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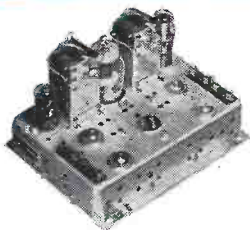
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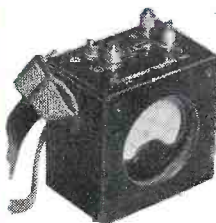
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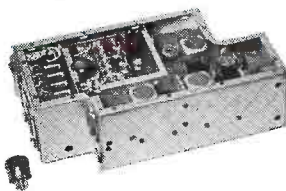
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However, it was noticed that all reports still mentioned severe distortion during carrier fades and difficulty in reading the signal, when carrier level was low during poor conditions. All DX stations worked also reported that the *audio level* of the FM signal was not very great, which, of course, is to be expected, as the carrier remains at constant amplitude with FM.

This comparison between FM and AM audio levels started the writer along a new train of thought. Why not combine both the FM and AM in the correct proportion and gain the advantages of both systems?

The idea seemed so full of possibilities that it is surprising it has apparently not been tried before—one rather guessed there might be some technical difficulties in putting the theory into practice!

Referring now to the diagram (Fig. 1) it will be seen that a 6L6 is used as a frequency doubler on 7 mc and it will be obvious that FM variations are present in the anode circuit of this valve. It was decided to insert the AM at this point and thus isolate the AM from the ECO stage.

As will be seen from the circuit, an orthodox three-stage amplifier working from a common microphone input is used to anode and screen modulate the 7 mc output stage of the exciter.

Extended tests were made with the combined FM and AM systems and after some adjustments the final results were excellent.

It should be pointed out at this stage that the exciter should be considered definitely as a FM exciter, and at all times the FM output must be the main component. The AM is added purely to increase the apparent audio

level of the signal, to give a slight centre carrier and to improve readability of the FM signal when received under adverse conditions.

The addition of the AM means that a very much smaller FM deviation can be used, with a further improvement in the signal accepted by a normal AM receiver.

It is also interesting to note that the addition of the AM does not in any way affect the FM signal when received on a special FM receiver, as the limiter circuits will not respond to the superimposed AM.

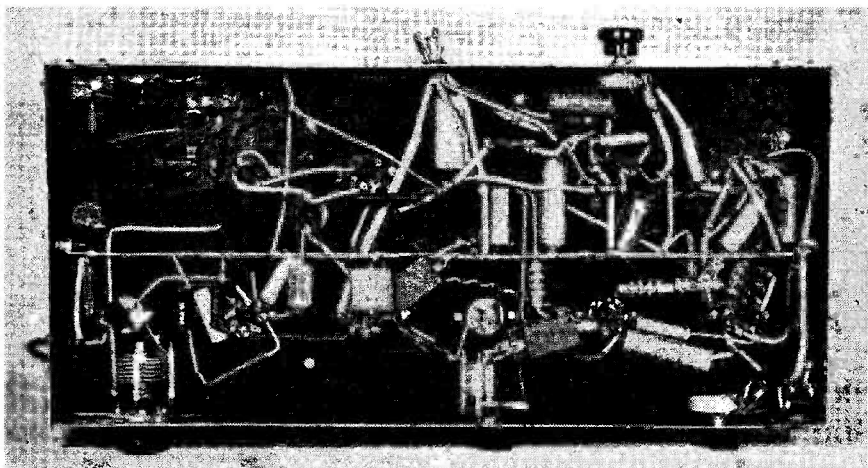
The microphone used for all the tests was a D.104 crystal type, and since a single stage of audio is used for the FM, and a three-stage RC coupled amplifier for AM, the audio output is remarkably free from distortion. This was confirmed in that better reports of quality were received when using FM than on AM with the usual Class-B modulator.

Interference

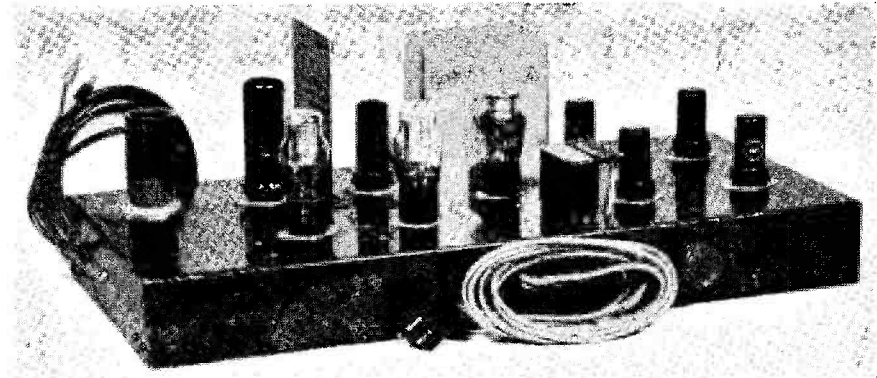
The next point was the thorny problem of BCI! As was expected, the use of FM completely eliminated all traces of local breakthrough on broadcast receivers. The amount of AM obtained even with maximum setting of the AM gain control in the exciter was so small (about 5 per cent.) that this did not in any way upset the advantages of the FM signal from the point of view of BCI or even TVI.

Construction of the Exciter

The unit was built on a chassis measuring 22 in. × 10 in. × 2½ in., of 16 SWG aluminium. This may seem a rather large chassis



Underneath the G3SN FM/AM Exciter.



General view of G3SN's FM/AM Exciter Unit. All details are given in the accompanying text.

but did enable a well-spaced layout to be obtained with corresponding stability and freedom from interaction between the various stages of the complete exciter.

The heavy bus-bar shown in the under-chassis view is quite important and does help towards the stability of unit. In the list of component values some are indicated as close tolerance, and these components have a direct effect on the degree of *symmetrical* frequency variations either side of the mean carrier frequency.

The grid condenser C12 is a silvered mica component for high stability. One of the most important factors in the stability of the ECO was the 3.5 mc grid coil L1. The original coil was wound on a standard ribbed former, and to get a good tension on the wire it is advisable to attach one end of the wire to a vice and wind on the required turns as tightly as possible. The grid coil was completely screened which prevented possible RF pick-up or "hand capacity" from the operator.

It will be noticed from the circuit values that only a 1,000-ohm resistor was used for R18, feeding the neon tubes V7 and V8. Although this was a lower value than usually recommended it did give sufficient control and actually it was the screen volts which had most effect on operation. It is rather interesting to note that the addition of the stabiliser in the anode circuit of the ECO cured a rather persistent AC ripple which was noticed during the early experiments with the FM exciter. Here again it will be appreciated that the slightest AC ripple in the exciter will be amplified by the doublers in the main transmitter. Incidentally, all power supply leads are run in screened cable as a precaution against AC or RF pick-up.

Referring again to Fig. 1, it will be noticed

that the FM deviation control VR1, and the AM gain control VR2, have been so placed in the circuit that they work quite independently of each other, which is a necessary condition when adjusting the controls for correct proportion of FM and AM.

Due to the use of an output stage actually built into the exciter, it is quite in order to place the unit some distance from the main transmitter. The writer used 14 ft. of co-axial cable with no apparent effect on the working of the FM installation.

All-metal valves were used in the exciter, but there is no reason why equivalent glass types should not be employed. The Class-B driver transformer was found to give a good match, and the low resistance secondary was of ample rating to carry the 6L6 anode current.

As there may be some criticism of the theory of operation of this FM/AM exciter, it would perhaps be of interest to mention the methods used for checking final performance.

Final Tests

All tests on the completed FM/AM exciter were carried out by means of an accurately calibrated audio oscillator in conjunction with a cathode-ray oscilloscope equipped with a time-base. The results of these tests indicated quite definitely that there was no sign of phase-shift or time-lag between the FM and AM impulses, and certainly no distortion in the output.

It was found, however, during these tests that

COIL WINDING DATA

- L1 = 22 turns of 20 SWG. enamelled wire, wound on standard 1½-in. ribbed former.
Cathode Tap at 7½ turns from earthed end of coil.
- L2 = 22½ turns of 22 SWG. enamelled wire wound on standard 1½-in. ribbed former.

the AM gain control, VR2, should not be advanced too far, and it must be stressed again that since the exciter is specifically designed for FM, only just sufficient AM should be used to improve the audio level and the readability of the FM signal during severe variations in received carrier level.

Operation

To put the exciter into operation, the following points should be carefully noted :

First, calibrate VC1 scale to show the 28 mc-30 mc band limits, then set the ECO to any

desired frequency, checking in the usual way with a good frequency meter.

For the initial setting-up of the various controls of the exciter, the station receiver must be used to monitor the signal, and it will be necessary to work with headphones to prevent acoustic feed-back.

By means of an RF loop tune VC2 to give maximum RF output from coil L2, and also, of course, maximum drive into the main transmitter ; make a note of the setting of VC2.

Next, increase the deviation control VR1 to a midway position, which will be about correct using a crystal microphone.

Tune in the FM signal on the monitor receiver switched to the 28 mc band, and it will be found that with the AM control, VR2, at *minimum*, there will be a zero point in the centre of the carrier with audio quite clear in each side-band.

Then slowly increase the AM gain control, VR2, when a point will be reached where the audio in the side-bands "moves more into the centre of the carrier" and the quality of the speech improves, with a corresponding increase in the audio level of the signal.

With the original exciter the deviation control, VR1, was set to 50 deg. on a 0-100 deg. scale and the AM gain control, VR2, was then at about one-third up from minimum. Final adjustment, still monitoring the signal, is slightly to detune VC2 from the previous setting, which gives a further improvement to the signal. Once the controls have been set they will require only a very slight adjustment for even very large shifts in frequency, as none of the adjustments is at all critical.

With any system of FM it is recommended that all following tuned circuits in the main transmitter should be tuned for exact resonance, but here again the writer did not find this at all critical.

The FM/AM exciter is now in constant use at G3SN and local reports confirm that the signal as received on the usual communication receiver sounds very closely like a normal AM signal,

Table of Values

Fig. 2. Power Unit for the FM/AM Exciter.

- C1 = 8 μ F elect condenser 450v.
- C2 = 32 μ F elect condenser 450v.
- C3 = 32 μ F elect condenser 450v.
- SW1 = Double-pole single-throw mains switch.
- LFC1 = 12 Henry 120 mA 200 ohm LF choke.
- LFC2 = 12 Henry 120 mA 200 ohm LF choke.
- T1 = Mains transformer.
- V1 = 5Z4G.

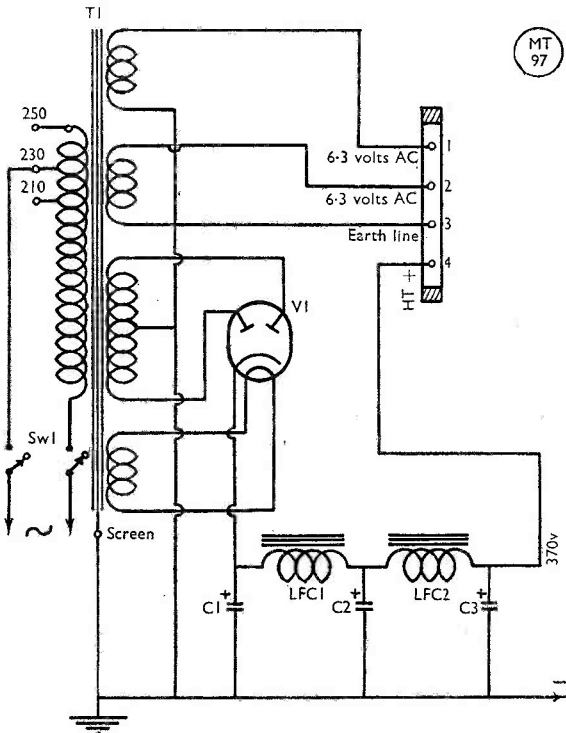


Fig. 2. Power supply unit for the FM/AM Exciter, with inter-connection.

both as regards quality and the level of the audio. Many DX contacts have been made and it is on these long-distance QSO's that all the advantages of the combined FM/AM signal is so marked. The power input used to the final stage of the transmitter was 130 watts, which gives some idea of the amount of audio equipment saved by the use of the FM/AM exciter.

In theory, of course, AM should not be introduced into a part of a transmitter which is

not working as a Class-B linear amplifier, but in the FM/AM exciter the AM used is so small, that in practice no distortion is caused by slightly modulating the frequency doubler stage.

In conclusion, the writer will be pleased to answer any queries from intending constructors or anyone interested in the theory of operation. Most amateurs avoid FM because of the poor quality of the signal, but the writer claims good quality with the exciter here described.

Feeding the Aerial

Coupling Adjustments and Circuit Loading

By V. J. COPLEY-MAY (G3AAG)

An interesting practical discussion on the problem of matching and feeding between PA tank and aerial tuning circuits. The author shows that there is a good deal more in it than simply slapping on the load and tuning for a rise in PA plate current.—Ed.

THIS article is directed mainly to those amateurs whose knowledge of the transference of power from the PA tank circuit to the aerial is a little hazy. It is quite a complex business and space will not permit a complete and detailed account of the theory involved.

When considering the problem with pencil and paper it may appear to be fairly straightforward, as we can take for granted that such factors as aerial length, PA tank Q, and so on are all correct and "ideal." But it seldom occurs that the coupling system behaves as anticipated when power is fed to the aerial. Many inter-dependent variables are introduced, some unknown, which may have considerable bearing on the problem. Mathematical prediction of results to a good order of accuracy becomes a virtual impossibility. In such a case it is quite justifiable to make an approximate mathematical computation of the factors involved and then to make final adjustments so that the system is operated with maximum efficiency.

Impedance Matching

First of all, we can investigate the

properties of the two parties before committing them to unhappy matrimony. To ensure maximum transfer of power to the PA tank circuit, the latter must present the correct load to the valve used. (The same applies to an audio output stage.) Also, to ensure that power in the PA tank circuit is transferred most efficiently to the transmission line that is feeding the aerial circuit, it is necessary for the input impedance of the line to be "transformed" to a value that will load the transmitter to its correct rating.

The manufacturers supply us with this value of PA load, in most cases; however, if the line is coupled to the tank circuit so that at resonance the valve draws the prescribed plate current at its correct operating voltage, the PA is loaded correctly anyway. So we can forget about the ohmic value of the load.

Many readers may have realised that in the foregoing assumptions nothing has been said about the effect of the dynamic impedance of the tank circuit. In all but academic cases it is reasonable to forget about this effect, as any usual value of LC ratio will result in the dynamic impedance

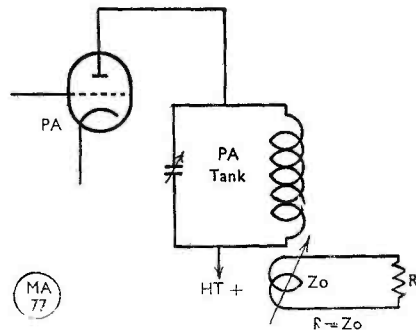


Fig. 1. Resistance R is equal to the characteristic impedance (Z_0) of the transmission line.

of the tank circuit being considerably higher than the load-line input resistance or the resistance of the valve to which the circuit is connected.

In all but exceptional cases the value of the load-line impedance is lower than the PA load impedance. Many factors become associated with this problem and the issue can be extremely confusing. So one says to the brainy types, "Forbear ! Don't try and explain the details to those not so gifted, as they can get along quite well without the knowledge !" Suffice it to say that if a 1,000-ohm resistor is connected in parallel with one of 100,000 ohms, the combination can be called 1,000 ohms with an inaccuracy of only 1 per cent.

At the end of a couple of feet of this transmission line, say we connect a resistance R equal to the characteristic impedance (Z_0) of the transmission line (see Fig. 1). Then we shall be dissipating most of the power generated by the valve in this resistance. Now, if we can substitute the aerial for this resistance, so that the PA tank circuit notices no difference whatsoever, then the maximum possible power will be transferred to the aerial. All very obvious ! Even more obvious—the feeder to the aerial connected where the resistance had been must also look just the same, with no reactance.

In the case of a half-wave aerial of correct length for the operating frequency, with 80-ohm cable connected at its electrical centre and 80-ohm cable used right up to the link at the PA tank, the above conditions are easily satisfied. With the link pushed into the tank circuit so that the PA is correctly loaded, we have a very efficient system for transferring power to the aerial.

Other Conditions

Unfortunately, all problems of coupling the PA to the aerial are not as simple as this. It may be required to end-feed an aerial ; or, more probably, it may be necessary to operate the aerial on more than one frequency. Therefore, some system has to be devised whereby it is possible to maintain an efficient match between the two circuits. Looking at it from the point of view of the PA—in order to give his best all he asks is that the system of carrying away the power loads him to correct value and does not reflect into his tank circuit undesired reactances. Unless we oblige him in this respect, the coupling will cause him to go off tune and *then* the dynamic impedance of the tank circuit may have a considerable effect and maximum output will not be possible.

Remember that retuning of the PA only compensates for the reflected reactance and, although it will increase the efficiency, it does not eliminate the trouble as losses increase in the feeder.

In the interests of harmonic suppression it is desirable to transfer the power from the PA tank to an aerial tank circuit so as to reduce capacity couplings. This is fortunate as it enables one to isolate the high DC voltages associated with the PA and also to place the aerial tank circuit in an accessible position for adjustment. These factors are, however, unimportant compared with the prime advantage of being able so to arrange things that the PA is always looking into the right load irrespective of adjustments made to the aerial.

Standing Wave Effects

The transferring of power from one to the other can be accomplished with a link line (see Fig. 2). The degree of mutual coupling will depend upon how far the links are pushed into the tank circuits. Now, a not-quite-so-obvious fact : If the coupling line is short it is satisfactory to couple one end tightly and leave the other for adjustment of loading of the PA. There will be standing waves on the feeder, but in view of the short length the losses will be negligible. If we wish to couple two circuits together where the feeder length is significant in terms of wavelength (one end in the sitting-room and the other in the loft), then we *must* have an adjustable link at both ends. In this case the link at the aerial end is adjusted so that the feeder is looking into a value of load resistance that is equal to

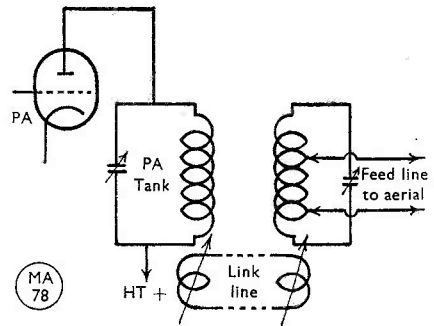


Fig. 2. Coupling the PA to the aerial tuning circuit proper, through a long feeder line—see text for detailed discussion.

its characteristic impedance. The link at the PA is then treated as a load adjustment. With both ends so adjusted, standing waves on the line will be almost eliminated and the loss will be low.

To elaborate this point: The insertion of a micro-match in this line with the aerial end tightly coupled will enable one to calculate the loss caused by the standing waves (standing-wave ratio indicated on the meter) and thereby decide whether such loss is acceptable in view of the greater convenience in having only one adjustable link. Knowing the length of cable in feet and the attenuation in dB per foot for the frequency used, the product is the total attenuation in dB. Convert this to the power ratio, and assuming a given input, you now know what to expect in watts in the load to which the line is connected. This assumes *no* standing waves. The difference between the two voltage figures is the power loss in the line; this is seldom more than a watt or two in a good line operated "flat."

But if there is a standing-wave ratio of 10 (it quite often exists) then the loss in the line is increased five times and 5 to 10 watts RF are lost in the line. Now, if the link line is long (one or two wavelengths at 28 mc) attenuation in even a good quality line may rise to 1 dB and it is possible to lose as much as 25 to 50 watts in the line from a transmitter loaded to 100 watts, assuming your standing-wave ratio is in the region of 10.

Of course, this is a very bad case—but far from being impossible—and judging by occasional remarks heard over the air, it seems that many operators are warming up the feeder line unnecessarily.

Balancing the Line

What it boils down to is that if the coupling line is long, then play safe and have an adjustable link at both ends. If you have no micro-match, you can get some idea of how serious the situation is by observing how much you have to retune the PA when you load up; though this is a crude method. Standing waves can be high without calling for PA retuning as the adjustment of a heavily loaded PA is pretty broad, anyway. With the two links, the best you can do is to adjust the one at the aerial end until a condition is found where the swinging of the link at the PA end has the minimum effect on the PA tank tuning.

You will never arrive at an adjustment where *no* retuning is required, due to the leakage reactance of the coupling coil on the tank circuit, but the minimum is the point to aim for, thus indicating a virtually flat line. It will be found in practice that an adjustment can be found where retuning appears to be unnecessary.

Aerial Coupling

The only thing now remaining is to transfer the power away from the aerial tank to the aerial proper and any of the many recommended arrangements can be used, depending on the type of aerial. The pi-section coupler is possibly the most versatile, as it will match almost any link line to any aerial feed line—flat or resonant—within all reasonable limits. Using large variable inductances on ceramic forms, this type of coupler makes a very practical piece of equipment.

Whatever type of aerial tuning unit is used, the only requirement is to adjust the coupling between the tuning unit and the aerial so that maximum power is transferred to the latter. This may call for a further adjustment of the link line at the aerial tuning unit end (dependent variables again!) as the dynamic impedance of the aerial tuned circuit may be reduced.

It is worth while to remember, especially with the more complex aerial systems, that the performance of an aerial on reception is not necessarily the same as its performance on transmission as, should standing waves appear on the line during transmission, the actual polar diagrams on transmission and reception may differ considerably. With a beam, there may be a very good front-to-back ratio on receive and a poor one on transmit, or *vice versa*. In fact, the gain of a system may be greater on transmit than on receive, due to a mismatch at the receiver but a good match at the transmitter. Unless both sides are correctly matched it is a fallacy to assume that you can work anything you can hear, propagation conditions permitting.

A sound generalisation for the beginner is that the most important factor governing the efficient operation of a combined transmit-receive aerial system is a good match at the receiver front end and also between feeder and aerial when on transmit. These adjustments control more than 50 per cent. of the efficiency.

This design amply demonstrates how small and compact an effective transmitter can be made. Though intended for field work on the DX bands, it will be of great interest to those who are compelled to operate under conditions where space for the accommodation of the gear is an important factor. Some readers may feel that the construction of a transmitter of the type described here is beyond their capacity, but our contributor's ideas will certainly inspire some new lines of thought on the design of compact station equipment.—Ed.

Twenty-Forty QRP Portable

VFO Driven—Band Switched

By W. R. JOSS (G2AJ)

PORTABLE working is fascinating in many ways, whether it is by the individual amateur himself, or as a combined operation by a picked team, such as takes place during field day contests. Various aspects of portable work appeal to each person. Some put their energies into the devising of aerial systems which are not possible at the home QTH; others design midget communication receivers running from vibrator packs; and there are those who concentrate on transmitter problems. Since the war, the writer has taken part in quite a number of excursions to hill-tops, and an immense amount of pleasure has been derived from operating portable on all bands from two to eighty metres. However, on all occasions (thanks to the help of friends) adequate transport has been available and liberal power supplies to hand, which are usually the two major headaches to be overcome when outdoor activity is contemplated.

With past experience as a guide and with an eye to the future, the writer set about producing a transmitter which would be suitable for both portable operation in the true sense and also as a QRP standby transmitter for use at home. Considerable thought was given to the various problems involved and to certain features which were deemed to be essential if the transmitter was to cover all requirements. The following is a summary of such features:

- (a) With the condition of the bands at present a Variable Frequency Control must be regarded as essential and stability should be equal to that of any fixed transmitter.
- (b) With a view to competitive operation where time is at a premium, Band Switching should be included if at all feasible.
- (c) In order to make the transmitter truly portable, both weight and physical size must be kept down to a minimum, something of the order of 8 lb. being considered maximum for the weight.
- (d) It was decided not to include Power Supplies in the same unit, in order that either Battery or Mains Packs could be used without extra switching.

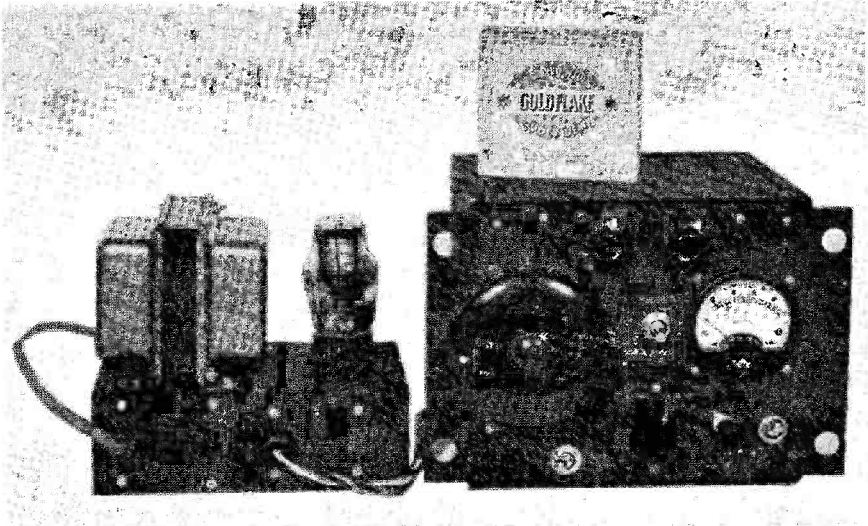
- (e) The power consumption of the entire transmitter should be kept down to less than 2 amps. for heaters and only 10-12 watts for the HT.
- (f) Adequate metering should be provided and the number of variable tuning controls should be kept to a minimum. Also to permit frequency-changing within bands the exciter stages should be reasonably broad-band.

It was obvious that it would be difficult to incorporate all the above and still produce something really portable; however, a start was made and eventually the transmitter shown in the accompanying photographs came into being.

Design Considerations and Circuit

To keep both the physical size of the transmitter and the heater current consumption down to a minimum it was decided at the outset to use button-base valves for all stages up to the power amplifier. This decision, of course, also enabled the HT consumption of the driver stages to be kept very low.

Thoughts were then turned to the VFO. An electron-coupled oscillator would probably provide the largest output, whilst a Franklin oscillator might be a little more stable. As the writer has used both these circuits many times in the past it was decided that more benefit could be derived from experiments with the "Clapp"—or series-tuned Colpitts oscillator, as it should more correctly be called. Results with this circuit proved that the claims put forward for it are not idle chatter, and with a 6C4 (the B7G-base triode) a fair RF output with exceptionally good stability was obtained. The drift from cold was very slight, and the note absolutely T9x. It was considered whether the 6C4 could be run on 7 mc driving a suitable buffer stage direct, or whether it should operate on 3.5 mc followed by either a buffer or doubler. In the interest of increased stability the latter course was adopted and an attempt made to drive a 7 mc doubler direct from the VFO. This, however, was not satis-



The transmitter and associated power supply. That (empty) Gold Flake packet well suggests the very small size of the two units.

factory and the final arrangement shown consists of the 6C4 operating on 3.5 mc followed by a 6AK5 as an untuned buffer stage. This combination produced ample drive for the succeeding stage.

