African country shortly to be active on Sideband. ELØA has an exciter and is building a linear, while another exciter is being sent *via* the Gold Coast to EL2C. Also from Africa, VQ4EO (ex-G8NV) has at last got his linear operating and now has a very consistent signal into G on both 15 and 20 metres. VQ4EU is another who is active on QRP sideband; he has been worked by several G stations.

According to G3GKF (Purley), conditions on 21 mc have been very patchy in recent weeks, especially during the daylight hours. G3GKF has managed to collect several new ones on Sideband, including CE2HV (2330 GMT), PJ2MC (Dutch St. Martin, 0030 GMT), HR2WC, VQ4EO and KH6AQ. The G3GKF/W9RUQ/KH6AR daily schedule has been changed to 2200 GMT to take advantage of the later openings under summer conditions.

As mentioned in the June "Topics," a second SSB station, KC4USV, has opened up in Little America. Although a few contacts have been reported with British stations, the usual "CQ Stateside" has prevented many stations from calling. G3MY is one station that has held off, although he has heard KC4USA, 'USB and 'USV almost every morning for several weeks.

[over

From KV4BB on 14 mc, it appears that the *Yasme* is now equipped for Sideband. Operation is next expected from VK9, VR4, CR10 and VU5.

Several new stations on Sideband have made recent appearances on 14 mc. These include K2GMO, ZS6AFF, VO6L, VK4AB, VK6CF, 5A2TP. VS6CW, JA1ACB and KX6NB.

Another series of Airborne SSB tests was carried out by WØCXX/AM during early July. Flying in a U.S.A.F. C97 over Arctic regions, many contacts were made with Sideband stations all over the world. In particular, a QSO has been reported with KC4USV (near the *South* Pole) while they were flying very close to the *North* Pole! The chief operator during the flight was General Griswold, KØDWC, of the U.S.A.F.; he will be remembered as KG6AAF.

Suggestion

It has been put forward that it might be a good idea to run, in connection with "SSB Topics," a results-panel tabulating countries worked on two-way SSB, *i.e.* AM/SSB *not* to count, on the different bands, January 1st, 1954, being taken as the starting date.

If you favour this suggestion, please include the necessary data in your next report. If you don't, please let us know, because it is not proposed to commence a Ladder unless it appears to have good backing—not necessarily by the majority, but by a sufficient number of SSB operators to make the table representative.

In Conclusion

That, then, is our SSB story for this month. The writer hopes to hear from all G/SSB's for the next appearance of this feature—in the October issue of SHORT WAVE MAGAZINE—by **August 31** latest. Send your comments, results, experiences and suggestions to: "SSB Topics," *Short Wave Magazine*, 55 Victoria Street, London, S.W.1. And would correspondents kindly note that it is more convenient (purely for administrative purposes) if they use this address rather than that of the writer at his home QTH. Thank you, and 73!

OBITUARY

We very much regret to have to announce the deaths of:

Basil King, EI5Y, of Dublin, suddenly on June 20, at the early age of 46. He leaves a widowed mother and a son; he was buried in England beside his wife, who died some years ago.

* * * *

James Catt, G5PS ("Hamish" of the F.O.C.), of Kings Langley, Herts., who passed over on June 5, after a heart attack, in his 69th year. One of our best-known old timers, G5PS was first licensed as long ago as 1904, with the call-sign CXD. In the course of his long life, he had at various times served the Crown, not only in all three of the Armed Forces, but also in the G.P.O., and, latterly, in the Ministry of Supply, from which he had recently retired. G5PS had visited more than 50 countries and cultivated a wide range of activities and interests outside Amateur Radio. He aimed always at perfection in everything he undertook. He leaves a widow, who is herself well known in F.O.C. circles.

* * * *

Jack Butterworth, G5XF, of Rochdale, Lancs., died on July 10 after a long period of ill-health, during which he was not active on the air. Prior to 1952, he was well known on the 160-metre band, and latterly the Bury Radio Society had planned to equip him with a bedside station.

* * * *

We offer our sincere condolences to the relatives and friends of all three of these amateurs—EI5Y, G5PS and G5XF—each of whom made, in his own way, his contribution to Amateur Radio.

NEW QTH's

With 458 candidates through the last R.A.E., there will shortly be many new call-signs coming on the air. Readers are reminded that they should inform us of their call-sign/address as soon as they can, for appearance in "New QTH's" and the *Radio Amateur Call Book*.

MOBILE WORKING on 15 METRES

From Whitehead in Co. Antrim, GI3CWY reports interesting /M results on 21 mc which, he says, "is a marvellous band for mobile when it is open." The GI3CWY transmitter is CO 6AQ5-6146 PA running 25w., modulated by a pair of 6AQ5's, and the receiver a Pye car radio modified; the aerial he uses is a bumper-mounted whip 8 ft. long with a variable-slider loading coil, fed by 52-ohm coax. Main power supply is a 350v. dynamotor.

The rig complete is arranged for push-to-talk, with the one switch controlling all change-over operations. As GI3CWY remarks, "anything less than this makes one a potential killer on wheels."

As to results: He has worked, *whilst in motion*, to fixed stations in no less than 18 countries, including CN8, PY, VE and W, with a report of RS-58 from VE3AIU. GI3CWY now wants an encounter with an American /M on the 15-metre band, so as to make a mobile-to-mobile QSO between Northern Ireland and the American continent!

Among other interesting points brought out by GI3CWY in his report is that on his car (a Vanguard) the biggest problem has been generator noise suppression above about 12 mc; below this frequency, normal by-passing technique produced a quiet enough background. All other electrics, such as clock and wiper motor, as well as the ignition system, had also to be thoroughly screened and by-passed. GI3CWY is going VFO to extend his coverage on the 21 mc band, and will also be /M on 80 metres shortly. It is understood that there are two other GI's who are /M, both on the LF bands.

More about Relays

OPERATION AND FUNCTION OF SLUGGED, POLARISED AND UNISELECTOR TYPES

N. P. SPOONER (G2NS)

Though we have recently disseminated a good deal of practical information on relays and their uses, the subject has by no means been exhausted, as this article will show.—Editor.

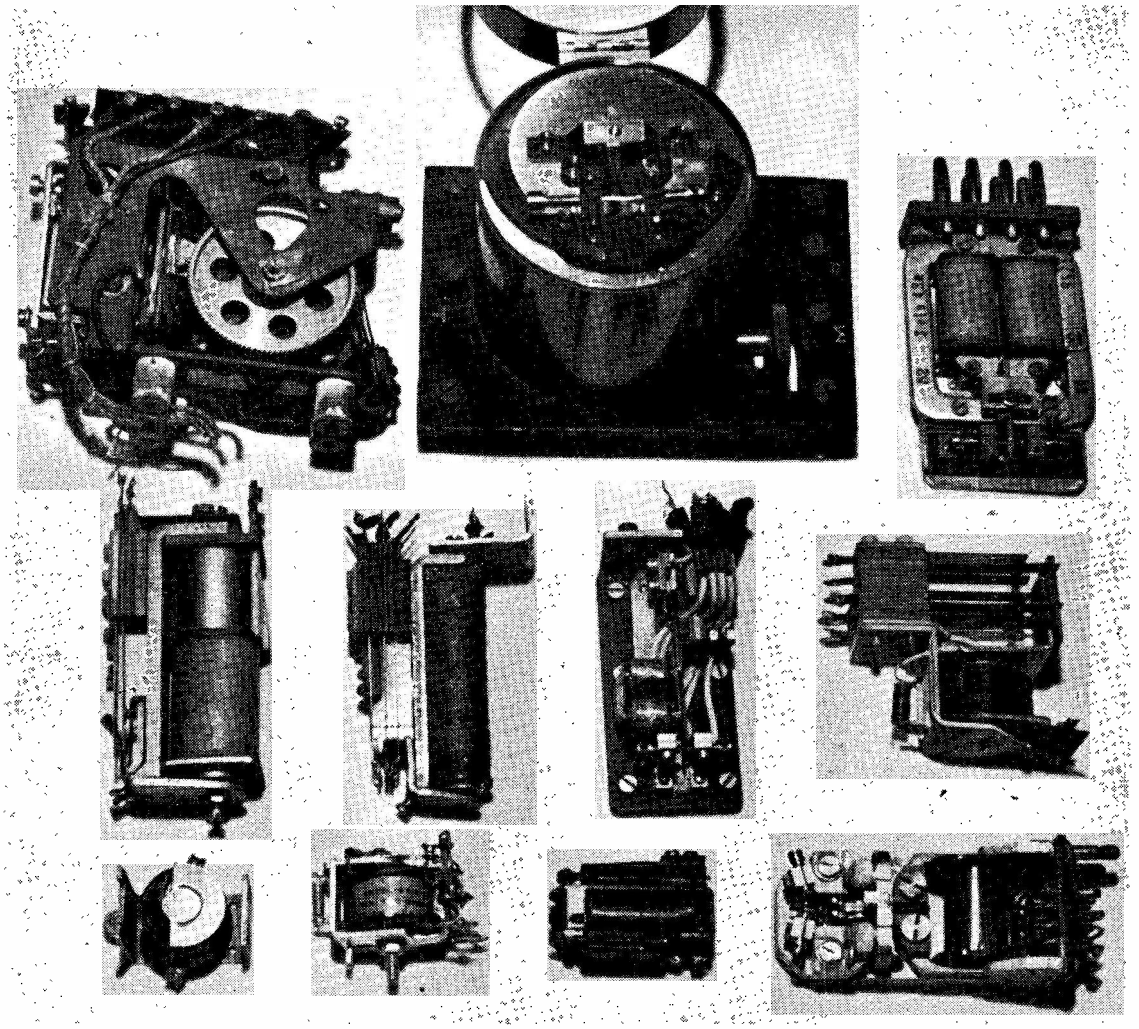
LIKE the XYL's hats, relays appear in such a variety of shapes and sizes that a novice, unfamiliar with the simplicity of their construction and the multiplicity of their uses, might easily be awed into planning out-of-date manual switching for the control of his station. This would certainly be a backward step; Amateur Radio is largely concerned with electricity and a relay, after all, is merely an electrically-operated switch. Even in the nineteen-twenties the writer heard of one remote "G" shack in which an MO-PA transmitter was controlled by land-line and relays from the receiving position 1½ *miles* away!

While modern versions of these fascinating devices are not yet able to make decisions for themselves, relays are nevertheless capable of effecting practically every switching operation needed for the remote or direct control of industrial and electronic equipment. They play an important part in mercury, pressure, time and vacuum switches, alarms, contactors, counters, cut-outs, flashers, flow-indicators, gas valves, hoppers, lubricators, level controllers and leakage units. There are phase failure relays, power factor regulators, winker beacons, latchers, steppers and quick-strikers. They make a vast host that even includes *no*-volt relays in which the armature is first mechanically moved by a manual push; they latch in electrically and fall off when the supply ceases. In conjunction with such gadgets as the photocell, relays help to start a process, control it during its operation, switch faulty components out of circuit, summon the repair gang, keep an eye on the time and stop the process when it reaches completion. In association with radio-controlled model equipment, they will not only carry out orders transmitted to them by a carrier, but also those prompted by audio tones of differing frequencies, a combination of which can then be used still further to increase the number of available controlled circuits. In direct contrast, the switching sequences required in an amateur station are so simple and straightforward that a few shillings invested in "surplus" market relays amply satisfies all normal requirements. This is a Good Thing because a relay-minded amateur, without having to increase keying speeds, automatically adopts smarter station operation which, in itself, lessens the burden of present-day interference. Much excellent information concerning the circuitry in which relays can best be employed has already appeared in *Short Wave Magazine* and the purpose therefore of the present article is not to amplify such knowledge, but to explain the construction of those types now most likely to be met with.

Types 3000 and 600

Without doubt the telephone exchange type of relay—the Type 3000—will be found in the greatest profusion with its smaller brother, the Type 600, in lesser evidence which requires no separate description. Because of its adaptability for amateur keying, AF, AC and DC switching the Type 3000 certainly merits some description* though the appearance of this relay must by now be well-known to all. As would be expected, this type is not suitable for RF working such as aerial transfer or band-switching because of capacity, leakage and insulation considerations. While as a general rule the higher the coil resistance the more sensitive the relay, it should be remembered that the design was evolved from the points of view of reliability, compactness and cost (now said to be about £1 each, new) rather than sensitivity and rapidity of action. In the "surplus" assemblies, any combination of contacts from 1 Make up to 8 Change-over may be encountered, with coil resistances ranging from 1 ohm up to about 80,000 ohms. The basic theory, similar to most other types of relay, is that when a current passes through a coil of wire wound on a core, the magnetic field thereby set up attracts an armature which, in moving, causes a number of contacts to make or break the circuits in which they are connected. While current is flowing, the relay is said to be "energised," to be in the "hold-on" position, to have "pulled in." When the current flow ceases, the armature and contacts return to their normal resting positions and the relay is

* And see "*Use and Operation of Relays*," *March 1956*, SHORT WAVE MAGAZINE.



A selection of relays of different origins and designs. Upper left is the G.P.O. uniselector type, described in the text; below it is a Type 3000, slugged slow-to-release, and lower left is an AC relay stripped to show the shading coil. At upper centre is a Silvertown Type B, a precision instrument of 1915 manufacture; beside it is a German plug-in polarised relay of recent design. A Siemens high-speed relay, of the kind found on various items of "surplus" equipment, is second from the right in the middle row; immediately below it is a German non-polarised type. The others are American relays of various patterns.

then said to be "de-energised," to have "released," to have "opened."

