R·S·G·B

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Five Inches

CONGRATULATIONS to Messrs. Noel Bevan, G8IH, and Leonard Grimshaw, G3BGN, on their success in making the first two-way British Amateur contacts on 2350 Mc/s. For months they ploughed a lonely furrow hoping that success would eventually be achieved. It was—as their story in this issue testifies.

We, in the U.K., still have some way to go before the present U.S. 2350 Mc/s. record is overhauled—66 miles set up in October, 1947, by W1JSM/1 and W1ILS/1—but it will be a disappointment if British amateurs fail to improve on that distance during the next few months.

Gear similar to that used by G3BGN and G8IH is available for those who like to look for it, although probably by now the market price of a CV90 and a type 216 set has jumped considerably!

The success they have achieved at 2350 Mc/s. augurs well for the future, when other bands in the V.H.F. and U.H.F. portion of the spectrum are released. In that connection members are reminded that the Desmond Trophies will be awarded to the two British Isles stations who first succeed in establishing two-way communication on 420 Mc/s. over a distance of 25 miles.

Those who are pioneering these new bands would do well to emulate the good example of Messrs. Bevan and Grimshaw by sending to Headquarters details of their work.

* * *

National Field Day

National Field Day, 1948, has come and gone for another year but its memory lingers on! In spite of the Dismal Jimmies who predicted a flop because power had been restricted to 5 watts input, we have a sneaking feeling that when the results are announced it will be found that new "highs" have been recorded. The low power feature called for a display of ingenuity and from what we saw during the contest and have heard since that factor was chiefly responsible for the big scores obtained.

N.F.D. has become a highly organised event in the life of the British Radio Amateur, and already we hear of plans being made for next year which will enable competing teams to do a little better than during 1948.

Unfortunately the Weather Man did not smile too kindly this year but rain and dull skies did nothing to damp enthusiasm.

To the ladies who helped, to the land owners who co-operated and to the lads behind the keys, we say "thanks a lot."

* * *

Empire DX Certificate

It is perhaps a little surprising that to date only 12 members have claimed the most coveted award issued by the Society. There are probably at least another dozen prominent DX men who have the necessary cards but cannot be bothered to look them out! On the other hand many who regularly work the world on 14 Mc/s. and have far more than the fifty-41 Mc/s. confirmations required for the award, are unable to produce 50 cards to confirm contacts on "other bands." Now that 28 Mc/s. has closed up for the summer, except for spasmodic openings, the only hope for those who are in the running is to try for DX on 7 Mc/s. or wait for 21 Mc/s. to be released!!

J. C.

Amateur Interference with Television

There are at present in use by the general public for the purpose of receiving broadcast television programmes a number of receivers which have a fairly high sensitivity at frequencies remote from the television band as, for example, the image frequency in super-heterodyne sets. In certain cases the frequencies fall within the amateur bands.

As the result of representations made by the Society, instructions have recently been issued by the G.P.O. to the Regions that *in such cases where the interference is not due to the radiation of energy outside the authorised amateur bands* the amateur concerned shall not be held responsible for the fitting of remedial devices in the television receiver, neither shall he be instructed to refrain from operating during television hours.

This statement is published with the authority of the Radio Branch, G.P.O.

In this issue

PRACTICAL EXPERIMENTS ON 2,350 MEGACYCLES

By NOEL T. J. BEVAN (G8IH) and LEONARD GRIMSHAW (G3CBN)

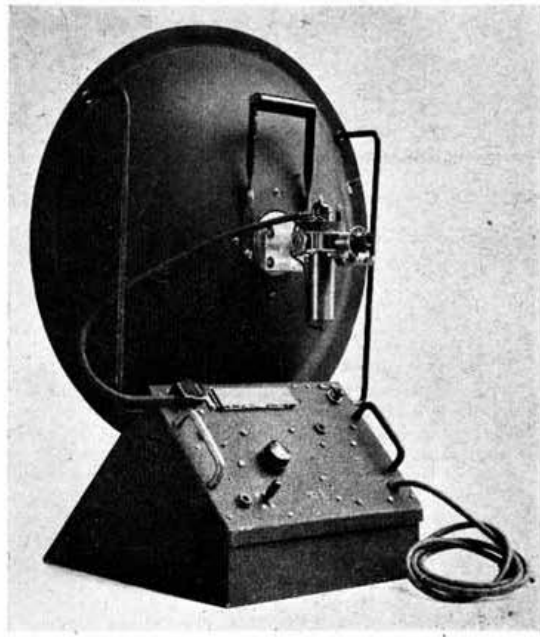
For the first time two British Amateurs have established two-way communication on a frequency of 2,350 Mc/s. Here is an account of their experiments.

IN JUNE, 1947, the authors, having repeatedly read of American amateur activity in the 2,300–2,450 Mc/s. band, decided that it was high time that British amateurs made some effort to establish communication on these frequencies.

Preliminary investigations were directed towards deciding on suitable types of valves for use as R.F. generators. Magnetrons of any type seemed to be unobtainable; Sutton tubes were available and the possibility of enlarging the cavity of the 10 centimetre Sutton tube cavity was given consideration, but the high operating voltages entailed would have precluded the use of this tube in portable gear. The Sutton tube was accordingly ruled out. There remained triodes of the U.H.F. disc-seal type, such as the "Lighthouse," CV90, or D.E.T. 22.

Preliminary Experiments

The "Lighthouse" type circuit was considered to be too complicated for first experiments, and would have entailed the purchase of a complete U.H.F. receiver merely in order to obtain the tube. It was finally decided to use a CV90. Accordingly, a piston-tuned co-axial oscillator was constructed to take a CV90 and experiments made to determine whether the desired frequency could be reached using this particular type of valve. This first oscillator was made entirely of brass, and consisting as it did of concentric anode/grid–grid/cathode–cathode/heater tubes all requiring to be accurately fitted, much machine work was entailed. It should be pointed out here that it is virtually impossible to construct oscillators of this type without the aid of a lathe and a good collection of metal-working tools.



Close-up view of the parabolic reflector and associated equipment used for the first two-way amateurs contacts in Great Britain on a frequency of 2,350 Mc/s. The oscillator is mounted directly behind the paraboloid.

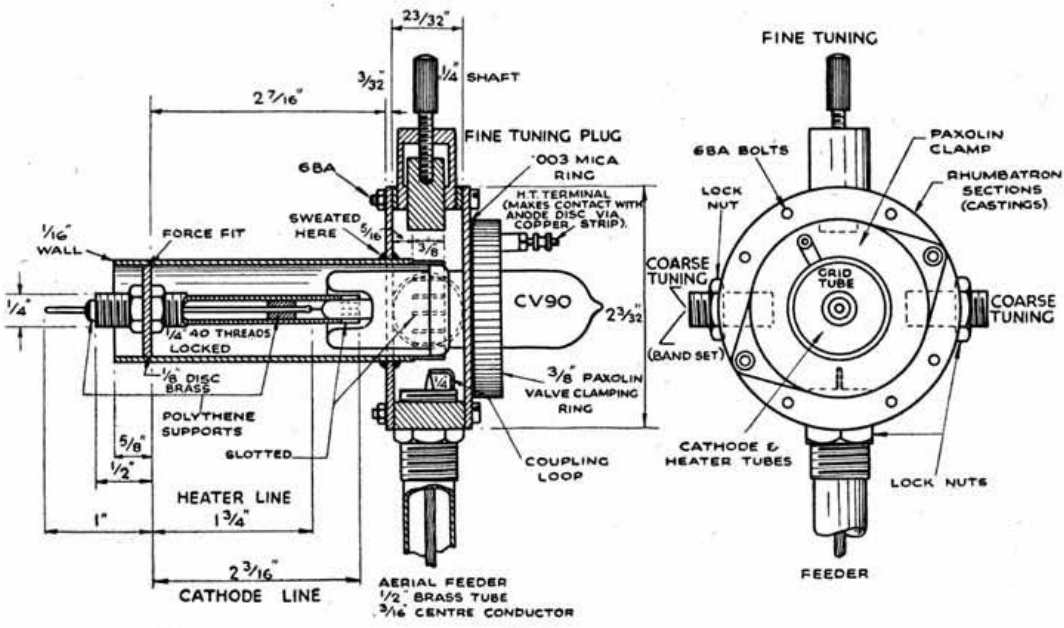
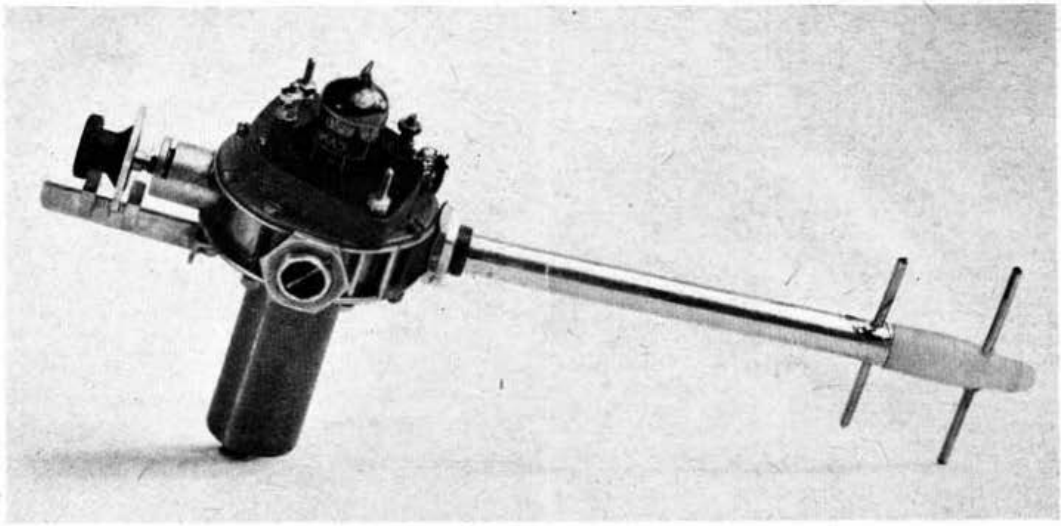


Fig. 1.
Details of 2,300 Mc/s. oscillator using valve type CV90.



Close up view of CV90 oscillator used for experiments at 2,350 Mc/s.

The CV90 oscillator worked fairly well, and with it, after a lot of tedious adjustment, oscillations up to 3,500 Mc/s. were produced and maintained. This oscillator, however, suffered from certain defects to which reference will be made later, but it was retained and used for subsequent experimental work on aerials and receivers.

Receiver Problems

Attention was next focussed on the design of a suitable receiver, and a superheterodyne was constructed in which the local oscillator was a type R.L.18 valve used in a conventional open Lecher circuit and working on a fundamental frequency of 800 Mc/s. The third harmonic from this oscillator was fed into a crystal mixer followed by three I.F. stages, using E.F.50 valves tuned to a frequency of 30 Mc/s. (the tuning of these stages being staggered to give maximum band-width) followed by a diode second detector and two stages of audio amplification.

First Results

By anode modulating the CV90 oscillator, and using this receiver, one-way communication was established over short distances and experiments were made with aerials of various types. The results, however, left much to be desired. Firstly it was found that, due to the heat developed in the body of the CV90 oscillator, the pistons were prone to jam, and could only be moved in a series of jerks. The heat also caused the pistons and their associated tubes to oxydise, causing intermittent contact and frequency jumping. Secondly the receiver signal-to-noise ratio and overall sensitivity at the mixer end was very poor. It was concluded that this was mainly due to the insufficient third harmonic output from the R.L18 local oscillator, which was already running at more than the rated input.

In view of the unsatisfactory results obtained from the foregoing experiments the writers felt that, although, given a local oscillator operating on its fundamental frequency the superheterodyne would prove quite satisfactory, the work entailed in constructing another oscillator of the CV90 variety plus the considerations of size and power requirements would make the receiver far too unwieldy for portable operation, a feature which was thought to be most desirable.

Super-Regeneration

The solution to this problem appeared to be super-regeneration, although it was not known what size interruption oscillator would be required to quench an oscillator running at 8 watts input. However, tests proved that it *was* possible, in view of the short transit-time of the CV90, to reduce the input by two-thirds, provided that the aerial loading was not too heavy. A 6V6 quench oscillator under these conditions, was found to be more than sufficient, and tests of the sensitivity were made by checking reflections at various distances, adjusting the receiver for maximum response to its own radiation reflected off objects up to about twenty feet distant.

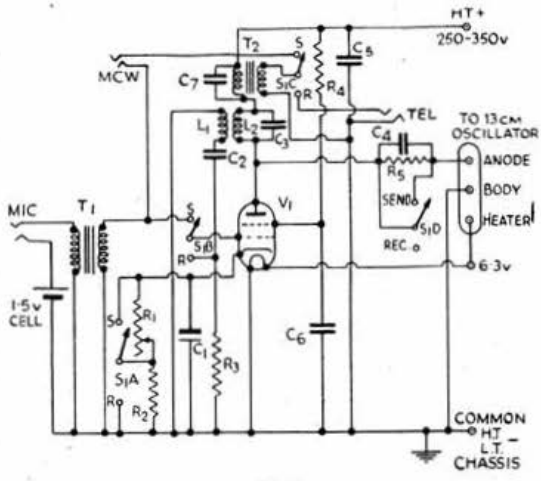


Fig. 2.
Circuit of Transceiver used for 2,300 Mc/s. experiments.

T1	100/1 microphone transformer.
T2	2/1 output transformer.
L1, 2	Quench coils, approximately 100 kc/s.
V1	6V6 valve.
R1	2,000 ohms wire wound potentiometer.
R2	500 ohms 1 watt.
R3	50,000 ohms ½ watt.
R4	10,000 ohms ½ watt.
R5	3,000 to 16,000 ohms 5 watt (dependent on H.T. used).
C1	12 μF 50 v. working.
C2, 7	2000 μμF Mica.
C3	Dependent on type of quench coils used.
C4	·01 μF paper.
C5, 6	·1 μF.

Note.— (1) Quench coils may consist of old broadcast 125 kc/s. I.F. coils or sections from high inductance R.F. chokes, etc.
(2) S1a, b, c, d, are included in 4 pole Dewar switch.

Improved Oscillator Design

These results on the receiving side were very encouraging, and it was felt that, given a more stable and easily tuned CV90 oscillator, a satisfactory transceiver could be built.

It had been noticed that, when tuned to the correct frequency, the anode-grid cavity of the piston-tuned oscillator was approximately the same size as the cavity of a 10cm. Sutton tube, which, being already fitted with very convenient tuning plugs and being of suitably heavy construction to dissipate the heat generated by the CV90, seemed to be an excellent foundation upon which to build an improved type of oscillator. The two halves of the cavity or rhumbatron of a Sutton tube were accordingly fitted with heavy brass end plates, one to carry the grid tube together with its associated cathode and heater line, and the other, bored out in the form of an annular ring with its outer surface covered with mica, formed, with the disc anode of the CV90, the anode blocking condenser. The valve was securely held in place by a suitably shaped piece of paxolin, about ⅛in. thick which was drawn tightly down on to the anode disc of the valve by two long bolts

Station G8IH/P being set up on the Cuckoo School clock tower, Hanwell.

passing right through the body of the cavity (see Fig. 1).

It was found in practice that the cathode piston could be pre-set for maximum output in the centre of the band, and so the cathode line was made a pre-determined length. This, the authors have found has solved all the previous troubles. Oscillators built on these lines have proved to be remarkably stable and easy to tune, and give about 400 milliwatts output.

A transceiver was built round the improved oscillator, and, using the old original oscillator as an amplitude modulated transmitter, a test was carried out over a distance of slightly more than a quarter of a mile between G8IH/P on 2,350 Mc/s., and G2DVD on 14 Mc/s. working cross-band. The 2,350 Mc/s. signal was received at S9, and it was found possible by G8IH to remove the 2,350 Mc/s. aerial from its bowl-fire reflector and still get a good report.

Parabolic Reflectors

Having perfected a satisfactory micro-wave oscillator, and having found that the super-regenerative receiver fulfilled all immediate requirements, the one remaining problem was that of finding parabolic reflectors of suitable size. This problem was recently solved when the authors were able to purchase two ex-R.A.F. test sets, type 216; these latter consist of a 400/500 Mc/s. oscillator with dipole and parabolic reflector all in one compact unit.

The two type 216 sets were stripped, and two identical transceivers were built into the 216 set cases, the 2,350 Mc/s. oscillator being mounted directly behind the paraboloid, thereby avoiding the losses previously experienced when using lengths of co-axial cable to couple the oscillator to the transmitting aerial. A circuit of a transceiver of this type is given in Fig. 2.

First Contacts

Using these two transceivers, a distance of two miles across Ealing to Hanwell was covered on June 6, 1948, when with one set working through a 16in. stone wall and the other working through a steel-framed window, signals were exchanged for a period of 1 hour 20 minutes with minimum reports of R5, S9 both ways.

The authors realise that this modest distance does not compare with the present American amateur achievements on this band, but it is, in their humble opinion, a beginning, and it is hoped that this record of experiment and first results will lead to more interest being taken in this portion of the spectrum.

In conclusion, the authors wish to express their thanks to G2DVD, 3BRL, 3BFS, and Mr. Pugh, of Ealing, for kindness in obtaining consent for the use of the buildings from which this latest experiment was made.

Empire DX Certificate

For the record, the following is an up-to-date list of those who can now wear the attractive EDXC Badge in their lapel and display the equally attractive hand-produced Certificate in their shack :

No.	1	..	R. Holmes, G6RH
,,	2	..	P. Pennell, G2PL
,,	3	..	J. M. Kirk, G6ZO
,,	4	..	A. O. Milne, G2MI
,,	5	..	C. G. Allen, G8IG
,,	6	..	F. A. Robb, GI6TK
,,	7	..	R. A. Bartlett, G6RB
,,	8	..	W. R. Joss, G2AJ
,,	9	..	H. Caunce, G6KS
,,	10	..	H. B. Gortz, PA0GN
,,	11	..	J. R. Letts, G8IL
,,	12	..	D. A. G. Edwards, G3DO

Suppression of Motor-Car Interference

A special sticker has been prepared for the use of members who have fitted a suppressor to their car. Copies are available on application to Headquarters.

A PORTABLE COMMUNICATIONS TYPE RECEIVER

By A. M.-M. PAYNE, M.D., M.R.C.P., (BRS.14354)*

Design Considerations

THIS receiver was designed with three main objects in view, (1) portability, (2) economy of operation and (3) first-class performance on the amateur bands. Headphones reception was mainly required but the ability to operate a small loudspeaker was desired. The set was to be powered by dry batteries, and a mains power-pack was needed for use at home. An H.T. drain of 20 mA was decided on as reasonably economical for battery use. The performance aimed at was a sensitivity of the order of 1 micro-volt for useful volume on phones, that is about 5 milliwatts output; selectivity, preferably variable from about 6 kc/s. to 1·5 kc/s. bandpass; adequate band-spread on the amateur bands up to 30 Mc/s., with general coverage as a secondary consideration. A noise-limiter and beat-oscillator were essential. Images and spurious responses had to be minimal and since the writer then lived within 2 miles of the B.B.C. transmitters at Brookmans Park there had to be complete freedom from cross-modulation. This was a fairly ambitious project, and indeed it has taken several months and four reconstructions to attain. Many unexpected difficulties were encountered. Only the most important of these will be mentioned. The obvious choice of valves was the miniature button-based series, I.T.4, I.R.5, I.S.5, 3.S.4, being compact and economical.