The original intention was to have a 7 mc doubler followed by a 14 mc doubler and a buffer, the output from the 7 mc doubler being switched to either the 14 mc doubler or another buffer stage operating on 7 mc, according to the band required. In the course of experiment however, it was found that provided the circuit values were carefully chosen the 7 mc doubler stage would also quadruple to 14 mc, and the output on this frequency was comparable with that on 7 mc. This of course offered the possibility of reducing the number of stages by elimination of the 14 mc doubler stage. Further investigation showed that enough drive for a 14 mc buffer was available from the quadrupler, whilst the same stage operating as a doubler provided plenty for the 7 mc buffer. Thus, a considerable saving resulted.

To obtain a wide-band effect slug-tuned coils were tried in this multiplier stage, but the efficiency was found to be far too low. The final circuit consisted of a large diameter coil tuned by a 30 $\mu\mu\text{F}$ air-trimmer (C21) for 14 mc, with a fixed capacity of 72 $\mu\mu\text{F}$ (C20) switched in parallel for 7 mc. Considerable experiment was necessary to determine the value of C20 so that no adjustment of C21 was

necessary when changing bands, provided the VFO remained on approximately the same frequency.

Broad-Band Stages

The multiplier and the two buffer stages are again 6AK5's. The possibility of using 6C4's was considered, but as they require considerably more drive and the extra output obtained from them is not really required for the final stage, it was decided to use the pentodes in spite of the few extra components that this entails. The two buffer stages are identical in all respects except for the actual anode circuit. These anode circuits consist of $\frac{1}{4}$ -in. diameter polystyrene formers with iron-dust cores and when tuned for the centre of each band they are sufficiently "flat" to allow them to be ignored for any other setting of the VFO. The two buffers are supplied from a common HT line which is connected to either circuit by

COIL WINDING DATA

- L1 30 turns 22 SWG enamel, 1 in. diameter, close wound, ceramic former.
- L2 12 turns 24 SWG enamel, 1 in. diameter, close wound.
- L3 32 turns 32 DCC, $\frac{1}{4}$ in. diameter, close wound.
- L4 40 turns 36 DCC, $\frac{1}{4}$ in. diameter, close wound.
- L5 12 turns 18 SWG enamel, 1 in. diameter, spaced wire diameter.
- L6 17 turns 22 SWG enamel, 1 in. diameter, spaced wire diameter.
- L7 2-turn link.
- L8 3-turn link.

Notes: L3 and L4 are wound on slug-tuned polystyrene formers.

means of wafer B on S1. Only one anode bypass condenser is employed, this being connected to the moving contact on wafer B. Each of these stages is capacity-coupled through wafer C on S1 to the PA grid and the grid current can be checked by means of the meter, switched in the appropriate position.

The power amplifier is a 6AG7. This is a pentode designed as a video amplifier; it is excellent in low-power transmitter circuits and makes a very good final stage. It requires very little drive, its filament consumption is comparatively low, and it will produce up to 9 watts of RF with the maximum permissible anode volts. In the circuit used, the 6AG7 is provided with two completely separate tank circuits—one for each band. This again facilitates band changing as only one turn of the band switch is necessary to change from Twenty to Forty; each circuit can be tuned to resonance and loaded with an appropriate aerial; once this has been done no further adjustment is required unless a very radical change of the VFO setting makes a slight retune necessary.

From the foregoing it will be appreciated that with the aid of the carefully-selected lump

DETAILS OF BAND SWITCH

Wafer	Reference	Details of contacts on wafer
A	S1a	Single pole on/off and double pole double throw.
B	S1b	Single pole double throw.
C	S1c	Single pole double throw.
D	S1d	Double pole double throw.

capacity (C20) in the multiplier, wide-band circuits in the buffers and separate tanks in the PA, *only a single movement of the switch is necessary for a complete band change.* The importance of such a facility during contests will be quite obvious.

Keying

Provision is made for keying the oscillator in the cathode circuit, thus permitting break-in operation. Should this facility not be required then the cathode of one of the later stages could be keyed and the oscillator allowed to run continuously. A small amount of cathode bias is employed in V2, V3, V4 and V5 in order to limit the standing current under key-up conditions. Whilst on the subject of the oscillator, a word should be said about the use of S2, which permits the HT to be applied to the VFO and yet allows the succeeding stages to remain inoperative. The advantage of this should be obvious to those who have heard the "whooping and swishing" which occurs on the DX bands while the operator lines up on his next victim.

Construction

The accompanying drawings and photographs show the general layout and method of construction. The cabinet was made from a small black crackle box, acquired on the surplus market many months ago, which had been waiting the day when a use could be found for it. Having decided to utilise this box the overall size was at once restricted to approximately *six inches cube*, and much planning was necessary to make the most of the space available. A chassis was made from 20 gauge brass and bolted to the lid of the box, which is used as the front panel. This lid had $\frac{3}{4}$ in. flanges overlapping at each side; these, however, were not removed as it was felt that they would be useful if at any future date the transmitter had to be mounted in a midget rack.

The screens likewise were fabricated from 20 gauge brass. These are held by three bolts spaced across the chassis, the upper screen being braced to the front panel by two lengths of brass rod, while the under one is sweated to the chassis at either end. All the exciter portion of the transmitter is located between the panel and the centre screen, while the PA valve and both tank circuits are mounted on the rear part of the chassis. The 6AG7 holder is sub-mounted a distance of approximately $\frac{1}{2}$ in. below the chassis in order to provide better ventilation. A $1\frac{3}{8}$ -in. hole is cut which allows clearance for the base of the valve, while the holder is supported on two lengths of brass rod. Both the PA condensers are carried on the upper screen and care should be taken to allow adequate clearance holes for their shafts, which carry the full HT. These condensers are connected *via* flexible couplers to extension shafts, which allow them to be adjusted from the front panel.

The coil and condenser for the VFO circuit are both carried on the front panel, the condenser being 100 $\mu\mu$ F of a type obtainable on the surplus market. This condenser has a metal frame fitted with three tapped bosses which permit a very rigid mounting to be obtained. The slow motion dial, a surplus item (A.M. Ref. 10A/7719) made by Muirhead, and incorporating a 50-1 reduction, is simple to fix and should present no difficulty.

The positions of the small switches, key jack, meter and so on can be clearly seen from the photographs and can be mounted without any trouble. The band-switch, however, caused the writer considerable difficulty and a word about it might not be out of place. Were a new switch with the correct wafers specially purchased then the cost at the present time would probably be over one pound. However, the junk box yielded various odd ceramic wafers together with a suitable spindle

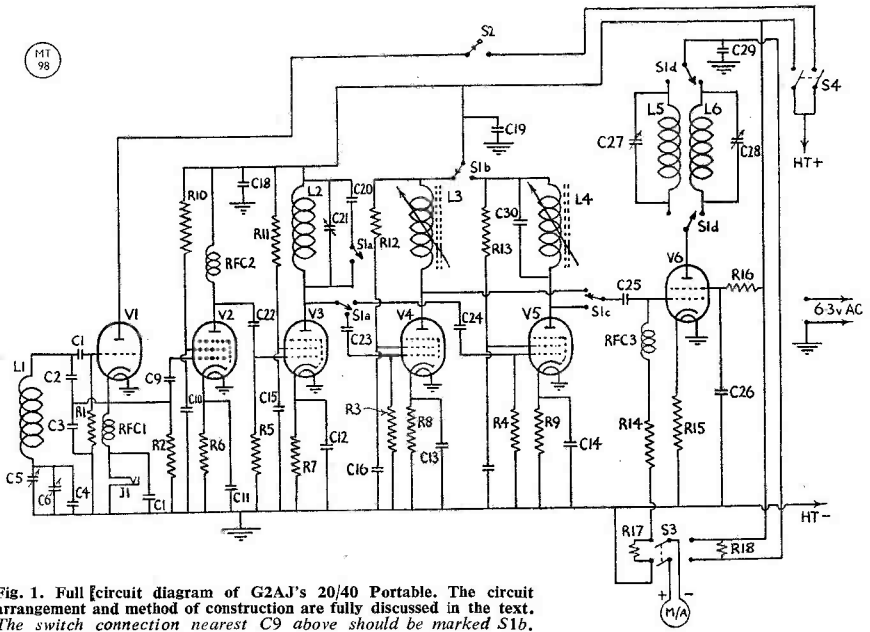


Fig. 1. Full circuit diagram of G2AJ's 20/40 Portable. The circuit arrangement and method of construction are fully discussed in the text. The switch connection nearest C9 above should be marked S1b.

Table of Values

Fig. 1. Circuit of the Transmitter complete

- C1, C9 = 100 μ F silver mica.
- C2, C3 = .001 μ F silver mica.
- C4 = 110 μ F silver mica.
- C5 = 75 μ F midget variable pre-set.
- C6 = 100 μ F variable.
- C7 = .01 μ F tubular.
- C8 = .005 μ F mica.
- C10-19 = .001 μ F mica.
- C20 = 72 μ F (see text).
- C21 = 30 μ F midget variable.
- C22 = 120 μ F Ceramicon.
- C23, C24 = 10 μ F Ceramicon.
- C26 = .01 μ F tubular, 500v wkg.
- C27 = 50 μ F midget variable.
- C28 = 100 μ F midget variable.
- C29 = .005 μ F mica.
- C30 = 30 μ F silver mica.
- R1, R2, R3, R4 = 100,000 ohms, $\frac{1}{2}$ -watt.
- R5 = 220,000 ohms, $\frac{1}{2}$ -watt
- R6, R7, R8 R9 = 330 ohms, $\frac{1}{2}$ -watt.
- R10, R12, R13 = 50,000 ohms, $\frac{1}{2}$ -watt.
- R11 = 10,000 ohms, $\frac{1}{2}$ -watt.
- R14 = 4,700 ohms, $\frac{1}{2}$ -watt.
- R15 = 100 ohms, 1-watt.
- R16 = 5,000 ohms, 5-watts.
- R17 = 22 ohms, $\frac{1}{2}$ -watt.
- R18 = See text.
- MA = 0-10 mA moving coil.
- J1 = Closed circuit jack.
- S1 = See Table
- S2 = DPST toggle type.
- S3 = DPDT toggle type.
- S4 = SPST toggle type.
- V1 = 6C4.
- V2, 3, 4, 5 = 6AK5.
- V6 = 6AG7.

and clicker mechanism. After much juggling these were assembled into a four-bank switch which met all requirements. Owing to the shortage of space the clicker plate was mounted outside the rear of the chassis and the spindle coupled to the main spindle by means of a solid brass coupler. The forward wafer (A) is mounted with 6 BA bolts on the front edge of the chassis, wafers (B) and (C) are carried on the centre screen, while wafer (D) is stood-off

from the rear edge of the chassis at a distance sufficient to give clearance for the solid coupler. The clicker plate was actually one with six positions and it was necessary to fabricate a "stop" after two positions, in order to avoid turning the knob too far and overshooting the appropriate contacts.

As far as component layout is concerned it is not proposed to give details other than as suggested by the photographs. Much depends

on the components used and also individual taste. The main point to remember is that with space so restricted the smallest components possible are necessary if they are all to go in! The over-critical may deduce that a small amount of space is still available in the rear half of the chassis. The writer, however, has not overlooked this and is considering the inclusion of a single-valve modulator suitable for screen control of the final at some future date!!

Metering

One meter is provided, this being a 0-10 mA m/c Weston Model S.33. The switch S3 is wired to connect the meter with either the grid or anode of the 6AG7. When connected in the grid circuit the meter reads normally, i.e. F.S.D. 10 mA, but when connected in the anode circuit a shunt R18 is placed across the meter so that it will give four times its normal reading, i.e. 40 mA. This shunt consists of 16½ in. of No. 24 eureka wire wound on a one megohm ½-watt resistor. R17 is a small 22-ohm resistor connected so as to provide a DC path to ground for the grid when the meter is out of this circuit. The shunt, of course, serves this purpose in the anode.

Power Supplies

The power required for the transmitter is 6.3 volts AC (or DC for portable work) and up to 300 volts HT. It is not proposed to discuss suitable power packs here, except to mention that the one shown in the photographs is of midget design (6 in. × 4 in. × 2 in.), constructed by the writer for use with converters, and found ideal for this purpose.

If the full 300 volts is to be applied to the 6AG7 a series resistor must be included to reduce the HT for the button-base valves to something in the region of 200 volts.

Testing

Each stage was checked and tested as the transmitter was built. The Clapp can be checked by means of the station receiver and the condenser C6 adjusted so that the 3.5 mc band is spread over the dial. The values of components used permit this. Having obtained a T9x note on the required frequencies the untuned buffer stage can be wired up. No trouble should be encountered and the output at the anode of the 6AK5 should be such that a neon strikes easily.

The multiplier stage required careful adjustment in order to make C21 tune to both bands at the same setting and the output on either band is again sufficient to strike a neon anywhere near the anode without difficulty. The grid drive to either buffer stage should be in the order of half to three-quarters of a milliamp and the anode current of the multiplier under load conditions about 4 mA.

The buffer stages supply ample drive for the final on either band, their anode current being about 5 mA when loaded. In order to obtain good efficiency the 6AG7 is operated with a considerable amount of bias—between four to five times cut-off. Under these conditions the drive should be in the order of 2 mA with the anode loaded. With 240 volts HT the off-resonance anode current should be between 30 and 35 mA, dipping to between 3 and 4 mA as resonance is reached. With a suitable aerial no difficulty was found in loading up to 25 or 30 mA on either band. By increasing the HT to 300 volts the full output of 9 or 10 watts can of course be obtained.

Once the transmitter is running correctly it

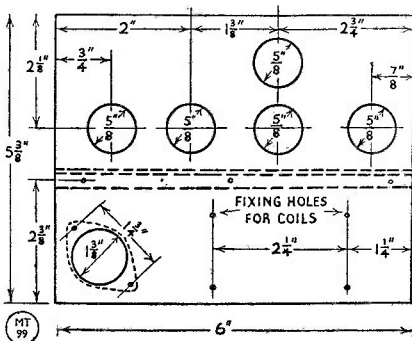


Fig. 2. Dimensioned sketch of the general chassis layout.

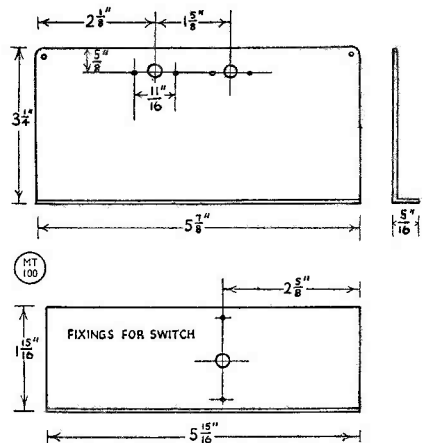
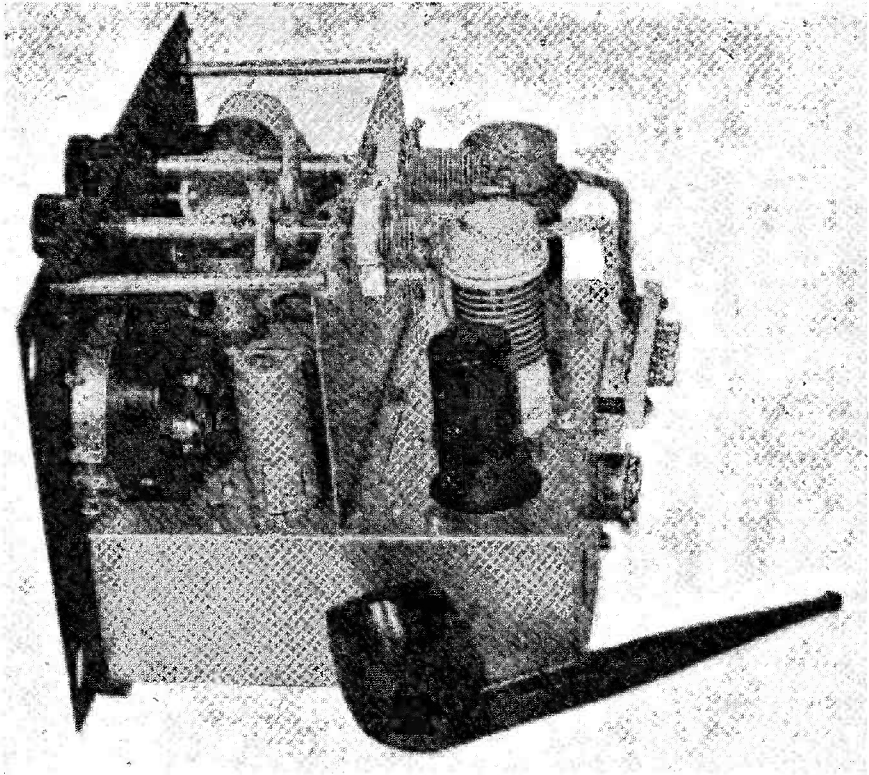


Fig. 3. Details of chassis screens, showing position of PA condenser mountings.



Internal arrangement of the parts in G2AJ's midget transmitter.

should be tuned up carefully for each band, after which apart from the VFO no further adjustment should be necessary. The VFO should cover more than the whole of the 20-metre band; for CW work it should be set about 14075 kc, and with all circuits peaked on this frequency the output from the final will be virtually constant from the lower edge of the band to at least 14150 kc. The same procedure applies to 7 mc.

Conclusion

The whole transmitter proved very easy to handle and reports have so far been consistently good. The first spell on the air from the writer's station produced a QSO with UC2 from the first CQ call! These were succeeded by contacts with F, G and SM all in the space of one hour on 7 mc, the worst report being 579. Further tests carried out by G3CWW

brought 589x from the North of England and many G contacts as well as several Europeans were made in the course of a week-end. On all these tests the input was never more than 4 watts, and neither QTH can be considered more than average. On a portable site with reasonable aerials there is no reason why DX should not be worked without difficulty. It is hoped to prove this point in the early summer.

The overall weight, including the cabinet, is just over 7 lb., the heater consumption is 1.4 amps., and the HT consumption is barely 50 mA. These facts, together with the operational features detailed in the preceding pages, very largely fulfil the specification set out at the beginning of this article, and from the results so far obtained the writer has no hesitation in recommending the design to those who are heading for the wide open spaces.

DX COMMENTARY

CALLS HEARD, WORKED & QSL'D

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

In spite of the excellent months already reported this year, the tempo of the DX still seems to be increasing, and March has been very lively indeed. Perhaps the number of new countries and "fancy pieces" on the air has not been so great recently, but the level of activity has been terrific. The second leg of the ARRL Contest, and BERU, with which the month opened, resulted in more QRM on 14 mc than even your hardened commentator has ever heard before. Truly, the life of a "week-end only" amateur is not all beer and fun these days.

So much of the incoming news consists simply of short comments on various points that it is well-nigh impossible any longer to separate out the DX into the bands. However, we will just have a run through the five DX bands (yes, we said *five*) and try to summarise things first.

Transatlantic on 1.7 mc

Hearty congratulations to G3PU (Weymouth), who got across to W4NNN with 10 watts on 1,751 kc, the W transmitting on the 3.5 mc band. This happened on February 19—just too late for reporting last month. G3PU was working W4NNN at 0630 on 3.5 mc, and asked him to look out on 1,751 kc. After calling him up there he heard the W come back immediately with a 339 report, and the QSO continued for more than half an hour.

The first G/W contact on the band was made almost exactly 16 years previously (G6FO/WIDBM), but we imagine that this is the first time that top-band signals have been reported from as far down as W4. Very nice work.

It is fairly well known now that the W's are probably going to be licensed again for limited operation on 1.7 mc. They will have small slices of about 25 kc, varying in different parts of the States according to the frequency of the nearest Loran set-up. Rumour has it that they will be allowed 500 watts by day and 200 by night; it is also more or less definite that if the W's get it, the KP4, KV4, KH6 and KL7 stations will be given the same

privileges. Some new countries on 1.7, boys! Now, now, don't rush. . . . By the way, G3PU was not using balloons or any form of fancy aerial system. His aerial was 265 ft., 35-40 ft. high and end-fed, running NW/SE.

3.5 mc DX

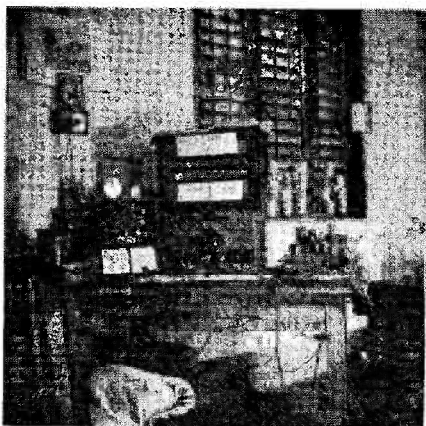
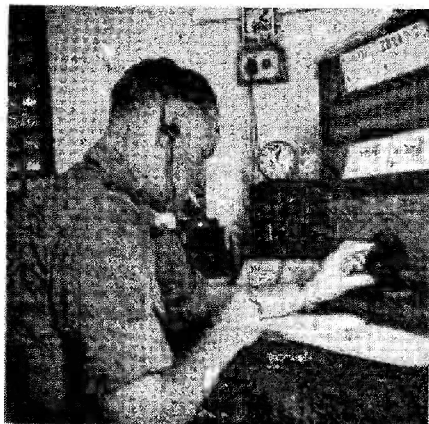
G8VB (London, W.5) continues his good work of inducing new countries to show up on the band. This month he has succeeded with EK1DP and SVSUN, and has also worked CT3AB; these three new ones maintain his position 'way out front of all the others in the appropriate column of the Four Band Table. Other "hopefuls" are CN8EQ, ST2AM, TA3FAS, HZ1AB, ET3AF, ZD4AX, VP9T, several VP2's and ZB2D, all of whom have promised to come up on 3.5 but haven't yet appeared. 'VB remarks on the fact that conditions to the West are still very bad, although, to the East, he gets R5 and S8 from SVSUN. Of his total of 47 countries worked, he has 44 confirmed; G8VB is prepared to present a brand-new 813 to anyone who can show him proof of contact with more than 50 post-war countries on 3.5 mc.

G3EIZ (Liverpool) has worked CT3AB and OX3MG, both for the second time, getting 599 from the latter at 0645. Other DX included East Coast W8's, a VE3 and a W8, and during the ARRL Contest he heard KP4HU and 4KD, KV4AA, KZ5AX, 5ER and 5WD, TG9JK and TI2KP. Also being called were KL7HI and EL7A. Then one night he heard a YM4 but assumed he was a phoney. Well, YM4, pre-war, was the prefix for the Free State of Danzig, but we can't quite swallow that one now!

G6BB (Streatham) has evolved a nice aerial for 3.5 mc by using his 68-ft. Zepp and his three-half-wave 28 mc aerial in a sort of aerial-and-counterpoise arrangement, series tuned. With this he has added 11 countries during the month, including W, although bound to a single rock.

Activities on 7 mc

Very little new on 7 mc this month, although G6BS (Great Shelford) has burst into the Four



The outfit (and operator) at VS7PH, Negombo, Ceylon. The Tx is 6L6-807, 25 watts, into a 14-mc dipole, with an Australian-built receiver. On this rig VS7PH (who is G3ATH of Skipton, Yorks) has had 1,000 QSO's with 94 countries in 38 Zones.

Band Table and makes his very first appearance right on the top line with 90 countries worked on 7 mc. G5GK (Burnley) was all set for that place with 88, but 'BS has just crowded him out. Fine work for both stations. G6HL (Shepperton) has added to his score with VP6CDI (2205), HZ5IP (0700), VP6SJ (2325) and PX1A (0745). The latter is, as usual, subject to doubt!

G3ATU (Roker) has worked FM8AD, and received a QSL from Y11FC, who proves to be a genuine RAF type at Habbaniya. Others also report receiving his card. G6BB has added PX1A, VE7, LX1SO (2014) and TA1RU (1444). The last two, especially the TA, set the eyebrows twitching somewhat.

G8LO (Portsmouth) says, "Do you ever listen to the Crazy Gang on 7 mc phone around 1400-1500 every weekday? This is not 'hot-under-collar' stuff or anything like that, but we all have our own ideas about Amateur Radio—give them a listen if you can." Not yet having had an hour to waste round about that time, we haven't.

From our own private stock we can add MP4BAD on 7 mc (2225). We gather that he has taken over the gear used by MP4BAB, who is now in Malta. The note is "a bit rough" (we gave him T6) and the transmitter is an 1154 with about 40 watts. Thanks also to G3DCQ (Chingford) who sent along confirmation of this news.

14 mc DX

Of course, our old "twenty" continues to carry the bulk of the traffic. Most sought-after specimens on the band this month seem to have been AC4RF, VK1VU, VK9NR,

ZD8B, VR2BH, 2BJ, and 2BL, KC6EA and 6WA, FD8RG, WØMCF/C3 and UAØKFD. Just before writing this, UAØFL (Sakhalin Island) cropped up. He is not a separate country but is at least a genuine rep. for Zone 19.

G3ATU has had a very good time with VK1VU (1725—14114), VQ8AF (14112), HS1SS (14100), MD4BPC (14036), HP1PL (14002) and, crowning glory, AC4RF (1715—14024). This puts 'ATU up to 40 Zones at one jump. Congratulations! He suggests that with so many phoneyabouts it would be a good idea to get the DX-chasers to send in their *confirmed* totals. We have been thinking on the same lines. Instead of that "Total" column in the Four Band Table, what about a "Confirmed" column? If this meets with general approval we will make the change, starting the month after next. (After all, the totals as claimed can and do appear in the Zones Worked Table.)

From G6HL comes this list of 14 mc DX: C4RK (1530), VK9NR (0745), EA6AZ (1900), ZS9D (1920), VR2BJ (1200), HP2X (1920), HP1PL (2000), HC7KD (2150). We could go on for a long time, but that's the pick.

G3CDC (Sherwood) reports for the first time. Using 40 watts to an 8-ft. square aerial on a 24-ft. pole, he weighs in with KG6FA, KP6AA, VS2CH, VS7PH, VK1VU, together with scads of VE8's, KH6's, ZS's, VK's, ZL's and the like. But he thinks he will need an auto-sender to raise ZD9AA. (So did we, but he came back to a CQ one night!)