In circuit diagrams, relays should always be represented as being in their de-energised positions and the contacts shown detached from their parent relays, but appearing in the circuits they control. The identity of each contact is proclaimed by a letter and number that corresponds with that marked against the parent relay.

Slugging

In certain circuits, and with key or voice-operated delayed-action systems, it is necessary to retard the working of various relays and, with the Type 3000, this is done by sleeving a solid copper "slug" round the core with the object of either delaying the release alone or both operation and release. In the former "slow to release" case, the slug does not affect either energisation or the initial movement of the armature because it has been placed at the far heel end of the yoke where it can only oppose the normal collapse of the magnetic field upon de-energisation. In the latter "slow to operate and release" case, the slug has been placed at the armature end where its presence not only delays the building-up of the magnetic field upon energisation, but also its collapse during de-energisation. Because the

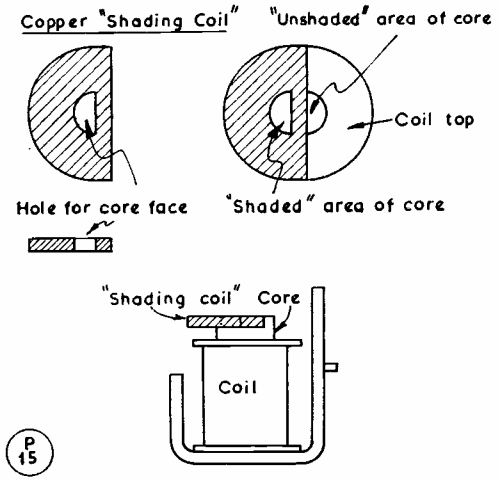


Fig. 1. Construction of an AC relay, which has part of the core "shaded" to maintain the field, as explained in the text.

same principle can be applied to a totally different type of relay, it is here convenient briefly to consider energisation by alternating current.

AC Relays

If applied to the Type 3000 as it stands, AC would cause it to chatter severely and behave erratically because at every half-cycle the voltage drops to zero and tempts the relay momentarily to de-energise. If a means is applied of opposing this half-cycle collapse of the magnetic field, then a relay for AC operation will result. These are useful where DC is either not available or else for other reasons is unsuitable. A slice of copper known as a "shading coil" is let into the core of the relay and "shades" part of the core face, acting as a thick short-circuited turn. This small shaded area, shown more clearly in Fig. 1, opposes the collapse of the magnetic field at every zero half-cycle and keeps the armature pulled in without assistance from the unshaded part of the core. The net result is that the armature remains attracted during the entire AC cycle without chattering. Although not previously mentioned, we have up to the present been dealing with "non-polarised" relays in which an unmagnetised soft-iron armature moves in a direction that is quite independent of the current direction through the coil.

Polarised Relays

In cases where requirements call for a relay that is more sensitive and capable of higher operational speed, a "polarised" type can be used. The large amount of metal present and the distance travelled by the armature of the Type 3000 restricts it to steady plodding because, first of all, a rapid build-up and collapse of the magnetic field is hampered, and secondly, the attraction exerted on the armature during its movement is uneven (initially slow and quickening as the core face is approached). In a polarised relay the armature can be a small tongue or reed confined to travelling through a short path, which allows rapid magnetic changes and speedy movement of mechanical parts. The basic details of Fig. 2 will be found reproduced in varying forms throughout most polarised types. The tongue or reed carrying the moving contact swings between the poles of a permanent magnet and, when adjusted neutrally, will fly to one particular pole when coil current flows in one direction. When the coil current is reversed, it flies to the opposite pole, adjustable fixed contacts being placed on either side in order to close circuit when met by the moving contact. Besides fixed contact adjustment, some types provide for altering the position of the permanent magnet pole pieces with relation to the reed. In this way the relay can be "biassed" so that the moving contacts either stay neutral or else rest against one or other of the fixed contacts. The benefits of rapid action brings us to a consideration of how higher speed can be attained in a relay without polarisation.

High-speed Relays

While, generally speaking, the polarised relay is capable of very much greater speed than a non-polarised type, the latter can be quite nimble if certain points are watched. The core is often laminated, the build-up and collapse

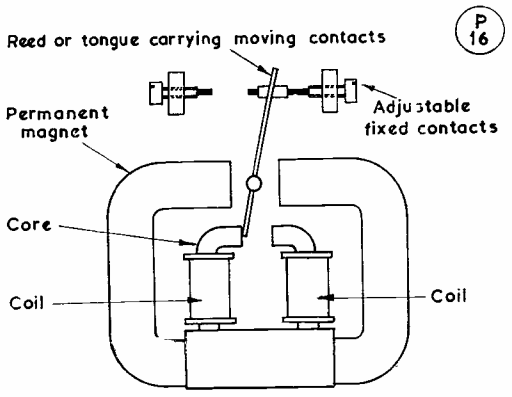


Fig. 2. Basic details of a polarised relay, which can be used in circuits where rapid operation is required.

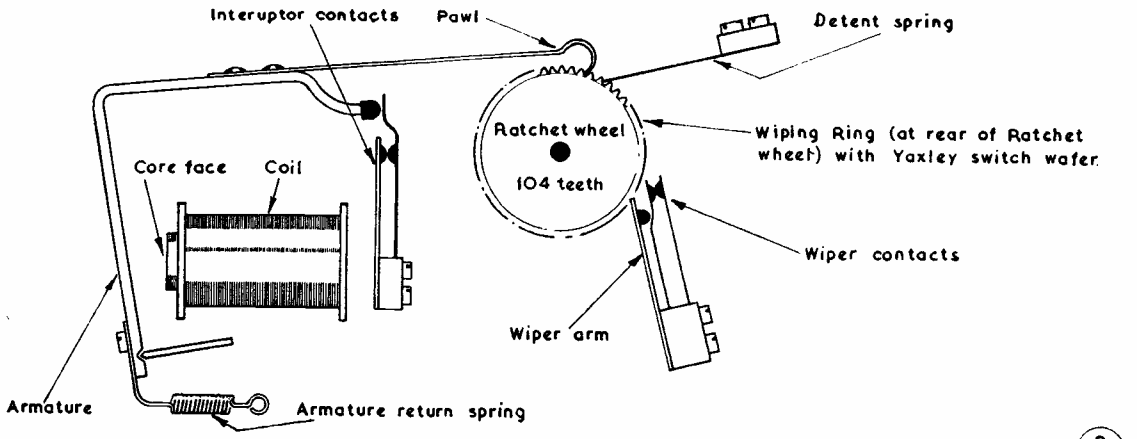


Fig. 3. Electro-mechanical layout of the G.P.O. Uniselector relay, an interesting and ingenious mechanism which has many useful applications. Each pulse of current in the coil moves the ratchet wheel one tooth, the pulses being produced by the interrupter contacts. The circuit being switched is controlled by the wiper contacts.

of the magnetic field is rapid, a very small armature is fixed to a spring (as in the Siemens high-speed relay), or to a lever pivoting on a spindle designed to reduce friction, coils are mounted on a horseshoe corè so that pole pieces or faces will exert equal attraction, biassing and contact adjustments are delicate and precise. With the Siemens keying relay found on the " surplus " market, positioning of the fixed contacts and spring tension adjustments are provided.

Uniselector Relays

As with the Type 3000, Post Office engineers have again to be thanked for producing yet another fascinating device that has in varying forms found its way from automatic telephone exchange dialling, into Service equipment and finally the " surplus " market. The type detailed in Fig. 3 is a reverse-acting Uniselector that has been considerably simplified for the Services. When the passage of DC through the coil energises the relay, the moving armature causes the pawl attached to it to ride over one tooth on the ratchet wheel and engage with the next waiting tooth. In the meantime, the detent spring has been bearing against the ratchet wheel to keep it steady. When the current flow ceases and the relay de-energises, two strong armature return-springs sharply return the armature back to its resting position and the pawl, travelling with it, pulls the ratchet wheel round for a distance of one tooth. With forward-acting uniselectors, the wheel is pulled by armature attraction and pawl during energisation and not, as in the present case, by the strength of the return-spring working on armature and pawl during de-energisation.

When in turn the wiper drops into and rides out of four equi-distant slots cut in the ring, the wiper contacts open and break the circuit in which they are wired. While in rotation, the wheel spindle also turns the wafer of a four-position Yaxley type switch to control exterior circuits. When travelling one tooth at a time, the relay is operated by impulses of energising current applied to the coil by the interrupter contacts that break the DC supply when mechanically opened by the armature.

This automatic cutting off of the supply as soon as the relay is energised thereupon de-energises it and thus, *by applying the required number of impulses,* the wiper contacts and the Yaxley will control any remote circuits chosen. In the type under discussion, the ratchet wheel has 104 teeth, requiring 104 impulses to travel one complete turn. With four slots in the ring, the wiper contacts break four times during one complete turn of the ratchet wheel. The unit can be re-wired so that it " motors," *i.e.*, operates non-stop, or motors for a quarter-turn and is then automatically stopped by the breaking of the wiper contacts as the wiper drops into the first slot. If two of these units are wired any distance apart, the wheel (and therefore, contact) position of the " home " unit will be imitated by the " remote " unit. Radio-control will effect the same result—that is to say, the units can be made to follow through a single-circuit radio link ; this has many interesting possibilities.

VHF BANDS

A. J. DEVON

Contest Comment—
Conditions Steadily Improving—
Centimetre-Band Activity—
The Portable Expeditions—
News and Station Reports—
Calls Heard and the Tables—

YOUR A.J.D. took a gloomy view of the prospects for the 1st Section of our European VHF Contest as he watched the weather situation unfold during the week before July 14/15. Sure enough, when the day came, conditions were just about rock-bottom all over Europe. This is no unusual experience for us, because practically every VHF contest period we have ever set has coincided with the worst conditions encountered that season! The weather was wet, with only moderate pressure and temperature, and by opening time on the Saturday evening, the "feel" of the two-metre band was rather dead. Practically all correspondents who have commented agree on this; though it is not yet possible to report in more than very general terms, it is already evident that the various areas of activity were not connecting up with one another. This gave the inevitable rather depressing sensation of a comparatively empty band—and there is nothing like the impression of a lack of activity to bring about, by snowball action, the reality of it.

The observations of your A.J.D., for what they are worth, are that conditions were better on the Saturday evening, July 14, than on Sunday, and that so far as any long-haul working was possible, the best paths were north-south for distances up to 150 miles or so. There was practically nothing doing east-west.

For the 2nd Section, July 21/22—to which it was possible to give some attention in the intervals of composing this piece—the picture was very much brighter. Conditions were good, without being sparkling, and some interesting GDX contacts were going on both north-south and east-west, with EDX being worked on the Saturday evening, July 21. However, no very big EDX opening developed (as had been hoped for one of these sections), though at the moment of writing it is not possible to say what the Continental experiences were. All we do know is that they were there, and trying.

It is very much hoped that everyone who came on for either Section of this Contest will put in a log, so that we can get a reliable picture of what did happen, apart from the competitive interest of the event.

The closing date for all logs for this Contest is Monday, August 13. The final results will appear as soon as possible.

Next European VHF Event

Oh, yes, we are in the contest season all right! The IARU Region 1 event, organised this year by the D.A.R.C. (German Amateur Radio Society) is fixed for September 8-9. In the ordinary way, the rules would have been published in this issue, but there is one provision that is so peculiar that we have decided to await clarification — it is that U.K. operators are apparently expected to calculate their mileage upon exact kilometre distances. This means distance brackets like 62.1 to 93.1 miles, 93.1 to 155.3, and so on. It seems quite unnecessary if the 5/3 conversion factor is used which (while not being *exact*) is near enough for all practical purposes. Only in a few borderline cases would such hair-splitting accuracy as the rules at present call for be needed.

Here is a summary of the essentials of the rules, if you do not see your September copy in time: All VHF bands, with 10 times the points on 430 mc, 1250 mc or higher for the same distance on 144 mc. The multiplier is the number of bands upon which contacts are made. A progressive serial number starting 001 must be given after each RS or RST report. A station can be worked once only on each band to score, and the Contest runs continuously from 1800 GMT on September 8 to 1800 on the 9th. There are four sections: Single-band fixed; multi-band fixed; single-band, /P, /M; and multi-band /P, /M. Portable/mobiles must remain fixed for the duration, and multi-*operator* stations may use only the one callsign throughout. Exact QTH's must be given, referred by distance and direction from the nearest town. Log headings must be in the order: Date, time, call (station worked), QTH, F/CW, RS/RST serial sent, RS/RST serial received, exact distance in km., points claimed, and band (A, 144; B, 430; C, 1250 mc and up).

The log must be fully summarised, including number of contacts, final score claimed, countries worked, points scored, multiplier used, sum of distances covered, best DX, with details of transmitter, receiver, aerial, exact location (in lat./long.) and height a.s.l. (in metres, presumably!).