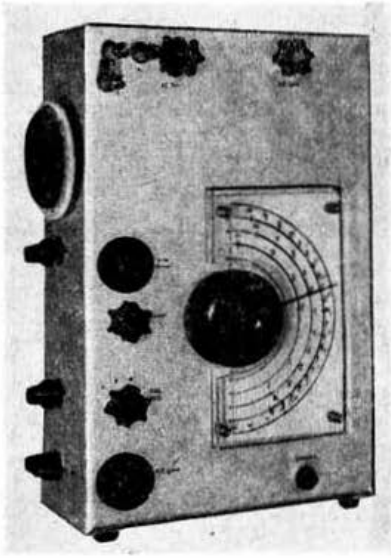
The first model embodied one R.F. stage preceding two 465 kc/s. I.F. stages and a crystal filter. Gain was just adequate on 28 Mc/s. with the filter in, but second channel interference was troublesome even on 14 Mc/s. An I.F. of 1·6 Mc/s. was considered but rejected since it was felt a third I.F. stage would be needed to offset the loss of gain at the higher intermediate frequency, and if an additional valve was to be included another R.F. stage would be preferable. With two R.F. stages image rejection was satisfactory even on 28 Mc/s. but the H.T. drain had leaped to over 30 mA, the gain on 7 and 14 Mc/s. was excessive and great difficulty was found in attaining stability. It was found, however, that by reducing the screen volts throughout from 67·5 to 45 volts the H.T. drain dropped to about 20 mA and the loss of gain was slight. Stability was still a problem. The set was rebuilt with additional screening and great care taken in wiring but only a slight improvement occurred. Finally the trouble was located in coupling through the filament circuit. Several different arrangements were tried without success until the present design was evolved and stability attained.

The Circuit

The circuit is shown in Fig. 1, the R.F., F.C. and 1st I.F. stages in section (a), the 2nd I. F., Detector, Output and B.F.O. in section (b).

The two R.F. stages use I.T.4 or D.F.91 valves. *Denco* slug-tuned plug-in coils are used and tuned by 75 μμF condensers. Aerial coupling is provided for a dipole if required. The grid circuit of the 1st R.F. valve is provided with a manual trimmer to compensate for the detuning effect of different aerials. The grids are coupled through ·001μF mica condensers and the A.V.C. is parallel-fed to facilitate short leads. The screens are fed through a 25000 ohm variable resistor to provide a measure of R.F. gain control. All circuits are decoupled by ·01 μF mica condensers which are compact and quite adequate on short-waves.

*2 Cavey Close, Oxford.



View of completed portable Communication Type Receiver embodying several novel features

The frequency changer is an I.R.5 or D.K.91 with separate excitation from a triode-connected I.T.4 oscillator. The oscillator grid current must be adjusted to 150 microamps. The grid leak of G1 is 100,000 ohms. Neutralization between G1 and G3 is necessary owing to modulation of the space charge at G3 by the oscillator frequency greatly reducing the conversion conductance. About 1—3 μμF is needed for neutralization and is obtained by twisting an insulated wire soldered to G1 around the grid condenser of G3. Different stray capacities in the wiring will necessitate greater or less neutralizing capacity. Excessive capacity reduces gain and greatly increases pulling when the R.F. circuits are tuned through the signal.

The oscillator circuit is tuned independently from the R.F. stages by a 15 μμF ceramic trimmer with one plate removed, resulting in adequate band-spread, not only of the amateur bands but also throughout the tuning range. General coverage is obtained by switching in parallel with the tuning condenser a series of trimmer and fixed condenser combinations arranged in steps of about 10 μμF up to a total of 75 μμF. The switch must be ceramic. A stopping resistor of 50—100 ohms may be necessary before the grid to suppress parasitic oscillation. The oscillator voltage is adjusted to the optimum figure by varying the anode resistor and the grid stopping resistor.

A miniature permeability-tuned 465 kc/s. transformer couples the F.C. anode to the 1st I.F. stage. Provision is made for incorporating an "S" meter in the screen circuit of this valve. The 1000 ohm resistor to the H.T. line is a meter shunt to bring the meter needle to any convenient zero reading.

The crystal filter circuit is standard with the substitution of an adjustable tuned circuit as output load. This renders the filter suitable for telephony. Detuning the output circuit increases the selectivity.

The crystal filter output transformer is coupled by a screened lead to the 2nd I.F. stage which is conventional.

The detector is an I.S.5 or D.A.F.91 diode pentode. The diode load is split into two sections of 70,000 ohms each and the signal taken from the centre. These resistors should be equal, though their value is not critical. The noise-limiter circuit consists of series and shunt limiters using *B.T.H.* Germanium crystal diodes. Automatic bias is provided by 500,000 and 860,000 ohm resistors and a ·25 μF decoupling condenser. These values are not critical but they should be in about the same proportions. Switching is provided so that any combination of the two limiters may be used. Although this is not essential, it is however useful to be able to switch out the limiter when receiving weak signals on 28 Mc/s. as it does cause some audio-loss. The combination of series and shunt limiters is strikingly more efficient than one would expect from the performance of either alone.

Two A.V.C. circuits are employed. One controls the 1st I.F. valve, with no delay, to make the use of an "S" meter possible. The voltage is taken *via* a 1 megohm resistor from the top of the detector diode load, but it can be switched out by S2. The signal for the second circuit is taken from the detector diode *via* a 25 μμF condenser to the diode in the I.S.5 beat oscillator. This controls the two R.F. stages and is operated with 1½ volts delay by returning the diode load to the filament circuit between the 1st R.F. valve and the detector. S2 enables this circuit to be switched out and closed.

The output valve is a 3.S.4 or D.L.92. The optimum load is 8000 ohms. To preserve this during phone reception the jack is arranged to disconnect the

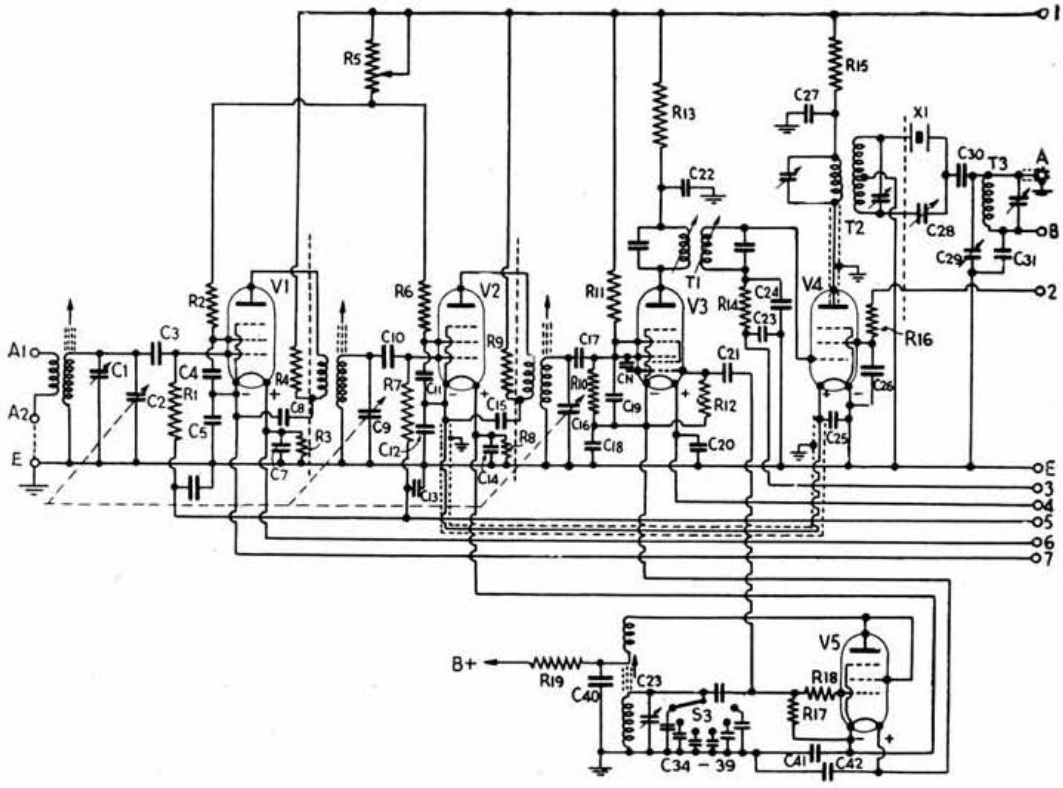


Fig. 1 (a).

Shows the two R.F. stages, F.C. and oscillator, and 1st I.F. stage with crystal filter.

Component Values.

C1	15 μμF air trimmer	C30	100 μμF.	R12	100,000 ohms.
C2, 9, 16	75 μμF variables ganged.	C31	·1 μF.	R16	68,000 ohms.
C3, 10, 17	·001 μF mica.	C33	15 μμF trimmer (see text).	R17	39,000 ohms.
C4, 5, 6, 7, 8, 11, 12, 13, 14, 15, 18, 19, 20, 22, 23, 24, 25, 26, 27, 40, 41, 42	·01 μF mica.	C34-39	See text.	R18	91 ohms (see text).
		CN	Neutralisation (see text).	R19	10,000 ohms (see text).
		R1, 7, 10, 14	150,000 ohms.	V1, 2, 4, 5	1T4 or DF91.
		R2, 6, 11	22,000 ohms.	V3	1R5 or DK91.
		R3	900 ohms.	T1	465 kc/s. I.F. transformer.
C21, 32	50 μμF Ceramic.	R4, 9, 13, 15	3,000 ohms.	T2	See text.
C28	5 μμF trimmer (see text).	R5	25,000 ohms variable.	T3	See text.
C29	25 μμF trimmer.	R8	600 ohms.	X1	465 kc/s. crystal.
				S3	1 pole, 12 way Ceramic switch.

In this diagram the screen of V3 is shown joined to grid. Where the line crosses the grid it should be looped instead of joined. The grid condenser of V5 should be labelled C32. The tuning condenser of V5 is C33 not C23.

speech-coil leads and connect a resistor equal to the speech-coil impedance in their place. The writer uses a 15 ohm speaker. For a 3 ohm speech-coil the resistor should be 3 ohms. High impedance phones should be used.

The filament circuit is rather complex. There are two circuits joined at earth at one end and pin 5 of the 3S4 at the other. From pin 1 of the 3S4 filaments are connected in the order I.F.2, B.F.O., R.F.I., detector-earth. From pin 7 the order is F.C., Osc., R.F.2, I.F.1,—earth. It will be noted that no two amplifiers working on the same frequency are next to each other, and that, with respect to earth, both R.F. stages are at the same potential, as are the detector and I.F.1, permitting satisfactory A.V.C. The filament of the 3.S.4 is 6 volts above earth and hence satisfactorily biased by returning the grid leak to earth. As the whole H.T. current of the set flows through the filament circuit, bleeders are necessary to carry off the excess current. The filament voltage is dropped by 1 volt by means of a 10 ohm resistor in the positive lead. This slightly underruns all filaments allowing a margin of a few milliamps in the safe current. Two bleeders of 1,500 ohms each from pins 1 and 7 of the 3.S.4 carry the output current. Two bleeders of 900 and 600 ohms at the positive side of the filaments of R.F.1 and R.F.2. respectively carry the currents of the I.F.2, B.F.O., and F.C., Osc., respectively. The safety margin, due to the voltage dropped, allows the detector and I.F.1 to carry the current of the R.F. stages. The filament circuit is extensively decoupled.

The speaker, battery and "S" meter leads are taken to an octal socket.

Construction

The receiver is constructed in two halves. Those stages shown in Fig. 1 (*a*) are contained in the screened compartments in the upper part of the case. The remainder (Fig. 1 (*b*)) occupy the lower part. The two parts are joined by a 7 pin plug which includes all leads except the grid lead and grid return of the 2nd I.F. stage. These are soldered separately to their respective connections.

The lay-out of the R.F., F.C., Oscillator and 1st I.F. stages can be seen in the photograph. The 1st R.F.

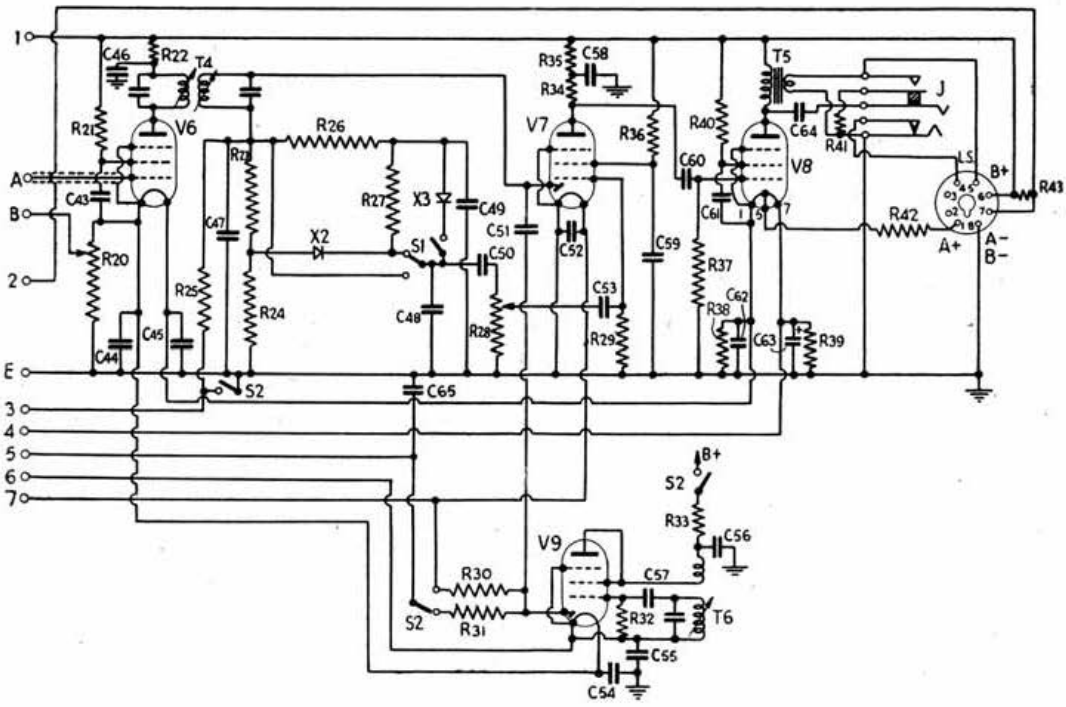


Fig. 1 (b).
Shows the 2nd I.F. stage, detector, B.F.O., and output stage.

Component Values.

C43, 44, 45, 46, 50, 53	·01 μF mica.	S2	3 pole, 4 way switch.	R21, 23, 24	68,000 ohms.
C47, 48, 57	100 μμF mica.	Points 1-7	7-pin plug.	R22	3,000 ohms.
C49	·25 μF.	J	Phone Jack ("make one, break one").	R25, 30, 31, 34	1 megohm.
C51	25 μμF Ceramic.			R26	500,000 ohms.
C52, 54, 55, 56, 59, 60, 61, 64, 65,	·1 μF.	T4	465 kc/s. I.F. transformer.	R27	860,000 ohms.
				R29	10 megohms.
C58	4 μF electrolytic, 150 V.D.C.	T5	Output transformer.	R32, 33	33,000 ohms.
				R35	100,000 ohms.
C62, 63	50 μF electrolytic, 12 V.D.C.	T6	465 kc/s. B.F.O. coil.	R36	3·3 megohms.
				R37	2·2 megohms.
V6	IT4 or DF91.	X2, 3	Germanium crystal "diodes" (B.T.H.).	R38, 39	1,500 ohms.
V7, 9	IS5 or DAF91.			R40	22,000 ohms.
V8	3S4 or DL92.	R20, 28	500,000 ohms variable.	R41	15 ohms (see text).
S1	3 pole, 4 way switch.			R42	10 ohms (see text).
				R43	1,000 ohms (see text).

stage is nearest the R.F. tuning dial, followed by the 2nd R.F. stage and finally the F.C. grid circuit. The F.C. itself lies just below and behind the screen. The 1st I.F. transformer and valve lie immediately below the F.C. The oscillator is in the central screened compartment, and the crystal filter components lie to the right. The chassis for this portion which measures $7\frac{3}{4}'' \times 7\frac{3}{4}''$, is constructed from a sheet of heavy gauge aluminium. All wiring is carried out beneath the chassis in a space $\frac{3}{4}$ inch deep, two sides of the space being formed by the upper and lower horizontal screens. The construction of the screened compartments is made clear by the photograph. Similarly placed screens $\frac{3}{4}''$ deep lie beneath the chassis.

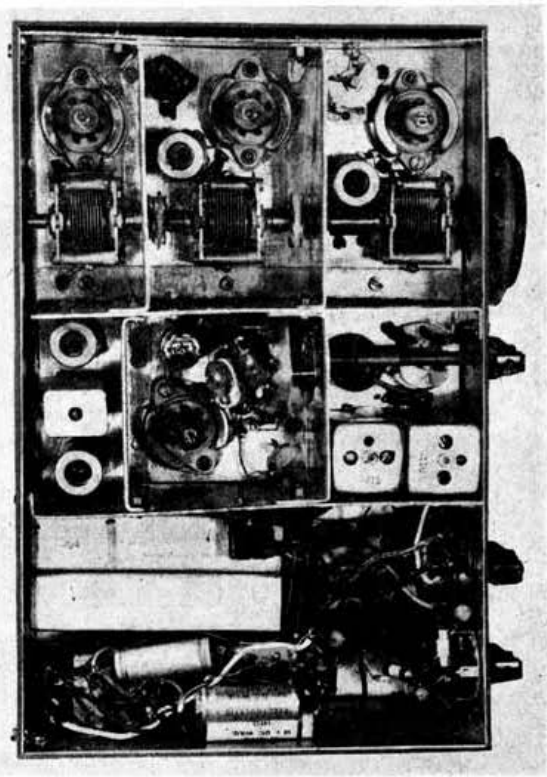
Wiring is inevitably cramped and needs to be carefully planned. The valve and coil holders are placed so as to make the grid and anode leads as short as possible. Earthing tags are provided at each valve socket. The condenser rotors must be earthed by thick soldered leads as no reliance can be placed on the contact of the condenser frame with the chassis. The screen and anode decoupling condensers are returned to pin 5 of the valve holders. To facilitate ganging, the wiring of the three R.F. stages should be as nearly identical as possible in order to keep stray capacities approximately equal. Bases for individual coil screens are provided. But as in practice the stability is perfect without them and since they reduce the Q they are not used. The octal coil holders are ceramic.