G4CP (Dudley) has pushed his score up nicely with VQ8CB (Chagos), VK9NR, WØMCF/C3, W6DLX/KW6, F18ZZ,

FOUR BAND DX

Station	Countries Worked					Power	Station	Countries Worked					Power
	7 mc	14 mc	28 mc	3-5 mc	Total			7	14	28	3-5	Total	
G6BS	90	149	4	28	163	150	G8IP	34	110	62	13	127	3/150
G5GK	88	116	26	11	183	150	G2AO	34	111	32	29	120	150
G5FA	81	114	21	17	127	100	G6BB	33	87	28	13	106	10/70
G6HL	80	141	124	29	170	150	G2WW	31	155	76	21	165	60/150
ON4JW	68	184	3	24	186	35/75	G6OM	30	28	55	20	87	?
G6QB	67	158	115	32	182	150	G8LO	29	110	14	10	111	140
G3ATU	58	151	49	26	158	10/150	G8PG	28	28	1	11	40	1 1/2/14
G8IH	55	164	27	14	172	7/150	G3BDQ	26	105	1	18	107	25/150
G2AVP	54	146	24	28	155	25/120	G2BJY	24	55	84	4	110	25
GC2CNC	52	134	61	8	162	10/50	G3FNJ	24	77	19	34	93	150
G8VG	51	101	24	19	117	60/75	G3DOG	24	33	1	3	42	25
G5WC	49	112	12	1	114	45	G2YS	22	96	25	21	107	150
G4CP	45	178	64	3	178	150	G4QK	22	73	2	19	77	100
G3AKU	44	126	13	29	134	30/60	G3COJ	21	31	50	1	83	75
G3CBN	44	92	14	12	102	?	G3EIZ	21	28	14	30	44	25
G2VD	41	155	68	24	161	150	G2DHV	19	63	2	12	68	25/60
G6XL	41	105	35	15	127	35/100	G8QX	17	95	63	12	120	150 Phone
G8VB	40	114	57	47	135	150	G2VJ	12	59	41	4	84	25/150
G3DO	37	144	95	19	175	150	G2HIF	9	42	34	6	66	150 Phone
G5HH	37	81	27	22	98	25/75	GW3ECH	9	37	13	10	46	25
G2DLJ	36	112	19	24	115	120	G3ACC	5	103	2	19	103	150
ZB1AR	35	66	26	28	82	25	G6CB	5	21	80	1	88	?

W6YNK/HS, EA6HZ and AC4RF. Some nice DX crammed into this small paragraph!

G3BNE (London, N.W.3) comments on the large number of Asiatic signals on 14 mc recently; new ones for him have been HZ1HZ, MD7RCS, VS2CH, MI3ZZ, ST2AE and UP2AA. G6PJ (Sheffield) reports an unusual occurrence in the form of a Japanese SWL report from one Yechio Yasuda in Sugunami, Tokyo, and adds that 14 has been very good around 0730 of late.

28 mc News

And so we come to "ten", which has been alternatively very good and very bad, as ever. G6BB worked a W6, using I0 watts to a doubler, and that just about sums up the band when it is good. G5FA (London, N.11) has been trying to level up his Four-Band scores

a bit by working on ten, and has added quite a few. He now has 107 countries verified, so is saying good-bye to the cards for a while in favour of a DXCC. He has likewise collected his last State for a WAS on 14. G3EIZ has commenced operations on the band with an indoor dipole and has raised all W districts plus AP, ZS, VP2 (2345) and KZ5.

G3ATU has received his card from VU7AF (Khatmandu, Nepal) so that one seems all right (although, after the "CZ2AC" story last month, one never knows!). He remarks that he heard VR2AQ "being badgered by bags of stations while in a QSO." We heard VR2AQ at 0900 one morning on 28, while there was no other DX of any kind on the band. (Yes, we worked him, too.)

Central Americans coming in for comment from many readers are YNIRO, HR1MB,

VS9AL on 28 mc, using a transmitter the line-up of which was 9002/6AG5/6AG5/6AQ5, with less than 5 watts. 'JW added six more to his score this month, including AC5CS (Bhutan).

B. A. M. Herbert (ex-G2WI) writes from Ismailia, MD5, and says that the G's show up best there between 1000 and 1700 GMT on 28 mc, and from 2100 onwards on 14 mc. He had bad attacks of nostalgia on hearing several Bromley stations, but gives the "Oscar" for the strongest signal to G8TH. We haven't been able to use his Calls Heard for 28 and 14 mc, but if he would like to listen on 3.5. . . !

Another keen one in Malta is ex-G3DIH, who is out there doing his old job of recording and programme engineering. He has taken some recording gear as well as his own Tx and Rx, and remarks that any G's heard on the Top Band will probably be rewarded with a 5-in. disc of their own transmission.

G3ESG (Gillingham) writes from Takoradi, Gold Coast, and reports lots of G Calls Heard during the passage. As, once more, these are all on 14 mc, we are afraid they are too numerous to use. Another request for some 7, 3.5 and Top-Band listening, please. (*Later* : see his 7 mc list at the end of this feature.)

Back to Malaya for VS2CP (Johore), who hopes to be putting signals into the U.K. by now. He operated for a while from VS2CH, and says that every time he signed off with a "QLM" he started at the bottom of the band, but never heard anyone until he got to his own frequency. He says "For goodness' sake spread out, if it's only 10 kc—with so many T9 notes on the same frequency you just can't separate them." VS2CQ (Kuala Lumpur) confirms that the VS2BC heard on 7 and 3.5 mc was a phoney. He adds that any 3.5 mc DX from VS2 is extremely unlikely on account of the terrific static level.

MT2E (Tripoli) is pressing on with a new transmitter (100 watts) and is experimenting with aerial systems using compressed dipoles.

He reports that MT2E, 2D, 2FU and MD2BU have all been active on 28 mc. MD2B is starting up; MD2KP, working on 14 mc, has had a blow-up. '2E sends a copy of his check list in the ARRL Phone Contest, as a specimen of the DX-man's so-called Happy Lot. You only have to call one station (or one CQ) and then you settle down for as many hours as you can keep going, averaging about 20 contacts an hour !

DX Miscellany

GM2FQO (Argyll) worked three W's in a row on 7 mc, using a single KT66 as CO ; the same KT66 has been in service since 1937 ! G8GA (Goole) says that W5MQI (Oklahoma City) is a dentist, and wants to arrange schedules with other dentists on 28 mc phone. Will anyone who can "fill" the bill please try to "extract" him from the 10-metre QRM ? (*Gercha !—Ed.*)

Short comments from G3AKO (Tiverton) : What about a "No CQ Club"? Pirates (when known as such) should be answered on their own frequency by a very long call, ending up with "QRU, VA". This makes them hopping-mad. Phoneyes—often a method of ensuring a DX reply when testing (see our previous remarks on VP1AD). And, *re* G2VV's remarks about "highly technical blokes" on the band, G3AKO says he has noticed a high casualty rate among trumpeters lately.

G3AKU (St. Ives) comments on 'bad manners' ; he was told by VS1CO that the latter is disgusted with lots of G's, who, when he wants a decent QSO with the Homeland, send "569 QRU 73 VA" and depart. 'AKU says we have a higher percentage of T7's and bad operators than we ought to have, and quotes the VK's as being the best operators one ever hears. True enough, one seldom hears a bad signal or bad operating from Down Under, and that goes for the ZL's too.

G2ZF (Bramhall) replies to our remarks about bug keys with a telling retort that to read

PREFIX AMENDMENTS

This list amends—to March 1, 1949—the country-prefix and prefix-country tables appearing on pp. 33-36 of the *DX Operating Manual*. By working from the list below in the order in which it is printed, readers who possess the *Manual* will be able to insert their corrections in the easiest way—and will have an up-to-date Prefix List.

Delete	"AR1, Syria"	Add	"KX6, Marshalls"
Add	"C3, Formosa"	Amend	"MC1, MD1, Cyrenaica" to "MC1, MO1, Cyrenaica"
Amend	"D, Germany," to "DL, Germany"	Add	"MP4, Oman"
Amend	"I, Sardinia" to "IS, Sardinia"	Add	"VK9, Norfolk Island"
Amend	"J, Japan" to "JA, Japan"	Delete	"VS9, Oman"
Delete	"J9, Okinawa"	Add	"YK, Syria"
Add	"J9, Iwojima"	Add	"ZS7, Swaziland"
Amend	"KA, Philippine Islands" to "DU, Philippine Islands"	Amend	"ZS4, Basutoland" to "ZS8, Basutoland"
Add	"KC6, Carolines"	Amend	"ZS6, Bechuanaland" to "ZS9, Bechuanaland"
Add	"KG61, Iwojima"	Add	"ZC8, Arab Palestine"
Add	"KR6, Okinawa"	Add	"4X4, Israel"

one "bug" through two or three more is purgatory, whereas one "fist" with any individuality will stand out. He hopes that "the sound of honest brass" will never die out from the amateur bands. Finally, he considers that to tie up the DX man in a long QSO when you know there is a queue waiting is "the spirit of the jungle, not of Amateur Radio." (But : please note VS1CO's remark in the preceding paragraph.)

G2ZC (Farnham), on behalf of the FOC, points out that G3PU (who made that contact with W on 1.7 mc), GW8WJ (who worked VK on 3.5 mc with 8 watts), GI6TK (who won the Braaten Trophy and was the world's highest scorer in the CQ Contest) and the four top scorers in the March Zones Worked Listing, are all FOC members. True enough ! GW8WJ (Prestatyn) was assailed by awful doubts when all the "hoax" calls on 3.5 mc came to light, but has now received his card from VK5KO and is full of joy once more. His post-war DX with 8 watts on 3.5 mc reads VK, KP4, W1, 2, 3, 4, 8, VE1, 3, VO and OX ! The rig uses a 59 and a 6V6G with a "W3EDP" aerial system.

Piracy Again

G3EBF (London, S.W.16) received some 30 cards from G stations and found that he had



"... Quick job on the PA while QSO a VK..."

only worked ten of them. The pirate is believed to be in the Manchester area. Why will they do it ? A novel poney is reported by G3DLQ (Aldershot) who worked I1OKX and then received a card from "DA2ZZ" (Bavaria) superscribed "I1OKX." When one pirate call isn't enough for a station we're in a bad way.

How Many of Them ?

From G6YQ (Liverpool) comes a letter full of praise for VK5KO's achievements on 3.5 mc ; 'KO had at least 250 European QSO's and worked more than 50 different G stations. G6YQ's remark "Let me press on to my goal of 200 different VK's" set us working through the log, and we were astonished to find that since the war we have worked, from G6QB, 214 of them, together with 102 ZL's and 101 ZS's. (Different stations, of course, not number of QSO's.) These figures are not quoted as being particularly clever, but it would be interesting to compare them with others. You can add 450 W6's if you like.

Heart-cry from GC2FZC, who says the GC prefix is all very well in some ways, but the countless numbers of useless SWL reports saying "Pse QSL Direct" are somewhat of a worry. If stamps are enclosed, all right ; otherwise, no-can-do. GC2CNC, likewise, says he got "caught up in" the ARRL Contest, and before he could get out of it had worked 52 W's in a row. (All the same, we should rather like a GC prefix. We should use QLM, QML, QMH, QHM *ad nauseam* and never listen on our own frequency at all.)

Danger de Mort

Just after reading a rather harrowing article in one of the American publications by an amateur who had attended a brother-amateur's funeral service we read a letter from

DX QTH'S

AC5CS	Charles Sadger, British Political Agent, Bhutan, via Bengal, India.
HS1SS	via U.S. Embassy, Bangkok, Siam.
HZ1HZ	Ahmed Zaadan, Mecca Saudi Arabia.
HZ1JE	Dave Leeke, BMM, Saudi Arabia, TAIF, MELF.
KC6WA	Navy 3054, c/o Fleet PO, San Francisco. (Station on Truk, Caroline Islands).
MD4BPC	c/o Box 50, Hargeisa, British Somaliland.
MD4GC	Maj. G. A. Crippledine, Mogadishu, Somalia.
MP4BAD	Cpl. Ken Smethurst, Signals Section, RAF Sharjah, British Forces in Persian Gulf.
PK5AA	H. Devos, c/o Shell, Balikpapan, Dutch Borneo.
PK6XZ	Swartlaan 3, Makassar, Celebes, Indonesia.
PX1A	c/o Radio Andorra (?)
SV5UN	QSL via PA0BB.
VQ4CJG	Box 1313, Nairobi, Kenya.
VQ4NJ	Kirk's Bridge Farm, P.O. Kitale, Kenya.
VS2CP	P. Zeid, c/o Scarboro' Estate, Sungei Patani, Johore.
YI1FC	AC2 Crisp, HQ, Flight, No. 2 AC Sqdn., RAF Habbaniya, Iraq.

G6CB (Wimbledon). He remarks that ZS6UR (ex-ZD2KC) has just had a finger amputated after receiving a severe burn while testing out on 28 mc. But he's tough, and was back on the air in a couple of days. It makes you think though—or it should.

G8IP (Hampton) has just shown us his 40 cards from all Zones. Congratulations to him on his WAZ, coming up . . . GC2AWT (Jersey), commenting on these EZ stations, says that they are in the Saar Basin region, and adds that some of the DA and DK stations seem to muster up perfect English although their German is shaky. Wonder what he means?

G3ACC (Dulwich), just recovering from a nasty operation, writes to say how kind and helpful many amateur friends have been; members of the FOC, in particular, have rallied round splendidly. During her convalescence she will be answering the large pile of letters from members at home and overseas. Truly, the real spirit of Amateur Radio lives on.

From G4AY (Gillingham) comes a description of a 7 mc CQ on QRO phone lasting ten

minutes. During this the operator struck gongs, rang bells, blew whistles and gave a display of express train noises. A QSO resulted, during which the gentleman talked glibly of QSBaltimore, QRMadagascar, Bottles, Trannies and all sorts of clever technical terms. Brrrr!

Apparently, judging by news from AP5B, although all AP licences were cancelled by the Pakistan Government, the Military and Diplomatic personnel have had theirs returned already. Civilians will follow. AP5B is back on 14 mc CW.

Direct from MD4GC, and also via G2YL (Tadworth) comes the news that John Farr of MD4JG has now left Italian Somaliland and is VQ4CJG once more, operating on 14150 and 28300.

And that seems to be about the news for this month. So please let fly with next month's letters in time for the deadline, first post on April 13, addressed to DX Commentary, *Short Wave Magazine*, 49 Victoria Street, London, S.W.1. Claims and scores on separate paper or postcard, please. Now 73 and BCNU next month.

G CALLS HEARD OVERSEAS

1·7 mc

G. Stanton, G3AJX, at R.N. W/T Station, Dingli, Malta G.C.

Feb. 13, 2230-2330 : G5JU (569c).

Feb. 17, 2230-2330 : G2HAU (549), 3AMF (569), 3EES (559), 3EIT (549).

Feb. 19, 2230-2330 : G2NJ (579), 2YY (569). (Rx : Sx 28.)

7 mc

G3ESG, Aboard S.S. "Ashantian", between Takoradi, Gold Coast, and Dakar, Senegal.

G2BDP (569), 2BTJ (579), 3AMX (579), 3BYD (579), 3DV (569), 3EMA (579), 3ENH (569), 3EVO (569), 4JY (569), 5LP (569), 6AT (569), 6BS (579), 6TN (579), 8IA (569), GM8SQ (579), GW3CB (559).

Power Pack PP-51/APQ9

Application Note

By G. P. ANDERSON (G2QY)

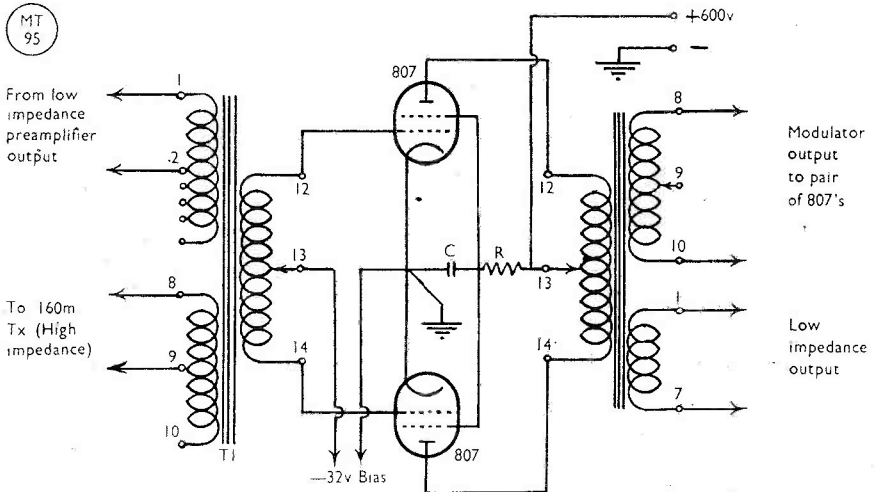
A NOTE on the uses made of the components in the Power Pack PP-51/APQ9, at present available on the surplus market, may be of interest.

The unit contains four rectifiers 5R4GY, rated to supply 175 mA at 925 volts, or heavier currents at lower voltages, e.g. 200 mA at 750 volts, or 250 mA at 500 volts. The directly-

heated filament requires 2 amps at 5 volts; the rectifier has an octal base and is directly interchangeable with other types, including the 5U4G. Ceramic octal valveholders are fitted to the chassis, but the four sockets not required for connection to the rectifier pins are not fitted.

Four high-voltage oil-filled condensers are included, comprising two 4 μ F 1,000 volts working and two 1 μ F 1,500 volts working. There are also two low-frequency chokes capable of carrying high currents, but owing to the fact that the unit was designed for 400-1,400 c.p.s. operation, the inductances are only of the order of a few Henries.

The heater transformer is designed for 75-125 volts input, and has windings for 2 \times 5 volts at 3 amps, 1 \times 5 volts at 6 amps, and 1 \times 6·3 volts at 5 amps; again, input is for 400-1,400 c.p.s., but this item would no doubt make a useful output transformer.



Modulator used by G2QY, utilising for T1 and T2 transformers from the Type 51/APQ9 power pack ; in this circuit C is 2 μ F and R 35,000 ohms. Voltage ratios of the transformers are shown in the accompanying table.

VOLTAGE RATIOS OF HT TRANSFORMER, EQUIPMENT PP-51/APQ9

Tags :	1	0	
	2	75	} volts
	3	80	
	4	85	
	5	105	
	6	115	
	7	125	

Tags :	8	425	250 mA DC
	9	0	} 10 mA DC
	10	425	
	11	675	} 435 mA DC
	12	485	
	13	CT	
	14	485	

HT Taps

The main HT transformer has primary winding as for the LT item, and secondaries of: 425-0-425 volts (250 mA); 485-0-485 volts (435 mA); and 675 volts (10 mA), connected as shown in the table, and two of these items have been incorporated in a modulator with very satisfactory results. One is being used as a driver transformer to a pair of 807's operating in push-pull, and the other as the modulation transformer. In the writer's station, the pre-amplifier ends with a pair of 6V6's, and has low-impedance output, since it is also used for gramophone amplifier work. Connection is made from the pre-amplifier to a low-voltage winding on the driver transformer, a third high-voltage winding on this also being used to modulate the 10-watt 160-metre transmitter. The 807's are switched off and the 6V6's act as modulators; needless to say, more than sufficient audio power is avail-

able from these valves to modulate the carrier. As a matter of interest the circuit is shown in the diagram.

Finally, the unit also contains two 35,000-ohm 35-watt vitreous resistors, which have many applications; it should also be mentioned that all the inductors and transformers are potted, and beautifully made jobs. It was largely this fact that induced the writer to try to find a use for them!

POINT ON TVI

A semi-official pronouncement discloses that less than 10 per cent. of the complaints of TVI are found to be due to amateur operation. This says a great deal for the large number of amateurs now on the air in the TV area—particularly as there were 111,850 television sets actually licensed at the end of January, 1949.

Bit of Psychology

Coping with That BCL !

By F. HENNIG (G8SW)

BELIEVE it or not, but hams are only Bhuman ! So next time you're launching your very best in CQ calls and a purposeful knock comes on the front door, don't be too ashamed of that hunted look that springs to your eyes and those little warning lights that flash "TVI" and "BCI" through your brain.

Oh yes—your rig just bristles with suppressors ; you boast the biggest Faraday screen East of the Rockies ; and you've tucked a trim little wavetrap into every aerial for miles around. But don't dare rest content till you've learnt how to act when that inspired "CQ" has burst boldly through all your protective barriers and the XYL is calling "Darling . . . there's a man at the door and he's asking about your broadcasting !"

Then it is, OM, that a little applied psychology can come to your aid. Remember, your only hope is to convince the complainant that the reins of *science* are held firmly in your grasp and that every microwatt that has ever jumped off your aerial has winged its way unswervingly along the path of Progress. Here's what to do.

Greet your neighbour at the door with an expression of intense, unsmiling wisdom. Wring his hand to the point where he is about to sue for peace and lead him straightway to the shack, uttering not a word. Once inside your den, of course, he's at your mercy.

Soften Him Up !

Fire up the rig without delay, switch on the carrier, and nonchalantly dangle your trusty bulb and loop as near to the PA tank as personal safety and your nerves permit. Idly strike neons in the most unexpected places, and slyly observe his reactions. Now all this may seem very *naive* to you but few of the uninitiated can withstand the lure of lamps illuminated by unseen hands, and your victim will be no exception. His eyes will widen with childlike wonderment, his lips will tremble at HF, and the softening-up process will be well under way.

Just for good measure, draw a sizable spark from the aerial, hand him the screwdriver and invite him to do the same.

Quick now !—you must thwart his endeavours to bolt for the door . . . and promptly turn his attention to the receiver.

With AF and RF gains wide open, swing to



Pack ALL your tools.

and fro over 7 mc (See now why this band is called the Roaring Forties ?) QRM ? QRN ? Don't let them worry you. It's *noise* that counts, and the more of it the better. Human powers of resistance are normally such that three minutes of this treatment will implant a frightening fixed grin upon the visitor's features and bring you a fervent apology for having been troubled.

If It Fails—

One final measure remains, only to be resorted to in the most troublesome cases. So you, break in on his Brahms ? So the TV pictures of bird-life in Outer Mongolia are accompanied by a voice that no bird ever owned ? Very well !

Announce firmly your intention of popping round to look over his set and then, with awful deliberation, proceed to pack your tool-kit.

Hack-saw ? Yes, you'll need that. Four-pound hammer ? Of course ! Cold chisel ? In it goes ! Add a meter or two if you must, but these are uncalled for embellishments. Then stride with shining eyes towards the door.

See ? Your problem is solved. Your visitor has fled to protect his domain. That diplomatic cup of tea the XYL thought of just won't be needed now. Relax, OM, and drink it yourself—and get after Zone 23 again !

Become a Direct Subscriber

Frequency Pin-Pointer

Continuous Measurement with High Accuracy

By G. A. KINGSBURY (G6SS)

This article offers a solution to the problem of obtaining, on home-built equipment, accurate frequency measurement through the whole range of a band, as distinct from calibration points at intervals only on the receiver. It is of interest to add that our contributor has protected his ideas under Provisional Patent No. 7367.—Ed.

THE writer has been interested for many years in radio frequency measurement to the degree of accuracy sought by all self-respecting amateurs. The use of VFO's on all bands since January, 1946, and the prospects of Band Planning did much to foster this interest. The usual equipment in use to-day consists of a crystal oscillator and some means of harmonic amplification. This type of equipment has gone a long way to keeping us within our limited bands, but all too often we require to know with equal accuracy some

frequency intermediate between a pair of 100 kc markers generated by such apparatus. Much guesswork is then brought to play with variable, and often unpredictable, results: frequently the receiver dial calibration is used to good effect, but the ever present shadow of doubt is a constant cause of irritation.

The existence of apparatus capable of extremely high accuracy in this field is well known; so too is the extreme cost, complication, and bulk. It may also require considerable skill in use and often takes quite a time to set up.

The equipment to be described was designed and built to strike a favourable compromise.

Development

It seemed quite feasible that interpolation between each of the pairs of 100 kc markers generated by the simple crystal oscillator and harmonic apparatus should be more easily achieved, and with this intent one was constructed for modification as necessary. (It will be assumed that the reader is conversant with such equipment.) The only means apparent to achieve constant band spread with just one calibrated dial (0 to 100 kc), without elaborate band-switching, would be by electronic mixing; thus a separate oscillator, covering a frequency sweep of 100 kc, was rigged up using the Transistron circuit.

As the interpolation accuracy would be dependent on the stability of this calibrated

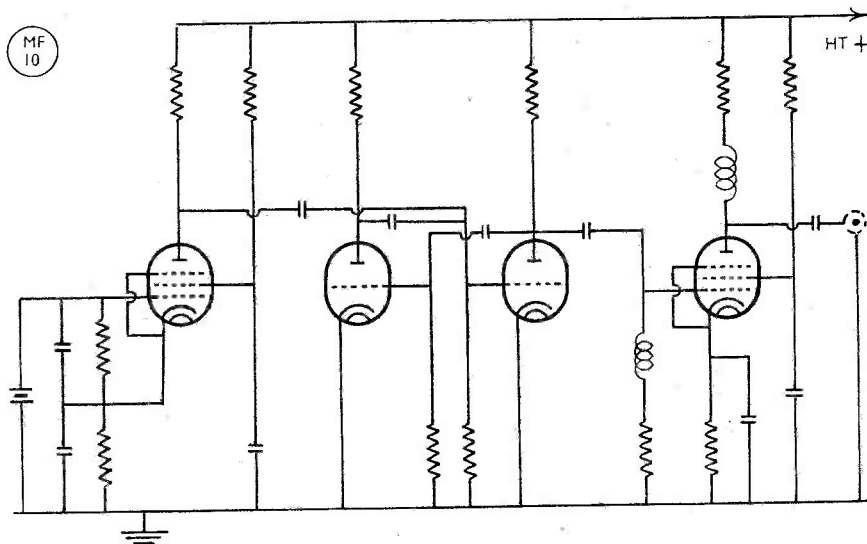


Fig. 1. Conventional crystal oscillator, multivibrator and harmonic amplifier.

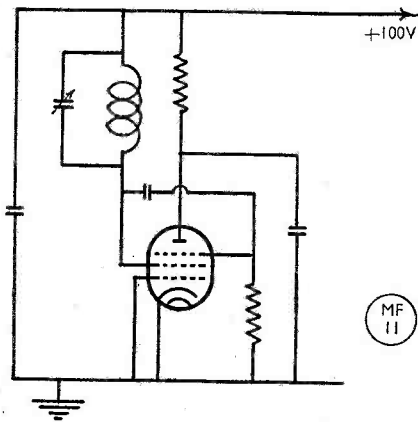


Fig. 2. The Transatron oscillator; the theory of operation of this circuit was discussed in our issue for June 1947.

oscillator, the usual precautions were taken, regarding electrical and mechanical stability. These and certain other considerations brought about the decision to use a fundamental frequency range for this interpolation oscillator of 1400 to 1500 kc.

Capacitive coupling between the two units, the easiest means, was chosen and the required coupling proved to be from the high side of the interpolation oscillator coil by way of a low-value condenser to the grid of one of the multi-vibrator triodes (it seemed immaterial which).

The first snag was then encountered. The interpolation oscillator certainly produced the required signal output between the 100 kc markers and this held the precise band-spreading in all parts of the spectrum from 100 kc to 30 mc, *but* a whole host of other beats were also to be heard and it was difficult to identify the required one. This was due, of course, to the beating of undesired harmonics and the first approach to their elimination was to reduce the coupling capacity between the interpolation oscillator and the multi-vibrator; this was limited by the falling off of output, particularly at the higher frequencies. The ultimate choice for the coupling capacity was $1 \mu\mu\text{F}$.

The next move was to prune the interpolation oscillator of all harmonic generation. This was done by reducing the amplitude of oscillation to a minimum compatible with the maintenance of stable oscillation. The set-up was then doing almost all that was required of it.

There remained, however, two oscillations of approximately equal amplitude between each

pair of 100 kc markers, one due to the mixing by addition of the two frequencies, and the other to the difference of the two frequencies. Suffice it to say at this juncture that in use the required beat can easily be ascertained and the other ignored. It will be explained later just how the presence of these two signals can be utilised as routine checks to detect any variation of calibration should it occur.