For those who have no objection to working in kilometres, the radii are: 0-20 km, 1 pt.; 20-100, 2 pts.; 100-150, 3 pts.; 150-250, 4 pts.; 250-350, 5 pts.; 350-500, 10 pts.; 500-700, 20 pts.; 700-1,000, 40 pts.; and over 1,000 km., 80 pts. This is the *two-metre* score table. For contacts on any VHF band above 144 mc, the loading is $\times 10$, except only over the 0-20 km distance, when it is $\times 2$.

So there you are—any necessary further clarification of the rules will appear in September "VHF Bands," in plenty of time for doing the office work; in the meantime, you have the essential information for taking part in the Contest.

[over

Notes and News

Turning now to our own affairs, there is a large clip of reports this month. Several of them cover the activities of various /P enthusiasts in the rarer Welsh counties, in particular G3KEQ, who undertook a sort of progression or marathon through Hereford, Merioneth, Brecon, Radnor, Montgomery, Caernarvon and Flints. Setting up in each of these to work whom he could, G3KEQ was in great demand throughout his tour; G5MA (Great Bookham, Sy.) raised him in every county except Merioneth in which, in Bob's expert opinion (and he should know), there is only one site which is any good for working south-east.

As the Activity Report shows, G3DO was also out GW/P in Montgomery and Radnorshire and, early in July, G/P in Norfolk and Rutland. He found it difficult to attract attention from Hunstanton, apparently because people do not often head their beams towards Norfolk.

Rare County

An exciting possibility, for the GM's even if not for us down south, is suggested by the fact that GM3BOC will be /P, /M at and around Brora in Sutherland from August 26 to September 7, using 144.56 or 145.67 mc, 6.30-8.0 p.m. and after 10.0 p.m., clock time, every evening. Even if nothing much materialises in the way of real DX, G3BOC (home QTH Willaston, Ches.) hopes to encounter the GM's — he should not have much difficulty with GM2FHH, anyway.

In a very interesting report, GM3DIQ (now of Edinburgh) draws attention to the high level of GM activity, as shown by his calls heard/worked list — *see* Activity Report. The GM's are still largely confined behind their mountain barrier, only the most northerly (and effective) G's being able to work them. GM3DIQ himself now has the double 6/6 Slot array going, mounted on a tower and remotely controlled; he is very pleased with results, and is said to be "laying down a wipe-out signal over most of Scotland." The G6NB of the Highlands, in fact! Anyway, the GM's look urgently for GDX on every possible occasion, and are there to be worked whenever the breakthrough comes. GM3DIQ is on most evenings from 1900 BST.

G3JWQ (Ripley, Derbs.) moves in the Tables, thanks largely to the /P expeditions, and G3FIH (Nr. Bath) also goes up, and for the same reason.

G3GHO (Roade, Northants.) wishes A.J.D. "a hpapy new year"—it being his first report for about eight months. Having done a complete rebuild, Mac is now running an 829B in the PA, modulated by a pair of 807's, input 60-70w. He maintains a steady level of activity and says that is more than can be said for some others, who nevertheless appear whenever there happens to be an opening! We tried to analyse this phenomenon in our last, and it is worth mentioning that several correspondents this month say that they are in complete agreement with your A.J.D.'s reasoning on the subject. It will be ever thus, one fears. Never mind——VHF is *always* worth it when we do get the openings.

G5DW (Ashcott, Som.) is now VHF-only, after years on the DX bands, and feels that many good day-time openings are missed because, of course, most people are not able to get on until the early evening. He is quite right. That such openings do occur is proved by G5YV's recent Sunday noon contacts with SM, and the daily lunch-time schedules worked by PE1PL, who can be heard in the Midlands almost every day by stations not well placed for DX working in the ordinary way, *e.g.* G6FO (Maids Moreton, Bucks.), in the valley of the Ouse, with no very clear get-away in any direction. G6FO has even succeeded in working PE1PL, getting the rather remarkable report of RST-419; this really meant that PE1PL knew G6FO was there, but only just. *(It was a QSO!—Ed.)*

G5MR (Hythe, Kent) climbs in the Tables and reports on the unusually low level of signal strength from his "local F's"

TWO-METRE ACTIVITY REPORT

(Lists of stations heard and worked are requested for this section, set out in the form shown below, with callsigns in strict alphabetical and numerical order).

GW3DO/P (nr. Newtown, Mont.)

WORKED: G2BNZ, 2HGR, 2NV, 2NY, 3EPW, 3HTY, 3IUD, 3IWJ, 3JZG, 3JZN, 5YV, GW3GWA. (*June* 24).

GW3DO/P (nr. Knighton, Radnor).

WORKED: G2CIW, 3BA, 3GHO, 3HTY, 3JWQ, 3JZG, 6WF, 6YU/M (Oxford). (*June* 24).

G3DO/P (Hunstanton, Norfolk).

WORKED: G2FJR, 3ARX, 5BD, 5LL, 5MA. (*July* 7).

G3DO/P (nr. Oakham, Rutland).

WORKED: G2FNW, 3CCH, 3DLU, 3DMU, 3IUD/P, 3JWQ, 3KQF, 4JJ/A, 5YV, 8CZ. (*July* 8).

GW3FXR, Port Talbot, S. Wales.

WORKED: G2ADZ, 2NY, 3FIH, 3IRS, 3KAA, 3KLP, 5DW, GW2ACW, 8SU.
HEARD: EI4E, G2AIW, 3EPW, 3FAN, 3HAZ, 3IOO, 3KHA, 5MA, 5YV, 6NB, 6OX, GI3GXP, ON4BZ. (*May* 10 *to June* 30).

G2DVD, Slinfold, Sussex.

WORKED: F9EA/9, G2ATK, 2BMZ, 2BVW, 3BA/P, 3AUS, 3DLU, 3ENY, 3IRS, 3JGY, 3JGZ, 3JWQ, 3KEF, 3KEQ/P (Hereford), 3KHA, 3KPT, 4GR, 4JJ/A, 5BM, 5DW, 5YV, 8DA, GC2FZC, 3EBK, GW3GWA/P (Denbigh), G3KEQ/P (Radnor), 8SU. (*June* 1 *to July* 11; *all over* 100 *miles*).

GM3DIQ, Edinburgh.

WORKED: G2DKH, 2NY, 3BW, 5YV, GI3GXP, GM2CQI, 2FHH, 3BDA, 3DDE, 3DYC, 3ENJ, 3FGJ, 3FMD, 3FSD, 3HLH, 3IBV, 3INK, 3JWS, 3KPD, 3NG, 3UM, 4HX, 4PW, 4QV, 5VG, 6KH, 6SR, 6WL, 6ZV, 6XW, 8MN. (*Month to July* 16; 115 *hours' operating*).

G6FO, Maids Moreton, Bucks.

WORKED: G2ADZ, 2HCG, 2HDZ, 3BFP/A, 3CGQ, 3FAN, 3FUL, 3KHA, 3KPT, 3XC/P, 4GR, 5KG, 5KW, 5MR, 5XD, 5YV, 6AG, 6NB, 6OX, 6XH, 8AL, 8MW, 8PX, 8UQ/P, 8VZ, GC3EBK, GW8SU, PE1PL.

HEARD: G2BVW, 2CZS, 2DDD, 2DVD, 2FVD, 2RD, 3BA, 3FZL, 3GHO, 3GNJ, 3GPT, 3HBW, 3IIT, 3JR, 3KEQ, 3KFT, 5DS, 5ML. (*Since July* 1*st*).

SWL Drybrough, Coventry.

HEARD: G2AK, 2ANS, 2ATK, 2BVW, 2CIW, 2CVD, 2DCI, 2FJR, 2FNW, 2HCG, 2FM, 2NY, 2OI, 2XV, 3ACZ, 3BA, 3BJQ, 3BXF, 3CKQ, 3CRH, 3DJQ, 3DKF, 3DLU, 3DMU, 3EJO, 3ENY, 3EPW, 3FAN, 3FDF, 3FIH, 3FUW, 3GGR, 3GHO, 3GJZ, 3GKZ, 3GNJ, 3GPT, 3GQR, 3GWB, 3HAZ, 3HTY, 3HXS, 3IIT, 3IOO, 3IRA, 3IVF, 3IWJ, 3JGY, 3JWQ, 3JYZ/A, 3JZG, 3JZN, 3KBL, 3KEF, 3KEQ, 3KFD, 3KHE, 3KZS/M, 3XC/P, 3YZ, 5DW, 5JU, 5KW, 5MA, 5ML, 5PP, 5SV, 5YV, 6AG, 6CI, 6CW, 6NB, 6OX, 6SN, 6TA, 6WF, 6XA, 6YU, 8AL, 8BP. (*April* 18 *to July* 14).

SWL Ball, Hutton, Essex.

HEARD: F9EA/P, G2AIH, 2AIW, 2BMS, 2BVW, 2CIW, 2CZS, 2DDD, 2DVD, 2FMJ, 2HCG, 2HDZ, 2HIF/P, 2RD, 3AEX, 3ANB, 3BEX/P, 3CNF, 3ECA, 3EYV/A, 3FAN, 3FD, 3FIJ, 3FUL, 3GDR, 3GGJ, 3GJZ, 3GPT, 3HBW, 3HGE, 3IIT, 3JMS, 3JMU, 3JPX, 3JWQ, 3JZG, 4JJ/A, 4RO, 5AU, 5BM, 5DS, 5DW, 5KW, 5MA, 5US, 5YV, 6LL, 6OX, 6XH, 6YP, 8AL, 8IL, 8PX, 8SK, GW3KEQ, 3GWA/P, PAØBL. (*July* 7-9 *only*).

during the 1st Section of the VHF Contest, F3JN and ON4BZ being far below normal strength; otherwise, from France it was weak carriers only. However, G5MR did hear G3KHA (Bristol) and G4GR (Marshfield, Mon.) for a few minutes, and had a QSO with somebody identified as "the Old Man himself" *(who can he mean? —Ed.)*.

G2DVD (Slinfold, Sx.) puts in a list for the Activity Report, and reports an Alarming Occurrence. His house was struck by lightning on July 8; a lot of gear was damaged and the usual strange things happened which are always associated with a lightning strike: The switch box for the electric cooker disintegrated, but the fuse remained intact; the power unit for the beam driving motor was blown to bits; and the strike ignored the direct earth lead and jumped an aerial relay instead. Having quickly put all this right and got back on the air again, G2DVD asks us to stress the fact that the band is now open nearly every evening; but unless there is a contest on, barely a dozen stations can be heard; yet over a contest week-end, anything up to 100 stations can be worked from his QTH near the South Coast. G2DVD is on each evening from about 2100 clock time, looking for contacts with anybody at any distance.

Report on 1250 mc

We were very glad to get from G3HBW (Bushey Heath, Herts.) a full account of his work up to date on the centimetre bands. On 70 cm some 30 stations have been worked since mid-June, including cross-bands with G2FNW (Melton Mowbray) and G5LL (Mablethorpe); the best straight 70-cm contacts have been with G2DDD (Littlehampton) and the two Cambridge stations, G2CIW and G2XV.

On the 23 cm band, G3HBW is now on the air with CC equipment, which has been extensively tested with G3GDR (Abbots Langley, 6 miles), who receives Arnold at S8 at any time. Their transmitters are DET-24 operated as power triplers in cavities on the output side, G3HBW being on 1297.05 mc and G3GDR on 1297.77 mc.

The receiver at G3GDR is a crystal-mixer superhet converter, with a CV82 as oscillator on 630 mc, doubled in a CV88 to 1260mc, into a wide-band IF/AF amplifier. G3HBW uses rather a different receiving arrangement: A crystal-mixer and CC oscillator chain, into an AR77 tuned across 27-31 mc, for 1296-1300 mc coverage. G3GDR's CW is perfect copy on this and the whole arrangement is just as stable and as easily workable as the two-metre and 70-centimetre receiving equipment. Aerials are, at G3GDR, a corner reflector, and at G3HBW, temporarily, a stack.

We congratulate G3GDR and G3HBW on these impressive results, which are the outcome of a great deal of hard work at both stations. Their QSO's probably constitute first U.K. contacts on the 1250 mc band with stabilised equipment at both ends, and over a reasonable distance, albeit local only. However, G5DT is known to have CC gear, and G3EOH is on with a receiver.

It is hoped that these results, and those obtained earlier by G3CGQ, G3FUL and G5RZ using simpler equipment, will stimulate activity on a band upon which there is so much practical work to be done in the way of amateur investigation.

More Station Reports

G3IER (Cheltenham) notices a remarkable increase in signals from the London direction whenever there is a /P expedition into the fastnesses of Wales; he suggests that beams should be turned west even under more normal conditions; he himself would very much like to work a station in Surrey, a county never yet raised from G3IER; yet some of the Surrey stations, when calling GW3KEQ/P on his recent expedition, were coming in at quite workable strength. However, in spite of everything, G3IER gains six more counties for the Annual, all from /P's!

From even further west, comes a report from GW3FXR (Port Talbot, Glam.) who also sends an interesting calls heard/worked list; there are one or two nice ones in this. GW3FXR would like schedules, any day, 1800-2000 or 2300-2359, clock time, with any stations over 150 miles distant. He runs 25w. to an 832, the converter is CC tuning 4-6 mc on the IF, and the beam a 4-ele flat top. (QTH: 142, Western Ave.).