All oscillator circuit components are in the central screened compartment. The tuning-condenser stators are connected by a lead $\frac{1}{2}''$ long to the ceramic single-pole 12-way switch. On this switch are mounted the various trimmers and fixed condensers to give complete coverage. The connections are as follows :—Position (1) nil, (2) 15 $\mu\mu$F ceramic air trimmer, (3) 15 $\mu\mu$F fixed + 15 $\mu\mu$F trimmer, (4) 25 $\mu\mu$F + 15 $\mu\mu$F trimmer, (5) 25 $\mu\mu$F + 15 $\mu\mu$F, (6) 50 $\mu\mu$F, (7) 30 $\mu\mu$F + 30 $\mu\mu$F, (8) 50 $\mu\mu$F + 15 $\mu\mu$F. If possible the various fixed condensers should be ceramic, but silvered mica may be used.

The crystal filter components are in the compartment to the right of the oscillator. The inner of the two cans contains the input transformer, the outer contains the output transformer and variable selectivity condenser. Above and to the left is the crystal and to its right is the phasing condenser—a 15 $\mu\mu$F ceramic air trimmer with all except 1 rotor and 1 stator removed. The tip of the stator is bent so that the rotor touches it in the " all-out " position, thus cutting-out the crystal. The condenser must be of the type in which both rotor and stator are insulated from the chassis and it must be driven through an insulated coupler.

The transformers are made from two small trimmer tuned transformers. Both are removed from the cans and the lower winding of one is disconnected from its trimmer and carefully slid off the dowel. This winding is slid onto the dowel of the other, taking care that the windings are in phase. The central winding is pushed a little way up so that the spacing is equal. This is now the primary. The two outer windings are joined in series, the junction earthed and the trimmer connected across the outer ends. This is the secondary of the input transformer. The remaining winding of the other transformer forms the output circuit. The dowel is cut short to allow room at the bottom of the can for a 25 $\mu\mu$F ceramic air trimmer. A midget 0·1 μF condenser is included inside the can to complete the circuit. The output grid lead is screened. The white lead in the photo is the grid return running to the variable tap on the I.F. gain control.

The lower part of the set contains the components shown in Fig. 1 (*b*). The upper of the two rectangular



Internal view of the receiver showing clearly the method of construction. Oscillator circuit components are in the central screened compartment.

screening cans contains the beat-oscillator and the lower one the 2nd I.F. stage. The output valve can just be seen below this and above the two electrolytic condensers; the detector lies immediately behind it. Behind the I.F. gain control is the 3 pole—4 way switch controlling the A.V.C. circuits and the beat-oscillator. In position (1) both A.V.C. circuits are on, (2) R.F., A.V.C. off, I.F.I. A.V.C. on, (3) both A.V.C. circuits off, (4) both A.V.C. circuits off, B.F.O. on. The wiring is quite simple and includes those switches marked S2 in Fig. 1 (*b*).

Below the I.F gain control fitted to the side of the case is the noise-limiter switch. The components of the noise-limiter—detector diode circuit are mounted on the switch (S.1 in Fig. 1 (*b*)). In position (1) both noise-limiters are switched off, (2) the series limiter is on, (3) both limiters are on, (4) shunt limiter is on.

The audio gain control lies on the front panel behind the limiter switch. The other components of the detector and output stages are grouped closely round the valve holders and cannot be seen except for the two 50 μF electrolytic decoupling condensers which should be of the 12 volt working type. To the left of these is the phone jack with the 0·1 μF coupling condenser above it. Again to the left is the output transformer, with the octal socket mounted at the corner of the case.

The case is made from an aluminium sheet cut and bent to measure $12'' \times 8'' \times 3\frac{1}{2}''$ deep. After drilling the various holes it is finished by immersing in strong caustic soda for about two hours to give a pleasant matt finish. The back of the case (not shown) is made in two sections from aluminium. The lower part is held permanently in place by screws whilst the upper part covers the screened compartments and is joined to the lower part by

brass hinges to allow of easy access for coil-changing. It has a flap which fits into the slot along the upper edge of the case. The back must be carefully earthed to the main case or it will cause coupling between the tuned circuits.

Component Values

Few of the component values given are critical. Except those already mentioned any nominal value within plus or minus one third of the value stated should be satisfactory. The values which are most critical are the grid leak of G1 in the frequency changer circuit, the grid leak and condenser of the first oscillator, and the bleeder resistors in the filament circuit. All resistors may be quarter-watt 20 per cent. tolerance and construction will be easier if they are insulated.

Power Pack

A companion unit has been built containing power pack, speaker and " S " meter which also meters the power supplies. Space does not permit a full description. It is a straight-forward A.C./D.C. circuit giving 130 mA at 100 volts. Thorough smoothing is necessary. The " S " meter can be switched to meter both H.T. and L.T. voltages and currents and variable resistors are included to adjust them.

Warning Note

The chassis is directly connected to the negative H.T. so precautions must be taken with an A.C./D.C. pack.

Alignment

An H.T. supply of 90 volts 20 mA and L.T. of 7½ volts 100mA are required.

For proper alignment and calibration a signal generator is almost essential. The I.F. transformers must first be peaked to 465 kc/s. with the crystal out and then to the crystal in the position of minimum selectively, *i.e.* with the crystal correctly phased, the output circuit tuned to resonance by the trimmer, and the selectivity control all out. Finally all other I.F. transformers should be peaked to the crystal with the selectively control in its maximum position, *i.e.* all in. An unmodulated signal is recommended for these checks.

The R.F. circuits are aligned on 7 Mc/s. by peaking with the coil slugs at the low frequency end of the range and loosening the couplers between the condensers and tuning each separately for the maximum response at the high frequency end. To obtain good tracking this operation will have to be repeated several times. The aerial trimmer should be set half out. Other ranges are peaked with the coil slugs on the amateur bands.

The oscillator trimmer condensers should be adjusted to allow sufficient overlap between the various switch positions.

The oscillator may of course be set above or below the signal.

Performance

The performance of the set is satisfactory on 3·5, 7 and 14 Mc/s. The 1·75 Mc/s. band has not been explored. The sensitivity is good and the noise level low. For what it is worth it can be stated that 1 microvolt from an A.V.O. oscillator is intolerably loud on headphones. Selectivity is just right for phone reception. In the maximum position speech is distorted by cutting the sidebands but is intelligible. The tuning arrangements work well and pulling of the oscillator is not noticeable. On 28 Mc/s. the performance falls off but is adequate, and the noise level is low.

Oscillator stability is excellent with battery-power and good with the power-pack when the latter is warm.

The noise limiter is effective against ignition interference and moderate against electric motors.

Calibration remains accurate provided the H.T. supply is constant.

The writer will be pleased to clarify obscure points for intending constructors since space does not permit detailed discussion of all the difficulties that may arise.

Contemporary Literature

Results of extensive microwave propagation tests carried out in the United States by the *Bell Laboratories* were published in the February issue of *Proceedings of the I.R.E.* Signal strengths over an unobstructed 40 mile path were recorded during a period of two years using wavelengths of from 1·25 to 42 cm. These tests further demonstrated the high reliability of microwave communication circuits especially with wavelengths above 3 cm. Losses due to rainfall increased rapidly at the higher frequencies and at 1·25 cm. it was found that general rainfall of moderate intensity was capable of obliterating the signal. It was also noticed that under conditions of temperature inversion signal strengths were subject to wide variation particularly during the summer months. No significant difference in fading was observed between vertically and horizontally polarized aerials on 6·5 cms.

* * *

Some details of the Dutch experimental television transmissions were recently given in *Electron*. The vision transmitter (PAB3) has a power of 20 kW. and operates on 63·25 Mc/s., with a definition of 567 lines, 25 frames per second interlaced. The F.M. sound transmitter—call-sign PAG3—works on 67·75 Mc/s. Normal operation is for four hours per week. Considerable research on projection-tube receivers is being carried out at the *Phillips* laboratories in Eindhoven.

* * *

An article in the May issue of *Proceedings of the I.R.E.* examines the possibility of using the moon to reflect VHF signals so as to permit long distance communication on frequencies above 50 Mc/s. The authors believe that the success of such a system would largely depend upon whether the moon presents an electrically smooth or rough reflecting surface and conclude that a considerably larger amount of experimental data than is now available is required.

* * *

Science Illustrated provides information on the mass production in the United States of synthetic crystals suitable for receiver crystal filters. The system is not unlike farming. A small " seed " crystal is slowly revolved in a saturated solution of E.D.T. (ethylene diamine tartrate) and the temperature gradually lowered. It takes three months to grow a crystal 1lb. in weight and some 6in. long. At present the crystals are not stable enough for transmitting purposes.

Around the Trade

Mullard Electronic Products Ltd. have recently concluded an agreement with *Hallicrafters Incorporated* of Chicago, whereby *Mullards* have the right to manufacture all *Hallicrafter* communication designs. One of the first models to be released under this arrangement will be the *Hallicrafter* SX42 communication receiver which gives coverage from 0·5 to 110 Mc/s. with frequency modulated reception from 50 to 110 Mc/s.

Silent Keys

It is with deep regret that we record the passing of Mr. John C. Watts, BRS.246, of Highgate, London, and Mr. Eldrick Fowler, GM5UT, of Birse-by-Aboyne, Aberdeenshire.

* * *

John Watts, elder brother of Past President Arthur E. Watts, G6UN, joined the Society in 1929 and served as a member of the Council for two years prior to the war. He was the first non-transmitting member to join the Executive of the Society and during his term of office did much to assist B.R.S. members.

* * *

Eldrick Fowler, brother of Alex. Fowler, GM8SV, had been a member since 1936. Always under the difficulty of a physical disability he never spared himself in furthering any good cause that would help others. He was a member of the F.O.C. and active on many bands until his last illness.

* * *

Condolences are offered to the families and friends of these two members who, in their respective fields and spheres of influence, played a prominent part in building up the Amateur Radio Movement.

SURPLUS WAR EQUIPMENT FOR THE V.H.F.'s

By E. MENZIES (G5MQ)*

CONSEQUENT upon the appearance of an article on the two metre band by Mr. W. H. Allen, G2UJ, in the April issue of the BULLETIN, the writer feels that his experiences in the conversion of surplus war radio equipment to operate on both the 2 metre and the 75 cm. bands might be of interest to other members.

Even for those who have not, or cannot obtain equipment of the types to be mentioned, there should be little or no difficulty in building a crystal controlled transmitter and a superhet receiver or converter for 2 metres, and it is suggested that at least for this band, super-regenerative receivers and self-excited transmitters should not be used. For 75 cm. work a converter offers little difficulty, but a crystal-controlled transmitter does, at present, appear more tricky, except perhaps for very low power.

A 2 Metre Transmitter

To deal first with the 2 metre band. The *Bendix* SCR522 provides a ready-made transmitter, the line-up being a crystal of about 8 Mc/s. in a persistent oscillator circuit using a 6G6G valve, the anode circuit of which is tuned to 16 Mc/s. A 12A6 trebler stage follows and produces 48 Mc/s., which is again trebled by an 832 push-pull twin tetrode. The power amplifier is another 832. The modulator is a pair of 12A6's in push-pull, driven by a 6S8T and uses a moving-coil microphone. One of the disposal ear-piece type microphones is ideal for this position. Provision is also made for tone modulation by means of deliberate feed back in the modulator stage and a relay is provided to bring this into action. Keying can be arranged by inserting a key into the cathode of the 12A6 trebler, but provision for this is not made in the standard model.

An external power supply is required furnishing 300 volts for H.T. 150 volts for grid bias, and 12 volts for the heaters. The latter may be run from an AC supply. Two "Jones" type plugs are fitted to the chassis and the essential connections are as follows :—

PLUG 1.

Pins 1 and 2 ..	Microphone.
Pin 6	MCW relay energising.

PLUG 2.

Pin 1	Grid bias negative.
Pin 2	Live heater.
Pins 3 and 4	HT positive.
Pin 8	HT negative, bias positive, earthed heater.

The remainder of the pins may be ignored.

Bringing the Transmitter into Operation

Insert a crystal of between 8,000 and 8,111 kc/s. into socket "A."

Push the top slider-bar as far to the right as it will go and fix it there.

Connect a 1 mA. meter to the meter pin-jack, apply heater volts, grid bias, and H.T. to the "Jones" sockets as above.

Connect a motor car lamp of about 12 watts across the aerial sockets to serve as an artificial aerial.

On turning the meter switch to position 1, current will show because the crystal begins to oscillate as soon as voltage is applied. Then proceed as follows :

Unscrew the locking-bars on each tuning condenser, and tune the left hand condenser for a *rise* in meter reading.

Switch to position 2 and tune the second condenser for a *rise*.

Switch to position 3 and tune the third condenser for a *rise* and the fourth condenser for a *dip* in current.

Output should now be indicated by the car lamp and the aerial coupling may be adjusted to make this a maximum.

Now switch to position 5—PA grid current—and retune all condensers for maximum output, re-adjusting the aerial coupling if necessary.

With 300 volts H.T. an RF output of between 12 and 15 watts may be expected.

Modulation

With the microphone connected as above, modulation should be upward. If not, either the aerial coupling is too tight, or the grid drive too low, and readjustments should be made.

Tone modulation can be obtained by connecting about 12 volts DC in series with a key, between pin 6 on "Jones" plug 1, and pin 2 on "Jones" plug 2, but as a rough check that the MCW system is working, the relay can be closed manually. This component will be found near the modulator valves.

With power still connected, the lock bars on each condenser should now be tightened, checking that maximum output is still being obtained. Hold the indicator plates and tighten the lock bar. Check also that each indicator plate reads about 150, as some of the circuits can be tuned to the second harmonic as well as to the third. *Should this have happened, output will not be on* 144 *Mc/s., and some of the indicators will read about* 100.

If desired, crystals of other frequencies between 8,000 and 8,111 kc/s. may now be inserted in sockets "B," "C" and "D," and the tuning system described can be repeated for each of the channels after pushing back the appropriate slide. Unlocking and retuning the condensers does not disturb the setting for channels already tuned. With four crystals one may have four channels available in the band by simply fitting a rotary 4-cam switch to the panel, so that each cam pushes back one of the slides, which at the same time brings all four condensers to their correct settings.

The variable aerial coupling will allow of feeding into any of the usual low-impedance feeders.

The Receiver

The companion receiver to the transmitter described, involves considerable work in adapting it to variable tuning as it is normally used with crystal-control of the oscillator on four spot frequencies between 100 and 150 Mc/s., a coverage much too great for amateur use.

The standard line-up is a 9003 RF with tuned grid and plate inductively coupled to another 9003 mixer with a tuned grid, these circuits being tuned

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by a three gang condenser. Injection voltage is obtained from one half of a 12AH7 twin triode with a crystal of about 8·5 Mc/s., followed by a 9002 which picks out the appropriate harmonic which is then amplified by a 9003. The plate of the 9002 and the plate of the 9003 are tuned by a two gang condenser. The plate coil of the 9003 is inductively coupled to the grid of the mixer. For a received frequency of 144 Mc/s., the crystal could well be 8·8 Mc/s., the 15th harmonic of which would be 132 Mc/s.; the injection frequency. The IF on 12 Mc/s. has three stages using 12SG7 valves followed by a 12C8 detector and first audio stage, and the output is normally a 12J5 triode, although some models employed a 12A6. Most of the receivers have some form of noise limiter using either a single or a twin diode, but different models vary very considerably after the second detector, and amendments from there on are best left to the individual user.

Conversion for Amateur Use

Various ways of obtaining variable tuning offer themselves. The 9002 " harmonic generator " could be arranged to oscillate at about 132 Mc/s. by coupling back from plate to grid, or it could be arranged to oscillate at, say, 66 Mc/s. and the 9003 would then act as a doubler. Possibly the 9003 could be made to oscillate itself at about 132 Mc/s. However, if any of these arrangements are used, one is still left with two tuned circuits, and some form of band spread is essential.

The writer first converted one of these units to operate on the 5 metre band as follows. The two gang condenser unit was removed completely. A ceramic 3 to 30 preset condenser was inserted in series with the mixer tuning condenser and fixed ceramic condensers of 5 $\mu\mu$F. inserted in series with the RF grid and plate tuning condensers. New coils of considerably increased number of turns were made, and the mixer was arranged as a cathode tapped oscillator, oscillating 12 Mc/s. on the LF side of the signal. It is essential when using autodyne mixing that the mixer oscillates only feebly, and on the *LF* side of the signal. If it is on the HF side, the impedance offered by the tuned circuit to the incoming signal is very low, but quite good transfer of energy is obtained with signals on the HF side of the oscillator. The screen voltage of the mixer should be low. Start by getting the oscillator working on the correct frequency, and then make coils for the plate and grid circuits of the RF stage. The same system of conversion has now been added to the receiver by the writer by fitting a second three gang in place of the two gang unit, with the same band spread system and coils suitable for the 2 metre band, and results are quite good at either frequency.

A considerable amount of work is involved, but by the use of a little common sense the conversion is not really difficult. Incidentally the March, 1948, issue of *QST* describes a suitable broad-band converter for use with the *Bendix* receiver.

Receiver Type R.3084A.

Recently the writer was fortunate to obtain an ex-Air Ministry receiver type R.3084A. Any lucky owner or purchaser of this equipment can have a receiver working on 2 metre in a couple of hours. The line up is as follows. Two RF stages using EF54's, EF50 mixer, EC52 oscillator, three IF's on about 30 Mc/s. using EF50's, diode second detector, EF50 first audio and two EF50's output. The output stage is not normal, but the remainder of the circuit is reasonably so.

To get the receiver working, first disconnect the coupling condenser from the first audio to the output stages by unsoldering it at the grid end, and insert a pair of 'phones between the free end of this condenser and the chassis. Underneath the chassis will be found two chokes in the H.T. supply. Connect 250 volts positive to this point, with negative to chassis. One side of the heaters is connected to chassis, the live lead going to the transformer nearest the back of the chassis. Find this lead and apply 6 volts AC between this lead and chassis, after disconnecting it from the transformer. This should bring the receiver into action, and the tuning range will be about 185 to 200 Mc/s.