Circuit Details

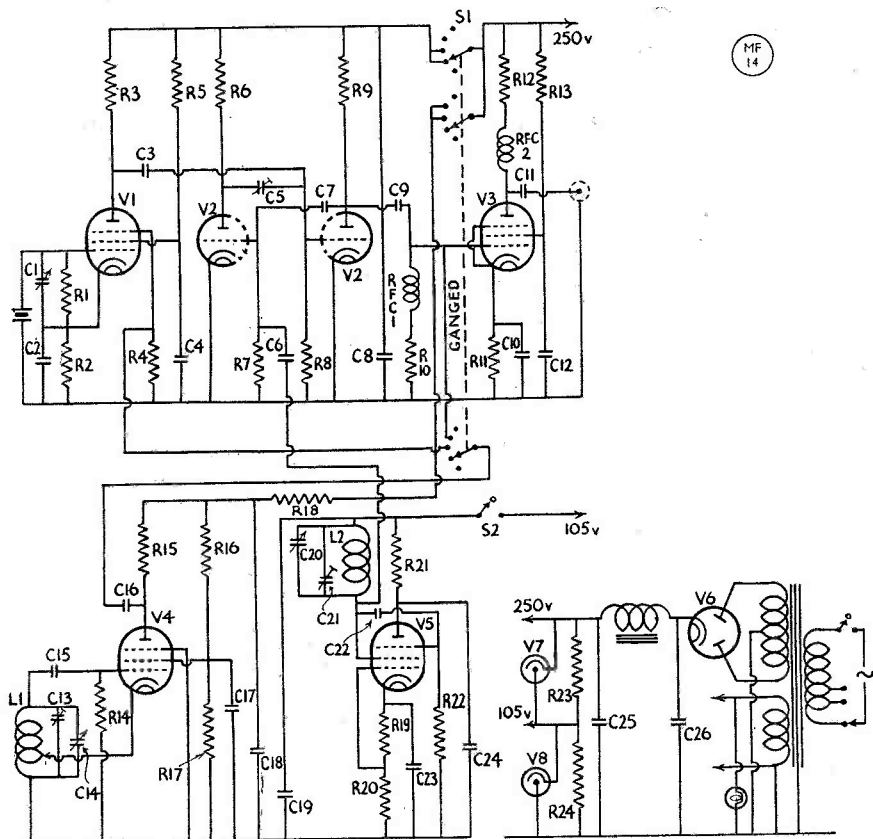
The following notes will supplement the circuit diagram (Fig. 3) and the mechanical layout plan (Figs. 4 and 5) sufficiently to enable the construction of a "sure-fire" reproduction of the complete crystal and interpolation oscillator frequency sub-standard which has served the writer well in all spheres of his Amateur Radio activities since the post-war resumption.

V1 is the 100 kc crystal oscillator using a 6SJ7 and is capacity coupled to V2, a 6SN7 wired as a multivibrator, the output of which is fed to V3, a 6SJ7 functioning as a buffer and harmonic amplifier. The output of this stage is taken to a concentric socket which forms the output socket of the equipment. V4 is a 6SJ7 operating as the 1000 kc (semi-variable 998 kc to 1002 kc) oscillator, which is coupled as desired by the selector switch S1 to the grid of V3 to give 1000 kc markers; or to the suppressor grid of V1 when required to modulate the output at audio frequency. When not operating for either of these purposes this stage can be switched off and out of circuit by means of S1.

V5 is the interpolation oscillator, a 6SJ7 coupled to the grid of V2 by a $1 \mu\mu\text{F}$ condenser from the high side of the tuned and calibrated oscillatory circuit. The all-important feature of this circuit is that it must produce low amplitude, stable oscillation over a range of 100 kc from any one harmonic of 100 kc to the next. (In this case from 1400 kc to 1500 kc). V6 is the rectifier, a 6X5 which together with V7 and V8 (VR150/30 and VR105/30) voltage stabilisers, the smoothing filter circuit and power supply transformer, form the complete power unit.

The tuned circuit of the Transatron oscillator consists of a coil of $25 \mu\text{H}$ with $450 \mu\mu\text{F}$ fixed capacity and a variable condenser of $75 \mu\mu\text{F}$ in parallel. This last condenser is the one controlled by the calibrated dial of the interpolation oscillator. A certain amount of coil trimming by the "cut and try" method will be necessary to obtain just the correct range of variability with maximum band spread round the dial.

The 1000 kc oscillatory circuit consists of a coil of $50 \mu\text{H}$ with $500 \mu\mu\text{F}$ fixed capacity in parallel and a variable condenser of $5 \mu\mu\text{F}$.



MF 14

Fig. 3. The final circuit arrangement evolved by G6SS.

Table of Values

Fig. 3. Circuit of the Frequency Pin-Pointer

C2, C9, C15, C16	= 1,000 μ F	R10, R21	= 250,000 ohms, 1 watt
C3, C11	= 100 μ F	R11	= 3,000 ohms, 1 watt
C4, C8, C12, C19, C23, C24	= 0.01 μ F, 250v wkg.	R12	= 20,000 ohms, 1 watt
C5, C13	= 500 μ F (max) Pre-set	R13, R16, R23	= 75,000 ohms, 1 watt
C6	= 1 μ F, ceramic	R19	= 2,000 ohms, 1 watt
C7, C10	= 500 μ F, 250v wkg.	R20	= 500 ohms, 1 watt
C14	= 5 μ F Var.	V1	= 6SJ7
C17, C18	= 0.1 μ F, 250v wkg.	V2	= 6SN7
C20	= 75 μ F (max) Var. (maximum stability)	V3, V4, V5	= 6SJ7
C21	= 500 μ F (max) Pre-set (maximum stability)	V6	= 6X5
C22	= 200 μ F, ceramic	V7	= VR 150/30
C25, C26	= 8 μ F electrolytic	V8	= VR 105/30
R1	= 500,000 ohms, 1 watt	L1	= 50 μ H
R2, R7	= 10,000 ohms, 1 watt	L2	= 25 μ H (high stability)
R3, R15	= 25,000 ohms, 1 watt	RFC 1 & 2	= 1.25 millihenries (or any receiving type of RF choke)
R4	= 100 ohms, 1 watt	S1	= 3-pole 5-way switch
R5, R14, R22	= 100,000 ohms, 1 watt	S2	= 1-pole 1-way toggle switch
R6, R9, R17, R18, R24	= 50,000 ohms, 1 watt	Pilot light	= 6v .3 amp
R8	= 5,000 ohms, 1 watt	Crystal	= Q.C.C. Type Q5/100
		Smoothing choke	= 20 H 30 mA
		Power transformer	
		Prim.	= 200/250v 50 Cy.
		Secs	= 250-0-250v 30 mA, 6v 2.5a

This being in an electron coupled circuit the coil requires the customary cathode tap and, if more convenient, the adjustment could be effected by a larger variable condenser across this cathode tap and earth. An iron-dust core coil can be used satisfactorily in this circuit without impairing the accuracy of the equipment. Adjustment of the turns should be made to obtain zero beat with the 100 kc oscillator at approximately the central setting of the main tuning condenser.

One of the most important points to be borne in mind is that in the choice of components all those associated with the variable Transistron oscillator (the interpolation oscillator) must be of sound mechanical and electrical design, particularly those directly in the oscillatory circuit. In this connection it should be noted that the 200 μF coupling condenser from the screen grid of V5 to its suppressor must be of the ceramic variety or of some equally stable type. So must the coupling condenser between the interpolation oscillator and the multivibrator triode grid.

Apart from these observations the rest of the circuit and components are of ordinary commercial standards. All circuits operate so much below the maximum valve ratings as to ensure long reliable life for all valves, and the resistors likewise work well within the one-watt rating specified. The only condensers subject to more than 250 volts are those in the smoothing filter and the standard 8 μF electrolytic type with a working voltage of 500 were used for this purpose.

The only details worthy of comment about the power transformer design is that it should be capable of supplying 250 volts at 30 mA for the HT and 6.3 volts at 2.5 amps for the filaments. By using a 6X5 rectifier valve with the filament isolated from the cathode, only one filament winding on the transformer was necessary. The transformer primary should be electrostatically screened.

Calibration

Having allowed the customary five minutes of warming-up time, the crystal oscillator and multivibrator circuits are switched on by turning the switch S1 to the appropriate position (without audio modulation). The output is fed by screened lead to the aerial input of a receiver which is then tuned (without BFO) to any one of the crystal oscillator harmonics. The interpolation oscillator is then switched on by means of the switch S2, and as the dial is rotated, a beat note will be heard at each end of the scale, providing that the range of this oscillator has been adjusted to cover 100 kc from one harmonic of the crystal oscillator to the next (in this case 1,400 kc to 1,500 kc). These two

points, when zero beat is reached, are precisely 1,400 kc and 1,500 kc and they should be marked 0 kc and 100 kc respectively.

The next move is to plot the 50 kc point, and this is done quite simply by tuning the receiver (without BFO) to approximately half-way between any two adjacent 100 kc markers from the crystal oscillator and multivibrator. As the interpolation oscillator dial is rotated towards the centre of the scale two beats will be heard to converge and the point where they zero will be the 50 kc calibration.

This procedure should be noted very carefully as it forms a ready and reliable means of routine checking for any possible alteration of the calibration of the interpolation oscillator.

Calibration of the rest of the scale is best carried out with the use of a 10 kc crystal calibrator if available; otherwise, one has to resort to ingenuity and the calibration points afforded by commercial or broadcast stations known to maintain their radiation frequency within close limits. Most amateurs have some artfully contrived means of frequency comparison from which they obtain accurate calibration points, therefore it would seem unnecessary to enlarge upon this part of the procedure.

Operation

It is always the practice at the writer's

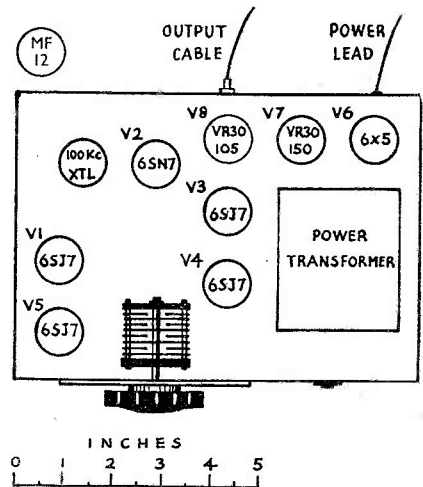


Fig. 4. Chassis layout plan for the unit. V1, 100 kc oscillator; V2, Multivibrator; V3, Harmonic amplifier; V4, 1000 kc oscillator; V5, Interpolation VFO; V6, Rectifier; V7, V8, Stabilisers.

station to switch on the frequency measuring equipment before anything else, and the receiver is nearly always the next. Assuming this to have been done, and that a signal is heard whose radiation frequency is required to be known: First approximate its position by switching on the 1,000 kc oscillator, with the semi-variable control about central; the order of megacycles per sec. is then readily ascertained. Then, with the 1,000 kc oscillator off and the 100 kc oscillator switched on, the position can be more accurately fixed in order of the nearest 100 kc. At this stage the interpolation oscillator is switched on, together with the 100 kc oscillator and the multivibrator, then the dial is rotated until a heterodyning oscillation is heard beating against the signal under investigation. At the point of zero beat the calibrated dial will register the exact frequency that has to be added to the nearest 100 kc marker lower in frequency than the signal.

To make this clear consider that a signal of unknown frequency is being received and that it has been ascertained by the usual means to be lying between 28,300 kc and 28,400 kc. As the interpolation oscillator dial is rotated, zero beat is obtained at the dial reading of 21.5 kc; thus, the measured frequency would be 28,321.5 kc. This example also serves to show the order of accuracy obtainable; equal, in fact, to any need likely to arise in an amateur station.

A point worthy of mention at this stage is that the complete equipment can be used with the same accuracy on sub-harmonics which enables all frequencies down to 10 kc to be measured and the useful coverage is therefore continuous from 10 kc up to 60 mc, or even to 100 mc with care.

One very useful application is to switch on the interpolation oscillator and the 100 kc oscillator and multivibrator and if the calibrated dial is set to the 50 kc point and then very slightly offset an audio beat can be heard in the receiver, as previously explained. It will then be found that as the receiver is tuned an unmodulated beat is heard at every 100 kc and a modulated signal will be found at every 50 kc in between. Thus, the spectrum is automatically divided into easily distinguishable 100 and 50 kc parts.

It is often desirable to use a modulated signal for the purpose of easy identification, reverting to an unmodulated carrier for accuracy in the final adjustment to zero beat. Switch S1 has been arranged, therefore, to switch on the 100 kc oscillator, together with either, or both, of the other two oscillators as required, and at the same time to make the necessary transfer of coupling to the suppressor grid of the 100 kc oscillator.

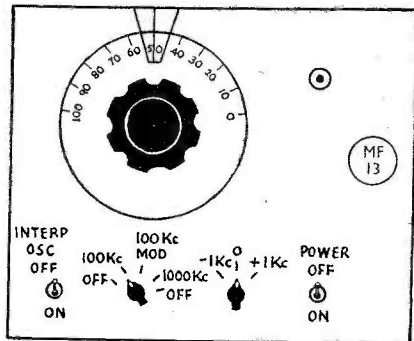


Fig. 5. General panel arrangement of the G6SS Frequency Unit.

The frequency of the audio modulation is adjustable at will by means of the semi-variable control of the 1,000 kc oscillator which is brought to a knob on the front panel. When this control is adjusted to zero beat with the 100 kc oscillator, the 1,000 kc oscillator is accurately set for generating precise 1,000 kc markers throughout the spectrum.

Much has been written and said on this subject before, but it cannot be over-emphasised that, in order to keep our VFO's within bounds, and so that we may properly observe the mild form of band planning accepted to-day, it becomes all to be able to talk, work, and advise in precise terms of frequencies.

The cost of the equipment can be assessed from the details given; the size can be judged from the fact that everything, including power supply, is contained in a steel cabinet size $8\frac{1}{2}$ in. by 7 in. by 6 in. deep.

To those who seek to achieve a useful compromise with the best in test equipment at moderate price and of compact size, this Frequency Pin-Pointer will perhaps appeal.

T.V.A.R.T.S. ON "TWO"

The Thames Valley Amateur Radio Transmitters' Society runs a regular two-metre net from 2230 onwards each Friday evening; present members are, G2DGO, G6NB, G8IP and G8SM. This follows the principle of the same Society's well-known 160-metre net, which has now been operating for over twelve months. Other local organisations might well consider doing something on the same lines—it is a great thing to have some fixed period when local activity can be guaranteed.

VHF BANDS

By E. J. WILLIAMS, B.Sc. (G2XC)

*The Five-Metre Story—
Summary of Results on Five—
Two-Metre Activity—
Another Record on 70 Centimetres*

TO summarise the results obtained on Five Metres since the band was first operated, and the experience it has given all VHF workers in this country, is not the easiest of tasks—apart from which, we are all bidding farewell to an old friend. Operations on Five Metres find a unique and lasting place in the history of Amateur Radio in this country. In the amateur field, they made possible some remarkable developments in VHF technique; every VHF operator, known or unknown, has benefited directly from the collective progress made by British amateurs on Five Metres; and most operators cut their VHF teeth on the problems (which seem so easy now) posed by the Five-Metre Band.

It will probably be agreed that the story of Five Metres divides itself into two well-marked periods. The first, the years up to about 1936, when self-excited transmitters and super-regenerative receivers were the order of the day; and the second, from 1938 onwards, when crystal control and either straight or superhet receivers became the standard equipment. The years between were a transition period when the need for stabilised apparatus was becoming generally recognised, with the DX possibilities of the band gradually assuming a greater importance.

Pre-War Era

For those who did not know the pre-crystal control period, we should like to paint a picture of five metres as it was then. The experience of your conductor started in 1933, but others knew the band long before that. That long distances might be covered on rare occasions had been proved by one or two reports of 100-mile reception several years before, but in general, anything over 10 miles was considered DX and worth reporting. Transmitters were often of the push-pull tuned

anode resonant grid type, feeding into long wire aerials.

Such was the transmitter at, for instance, G6NZ in Southsea. In common with other local enthusiasts, we built a super-regenerative receiver, but being on the opposite side of a 300-ft. hill from G6NZ, we failed to hear anything but ignition QRM. Nothing daunted, we persuaded a neighbour to spend Sunday mornings taking us round the district in his car, so that we could log G6NZ's signals in more favourable locations.

Other groups up and down the country were doing the same sort of thing. Portable work became the great thing. One Sunday in each month was set apart in the South of England as a 5-metre field day. Transceivers, each smaller than the last, were built by everyone and provided much fun, even if they did not add much to the sum total of radio knowledge. We remember a contact between G2XC and G6NZ while the latter was on a moving bus, and other similar novel contacts were made elsewhere.

In 1934, G6QB took his five-metre gear to the top of the Crystal Palace, while G5CV went aloft in an aircraft and obtained air-to-ground ranges of 130 miles. G5BY went to the top of Snowdon, a venture repeated by G5CV, G6YQ, GW6AA and others later. Signals from Snowdon were heard as far away as Essex.

But by 1936, many of us were realising that so far we had only been playing at 5 metres and that if the full possibilities of the band were to be explored, both transmitters and receivers must be improved considerably. CW reception should be made possible, and that meant frequency stability at both Tx and Rx ends. Really good valves for use on 60 mc were still scarce and expensive, and in spite of the general acceptance that CC transmitters and straight or superhet receivers were desirable, progress was slow. Gradually, however, stabilised transmissions increased in number as news spread of the possibility of European DX; commercial harmonics had been logged during the summer of 1936 and G2FA worked F8NW across the Channel, while G5BY (then at Croydon) was reported heard at W2HXD.

But the first European QSO was delayed until July 2, 1938, when G5MQ worked IIRA. About this same time, inter-G contacts over distances up to 100 miles or so were becoming commonplace, as a result of the improved Tx, Rx and aerials in use. In fact, we find A. J. Devon saying in the *Short Wave Magazine* for October, 1938, "56 mc contacts are of little value as news items when the distances involved are less than 50 miles." In the latter half of the same year, G5BY-G6FO obtained regular schedule contacts over the

126-mile path between Croydon and Newport, Mon., for the first reliable ground-to-ground GDX, and G6FO also logged G6DH at 180 miles. The G5BY-G6FO contacts stood for many months as the GDX record.

Early 1939 found G6DH striving to work ON4DJ across 85 miles of sea. And so came the summer, when in 8 days of June, G6CW made 13 contacts over 100 miles. Contacts between G and I were made on June 1, 13, 24 and 25, and G2ZV and G6CW set up a new inter-G record of 150 miles. The Snowdon tests of that same summer were, however, not so successful as a result of a severe gale which reduced all the expectations of GW6AA and his helpers to nothing. In spite of that 25 stations were worked, including G6CW at 137 miles. In August, 1939, the GDX record advanced another stage, when the late G2OD (Worthing) contacted G8KD (Sheffield) over a 190-mile path, while G2AO (Eastbourne) worked PAØPN. When, on the outbreak of war, activity ceased on September 3, 1939, not only had the GDX record been brought to a figure which would have been considered incredible only a few years previously, but contacts had been made between G and EI, F, I and PA.

Post-War Results

And so to 1946, when with the return of amateur licences the Five-Metre Band was one of the two bands made available, but shorn now of its LF end. With better and cheaper valves, and a general trend towards beams in place of long wires and simple dipoles, GDX was soon being worked. By June, A. J. Devon, in his feature "Five Metres" in the *Magazine*, was beginning to run out of superlatives! G5BY made the first inter-European contact on May 19, working IIFA. About the same time G5MQ and G6VX were maintaining a 184-mile schedule for 15 evenings in succession, while G5BY worked G5MQ on May 13 over a 215-mile path. As A.J.D. said that month, "Inter-G working up to 200 miles is passing from the very uncommon and exciting". During June, the band opened to Europe on six occasions, G2XC, 5BD, 5BY, 5LL, 5MP and 6CW being there to take advantage of it. G5BY and G6LK started a regular schedule over 156 miles with remarkably consistent results. The GDX record passed to G5BY/G8UZ. July 23, 1946, was an outstanding evening for inter-G work, while August 22 provided the best European evening of the year with the first HB contacts being made. Early October brought a fortnight of excellent conditions for GDX working, the evening of October 11 surpassing anything previously experienced. Complaints were coming in of congestion at the LF end of the band, and of

FIVE-METRE COUNTIES WORKED LIST

Starting Figure, 14
From Fixed QTH only

Worked	Station
43	G3APY (225)
42	G3BLP (254)
41	G5WP
40	G5BD (234), G6CW
39	G2ADZ, G2AJ (341), G2OI, G5JU
38	G2MR, G5MA, G3ABA (189)
37	G2CIW (219), G3DCV, G5YV (191)
36	G5MQ, G6OS (186), G8UZ
35	G5BM, G6MN (150)
34	G2NH (270), G2RI (167), G5VB, G6LK, G6VX
33	G5BY, G5GX (147), G5RP, G6XM (319), G8WV
32	G2IQ, G2XC (320), G3IS (143), G3WW, G4LU, G5BJ (114), G6OH, G8KL (151)
31	G2AXG, G5PP
30	G2KI (177), G3BK, G5PY (251)
29	G2KG (164), G4AP
28	G3CGQ (146), G6HD (181)
27	G2BMZ, G3BOB (130), G3KX/A, G4IG, G8UR
26	G4MR (154), G5HN, G5LC (144), G6NF (170), G8SM (159)
25	G2AOK/A, G4RO (164), G5LQ (200)
24	G6UH (226), G6VC (137), G8GX, G8KZ (198), G8WC
23	G2NM, G5LQ, G8PX
22	G2ADR, G2AOL (100), G2HLF (134), G3CWW (194), G5IG, G6KB (170), G6LC, G8QX
21	G2AUA, G2KF (121), G6SM (115), G8LY
20	G3BW, G5CP, G5MR (119), G6TF
19	G2LC (136) G5UM (150) G6ZQ
18	G2HDY (135), G6FO, G6UW,
17	G3YH, G3COJ
16	GWSSA
15	G3EHY, G6CB, G8IC, G8TS (170)
14	G3BTC (108), G8JO

Note: Figures in brackets after call are number of different stations worked. Starting figure, 100.

weak, unidentifiable 'phones who failed to sign on CW.

In November came the first *Short Wave Magazine* Five-Metre Contest, lasting a fortnight. From the point of view of GDX, the event was a failure, conditions being far below normal, but all participants enjoyed it and activity was outstanding. G6VX (Hayes) was the easy winner of this Contest, with G5MA his runner up. There was a total entry of 44, and A. J. Devon estimated that about 300 G's were active on the band during the period.

Aurora Openings

March 8, 1947, was the date of the first major Aurora opening on 58 mc, GDX signals being received from the North irrespective of great-circle directions and with fuzzy notes. During a further auroral display on April 17, G5MA (Ashstead) was logged by GM3BDA (Airdrie). In April, 1947, A.J.D., in the *Magazine*, launched "Counties Worked" as a method of assessing collective progress, commenting that there was known to be activity in 30 G counties. G5MA became first leader in the table with 22 counties worked. The EDX season opened on May 14 with the GM's receiving I's, while at G2XC we worked 21 counties in a month! The table of Five-Metre Firsts was growing rapidly, and by the end of the summer 11 different European countries had been worked from the U.K. W5BSY/MM added to the excitement of that summer of 1947 by operating on 5 metres from the Mediterranean area, and a new GDX record was set up on June 1, 1947, over 285 miles between G5BY and G5GX.

Personality Note

In November, 1947, your present conductor took over from A. J. Devon, who for years had contributed this feature. As many may have guessed, it might now be disclosed that A.J.D. was the pseudonym of the Editor of the *Short Wave Magazine*.

Five-metre news was temporarily eclipsed by the DX openings on 6 metres. A second Five-Metre Contest in January, 1948, attracted a good entry, although again we were unlucky with conditions. G6VX and G5MA repeated their former success and, as in the previous contest, occupied the first two places. The idea of the "Fiveband Club" was born on February 21, and was immediately well supported by VHF enthusiasts.

Rise—

Activity Week-Ends provided a valuable incentive during the summer of 1948. By a remarkable coincidence, all these week-ends produced unusually fine weather, and we were inundated with requests to make every week-

FIVE-METRE COUNTRIES WORKED LIST Starting Figure, 3

Worked	Station
17	G6LK (D, F, FA, G, GI, GM, GW, HB, I, LA, OE, OK, ON, OZ, PA, SM, ZB1)
15	G5BY (D, F, FA, G, GW, HB, I, LA, OE, OK, OZ, PA, SM, ZB1, ZB2) G5YV (D, F, FA, G, GI, GM, GW, HB, I, OE, OK, ON, OZ, PA, SM)
13	G5WP
12	G2XC, G5BD, G5MA, G5MQ
11	G2AJ, G3KX/A, G5CP, G6XM
10	G2ADZ, G2AOK/A, G2MR, G2OI, G3APY, G3BW, G3DCV, G5BM, G5GX, G5VB
9	G2BMZ, G2CIW, G2NH, G3IS
8	G2ADR, G2HML, G3COJ, G3YH, G15SJ, G6CW, G6DH, G6LC, G8GX, G8TS, G8UZ
7	G2KG, G2QY, G3ABA, G3BLP, G4AP, G4LU, G6MN, G8SM, G8UR
6	GM2DI, GM4JO, G4MR, G4RO, G6TF, GM6XI, G8IC, G8KL, G8KZ, G8WV
5	G2BDQ, G2KF, G2RI, GM3BDA, G3BXE, G3WW, G4IG, G4LX, G5BJ, G5IG, G5LC, G5PY, GM5VG, G16VU, G8LY
4	G2DBF, GM3AXO, G3CWW, GM3NH, GM3OL, G3TP, G5MR, G6OH, G8WC
3	G2HLF, G2KI, G3CGQ, G3CYY, G5LQ, G6HD, G8FO, G8VN

end an "activity" one! GM3OL and the Newcastle group broke through to the Midlands in May, and several new counties, notably Dorset, Somerset and Suffolk, appeared on the 5-metre map.

The Counties table now showed several stations at the 31 level. Excitement grew as in June GM3OL and G3BW were heard in the London area, and on June 13 a new GDX record was achieved by G3BLP and GM3OL, the distance being 296 miles. On June 9 a tropospheric contact between G2XC and PAØWL, 370 miles, also set a new record. In fact, some 19 contacts during June of over 200 miles *via* the troposphere were recorded in our columns. June 4 saw an excellent Euro-

pean opening, as many as *eight different countries* being heard.

With greatly increased activity in GI and GM the stage was well set for August 7, when an amazing spell of "aurora conditions" opened the band for working between Southern G and GM's and GI's. Record contact was that by G5MA and GM2DAU, a distance of 363 miles. A further outcome of this occurrence was a rapid rise in the counties worked, G5WP reaching 41, and G6LK making his total 16 countries.