G2CIW (Cambridge) has worked G3BW (Whitehaven, Cumb.), G2DKH/P (Co. Durham) and GC3EBK in Guernsey on two metres, and on 70 cm his best contact recently was with G3IOO (Oswestry). The 70-cm transmitter is now a QQVO3-20A PA, on 433.95 mc, into an 8-ele stack with a mesh reflector. G2CIW, who is VHF-only, would like us to suggest activity week-ends for 70 cm, to increase the number of stations operating at known times. Well, we are prepared to suggest anything likely to do that, and if only *four* other people write in, as a result of this note, to say that they would support an activity week-end on the 430 mc band, we

TWO METRES

COUNTIES WORKED SINCE SEPTEMBER 1, 1955

Starting Figure, 14

From Home QTH only

Worked	Station
43	G3GPT
41	G3GHO
38	G3FIH
36	G2DVD, G5DW
35	G3JWQ
32	G3IOO, G3JZG
31	G3WW, G5DS
29	G3WS, G5BM
28	G3IRA
24	G3DLU
23	G3IER, G3KHA, G4JJ/A, G5MR, G8VN
21	G3CKQ, G3DO, G3JXN
20	G3BJQ, G3HWJ
18	G3IEX
17	G3ITF
16	G3BW, GM3DIQ

This Annual Counties Worked Table opened on September 1st, 1955 and will run for the 12 months to August 31st, 1956. All operators who work 14 or more Counties on Two Metres are eligible for entry in the Table. The first list sent should give stations worked for the counties claimed; thereafter, additional claims need show only counties worked as they accrue. QSL cards are not required for entry in this Table.

SEVENTY CENTIMETRES

ALL-TIME COUNTIES WORKED

Starting Figure, 4

Worked	Station
26	GW2ADZ
25	G2XV
23	G3BKQ
20	G6NB
18	G3IOO
16	G6NF
15	G4RO, G5YV
12	G2HDZ
10	G2OI, G3HBW
8	G2CIW
7	G2DDD, G2HDY, G3IRW
6	G3FAN, G3JMA, G3WW
5	G3FUL, G3IRA, G3IUD
4	G3JGY

On working four Counties or more on the 70-Centimetre band, a list showing stations and counties should be sent in for this Table, and thereafter new counties worked notified as they accrue

will post up a notice in the next issue.

EI2W (Dublin) who has been very inactive due to pressure of business, is getting going again, and during the periods September 8-9 and 10-16 will be on 144.4 or 145.2 mc, continuously, first in working the European Contest and secondly in maintaining the proposed schedule with OH2OK. During the latter period, it is hoped to keep EI2W on the air all the time, with the help of some other EI operators and a remote-control system.

SWL's Ball (Hutton, Essex) and Drybrough (Coventry) also write in, both with calls-heard lists, which we are glad to print. SWL Drybrough, a keen statistician in the field of VHF activity, presents his list in such a way that one can see at a glance that, for instance, G2ATK, G2HCG, G3GHO, G5ML and G6CW (to mention only a few) were on regularly during the months April-July inclusive, whereas certain other stations only appeared in one month out of four. Of course, he does not claim to be able to hear everyone and everything (even with the new beam) but an analysis of this sort is useful as general guide to activity and conditions, and may be taken as a good average indication of what is going on.

G5MA, now on regularly from the new QTH, had quite an eventful month on Two, with some very good GDX contacts — these included G2DKH/P (247m.), G3BW (262m.), GW8SB/P for Anglesey at 220 miles, and GI3GXP at 305 miles. G6NB (Brill, Bucks.) worked GI3GXP twice during the period, on July 7 and 10; Bill has also been keeping the fire well in on 70 cm, and on the latter band is now at 20C worked. Add to this some new /P gear and various trips out to test it, and it can be seen that G6NB is still very busy on VHF.

Items of Interest

The good days during the period covered by these notes were apparently July 6—when GC3EBK and GW8SU appeared in the Midlands—July 7 and July 10, with a steady general improvement in conditions from about July 18 onwards. At the moment of writing, it looks as if we are moving into a good spell, but that can only be conjecture, as it will depend upon what actually happens after this piece has gone to press.

As has been widely reported and commented upon, the MUF (maximum usable frequency) has gone to an all-time high—so far as records show—of no less than 60 mc in tropical latitudes. This means that our old 6-metre band is wide open for cross-world working, and some remarkable contacts are already being reported. What is claimed as a new 50 mc record has been made by JA6FR working LU9MA for a first-ever QSO, during an opening which was evidently a good one because JA6FR also raised LU2EW and LU3EX. Big things are also happening on this band in VK/ZL circles.

We are out of all this through no longer having the band. But if you happen to possess a receiver such as an S.27 or a National 1-10, have a look round 50 mc; you will probably hear ZS's working W's.

As it is the present sunspot activity that is responsible for this interesting situation, the possibility is that the peak of conditions will reach us (in northern latitudes) on two metres about the middle of next year. In any event, the 1956-'57 VHF season should be a particularly exciting one.

The tables shown here this month are up-to-date from the latest available information, with many new movements recorded (the All-Time is being held out for lack of space). The popular demand for calls heard/worked lists—and there is no doubt that they *are* of great interest to most readers—has been met so far as we had anything to print. With their reappearance, it is hoped that we shall have many more to show next time. But before sending in *yours*, which we look forward to seeing, do please read the notes on p.38 of the March issue. It will make it much easier for everybody!

Closing Date

And that, friends, is it for another month. With things in the VHF world very much on the move again, one hopes that not only will the activity improve, but also that everyone who *is* active will report his results. For the next issue, the dead-line is **August 22,** with everything addressed: A. J. Devon, "VHF Bands," *Short Wave Magazine*, 55 Victoria Street, London, S.W.1. Have a good Bank Holiday and, if you are out on the roads, go carefully.

TWO METRES

COUNTRIES WORKED

Starting Figure, 8

15	G3GHO, G4MW, G5YV, G6NB (DL, EI, F, G, GC, GD, GI, GM, GW, HB, LA, ON, OZ, PA, SM)
15	ON4BZ (DL, EI, F, G, GC, GI, GM, GW, HB, LA, LX, ON, OZ, PA, SM)
14	G2HDZ, G5BD, G8OU
13	G2FJR, G3BLP, G3CCH, G3DMU, G3GPT, G3IOO, G5DS, G6XM, G6XX
12	G2HIF, G2XV, G3WW, G6LI, G6RH
11	G2AJ, G3ABA, G3HAZ, G4RO, G4SA, G5UD
10	EI2W, G2FQP, G2HOP, G3BK, G3BNC, G3EHY, G3FAN, G3GHI, G3GSE, G3WS, G5MA, G8IC, GM3EGW, GW5MQ
9	G2AHP, G2DVD, G3DVK, G3FIJ, G3IUD, G5MR, PAØFB
8	G2CZS, G2DDD, G2XC, G3AEP, G3GBO, G3HCU, G3HWJ, G3VM, G5BM, G5BY, G5ML, G8SB, GC3EBK.

Single Valve Transmitter

SEO ON TWENTY METRES

THOUGH single-valve oscillator transmitters, direct coupled to the aerial, have long since fallen out of fashion, they are nevertheless of considerable experimental interest because of their inherent simplicity, and in fact can be made to give good results when carefully handled.

Shown herewith is one of these simple circuits, in this case due to ZC4AL. It is the transmitter in regular use at ZC4GT, and on the 14 mc band, at that. The 6L6 is being run to take an input of 10-12 watts.

By using high-C circuits, a reasonable degree of stability is obtainable in a design of this kind—and, indeed, on the LF bands such an oscillator should be capable of producing a T9x note so long as the tank circuit is not too heavily loaded.

Aerial Arrangements

An end-on aerial is shown and this should be resonant somewhere near the frequency band to be used if the tank coil tap adjustment is to be effective, *e.g.*, for 14 mc, the aerial length should be 30-36 feet. For operation on 80, 40 and 20 metres, it should be 134-138 feet long, measured from the transmitter aerial terminal to the far-end insulator.

Alternatively, a link-coupled aerial tuning unit could be used (into any of the usual types of aerial) or the tank arranged to feed direct into a ground-plane cut for the required band. This could be done either by tapping the aerial feed lead well down the tank coil (if a short feeder is practicable) or using a link winding, at the earthy end of L2, connecting into coaxial cable to feed the GP. In this case, the critical factor would be the link coil turns.

Condenser C7 is merely to keep HT off the load in the arrangement as shown here, and at the value given would have no other effect on the HF bands. Resistor R3 enables the transmitter to be set up with the aerial disconnected—it should be rated 5 watts or more, and the value required will vary from about 100 ohms or so for a ground-plane or any low-impedance feed type of aerial, to 2,500 ohms or thereabouts for high-impedance end-on types, *e.g.*, a half-wave aerial.

Adjustment

C2 sets the operating frequency and C5 resonates the tank to produce RF output. There will be pulling between these two circuits, but once they are adjusted into the band, small variations of C2 can be made—to change the operating frequency in the band—without the setting of C5 being much affected. The degree to which this is possible will vary with different versions of the circuit, and is a matter for experiment.

To obviate or eliminate pulling, an alternative arrangement is to run C2, L1 at half the output frequency (on 7 mc for 14 mc operation) but this will, of course, be at the sacrifice of RF output, even though meter readings may be higher.

The loading on L2 should be such that the note is as clean and as sharp as possible, consistent with reasonable RF power into the aerial. This can all be done by monitoring

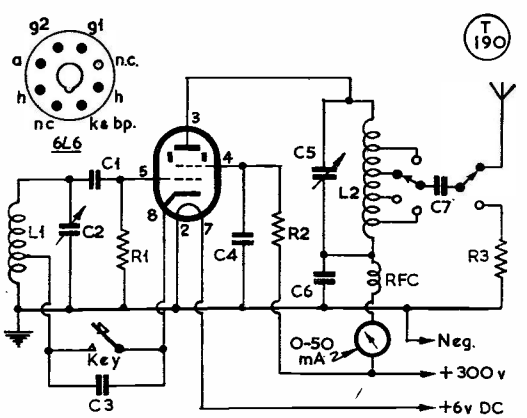
Table of Values

Single-Valve Transmitter for 20 Metres.

C1 = 100 $\mu\mu$F
C2, C5 = 160 $\mu\mu$F
C3 = .05 μF (*see text*)
C4 = .02 μF
C6 = .001 μF
C7 = .005 μF
R1 = 47,000 ohms
R2 = 25,000 ohms
R3 = 100-2,500 ohms (*see text*)
RFC = Standard 2.5 mH RF choke

Coil Values (for 14 mc Band)

L1 = 8 turns 24 SWG enam., ¼-in. diam., spaced over ¼-in., tapped 3 turns up
L2 = 5 turns 18 SWG on 1½-in. former, spread over ¾-in. length, tapped each turn for end-on aerial (*see text*)



A T9 note from an SEO transmitter on 14 mc will be no new idea to old timers who, in the 1920's, expected, and got, such a report with a direct-coupled Hartley oscillator, built on a breadboard and mounted on rubber pads. The circuit shown here is a considerable advance on that sort of transmitter, but is still an SEO, and so should not be put on the air until it has been adjusted to give a clean, stable note. On the LF bands, this would be much easier to attain, and there is no reason why good CW results should not be possible on 160 and 80 metres. It is, of course, in these days essentially a circuit for the experimenter.

on the receiver and watching the behaviour of a loop lamp held near L2.

Some General Points

The circuit could be built up on a small chassis, with an extension control for C2, and L1, L2 screened from one another. Certainly on 14 mc, it would be necessary to guard against any mechanical vibration producing a "judder" on the note. This is best done by resting the transmitter on a pad of sponge rubber.

On the LF bands, the note should be T9x, PDC or very near it, with AC on the heater of the 6L6. This, again, is a matter for experiment, as is the value of C3; the capacity of this condenser will have a distinct effect on the quality of the note.

Jack System for Keying and Metering

FLEXIBILITY WITH ECONOMY

A FEATURE of the amateur's make-up is that sooner or later he is left with one or more pet theories which he is, in the main, most reluctant to discard. This diehard spirit has often led to learned and not unlively debate, and on occasion, perhaps, to a change of outlook in which time-honoured procedure has been laid aside.

Keying practice figures very largely in this matter of individual preference. Yet it is oddly true that metering systems, particularly, do not arouse nearly as much interest. Metering, it would seem, is a problem that is commonly left to solve itself—a vacant spot is discovered somewhere on the panel or on the transmitter assembly—and in goes a meter, which is then wired, switched and generally adapted to the layout much as if it were an unwelcome but unavoidable addition to an otherwise normal scheme of things. On the other hand, there are those who like to see rows of meters, and have one for every circuit.

When much patient planning has gone to an otherwise excellent design, why should not the question of metering be given the respect and consideration which it certainly deserves?

With a new transmitter under construction, a critical survey was made of the circuit, with the gratifying result that the keying and metering systems have, in the interests of simplicity, flexibility, efficiency and economy, been thoroughly streamlined.

Although there is nothing new in the particular arrangement shown here, it offers a ready-made solution to keying and metering problems, enabling these functions to be carried out in accordance with the streamline objective.

Circuit

A glance at the circuit will show that any stage, or combination of stages, may be keyed and/or metered by the simple insertion of a key or shorting plug in the appropriate jack. Closer study of this circuit will reveal that it has possibilities.

Since VFO's are now the vogue, it is often necessary to provide for keying in more than one stage. It is in any case desirable to arrange matters so that keying can be applied at a number of different positions.