Having got the receiver going, disconnect the power supplies and remove the screening boxes from all stages. Add a 20 $\mu\mu$F. condenser across the oscillator coil, and 3 $\mu\mu$F. across the other tuning coils. This will make the oscillator tune to about 114 Mc/s. and the RF and mixer coils to about 144 Mc/s. It will be advisable to remove the small stud on the oscillator tuning control, which normally restricts the tuning to one revolution, so that the band can be found with the oscillator. It will be found that all IF coils are damped by resistors; these should be removed, and the IF peaked up to about 30 Mc/s. Some models have a switching input/output motor. This can be removed, also the mains transformers as they are not suitable for 50 cycle supply. The rectifiers and the EF50 output valves may also be removed and this will leave plenty of room on the chassis for a suitable power pack. If reception of 'phone or tone modulation only is required, no further alterations will be necessary. The writer has, however, proceeded as follows. The diode, which as standard is wired with its cathode to the last IF coil, was reversed, and the EF50 first audio was removed together with the output stage. A double-diode noise limiter was fitted, a twin triode as first audio and beat oscillator was added, together with a 6F6 output stage to allow of speaker reception. A VR150/30 was fitted to stabilise the voltage to both the RF and beat oscillators, with the result that tuning of CW carriers is quite easy. It will be found that about one full revolution of the RF oscillator tuning screw will cover about 144 to 146 Mc/s., and by fitting a slow motion dial to this shaft, tuning of CW is as easy as on the lower frequency bands.

Unfortunately the writer has no means of measuring the actual sensitivity of the receiver as the only frequency meter he has available has a leakage of about 10 microvolts at 144 Mc/s. but it might give some idea to readers when it is stated that the harmonics from a *Q.C.C.* type 100 kc/s. bar oscillator can be heard at S6 when the output of the oscillator is fed directly into the aerial terminal, and even the 10 kc/s. beats from the multi-vibrator can be detected.

One further amendment was to couple a single turn loop to the grid coil of the first IF stage, and to bring this out with co-axial cable to one of the unused sockets on the panel. This allows the rear end of the set to be used with any converter having an output of 30 Mc/s. by simply removing the mixer valve. See notes on 420 Mc/s.

The 420 Mc/s. Band

For this band there is a certain amount of disposal equipment available. One is the A.P.S.13, which contains a transmitter section using two 6J6 valves in a long-line oscillator, and a converter unit using one 6J6 as oscillator and another as mixer. The model which the writer obtained had been very badly damaged about the IF stages, so the convertor and oscillator were removed bodily from the chassis, as they were intact. With about 200 volts applied to the transmitter section, about 2 watts RF output could be obtained at 420 Mc/s. An article

in a recent issue of *QST* describes means of improving the performance of this transmitter.

Base connections of valve type 368 A.S.

The converter unit uses a shorting bar to vary the inductance of the oscillator circuit but this would be a noisy method for a receiver, so a small two plate variable condenser was connected across the " hot " ends of the line, and the shorting bar adjusted so that that oscillator covered about 390 to 410 Mc/s. The mixer already has a two plate variable condenser across the " hot " ends of the line, and by adjustment of the shorting bar, and this condenser, will tune to 420 Mc/s. without alteration. The mixer circuit tuning is very flat. A 30 Mc/s. IF transformer was fitted to the unit and a suitable cable, with plug for power supply was fitted, arranged to take 6 volts for heaters and 150 volts HT stabilised, from the R. 3084 A. receiver. Some amendment to the converter will be necessary to allow of 6 volt heater supply being used, but this will be quite obvious, and easy to do.

Sensitivity seems rather low, no doubt due to the lack of RF stages, but at least it offers a start on the band.

Another unit which shows promise is the altimeter type A.P.N.1, which contains a pair of 955's in the transmitter section, and another pair as oscillator for receiving, with two 9004's as mixer.

A higher powered transmitter is available in one of the radar jamming devices, believed to be the A.P.Q.5, which contains two 368 A.S. valves (also known as 703's) in long-line push-pull. As it stands it covers the 420/440 Mc/s. band, and with about 300 volts H.T. on the valves, some 10 watts of RF can be obtained. Details of the valves are as follows :—

Filament 1·2 volts		4 to 4½ amps.
Anode volts	..	350 max.
Anode current	..	75 mA. max. per valve.
Grid current	..	12 mA. max. per valve.
Dissipation	..	20 watts max. per valve.
Amp. factor	..	8.
Impedance	..	3,200 ohms.
Conductance	..	2·5.
Capacities	..	A–G 1·1 μμF., G–F ·9 μμF., A–F ·6 μμF.
Output (one valve)		1,000 Mc/s. 2½ watts.
		1,250 Mc/s. 2 watts.
		1,400 Mc/s. limit of oscillation.

Another unit of promise is the A.P.Q.9, also a radar jamming device, which contains a pair of 8012 tubes in push-pull and looks as if it should be good for 420 Mc/s. However, up to the present the writer has not been able to make this device oscillate and it has been shelved *pro tem.* Information on the A.P.Q.9 and also the A.P.N. 1 would be appreciated.

THE CHARACTERISTICS OF "END-FIRE" AERIAL SYSTEMS

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

THIS article draws attention to a simple graphical representation which is of assistance in visualising the performance of end-fire aerial arrays. The method can be used to show that the divergent views concerning the performance of the two-element driven end-fire array expressed by G8PO(1), G2HDU(2) and G8TS(3) can be reconciled.

The Representation of a Dipole

Considering the magnetic field alone, this is sinusoidal in form and radiates in all directions, but is drawn in two directions only. Its instantaneous value is represented by the position on the vertical line through the dipole from which the waves arise. Fig. 1 illustrates four typical cases. The pattern on one side of the axis is always a mirror image of that on the other.

The Second Element

Fig. 2 illustrates some of the combinations possible when wave-trains arise from two elements. The spacing between the elements A and B is shown as $\frac{1}{8}$th wavelength or 45°, radiation in the horizontal direction only being represented, since this is the direction mainly concerned with end-fire radiation. The symbolism breaks down if representation of the entire field is attempted.

Fig. 2A illustrates a case where the front-to-back ratio is, in theory, infinity, since there is some forward signal and no back signal. Complete rearward

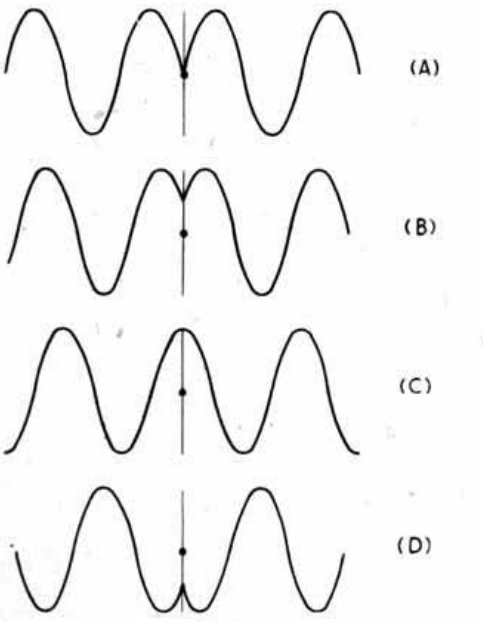

Fig. 1.

Symbolised radiation from a dipole.

(A) At phase instant 0°. (B) At phase instant 30°. (C) At phase instant 90°. (D) At phase instant 210°.

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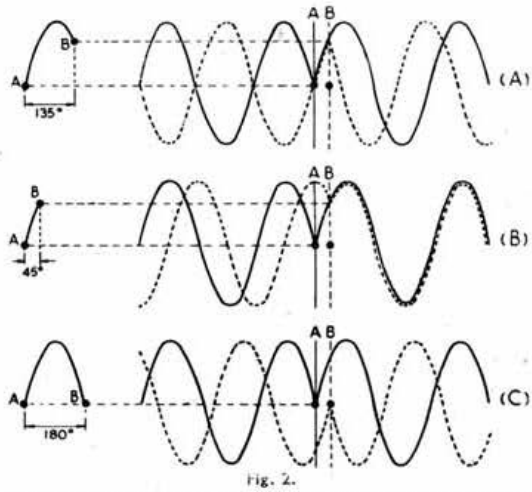

Fig. 2.

Symbolised radiation from a two-element array, with phase diagrams for one-eighth wave spacing.

(A) Element B leading by 135°; radiation to left, nil, to right, 141*.
(B) Element B leading by 45°; radiation to left, 141*, to right, 200*.
(C) Element B leading by 180°; radiation to left, or right, 77*.
* Indicates that the figure is compared with 100 for a dipole with the same current.

cancellation will not be achieved in practice but adjustments near that particular phasing will result in high front-to-back ratios, as observed by G8PO. Suppose that, in addition to the feeder to one element being $\frac{1}{8}$th wavelength longer (giving a phase retardation of 45°), one feeder is also crossed (a phase advance of 180°), a nett phase advance of 135° will be produced and radiation will be a maximum in the direction of the leading current element, but this is also the element with the extra feeder length. This is the case in the array described by G8PO, and it is clear that while his observations are correct, his description and analysis is incomplete.

Fig. 2B is the case analysed by G2DHU with a theoretical front-to-back ratio of 1·4 : 1. (Note that the greater signal is in the direction of the leading current element, *i.e.* the element with the extra $\frac{1}{8}$th wave of feeder is the reflector.)

Fig. 2C is for 180° phase displacement alone, as in the Krauss flat-top beam. It is mainly characterised by complete cancellation in directions at right angles to the lines joining the two elements, and symmetrical radiation in both "in line" directions, that is, unity front-to-back ratio.

The sketches at the left side of Fig. 2 illustrate the method of determining the required phase relationship. The physical displacement of the elements is ignored, and the two wave-trains are regarded as superimposed, the instantaneous current magnitudes being plotted on the combined curve. Considering Fig. 2A, for example, when A is at its starting point, B is well on its way to completing its first half-cycle; B is, in fact, leading by 135°.

Radiation Resistance

The radiation of energy from a dipole in free space takes place equally in all directions at right angles to

its axis and amounts to 72 watts when the aerial current is one ampere. That is to say, its radiation resistance is 72 ohms. In the case of Fig. 2C, for example, there is zero radiation in the direction at right angles to the line joining the element axes and partial cancellation in all other directions. The power radiated is considerably less than 72 watts per ampere, and the radiation resistance is, therefore, reduced. The disadvantages of low radiation resistance have often been expressed in the past and will not be repeated here. If ohmic resistance and dielectric losses are negligible, the aerial current will increase to such a value that the total power radiated is equal to the transmitter output power, and the signal will increase in the directions of least cancellation because of this increased current. This is the reason why the arrangement of Fig. 2C gives a useful gain when at first sight it appears to give a loss, and Fig. 2A a gain much greater than the apparent 41 per cent.

To pre-determine the gain of a given set-up means, among other things, that the radiation resistance must be calculated, and this in turn means determining the degree of cancellation not only in every direction in the plane at right angles to the axis, but in every other plane as well, a mathematical operation beyond the scope of this article.

Determining the Phase Relationship

In driven arrays, the phase relationship is primarily determined by the feed-lengths. Where a difference of $\frac{1}{2}$th wavelength is required for example, the difference in feeder lengths must be $\frac{1}{2}$th wavelength in the cable (*i.e.* the free space value multiplied by the cable velocity constant). Even so, the difference in cable lengths to achieve any particular phase relationship may not be quite as simple as theory would suggest. The equivalent electrical length of the dipoles and the parasitic or shock excitation of one element by another may modify the conditions slightly.

As the radiation resistance of one of the elements will be much lower than 72 ohms, appreciable standing waves will be present in the feeders if 70–80 ohm cable is used. Since the feeders are of unequal length the impedances at the sending end are not likely to be the same, and the power fed to the two elements will be unequal so that the expected radiation pattern will not be obtained. Either some matching device at the dipole end of the feeder would seem desirable (e.g. "T." "Y." or "Q "), or else multi-wire "folded" elements should be employed.

The radiation resistance of either element of the arrangement of Fig. 2A is judged to be about 30 ohms, but, since the radiation is not symmetrical, the two elements may not have identical radiation resistances. The difference in this case, however, is not likely to be large.

The method is not confined to the examples treated. Any combination of spacing and parasitic or driven elements can be considered similarly, the current phase in a parasitic element being determined by its reactance at the exciting frequency, or in other words, by its electrical length.

References:

(1) R.S.G.B. BULLETIN, November, 1947.
(2) R.S.G.B. BULLETIN, December, 1947.
(3) R.S.G.B. BULLETIN, February, 1948.

WHEN TRANSATLANTIC DX IS AUDIBLE AVOID USING TELEPHONY BETWEEN 14,100 KC/S AND 14,150 KC/S

Radio Amateurs' Examination

Courses arranged in East London

Arrangements have been made, in collaboration with the Ilford Borough Council, to run a course of lectures in preparation for the 1949 Radio Amateurs' Examination. The course will commence in September and will continue for a period of approximately 8 months.

Lectures will be given on Wednesday evenings from 7 p.m. to 9 p.m. at the Ilford Institute (County High School for Girls) and the syllabus will be that issued by the City and Guilds of London Institute.

The cost of the complete course of lectures will be 5s. and the entry limited to 70 students. Two classes will operate, each under a qualified member of the R.S.G.B.

Mr. W. F. Holdaway, BRS15028, of Romford, will lecture on Aerials and Aerial Design problems, Messrs. R. Faulkner, G8AL, and A. E. Royle, G3XS, of Chingford, on Fundamental Principles, Simple Transmitter and Receiver Design, Measuring Instruments, Modulation Equipment, etc., and Mr. C. H. L. Edwards, A.M.I.E.E., G8TL, of Ilford, on the Licence and the Log.

A mock examination will be held early in April and revision in weak subjects will continue up to the time of the 1949 Radio Amateurs' Examination.

Already 30 members have expressed a desire to be enrolled. Others who are interested should communicate with Mr. Edwards at 10, Chepstow Crescent, Newbury Park, Ilford, Essex. Members resident in any part of the London Region are eligible.

The Ilford Institute is only 100 yards from Gants Hill (Central Line). Buses from Romford, Wanstead, Woodford and Chingford pass the door.

Further details of enrolment times and dates will appear in the August issue.

The 45' tower upon which is mounted the 5 metre beam used by Arthur Simons, G5BD (Mablethorpe, Lincs.). The tower is constructed from steel scaffolding and the beam comprises ½" copper elements with 1" boom mounted on a 6" ball race. Rotation is by means of cables and pulleys. G5BD has worked 160 stations in 32 counties and 10 countries on 5 metres.

ABSORPTION METERS

By C. H. L. EDWARDS, A.M.I.E.E. (G8TL)

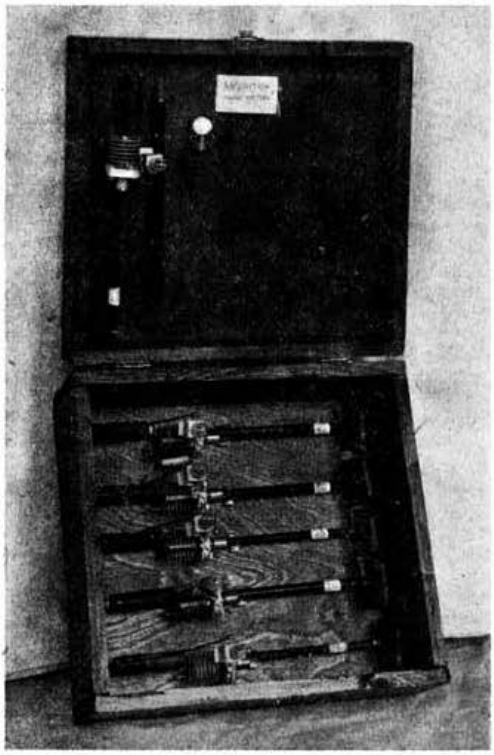

Fig. 1.
A complete set of Miniature Absorption Meters mounted in a carrying case. The trimming tool and a spare lamp are mounted inside the top of the case. Total expenditure for the six wavemeters was 2s. 6d.—the cost of the bulbs.

NO doubt many amateurs to-day have an appreciable amount of surplus equipment which they have broken down, the most useful parts having been utilised in the various transmitters, instruments, etc., common to the average shack.

Looking over the residue, the writer noticing a predominance of pre-set condensers, keramot rods and tubes, decided that a set of small absorption wavemeters could be constructed with very little expense.

Construction

Accordingly a start was made by sorting out the air spaced pre-set condensers which had no extension spindles, but a slot and locking collar. As the supports carrying the fixed vanes extended about $\frac{3}{16}$", the right hand one was floated with solder and screwed to 6BA to take the short tapped lengths of keramot rod which were to serve as the coil bobbins. Six screwed panel-mounting lamp holders were then picked out and these were soldered direct to the moving vane condenser tag. The longer lengths of keramot and bakelite rod were then drilled each end, threaded to take 4BA short brass studs, one end being secured to the condenser ceramic plate by a nut and the other to a rectangular piece of bakelite cut from available panels.

A further length of this rod was then drilled one end, and tapped 4BA, and a stud fitted which was filed to a wedge end to fit the slot in the condenser spindles.

This served as a trimming tool for all wavemeters, a small pointer rotating across the graduated paper dials, which had been glued to the front of the bakelite end pieces.

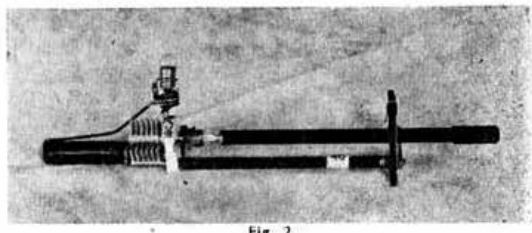

Fig. 2.
Close-up view of one of the handy little absorption meters made up from surplus Government components.

Winding Data

The bobbins were then wound and adjusted to fall into the various bands. A mark was then made on the dials to indicate the desired frequencies. In the case of the "top band" absorption meter an additional 100$\mu\mu$F padder was soldered across the variable condenser and with the vanes half way in, same was trimmed to frequency.

Lengths of wire taken from old coils were used for the bobbins. The gauge does not appear to be too critical, a few turns more or less in the case of the lower frequencies will be covered by the condenser capacity.

Winding Data

Band	Wire	Winding
160 metres	No. 38G enamel	Closewound, $1\frac{1}{2}$"
80 metres	No. 38G enamel	Closewound, 1"
40 metres	No. 26G enamel	Closewound, 80 turns
20 metres	No. 26G enamel	Closewound, 38 turns
10 metres	No. 24G enamel	Closewound, 23 turns
5 metres	No. 24G enamel	Closewound, 8 turns

All bobbins 2" in length $\frac{1}{2}$" diameter.
Air spaced condensers 25$\mu\mu$F, type 10c/3092.