—And Fall

On September 1, 1948, the two-metre band became available for amateur use and from that date five-metre activity started on a steady decline. A contest organised by the R.E.F. on October 23-24 produced a brief burst of activity and enabled G3HW/A and G3CQC to make 460-mile contacts with F8YZ, thus raising the tropospheric record to an even higher figure. A second break in the general lull came as a result of our own *Magazine* VHF Contest in mid-November. This time conditions were excellent and numerous over-200-mile contacts were made, G5BY and G3HW/A being the outstanding stations.

To round it all off, we reproduce herewith the last set of Five-Metre Achievement Tables, based upon all the available information. Some of the figures are interesting: No less than 43 countries worked, 42 of them by a station in the South London area; nearly 100 stations figuring in the Counties Worked list, for which the qualifying standard is 14 countries; 17 European countries worked by one station, followed by two operators with 15 countries each; a total of 88 stations shown in the Counties Worked list; 11 European countries worked first time on 58 mc post-war, three of them—North Africa, Switzerland and Czechoslovakia—by the same operator; an estimated total of not less than 600 G stations which have appeared on the band; and some distance records which will stand as a monument to the operators who made them.

The detail of all this achievement, over a period of years, is contained in the pages of the *Short Wave Magazine*, which from the beginning has devoted much space, time and energy to the VHF bands. No other record can be so complete nor so accurate. It is with pride that we look upon their results in the VHF field and the vast accumulation of technical knowledge and experience gained by so many of our readers for still further VHF exploration. But unless they had taken the time and the trouble, not only to record their results but also to report them to us, this all-too-brief Summary would not have been

possible, and much of the history of VHF achievement would have been lost.

And so we come to the close of the story. Among the thoughts which pass through one's mind is the remarkably persistent attraction the band was held for so many operators. Many of the calls that were in the five-metre news in 1933 still hit the headlines in 1948. Among its regular habitués existed a unique spirit of friendly rivalry, an amazing willingness to help the other man, even to break one's own records.

From the technical point of view the Five-Metre Band laid the foundations of British VHF technique and provided a grand opportunity to investigate sporadic-E propagation; the Summaries of European Activity and EDX contacts which we prepared from readers' reports have been acknowledged by research laboratories in several countries as a valuable contribution to the study of VHF propagation problems.

Most of the well-known 5-metre call-signs can now be heard on two metres—or if not there, then on 70 cms. The experience of Five-Metre operation enabled excellent two-metre records to be set up within a few months. On

FIVE-METRE FIRSTS

France	G2FA/F8NW March 29, 1936
Italy :	G5MQ/IIIRA July 2, 1938
Holland :	G2AO/PAØPN August 17, 1939
North Africa :	G5BY/FA8B June 24, 1946
Switzerland :	G5BY/HB9CD August 22, 1946
Sweden :	G5TH/SM5FS May 24, 1947
Denmark :	GM8MJ/OZ7G May 24, 1947
Belgium :	G6DH/ON4KN May 25, 1947
Czechoslovakia :	G5BY/OK2MV June 22, 1947
Malta :	G6LK/ZB1AB June 30, 1947
Gibraltar :	G2XC/ZB2A July 22, 1947
Norway :	G2BJS/LA1V June 26, 1948
Austria :	G5GX/OE1CD July 2, 1948
Germany :	G5BM/D7RB July 2, 1948

70 cm. technique is somewhat different, but we have no doubt that the persistence and endeavour which brought success on "five" will prevail on 70 cm. as well and that in due course a story of great achievements will be written for this new band. Five has gone! Here's to Two and Seventy!

THE 145 AND 420 MC BANDS

In spite of generally poor conditions on the VHF bands, the large number of reports we have received this month indicates that interest is well maintained. On the other hand, we do feel that if *all* those who wrote to us complaining of lack of signals were to be as active as they wish others to be, the liveliness of the bands would be something at which to marvel!

New 70 Cm. Record

On March 19, G3AHB/A-G2WS/P made it on 420 mc over the 24-mile path Hayes-Oxted, Surrey, where G2WS was operating portable. The contact was held for an hour, with signals reported R5,S8 both ways—our congratulations to the operators concerned, who are working hard on 70 cm. It will only be a matter of time and opportunity before this distance is increased still further.

On 420 mc the number of active stations is on the upgrade. On the South Coast G3BEX and G3BNR are on daily in Southwick, Sussex, at 0715 and 2200. Their home QTH's are badly screened to the north by the South Downs, but they hope to be out portable very soon. At present they are running a pair of RL18's (EC53) into a 24-element beam consisting of 12 radiators and 12 reflectors. A higher-powered Tx is likely before long. The Rx is an RAF 1359 superhet. Over their 2½-mile path S9 signals are received. G3LV (Southsea) is also on 70 cm. with an 18-element beam, while in the South Birmingham area G3EMY, G3LN, G5JU and G8JI are there on most evenings at 2000. G3APU and G3BUR should be ready shortly. Anyone interested in VHF work in that area is asked to contact G8JI. G3APY (Kirkby, Notts) has a much modified BTH P58 Rx with a CC BFO; CW can readily be taken and held. There are switchable band widths from 30 kc to 1 mc. An aircraft altimeter transmission was recently heard and the time from when it was S9 *plus* until it faded out was 70 minutes, which indicates a remarkable range. Others active on the 70 cm. band include G2HKU and G2VA in Sheerness.

Two Metres

We are grateful to G3BHD (Psterborough) for some news of activity in Germany. DL4XS will be on 144 mc (exactly) shortly with

130 watts to HK24's in push-pull. A 32-element beam will be in use, with an RME152 converter feeding into an AR88. DL4DZ will be on 144.45 mc with 40 watts to an 815 and a BC629 for Rx. On April 2, 3 and 4, D4LDD was to be active on the top of the highest point in the Bavarian Alps, beamed on G in an attempt to beat the 660-mile world record. Perhaps by the time you read this someone may have worked him! G3BHD himself has an SCR522 ready, but wants some information on multi-element beams.

In Scotland, GM5VG is regularly active in Glasgow, while GM2DI and GM3EDQ (Wishaw), GM6KH (Hamilton), GM3BDA (Airdrie) are also heard frequently. GM6LS, 500 feet up in Edinburgh, has been heard at S7 in Glasgow, while GM3BDA has worked GM3OL (Dumfries) and has been received by G3BW (Whitehaven). This follows on the first 2m. G/GM QSO reported last month between G3BW and GM3OL. Schedules with northern G's are requested by the GM's.

South of the Border, G4LX (Newcastle) has worked the South Shields group G8AO, G8JO and G8IF at 10 miles, and G3CYY at 1 mile. He comments that the signals he receives from G8AO on two metres are louder than on any other band. So far no signals from the South have been logged; schedules will be welcomed in any direction.

Another centre of 2 m. activity in the North is Catterick, Yorks, where G2HNL, G3CIO, G3CVO/A, G3DMK and G4RB are on the band. A regular net on 145.26 mc is maintained daily at 2000 and they look North and South at 2030 for DX. G8IC is active near Doncaster, while G2OI (Manchester) is on every evening at 2100 hoping for a break! He is of the opinion that the 2 m. beams are so efficient that unless some arrangement be made for times of North and South transmissions many possible DX contacts will be missed. Perhaps northern beams have better front-to-back ratios than the southern types, but we must mention that we can get most of the South London stations when they are beamed North, and we have worked Devon with our own beam NE! Over a year ago it was prophesied in this column that there would be more "dead" spells on two than on five metres, working on the fact that much of our

British VHF Records

58 mc	GDX (Tropo),	G3BLP/GM3OL,	296 miles.
	GDX (Aurora),	G5MA/GM2DAU,	363 miles.
	Tropo (European),	G3CQC/F8YZ,	460 miles.
145 mc	European,	G5BY/PAØZQ,	390 miles.



Another VHF Dinner group. In the front row, l. to r., are G2AJ, G6VX, G2XC, G2NH, G3BLP, G2WS and G16TK. The ladies in the back row are G2YL (left) and G8LY.

five-metre GDX was probably due to reflection, a mechanism which would be much less effective on 2 m. So we feel that it is just a case of patiently waiting for that settled summer weather and a nice duct.

G2ADZ (Oswestry) called six London stations one evening without success and asks for a receiver check-up down South! He says G4OS is active in Chester and G3AUS in Stoke.

In Wolverhampton, G3CNY, G3EEZ and G8KL are all on 2 metres. The last-named is anticipating building a 16-element array and asks for information on feeding it from 50-ohm coax. His Rx is a modified SCR522 with 9003 local oscillator and 12 mc IF. Active stations in Coventry are G3ABA, G3BGG, G4NB, G4RK, G5PP and G6YU, while G2R1 is ready in Leicester.

G2XS and G5UD (King's Lynn) are hoping to put Norfolk on the 2 m. map and the former worked G5MA (Ashstead), during one of the few good spells of the past month.

G8QX (Malvern) has hopes of erecting a stacked array, while G5BM (Cheltenham) heard or worked GDX on 14 days during the month. G8DM (Shrivenham, Berks) has shifted QTH and as a result will be inactive for a while. The new QTH is about 1 mile from the old. He enquires for 145 mc activity between 1700 and 1800, especially on the South Coast or in GC. G3CCP, also at Shrivenham, hopes to be on VHF soon. G4AP keeps the flag flying at nearby Swindon.

In the South-West, G3YH and G5YK keep Bristol in the 2 m. picture. The former has an R1132A with EF54-EF54-EC52 at the front end. He has been heard by G3EHY and G5BH, and is active daily at 1930 and 2230. G3EHY (Banwell) has an RK34 PD on 145 mc and will beam ESE nightly at 1930, 2030 and 2200, while G4RX (Bridgwater) hopes to be active soon. G5QA (Exeter) is finding 145 mc very lonely. He has worked G6WT but nought else, using a G2AJ type Tx (*Short Wave Magazine*, November 1948) a 4-element beam, and a CC converter with a 2 RF stages. Active hours are 1900-2000 and 2200-2230. He wants information on aerial change-over relays.

News from the South-East includes a shift of QTH by G2CIW (Brentford) to a somewhat lower position on the same hill. (We apologise for identifying G3BLP as G2CIW in the picture last month!) G3BLP (Croydon) has worked G2IQ for DX. G5UM (Knebworth) uses a TRF Rx, EF54-EC52-EF50, which gives excellent results on CW. He will keep any schedule at any time (except Wednesdays) for anyone requiring Herts. Others active on two metres include G2AKM (Guildford), G2KG (Chelmsford), G2WJ (Dunmow), G5PB (New Milton)—1830 daily, G6VC (Northfleet) and G8SM (Molesey).

Finally, our apologies if we have had to condense your report this time, but the Five-Metre story in these pages has taken much of our quota of space this month. But we hope

to be able to do ample justice to the 2 m. and 70 cm. news in the May issue.

Activity Week-End

The first Two-Metre Activity Week-End was not blessed with outstanding conditions, but reports from up and down the country show that there was plenty doing—enough, at least, to encourage us to suggest a second such Week-End for May 7-8. The idea is to be on the band as much as possible between 1800 on the Saturday and midnight on Sunday. Might we suggest a N-S effort from 1900 to 1930 and 2215 to 2300, and E-W 2000 to 2030 and 2300 to 2330, both days.

Late News

SM5VL is reported to be on 144.24 mc daily with an 18-element beam directed at G; times are 0640 and 2000 GMT, for 15 minutes.

His input is 150 watts and he has a triple superhet Rx. Others known to be interested include SM7BE, OH2NV, 2NJ and 2OK. In addition, the SM's are still licensed for 50 mc.

We also understand that the OZ's are holding a 2 m. field day on May 14-15, from 2000 to 2300 on the Saturday, and 0900 to 1700 on Sunday.

GC2AWT is on 145 mc in Jersey, and has heard a few (mostly unreadable) signals, but G3DUP was logged in November. He hopes to operate portable soon.

In Conclusion

Please let us have your reports for next month by April 14 latest. The address is, as usual, E. J. Williams, G2XC, *Short Wave Magazine*, 49 Victoria Street, London, S.W.1. CU on May 4.

Crystal Checker for 70 Cm.

Useful 420 mc Test Unit

By E. JOHNSON (G2HR)

ONE of the particular advantages of VHF work is the ability to carry out aerial tests and transmitter adjustment within the four walls of the station. The chances are that the operating room may have an area of at least several square wavelengths—if one may coin a phrase!—and it is quite practicable to construct aerial arrays on 420 mc and to watch their behaviour very easily.

The new silicon-type crystal detector lends itself admirably to this purpose, untrammelled as it is by any kind of power supply. A basic circuit is shown in Fig. 1, the performance of which can be vastly improved by slight modifications.

Crystal Matching

The dipole should be cut for a frequency of 440 mc, the centre of the band. Owing to increased "end-effect" in the VHF spectrum, the length will be slightly less than the value given by the formulæ commonly used on the lower frequencies. In any case tuning will not be sharp owing to the loading of the crystal,

and a length of 12 ins. will land us well in the band.

The centre impedance of the dipole is roughly 80 ohms. Obviously, this is a very poor point to insert the crystal, the working impedance of which is certainly very much higher; it is a value rather difficult to compute, varying as it does with the applied signal. There are several approaches to the problem. Fig. 2 shows that by the insertion of a quarter-wave matching section the impedance presented to the crystal may be raised con-

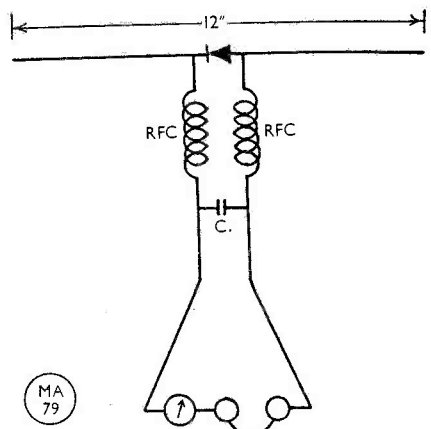


Fig. 1. The basic arrangement, but unsuitable without the modifications discussed in the text. C is .0001 μ F.

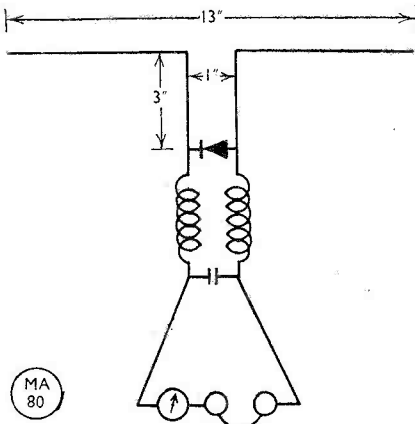


Fig. 2. Addition of a quarter-wave line transformer matches the crystal into a more suitable impedance. The vertical distance should be 6 in., and not as shown above.

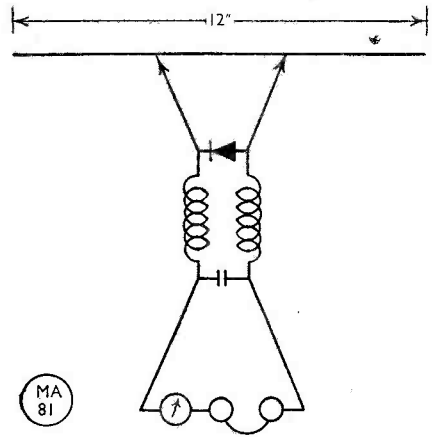


Fig. 3. Using delta-matching as an alternative connection into the detector.

siderably. The matching transformer may consist of two parallel wires of 16 SWG, spaced 1 in. and 6 ins. long. This will have a surge impedance of about 400 ohms. The "see-saw" action of the transformer is such that the step-up to the crystal is in the ratio 400/80 or approximately 2,000 ohms, which is a value far more acceptable to the detector.

As an alternative, the well-known delta match may be tried as shown in Fig. 3. Here the best method of adjustment is to slide the feed wires along the aerial, each equidistant from the centre, until a maximum indication is shown on the microammeter.

Parasitic Elements

The addition of a reflector behind the dipole not only serves its primary purpose, but also helps to achieve a good impedance match between aerial and crystal (Fig. 4). At the usual spacing of 0.1-0.15 wavelength, the impedance of the aerial is lowered considerably. Remembering the "see-saw" action of the quarter-wave line, it will be seen that the impedance presented to the crystal will be raised accordingly. The adjustment is, of course, to vary the distance between aerial and reflector until once again a maximum indication is shown on the meter.

Applications

Once having adjusted the unit for optimum performance, its versatility will be obvious. The effect of various transmitter adjustments and aerial systems will be clearly shown. In order to eliminate any possible pure induction

effects, the separation between receiver and transmitter should be several wavelengths. As this is only a matter of a couple of yards or so, there is plenty of room in the average station.

The actual range of the VHF crystal receiver is obviously very limited, and not much more than of academic interest. The possibilities are nevertheless intriguing, and experiments with a local amateur are proceeding along these lines. The transmitter must, of course, be tone-modulated for this purpose.

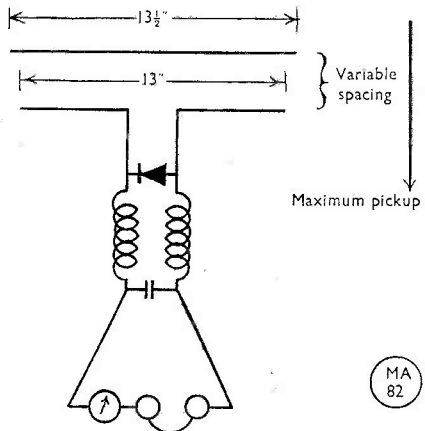


Fig. 4. Putting on a reflector not only increases the pick-up in the desired direction, but also enables the impedance appearing at the crystal to be varied.

Off the Air

Some Random Notes

By THE OLD TIMER

TWO years have elapsed since I wrote on a number of disconnected subjects under this same title; and in two years of Amateur Radio a lot of things can happen. They have—to me, personally—but not to our hobby as a whole. We still seem to be doing much the same things; chasing the same countries on the same bands, except for the fact that “Two” has replaced “Five”.

One of my major headings concerned the frightful risks that some owners of haywire stations take in the way they deal with high voltages. Well, I haven’t actually heard of any deaths from this cause since April, 1947, but I *have* very nearly run into trouble myself. Not, let me hasten to add, through any carelessness over wiring or safety precautions, but because of an unfortunate technical hitch occasioned by a sticking relay.

Normally, all my power supplies and, in fact, all my station switching is carried out by relays. On the occasion I refer to I “pulled the big switch”, and all the relays except one duly broke their circuits. That one (of course you’ve guessed it) was the relay in the primary of the main HT transformer. Luckily, I touched my PA and switched off the actual power *switch* at the same time.

So don’t rely *too much* on relays! Use them for a quick change-over but acquire the habit of knocking off a switch as well, before you engage in any potentially lethal operations.

These Windoms!

No, not another argument on how the Windom aerial works, but just a note of surprise. How often you see on the other fellow’s card that he uses a “Wyndham”? And how seldom do you find an American who knows what a Windom aerial is? You have to explain that what you mean is an “off centre single-wire feed” arrangement. A little while back a W station said to me, in the course of a phone QSO, “Several of you fellows use this Windom antenna over there; we’ve never heard of it in the States, and we’d sure like to know what it s and why”.

So I had much pleasure in explaining to him that the Windom was first described in QST during the 1920’s, and that the author of the article was Loren G. Windom, W8GZ/W8ZG, who, incidentally, still appears in the latest Call Book under both those call signs.

We hear so much of the Americans’ liking for snappy titles (Radar instead of Radio-location, and so on) that it rather pains me to hear them talking about “off centre single wire feed”—especially when describing one of their own products!

Mainly Historical

Little do some of the newcomers know about our prefixes, and how many changes they went through before we arrived at the system which every good amateur now knows off by heart. No mean feat of memory, by the way, to remember some 250 of them with hardly any conscious effort, but lots and lots of people can do it.

In the very early days of Amateur Radio (just after the 1914-18 war) the British amateurs were distinguished by the initial figure “2”. No “G”, of course. The “2” was doubtless allotted because there was, and still is, a horror in some circles of using “0” or “1”, which might be mistaken in writing for the letters “O” and “I”.

So all British amateurs were “2’s”, which is why the Old Timers who busted the very first DX records all hold calls like (to quote a few) 2NM, 2KF, 2SZ, 2OD, 2WJ, 2JZ, and so on. As the number of British licences increased the authorities for some reason omitted to use “3” and “4”, so the next series was the “5’s”, followed by the “6’s”.

Searching round Europe, therefore, *circa* 1925-27, one heard 2’s, 5’s and 6’s from Great Britain; 8’s from France; Ø’s from Holland; 1’s from Italy; 4’s from Belgium; 7’s from Denmark. Swedish stations had calls like SMZZ, SMZV, and so on, starting from SMZZ, and working backwards. Their figures, denoting districts, were put in afterwards. Spanish stations were EAR1, EAR2, and the like.

Then the prefix scheme was started, owing to the fact that American and Canadian stations were being so well received in Europe that they had to distinguish themselves by using the letters “U” and “C” respectively. So in came a system of somewhat unofficial single-letter prefixes—F for France, B for Belgium, D for Denmark, H for Switzerland, L for Luxembourg, N for the Netherlands, and so on. At the same time stations in other continents were beginning to overlap; Brazil, for instance, used B, Chile used C.

Next, at the instigation of the I.A.R.U., each *continent* adopted a prefix in front of the country prefix. So we—quite unofficially—became EG; France EF; the United States NU, Canada NC; Brazil SB, Chile SC; Australia OA and New Zealand OZ (O for Oceania); India AI, China AC; and Africa, finding Asia already using “A”, had to use

"F" as the continental prefix, which gave us FO for the Union of South Africa, FK for Kenya, FE for Egypt, and so on.

All this was quite clear and free from overlap, but it was unofficial. So, in 1928-29, at one of the periodical high-power conferences, amateur stations throughout the world were given official prefixes, derived from the blocks of call-sign letters allocated to each country. And then, for the first time, W was heard from the U.S.A., VE from Canada, VK from Australia, and, in fact, the prefixes became what they are to-day except for the various individual alterations and modifications that have taken place from time to time.

The interesting thing is this—if you hark right back to the time when Europe had no prefixes at all, and note the Belgian 4's, the Italian 1's, the Dutch Ø's, the French 8's and the Swiss 9's, you will see that these, at least, have persisted right through to the present day.

All-Band Finals

There are many, many stations on the air now in which the same final PA is used for all the DX bands. But how long does band-changing take, do you think? Well, researches from my own station have shown that it may be anything from 20 seconds to 5 minutes. This strange variation depends upon two things—the type of coils used and the link-coupling arrangements from the exciter unit to the final.

Plug-in coils can be made extremely rigid in these days by winding them on a former and mounting them on a five-pin plug of one of the well-known designs, giving two ends, a centre-tap and the two ends of a link winding. So there's really no excuse for sloppy coils which wobble about on stalks and have highly unstable links dropping round them like banana-petals!

Regarding link coupling, I cannot understand why so few amateurs take the trouble to run a short length of concentric, *properly fitted with plugs and sockets*, for this purpose. The links on my own PA's grid coils are taken out through two of the pins on the little five-pin former to a concentric socket on the panel. Into this I can plug one of two cables; one comes from an exciter that I use for 3.5 and 7 mc, the other from an exciter for 28 and 14 mc. It takes only a second to change. The common VFO unit can likewise be plugged into either of the exciters by similar means. It's such a joy to be clear of dangling leads, twisted flex and general untidiness that it is well worth two days off the air to tidy the whole station up to this extent—not that it could take anything like two days to do it!

The coupling from the final tank to the aerial tuning unit, over by the window there, can also be so equipped; this makes for flexibility, as well, because you can easily plug the exciter straight into the aerial unit for QRP tests, if you are interested. My motto is "Haywire's all right for the experimental bits, but not for piping RF around the place".

Logging the DX

I have heard many people remarking that the sorting out of their countries worked into the four separate DX bands has meant an awful lot of browsing through logs and much clerical work. This means, of course, that very few of us keep a really good record of what we have worked on each band.

Let me put up an obvious suggestion for a real trouble-saver. Open your *DX Operating Manual* at page 35—the Country List by Prefixes. Between the countries and the Zone numbers you will find there is just room to rule four narrow columns. The only cases in which they need cut into the type are on page 36, where "Sudan, Anglo-Egyptian" and "Newfoundland and Labrador" stick themselves out rather a long way. Head these columns 3.5, 7, 14 and 28, and simply put a dot in the appropriate column when you work a country on that band.

When you have finished, tot them up and enter them on a sheet of paper which you can keep tucked inside the Manual, against a date. From the day on which you do this, keep a full record; each time you work a country that is new to a particular band; put his prefix down in the appropriate column on this slip of paper, and also put a dot in the right place in the country list. Then, each month, when the time comes round for you to tot up your figures, just rule across the paper, add the new prefixes to your previous total, enter the new set of totals, and there you are. Obvious, but it may save a lot of people a lot of time.

THE NEXT R.A.E.

The Radio Amateur's Examination to be held in May is not far off, and we find potential candidates are taking a great interest in "R.A.E. Questions Answered" in our *Short Wave Listener*. This series is a practical treatment of the Paper set for the last R.A.E. and the whole subject is covered in issues of the *Short Wave Listener* for February-May inclusive. The May issue appears on April 21 next. The price of the *Short Wave Listener* is 1s. 3d., or 16s. by annual subscription. Write the Circulation Manager, Short Wave Magazine, Ltd., 49 Victoria Street, London, S.W.1.

Sensitive S-Meter

Note by G. A. DAY

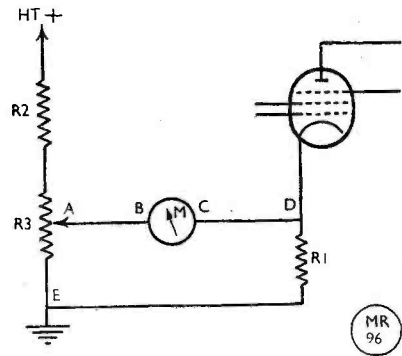
SIGNAL strength is always a controversial subject and so far there seems to be no standard by which it may be judged. Each operator seems to have his own notion of what is S1 or S9. But it is at least a good idea to have linear indication of signals lying between *your* idea of 1 and 9 on the meter.

The arrangement described here is sensitive and fills this need, so far as an experienced eye/ear combination can tell. Taking an IF valve on the AVC line, measure the voltage on the cathode at zero signal. Then arrange for the voltage drop between A and E to equal the cathode voltage. The meter will then read zero.

On the application of a signal to the grid of V1, the cathode current decreases, but since the proportionate decrease over the comparatively high resistance arm DAE is less than that over the bias arm, the voltage drop will be less, resulting in a potential difference between B and C.

The current through the meter due to this PD is thus a measure of the signal strength. Now the values:

The calculations are simple applications of Ohm's Law (don't forget the current through



Circuit suggested for S-meter connection to an existing receiver, as described in the text.

R2, R3) but, as a practical guide, the following data may be helpful and are in use.

V = 6K7 Va 200, Vg2 100
M = 0.1 mA
R1 = 500 ohms
R2 = 30,000 ohms
R3 = 5 000 ohms

The HT to R2 is 150 volts from a stabiliser.

It's possibly a good idea to make the initial tests with a 0.5 milliamp. meter, in case the needle gets over-enthusiastic about your S9 signal!