The same arguments apply to stage metering: It might be interesting to read the anode current of the VFO; it is accepted practice to read that of the buffer stages; and of course, a rather serious default not to sample the juice in the last bottle.

Thus one may have any number of stages on tap, either singly or otherwise, without the inherent drawbacks of complicated switching, intricate wiring, circuit losses and panel spoiling.

Only a few of the more obvious uses to which this flexible arrangement may be put have been listed below, and although cathode keying serves as an illustration, the idea may easily be adapted to any other method of keying.

(1) Insert key at jack A to key the oscillator.

(2) Insert key at B for simultaneous keying.

(3) Any one stage may be keyed and metered by inserting the key at jacks 1, 2 or 3, as required.

(4) Any stage can be metered by inserting shorting plugs at jacks 1, 2 or 3. when keying may be carried out in the oscillator stage (jack A) or simultaneously at jack B.

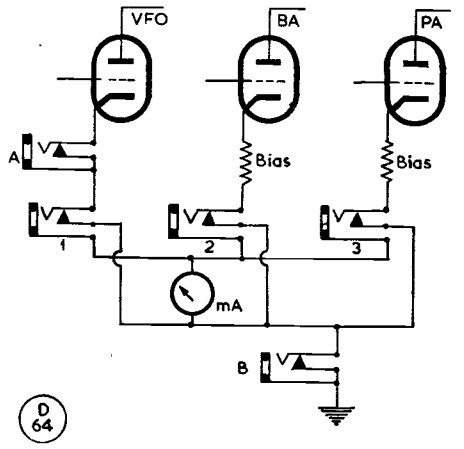
(5) Stages can be metered simul-

taneously by inserting shorting plugs at jacks 1, 2 and 3,. when keying may be carried out at any stage by inserting the key in place of any one shorting plug—simultaneous keying is then done at jack B.

(6) By partially inserting a shorting plug in jacks 1, 2 or 3, the cathode circuit is broken and a stage may thus be cut off for test or other purposes.

(7) By inserting the key at jack B (with the key up), the anode current to all stages may be cut for test or warming-up purposes.

When the transmitter is not in use the meter can be employed for ordinary test purposes by insertion of a plug in any of the jacks 1, 2, 3 and in jack B, with a single lead from each taken to a pair of test prods or a test panel. These plugs must be wired in such a way as to connect with the meter when they are jacked in.



The circuit discussed in the text. With one meter, currents at three points can be measured, either together or separately, and the same jack points can be used for keying. All that is required is one or two shorting plugs.

PRODUCTION OF HF TRANSISTORS

BY NEW DIFFUSION TECHNIQUE

BELL Telephones have reached pilot production with a new technique for making transistors having exceptional HF properties. This consists of surrounding the pure crystal in a vapour of the impurity under carefully-controlled conditions of temperature and allowing the vapour to diffuse directly into the solid. By this means, the thickness of the base region can be reduced to the order of .04 mils. under controllable conditions.

The characteristics of these transistors are phenomenal. The germanium type has a dissipation of 150 mW and a cut-off of 400-600 mc. The silicon type, which cuts off at 100-120 mc, is rated up to 500 mW.

All previous efforts at making HF Transistors have failed to produce a commercially available type at a reasonable price. The difficulties revolve around the manufacture of junction transistors with very close spacing of the emitter and collector regions without a short-circuit through the base. No technique so far evolved has been commercially successful in this country, and one sincerely hopes that this new approach may prove to be the answer.

The Possibilities

The potentialities of transistors at HF are crying out for investigation, but so far their commercial use on any scale has been largely confined to LF applications in deaf aids. Once HF transistors at a competitive price become available, all early stages of transmitters and receivers can be transistorised with great advantages in power consumption, size, efficiency and simplicity. So far the point-contact type has been the only practical transistor available for these purposes, and it has had the disadvantages of high noise, low efficiency, high manufacturing cost and poor reproducibility of characteristics.

If the new process can be inaugurated successfully on mass production lines, a revolution in the use of transistors is in sight. However, we must be patient, as it may well be two years or so before the laboratory development can influence output from the factory. *J.M.O.*

BRITISH ANTARCTIC EXPEDITION

The U.K. advance party at their Antarctic base, named Shackleton, on the Weddell Sea, are still living and working under considerable difficulties. Late on the scene, due to the hold-up in pack ice on the approach journey, they lost a large part of their supplies through the ice and were unable to get the main living quarters completed before the Antarctic winter, with its terrible blizzards and paralysing low temperatures, set in. The 350-watt main station transmitter, to be operated by VP8AO/VP8BO, has yet to be put on the air; in the meantime, VP8BO is using a Pye C12 vehicle transmitter-receiver, in a packing-case shelter, to keep in touch with the Falkland Islands, a distance of about 1,000 miles.

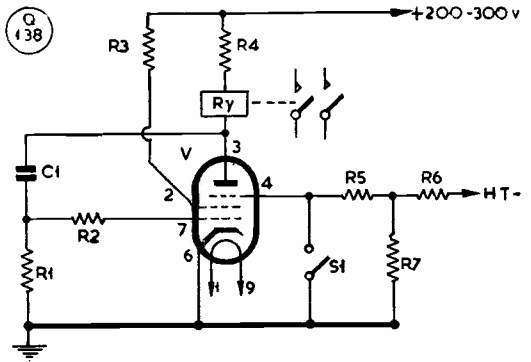
Though the messages relayed through to the Expedition's offices in London are cheerful and encouraging, one fears that the British party is having a hard time under very difficult conditions. There is no chance of any amateur contact with them until the main station is in operation—and probably not much even then, due to shortage of fuel, which will have to be conserved for official traffic on non-amateur frequencies. The equipment at present in use for working to Port Lockroy in the Falklands covers 1.6 to 10 mc only.

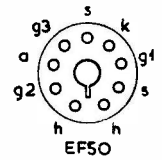
Wide-Range Valve Delay Circuit

EFFECTIVE FOR RELAY CONTROL

THIS circuit, by means of a valve, provides an adjustable delay from milliseconds to seconds, depending upon the time constants used.

Basically, the circuit consists of a standard Miller time base with the addition of a relay in the anode line, with hand-switched bias on the suppressor taking the place of the synchronising pulse and DC restorer. The grid is returned to earth instead of HT, as one does not require a very linear fall of anode voltage.





Circuitry for the valve delay system. The delay is controlled by the constants C1, R1 and is variable over wide limits. With the values given, a 40-second pause can be obtained before the relay is actuated.

Table of Values

Valve Delay Circuit

R1 = 500,000 ohms	R7 = 100,000 ohms
R2 = 1,000 ohms	S1 = SPST Toggle switch
R3 = 27,000 ohms	C1 = 1.0 μF
R4 = 6,800 ohms	V1 = Mullard EF50
R5 = 470,000 ohms	Relay = Ex-GPO Type 3000,
R6 = 100,000 ohms	or as required

Operation

With S1 open, the suppressor is very heavily biased negative and results in the anode current being at zero and the anode voltage at maximum. The screen takes heavy current and the voltage is therefore low ; cathode and grid are at earth potential. The relay is de-energised and the contacts are open.

When S1 is closed, the suppressor is earthed, removing the bias, and anode current starts to flow. The anode voltage falls and transfers the drop *via* C1 to the grid. This slides the grid back along the grid base and so reduces the anode and screen currents. The charge on C1 starts to leak away and allows the anode current to start increasing again. The anode voltage drops once more ; the action is cumulative until the anode voltage falls to a low level and the valve takes full current. This is the normal Miller action. During this time the relay is steadily energised until it closes at a current depending upon the type of relay used.

The time that the valve takes to assume full anode current depends upon the time constant of C1, R1 and altering these values will alter the delay time.

Practical Circuit

The values shown were found to be suitable for the EF50 and result in a delay of about 40 seconds. Other valves may be employed providing the anode current is sufficient to close the relay used. The anode load and bias may have to be altered to obtain correct operation. The bias value need not always be as high as shown, but it must be sufficient to cut the anode current off. The relay in the circuit as shown here is an ex-GPO Type 3000 with a pair of heavy-duty contacts added. The DC resistance is 1,650 ohms and it closes at just over 6·0 mA, with a hold-on current of 1·5 mA.

Application

This circuit is employed in a power pack feeding a universal supply panel. Its use is to delay the HT supply until heaters are warmed up. Overload contacts could be inserted in series with S1 to cut HT if a fault developed and so safeguard the power supply. If S1 is tripped either accidentally or on purpose, the full delay time is effected and so the HT would flick on and off if the overload persisted. In a station layout, S1 could be one set of contacts on the stand-by on-off switch.

No originality is claimed for this circuit, which is an adaptation not generally known of a standard arrangement. It can be applied to a variety of control circuits.

MORE FRIENDLY RIVALRY

Having found that some instruments they make are unique to the American market and that the Solartron range of servo-testing devices (essential for automatic control and automation systems) are far ahead of present American development, The Solartron Electronics Group, Ltd., Thames Ditton, Surrey, are to establish a sales base in California.

CALIBRATING A CONDENSER

ANOTHER PRACTICAL METHOD

In the July issue of SHORT WAVE MAGAZINE, *G3DIR discussed one method of putting a near-enough calibration on a variable condenser, in terms of capacity against dial reading. Here is another method, also suggested by the same author, to whose July article reference should be made.—Editor.*

IT is not impossible to calibrate a variable condenser when no standards are available, although it is tedious. First, connect the condenser across a coil and determine its resonant frequency by using it as an absorber circuit against a known oscillator frequency—the oscillator of a superheterodyne receiver is quite suitable. Vary the setting of the condenser, and a curve can be drawn of the condenser dial setting against the reciprocal of the square of the frequency, as in the plotting shown here. The curve should be a straight line, and can be extended, as indicated by the broken line, to meet the dial-setting axis on the negative side of the $\frac{1}{f^2}$ axis. The part of the curve which indicates "negative capacity" in reality shows the value of the minimum of the condenser plus the distributed capacity of the coil. Next, remove the variable condenser from the coil and replace it by a variable parallel 2-plate condenser which might consist of two pennies so fitted that they can be moved either closer together or further apart by means of a screwed rod soldered to the middle of one face of one of them—*see* sketch. The value of this condenser can be calculated, whatever the distance apart of the plates, from the formula

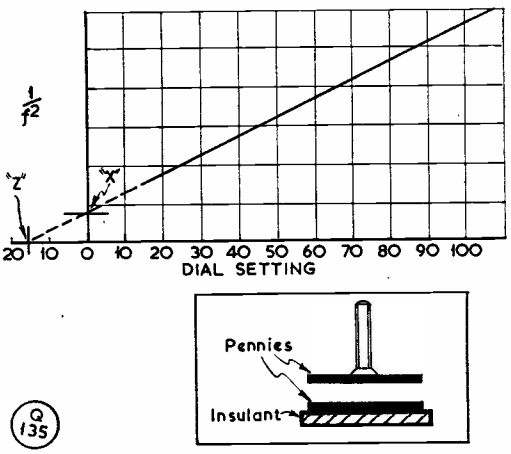
$$C = 0.2244K \frac{A}{d} \mu\mu F$$

where K is the dielectric constant between the plates (in this case air = 1)
A is the area of one plate in sq. ins.
and
d is the spacing apart of the plates in inches.

With such a condenser across the coil, adjust the coil (by spacing turns and taking them off) until it is resonating at a frequency which will give a point as marked "X" on the curve. Calculate the value of the condenser, and this will be equal to the minimum of the original condenser. (Incidentally, this value subtracted from the value given by point "Z" will indicate the distributed capacitance of the coil.)

Now, again connect the condenser to be calibrated, and, keeping the parallel-2-plate condenser also in circuit, replace the capacity of the latter, step by step, by inserting capacity in the condenser to be calibrated, each time resonating the circuit against an oscillator (the receiver BFO again). This will eventually allow the whole of the condenser to be calibrated. As stated earlier on, it is not an impossible job, but rather tedious!

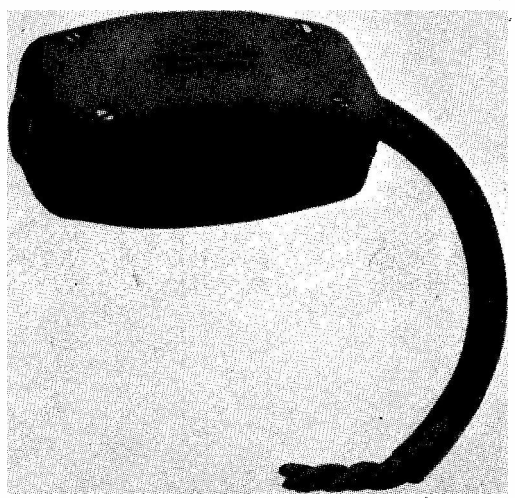
The value of 100 $\mu\mu$F is very convenient for the condenser under calibration, though one of 120 $\mu\mu$F, or 75 $\mu\mu$F, will be just as useful.



The plotting of this curve is explained in the text. The "penny-plate" condenser is of known capacity, calculated on its dimensions from the formulae below. By substituting this known fixed capacity in successive steps, a variable condenser can be calibrated in a circuit held to a given frequency.

For measurements in centimetres, the formula is

$$C = 0.08842 K \frac{A}{d} \mu\mu F$$



Labgear E.5040 mains lead suppressor unit for domestic and industrial appliances incorporating small motors.