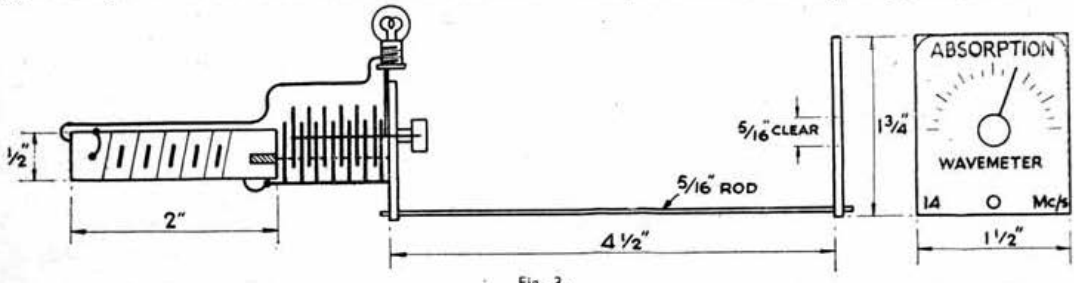

Fig. 3.
The lamp, condenser and coil are shown connected in series to form a closed circuit. If preferred the lamp can be link coupled by the addition of a few turns adjacent to the coil.

The Station Behind the Call

G2VV*

Mr. J. Roe, G2VV at the Controls

LICENSED in August, 1929, at Farnham, Surrey, G2VV was the first amateur station in that town. To-day Farnham boasts five active transmitters! The full call was preceded by an A.A. call—2 BUW—issued early in 1928.

From 1929 to 1934 all work was restricted to low power derived from dry batteries (usually about 200 volts at 25 mA) and single valve self-excited transmitters were used.

In 1934 the station was moved to St. Margarets-on-Thames, Middlesex, where A.C. mains were available and a CO-FD-PA running 40 watts to a TZ-0520 C.W. only, was in use up to the outbreak of war. Between 1935 and 1939 a good deal of 56 Mc/s. fixed, and portable, work was carried out.

The present location at Hampton-on-Thames seems a good spot for radio work. The first contact, on 14 Mc/s. being with KH6CT! The river is quite near, and Hampton Court Palace (QTH of King Henry VIII!) only about a mile away.

The photograph shows the present operating position and details of the apparatus seen are :—

Lower left, Hartley oscillator working on 3·5 and 7 Mc/s. (this was described in the February issue of the R.S.G.B. BULLETIN). Standing on the Hartley is a Type A Mark III Transceiver which has a 7H7 Oscillator (Pierce) and 7C5 PA running at 10–12 watts input. The Hartley takes the place of the usual crystal for VFO operation and the 7H7 operates as a buffer stage. This Transceiver also incorporates a superhet receiver employing a 7Q7 and two 7H7s. Its compact size will be obvious and in addition to use at the station it is employed for portable work. It works from a vibrator having 6 volts input from the car battery. Crystals are used for frequency control when operating portable.

Standing next to the Hartley is a Type RF 27 Converter modified for 58 Mc/s. work. This has two EF54's as R.F. and mixer, with an EC52 oscillator. This is A.C. operated from a 250 volt power supply and has a 7 Mc/s. output which is fed to the AR88D receiver, seen in the centre of the table. The little gadget sitting on the Type 27 Converter is a home-made absorption wavemeter.

To the right of the AR88D is an HRO receiver used as a stand-by set and monitor. Standing on the HRO, and partly hidden from view, is an "Avo" All-Wave Signal Generator which is used in conjunction with a 100/1000 kc/s. crystal for frequency checking.

Aerials (constantly changing throughout the years of operation) are, at the moment, a 68 ft. end-fed, 42 ft. high, a 14 Mc/s. doublet and a 14 Mc/s. matched impedance.

Recent activity has been restricted to 3·5 Mc/s. with a little work on 7 Mc/s. Operation is limited thus as the main 150 watt transmitter is being completely re-built. This will be an all-wave, band-switched, transmitter running two PT15's in push-pull for C.W. and 'phone, the latter mainly to interest non-radio visitors. The modulator output will run two 807's in class-B. The complete equipment is being built into an ex-Service rack measuring over 6 ft. high and 2½ ft. wide.

It will be evident from the small transmitter shown in the photograph that the love of QRP work is still present at G2VV. The Hartley was used with 1·2 watts in the 1947 R.S.G.B. QRP Contest.

In addition to the *Mac Elroy* bug in the foreground there is a straight key to the right of the HRO but hidden from view.

DX and ragchewing are the main interests. The score stands at 95 countries, but it is hoped that the new transmitter will bring home a DXCC certificate.

* *5 Gloucester Road, Hampton-on-Thames*

Bath Trades Fair

One of the outstanding attractions at this year's "Bath Trades Fair"—visited by more than 25,000 people—proved to be an exhibit organised by the local members of the R.S.G.B. Despite the crowds, G8JQ/A operating on 7, 14 and 28 Mc/s. with an input of 120 watts succeeded in making many contacts. Some idea of the ambitious nature of the installation may be gauged from the 28 Mc/s. aerial: a three element beam mounted on top of a 60ft. mast. Spectators, often three or four deep around the stand, were able to watch the station in action and typical excerpts were later broadcast by the B.B.C. Other equipment shown on the stand included G8DX's 16 valve amateur-built communications receiver, working models of the Fisk Solariscope, an automatic Morse sender and a remote controlled rotary beam. "Auto," an electronic animal was in attendance and a high-fidelity amplifier built by members of the Admiralty Electronic Society was also demonstrated. The Town Representative—Mr. J. F. S. Carpenter, G8JQ, and the many members who assisted, well deserved the success they achieved.

V.H.F. Technique

The co-authors of *V.H.F. Technique* wish to record their appreciations to Mr. M. Mason, G6VX, for valuable material contributed and practical assistance freely given.

Mr. J. F. S. Carpenter operating G8JQ/A at the Bath Trades Fair.

LOW POWER CONTEST, 1948

ANOTHER Low Power Contest has been arranged for the coming autumn.

Intending contestants should read the report of last year's event, which was published in the January, 1948, issue of the BULLETIN (page 140). It will probably prove advantageous to build a special transmitter for the event.

Rules

1. The contest is open to all fully paid up members of the Society resident within the British Isles and the British Zone of Germany.

2. The British Isles for the purpose of the contest include England (G), Scotland (GM), Northern Ireland (GI), Wales (GW), Channel Islands (GC), and the Isle of Man (GD).

3. The contest will commence at 23.00 G.M.T. on Saturday, September 18, 1948, and will conclude at 22.59 G.M.T. on Saturday, September 25, 1948.

4. Entries will be accepted only if submitted on lined foolscap or quarto paper and in the form set out below :—

LOW POWER CONTEST, 1948.

Name..... *Callsign*.....

Address..... *County Code No.*.....

Details of equipment used.....

Aerials.....

Contact No.	*Date*	*G.M.T.*	*Call-sign Worked*	*RST Sent*	*RST Recd.*	*County Code No. of Station Worked*	*Multiplier*

Declaration : I declare that my station was operated strictly in accordance with the rules and spirit of the Contest, and I agree that the ruling of the Council of the R.S.G.B. shall be final in all cases of dispute.

Date..... *Signature*.....

(A figure will be entered in the multiplier column each time a new County is worked, thereby showing the total number of Counties worked up to that time.)

5. No entry form postmarked later than Sunday, October 3, will be accepted.

6. Details at the top of the entry form must be completely filled in and the declaration signed, otherwise the entry will be disqualified.

7. Entries must be addressed to the Hon. Secretary, R.S.G.B. Contests Committee, New Ruskin House, Little Russell Street, London, W.C.1.

8. The high tension power supply for the complete transmitter must be obtained from a single standard-capacity 120 volt dry battery. Only one battery may be used throughout the contest.

9. The only transmitter which the entrant may use on 3·5 Mc/s. during the period of the contest shall be that which he uses for this contest, using the power supply specified in Rule 8.

10. All contacts must take place on the 3·5 Mc/s. band and must be with amateur stations located in the British Isles as defined above or in the British Zone of Germany.

11. Proof of contact may be required.

12. Contacts with unlicensed stations will not be permitted to count for points.

13. Only one person will be permitted to operate a specific station during the contest period.

14. The contest is confined to two-way telegraphy contacts.

15. Only one contact with any one station may be made during the contest.

16. One point will be scored for each contact, and the total will be multiplied by the number of counties contacted during the contest.

17. Competitors should use the code number denoting their own county whilst calling CQ, e.g. "CQ CQ CQ de G – – – G – – – G – – – 17 AR." An exchange of RST reports and code numbers will be required before points for contact can be claimed, e.g. "RST579 NR 17."

18. Competitors making contact with stations not entering the contest must obtain from them during the contact the County in which they are located.

A list of County Code Numbers is set out below :—

ENGLAND (G).

1. Bedford	15. Hereford	28. Nottingham
2. Berkshire	16. Hertford	29. Oxford
3. Buckinghamshire	17. Huntingdon	30. Rutland
4. Cambridge	18. Kent	31. Shropshire
5. Cheshire	19. Lancashire	32. Somerset
6. Cornwall	20. Leicester	33. Stafford
7. Cumberland	21. Lincoln	34. Suffolk
8. Derby	22. London (Postal Districts)	35. Surrey
9. Devon		36. Sussex
10. Dorset	23. Middlesex	37. Warwick
11. Durham	24. Monmouth	38. Westmorland
12. Essex	25. Norfolk	39. Wiltshire
13. Gloucester	26. Northampton	40. Worcester
14. Hampshire	27. Northumberland	41. Yorkshire

SCOTLAND (GM).

42. Aberdeen	53. East Lothian	64. Peebles
43. Angus	54. Fife	65. Perth
44. Argyll	55. Inverness	66. Renfrew
45. Ayr	56. Kincardine	67. Ross & Cromarty
46. Banff	57. Kinross	68. Roxburgh
47. Berwick	58. Kirkcudbright	69. Selkirk
48. Bute	59. Lanark	70. Shetland
49. Caithness	60. Mid-Lothian	71. Stirling
50. Clackmannan	61. Moray	72. Sutherland
51. Dumbarton	62. Nairn	73. West Lothian
52. Dumfries	63. Orkney	74. Wigtown

WALES (GW).

75. Anglesey	79. Carnarvon	83. Merioneth
76. Brecknock	80. Denbigh	84. Montgomery
77. Cardigan	81. Flint	85. Pembroke
78. Carmarthen	82. Glamorgan	86. Radnor

NORTHERN IRELAND (GI).

87. Antrim	89. Down	91. Londonderry
88. Armagh	90. Fermanagh.	92. Tyrone

CHANNEL ISLANDS (GC).

93. Alderney	95. Jersey	96. Sark
94. Guernsey		

97. ISLE OF MAN (GD) 98. BRITISH ZONE OF GERMANY (D2).

Five Metre Contest, 1948, Second Section

The second section of the Contest will be held on September 4 and 5, 1948.

Rules.

Intending entrants are referred to the Rules published in the February, 1948, and November, 1947, issues of the BULLETIN. The only amendments are as follows :—

(*a*) The event will commence at noon on Saturday, September 4, and conclude at midnight on Sunday, September 5.

(*b*) Completed entry forms must be addressed to the Hon. Secretary, R.S.G.B. Contests Committee, New Ruskin House, Little Russell Street, London, W.C.1, and must bear a postmark not later than Monday, September 13, 1948.

(*c*) An additional column must be added to the entry form as published, giving the location (Town and County) of the station worked.

NOTE.—The map used by the Contests Committee for checking distances will be the Ordnance Survey Base Map (10 miles per inch), Sheets 1 and 2.

Danish V.H.F. Activity

The Danish National Society (E.D.R.) is organising a V.H.F. Field Day during the weekend August 21–22, 1948.

Danish stations will be active on the Five and Two Metre Bands, and will be looking for British signals on "Five."

This contest will also give an opportunity for British Amateurs to listen for Danish stations on the Two Metre Band.

It is hoped that exact details of operating times will be available for publication in the August issue.

Swiss National Mountain Day

Swiss enthusiasm for portable work is well-known to all N.F.D. operators. But should there still be any question as to their keenness, a glance at the U.S.K.A. rules for the "National Mountain Day" (August 8) would soon dispel all doubts. For in this contest every station must be situated more than 3,000 feet above sea-level, the last 1,000 feet having been climbed on foot with the complete 3·5 Mc/s. station—weight limit 6kg. (about 13lb.)—carried by the operator. All equipment has to be built by the entrant himself, no contact is considered complete until RST, location and altitude have been exchanged and, in the case of a tie, the "difficulty of access" of the location will be taken into account. Perhaps it is just as well that there are no Alps in Britain. Otherwise . . . !

Stray

M. Pierre Guillard, 8 Rue Porte-Hozanne, Soissons, France, a 28 year old radio engineer would be pleased to hear from any member wishing to arrange an exchange of holiday accommodation. He would like to visit England this summer.

FOR TRANSATLANTIC PHONE CONTACTS USE FREQUENCIES BETWEEN 14,300 AND 14,400 KC/S

THE MONTH ON THE AIR

By C. G. ALLEN, G8IG

FORTHCOMING R.S.G.B. CONTESTS	
Sept. 4– 5	Five Metre Contest (Second Section).
Sept. 20–25	Low Power Contest.
Nov. 27–28	Top Band Contest.

Personal

I AM sorry that M.O.T.A. will not be up to its usual standard this month, but if anyone deserved a holiday it was 'MI. He is not on the air as much as some of us, because he cannot get near to his rig for QSL cards. We owe him and his wife a lot fellows.

It's a coincidence that I should take over this page from 'MI for a month because he took over my original call sign. In 1923 G8IG was G2MI—small world!

Phone v. CW—A Few Moans

Let's begin with a few moans. I have read suggestions addressed to phone operators advising them to keep out of the CW bands but what about the CW merchants keeping out of the phone bands? Ever tried to work DX phone between 14150 and 60? Have a go, Joe! If the CW is not local, it's not so bad but when it *is* local, you've had it, and *all* G's are local to somebody.

I won—I wond—I wonder when the stations running a 5 watt carrier and 500 watts of audio will clean up their rigs—I wonder why they get any QSO's. Talking of over modulation, have you looked at the "mod." of some of the well-known G's on 10 metres? It's an eye-opener—an envelope, a nice bright line and may be another envelope if the screen is large enough to take the long bright line. When 10 opens up again, keep an eye on the "mod," chaps and maintain the high standards for which G's are famed.

That's split the moans out evenly between CW and phone. I work both so I'm not biased.

B.C.I.—An Idea

G5UP may have something. He writes—"In case of BCI any amateur can apply to his local P.O. W/T Investigation Officer for co-operation. Why more assistance in this way is not sought, can only be taken to mean that the offending amateur is using power in excess of his licence." I don't believe it—do you?

Emigrants

The list of emigrating G's continues to grow. G3AHP reports that ex-G2CIN now VE2AGF is working phone on 14·3 Mc/s. What about a W.A.E. certificate (Worked All Emigrants)? Ex-G6WY, 8ID, 8RN are all in Canada, 3CDI in Barbadoes, GW (Bert Hay) and old Ted of 8PO aerial fame in VK, and, of course, lots more in our far-flung Empire. G3YM is off to U.S.A.—good luck, Larry.

Oldtimer

I wonder how many G's realise the famous name behind the call G8NK. Let me introduce Rene Klein, Founder, with Leslie McMichael, of the R.S.G.B. Rene, who is piling up the countries on 14 and 28 Mc/s., was working the bands when a local QSO meant a contact with the man next door and DX, one with a chap two streets away. Good hunting O.M. and may you work all the DX you hear.

Advice to B.R.S.

A word of advice to B.R.S. when reporting to DX stations. It will certainly help to bring a card if comparative reports on signals from the same area are given. We all receive listener reports and it is interesting to know how many other G's are stronger or weaker than we are. I would much rather know *that*, even if it meant omitting a remark that the weather was cloudy and windy.

Notes and News

G6RH bobs up with some good ones:—
ZD8A, 14175; CT3MN, 14140; MD4JG, 14160; FQ8SN, 14380; ZP8AC, 28400; HP1LS, 14180; YS3PL, 14200; TG9RV, 14180; VQ4MSH, 14150 (all phone). ZA2AA, 14080; CT3AB, 14060; UF6AA, 14080; UF6KAB, 14090; ZD8B, 14027; ZD9AA, 14015 (all CW).

I wonder how many countries he has worked? I think we might get a surprise if we knew. RH would like to know the frequencies and times of M1A and M1B.

G2HIO reports that K2UN (14296 kc/s.) has commenced afternoon (E.D.S.T.) operations. The operator is Vi. Grossman, W2JZX (member of R.S.G.B. Home, East Rockaway, Long Island). VS1BA is returning to G soon but VS1CO will keep the flag flying on 28 Mc/s. phone. VQ4SC ex-ZS6JK, ex-G8SC (another for the W.A.E.) is on 14280 and sends 73 to the Manchester gang. Look for him between the showers, chaps. ZC1CL with the Arab Legion, on 14250, has returned to ST., but may be going to ZE6. Here's a nice one—VQ4NSH on 14,375 working portable from a car with 30 watts and looking for G's. EQ1RX 14290 is in the Persian Gulf, also works on 28—QSL c/o Radio Workshop, Abadan. Thanks for dope, Alan.

G3CO1 worked EP1AA (T4 note) at 1638 on 7040. Gives QTH as Tabriz (Iran). Also YU7UX on 3525 at 2153.—Is he a "phoney"? ZD2RGV (Signals Squadron, Lagos) would like to QSO stations in Bournemouth but does not give his frequency or system of transmission. BRS11494 has heard MD4DG, Mogadishu (Italian Somaliland) on 28 Mc/s who says he is the only station there. Norman has also heard VQ3JMT, VQ4HPP, VQ5PDB and FQ8SN on 28 and a stack of nice Asiatic DX on 14.

G5GK wonders if his phone QSO with XP1CQ on 14 is the first contact with Nepal. Time, 1800 GMT, date June 22. You beat G8IG, anyway, George, by 12 minutes. Have you worked SHF1X the "Albatross" on 28 and 14 phone? The "Albatross" is on a world cruise, photographing under-sea life, and is now probably near South America. ET3AF (Box 858, Addis Ababa) is President of the Amateur Radio League of Ethiopia and also the QSL Manager. He naturally QSL's.

G3AKU gives M.R.R.E., Box 185, Budapest 4, as the new QSL Bureau for Hungary, but we have had letters from HA amateurs imploring us not to send cards to this address. So what! Station HA2BNV, operating between June 10 and 20 was run by M.R.R.E., H.Q. The operator will be on next year as HA3BNV and in 1950 as HA4BNV. G3AKU has worked I1AEW in Sardinia. Enquires if anyone has yet worked UM8? VS1BG now back home, says working G from Malaya is a very chancy business.

AP4M sends 73 to all "Beaumanor Hams" and includes G3BMR. What is a "Beaumanor Ham"? G6VV (? 2VV—Ed.) disclaims all knowledge of GM2VV who says his name is Jock. He is also a pirate. VP9 licences are being issued so fast that the single series is now exhausted. VP9AA is, therefore, genuine. Ex-GM3TD will shortly be on the air with a VP9 call. If you need a card from Bermuda look for VP9E on 14022 and nearby frequencies. BRS16304 has 129 countries confirmed which is very good going. No doubt the result of giving useful "gen" in his reports. More news of PK2RK from G2FSP. He says a bunch of cards be sent to R.S.G.B. was returned to him and asks "please hold all cards until you hear from me." MD4JG is active and several more licences are on the way.