In operation the meter is sensitive enough to give a clear S1 and, of course, reads upscale.

XTAL XCHANGE

Just a few this month—please see page 49 of our March issue for the simple rules regarding insertions in this space. free to those readers who wish to exchange crystals. Buy-or-sell notices can *not* be accepted for "Xtal Xchange," and your offer should be set out as below on a separate slip headed "Xtal Xchange—Free Insertion."

GC2CNC, 8 Havre-des-Pas, Jersey, C.I.

Has OCC 3263 kc crystal in holder. Wants similar type 1800-1900 kc.

G2WD, End House Hilderstone Road, Rough Close, Stoke-on-Trent, Staffs.

Has Brookes $\frac{1}{2}$ -in. pin spacing 1900, 3631, 3716, 14513.5 kc crystals. Wants $\frac{1}{2}$ -in. pin spacing crystals 7050, 7060 kc or near.

G3CTM, Lyn-on, Pound Road, Bursledon, Southampton.

Has OCC P5 3530 kc crystal certificated. Wants similar crystals at 3515-3525 kc.

G3EQK 198 Sandford Road, Jesmond, Newcastle-on-Tyne, 2.

Has certificated RCA 100 kc bar, with base. Wants crystal for LF end 1.7 mc band.

CARDS IN THE BOX

If your call appears below, we are without your full address for the delivery of card(s) waiting for you in our QSL Bureau. Please send a large stamped addressed envelope to BCM/QSL, London, W.C.1., with your name and callsign. If you would like your address to appear in "New QTH's," and thereafter in the *Radio Amateur Call Book*, mention that at the same time.

G2AWF, 2AZ, 2BIP, 2BQ, 2BTJ, 2CXU, 2DCL, 2GU, 2HED, 2KB, 3AAD, 3AGO, 3AJB, 3BRR, 3BVM, 3CKF, 3CNO, 3CRJ, 3CRS, 3CSY, 3CVR, 3DGY, 3DID, 3DMG, 3DRG, 3DVT, 3DWF, 3DYG, 3DZJ, 3DZO, 3DZZ, 3EAM, 3ECV, 3EEQ, 3EFF, 3EHJ, 3EID, 3EKO, 3ELO, 3EMA, 3ENZ, 3EPB, 3EPE, 3EPK, 3EQ, 3EQQ, 3ERZ, 3ESK, 3FHC, 3FOZ, 3OD, 3QA, 3VC, 3VZ, 3XG, 3YA, 3YC, 4PA, 5CJ, 5RT, 5UJ, 5YM, 6PU, 8BB, 8BJ, 8JX, GC2BMU, G13FEF, GM2CMP, 3BYM, 3BZY, 3EHC, 3EHH, 3FGL, 5PJ, 5YW, GW3DRK.

Here

The Tenth Province

On March 31, the ancient colony of Newfoundland became the Tenth Province of the Dominion of Canada. This means that for Amateur Radio purposes, the VO's no longer count for a separate country—Newfoundland and Labrador are in Zones 2 and 5. And so the wheels of history turn.

Note on EF50's

Several readers query the choice of EF50's for the early stages of the Speech Driver Unit described by G2AJ in the March issue of the *Magazine*. The contention is that these valves are so prone to microphonic effects that they are likely to be quite unsatisfactory for the purpose. The answer is that microphony can be entirely avoided if the locking rings, as specified by the makers, are used. In fact, in any application of the EF50 the locking ring should be fitted as a matter of course; apart from preventing microphony in audio circuits, it is the only way in which the valve can be properly gripped into the holder.

As a point of interest, it might be added that this particular model of the Speech Driver Unit is in regular use on the air and until it was queried, no difficulty about microphony had even been considered.

Getting Around !

A Danish reader remarks as follows: "... Two weeks ago I bought the *Short Wave Magazine* at a small station on the SM-LA border; the train on which I was travelling from Oslo to Gothenburg and Copenhagen happened to make a short stop there. I was

indeed surprised to find such a book on sale at such an outlandish place. . . ." So are we, rather !

Old Timers' Club

This month we welcome a further nine members into the British Old Timers' Club, bringing the present total membership figure up to 147. It is very much hoped that a considerable percentage will be able to foregather at the Horse Shoe Hotel, Tottenham Court Road, London, W.C.1, for the Dinner on May 20 next. The necessary paper about this has already been circulated to all B.O.T.C. members, and a large

and

number of reservations have come in. *Please* don't leave it till the last moment, nor expect to be able to squeeze in on the night. We must know well in advance how many are coming, so post that slip, with your 10s., straight away.

The new members are: H. R. Adams (G2NO), 1919; W. Gill (G6NP) 1920; J. Cookson (G6KK), 1922; E. G. Ingram (GM6IZ), 1925; F. W. Miles (G5ML), 1925; R. A. Bartlett (G6RB), 1927; H. C. Kenworthy, O.B.E. (G6HX), 1927; C. D. S. Underwood (G5UD), 1929; and L. A. Carter (G5AQ), 1929.

If you received your full transmitting permit not less than 20 years ago, and still hold a licence to-day, you are eligible for membership of the British Old Timers' Club.

For Blind Amateurs

We would particularly ask that this note be brought to the attention of transmitting amateurs handicapped by blindness. On the initiative of

G3DRE and G6KJ, who themselves are both blind, it is suggested that a small club or society be formed to bring together all such amateurs; the main object of the organisation would be mutually to advise and assist members with their own particular problems in Amateur Radio.

There are at least six active operators known to us to qualify, and from much observation of one particular case, we are well aware that the problems of the blind operator are such as to be quite outside the experience of sighted people.

We are therefore very glad to be able to give publicity to this suggestion, which will be aided by the *Magazine* in every possible way. In the first instance, all correspondence on the subject should be addressed *either* to: P. H. H. Jones, G3DRE, Flat 2, 81 Upper Hanover Street, Sheffield, 3, or W. Krohn, C.S.P. (G6KJ), 20 Church Street, Buckingham.

Chink in the Curtain ?

In connection with "Pse QSL" in our *Short Wave Listener*—a note regarding which appears periodically in the *Magazine*—we were astonished to receive requests

There

from two UA3's in Moscow giving details of their activities for insertion in "Pse QSL"! Even more surprising is the fact they both give a full postal address for reports; it is the first time for many years that we have seen a Russian amateur QTH. Both notices duly appear in the April *Short Wave Listener*—we hope nobody is going to be shot for this !

NEW QTH's

This space is available for the publication of the addresses of all holders of new call signs, or changes of address of transmitters already licensed. All addresses published here are automatically included in the quarterly issue of the Call Book in preparation. QTH's are inserted as they are received, up to the limit of the space allowance. Please write clearly and address on a separate slip to QTH Section.

- G2AL T. Halstead, Castle Hill Cottage, High Westhouse, *via* Carnforth, Lancs.
- G2AUK S. J. Harris, 90 Wilsmere Drive, Northolt, Middlesex.
- G2AYN M. Page, 55 Dudden Hill Lane, Willesden, London, N.W.2.
- G2BBA S. Bradbury, 34 Cumberland Road, Lidget Green, Bradford, Yorks.
- G2BXS H. Simpson, 2 Amelia Street, Saltaire, near Shipley, Yorks.
- G2CBR A. Prince, 72 Ryburn Road, Ormskirk, Lancs. (Tel.: *Ormskirk* 775.)
- G2FXG A. S. Green, 12 Meadow Walk, Hackbridge, Wallington, Surrey.
- G3AFA F. Marrs, 6 York Street, Penrith, Cumberland.
- G3AVV G. Gunnill, 11 Kennet Road, Chilton, Berks.
- G3BDD D. Hudson, 20 Palin Avenue, Bradford Moor, Bradford, Yorks.
- G3BER W. Medland, Deneholme, Ocean Road, Hart Station, Hartlepool, Co. Durham.
- G3BMY I. T. Cashmore, 9 Beechfield Close, Cocksheads Estate, Blackheath, Birmingham.
- G3BZU H.M.S. Mercury Amateur Radio Club, H.M.S. Mercury, East Meon, Petersfield, Hants.
- G3CCX P. Craw, Sea Breezes, Harsfold Road, Littlehampton, Sussex.
- G3CNI K. S. Smart, 50 Church Street, Dunstable, Beds.
- G3CZA W. B. S. Marsters, 86 Station Road, Manea, near March, Cambs.
- G3DBY J. S. Hallatt, 10 Queens Grove, Chorley, Lancs.
- G3DC F. E. Woodhouse, 13 Lancaster Road, New Southgate, London, N.11.
- G3DGR B. Goodger, The Barley Bungalow, Gobowen Road, Oswestry, Salop.
- G3DHJ A. B. Ormston, 1 Bywell Avenue, Hexham, Northumberland.
- GM3DIE T. W. Dickson (*ex-XZ27D*), 37 Winton Park, Cockenzie, East Lothian, Scotland.
- G3DLQ S/Sgt. J. S. MacAulay, WO/Sgts.' Mess, Mons Officer Cadet School, Mons Barracks, Aldershot, Hants.
- GM3DNW W. Elliott, 14 Beechwood Drive, Renfrew.
- GM3DPL G. Morgan (*ex-VU2EG/VS2BU*), 16 Norval Place, Rosyth.
- G3DPU J. Wilson, 13 Holderness Road, High Howdon, Wallsend-on-Tyne, Northumberland.
- G3DQP K. D. Coleman, Bury Mill House, Bury Road, Hemel Hempstead, Herts.
- G3DQY J. Vaughan, Stanstead House, Stanstead Road, Caterham Surrey.
- GW3DSG W. D. Gooderidge, Sydney House, Romilly Road, Barry, Glam.
- G3DWP R. E. Marsters, Daintree Farm, Upwell Road, March, Cambs.
- G3DWT G. R. Rustage, 25 Maple Avenue, Whitefield, Manchester.
- G3DYZ V. Brindley, 7 Briarfield Crescent, Gleadless, near Sheffield.
- G3DZU B. Barrett, 1 Bambury Street, Bury, Lancs.
- G3EBG W. H. Reckitt, 28 Caterham Avenue, Ifford, Essex.
- G3EBK B. B. Gale, Braemar, Downfield Road, Stroud, Glos.
- G3EBR L. Sisson, 10 Holyoake Terrace, Penrith, Cumberland.
- G3ECQ G. McGarry, Ardmore, Crumlin, Co. Antrim.
- G3EDV J. Smale, Ashlyn, Matfield, near Tonbridge, Kent.
- G3EEI G. Scot Simmonds, 19 Broomwater, Teddington, Middlesex.
- G3EFI P. J. Powell, 36 Cundey Street, Bolton, Lancs.
- GM3EFJ J. R. Ellis, 15 Howegate, Hawick, Roxburghshire.
- G3EGJ R. C. Hotter, 14 Crescent Avenue, Little Thurrock, Grays, Essex.
- G3EGK G. S. Bracewell, 40 Downs Drive, Timperley, Cheshire.
- G3EGV R. Stanforth, 365 Queen Street, Withernsea, Yorks.
- G3EHA G. F. Hendriksen (*ex-JAAU*), 14 Drayton Road, Wallasey Cheshire.
- GW3EHN J. O. Thomas, Cymie House, Wau Road, Loughor, near Swansea, Glam.
- G3EKH G. B. Oswald, 3 Briardale, Edgware, London.
- G3ELG H. N. Gubby, 37 South Hall Road, Thorpe Hesley, near Rotherham, Yorks.
- G3ELL G. I. Griffiths, 37 Pagebank Road, Liverpool, 14.
- G3ELY D. Parker, 5 Meech Street Openshaw, Manchester, 11, Lancs.
- G3EMU I. R. N. Cline, 7 Monastery Street, Canterbury, Kent.
- G3ENO R. Green, 23 Haugh Road, Rawmarsh, Yorks.
- G3EOG G. A. Amey, 20 Norwich Road, Bitterne Park, Southampton.
- GW3EOP Neath, Port Talbot and District Amateur Radio Club, Royal Dock Hotel, Villiers Street, Briton Ferry, Neath, Glam.
- G3EQR F. Bradley, 44 Hinstock Road, Handsworth Wood, Birmingham 20.
- GM3EQZ J. Solly, 192 Windmill Hill Street, Motherwell, Lanarks.
- G3ERH J. S. Rowe, 12 Russell Road, Liverpool, 15.
- G3ERJ R. A. Dimmer, 23 Linden Grove, Alverstoke, Gosport, Hants.
- G3ERQ D. Day, 110 Vicarage Farm Road, Heston, Middlesex. (Tel.: *Hornstow* 4659.)
- G3ESG R. S. Moss, 83 Rock Avenue, Gillingham, Kent.
- GM3EST A. E. Sinclair, 76 Jerviston Road, Motherwell, Lanarkshire.
- G3ETN J. Staff-Breit, 27 Stanton Road, Shirley, Birmingham.
- G3ETN/A F/Lt. J. Staff-Breit, Officers' Mess R.A.F. Debden, Saffron Walden, Essex.
- G3ETY G. H. Lane, B.Sc., 110 Boothroyden Road, Higher Blackley, Manchester, 9.
- GW3EUS J. G. Fitzgerald, Church House, Laverdock, near Penarth, S. Wales.
- GM3EUV A. Porter, B.Sc., Kellas, By Broughty Ferry, Dundee, Angus.
- G3EVD T. H. Spokes, 47 Carlton Road, Woodside Estate, Grays, Essex.
- G3EVE Brighton and District Radio Club, St. Mary's Hall, Bread Street, Brighton, Sussex.
- G3EWJ Capt. E. R. B. Harmer, 53 Kinross Avenue, Worcester Park, Surrey.
- G3EWS A. K. Sargeant, 11 Arbor Drive, Burnage, Manchester, 19.
- G3EWY P. F. Walder, 1 East Street, Chichester, Sussex.
- G3EWZ W. D. Wardle 42 Cromptons Lane, Liverpool, 18.

G3EXL	D. C. Derham, B.Sc.(Eng.), Station House, Liphook, Hants.
G3EXT	S. H. Dutton, 17 Victoria Pathway, Queen's Park, Chester.
G3EXW	A. S. Apperley, 32 Cutler Road, Uplands, Stroud, Glos.
G3EYK	C. S. McCann, 20 Acregate Lane South, Preston, Lancs.
G3EYM	J. E. Grace, 17 Brereton Avenue, Bebington, Cheshire.
GM3EZO	I. Sutherland, 15 High Street, Buckie, Banffshire, Scotland.
G3EZZ	J. Eaton, 74a Station Road, Langley Mill, Nottingham.
GM3FAK	J. McIntosh, 68 Windsor Park, Musselburgh, Midlothian, Scotland.
G3FAM	H. W. Brooker, 17 Royal Oak Road, Bexleyheath, Kent.
G3FAO	A. F. Davidson, 3 Hervey Road, London, S.E.3.
G3FBE	R. Chandler, Hillside, Bayview Road, Whitstable, Kent.
G3FBN	W. J. Bolton, 37 Elmwood Avenue, Kenton, Harrow, Middlesex.
GD3FBS	H. Grist, Broadway House, Broadway, Douglas, Isle of Man.
GW3FBX	A. Harbottle (ex-VS6AO), 175 Caerphilly Road, Birchgrove, Cardiff.
G3FBZ	J. Jeffs, Willow Brook, Tinacre Hill, Wightwick, near Wolverhampton.
G3FCZ	I. R. Gibbons, 98 Staplehurst Road, Sittingbourne, Kent. (Tel.: <i>Sittingbourne 565.</i>)
G3FDF	D. W. Lilley, 1 Gt. Northern Cottages, Scaford Road, Melton Mowbray, Leics.
G3FMB	F. T. Butler, 101 Wilson Avenue, Rochester, Kent. (Tel.: <i>Chatham 3978.</i>)
G3RO	A. M. Johnson, 2 Broughton Drive, Cressington, Liverpool, 19.
G4SA	E. J. W. Ahier, The Little House, Norman Avenue, Abingdon, Berks.
GM6IZ	E. G. Ingram, 275 Clifton Road, Aberdeen.

CHANGE OF ADDRESS

G2AAA	R. E. Durrant, The Lodge, Pitsford, Northampton.
G2BVM	K. H. Pearce, High Street, Ixworth, near Bury St. Edmunds, Suffolk. (Tel.: <i>Pakenham 348.</i>)
G2FQH	C. H. Gould, 51 Pontefract Road, Ferrybridge, Yorks.
GM2FQO	W. Anderson, 58 Kirk Street, Campbeltown, Argyll.
G3ALE/A	B. Randell, Almora Hall, Middleton St. George, Darlington, Co. Durham. (Tel.: <i>Dinsdale 3.</i>)
G3AQB	W. Stephenson, 78 Stanley Street, Blyth, Northumberland.
GM3ASM	S. Hincks, 97 Marchfield Avenue, Paisley, Renfrewshire, Scotland.
G3BWH	R. Tulloch, 27 Hall Carr Road, Rawtenstall, Lancs.
GW3CDH	E. E. Evans, 91 Grove Road, Risca, near Newport, Mon.
G3CPT	D. A. Capp, 23 Larch Grove, Bletchley, Bucks.
G3CWF	C. Wallis, 1016 Warwick Road, Acocks Green, Birmingham, 27.
G3DVH	J. R. Mason, 5 Ashcroft, Beecroft Estate, Dunstable, Beds.
G3EJR	J. B. Armstrong, 96 Powell Street, Wolverhampton, Staffs.
G3ENI/A	Lt. A. J. R. Pegler, R.N. Air Station, Culham, Abingdon, Berks.
GW3VL	P. R. Jenkins, Troedyrhiw, Lr. Greoswen, near Pontypridd, Glam.
G4FN	C. T. Wakeman, 12 Westborough Road, Westcliff-on-Sea, Essex.
G5AO	A. E. Lambourne, 23 Glynde Road, Brighton, 7, Sussex.
G5QI	W. S. Carter, 50 Fawley Bottom, Henley-on-Thames, Oxon.
GW8AI	D. G. Ross, 19 Llanmiloe Estate, Pendine Sands, Carmar. S. Wales.

RADIO VALVE DATA

We welcome the reappearance of the first post-war version of *Radio Valve Data*, an 80 pp. production giving the characteristics and other essential details on 1,600 British and American receiving valves. These are classified by types under functional headings, and British valves are further grouped under the names of their manufacturers. Obsolete, replacement and current types are also listed. Altogether, *Radio Valve Data* is complete on its subject and as such is an essential buy. Price is 3s. 9d. post free, of the Books Dept., Iliffe & Sons, Ltd., Dorset House, Stamford Street, London, S.E.1.



FOR THE DX MAN

A great many operators—probably the majority—have as their main interest in the practice of Amateur Radio the working of DX.

The *DX Operating Manual*, written by L. H. Thomas, M.B.E. (G6QB), who for long has been well known for his "DX Commentary" in the *Short Wave Magazine* each month, is

the fruit of many years' practical experience of every aspect of DX operation on the amateur bands. The *Manual* sets out to guide the beginner, inspire the uninitiated, and give points to the operator already high in the DX tables.

Of seven chapters, each complete in itself, and dealing fully with one particular phase of DX working, the *DX Operating Manual* can be regarded as a standard work of reference on the subject. The price is 2s. 8d. post free, of the Circulation Manager, *Short Wave Magazine, Ltd.*, 49 Victoria Street, London, S.W.1.

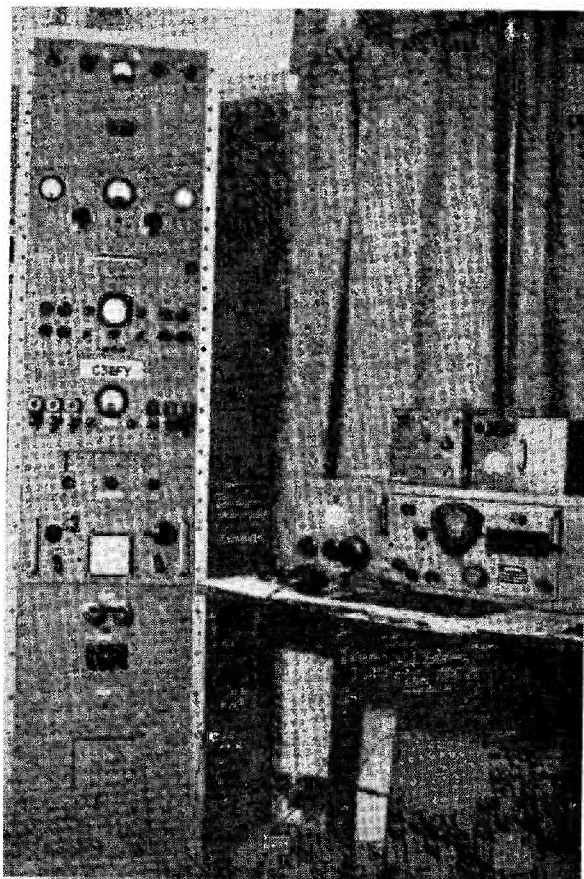


SMALL THOUGHT

To work DX successfully without offending others who also want to work it calls for a number of qualities in combination—patience, tolerance, common-sense, good humour and consideration for others.

These things cannot be taught by the written word, but they can always be found in the finest type of amateur.

The other man's station G3EFY



Licensed in September 1948 for 25 watts input, G3EFY is owned and operated by T. W. A. Smith at 98 Ladysmith Road, Exeter, S. Devon. With the exception of the receivers and the Class-D Wavemeter, all the equipment is home-constructed, including the rack assembly.

At the operating position is the BC-348Q receiver, with an RF-24 unit modified to work into it as a 10-metre converter. With the Class-D wavemeter is a field-strength meter, for aerial check and general monitoring. A speed key is used, and aerial change-over is by relay control.

The transmitter rack carries ten panels, accommodating a great deal of equipment. From the top down, there is the aerial tuning network, followed by a spare panel for what G3EFY describes as development; then the transmitter unit, running 6F6-6L6-807 PA; next below is a gramophone turn-table with

crystal pick-up; the oscilloscope with its Miller time-base follows; panel 5 distributes and controls AC power to the various units; then comes the racked-in five-band stand-by receiver; below is the VFO unit, consisting of a Clapp oscillator built into a TU6B; followed by the LT supply and main switching panel, below which is the HT deck carrying two power units (300-volt 60 mA, and 350-volt 100 mA), with a 10-in. moving-coil speaker.

The whole layout shows that much time and thought have been devoted to the design of a properly equipped station, easy to operate and yet allowing scope for expansion as time goes on and a full-power ticket is achieved. Active on 3.5, 7 and 14 mc, G3EFY uses the multi-band aerial described in the November 1946 issue of the *Short Wave Magazine*, and with the outfit as described here he has worked a total of nearly 30 countries to date.

THE MONTH WITH THE CLUBS

FROM REPORTS

The season seems to be in full swing, with no fewer than 37 Clubs reporting to us this month. Many of them are making preparations for portable work, Field Days, D/F Contests and the like, and it seems that this summer will not by any means imply a close-down for the majority.

We have seen, in their report, an appeal by the Worcester and District Amateur Radio Club, in connection with the Worcester College for the Blind. Although made primarily to the Club members, it seemed to us of sufficient importance to mention for the benefit of all who feel that they might undertake similar work. In a nutshell, it is this: "Can any members give a little time to coaching the young trainees at the College?" Several of the older students have been made honorary members of the club, and many of them have an excellent knowledge of the Morse code. Other clubs, please take note; there may be a similar job, well worth while, on or near your doorstep.

Next month's deadline for reports will be first post on April 13. Please address them to the Club Secretary, *Short Wave Magazine*, 49 Victoria Street, London, S.W.1. And so to our 37 reports. . . .

Stourbridge & District Amateur Radio Society.—The AGM was held in March, and the officers for 1949 elected. G6OI is President, G2NV Chairman, G8GF Secretary and G2CLS Treasurer. Future policy was discussed, and then G2YM, the Secretary of the Wolverhampton A.R.S., and of the Association of Midland Radio Committees, gave a short talk on the purposes of the latter. Finally, the winners of the January Top Band Contest were presented with their awards; G8GF won the CW section and G3CLG the Phone.

Reading Radio Society.—Recent meetings have included a talk on Oscilloscopes by G3BJE, a Junk Sale, and the annual Dinner and Social, held at the People's Pantry. In March several members also visited the new power station at Earley.

Swindon & District Short Wave Society.—This club now has a permanent Clubroom at 121 Morrison Street, Swindon, and a licence, with the call G3FEC, for 150 watts CW and Phone. Meetings are held every Saturday at 7.30, and new members will be wel-

comed for the programme of talks, constructional work and Morse practice which has been arranged for the coming season.

Malvern & District Radio Society.—At the April meeting Mr. A. Tuchins is due to give a talk on Sound Recordings; the following meeting takes place on May 3, when Mr. G. Garfitt (G2CKR, ex-VS1BZ) will speak on "Experiences in VS1".

Lincoln Short Wave Club.—They have received promises of lectures on Valves and Radio Relays by local members, but would very much like to get into touch with any organisation who will hire out suitable films. The committee is very busy on a programme which will include more interesting work out of doors for the coming season. New members will be heartily welcomed.

Surrey Radio Contact Club (Croydon).—Members present at the March meeting were given a very interesting talk on Practical Transmitter Design, by G2KU and G4QK. At the previous three meetings the club was glad to extend a

welcome to W3TR, ZL1LD and VK3JP. The April meeting is on the 12th, 7.30, at the Blacksmiths' Arms, South End, Croydon.

Kingston & District Amateur Radio Society.—A series of lectures is now in progress to help newcomers to obtain their licences. NFD arrangements are being discussed, and the club is still searching for more suitable premises. The fortnightly meetings continue, the next being on April 14—Kingston Hotel, at 7.30 p.m. Note the QTH of the new Hon. Sec., in panel.

South Manchester Radio Club.—The introduction of the club transmitter into the activities has increased members' interest, and plans are in hand for a D/F competition in which this transmitter will "go portable". In March a "Cash Quiz" was held, strange circuits being drawn on the blackboard. Members were invited to spot mistakes therein "for a small reward"! A recent Junk Sale was also highly successful, several members turning up looking rather like emigrants.

Lothians Radio Society.—Recent meetings took the form of a talk by Mr. W. R. Eadie, on Aerial Theory and Practice, and a lecture on Sound Reproduction by the designer of the Williamson amplifier. The club meets on the last Thursday of the month in the Chamber of Commerce Rooms, 25 Charlotte Square, Edinburgh.

Basingstoke Amateur Radio Society.—The first Annual Dinner of this society was held recently. Mr. F. E. Herzog (G2UM) spoke on the way in which radio amateurs had not only laid the foundations of our present system of broadcasting, but provided a valuable reserve in times of emergency. The President (G6OU) replied and stressed the aspect of comradeship

engendered by Amateur Radio as a hobby.

Cannock Chase Radio Society.—At the March meeting Mr. Bennett gave an interesting demonstration of fault-tracing with a CRO. Plans are in hand for a visit to Droitwich, and also for the forthcoming NFD.

South Hants Radio Transmitting Society.—This club, which serves the Portsmouth area, held its first AGM in February. It was decided to move to more spacious premises, to cope with the increasing membership. Meetings will be held monthly—see panel for Secretary's QTH.