FLYING LEAD VALVE ASSEMBLIES for CHASSIS MOUNTING

Brimar are now able to offer a range of flying lead valves assembled on moulded bases suitable for chassis mounting and using the same fixing holes as the corresponding valveholders for plug-in valves. Two types of assembly are available; *unscreened*, with the valve mounted on a base only, or *screened* with a close fitting blackened metal can which provides electrical screening and conductive cooling of the envelope. Both these assemblies can be supplied with the bases moulded in nylon-loaded P.F., or in P.T.F.E. The nylon-loaded P.F. base has good electrical properties and is suitable for general use up to about 200 mc, and the P.T.F.E. base, which is heat and moisture resistant with excellent electrical properties, can be used for all frequencies under arduous conditions such as in situations of high humidity.

AMERICAN AMATEUR POPULATION

It is reported that there are now nearly 140,000 radio amateurs licensed in the United States, an increase of roughly 40% in the last seven years. Though the American Radio Relay League is a large and powerful organisation, it seems that it can still only claim as full members about one-third of this huge U.S. amateur population.

SOUTHERN RADIO CATALOGUE

We are glad to bring to the notice of readers the new edition, No. 10, of the catalogue issued by Southern Radio & Electrical Supplies, Sorad Works, Redlynch, Nr. Salisbury, Wilts. A well-produced 54-page publication, it describes and illustrates a wide range of apparatus for the home constructor, experimenter and radio amateur. The firm is well aware of amateur needs and interests, because it is under the direction of G2ACC, himself an active operator. Catalogue No. 10 can be obtained for 6d., post free, from the address above.

COMPREHENSIVE VALVE MANUAL

There are a number of different publications on radionic valves. Some are issued by manufacturers and discuss only their own types, with equivalents. Others attempt to correlate the data on all available types, and some give the American listings but not the European, and *vice versa*.

The 1956 edition of the *World Radio Television Valve Handbook* attempts to bring all makes and types between its covers. Thus, it lists the products of some 40 different manufacturers—in Australia, Austria, Britain, Canada, Denmark, France, Germany, Holland, Italy and the U.S.A.—of radio valves, cathode-ray and picture tubes, synthetic diodes and transistors. This involves data on about 3,300 different "named varieties," which are carefully sorted into corresponding types (equivalents or near equivalents) so that one can see at a glance that an N17, say, is pluggable with a 3S4, and why a 3B5GT differs from both of them — they are all battery output valves. Similarly, one can see immediately that the only difference between an SP61 and an SP181 is that the latter has an 18v. heater.

An excellent index leads one straight to the required entry, and a valuable additional reference is to have the CV and VT numbers cross-referred, in the receiving types. The range of valves listed is inclusive up to the 6L6/5763 classification and rating. The picture tubes include all those available as at November 1955, excluding only the "surplus" VCR's. Base connections are, of course, given for every type listed, and additionally there are notes on special characteristics or performance, *e.g.* the 4695 is stated to be for VHF and, for multi-element valves, electrode potentials are given where they differ from the main column headings for the type.

As a guide and quick reference to all known (receiving) types, *World Radio Television Valve Handbook, 1956,* is probably one of the most comprehensive publications of its kind yet attempted. It is certainly a monument to the ingenuity, resource and industry of its compilers, and for the range of its contents should command a ready sale throughout Europe.

Edited and published by O. Lund Johansen (Denmark), all notes and references are in English. *World Radio Television Valve Handbook* is set in small type and, though it runs to 195 pages, is pocket size. The price is 14s. 9d., post free, and it is available, from stock, of the Publications Dept., Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

VALVE PRICES DOWN

As announced on June 30, the retail price of a wide range of receiving valves and picture tubes made by members of the British Radio Valve Manufacturers' Association (BVA) — Brimar, Cossor, Ediswan, Emitron, Ferranti, G.E.C., Marconi, Mullard and Philips—was reduced substantially with effect from that date. As the new lists show, it is the incidence of purchase tax that keeps the price up. Any of the types listed at 8s. 6d. cost an additional 3s. 4d. p.t., while a £14 picture tube is taxed at no less than £6 11s. 1d.! The unfortunate fact is that purchase tax, like P.A.Y.E., originally introduced as a "temporary expedient," has now become an ineradicable feature of the fiscal system, to be juggled with by successive Chancellors.

CARDS IN THE BOX

Operators as listed below are notified that we hold cards for them in our QSL Bureau. As we are without any postal address, they are asked to send in a stamped addressed envelope, with name and call-sign, to: BCM/QSL, London, W.C.1. Cards will be forwarded on the next (fortnightly) G clearance. If publication of the call-sign/address in our "New QTH" feature and in the *Radio Amateur Call Book* is also required, that should be mentioned at the same time.

G2AAZ, 3EM, 3GD, 3IRN, 3KNQ, 3KRO, 5GO, 5PN, GI2AA, GM3CIB, 3KSI, 3KYI, GW8BW.

NEW QTH's

This space is available for the publication of the addresses of all holders of new U.K. callsigns, as issued, or changes of address of transmitters already licensed. All addresses published here are reprinted in the quarterly issue of the "RADIO AMATEUR CALL BOOK" in preparation. QTH's are inserted as they are received, up to the limit of the space allowance each month. Please write clearly and address on a separate slip to QTH Section.

GM3BCD, T. Simpson, George Watson's Boys' College, Colinton Road, Edinburgh, 10.

G3ENG, J. D. Mathews, 5 Dryburgh Mansions, Putney, London, S.W.15.

G3FDC, H. Makin, 46 Upper Highfield, Mount Tabor, Halifax, Yorkshire.

GW3JFT/A, 4156564 Cpl. Dare, B. R., Signals Section, R.A.F. Station, Llandwrog, Caernarvon.

G3JHI, F/Lt. R. L. S. Hathaway, Officers' Mess, R.A.F. Station, Odiham, Hants.

G3JMJ/A, D. E. Nunn, Hut 341, No. 6 Sqdn., No. 3 (T) Wing, R.A.F. Station, Compton Bassett, nr. Calne, Wilts.

GM3KTZ, C. Lindsay, 17 Dukes Road, Cambuslang, Lanarks.

G3KUB, B. E. Richter, 25 Dordrecht Road, Acton Vale, London, W.3.

G3KXJ, H. E. Vincent, 48 Meadway, Dunstable, Beds.

G3KYF, K. G. Sullivan, 21 Chapel Street, Enderby, Leics.

G3KYR, J. J. Phillips, 3 Queen's Road, Oldfield Park, Westbury, Wilts.

G3KYS, R. Kendall, 23 Southport Drive, Walney Island, Barrow-in-Furness, Lancs.

G3KZJ, J. M. Dart, 11 Garfield Road, Paignton, S. Devon.

G3KZM, S. J. Bunce, 3 Johnson Road, Parkhurst, nr. Newport, Isle of Wight.

G3KZM/A, A/A S. J. Bunce, Hut 314, "C" Sqdn., No. 1 (Apps) Wing, R.A.F. Station, Locking, Weston-super-Mare, Somerset.

G3KZN, D. W. Blakeley, 96 Consort Road, Peckham, London, S.E.15.

G3KZS, G. F. D. Edwards, Brook House, Ladywood Road, Sutton Coldfield, Warks. *(Tel.: Four Oaks 269).*

G3KZX, L. J. Loveland, 39 Beech Avenue, Beeston, Notts.

G3KZY, J. Rathbone, 56 Wild Street, Bredbury, Woodley, Stockport, Cheshire.

G3KZZ, D. Forster, 41 Marlborough Street, South Shields, Co. Durham.

G3LAC, P. B. Smith *(ex-ZC2AD/VS1GM/ZB2S),* Trevithal House, Trevithal, Paul, Penzance, Cornwall.

GW3LAD, E. G. White, 41 St. Alban Avenue, Cardiff, Glam.

G3LAE, K. Graham, 7 Highbury Avenue, Linthorpe, Middlesbrough, Yorkshire.

G3LAI, G. E. Livingston, 289 The Ridgeway, Erdington, Birmingham, 23.

G3LAQ, P. T. Jones, 15 Malvern Road, West Bridgford, Nottingham, Notts. *(Tel.: Nottingham 231992).*

G3LAS, J. Butcher, 9a Broad Street, Ely, Cambridgeshire.

G3LAT, R. Arnold *(ex-DL2VH),* 13 Broadway Grove, Fulford, York, Yorkshire.

GM3LAV, C. W. Davidson, B.Sc., 9 Wilfrid Terrace, Edinburgh, 8.

CHANGE OF ADDRESS

GW2DXS, D. L. C. Creedy *(ex-G2BMZ/G2DXS),* The White Horse Hotel, Overton-on-Dee, Flintshire. *(Tel.: Overton 265).*

G3ASJ, G. Kelsey, 36 Marshfield Avenue, Goole, Yorkshire.

G3BYO, J. A. Bointon, 18 Kent Road, Mapperley, Nottingham, Notts.

G3CPS, E. C. Gray, 111 Ravenor Park Road, Greenford, Middlesex.

G3DKS, Wg/Cdr. C. K. Street, R.A.F. Station, High Wycombe, Bucks.

G3EUP, W. T. Dodd, 156 Oxford Road, Stratton St. Margaret, Swindon, Wilts.

G3GAH, A. W. Foster, Spring Grove, Howey Lane, Congleton, Cheshire.

G3GRV, G. L. Halse, 17 Weymouth Road, Hayes, Middlesex.

G3GWO, M. G. Groom, 13 Maltese Road, Chelmsford, Essex.

G3HDL, S. E. Kelly, 79 Bankfield Road, Stoneycroft, Liverpool, 13, Lancs. *(Tel. Stoneycroft 6042).*

G3HKH, M. J. F. Harrison, The Wanderer, Ravensbury Road, St. Paul's Cray, Kent.

G3IOL, A. Barlow, 53 Egerton Street, Heywood, Lancs.

G3IZJ, M. J. Faulkner, 9 Wood Road, Camberley, Surrey.

G3JDN, P. D. Lucas, 15 Atherfield Road, Woodhatch, nr. Reigate, Surrey.

G3JOC, O. S. Chilvers, End Vale, Valley Road, New Costessey, Norwich, Norfolk.

G3JUT, T. J. Jones *(ex-DL2SW),* 36 Morstone Road, Wootton Bassett, Wilts.

G3KFW, G. Ripley, 91 Hoads Wood Road, St. Helens, Hastings, Sussex.

G3KJX, B. Alderson, 43 Brompton Road, Northallerton, Yorkshire.

G3KLZ, D. G. Enoch, 86 Heaton Park Drive, Heaton, Bradford, 9, Yorkshire. *(Tel.: Bradford 45440).*

G4HP, H. C. Doherty, Farm Gate, Oathall Road, Haywards Heath Sussex.

GM6RV, W. B. Stirling, 31 Clyde Terrace, Ardrossan, Ayrshire.

G8US, J. H. Caldwell, 3 Milton Avenue, Wellsway, Bath, Somerset.

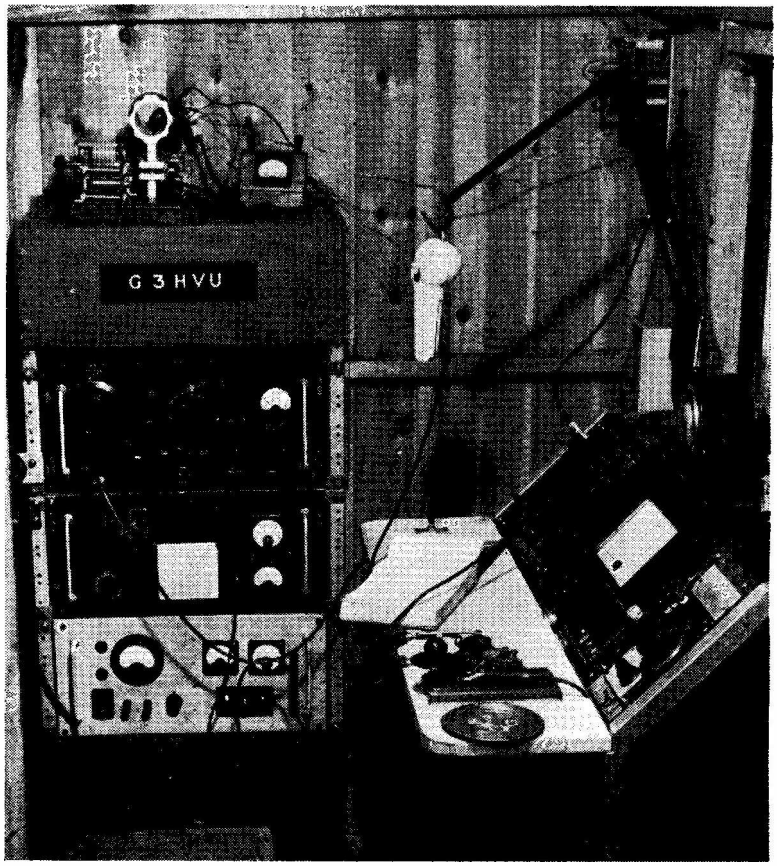
CORRECTION

G2DF, F. A. Vost, 26 Pinewood Avenue, Warrington, Lancs.

GW3KWA, J. Parry, 21 Penrhos Road, Bangor, Caerns.