OX3BG has left Greenland. Anyone who has not received his QSL should write to him at 1409 Marion Avenue, Lincoln Park 25, Michigan. G2AHP has worked and had a card from PZ1OY who uses only 5 watts to a 6V6. 2AHP has a nice line in QSL's presented to him by his firm. The ridiculous ban on working foreign amateurs still remains in the Philippines. Why are some Governments so bone-headed? Can't they realise the harm such action is bound to do to their reputation abroad? G2DP has the QTH of FQ8SN as c/o SCKN, Brazzaville, French Equatorial Africa. M5DA states that MD7AZ although in Cyprus, is a pirate. No cards will, therefore, be forthcoming.

Following on ZD9AA, another new station will shortly be coming up—ZS2MI on Marion Is. News from ZS6BT. QSL's should go to Box 4887, Johannesburg. This will also be a permanent licence although the operators may change. He has a rhombic pointing north so should be OK for G. G2CWW gives QTH of W2EJV/PK3 as 8 Simpang Park, Soerabaya, Java. Will VS9ET please send his home QTH to G2MI?

TA3AFS (Johnny), an American in Ankara (input 1 kW., 14175 telephony), worked G4RB at 17.47 B.S.T. on June 20. Is QSL'ing his first twenty G QSO's by air mail.

Another Real H.A.M.

Twelve hours before N.F.D. commenced another H.A.M.—Howard Anthony Michael Eldridge—was born to this world. His O.M. (G3AGQ) is worried because so far he has not shown any interest in radio!

More Certificates

According to GW4CZ, there is a magnificent certificate available to anyone who can produce confirmation of contact with 10 of the 50 stations in Corpus Christi, Texas. Why not have a go?

Yet another! Jess Leach, W4CMI, President of the Orlando Amateur Radio Club, says his Club, in conjunction with the Orange County Chamber of Commerce, have prepared a "Worked Orlando" Certificate. Awarded for working any 10 stations in Greater Orlando from the 50 available. Any station working 5 or 10 over the certificate requirement (definite number to be advised later) will receive a bonus prize of a case of oranges. Get cracking, they'll be nice for Xmas!

Well, cheerio fellows, if you've got this far. 73.

AROUND THE VHF's

By W. H. ALLEN, M.B.E., G2UJ.*

Noise Factor

THE writer has recently carried out some interesting tests on a five metre receiver employing a noise diode. A suitable circuit was described by Mr. W. P. Dolphin, G4DN, in his article in the April, 1947, issue of the BULLETIN on noise factor measurements.

After sundry adjustments had been made with a view to obtaining the best results, it was found that the noise factor was 4·5 db. at 60 Mc/s., falling to about 5·5 db. at 58·5 Mc/s., due, no doubt, to the less favourable L to C ratio at the lower frequency. This instrument is certainly the answer for those seeking to improve the performance of their receivers, as the equipment is very simple and the results of slightest adjustment show up immediately for what they are worth. While it is, of course, an advantage to be able to read absolute values of noise factor, the absence of this calibration on the instrument does not prevent it being used for comparative readings.

The receiver referred to above employs a CV66 common-grid stage, followed by an EF54 tuned R.F. and an EF54 mixer with screen injection from an EC52 oscillator. We understand from G8GX of Northwood that his converter, with two R.F. stages, of which the first is a 6AK5, has a noise factor of 4 db. The writer will be interested to hear from other readers what noise factor they have obtained from their receivers, together with a brief note of the valve line-up as far as the mixer stage, for comparative purposes.

Converting the Type 27 R.F. Unit

G2FMF of Hillingdon, Middlesex, sends details of how to get a Type 27 R.F. Unit on the five metre band in about fifteen minutes without rewinding the coils. The method is as follows:— Solder a 3–30 $\mu\mu$F. *Philips* concentric trimmer between the "hot" end of the oscillator coil and earth, *i.e.* in parallel with the trimmer already to be found under the chassis. A similar trimmer is connected across the mixer coil. Wiring will be unnecessary, as the tags should reach. Next remove the existing aerial trimmer, and substitute one of 50 $\mu\mu$F. The converter is connected to a receiver tuned to between 7·2 and 7·3 Mc/s., the new oscillator trimmer is set to maximum capacity and the mixer trimmer to one turn short of maximum capacity. The band should now be found around 70° on the dial, and the aerial and mixer circuits adjusted for maximum noise. Tracking may be carried out by variation of the appropriate condenser in the mixer circuit.

Although these modifications lead to a L to C ratio rather lower than usual, the efficiency does not appear to have suffered seriously, for using such a converter G2FMF worked 42 G stations in 14 counties, using an indoor dipole, and logged upwards of 30 continental stations in a matter of three weeks.

New U.K. 58 Mc/s Record

Congratulations to G3BLP of Selsdon, Surrey, and GM3OL of Dumfries, Scotland, in breaking the existing G-DX record. This achievement came at the end of five days of gradually improving conditions, commencing on June 9th, when G3BLP heard G3BW in Cumberland at 2330 BST, and effected contact. Further QSO's were made by them on the 11th, 12th and 13th, when the Cumberland station was audible most of the day. GM3OL was first heard by G3BLP at 2130 and at 2225 he made contact with him, followed immediately by G6VX of Hayes, Kent. GM3OL then faded out, as did the good G-DX conditions for about a week, so far as the Selsdon station was concerned. Other G-DX stations worked by 3BLP during the period June 9–13 were G2ADR (York), 2IQ (Sheffield), 3ALY (Hull), 3ATZ (Chester), 3DA (Handforth), 3ZK (Halifax), 4OS (Chester), 5CP (Sale), 5UD (Kings Lynn), 5YV (Leeds), 6PD (Middleton), 6XR (Coventry) and 6TF and 6YO, both in Yorkshire. G3BW was heard again on June 20th, at 2330.

European DX.

June gave us our first taste of European DX this year. G2ADZ (Oswestry) found that the best day was June 4th, with signals coming in from F, HB, I, LA, OK, PA and SM. There were other openings on the 3rd, 5th, 7th, 10th and 20th. The band was open towards the S.S.W. on June 16, 17, 18, 19, 21, 22, but no amateur signals were heard. FA8BG and FA8IA were heard in Oswestry on the 7th, but the most northerly British station they worked was G6YU (Coventry). 5BY (South Devon) heard FA and OK on the 10th. In addition to Europeans G2ADZ worked GM3OL and G3BW as well as a number of other stations all over 100 miles distant during the month.

Activity Reports from G-Land

G2DBF, 3BSM and 8DL, all near Bournemouth, operate most evenings from 1900 to 2000 and from 2200 to 2300 BST. 2HLF (Heathfield) heard I1AAW, 1UE, 1XW and a commercial IRL on the 4th, all at S9, as well as F8XW, HB9CB and OK2MV, but he did not make contact. No less than 52 different stations were heard on the 12th, including G2OI and 6OS, two French stations, and ON4AP.

G5AM (Ipswich) reports that his best days were from June 8 to 13, with the 10th and 11th outstanding. He has worked 5YV (Leeds) at 569.

Northern Ireland and Channel Islands

GI3BUP (14 miles S.E. of Belfast) after weeks of negative listening finally heard F8HO at 1950 GMT on the 4th, calling a G station. This event was followed by the reception of a spate of European 'phone signals including F3EB, 3JB, 8UW, 9AQ, 9BG, I1AAW, 1ABR, 1ARD, 1IFA, 1IFS, 1IRN, 1ISS, 1IXJ and 1IXW. F9BG and I1ARD were heard at R5 S9, and the others averaged S6/7 with slow, deep fading. GI3BUP heard F9BQ calling GM3OL at 2000 GMT. At 1730 GMT on June 5 'phone from F3JB, 9BQ and 9OM was received at R5 S9.

GI3BUP is at present without a 5 metre transmitter, but we trust this deficiency will be rectified before summer conditions end.

We are indebted to GC3GS for the information that GC2AWT and GC5OU are now operating most evenings on 59 Mc/s. from 2000 BST. It is hoped that a G/GC contact will soon take place.

Shorts

G3PZ (Gloucester) has erected a fixed 4 element, close-spaced beam for European Sporadic E contacts in addition to his 3-element rotary. G2ADR (York) worked I1DA and 1WX at S9 on 'phone between 1930 and 2000 GMT on May 25, and heard F9AQ and I1RN. G5LC (East Molesey) would appreciate contacts and reports. His frequencies are 59·44 and 59·92 Mc/s. with an indoor doublet. G2UJ has heard him on several occasions. G3WW (Wimblington) had worked 59 stations in 22 counties by the end of May. He is on nightly from 1830 BST and asks why the South and South West remain dormant before 2000BST and also on Saturday afternoons. G3AUS (Torquay) reports that he hears G2FZR (Snodland) well and would like a contact.

For the record we print the E-DX heard by G2FMF, mainly on June 4. (Calls additional to those already listed). F8GH, 9KB, I1AAE, ABR, ALH, DA, FM, IX, MCM, PB, RN, SL, SS, SW, OK1CZ, 2FF, 3ID, PA0UW and SM5FI. I1UE and OK2ID were heard by G2UJ on the 24th, and OK2ID and IRL on the 23rd. Sporadic E openings occurred several times during the daytime on both dates. G6CJ was heard to say that he had received FA8IH during the evening of June 25.

144 Mc/s.

Much interest has been aroused by G3BPM's offer published last month, and a number of members have written to him requesting information concerning commercial V.H.F. signals. As the data available is very considerable, and covers not only the 100–125 Mc/s. band, but all frequencies from about 300 kc/s. upwards, and all kinds of transmissions including radar, navigational beacons and S.B.A., correspondents would assist Mr. Matthews by indicating their exact requirements. GM3DIQ who, together with GM3DDE is all ready to go on this band as soon as permission is granted, is also finding the V.H.F. commercial 'phones of interest in receiver development. His best DX so far is in the region of 120 miles—for an aircraft—which goes to show that the modified R.1147A receiver is behaving pretty well.

420 Mc/s.

G5CD (Hendon) describes some experimental work recently carried out with the S.T.C. 3B/401J double disc seal valve (see *V.H.F. Technique*, page 34) as a frequency doubler into the 420–460 Mc/s. band using a short, capacity-loaded pipe tank circuit. An output of 13 watts was realised at an efficiency of 36 per. cent., operating conditions being *Va* 600, *Ia* 60 mA., *Ig* 12 mA. Satisfactory anode modulation was obtained. Work is proceeding on the *S.T.C.* type 12AT7 V.H.F. double-triode frequency changer with a view to its possible use on this band, although the makers give its maximum operating frequency for normal use as 300 Mc/s. So far the oscillator section has been persuaded to function as high as 700 Mc/s., and we look forward to further information in due course.

New V.H.F. Bands

For the past nine months the Society has been negotiating with the G.P.O. for the early release of certain frequencies within the 144–146 Mc/s. and 420–460 Mc/s. bands. It had been hoped to publish an official announcement this month, but up to the time this issue closed for press the G.P.O. had been unable to obtain a clearance.

It is possible that the G.P.O. will authorise the release before the August issue appears in which case a circular letter will be sent to all Regional Representatives. Individual members who would like to receive immediate advice of a pending release should send a stamped and addressed envelope to Headquarters.

420 Mc/s. Group

Mr. W. A. Scarr, M.A., G2WS, is willing to organise a special 420 Mc/s. Group, and invites all members who are actively engaged in building gear for that band to communicate with him, at 8 Beckenham Grove, Shortlands, Bromley, Kent.

* *32 Earls Road, Tunbridge Wells, Kent*

NEWS FROM HEADQUARTERS

COUNCIL, 1948

President:
VICTOR M. DESMOND, G5VM.

Executive Vice-President: W. A. Scarr, M.A., G2WS.
Hon. Secretary: K. Morton Evans, O.B.E., G5KJ.
Hon. Treasurer: A. J. H. Watson, F.S.A.A., G2YD.
Hon. Editor: Arthur O. Milne, G2MI.
Immediate Past President: S. K. Lewer, B.Sc., G6LJ.

Members: I. D. Auchterlonie, G6OM, G. F. Bloomfield, Ph.D., A.R.I.C., G2NR, F. Charman, B.E.M., G6CJ, D. N. Corfield, D.L.C.(Hons.), A.M.I.E.E., G5CD, C. H. L. Edwards, A.M.I.E.E., G8TL, R. H. Hammans, G2IG, J. W. Mathews, G6LL.

General Secretary: John Clarricoats, G6CL.

G.P.O. Liaison Officer: Arthur E. Watts, G6UN

May Council Meeting

Resume of the Minutes of the Proceedings of a Meeting of the Council of the Incorporated Radio Society of Great Britain, held at New Ruskin House, Little Russell Street, London, W.C.1, on Tuesday, May 11, 1948, at 6 p.m.

Present.—The President (Mr. V. M. Desmond in the Chair), Messrs. Auchterlonie, Bloomfield, Charman, Corfield, Edwards, Evans, Hammans, Lewer, Mathews, Milne, Scarr, Watson, Watts, and John Clarricoats (General Secretary).

Amateur Radio Exhibition.
It was reported that provision would be made for a minimum of 26 and a maximum of 29 stands.
Resolved that:
(*a*) A copy of the exhibition catalogue be sent free of charge to each member.
(*b*) No charge be made for admission to those who present a catalogue at the door.
(*c*) The official opening take place at 2.30 p.m., on Wednesday, November 17.
(*d*) The Exhibition be opened at 11 a.m. on the three following days and closed at 9 p.m. each evening.

Membership.
Resolved:
(*a*) To elect 160 Corporate members, 28 Associates and 6 Junior Associates.
Total elected 194.
(*b*) To grant Corporate membership to 10 Associates who had applied for transfer.

Visit to Eire and Northern Ireland.
The Secretary reported that the President had accompanied him on a four days visit to Eire and Northern Ireland, and that during their stay they had discussed matters of mutual interest with the Executive members of the I.R.T.S., and with the Society's representatives in Region 15. The visit had been marked by a display of warm hospitality. The I.R.T.S. hope to organise a Convention in October.

Finance.
Resolved to accept and adopt the Balance Sheet for the quarter ended March 31, 1948, and the Cash Account for the month of April, 1948.

5 Metre Contest (1st Section).
Resolved to award a Miniature Trophy to the leading station (Mr. E. J. Williams, G2XC) in the above contest, and to award Certificates of Merit to the runners-up (Messrs. W. James, G6XM, and G. W. J. Haydon, G3BLP).

Stockholm C.C.I.R.
Following the receipt of a letter from Mr. K. B. Warner confirming that it is not the intention of the A.R.R.L. to send Representatives to attend the forthcoming C.C.I.R. meeting in Stockholm, and in view of the fact that, as far as can be ascertained, no items directly affecting amateurs are to be discussed, it was resolved not to appoint Society Representatives to attend.

Television Interference.
It was reported that steps are being taken to discuss with the G.P.O. matters of policy relating to interference with Television caused by amateur transmissions.

Technical Booklets.
Resolved to place an order for a further printing of 10,000 copies of the booklet *Service Valve Equivalents.*
Resolved to record the warm thanks of the Council to Messrs. D. N. Corfield and P. F. Cundy, co-authors of *Valve Technique.*
The Meeting terminated at 9.15 p.m.

Slow Morse Transmissions

Mondays	20.00 B.S.T., 1900 kc/s.	G2AJU (Stowmarket)
Mondays	20.00 B.S.T., 1800 kc/s.	G2DJS (Bradford)
Tuesdays	22.00 B.S.T., 1896 kc/s.	G8TL (Ilford)
Tuesdays	23.00 B.S.T., 1820 kc/s.	GM4AN (Kirkcaldy)
Thursdays	22.30 B.S.T., 1803 kc/s.	G3OB (Manchester)
Fridays	20.00 B.S.T., 1900 kc/s.	G2AJU (Stowmarket)
Fridays	20.30 B.S.T., 1835 kc/s.	G8LZ (Gravesend)
Fridays	23.00 B.S.T., 1820 kc/s.	GM4AN (Kirkcaldy)

Volunteers for this service are still required as it is desired to cover the whole country. The service is of particular importance to members living in remote areas. Details to Mr. C. H. L. Edwards, G8TL, 10 Chepstow Crescent, Newbury Park, Ilford, Essex.

Representation

The following are additions and amendments to the list of Town, County and Regional Representatives published as a Supplement to the February issue.

Regional Representative

Region 12.
J. Douglas, GM2CAS, 223 Abbotswell Road, Aberdeen.

County Representative

Region 3.
Staffordshire .. J. M. Foggo's address is now:—"Rockville," Cherry Orchard, Lichfield. Phone 2052.

Town Representative

Stoke-on-Trent .. D. Poole, G3AQW, 13 Oldfield Avenue, Norton-le-Moore.

* * *

Apropos the list of Town Representatives published in the June issue, Mr. W. G. Hoperoft, GM4AN, T.R. for Kirkcaldy, advises us that his address is 141 St. Clair Street, Sinclairtown, Kirkcaldy.

Ballot

Mr. T. Martin, G2LB, 3 Gladys Road, South Yardley, Birmingham 25, and Mr. J. N. Walker, G5JU, 333 Rednal Road, Northfield, Birmingham 31, having been nominated for the office of Warwickshire County Representative, a Ballot becomes necessary. Corporate Members resident in Warwickshire are invited to record their vote in favour of one of the above candidates, and to forward same on a *postcard* addressed to the General Secretary by not later than July 31 next.

Ballot Result

Mr. J. F. Squires, M.B.E., G2DBF, has been elected T.R. for Bournemouth. Result of ballot:—Mr. Squires, 11 votes; Mr. Kay, 10 votes.

Mr. Squires also received two votes from members resident in Ferndown, Dorset, and one from a member resident in Wimborne, Dorset.

Vacancies

Mr. H. J. Sherry, G6JK, having tendered his resignation, for personal reasons, from the office of Region 6 Representative, a vacancy now exists.

Corporate Members resident in Region 6 are invited to submit nominations in accordance with the instructions given in the Circular issued with the September, 1947, issue of the BULLETIN. Each such nomination must be signed by five Corporate Members.

Closing date for nominations July 31, 1948.

* * *

In recording their acceptance of Mr. Sherry's resignation the Council wish to place on record their warm appreciation of his past services as Regional Representative.

* * *

Mr. H. Beadle, G8UO, having resigned as County Representative for Yorkshire (West), a vacancy for that office now exists. Corporate members resident in the above area are invited to submit a nomination by not later than July 31st next.

* * *

Mr. Bert Adams, G5AD, having resigned as West Lancashire County Representative, a vacancy for that office now exists. Corporate Members residing in West Lancashire are invited to submit a nomination in accordance with the instructions given in the Members' Circular published with the September, 1947, issue of the BULLETIN. Closing date for nominations is July 31, 1948.