Leicester Ham Radio Society.—The AGM was held recently and officers elected for the coming year. The permanent HQ is now The Holly Bush, Belgrave Road, Leicester, and meetings will be held there at 7.30 on the first Friday of each month. The general programme will include lectures, visits, local contests, Field Days, and participation in most of the National contests. All are welcome, and intending members should contact the Hon. Sec.—see panel for QTH.

Clifton Amateur Radio Society.—This club held a listening contest over a week-end in February. 18-year-old M. Wallace was the winner, with 76 countries heard in 36 Zones. The runner-up, D. W. Bruce, heard 71 countries in 29 Zones. Two lectures were also given during February, and many new members were

welcomed. There is still room for more at the New Cross Clubroom.

Solihull Amateur Radio Society.—The February lecture was given by G5TU and covered his professional experiences in VHF transmitter and receiver installation in Calcutta. It was illustrated with an epidiascope lent by a member of the club. The next lecture, by G5BJ, of the Birmingham City Police, is on the subject of Police VHF. At a later date G2ACV will describe the club transmitter.

West Cornwall Radio Club.—This club keeps in touch with its widely-scattered members by means of an excellent little publication called *The Radio Link*. From this we gather that an Annual Dinner is in the offing; that the March meeting at Penzance took the form of an Auction Sale in the office of the Town Clerk (G2WW); that the "Falmouth gang" are very active; and that considerable quantities of DX are being worked down in West Cornwall.

West Middlesex Amateur Radio Club.—Lectures on valves, amplifiers and television, as well as an amusing and profitable junk sale, have been held in spite of the lack of proper accommodation, which restricts the more practical side of club activity. A permanent home is still being sought. Meetings are held at the Labour Hall, Uxbridge Road, Southall, at 7.30 on the second and fourth Wednesdays. The AGM will be on

April 13, and is restricted to members only.

Hounslow & District Radio Society.—The club transmitter will shortly be on the air under the call-sign G3FHD; the gear has already been completed. Interesting and informative "lecturettes" were given by members at the February meetings. On March 9 the club's first lady member, Miss V. E. Stent of Staines, was admitted. A Junk Sale was also held, and many useful articles changed hands.

Cheltenham & District Amateur Radio Society.—February meetings took the form of a lecture by G8DT on the general principles of television and by a demonstration by G3COZ of a television receiver. With a make-shift aerial system, quite good pictures were received from London, so the club looks forward to the opening of the Midland station. Plans are afoot for two NFD stations, to be run by G5BK and G5BM on sites already chosen. The March programme included "Any Questions?", a Film Show by G3LP, a talk on D/F and a Club Whist Drive. On April 1, G3AJO gave a talk on the Oscilloscope.

Barnsley & District Amateur Radio Club.—Lectures on Suppression of Electrical Interference and Propagation of Radio Waves have been given by G8WF to a packed Clubroom at the last two meetings. The Annual Dinner was also a great success. Forthcoming meetings are on



The Morley Radio Club membership and their transmitter, with G3ABG on the key.

April 8 and 29, both 7.30 at the Clubroom.

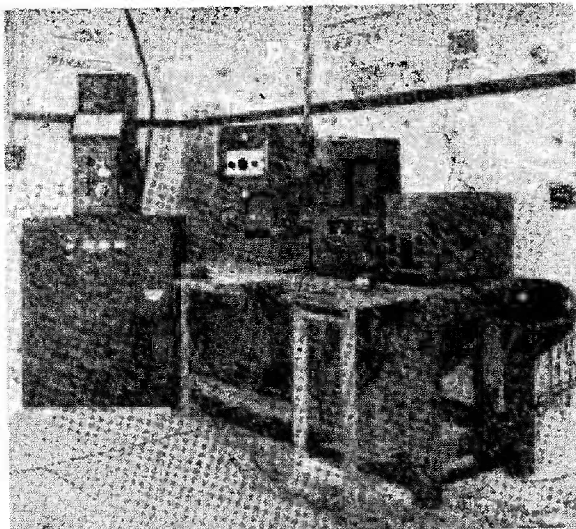
Aberdeen Amateur Radio Society.—This club flourishes with a membership of about 24, but unfortunately has no permanent headquarters at present, and the club transmitter is in storage. It is hoped that a lot of activity on the VHF bands will take place shortly.

Worcester & District Amateur Radio Club.—Meetings still command an average attendance of 75 per cent. of the membership—a very satisfactory figure. Committee meetings return the figure of 100! A club transmitter is hoped for in the near future. The Chairman (G3NL) is preparing a series of three talks on Aerials which will start with the May meeting. Please note that future meetings will be on the first and third Thursdays at 7 p.m., and that there will be a visit to Droitwich on May 22.

Exeter & District Radio Society.—Membership has now increased considerably and the weekly (Thursday) meetings at the YMCA are well attended. Subjects for lectures have been Loud Speakers, Screening, Layout of Components (US and British), and Time Bases. A talk was also given by Mr. E. Duffell of Antiference, Ltd., on Interference and Aerials. Summer visitors will be welcome at the Clubroom.

Wirral Amateur Radio Society.—Recent talks included one on The Development of the Loudspeaker (Mr. G. L. Flint) and one on Modulating the 807 (G6VS). Preparations are now in hand for the forthcoming Amateur Radio Exhibition. The April meetings will be on the 6th and 20th, YMCA, Whetstone Lane, Birkenhead.

Thames Valley Amateur Radio Transmitters Society.—The President of the Sutton and Cheam Radio Society was welcomed at the March meeting, together with members of that club. The VHF lecture by G8SM had to be postponed on account of illness, but G2NH, with G8IP and



Station VU2ARCI/VU2SWL of the Amateur Radio Club of India and associated Short Wave League. They publish *ORZ* as their official journal, with a QSL Bureau at Box 6666, Bombay.

G2DGO, gave an interesting talk and demonstration on Two Metres.

Cray Valley Radio Transmitting Club.—There are now 38 licensed members of this club, which is still growing. During March a "Supper-Social" was attended by over 50 members and friends; normal meetings are on the third Thursday, 7.30, in a private hall of the Station Hotel, Sidcup. A monthly club magazine is published.

West Kent Radio Society.—Mr. D. H. Budd, of the GPO Radio Section, gave a lecture to this club on TVI. In the course of a very informative and interesting talk, Mr. Budd disclosed that amateur transmitters have been responsible for less than one-tenth of the TVI complaints received by the Post Office. Meetings are on alternate Wednesdays (first and third) at Culverden House, Tunbridge Wells. Note new Secretary's QTH in panel.

Grafton Radio Society.—Grafton was visited by the Wanstead and Woodford Club

during March, for tea, cakes and discussions. A television receiver is under construction by members; Morse classes still flourish; and visitors are assured of a hearty welcome any Monday, Wednesday or Friday evening.

Edgware & District Radio Society.—Recent events have included a talk on Oscillators by G2IM, followed by a discussion, and a very interesting talk on Amateur Radio in Sweden by SM7PP, who also described his 400 mc gear. Every overseas visitor to this club now receives a certificate commemorating his visit. A 5-metre D/F Contest is being held late in March.

Enfield Radio Society.—A television receiver constructed from surplus gear was demonstrated at the last meeting, and members were considerably surprised at the excellent stability, intensity and quality of the picture considering the very low cost of the gear. A Morse class has been started. Prospective members are invited to contact the Hon. Sec.—QTH in panel.

Wanstead & Woodford Radio Society.—This club is still talking about its very successful visit to Grafton and about the wonderful welcome received. The membership continues at round about the 25 mark, and meetings are well attended. The club would like to hear from other clubs regarding exchange of visits.

Romford & District Amateur Radio Society.—A good attendance is still the rule at all meetings, cold-weather nights being helped out by the welcoming fire on arrival. The club programme has been printed, and other clubs desiring a copy are asked to get into touch with the Hon. Sec. NFD and the D/F Contest are being talked about; the latter contest will be in August and "somewhere in Essex". Lectures on D/F are being arranged before that time.

Coventry Amateur Radio Society.—When the lecturer booked for a recent meeting failed to arrive, the Chairman, G5GR, stepped into the breach with a talk on SSSC

and fits problems. The annual MARS/CARS transmitting contest took place late in February, and results are now being judged. The former Hon. Sec., G2YS, has left Coventry for a new location at Chester, and his place has been taken by Mr. K. Lines (see panel for QTH).

Liverpool & District Short Wave Club.—Preparations are being made for an Amateur Radio Exhibition in Liverpool, and the Liverpool, Merseyside, Wirral and Ellesmere Port Clubs are all taking an active part. Leading manufacturers will be co-operating in this important event, which is scheduled for May 2-7, in the premises of Messrs. Crane & Sons, Ltd., Hanover Street.

Gravesend Amateur Radio Society.—The Mayor (Cllr. E. E. Osborne, J.P., C.C.), visited the Clubroom during March and was installed a first Patron of the Society. He showed a keen interest in the equipment and QSL cards. G3EJK gave a talk on the SX-28 receiver, Mr. C. Paul

on the B.2, and Mr. P. Jobson on the Multimeter. Lectures on Receiver Design and Elementary Principles, together with the Morse class, continue each Wednesday.

Pontefract & District Amateur Radio Society.—At the March meeting G2FQH, the Hon. Sec., gave a talk on the Repair and Maintenance of Amateur Stations. There was a good attendance for this meeting, and some interesting discussion. At a later meeting in the month there was to be a talk on The Oscillator, by G3ADH.

Derby & District Amateur Radio Society.—The Society held its first Annual Dinner and Social during February. This was a highly successful event and it has now been decided, on the strength of it, to include a Social Evening in the programme once a month. Mr. A. G. G. Melville, F.R.C.S., Radiotherapist at Derbyshire Royal Infirmary, has consented to become the President of the Society. The next meetings are on April 13 and 27, and on May 11.

CLUB SECRETARIES' NAMES AND ADDRESSES

ABERDEEN. A. W. Wardle, 6 Leggart Terrace, Bridge of Dee, Aberdeen.
 BARNSELEY. J. A. Ward, G4JI, 44 Northgate, Barnsley.
 BASINGSTOKE. L. S. Adams, 16 Brambly Drive, Basingstoke.
 CANNOCK CHASE. W. Whettall, 94 Cannock Road, Pye Green, Hednesford, Staffs.
 CHELTENHAM. S. Kelly, 10 London Road, Cheltenham, Glos.
 COVENTRY. K. Lines, 70 Stepping Stones Road, Coventry.
 CLIFTON (S.E., LONDON). W. A. Martin, 21 Brixton Hill, London, S.W.2.
 CRAY VALLEY. G. Miles, G2CXO, 33 Silverdale Road, Petts Wood, Kent.
 DERBY. F. C. Ward, G2CVV, 5 Uplands Avenue, Littleover, Derby.
 EDGBWARE. R. H. Newland, G3VW, 3 Albany Court, Montrose Avenue, Edgbare, Middx.
 ENFIELD. F. Tickell, 10 Cowdrey Close, Enfield.
 EXETER. E. G. Wheatcroft, 34 Lethbridge Road, St. Loyes, Exeter.
 GRAFTON. W. H. C. Jennings, G2AHB, Grafton LCC School, Eburne Road, London, N.7.
 GRAVESEND. R. E. Appleton, 23 Laurel Avenue, Gravesend, Kent.
 HOUNSLOW. A. H. Pottle, B.Sc., 11 Abinger Gardens, Isleworth, Middx.
 KINGSTON. R. K. Sheargold, G6RS, The Avenue, Sunbury-on-Thames, Middx.
 LEICESTER. L. Milnthorpe, 3 Minster Drive, Thurleston, Leics.
 LINCOLN. G. C. Newby, G3EBH, 35 Chaucer Drive, St. Giles, Lincoln.
 LIVERPOOL. W. G. Andrews, G3DVW, 17 Lingfield Road, Liverpool, 14.
 LOTHIAN. I. Mackenzie, 41 Easter Drylaw Drive, Edinburgh, 4.
 MALVERN. J. Nash, Piers Plowman Club, Malvern, Worcs.
 PONTEFRACT. C. H. Gould, G2FOH, 51 Pontefract Road, Ferrybridge, Yorks.
 READING. L. Watts, G6WO, 817 Oxford Road, Reading.
 ROMFORD. D. L. K. Coppendale, G3BNI, 9 Morden Road, Chadwell Heath, Essex.
 SOLIHULL. G. Harding, 121 Bradbury Road, Olton, Birmingham.
 SOUTH HANTS. H. G. Martin, G3ACM, 184 Kirby Road, North End, Portsmouth.
 SOUTH MANCHESTER. M. I. Wilks, 37 Longley Lane, Northenden, Manchester.
 STOURBRIDGE. W. A. Higgins, G8GF, 35 John Street, Brierley Hill, Staffs.
 SURREY (CROYDON). L. C. Blanchard, 122 St. Andrews Road, Coulsdon, Surrey.
 SWINDON. P. Greenwood, G2BUJ, 49 Western Street, Swindon, Wilts.
 THAMES VALLEY. Major A. Eden, 31 Chatsworth Crescent, Houslow.
 WANSTEAD. R. J. C. Broadbent, G3AAJ, Wanstead House, The Green, London, E.11.
 WEST CORNWALL. R. V. A. Allbright, G2JL, Greenacre, Lidden, Penzance.
 WEST KENT. G. B. Brewer, G4LJ, 80 London Road, Southborough, Kent.
 WEST MIDDLESEX. C. Alabaster, 34 Lothian Avenue, Hayes, Middx.
 WIRRAL. R. A. Browning, 24 Norbury Avenue, Bebington, Cheshire.
 WORCESTER. J. Morris-Casey, G8JC, c/o Brookhill Farm, Ladywood, Droitwich, Worcs.

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200 ...	*3½"	6/-
300 ...	*3½"	10/-
2.5KV with shunt	*3½"	20/-
.5A R.F. ...	*2½"	3/6
1A R.F. ...	*2½"	3/6
4A R.F. ...	*2½"	3/6

*Square †Round

L.F. CHOKES 6H. 200 m/a 100ohms D.C. NEW, 3/6. 3-6/4-2H 250 m/a, 75 ohms D.C., 5/6.

MAINS TRANSFORMERS. 5v 2a, 6-3v 2a, 275-0-275 85 m/a. Brand new sub-mounting, 22/6. 350-0-350 100 m/a, 5v 2a, 6-3v 3a, 27/-, 300-0-300 @ 250 m/a, 6-3v 4/5a, 5v 3a, shrouded, 32/6. worth 80/-. Midget Output 250-0-250v 40 m/a 6-3v 2a, 16/-, All above 230v A.C. input.

OUTPUT TRANSFORMERS P.P.6L6, Class A, 10 watts, 3 and 15 ohms matching. Brand new, 12/6.

INTERVALVE TRANSFORMER for P.Pull C.T., new, 5/-.

ULTRA VIOLET LAMPS. 6" long ¾" diameter. These lamps have neon starter incorporated and are marvellous value. Work across 230v A.C. mains with choke and condenser in series. 3 for 10/-. All orders in strict rotation.

TELEVISION. R.1355 Receiver, good condition, complete, 33/6.

R.F. Unit No. 24, 12/6. R.F. Unit No. 25, 15/-. Both above R.F. Units brand new in sealed cartons.

B.C.348 RECEIVERS. With circuit diagram. Note price, £14. Excellent condition.

B.C.433G RADIO COMPASS RECEIVER. Excellent condition, few only, £4/10/-.

FLEXIBLE DRIVE AND CONTROL BOX for above, 15/- complete. Supplied only with receiver.

RI147A UHF RECEIVER. 8-valve. Brand new, in boxes, £2/10/-.

MCRI MIDGET COMMUNICATIONS RECEIVER, with 2 spare batteries, AC/DC power pack, midget headphones, aerial and plug-in coils. 20/3,000 metres continuous. Brand new, in sealed tins, £11.

WALKIE TALKIE CANADIAN, No. 58. Brand new and complete with spare valves, 2 headsets, 2 mics, accs, carrying case, etc. In sealed cartons, £17.

CANADIAN STAFF CAR RADIOS. 1/18 mc/s with BFO. Brand new, with spare set valves, vibrator, dial lamps, fuses, aerial and fittings, £25.

BC312 AMERICAN RECEIVER. Continuous 1-5 to 18 mc/s A.C. mains model. Plug in. Beautiful job. £16.

VALVES. SEE LAST MONTH'S LIST. Add 6K8, 5Z4 and 6V6, 8/- each.

Please note.—In January we received over 1,000 replies to our advertisement in this Magazine. Some customers were disappointed in certain lines having been sold out very quickly. We would recommend your early despatch of order to avoid disappointment. All orders are executed in rotation of receipt.

NO CARRIAGE OR PACKING CHARGES

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VALVES. DET12 (List £7), 6/6; AL60 (4v807), 5/-; DA30, 5/-.

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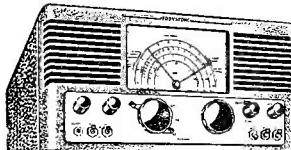
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R28/ARC5. Boxed. 100-150 mcs. Rx with circ. dia. 10 valves, less xtals, 45/-.

T.V. RF Units. 24, 25, 15/-; 26, 31/6. Modified unit, 45/61 mcs, 5 spot frequencies, 20/-.

R1355. Good, used, 29/6; new, 45/-. Callers only.

PP-2/APQ-5 Amplifier, with 4 6Y6, 2 5U4G, 1 6X5, 1 6SL7, 37/6.

BC453/4/5. Spare coils, set (3), 5/-. IFTs, 1415 kcs, set (3), 7/6. Most other spares for these sets available, except IFTs. Enquiries invited.

Mains Units for above, plug-on, 230v input, 250v DC and 12v AC output, 45/-.

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Wirewound pots, 20k 4w, 5/3.

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Electrolytic, 30 mfd 100v.w., 1/-.

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Creed highspeed relays, 500 micro amps, 12/6.

Meters. 2 1/2" MC 50 micro A, 15/-; 0/50mA, 7/6; 0/200 micro A, 8/6; 0/2 1/2A, 7/6; 2" 0/1A, 5/6.

Valves, at 5/6: 5R4GY, 6SN7, 6SL7, EF50, 12SK7, 12SR7, EF36, EF39, 1625, 6S17. At 3/6: 6SH7, SP61, SP41, 12J5. At 6/6: 6Y6, 5U4G, 5Z4M, 12K8. At 7/6: 6V6G, ECH35, 6K8M, 6X5, 6AC7. At 3/-: 6H6, EA50, EB34, 7193, CV6. Most other types stocked at best prices.

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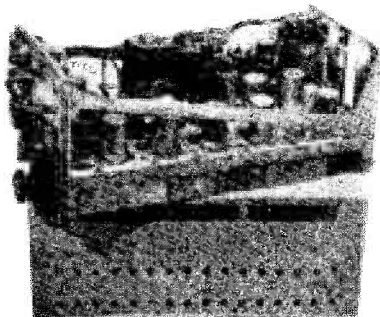
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Lyons Radio

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Size of chassis $15 \times 5\frac{1}{2} \times 7\frac{1}{2}$ ins.

A particularly useful unit of considerable application. Easily converted into a first-rate 2-metre receiver in a few hours (see R.S.G.B. Bulletin, July, 1948), or can be utilised as television amplifier. Valve line-up:—2 RF stages, Mixer, Oscillator, 3 IF stages, (approx. 30 mc/s), 2nd det., 2 audio

stages plus high and low voltage rectifiers. Employing 2 VR136's, 1 VR137, 7 EF50's, 1 VR92, 1 VU39A, 1 VU134. BRAND NEW and UN-USED. Supplied in maker's transit cases. Price £3/15/0 (carriage 7/6).

R.A.F. RECEIVER, TYPE R1132A

We now offer a completely new batch of these famous 11-valve V.H.F. superhets, covering the 100 to 125 mc/s band. Made to highest Government standards for use on R.A.F. ground stations, now made available to you, complete with all valves, new and unused, for but a fraction of manufacturing cost. Power supply required : 200v at 65mA and 6v at 3A. Circuit diagram fitted inside dust cover. Supplied in special transit cases. Price £4/19/6 (carriage 10/).

EX-ARMY FIELD TELEPHONES (Type F)

These useful inter-communication sets will be familiar to many and have been proved most satisfactory. Each instrument is complete (less battery) with handset and buzzer. Not new, but in good serviceable condition. Price £2 each (carriage 2/6), or £4 per pair carriage paid.

L.F. Chokes—4H at 250mA, 20H at no load, DC Res. 80 ohms. —Weight 7 lb. Made by Parmeko, Ltd. Fully guaranteed. 12/6 post free. Also as above, but 4H at 15mA, DC. Res. 120 ohms. Weight 5 lbs. 7/6 post free.

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EDDYSTONE 640. £27/10/- cash, ex stock, or terms, £5/15/- down, plus 6/- for 78 weeks.

EDDYSTONE 670. The personal receiver for marine use. 10-51 and 110-575 metres, 4 bands, a.c./d.c., 110-230v, internal speaker. £46/-/7, inc. tax. Now available for home use.

EDDYSTONE 680. The new super comm. receiver for commercial use and for discriminating amateurs. 13 valves, 10-612 metres. £85, tax free.

G.E.C. BRT400. A high-quality 14-valve receiver, 9-1-2,000 metres. A refined design with a high performance. £120 cash. No tax. Early delivery.

G. N. PILL & PARTNERS
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(Not removed from Surplus Equipment)

6K7	6D6	6SS7	
6F7	6B8	6G6	ALL
6Q7GT	6J5	12J5	6/-
6SJ7	1N5	6F8	each
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Doz. Lots Assorted less 10%

Very Limited Supply

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"Television for the Home Constructor," 1/6
R1355 Receiver, complete with Valves. Brand New in original crates. 49/6 carr. paid
RF Units for use in R1355 Receiver. Brand New in original sealed cartons. RF25 units, 19/6. RF26 units, 30/- . Post 1/-.

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INDICATOR UNITS, TYPE 184A
BRAND NEW AND UNUSED. IN MAKER'S ORIGINAL WOOD TRANSIT CASE. Containing 17 new valves and 2 cathode ray tubes. Valve line up : 5 EF50, 3 EB34, 3 SP61, 4 EA50, 2 VR78. Also 1 2½" cathode ray tube, type VCR139A, and 1 6" cathode ray tube, type VCR517.

Hundreds of components, condensers, resistances, coils, transformers, etc.
Totally enclosed in grey metal case, size 12" x 9" x 19". Weight, 40 lbs.

LASKY'S PRICE **75/-** Carriage in crate 10/- extra

ONCE AGAIN WE HAVE MANAGED TO OBTAIN A QUANTITY OF:
BRAND NEW V.H.F. RECEIVERS, TYPE R1132A

Specifications : 11-valve superhet, 100/124 Mc/s. Large tuning scale with super slow motion drive. 0.5 m/a., moving coil tuning meter. R.F. and L.F., gain controls, jack sockets for line and monitor. Valve line up : R.F., amplifier VR65 ; local oscillator, VR66 ; first I.F., VR53 ; second I.F., VR53 ; third I.F., VR53 ; second detector and A.V.C., VR54 ; L.F., amplifier 6J5 ; B.F.O., VR53 ; voltage stabiliser, VS70. The set is totally enclosed in grey metal cabinet, front panel grey, with all controls clearly marked, plated handles. Size : 18" wide, 10" high, 11" deep. Weight, when packed, 54 lbs. Calibration chart and circuit diagram supplied with each set.

LASKY'S PRICE **99/6** Carriage in original wood transit case 10/- extra.
THIS IS MOST PROBABLY YOUR LAST CHANCE TO PURCHASE ONE OF THESE EXCELLENT BARGAINS.

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30-26 mcs. Contains 3 SP61's, switched tuning, suitable for conversion. Brand new and unused.

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Suitable for receiving the Birmingham transmitter. Brand new and unused.

LASKY'S PRICE **32/6** Post 2/6 extra

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BRAND NEW IN MAKER'S ORIGINAL WOOD TRANSIT CASE

This radar receiver contains 14 new valves : 7 EF50, 2 VR136, 1 VR137, 1 HVR2, 1 R3, 1 V1507, 1 EA50.

A 5-stage I.F., strip, small motor, dozens of useful components, resistances, condensers, switches, plugs, etc.

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EASILY CONVERTED TO TELEVISION.

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G5GX

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1359 UHF. 130-520 M.Cs. ... £11

BC348R. Brand new in original cartons ... £17

Eddystone 640s ... £27/10/-

Ruco ham band bandspread converter to work into broadcast R.X. ... £10

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"Q" Max B4/40. 80, 40, 20, 15 and 10 band switched 35 watt phone-40 watt c.w. ... £55

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11-250 Metres ... per set £1

All Eddystone components in stock, your requirements despatched by return. Send for details of our new H.P. Terms.

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MOVING COIL HEADPHONES

45 ohms ½" coil energised by Alni Magnet, 3/6 each, 6/6 pair. Microphone and headphones assemblies, M.C. mike in bakelite case with M.C. headphones and cord, 10/6.

TANNOY hand-mike multi carbon type, in metal case with switch-in handle, 7/6.

MAGNETS. New alloy perm. magnets by Swift Levick ; instrument type machined and drilled, useful for polarised relays, mirror galvos, M.C. meters, electric guitar construction and many other purposes ; circular horseshoe type 1½" dia, ¾" thick ½" pole gap, drilled poles, lift 3 lbs., weight 2 ozs. 3/6 each or 4 for 10/-.

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IFT 1, 2, 3. (210, 211, 212)
 IFT4 (213) Diode coupling
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5-2 Mc/s COMPLETE SET of 5 TRANSFORMERS with complete shrouds. Post Free.

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 Single 8" hole fixing for panels up to 1" thick.
 4 for 5/-
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 Oil-filled paper condensers, with fixing clips.
 4x25 1000V 7/6
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 100 & 250 Ohm 2BC controls & on/off switch
 2 for 5/-
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Ceramic STAND-OFFS 1/2" high
 Less inner terminal bolt. Post 2/5/-
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BRAND NEW & Guaranteed RCA valves in many boxes
 807 7/6
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 22yd eased colour single PVC knock-up wire. REPR17.
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Following types have universal L.T. windings enabling 4, 5 or 6-3v valves to be used:

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 (f) 250-0-250v 100 mA, L.T.'s as (c) ... 21/-
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Ex-Air Ministry H.T. Eliminators. Voltage stabilised, 120v 30mA in grey enamelled cases. £1/17/6.
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AMPLIFIER, PP 6L6, 25 WATT. High gain push-pull with 2 mike, gram and line inputs, using 6J7's (3) in amplifier stages and push-pull 6L6's in output stage, output impedance 3, 7 and 15 ohms, fitted with switched meter for checking all valves. Supply 200-250v A.C. £12.

Also available, 50-watt amplifiers using 4 6L6's in parallel push-pull. Price, £20.

R.C.A. PLATE TRANSFORMERS. 2,000-0-2,000v (tapped 1,500) 500 ma, Primary 230v 50cy. Brand new, boxed, £4/10/-, carriage paid.

INDICATOR UNITS TYPE 73 and 198. Contain VCR138a and 6 valves, ideal or scope: £1/15.

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VARIOUS RECEIVERS IN STOCK, INCLUDING 144 MCS JOBS.