THE OTHER MAN'S STATION

G3HVU



THE location of G3HVU—owned and operated by J. Roberts at 63 Gregory Avenue, Green Lane, Coventry, Warks.—is particularly blessed in that it has a fairly large and long garden, a factor which greatly influenced him in the choice of this QTH! The station, which has recently been accommodated in a small shed 6ft. x 4ft. 6in. x 5ft. high, situated about half-way along the length and to one side of this garden, has in the process of the move been adapted to conform to the practical layout shown here; there still remain one or two further modifications to be done and finishing touches to be added, but these are of a minor nature.

The "console" carries: (Top left) a Class-D Wavemeter; (at centre), the Eddystone S.640 receiver; and, right, the Q5'er modified to suit an IF of 1.6 mc. Power supplies for this equipment are housed in the bottom section of the console, the switches for which are situated just below the writing table. The front of the console is instantly removable for access to the bank fuses, power supplies and loud speaker. On the extreme left of the writing table can be seen the send-receive switch, which is operative to all bands and both transmitters.

At the rear of the shack is the transmitter unit. This assembly is mounted on castors, again for easy access and to facilitate any man-handling that might have to be done. The bottom compartment contains the modulator: First stage EF37A, into a pair of 6J5 phase-splitters, which feed a pair of 6L6's in Class-AB1; this modulator has its own power supplies. To the right of this unit, on the floor, is the power unit for the PA on the 5-band transmitter; the latter pack has yet to be mounted in a suitable cabinet. The second compartment contains the power unit for the Top Band transmitter, this being switched for use as the driver stages for the 5-band transmitter.

The third compartment contains the Top Band transmitter, involving a 6J5 VFO into a 6F6 buffer driving a 6V6 PA. This transmitter can also be switched for operation on 80 metres. The fourth compartment contains the 5-band transmitter, which can be VFO or crystal operated. The sequence is a 6J5 Clapp oscillator into a 6F6 buffer feeding into an 807 PA coupled to a pi-tuned tank circuit. The transmitter is TVI-filtered, and the input is 60 watts.

The station aerial at the present time is a 130-footer centre-fed with 66 feet of 600-ohm feeder parallel tuned; the link is coupled in series with the pi-tank circuit, with a 300 $\mu\mu$F capacity to ground, thus allowing parallel tuning on each band. On the top right of the far wall of the shack can be seen the aerial relay gear, with the aerial tuning unit and current meter on the top of the transmitter.

Although G3HVU is active on all bands, main interest is concentrated on the 160- and 20-metre bands, and he is as pleased to work the newcomer on Top Band as he is to hook rare DX on 20 metres. Incidentally, G3HVU spends part of nearly every lunch hour teaching Morse to aspirants to the Amateur Radio licence, some of whom are coming along very nicely indeed.

THE MONTH WITH THE CLUBS

By *"Club Secretary"*

(Dead-line for September Issue: AUGUST 17)

DUE partly to the early dead-line for this issue, activity reports are not very numerous this month. In some cases a Club is definitely "in recess," and in others The-Man-Who-Does-All-the-Work is away on holiday, so everything stops. Surprising how many Clubs there are with a one-man set-up of this kind, everybody being content to "leave it to George." Then one day George moves from the district and the Club falls flat on its face.

Has *your* Club got a "George"? If so, it's about time the members got some deputies into training to take some of the work off George's hands. (After all, moving from the district isn't the only hazard—the chap might get married!)

We also note a shortage of Club News-Sheets, Circular Letters, and so on. Time was when we acknowledged five or six of them nearly every month, but nowadays we seldom see them at all. Perhaps this coming autumn and winter will see a revival of activity, since everyone agrees that it should be a boom season for Amateur Radio on account of the coming sunspot maximum.

The next issue will see the preliminary announcement for the Club Contest, MCC, which will, as usual, be held in November. Rules will appear in our October issue.

And so to the Activity Reports for the month . . .

Bournemouth will be organising a Mobile/Portable Rally for Sunday, September 16, to be held at Stoney Cross Aerodrome, 7½ miles West of Southampton on A.31. Three control stations will be operating from 10.30 a.m.—G2HIF on Two Metres, G3GYK on Eighty, and G3KYU on One-Sixty. Anyone is welcome to attend, and should bring picnic lunch and/or tea. All further details from the Hon. Sec. *(See* panel.) The Club meets on the first Friday of the month at The Cricketers' Arms, Windham Road, Bournemouth. Visitors will be welcomed.

West Cornwall meet on alternate Thursdays in the YMCA Building, Grove Place, Falmouth, next dates being August 9 and 23, September 6 and 20. They will be particularly glad to see any visitors to that district during the holiday season.

East Kent meets at the basement of the Technical College, Longport Street, Canterbury, and continues to enrol new members. The main activity recently has been D-F work, with two sets operating and three more about to take the field. New members and visitors always welcome.

Leicester now occupy their new Clubroom, recently opened by their president. Facilities are available for constructional work, and it is hoped that members will make frequent use of the clubroom in Highcross Street for this purpose. A complete station is in operation, and a club call-sign hoped for in the future. Meetings are on alternate Mondays, the next being August 13 and 27.

Lothians recently held their AGM, and elected GM3FGJ president, Mr. Arthur A. Dewar secretary *(see* panel for address) and GM3HX, 3AKM and 3EWL as committee members.

Norwich now meets at The Golden Lion, St. John's Maddermarket, Norwich, where they have two rooms, one for the shack of G3JGI and the other a large clubroom. Recent events have included talks by G3BHJ, VP8AX and Mr. Reg Williamson, as well as a film show and lecture by G2UK. A "bucket-and-spade" event was scheduled for Sunday, July 15, and on August 17 the Club is looking forward to a visit from WØFQY, of St. Louis, Missouri.

Slade will have a "Club-night on the Air" on August 17, when small groups of members will get together at the various transmitting members' shacks. On August 31 they will meet as usual at Church House, to hear a lecture on Car Ignition Suppression by Mr. R. G. Hackel, of Joseph Lucas Ltd. The Club Tx, G3GBN, is available for members' use *every* day of the week.

Sutton and Cheam have no regular meeting this month, but will be holding a Portable Evening on August 21, beginning at 7.30 p.m. Several stations will be operating on the 160-metre band, either /P or /M, and an open invitation is extended to other clubs to "come out and make a night of it." The following meeting will be on September 18.

Warrington recently held a successful Field Day to test their newly-acquired equipment. Good weather helped, and a pleasant day was spent on high ground at Appleton. Meetings are now held on the third Thursday each month, at 13 Sandy Lane West. Longford, Warrington.

Bailleul (Arborfield) meets on the first Monday of the month, but the clubroom and shack are open every evening and on Wednesday afternoons. The rebuilt club Tx will be on the air with 150 watts on the HF bands by the time this note appears. A Cubical Quad is projected for 28 mc, but folded

Reports for this feature are welcomed from all active Clubs. For the September issue, they should reach us by **August 17,** addressed "Club Secretary," *Short Wave Magazine,* 55 Victoria Street, London, S.W.1. Closing date for October will be *September 14.*

dipoles and a long wire will be used on the other bands.

Mitcham have had two Junk Sales and a lecture-demonstration on Hi-Fi. On July 13 G5GQ expounded his ideas on Phone Rigs, and at the present time the club is " in recess " until the next meeting, which will be on August 31.

Plymouth have also had a Junk Sale, and lectures on Two-metre Converters and a Two-metre super - regen. receiver. Morse classes have begun, at very low speeds. Next meetings are on August 7 and 21, at the Virginia House Settlement, near The Barbican, Plymouth.

South Shields will be very active at the Corporation's Flower Show, August 24-26, transmitting on all bands from Ten to Eighty with the special call GB3SFS. In addition to special QSL's, there will be certificates for the station (over 25 miles distant) which affords the most QSO's and obliges with the greatest amount of time in assisting the club to show the visiting public the pleasures of Amateur Radio—and also for the SWL who gives the most comprehensive survey of reception during the period of the Show. (Such reports should be sent to Radio Exhibit Organising Secretary, c/o The Pier Pavilion, South Shields, Co. Durham.

Hastings had G6HH on the air once more from the Hobbies Exhibition during Carnival Week, July 9-14. This year they used the 40-metre band with a rather smaller layout than that of former years, but successfully worked through the usual QRM and QRN of their adjacent fun-fair.

" Who's going to hump the batteries ?" could be the caption for this picture, taken at their Kenley site when Purley & District Radio Society were out on a field day in June.

The **Tops CW Club** will be celebrating its tenth anniversary with a " Topsfest " at the Swan Hotel, Lichfield, Staffs., on Sunday, August 12. Both members and non-members will be welcome, and tickets to include tea (price 7s. 6d.) may be obtained from either GW8WJ or G3ABG by August 8, at the latest. Those not requiring tea may pay a 2s. admission fee at the door.

Cardiff are still active and meet on the second Monday each month, the Morse classes on the fourth Monday having been discontinued. (The class preceding each regular meeting is to carry on as usual.) A portable week-end exercise will be discussed at the August meeting, and in September a Junk Sale will start off the autumn programme.

Bradford notify us that classes for the R.A.E. will again be held this coming winter, at the Bradford Technical College. Full particulars may be obtained from the College, Great Horton Road, Bradford.

Crystal Palace is now holding additional meetings, on the first Tuesday of the month. Next lecture meeting is on August 18, when G3ILI will talk on Single-Sideband Operation. All meetings at Windermere House, Westow Street, S.E.19.

Purley met on July 19 to hear G4ZU's talk on Aerials, and on the following day they were active from the Summer Fair with the call G3DPW/A. They hope to arrange a visit to the BBC Receiving Station at Tatsfield, on either the 23rd or 30th of September.

One of the annual events for the **Midland** Amateur Radio Society is a Field Week-End, and this year it was held over July 7-8. On previous occasions only the LF bands have been worked, but this time coverage was increased by the introduction of a VHF section—G3BA/P was active on both 70

NAMES AND ADDRESSES OF CLUB SECRETARIES REPORTING IN THIS ISSUE :

BAILLEUL : T. Holbert, G3DXJ, B.R.S., Bailleul Camp, Arborfield, Berks.
BOURNEMOUTH: J. Ashford, G3KYU, 119 Petersfield Road, Boscombe East.
BRADFORD : F. J. Davies, 39 Pullan Avenue, Bradford 2.
CARDIFF : R. Morris, GW3HJR, The Shack, St. Cenydd Road, Caerphilly, Glam.
CRYSTAL PALACE : G. M. C. Stone, G3FZL, 10 Liphook Crescent, London, S.E.23.
EAST KENT : D. Williams, Llandogo, Bridge, near Canterbury.
HASTINGS : W. E. Thompson, 8 Coventry Road, St. Leonards on Sea.
LEICESTER : J. Tranmer, 4 Grocot Road, Evington, Leicester.
LOTHIANS : A. A. Dewar, 37 Calder Circle, Edinburgh 11.
MITCHAM : D. Tilcock, G3JYV, 67 Fleming Mead, Mitcham.
MIDLAND : C. J. Haycock, 360 Portland Road, Edgbaston, Birmingham, 17.
NORWICH : D. Youngs, 53 Salisbury Road, Norwich.
PLYMOUTH : C. Teale, G3JYB, 3 Berrow Park Road, Peverell, Plymouth.
PURLEY : E. Honeywood, G3GKF, 105 Whytecliffe Road, Purley, Surrey.
SLADE : C. N. Smart, 110 Woolmore Road, Birmingham 23.
SOUTH SHIELDS : W. Dennell, G3ATA, 12 South Frederick Street, South Shields.
SUTTON AND CHEAM : F. J. Harris, G2BOF, 143 Collingwood Road, Sutton.
WARRINGTON : G. H. Flood, 32 Capesthorne Road, Orford, Warrington.
WEST CORNWALL : J. Trewavas, 10 Trevethan Rise, Falmouth.

". . . . Could never resist the opportunity of showing off his code speed . . . ."

cm and two metres, with excellent results. Good weather favoured the event, and the catering arrangements, undertaken by the Sutton Coldfield Sea Scouts, are described as having been first class! All those who took part in this enterprising week-end outing, purely a M.A.R.S. affair, had a thoroughly good time, apart from the valuable lessons learnt and practical experience gained by operating under field conditions. Needless to say, further such week-ends are planned — and the idea is offered as something worth considering by other clubs. An essential to success is, of course, smooth organisation.

BOOK REVIEW

An Introduction to Amateur Television Transmission

Television transmission is a branch of Amateur Radio which so far has had a comparatively small following. No doubt this is because, as a subject, it is so complex that few have sufficient "know-how" to make a start. Thus many, who are both interested in the theory and competent to build a receiver, are deterred from pursuing amateur television transmission. Until now there has been no practical source of information to guide them on the big step from reception to transmission. Michael Barlow has written a small book which covers all the important phases in taking this step.

The logical sequence leading up to a live high-definition ATV transmission might be: *(a)* A closed circuit system comprising a transparency illuminated by a cathode ray scan, a photo multiplier and video amplifier, and a monitor tube — both these being driven from a common frame and line time base; *(b)* Extending the system to include opaque objects and living subjects by projecting a flying spot from a high intensity raster; *(c)* Building a pulse generator to achieve synchronisation of a remote receiver; *(d)* Constructing a mixer to combine video and synch. and a wide band modulator; and *(e)* Finally building a VHF transmitter and aerial for the authorised amateur TV band (430 mc) in order to put the whole ATV station on the air.