* * *

Group Capt. H. W. Evens, G6CH, having resigned as T.R. for Southend-on-Sea, a vacancy for that office now exists. Corporate members resident in the Southend area are invited to submit a nomination by not later than July 31 next.

HIC ET UBIQUE

Rhyl and Bangor Meetings

TWO highly successful meetings were held last month in Region 11 (North Wales). The first, on Sunday, June 20, was honoured by the presence of Mr. W. A. Scarr, M.A. (G2WS), Executive Vice-President, Mr. R. H. Hammans (G2IG), and Mr. John Clarricoats (G6CL), General Secretary. During the business meeting, which followed an excellent lunch, the Chair was taken by Mr. Scarr, who was introduced by the Regional Representative, Mr. Fergus Southworth, GW2CCU. Mr. Scarr spoke of the work of the newly-formed Scientific Observations Groups, and of the preparation being made for the opening up of new V.H.F. bands.

The General Secretary then delivered a much appreciated address on a wide range of topics, including an account of the work done by Society representatives at the Atlantic City Conference. Mr. Hammans spoke on television interference problems and outlined some aspects of the Society's technical publications programme.

Rhyl Meeting, June 20th, 1948
Front Row: GW5FU, GW2CCU, G2WS, G6CL, G2IG

The addresses were recorded on discs by Mr. Eric Foulkes, GW5FU (C.R. for Flint and Denbighshire), who was warmly thanked for organising the meeting.

Due to Sunday transport difficulties between the Caernarvonshire-Anglesey area and Rhyl, arrangements were made to hold an informal dinner-meeting in Bangor on Monday, June 21. On this occasion Headquarters was represented by Mr. Scarr and the General Secretary, both of whom addressed the meeting on Society matters. Thanks were offered to Mr. Ivor Jones, GW3KY (C.R. for Caernarvonshire and Anglesey), and to Mr. Jones, GW2DLK, for their work in organising the first fully representative R.S.G.B. meeting ever held in Caernarvonshire.

Considering the very scattered nature of the Region, an attendance of more than 30 per cent. of the total membership in North Wales was most satisfactory. The following were present at one or both of the meetings:—G2IG, WS, GW2CCU, CSX, DAH, DLK, DNJ, DYN, FVZ, HAQ, HJM, HIY, G3IR, GM3BUX, GW3GL, JI, KY, QN, YR, AMA, CGN, CYP, DGZ, DIX, G4JW, GW4CK, CX, MZ, OH, GW5FU, TC, UD, YB, G6CL, GW6OK; BRS10192, 11062, 12728, 14794, 14837, 15932, 16252, Chapman, Hughes, Burton, Andrews and Williams.

Thanks to the R.R. and Mr. Foulkes the Society's representatives were given an opportunity during the week-end of seeing a little of the North Wales countryside.

Spen Valley Radio and Television Society

Members recently enjoyed a most interesting visit (by permission of Chief Inspector Dewhurst) to the Patrol Car headquarters of the Bradford City Police. Under the direction of Sergt. Bradford (G3CQF) the party visited first the control room, where they heard traffic being exchanged with the mobile units. Passing to the operation room they examined the large map which indicated by means of coloured lights the positions of the patrol cars at any given time. The tour was concluded by the inspection of a patrol car and a demonstration from the mobile end.

The Society has recently appointed a new Secretary, Mr. W. C. Longman (G2DYY), of 16 Victoria Terrace, Cleckheaton.

Sutton & Cheam Radio Society

The above Society offer to loan to any other Affiliated Society 300 ft. of 16 mm. film taken during the recent N.F.D. Application should be made to Mr. F. J. Harris, BRS1820, 143 Collingwood Road, Sutton.

Can you help?

Mr. C. J. Oldrey, The Laws House, Turvey, Nr. Bedford, has an ex-A.M. Viewing Unit type 184A which he wishes to convert to an oscilloscope for monitoring purposes and as an L.F. oscilloscope. He is at present held up by lack of information about the transformers, tube base connections, etc.

Mr. A. Wormald, BRS.15751, Little Gavles End, Otley Road, Bramhope, Yorks., is anxious to obtain details of the American Synchroniser Unit BC-993-B, and also the circuit of the British Indicator Type 62.

Mr. H. W. A. Holloway, G2DGW, 105, Northfield Road, Waltham Cross, Herts., would appreciate details and connections of the transformers removed from a U.S. Army BC-375-E transmitter.

Mr. D. Hedderly, Associate, 7, Adelaide Crescent, Hove, requires information concerning the R.A.F. receiver type R1359, and the oscillator valve type E.1231.

Mr. D. R. Williams, BRS.12,558, 68 Yew Avenue, Yiewsley, Middx., would welcome any information on the Indicator Unit type 62A and details of modifications of this unit.

Mr. A. R. Yates, G3LB, 7 Skellbank, Ripon, Yorks., requires information concerning the VLS-492-AG-F 1½in. C. R. Tube, the Telefunken LS50, the CV1199 valves, and the Radar Test Set type 73.

Mr. J. N. Carter, BRS.6174, 1 Turret House, Austen Street, Hunstanton, seeks diagrams of the A.M. Unit Type 27 and the Indicator Unit 184.

Mr. H. Dalrymple, BRS.12,314, 151 Blackthorn Road, Bitterne, Southampton, would appreciate details of the 51Q-1 Collins receiver and the Coll 52245 transmitter, also manufactured by Collins Radio.

Mr. P. Ambler, BRS.976, 296 Leeds Road, Newton Hill, Wakefield, is in need of diagrams of the U.S. BC-458-A transmitter, the U.S. Naval Aircraft Receiver type CCT.46106, and the VHF Receiver type ABK, as used for I.F.F.

Mr. C. T. Fairchild, G3YY, 75 Holland Road, Brighton 7, Sussex, seeks details of the R.A.F. type 39 transmitter, type CV 15 valves, and also the American Indicator Unit ID-6A/APN-4.

Mr. W. J. Barton, BRS13279, 2 Hollens Court Cottages, Grasmere, Westmorland, wishes to know the I.F. of the R 103A receiver.

Mr. W. Gravett, BRS13884, 85 Seaforth Avenue, New Malden, Surrey, requires details of the BC-906-D frequency meter and the Admiralty Test Set 28.

Lt. J. Turner, MB9BG, 784 L of C Troops Workshops, British Troops in Austria, would appreciate information concerning the Hallicrafters SX25 (Super Defiant) receiver.

Mr. I. D. Bruce, BRS1416, 224 Clifton Road, Darlington, Co. Durham, requests information on the R.A.F. Indicator Unit type 184A.

Mr. W. Hartley, BERS.714, 1290 Malvern Road, Malvern, S.E.4, Victoria, Australia, seeks information and circuit diagram of BTH P.58 AP.53997B, 1945, 18-valve U.H.F. Receiver (290–650 Mc/s.) 240 volts A.C.

Offers

Mr. T. G. Ward, G2FKO, "Tormeen," Marytavy, Tavistock, Devon, has a limited number of photo-copies of the circuit diagram and the under-chassis location diagram for the B28 (CR100) receiver. These are available to members for the cost of the printing: 2s. the circuit and 8d. the location diagram.

South East London Technical College

South East London Technical College, Lewisham Way, London, S.E.4, require the services of a qualified instructor to take a first year course in Radio Theory and Practice for the City Guilds of London Institute P.M.G. Certificate. The class will meet each Friday from 6.45 p.m. to 9.15 p.m., commencing October 1 next. The salary is 25s. for the 2½ hour period.

Applications should be addressed to the Head of the Electrical Engineering Dept., and a reference made therein to the R.S.G.B.

WEST REGIONAL
— MEETING —
SUNDAY, JULY 18th, 1948
GRAND HOTEL ∴ ∴ ∴ BRISTOL

Assemble	1 p.m.
Luncheon	1.30 p.m.
Business Meeting	2.15 p.m.
Tea	4.30 p.m.
Station Visits	5.30 p.m.

Tickets (price 10/-) from the R.R., Mr. A. A. Uppington (G2BAR), or Local Representatives.

FORTHCOMING EVENTS

REGION 1

Accrington.—August 11, 7.30 p.m., Cambridge Street Schools.
Ashton.—August 1, 3 p.m., New Jerusalem Schools, Katherine Street.
Bolton.—August 3, 8 p.m., Y.M.C.A.
Burnley.—August 4, 7.30 p.m., Mechanics Institute, Manchester Road.
Bury.—August 12, 7.30 p.m., Atheneum, Market Street.
Darwen and Blackburn.—August 6, 7.30 p.m., Weavers' Institute, Darwen.
Liverpool.—August 21, 2.30 p.m., 29 Derby Lane, Old Swan.
Manchester.—August 9, 7.30 p.m., Reynolds Hall, College of Technology, Sackville Street.
Rochdale.—August 1, 3 p.m., Drill Hall, Baron Street.
Southport.—Second Wednesday, 38A Forest Road (Nr. St. Luke's Station).

REGION 2

Barnsley.—July 23, August 13, King George Hotel, Peel Street.
Bradford.—July 27, 7.30 p.m., Cambridge House, 66 Little Horton Lane.
Catterick.—Tuesdays, 7 p.m., S.T.C., H.Q. Block, Vimy Lines.
Doncaster.—Tuesdays and Wednesdays, 7.30 p.m., 73 Hexthorpe Road.
Harrogate.—Wednesdays, 7.30 p.m., Rear of 31 Park Parade.
Huddersfield.—July 25, Aug. 11, 7.30 p.m., Plough Hotel, Westgate.
Hull.—July 28, 7.30 p.m., Imperial Hotel, Paragon Street.
Leeds.—Fridays, 7 p.m., Swathmore Settlement, Woodhouse Square.
Middlesbrough.—July 19, August 16, 7.30 p.m., Cleveland Scientific and Technical Institute, Corporation Road.
Newcastle-on-Tyne.—July 26, 8 p.m., British Legion Rooms, 1 Jesmond Road.
Sheffield.—July 28, 8 p.m., "Dog and Partridge," Trippet Lane. Aug. 11, 8 p.m., Albreda Works, Lydgate Lane.
South Shields.—Fridays, 7.30 p.m., Trinity House, Laygate.
Spenborough.—July 21, August 4, August 18, 7.30 p.m., Temperance Hall, Cleckheaton.
Sunderland.—Wednesdays and Fridays, 7 p.m., Prospect House, Prospect Row.
York.—Wednesdays, 8 p.m., 29 Victor Street.

REGION 3

South Birmingham.—August 8, 10.30 a.m., Stirchley Institute.

REGION 5

Chelmsford.—August 3, 7.30 p.m., 184 Moulsham Street.

REGION 7

Barnet.—July 17, Bunny's Restaurant, 15 Station Road, New Barnet.
Chingford.—July 22, 7.45 p.m., G2FSR, 2 Parkhill Road. August 5, 7.45 p.m., G2CVO, 13 Mount Echo Drive.
Croydon R.C.C.—August 10, 7.30 p.m., "Blacksmiths Arms," South End.
Edgware.—July 21, 28, August 4, 11, 18, Orchard Cafe, Broadway, Mill Hill.
Enfield.—July 18, August 15, 3 p.m., A and B Cafe, Southbury Road (junction with Ladysmith Road).
Peckham.—August 9, 7.30 p.m., "The Kentish Drovers," Rye Lane.
Slough.—August 19, 7.30 p.m., Congregational Church Hall, Church Street (Filters, Part II by G2BWV).
Welwyn Garden City.—August 3rd, 8 p.m., Council Offices.

REGION 8

Southampton.—August 7, 7.30 p.m., 22 Anglesea Road, Shirley.

REGION 9

Bristol.—July 16, 7 p.m., Keen's Cafe, Park Row.
Exeter.—Second Saturday, Y.M.C.A., 41 St. David's Hill.
Plymouth.—Third Saturday, 7 p.m., Tothill Community Centre, Tothill Park, Knighton Road, St. Judes.

REGION 14

Glasgow.—June 30, 7 p.m., Institute of Engineers and Shipbuilders, 39 Elmbank Crescent.

Congrats

● To Corporal E. F. S. Pullen, R.A.F. (GM3BLD), of Burghead, Scotland, who has been awarded the British Empire Medal (Military Division).

● To F/Lt. P. Michael S. Hedgeland, G2DBA, who has been appointed a Member of the Order of the British Empire. This honour was given to him for his work on trials at the C.B.E., Marham.

● To Mr. J. F. Friend, BRS14798, and his wife, of Dover, on the birth of a son, Colin Leslie.

● To Mr. T. E. Povey, BRS10111, and his wife, on the safe arrival of a son.

E.D.R. Summer Camp

Information concerning the E.D.R. Annual Summer Camp to be held this year in Bornholm, Denmark, between July 25 and August 8, was received too late for inclusion in our last issue. Those who wish to take advantage of the invitation, extended by E.D.R. to attend the camp, should write to: Paul Heinemann, OZ4H, Box 79, Copenhagen K. The location of the camp is "Week-end Hytten," Balka Strand, Nexo, Bornholm.

MD5 Activities Suspended

The Communications Board Mid-East has advised all MD5 stations that owing to representations made by the Egyptian Government it has become necessary to suspend amateur activity in the Canal Zone. Licence holders have been informed that this action is of a temporary nature and that authority for a resumption of operation will be granted as soon as circumstances permit.

Meanwhile it has become apparent that QSL cards recently sent *via* Box 360, Cairo, have not reached their destination and all members are warned that this is no longer to be regarded as a reliable QSL address.

AC3SS

Mr. Henry Baker, VQ4HGB, ex-AC3SS, has received a batch of mail from amateurs who contacted AC3SS when Mr. R. Ford was operating that station. Mr. Baker has passed on their names to Mr. Ford but has not yet received a reply.

Although Mr. Baker was the original operator at AC3SS he was not there during the time Mr. Ford operated the station and consequently he cannot confirm contacts made after he left.

Mr. Baker is returning to England next month, having recently been active on 28 Mc/s. with an input of 3·2 watts from Nairobi.

Mr. W. J. Erich, W6AL, originator of and power behind the "Amateur Radio International Friendship" organisation, details of which appeared in our May issue. Nearly 1,000 parcels have already been despatched to Great Britain.

Congrats

● To Archie Brown, G2WQ, of Manchester, who was married on June 5 last to Miss Joan Wilkins, of Dalton on Tees. Archie is Hon. Treasurer of the Manchester and District Radio Society and a real "Old Timer." Dr. Harold Walls, G2DH, was best man.

● To Alan Bayliss, G8PD, and his wife, of Wembley, Middlesex, on the birth of a son, Ian John, on June 10, 1948.

OUR FRONT COVER

VALVE performance and reliability depend to a large extent upon meticulous care in production.

Our front cover picture is a good illustration of what this really means. The photograph was taken on an assembly line in one of the *Mullard* valve factories, and is a fine study of concentration and skill.

The operator is examining the alignment of the assembly before passing it on for pumping and sealing.

EXCHANGE AND MART SECTION

Due to paper restrictions advertisements are only accepted "for Insertion when space is available." No advertisement must exceed 50 words. Rates: Members Private Advertisements 2d. per word, minimum charge 3/-. Trade, 6d. per word, minimum charge 9/-. Use of Box number 1/6 extra. Send copy and payment to Parrs Advertising Ltd., 121 Kingsway, London, W.C.2.

AGENCIES. Eddystone Short Wave Radio invite applications for registered dealerships in areas not already covered. Applications solicited from expert, enthusiastic shortwave specialists at home and abroad.—STRATTON & Co., LTD., Alvechurch Road, West Heath, Birmingham, 31. [152

ALL equipment of G2WG (deceased) for sale. G.E.C. battery communication 6 valve receiver; McMichael portable, trickle chargers, clockwork turntable and pick-up, etc. QST 1931–36. BULLETINS 1931–40. *Wireless World* 1930–35. *Wireless Magazine* 1925–33, and others, all at Hutton, Essex. Full details from G6CT, 23 Eastwood Boulevard, Westcliff-on-Sea. [123

ALL new items. 6V6G 5s. 6d.; 6K7 6s.; 6R7 4s.; 6SH7 4s. 6d.; 6SR7 4s.; ATP4 3s. 6d.; 2½ in. moving coil meters. 0–30 mA, 5s. 6d.; 0–5A R.F. 5s.; 5 in. P.M. Speakers 15s. with trans. Mail order only.—OMEGA RADIO SALES, 107 Rolleston Drive, Nottingham. [46

ALL-WORLD Two, Eddystone Receiver in metal case, plus box of coils and valves. For mains operation. No power pack. Best offer—G4MM, JACK MILLER, 51 Toothill Road, Loughborough, Leicestershire. [131

A.R.77 R.C.A. in good condition, with spare set valves, 40 gns. Also T.R.1155 fully converted, reconditioned cabinet, 15 gns. —Box 120, PARRS, 121 Kingsway, London, W.C.2. [120

AR88D. Inside information. Fully detailed alignment instructions covering calibration. IF alignment, RF alignment. With measurement methods and figures and modification details for super performance. 10s. 6d.—W. K. MILLER, 94 Hilton Lane, Little Hulton, Nr. Bolton, Lancashire. [161

AUTOMATIC Record Player, Garrard, excellent condition, £15. Valves unused, 6D6, 6C6, 6K7G, 6J7G, X65, VP23, PM2BA, U14, 7s. 6d. Wanted SX28 or AR88D.—WILLETTS, Bishop Sutton, Nr. Bristol. [115

AVOMETER 40, complete leather case, as new £12. Rotary converter, 24v. I/P, 230 v. ·87A O/P, £5. Valves new, boxed; FC4, EBL1, 15s.; TH41, DK32, 12s. 6d.; DAC32, 10s.; 6AG5, 5Z4, 7s. 6d.; others. Stamp, list.—BRS9139, 29 Queen Street, King's Lynn. [108

BC348 Fully Modified A. C. Mains. S. meter, noise limiter, good condition, manual, first £25 secures.—G3ANK, 135 Station Road, Sidcup, Kent. [117

BC348–Q Receiver, modified with internal power pack. Range, 200–500 kc/s., 1·5 to 18 Mc/s. Crystal filter. Offers, around £25 to CATTELL, Howard Hall, Stone, Staffs. [119

BC640A Bendex VHF transmitter (100 to 155 Mc/s. at present modified for 28 Mc/s.). This transmitter is complete with receiver Type BC639A and frequency meter BC638A. Complete with power packs, etc. A superb American outfit. What offers? —MORTIMER, Dore, Sheffield. [159

BRS, QRT, H.R.O. Senior, 30 Mc/s., 50 kc/s., 9 coils in case—10 in. Speaker—pack, 500v, 100mA. Separate 6v transformer, also suitable QRP transmitter; super performance; near London; £50, offers. Brown's adjustable Reed phones 30s.—Box 91, PARRS, 121 Kingsway, London, W.C.2. [91

B.50 Naval Communications Receiver, working order, 13–550 m. Complete with 7 valves, £9 10s. 0d., or offers.—SHARPES, "Nasha Doma," Snowdon Street, Barnton, Northwich, Cheshire.

CATHODE Ray tubes VCR97's, 30s. each. Also E.H.T. Transformer for above, £3. Wanted.—SX28 Receiver in good condition.—G3BWS, 125 Nelson Road, Gillingham, Kent. [93

COLLINS 200 kc/s. Osc. and I.C.W. unit, £3 10s. 0d. Collins two stage speech amp, mod. transformer, two 811's, one 813, £12. Eimac 35T's new, £2 each. CR100 "S" meter and 88 noise limiter, £31. EF50's and 54's new, 3s.—94 Halfway Road, Sheerness. [111

COMPONENTS.—BRS12644 selling gear for space. Quantity valves, speakers, components, chassis. Mostly new, some slightly used, all cheap. Enquiries answered, S.A.E.—HUDSON, 3B Winner Street, Paignton, Devon. [86

CONVERTED 1155 Receiver, output stage and new panel and controls fitted ready for speaker and power supply. Good condition £9, carriage free. Cash with order.—75 Fowler Street, Derby. [167

CRYSTALS.—QCC 100 Kc. 25s., RCA 500 Kc 20s. Brookes 7013, 7112, 7028, 17s. 6d., QCC 7141, 7245, 7149, 1734, 1795, 1800, 1805, 10s. each. Reslo moving coil mike £3. Browns Type A phones 35s. TZ40 valves (pair) £2. Mod. transformer p.p. 807 to p.p. 807 £2. Triplett 666H multi-range meter £5.—Box 52, PARRS, 121 Kingsway, London, W.C.2. [52

CR100 Communications Receiver, 60 kc/s.–30 Mc/s. All grey with matched speaker, A.N.L. "S" meter, spare set valves, instruction manual, excellent condition, £40.—DAIEH, 302 Bitterne Road, Southampton. [113

EDDYSTONE 358 coils, types A, C, D, E, F, H, I, 15s. each; R1155 £7. Valves: 808, 17s. 6d.; 866 12s. 6d.; 6SG7, EF50, EF54, 4s. 6d.; Meters 4s. 6d. each; F.s.d. 15v, 40v, 100mA, 500mA, Thermocouple 8A, 5A, ·35A (2). Chokes: 5H, 200mA, 12s.; 10H, 500mA, 15s.; 10H, 650mA, 17s. 6d.; 5 Mc/s. crystal, 10s.; Aerial relay, 2 pole change over 15s.—Box 84, PARRS, 121 Kingsway, London, W.C.2. [84

EX-U.S. Govt. Amplifiers. Brand new, by R.C.A. 190–250v. A.C. input, 15 watt P.P. 6L6 negative feedback output. 7-valve. For m/c microphone input. In brown crackle enamel cases, £13 10s. 0d.—WESTON, Harman's Cross, Corfe Castle, Wareham, Dorset. [80

ELECTROLYTICS. Small Cans 8 uF, 2s; 16 uF, 3s. 1d.; 16–16 uF, 4s. 3d., 350V. W., ·1 tubular 500 V.W., 5d. International Octal valve-holders, 3½d. 10uF 1,000 V.W. paper, metal case, 7s. 6d. (ex G.P.O.) S.W. Tuning condensers, 50 pF ceramic insulation, ¼ inch shaft, 1s. 6d. Orders over 10s. post free.—G. A. TAYLOR, 125 Manchester Road, Denton, Manchester.

EDDYSTONE 504. Beautiful condition, 500 kc/s. to 30,000 kc/s. Optional speaker accessories, manuel, etc. First reasonable offer accepted.—I. PENROSE, 27 Causewayhead, Penzance, Cornwall. [168

ELECTRICAL measuring instruments skilfully repaired and recalibrated.—ELECTRICAL INSTRUMENT REPAIR SERVICE, 329 Kilburn Lane, London, W.9. Tel.: Lad. 4168. [89

EXCHANGE.—R1155 and modified 38 A.F.V. for complete R107 or BC 312 or offers.—G2HNA, Thorneyfields Cottage, Stafford. [140

FOR SALE.—All major components for 1250v 300mA and 425v 250mA power packs. Transformers by Woden and unused. £12 and £4 respectively. Avo Model 7 unused £16 10s. 0d. Details.—Box 79, PARRS, 121 Kingsway, London, W.C.2. [79

FOR SALE.—Cossor D.B. 339 Oscillograph. Offers or would exchange for Eddystone 358 with cash adjustment.—Box 146, PARRS, 121 Kingsway, London, W.C.2. [146

FOR SALE.—Cossor type 3232 CR Tube, with H.T. and L.T. transformers, smoothing condensers, mains rheostat, H.T. Rectifier and spare CR Tube, £6 10s. 0d.—BRS16443, 11 Eastway, Morden. LIB. 6749. [87

FOR Sale: Hallicrafter S.19 "Sky Buddy," £15, also Trophy 2–stage preselector (EF8's), £8. 200–250 V.A.C. in perfect condition. Details—B.R.S.5140, 4 Haig Place, Braunstone, Leicester. Phone: 34312. [124

FOR SALE.—National HRO perfect, complete with speaker and handbook. Offers £30.—Box 151, PARRS, 121 Kingsway, London, W.C.2. [151

FOR SALE.—National H.R.O. short wave receiver, separate input power unit. 4 coils 1·7 to 30 Mc/s. Extras: 2 sets headphones; 1 input Pye transformer; 1 portable folding aerial; 2 spare valves. Perfect working condition. Price £65.—G. W. HUSBAND, Iolaire, Bassett Close, Bassett, Southampton.

FOR SALE.—One E.D.C. convertor. D.C. to A.C 82 amp 220–220 volts, £10.—J. LAWTON, Woodleigh, Lower Dolcliff Road, Mexborough, Yorks. [100

FOR SALE.—Transmitter, Model T.1154. Brand new, boxed. Price wanted £15.—P. W. T. CRAIG, 12 Chatelherault Avenue, Cambuslang, Near Glasgow. [81

FOR SALE.—Type 3/II Receiver, 3·1 – 15·5 megacycles, complete in case with power pack and phones, £8. D.C. Avominor in case £2.—TEYCHENNE, 37 Greenwood Drive, Kingswood, Watford, Herts. [164

FOR SALE—25 watt Modulator 76.6A6. 6A6 Class B output transformer tapped 8,000 ohms and 5,000 ohms, £5.— G8LY, Restawhile, Clanwilliam Road, Lee-on-Solent, Hants. Tel. 79547.

GROUNDED Grid U.H.F. triodes 3A/146J (CV53). unused, 15s. each; Crystal valves, 3s. 6d. each.—Box 102, PARRS, 121 Kingsway, London, W.C.2. [102

G6JA temporary QRT, has for sale transmitters, receivers, transformers, condensers, crystals, valves, relays, aerial cable, etc. S.A.E. please for lists.—46 Bellevue Road, West Cross, Swansea. [85

G6MN for all print. QSL's and Log Books; state G or BRS. Samples from Bridge Street, Worksop. [160

HALLICRAFTER Sky Buddy; power pack needs attention, otherwise good order. Best offer over £5.—G2SA, Burnham-on-Crouch, Essex. [157

HALLICRAFTER Sky Champion Model S2OR. 6·8–550 metres. Fine condition, £25.—HODGKINS, 43 Hawthorn Avenue, Bury, Lancs. [170

HAMMARLUND Super pro SP200, R.M.E.69, and Hallicrafter, Skyrider "5–10." Complete and condition good. Nearest offers to £65, £35 and £22 respectively.—BRS7982, 9 Kingsway East, Newcastle, Staffs. [165

HAM-AID QSL's.—A fitting climax to good QSO's.—Samples no (BRS) from: G6XT, 47 Watson Street, Morley, Leeds.

H & B Multavi voltage and current meter, with mirrored scale. In attractive black bakelite, dust proof case. Ranges ·003, ·03, ·3, 3, 15 amps; 0 ·3, 3 30, 300 volts, £5, or best offer. —Box 103, PARRS, 121 Kingsway, London, W.C.2. [103]

H.R.O. Coils wanted. State details and price.—WARBURTON, 17 The Close, Treneere Estate, Penzance, Cornwall. [129

H.R.O. Coil 480–960 kc/s., perfect working order. Exchange for 900–2050 kc/s. coil.—G8WF, 12 First Avenue, Royston, Yorkshire. [77

HRO Senior 4 HF Coils, good condition, £33. Power pack £5 extra.—DRISCOLL, Montazah, St. Charles Road, Brentwood, Essex. [126

MARCONI CR 100, with noise limiter, condition new including valves, genuine receiver; no reasonable offer refused. Purchaser pays carriage—G3AZO, 56 Gifford Terrace Road, Plymouth. [144

NATIONAL 1–10 Receiver, complete with coils and power pack, £16. Unused, new, type 37 mains driven calibrated oscillator 20–70MC suitable V.F.O. or Transmitter, 10-watt output, £10 10s. Unused, ex U.S. Army, BC.614E speech amplifier, complete with valves and meter for BC610 transmitter, £6 10s.—B.R.S. 2,563, 85 Elm Road, Evesham. [132

NATIONAL 1–10 Receiver for sale, less power supply; spare Valves £8.—G2AHP, 90 Rydal Crescent, Perivale, Middlesex.

NEW Crystal Rectifier Test Set, U.S. Navy model TS–268/U, complete with spares and instruction book. Offers to—Box 143, PARRS 121 Kingsway, London, W.C.2. [143

NEW 4 uF 1,500 V.W. (TCC), 6s. 6d. each; U.M. 2, £3. Eddystone 640 £39 10s.—R. T. R., 78 Eyre Place, Edinburgh. [118

NEW Valves, 1625(2), 4074A, 807, 1631(2), 7s. 6d. each; 3Q5GT, 6SG7(2), 12SQ7, 12Q7, 6SA7(2), 6SF7, 7Q7, 6F6(2), 6N7, KTW63, CV6(4), EB34(4), RX235, AU5, 5U4, 6J7, AZ31(2), SP61(4), 6J5GT, 5s. each, £7 the lot.—RAWSTON, 30 Kirkley Gardens, Lowestoft. [118

NEW 6V6, 5UG, 6s. 6d.; 6B8G, 9D2, 5s.; PT15, £1; 872, 30s. New Avo Universal, £5. 220 D.C. motor 1/3 H.P. and 1,500v./150 ma generator, 35s. carriage. Transformer 220 input secondaries 3 × 2·5v. at 5 amps 1 × 2·5v. at 15 amps, 35s. Crystals in holders, 3,885, 4,035, 4,397, 4,840, 4,950, 5,295, 5s.—43 Baghdad Road, Bulford, Wilts. [122

NO reasonable offer refused. Highest offer secures B2 Transmitter/Receiver complete; B2 receiver only; B2 Transmitter only; A3 Transmitter/Receiver complete, faulty on receiver; National NC-44 A.C./D.C. commns. Receiver complete with speaker and spare valves; Army 12-set 40 watt transmitter complete; Philips D.C. to A.C. reed converter.—INGRAM, 46 Upper Richmond Road, S.W.14. [94

OSCILLSCOPE 2½" green, two amps, gas time base £10. R1155A, 6V6 output, excellent condition, £12. Pair unused Elmac 35T's, £3. Pair LS50's, £2.—BRS13,069, 10 Elms Drive, Kirkella, Hull, E. Yorks. [137

PATENTS and Trade Marks. Handbooks and advice free.—KING'S PATENT AGENCY, LTD. (B. T. KING, G5TA, Mem. R.S.G.B. Reg. Pat. Agent), 146A Queen Victoria Street, London, E.C.4. Phone: City 6161. 50 years' refs.

PRE-WAR kit partly built for two valve 5 meter battery transceiver, all new with circuit, instructions and valves. Offers or exchanges around £4 15s. 0d. Also clean BULLETINS, complete from May, 1943. Offers.—LUCAS, "Durbeyfield," West Bay, Bridport. Phone: Bridport 622. [97

QSL Cards.—Distinctive and attractive designs.—Samples and prices from: G5KT, 33 Howard Road, Westbury Park, Bristol, 6. [951

QSL's and Logs by Minerva. Always new and attractive designs. Samples from MINERVA PRESS, Elm Park, Romford, Essex. [153

Q5R9 Rotary Beams. We are your leading specialists for beams, 20 to 2½ metres motor units, direction indicators, masts, chimney clamps, the complete outfit. Good delivery. S.A.E. and 2½d. stamp for list.—E.M.D.O., LTD., Ace Works, Staines. [147

R.A.F. Officer (ex-D2SP and 'phone enthusiast) now working Whitehall, desires single accommodation (not lunch) with homely London amateur family. Away week-ends.—PHILLIPS, 32 Barkston Gardens, Earls Court, S.W.5. [145

RECEIVERS for sale. H.R.O. National receiver, no power pack, realigned; AR77 realigned; B.C.348 converted for A.C., also National R.B.J.4 rack, mounted, 9 coils; is brand new and in mint condition. All these sets are in perfect condition and open to any examination; offers invited.—C. J. SMITH, 82 Framingham Road, Sale, Cheshire. G3BMF. [88

REWINDS and specials. Mains, intervalve, output and modulation transformers manufactured to your specification. Compact transformer for B.C.348, 26v. Fils, no alteration to wiring, 36s. Choke to match, 10s. 6d. 2·5 MH 120 m/A; RF chokes, 1s. 6d. Trade enquiries invited.—G6VS, Carlton Coilwinding Co., 8 Church Road, Birkenhead. [109

R1155 for Sale. Converted; with full bandspread on 20 metres and 6F6 output stage. Separate power pack, £16 10s. or offers.—Box 149 PARRS, 121 Kingsway, London, W.C.2.

SALE.—As new, homebuilt 4 valve battery receiver, all Eddystone components, 9-200 metres, parts cost £15, reasonable offer. 5 metre converter using 3 SP61's, black crackle panel and Muirhead S.M.D. £3. Wheatstone bridge, 0–210 ohms, brand new, 35s. 1-V-2 battery receiver, 11-200 metres, without cabinet, £4 10s. 0d.—Tiev-Tara, Hilltop Road, Herne Bay, Kent. [82

SALE.—H.R.O. Receiver (Senior) in excellent condition, complete with full set of coils, power unit, crystal gate, new set of valves, etc., £40. Also—complete phone—C.W. 80 metre transmitter, 40–50W. input. V.F.O. control two rack assembly, black-crackle finish, £30.—G3DAN, 1 Whiteley Place, Altrincham, Cheshire. [158

SALE.—Huge purchase of ex-R.A.F. surplus Radio receivers and transmitters, power units, converters, block-out units, modulators and amplifier, etc., etc. Viewing units, brand new by well-known makers, £4 12s. 6d. Send S.A.E. for complete list. All at Bargain Prices.—L. GLASSCOCK, Radio Shop, Bridge Street, Downham Market. Phone: 3328. [107

SALE.—New design Cathode follower V.F.O. 3–4 Mc crystal stability and keying, with valves and combined power pack, only £7 15s. 0d. each. L.T. transformer 0–5. 6·3, 7·5, 10V at 8a, 0–5 6·3, 7·5V at 4a, 230V 50cy., 39s. 6d. New valves, T20, 816, 17s. 6d. each.—G3LB, Ripon Yorks. [155

SALE or Exchange.—Hallicrafters SX24, good condition. Wanted miniature camera.—ANDREWS, 175 Moorland Road, Weston-super-Mare. [163

SALE.—12V Communications Receiver—first-class appearance, Ham bands only. Bandspread 3½ in. on 20. 1RF–LO mixer, crystal filter. 2IF—BFO—separate AVC—Noise silencer, etc. £13 or offer. Correspondence course C and G grade 1 and 2 radio comm. including mathematics to calculus standard. Complete £3.—G2DJS, 287 Poplar Grove, Gt. Horton Bradford. [156

SELLING cheap—American and British valves—6SK7, 12SK7, 12A6, and many other receiver types, 4s. each. Also 807 (2) 8s. each.—STENT, 39 Fordwich Hill, Hertford. [179

SMASHED 813? Dropped meter? Mast injured neighbour or damaged own house during raising or lowering? Shack burgled? Fire? Insure against all risks for annual 10s. per £100 of gear.—P.C. to R. F. ARMSTRONG, G2HDX, Midland Bank Buildings, Castle Square, Swansea. [114

SKY Champion S20, new valves, fitted "S" meter, very good condition £25 or nearest. Also E.F.50 pre-selector £1 10s. 0d. S.A.E. lists.—ALDRIDGE, "Asprillis," New Road, Amersham. [83

SALE or Exchange.—B2 Transmitter-Receiver with power pack, coils, key, phones, perfect order. Ready for use, £15, or offer. Or a communication receiver.—HOUSEMAN, 11 Snowdon Street, Barnton, Northwich, Cheshire. [76

SALE.—3 used 807's 22s. 6d. (tested perfect). 1946 A.R.R.L. Handbook 6s. Official Mazda loose leaf valve data book 5s. D.C. Avominor £3.—BRS8464, 85, Bryanston Road, Bitterne, Southampton. [78

"S"-Meters. Moving coil, 2¼ in. external square flange (2¼ in. round fitting). Two types, backward or forward, indicating (for bridge circuit). Scales 0 to 9 and plus Db. 17s. 6d. with circuit.—G3BK, 28 Regent Avenue, March, Cambs. [110

STEEL Cabinets, khaki crackle 16½ × 6½ × 9½ deep inside, screw tapped for 17"–19" panel, suitable desk or rack, 7s. 6d. each, carriage 1s.—GELL, Redhill Road, Arnold, Nottingham.

TRANSFORMERS and chokes, all types, mains, inter-valve, modulation, etc., re-wound to your own specification. Best quality materials, first-class workmanship. All our rewinds subject to 24-hour under-water test. Prompt delivery—STUDLEY RADIO, LTD., 41 Alcester Road, Studley, Warks. Works at Bull's Head Yard, Alcester. Telephone 212. [138

TRANSMITTERS and power packs for sale, TX1154 H and B types, picked specimens, complete with valves, few only left, at £6 17s. 6d., carriage extra.—D. M. R. LTD., 27 Bath Road, Walsall. [162

TYPE 12 Transmitter, 40 watts C.W., 25 phone. Crystal or V.F.O. voltage stabilised. Break-in keying, push to talk phone. 200–250 A.C. input 20, 40, 80, 160. Perfect working order. Converts easily to 150 watts, £30 or exchange.—STIRLING, 137 Glasgow Street, Ardrossan, Ayrshire. [116

T1154.—All components, including click stops, coils, condensers, resistors, etc. B.C.458 transmitter. Aerial loading coil. with taps to ceramic switches. Prices reasonable. Send S.A.E. for full list.—AMBLER, 296 Leeds Road, Newton Hill, Wakefield.

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