The book consists mainly of reprints of a series of articles already published elsewhere by the author. The sequence is the logical one and the articles are written in a most helpful way with numerous practical suggestions and ample illustrations. For example, certain Government "surplus" cameras are recommended as an economical source of lenses suitable for the optical equipment. The circuit is given of a video amplifier for use with the easily obtainable 931A photo multiplier tube. Block diagrams, wave form patterns and circuit details of the pulse generator precede the section dealing with mixers, modulators and RF envelope patterns. The difficulties of achieving an overall 3 mc bandwidth in the PA, tank and aerial circuits, of getting the drive correctly adjusted and other special problems relating to TV transmission are dealt with clearly and with just the right amount of detail. Nor is a suitable 70 cm TV converter forgotten. In addition, throughout the book are interspersed useful pieces of information such as how to get lecture tapes, film strips and films on the subject, and what are the recommended club standards to facilitate joint efforts in the assembling of equipment. Details of the Amateur Television Licence and the Amateur Television Club take two pages, and a long list of references will prove an invaluable guide to further reading.

The booklet succeeds most convincingly in its purpose of introducing the uninitiated to amateur television transmission, and we are grateful to the author, one of its most enthusiastic exponents, for filling this gap in our literature.

An Introduction to Amateur Television Transmission, pp.30, illustrated, by M. Barlow, B.A., Grad.I.E.E., price 3s. 8d., post free, of the author at 10 Baddow Place Avenue, Great Baddow, Chelmsford, Essex. *J. M. O.*

SMALL ADVERTISEMENTS

9d. per word, minimum charge 12/-. No series discount; all charges payable with order. Insertions of radio interest only accepted. Add 25% for Bold Face (Heavy Type). No responsibility accepted for errors. Replies to Box Numbers should be addressed to The Short Wave Magazine, 55 Victoria Street, S.W.1.

TRADE

G3CGD QSL's. Fixed and mobile samples on request. Printing enquiries welcomed.—30 St. Luke's Road, Cheltenham.

TELEVISION INTERFERENCE: Receiver Filters — High-pass E.5037, 30/-; Low-pass E.5031, 30/-; Composite Band I/III, 49/6; Transmitter Filter E.5034, 80 dB. 1 kW., £6.—Labgear (Cambridge) Ltd., Willow Place, Cambridge.

QSL CARDS AND LOG BOOKS. G.P.O. APPROVED. CHEAPEST, BEST. PROMPT DELIVERY. SAMPLES. — ATKINSON BROS., PRINTERS, ELLAND, YORKS.

WANTED: BC-610 Hallicrafters, ET-4336 Transmitters and spare parts for same. Best prices.—P.C.A. Radio, Beavor Lane, Hammersmith, W.6.

QSL's and Logs by Minerva. The best there are.—Samples from Minerva Press, 46 Queen's Road, Brentwood, Essex.

SITUATIONS VACANT

RADIO ENGINEER REQUIRED FOR THE ASSEMBLY AND TESTING OF ELECTRONIC INSTRUMENTS. SOUTH LONDON DISTRICT. —Box No. 1690, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

READERS' ADVERTISEMENTS

3d. per word, min. charge 5/-, payable with order. Box Numbers 1/6 extra. Replies to Box Numbers should be addressed to The Short Wave Magazine, 55 Victoria Street, S.W.1.

WANTED: Potted Mains Transformer; Secondaries 380v., 6.3v., 5v.; 12in. 15-ohm speaker and *de luxe* Radio Tuner circuit.—Albans, 17 Fern Road, Cropwell-Bishop, Notts.

WANTED: Drive mechanism, IF's and selectivity switch for CR100. New condition, please.—Box No. 1701, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

CR100, excellent condition. Instruction Manual, 6in. Goodmans speaker; £20. Buyer collects. —Newman, 14 Gamuel Road, London, E.17. *(Call after 7 August.)*

CR100/7, unmodified, £14; another with S-meter, 500 kc crystal calibrator, noise limiter, £20; both first-class appearance and performance. WANTED: Gen. on Standard Tx, Type 5 A.H.—Box No. 1700, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

WANTED: DST-100 Receiver, or parts for AR88 W.H.U.? State price.—G3GCO, 31 The Crescent, Donnington, Shrops.

SMALL ADVERTISEMENTS, READERS—*continued*

WANTED: HRO, 20 B/S., HRO Xtal, UM3. 750-0-750 and 5-25 Hy. Swinger, 400 mA, Lionel Bug. FOR SALE: Army 12 Transformer.—G3KDA, 38 Grafton Lane, Bidford-on-Avon, Warks.

COMPLETE SET (30 copies) pre-war *Short Wave Magazine,* 1938-40 ; 58 *Wireless World,* 1947-51 ; 52 *Brit. I.R.E. Journal,* 1950-55, for sale. WANTED: S.27, AR77, CBY 46181.—Offers to Knight, Homefield, Upper Nazeing, Essex.

BC348, Internal P/Pack, Handbook, £10 10s.; also 10-metre Converter, £1 10s. Together, £11.—Box No. 1702, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

WANTED: B2, complete with case ; in good order ; with power pack.—Please write: G3JJU, 15 The Avenue, Cheam, Sutton, Surrey.

BRITISH PHYSICAL LABORATORIES Sig. Gen., 100 kc to 30 mc, six ranges, 400 mod., Instruction Manual, £10 ; Collins TCS12 Communication Rx, 3.5 to 12 mc, complete, manual, £8 ; RCNZ Communications Rx, 3.5 to 25 mc, 8 valves, S. G. Brown phones, power unit, complete, £9 10s.—Roberts, 33 Bishops Road, Benwell, Newcastle-on-Tyne, 5.

EXCHANGE: Hallicrafters SX24, in original new condition, for Modulator and Power Pack suitable for 150w. Tx (19-inch rack-mounting, if possible) ; must be in new condition.—Box No. 1703, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

1403 TRANSMITTER with C/D, £4 ; E.M.I. 144 mc Absorption Wavemeter, £4 ; E.M.I. 144 mc Absorption Wavemeter GDO, £4 ; RG1/240 valves, T20 valves, 10/-. Quantity PT15 and 6AC7 valves offered.—Box No. 1704, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

OFFERS FOR: B2 Transmitter/Receiver, complete ; NZ Mk. II, complete and new ; LM 13 Frequency Meter with book and case ; Utah Wire Recorder ; BC-645A 420 mc Transmitter/Receiver ; 9.5 Pathé "Son" Sound/Silent Projector, complete with 1,800 ft. talkie feature film.—S.a.e., pse, to D. Poole, 13 Oldfield Avenue, Norton-le-Moors, Stoke-on-Trent.

REQUIRED, soonest B2 Tx/Rx and Power Pack.—Please write, stating price, condition, etc.: G3JEG, Eilansgate House, Hexham, Northumberland.

EDDYSTONE S750 with speaker, re-aligned by makers, in perfect condition, £47 (or nearest offer) ; also 1155A, with separate output stage and power pack, £4.—25 Cam Green, Cam, Nr. Dursley, Glos.

1799 3508, 3523, 3759, 7040, 7050, 7075, 7106. 7173, 7450, 8085 Xtals. Exchange or sell. W.H.Y.?—J. Brown, Waterworks, Penryn, Cornwall.

WANTED: R107, TCS12, or HRO without coils, etc.; will collect, reasonable distance. Also UM1.—G2VO, Underhill, Glenlyon Drive, Keighley, Yorks.

JERSEY HOLIDAY: Stay at "The Lincoln," 3 Saviours Road ; near sea/town centre. Ham shack ; photo dark-room ; s.a.e., please, brochure.

SMALL ADVERTISEMENTS, READERS—*continued*

FOR SALE: Phone/CW Transmitter 0.9 to 17.5 mc. up to 250 watts output; can be viewed S.W. London; would be delivered and set working, reasonable distance. Has earned DXCC (QSL cards available). Large motor reduction gearbox, long multicore outdoor cable and major components for automatically-controlled rotary beam. — Box No. 1705, Short Wave Magazine, Ltd., 55 Victoria Street, London. S.W.1.

ZCI - Mk. II, £8 10s.; Manuals HRO-50, SP400, 10/-; AR88D, 15/-; 32V-1, £1; standard 13-channel TV Tuner, £5; 3EP1 with screen, £1.—Box No. 1706, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

AMATEUR TELEVISION: Partly completed Television Camera for sale; designed for use with a 5527 tube; professional-type finish.—Send for full details to F. Brown, 72 St. Mary's Road, Ilford, Essex.

EXCHANGE: Trophy 6 AC for Trophy Battery 3. —W. Spearman, Stansfield, Sudbury, Suffolk.

QST's WANTED: All before 1934; April, October 1935; May, July 1936; March, November, December 1939; January, February, April 1940; February. April 1945; January, May 1948; February 1949; March, April, May, June 1952.—Write first: R/O C. D. Hammett, s.s. *Hallindene*, c/o Dene Shipping Co., Ltd., 51 Bishopsgate, London, E.C.2.

G3GVF: Band-switched Tx, 50 watts, 80-10 metres. 829B PA, 10m., VFO self-contained; 2-metre Tx 829 B PA, 80w., modulator P/P EL38; power supplies, two racks; £40. Home-built Rx and 2m. Converter, £15. *Short Wave Magazine*, 1949-56; *Bulletin*, 1950-56; *Wireless World*, 1949-56. Offers? —J. A. Lowe, Hillside, Hartley Wintney, Hants.

SALE: R.1155A, 70/-; and power pack, 45/-; Battery 1-V-1, Eddystone Cabinet and components, and dozen miniature coils (contest winner), 85/-; "Globe King," 0-V-1, with coils, 20/-; Eddystone speaker, 25/-; Arnine 20-metre folded dipole, 25/-. Many components, radio books, periodicals.—Write list: Baker, 6 Greenways, Flitwick, Bedford.

FOR SALE: R.1155L, FB Rx, Top Band coverage, D/F section removed; built-in 6V6 O/P stage. Requires P/Pack. £10.—J. Love, 107 Fernside Avenue. Hanworth, Feltham, Middlesex.

WANTED: Eddystone or similar Communications Receiver; ex-Govt. not objected to; must be reasonable price. — Perry, 55 Woodview, Grays, Essex.

FOR SALE: One heavy-duty Mod. Trans. for 813 plate and screen, 30/-. Type 37 Osc., as new—the ideal 10-metre table-top Tx—£11. Two HRO Receivers with coils and power pack, £22 10s. each. Sound Sales Amplifier with Med. L. and S/W radio, two PX4's output, £10. 813 valve, £3; 803 valves, 15/- each; 807 Mod., push-pull, needs power pack, £4. Complete P/P 807 Mod with heavy-duty pack and HT for Tx, in wooden transit case, £10. Carriage on above items extra.—Thomas, Roseland, Kittle, Bishopston. Swansea.

SMALL ADVERTISEMENTS, READERS—*continued*

ZCI Mk. I, modified for 80m. and 160m. aerial ammeter, spare vibrator, mike, two loading coils, whip aerial, base, manual; all in good order; £9.—30 Priory Terrace, Stamford, Lincs.

AR88 WANTED in exchange for Eddystone S.750 Communications Receiver in mint condition.—G3COI, 9 Links Road, Penn, Wolverhampton, Staffs.

750 S-METER (new), £3 5s. 0d. SX28A instructions, and others. 15/-.—R. Grain, 15 Waverley Gardens, Grays, Essex.

HRO SENIOR, 0.9-30 mc, B'spread 10, 20, 40, 80 metres, unmodified; speaker, power pack, phones, bug-key; £22. — After August 11th: 303 Beake Avenue, Radford, Coventry.

VALVES (brand-new), boxed, guaranteed: 5R4GY, 12/6; 5763, 13/6; 805, 30/-. "Tiger" 60w. phone table-top Transmitter, as new, only £35!—G8VB, 124 Carr Road, Greenford, Middlesex.

PANDA PR120V, black cabinet, TVI filter, Acos mike; first-class condition; no reasonable offer refused.—23, Keogh Close, Mytchett, Surrey.

CABINET containing many hundreds useful components, valves, etc., £25. *Short Wave Magazine*, October 1950 to January 1957 (sub. paid), £3. Many other items; s.a.e. list; carriage extra.—G3KAB, 28 The Vale, Southgate, N.14.

PANDA PR-120V Tx, latest model, unmarked, £120. Accept smaller table-topper Tx or good Rx as part-payment. Lancs. area.—Box No. 1707, Short Wave Magazine, Ltd., 55 Victoria Street, S.W.1.

BUY OR BORROW Manual for TCS 15 Receiver (CKP-46159A). Please help. SALE: Type 88 Rx, 2 to 20 mc, circuits, 13 valves, unmodified, professionally checked, £7. New unused Bendix RA-10, 58/-; ditto R4-ARR2, 37/-. All carriage extra.—Lewis, 46 Clydesdale Road, Romford, Essex.

OFFERS! FOR SALE: R107 Communications Receiver with official handbook; also R1155N with associated power pack/output stage. WANTED: AR88D Receiver with S-meter.—Details and price to Miller, 48 King's Road, Clacton-on-Sea, Essex.

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