COMPONENTS: 4-20 henry 250 ma swinging chokes, 10/6. 15 henry, 200 ma chokes, 12/6. Condenser, -1 mfd 3,000v, isolated case, 3/6; vol. controls, -25 meg standard spindle, 1/6.

MICROPHONES, M.C. hand, 5/-; Rothermel Torpedo, £3/15/-.

The above is only a selection of our stock of components, send your list of needs along to us.

TELEVISION EQUIPMENT, including 1355, RF units, indicators with VCR97's and transformers, also new components and TUBES.

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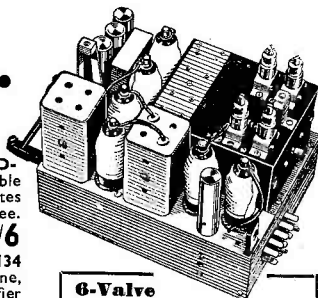
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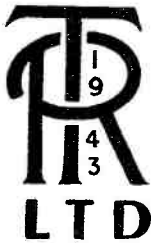
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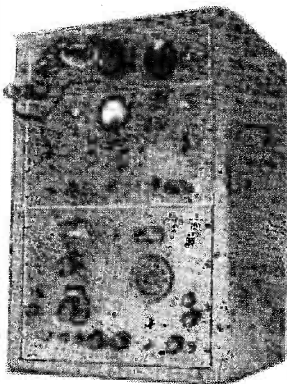
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BC221 200-250v AC Power Packs. To fit into battery compartment. Stabilised output, £2.—M. Weston, Harman's Cross, Corfe Castle, Dorset.

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READERS' ADVERTISEMENTS

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HALLICRAFTER Super Skyriver SX17, Crystal, S-Meter, amplifier, recently overhauled. Offers? 5 Station Road, Benton, Newcastle-on-Tyne.

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VIBRAPACK by Mallory, 12v, 250v output, 15/-.—Box No. 498.

SMALL ADVERTISEMENTS

READERS'—continued.

WANTED.—Hallcrafters SX24 or SX28; packing facilities must be available. Price and condition to Box No. 497.

BC625A.—New 2-metre transmitter with crystal, price £7/10/—G2BVM, High Street, Ixworth, nr. Bury St. Edmunds, Suffolk.

AR88D (with manual) 540 kc-32 mc. £43. Valves and alignment recently tested. L.S. demonstration VK phone, 8 am-9 am. Nield, Newcot, Chichester Drive (West), Saltdean, Brighton. Rottingdean 3412. Deliver reasonable distance.

WANTED.—Manual for Reception Set. R.201, purchase or loan.—Harris, Strouds, Pangbourne, Berks.

WANTED.—Long wave receiver, any type, from 15 kc to 100 kc or more. Please give details and price.—Harris, Strouds, Pangbourne, Berks.

WANTED.—American manuals, instruction books, and catalogues.—Harris, Strouds, Pangbourne, Berks.

MK.III Type A or 12v car radio, required in exchange for MCR1 with power pack and 5-valve recr. 1224, with cash adjustment.—Clark, 41 High Street, Macduff.

CR100 OK, Manual, £23/10/-. Nat. 1/10, £7/10/. 1948 Pye 12v car radio, £12/10/-. DC Avomiron, £2/10/-. Lot £40. No offers. BRS3193, Inglenook, Welland, Malvern, Worcs.

URGENTLY require *Short Wave Magazine*, November 1947, or details conversion BC348 Communications Receiver.—Billing, 17 Lon-y-Dail, Rhiwbina, Cardiff.

WANTED.—Official manual for Bendix RX RA-10-DA/DB and remote control for same.—Gore, c/o Black Lion Hotel, Ellesmere, Shropshire.

SALE.—Brand new professionally built 50-watt transmitter, 6L6 CO-807 PA, modulator, power packs, 600v, 400v, metered, excellent Tx. In grey and chrome steel rack. Brand new absorption wavemeter in black crackle case, metered, all bands. Aerial tuning unit. 2 Mikes, etc. £35 the lot.—Downey, 23 New River Gardens, Wood Green, London, N.22.

REAL opportunity for lucky 460 enthusiast: American HSB7 superhet in superb condition, £10. *RSGB Bulletins*, July 1941 to February 1948 (6 omissions), clean condition, 30/—J. Ogilvie, Beryl Road, Noctorum, Birkenhead.

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HRO receiver, rack model, with power pack for 230v 50-60 cy. AC. Coverage 100 kc to 30 mc. £35. Buyer collects.—Box No. 500.

COMMUNICATIONS Receiver, Type R1116, for sale. Range 142 kc-20 mc. Circuit diagram, etc., £8.—P. Kilby, 149a Camden Road, Tunbridge Wells.

SALE.—829B (4), 20/- ea. GU50 (6), new, 10/- ea. **SCR522** (not working), £2. Hallcrafters SX25, 230v P.P., speaker, £17/10/-. S.A.E. for details. Carriage extra, except valves—MQ.17, R.A.F., Woodvale, Formby, Lancs.

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UNUSED, Guaranteed. GU50, RG1-240, 12/6. DA30, DET25, 10/-, PEN45, AC2PEN, 7/6. CV173/DDR2, APP4E, 6/-, 80, 6SK7, 5/-, CV188, VS70/7475, 4/-, 6H6, 2/6. List others.—Box No. 502.

TRIPLET Multi-range Test Meter, as new: 0-5 ohms to 7.5 megohms, 0 to 1000v AC and DC, 0 to 250 mA DC, £10. Carriage free. S.A.E. particulars.—Box No. 501.

COMPLETE Station, BC348, R107, RCA VFO, 12-in. Goodmans speaker, 6-ft. rack and panel (under construction), Power supplies, Valves, meters, spares. Bargain Prices. Sell separate.—Write G3COF, 8 Cogan Avenue, Walthamstow, London, E.17.

FOR sale.—R1116/A receiver, 8-valve double s/het. 15-2000 metres, with Amplion convertor, for AC mains, phones, circuit diagrams, £10 or offers.—Warwick, 19 Church Road, Roffey, Horsham, Sussex.

BC348 for sale. 230v AC, modified internally. Or exchange unmodified R1155, with cash adjustment.—333 Wigan Road, Atherton, Lancs.

COMPLETE DC mains station. AR77E Rx; Fox 25T Tx, Phone/CW, 40/20/10, P.P. incl.; 200-watt DC/AC converter. The lot, £75, carr. paid UK, or separate offers. Also many TX components (no junk), QST's, books, etc. S.A.E. list.—GM3BCL, 38 Aberceldie Terrace, Aberdeen.

FOR sale.—4 PX4's, 7/6 each. 6 6SN7's, 5/- each. 6 ATP7's, 5/- each. All in perfect condition.—Box No. 504.

HALLICRAFTERS SK24. Good condition. Continuous 6-550 metres. Xtal. Separate bandsread, £20. Matched cabinet speaker, £1.—G5NH, 2 High Street, Daventry.

AR88, matching speaker and handbook, excellent condition, £40. New R1481 with 6V6 output, £3. New T1154, with valves and handbook, £6. Transformers (standard primaries) 2000-0-2000v, 400 mA, £3, two at 600-0-600v, 250 mA, £1 each. RCA Modulation transformers, 250watt, one new £3, and one used with damaged tag strip, £1/10/-. Twenty-metre 150watt CW Tx, 813 PA, complete with power pack (1000v, etc.), £15. G8JJ, 75 Church Road, Richmond, Surrey.

WANTED American Comm. Receiver, preferably by Hallcrafters, any condition. Price and details to: 8 Wilwick Lane, Ivy Road, Macclesfield, Cheshire.

SWOP—Test Set 74A, new condition; 803, 860, SDET.19(2), new, unused. Offers? Wanted: *Short Wave Magazine* 1948; price to: GM5CF, 41 Viewmount Drive, Glasgow.

E.D.D.C. Rotary converter, 110 DC to 230 AC. 230 AC. Cash offer? Also BC348, £14. 24 Melmore Gardens, Cirencester, Glos.

SALE—SCR522 Transmitter-Receiver, with valves, new condition, £10. C43 Exciter Unit, with six 807's, £6. C43 Modulator Unit, with valves, £5. Pair RK48A with bases, £3. Pair 813 with bases, £3. Wanted: Metal cabinet for AR88. Box No. 505.

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FOR SALE—145 Osc. complete with 392 power pack. A perfect VFO 2-7.5 mc output, £10. Edwards, SME, Deverell Mess, Ripon, Yorks.

SMALL ADVERTISEMENTS

READERS'—continued.

SALE—AR88LF, first-class condition, S-meter, instruction manual, £37. Modified WZJME Broadband Exciter (see QST, December 1946). £25. Portable Transmitter, used last NFD, VFO-BA-FD-1625 PA, with AC pack, £8; BC453 Q-Fiver, fully modified, £3. Want Advance Signal Generator—part exchange? G5RP, Old Gaol House, Abingdon, Berks.

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BC348M, internal mains, as brand new, £14/10/-. Phone sockets, brand new, boxes of five, 2/6d. Holmes, 24 Castle Lane, Bedford.

HALICRAFTER SX24, £20 or best offer. Good condition. Buyer collect. S. Corbett, 30 Old Grimsbury Road, Banbury, Oxon.

EXCHANGE—T1154H, good condition, plus mains p/pack components for same. For QRP Tx, with mains pack; gear adjustment if necessary.—Box No. 507.

SALE—Complete station. 100watt phone/CW Tx 3-5, 14, 28 mc. PP 807's in PA and mod, mc microphone, in 5 ft. steel rack. BC348, power pack, S-meter. Wavemeter Type D. £45, or offers separately.—Box No. 506.

SEVERAL first grade meters by Turner, Weston, Everett, etc., 2½ to 3½ in., 100 mA upwards, etc., etc., all new and unused, 3½ in. wirewound potentiometers, 10K, 10watt. S.A.E. particulars.—Box No. 487.

R103A—1.7 to 7.5 mc, 240 AC mains, £8. R208, 10 to 60 mc, 240 AC mains, internal loudspeaker, £10. Both sets aligned and in excellent condition and appearance. Wanted: D104 mike. Offers? GZCVO, 13 Mount Echo Drive, Chingford, London.

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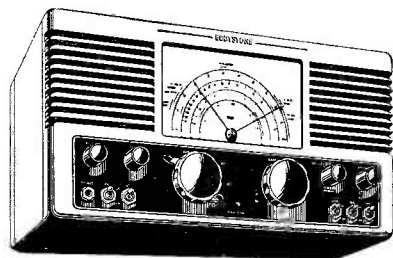
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AR1000 Band-pass 950-1,050 cycles ... £3/10/-

Grey-cellulosed steel box, 2 1/4" x 3 1/2" x 3 1/2" high.

Others from 25/-. Filters to specification.

DATA SHEETS HAMFILTERS. Price 6d.

LYNCAR LABORATORIES

29 Camborne Road, Morden, Surrey.

LiBerty 3247

SLOUGH, BUCKS

We have an excellent selection of specialised components for short wave and television construction. Eddystone 640, £27/10/- cash. H.P. £5/15/- down, 6/- per week for 78 weeks. Write to-day for full details.

THE FOLLOWING PRICES MUST INTEREST YOU

Indicator Unit, Type 198, comprising 1 3" CRT, 4 VR65, 1 VR54, 3 EA50, 45/-.

Receiver, Type 184, comprising 7 VR65, 4 EF50, 1 VHF power oscillator, 52/6.

All Brand New.

C.W.O. Please add postage

FON RADIO CO. (G3XC)

7 Station Approach, Slough. SLOUGH 22526

LESLIE MOSLEY

Government Surplus

Muirhead Slow Motion Drives, Dial 180-0, each 8/6.

Jack Plugs, 2 or 3 contact ... pair 2/6

Coaxial plug and socket, with rubber shield ... pair 2/6

Marconi Rotary Converters, 6 V.D.C.-190 V.D.C.

x 80 M.A. ... 25/-

Throat Mikes, with instructions ... 3/6

24-v Camera Controls, in wood case ... 20/-

Fog Lamps, easily adapted ... 4/6

All above goods are new and genuine bargains.

Terms C.W.O. Trade supplied.

137a KENSINGTON, LIVERPOOL, 7

Telephone : ANField 4492

SMALL ADVERTISEMENTS

READERS'—continued.

WALKIE-TALKIE 18 for sale, complete with accessories, good working order, £7 or offer? Patch, 105 Potter Street, Northwood, Middlesex.

B2 Tx/Rx, Power Pack, £14. T1154, £5. BC375 100watt Tx, £10. Each little used and very good condition. Box No. 508.

OSCILLOSCOPE by Furzehill as new, £15. TCS12 Tx and Rx (1.6 to 18 mc), gene-motors power pack, all cables and mike, instruction book, all in most excellent order, £20, complete. G3DH, 18 Bramhall Park Road, Bramhall, Cheshire.

C43 Philco phone transmitter, with Power Pack 200v-250v AC; unused, brand new condition. Pair 813's final amp., five 807's drive unit VFO, 10-valve Modulator. Power Pack four 866's, one 83. Metal rectification for relays, etc. Complete with valves, £37. Box No. 510.

MODIFIED R208 10-60 mc, AC mains, speaker. S-meter, noise limiter, £9. Collins 7-valve Rx, 1.5-24 mc, AC operation, £7. B2 Rx, with power pack for Rx only, £5. R. Parris, 47 Allen Street, Maidstone, Kent.

145 Oscillator, new and unused, less valve and stabilisers, £2/10/-, plus carriage. G5JV, 198 Harrow View, Harrow, Middx. UNDERhill 0026.

MI19467 Master Oscillator tr, 2-10 mc. using 807 as ECO as new, handbook, £2/10/- Box. No. 509.

EDDYSTONE 5/10 metre converter (perfect), £5/5/-; Modulator in 19 in. x 6 ft. rack, includes Panel Amplifier Type 6 (2/s/PPX25), Power Unit Type 6 (500v, 150 mA), and two panels, sounder relays, metal rectifiers, 10v microphone energising supply, valve, etc., £10; Tx Unit Type 22, £1. Rands, 18 Elm Road, Cleethorpes, Lincs.

1154 four-band, £10. PPI new, complete, 7BPI tube, £15. New BC348R, modified AC, £19/10/-. Scope, new, complete, £15. Offers cash or swap for Hallicrafters AR88. Box. No. 511.

HOWARD communication Rx, 6 valves, 7 to 550 metres, built-in speaker, nearest £12. Xtal mike, torpedo head, brand new, unused, 28/- 3 Hinston Street, Birmingham 18.

WANTED—Xtals, 1750-1800 kc and 3510-3595 kc. State price. H. Miller, 72 Victoria Road, Runcorn, Ches.

SALE—Berry's Shortwave All Dry 4, never been used. Complete with 5 valves, 3 sets coils, batteries, phones, etc., the lot, £9. Box No. 512.

HALLICRAFTER Skyridr Defiant. SX24, Xtal gate, S-meter, good condition, £25. Wanted, both AR88 aligning tools. G3AZD, 60 Lewisham Park, S.E.13.

HRO, 3 coils, 3-30 mc Power Pack, 100 per cent spare valves. £35 or near offer. Walmisley, 3 Warren Row, Lacey Green, Aylesbury, Bucks.

AR77E for sale, good condition; best offer over £20. Thompson, Public Library Disraeli Road, Putney, S.W.15.

TRANSMITTER-RECEIVER Type A Mark III, complete with spares, less vibrator unit. McElroy bug key. Both excellent condition. Offers to: Peattie, 1 Laurence Drive, Bearsden, Glasgow.

BC348 Receiver, 230v, perfect, £18; Woden UM2 Mod. Transformer, new, unused, 52/6; Transformer, output—12v 4 amp. CT, new, 15/-; Valves: PT15, brand new, 15/-; Also PT15, used, perfect—8/6 each; Vitavox table mike stand, super job, black/chrome, standard fitting, 12/6; Universal Avominor, brand new, £6/10/-. Box No. 513.

SALE, RME69 noise limiter, £22. Advance Signal Gen, Type E, Model I, 100 kc to 60 mc, new, £13. Accept £32 for lot or offers. Hazel Drive, Nottingham Drive, Wingerworth, Chesterfield.

FOR Sale. Hallicrafter Sky Champion S20R. 8 valve. 550 kcs, 44 mc, £15, or offer. Pearce, 118 Chiswick Village, W.4.

H. WHITAKER G3SJ

10 YORKSHIRE STREET, BURNLEY Phone 4924

POWER SUPPLIES ? POWER SUPPLY COMPONENT PARTS ? AND MODULATOR EQUIPMENT

We give you this month a grand selection of power supply equipment by the world's best manufacturers, at prices within the reach of all. All the material offered is brand new, without a blemish. This equipment represents but a small fraction of our extensive stocks, covering every aspect of Amateur Radio. To Dealers, Service Engineers and the Export Market we will be pleased to quote any item below—per 12, or per 100.

MAINS TRANS. R.C.A. Input 200-250v, 50 cy. Output 2000/1500/0/1500/2000 at 800 mills. Size 9" x 9" x 8". Weight 150 lb. Price £4/10/-.

R.C.A. Input as above. Output 950/0/950 at 400 mills. Size 8" x 8" x 7". Weight 70 lb. Price £3/15/-.

R.C.A. Input as above. Output 425/350/0/350/425, at 200 mills, 6-3v, 5v, completely shrouded. Electrostatic screen. 30/- each.

R.C.A. Filament. Input as above. Output 10v CT 20 amp, 10v CT 20 amp, 10v CT 10 amp. Size 10" x 7" x 7". Weight 60 lb. £3/10/-.

R.C.A. Filament. Input as above. Output 10v CT twice, for a pair of 813s. Completely screened. Price 25/-.

R.C.A. Filament. Input as above. Output 6-3v 10 amp. 25/-.

All the above R.C.A. goods are the usual fine R.C.A. finish and are in original crates.

MET. VIK. Input 230/50 cy. Output 6000/0/6000, tapped at 5000, 890 mills. Oil filled. Size 18" x 18" x 12". Weight about 300 lb. £10.

MET VIK. Input 230/50 cy. Output 13, 13-5v, 14 or 15v at 60 amp. Size 8" x 8" x 8". Weight 30 lb. 35/-.

RADIO RECEPTOR CO., U.S.A. Input 205/250v 50 cy. Selected by rotary switch. Output 1250/0/1250 at 450 mills., 12v CT at 14 amp., 2½v 10 amp. for a pair of 866 rectifiers, 0/10, 11, or 12v 5 amp. Completely shrouded, 10,000v insulation. Size 10" x 8" x 7". Weight about 60 lb. Price £5.

POWER SUPPLY UNIT TYPE 45. Input 230/50 cy. Output 1200v at 200 mills., in ventilated steel cases. Weight about 80 lb. Incorporates Westinghouse Metal Rectification, doing away with all valve costs. The unit has double section choke filter with choke input, stabilised by 120 watt bleeder, ensuring excellent regulation. £10 each.

BIAS TRANS. U.S.A. Input 230/50 cy. Output 175/0/175, with separate windings, 40/0/40. Small and compact. 7/6 each.

PLESSY. 230v 50 cy. Output 275/0/275 80 mills., 6-3v, 5v. 20/ each.

Q. FIVER. Input 230/50 cy. Output 24v 2 amp., suitable for Q fiver. 14/-.

CHOKES, L.F. Swinging. By Kenyon and other well-known U.S. makers. 2½/24 hy., 450 mills. Completely shrouded, 10,000v. Ins. 35/- each. Weight 40 lb., 9/60 hy., 40 mills. Completely shrouded, 10,000v. Ins. £3. Weight 50 lb.

G.E.C. 500 mills., 15 hy. 25/-.

Ditto, 150 mills., 15 hy. 12/6.

CONDENSERS. 3mF 6000v wkg. 13" x 6" x 10½". Heavy 2" insulated terminals. 20/-.

SPRAUGE. 5mF 2000v DC wkg. 8/-.

8mF ditto. 8/-.

SOLAR, etc. 24 mF 1500v DC wkg. 8" x 4" x 4½", 10/-; 15 mF 1000v wkg., 8/-; 4 mF 2000v wkg., 6" x 5" x 3". Brand new. Special offer at 5/- each.

T.C.C. 1 mF 2000v DC wkg., 5/-.

Hundreds of others in stock. Enquiries welcome.

CORNELL DUBILIER. Mica BI Pass. 2500v wkg., 30pf, 40pf, 100pf, 002,005,02. 1/- each, 9/- doz.

BLEEDERS. All Vitreous. 20 k 120w, 50k 50w, 10k 75w, 60k 75w, 5k 75 w, 43½k 60w, 6½k 50w, at 2/- each; 5k 20w, 35k 35w, 47 ohm 20w, at 1/- each.

VOLTAGE REGULATORS. VR105, 7/6; VR150, 8/-.

MODULATION TRANS. Woden UMI, 54/-; UM2, 72/6; UM3, 90/-. Immediate delivery ex stock.

DRIVER TRANS. P.P. 6J5s to P.P. 6J6 or 6V6s. U.S.A. Mu-metal potted. 3/-.

As above. Output trans. P.P. anodes to 3 ohm speech coil. 3/-.

VALVES, RECTIFYING. 866, 25/-; 836, 20/-; RG240a, 20/-; 5U4, 10/-; 5W4, 7/6; C61, 25/-; 5R4 GY, 7/6; Tungar 189049, 25/-; FG17 Grid Control, 25/-.

MODULATOR VALVES. 805, 45/; 811, 45/-; 807, 12/6; 808, 37/6.

VALVE HOLDERS. All Ceramic. Octal and 4-pin UX, with fixing flanges and spring loading, 1/- each; R.C.A. 4-pin Jumbo, 6/-; 813, 7/6; 832, 7/6.

AUTO TRANS. Kenyon, 230/110v 1 kVA. Completely shrouded. Weight about 50 lb. Price £3.

Our new March List with hundreds of bargains on receipt of stamp. All the above goods carriage paid, including crates, etc. All items from our March Ad. are still available per return.

AT LAST—

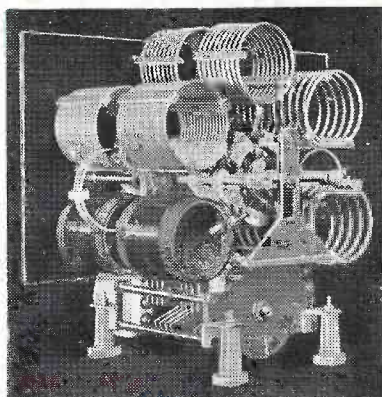
A 150-WATT SWITCHED TANK UNIT WITH SWINGING LINKS

A complete switched P.A. TANK ASSEMBLY for 5 bands, operating at high efficiency and handling powers up to half-a-kilowatt and voltages up to 2 kilovolts.

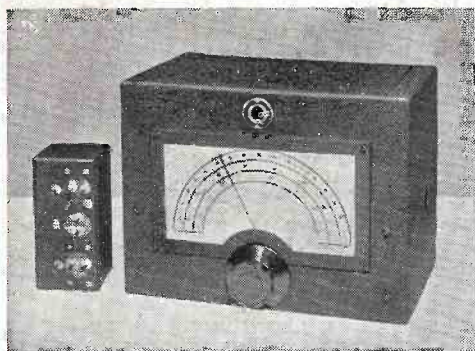
The unit comprises a 60-60 pf split-stator condenser (.082 spacing) over which a 5-wafer ceramic switch with polythene rotor is mounted. The 5 coils for 28, 21, 14, 7 and 3.5 Mcs. are fitted directly on to the switch contacts.

Swinging links have been incorporated for all bands to enable optimum loading and matching to be obtained. An output of 427 watts of RF was obtained at 28 Mcs. with two 813's in push-pull loaded to 600 watts input.

The complete unit is mounted on stand-offs—ready to go straight on to a P.A. chassis.



Price 12 Gns. complete



“Q-MAX” V.H.F. CONVERTOR

Designed for operation on 10, 6, 5 and 2 metre bands in conjunction with any receiver covering 10 Mcs. for the I.F. channel. MONO-UNIT plug-in coils are used. Self-contained power supply.

(With 1 coil unit) 17 Gns.
(Extra coil units 30/- each)

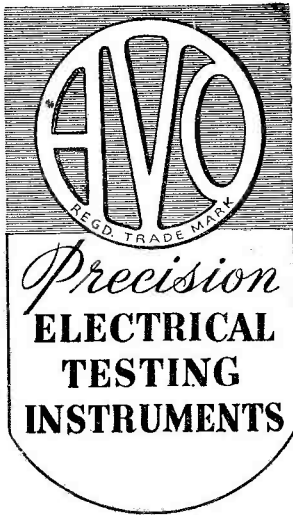
“S” METERS

with backplate for fitting to AR88's
63/-

CRYSTALS

ALL FREQUENCIES
32/6

BERRY'S (SHORTWAVE) LTD
25 HIGH HOLBORN · LONDON · W.C.1
(OPPOSITE CHANCERY LANE) TELEPHONE: HOLBORN 6231



BRITISH MADE

PRICE
£35

Fully descriptive pamphlet available on application.

This instrument, which is an up-to-date example of current instrument practice, has been developed to meet the growing demand for an instrument of laboratory sensitivity built in a robust and portable form, for use in conjunction with electronic and other apparatus where it is imperative that the instrument should present a negligible loading factor upon the circuit under test.

The instrument consists basically of a balanced bridge voltmeter. It incorporates many unique features and a wide set of ranges so that in operation it is as simple to use as a normal multi-range testmeter.

The instrument gives 49 ranges of readings as follows :—

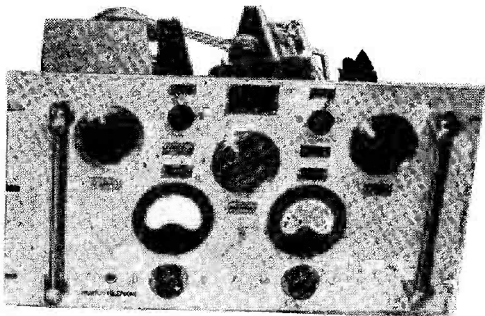
- D.C. VOLTS : 2.5 mV to 10,000 V. (Input Resistance 111.1 megohms).
- D.C. CURRENT : 0.25 μ A to 1 Amp. (150 mV drop on all ranges).
- A.C. VOLTS : 0.1 V to 2,500 V R.M.S. up to 1 Mc/s. With external diode probe 0.1 V to 250 V up to 200 Mc/s.
- A.C. OUTPUT POWER : 5 mW to 5 W in 6 different load resistances from 5 to 5,000 ohms.
- DECIBELS : -10 db to +20 db.
- CAPACITANCE : .0001 μ F to 50 μ F.
- RESISTANCE : 0.2 ohms to 10 megohms.
- INSULATION : 0.1 megohm to 1,000 megohms

The thermionic circuit gives delicate galvanometer sensitivity to a robust moving coil movement. It is almost impossible to damage by overload. The instrument is quickly set up for any of the various tests to be undertaken, a single circuit selector switch automatically removing from the circuit any voltages and controls which are not required for the test in question.

Sole Proprietors and Manufacturers :

The AUTOMATIC COIL WINDER & ELECTRICAL EQUIPMENT CO. LTD.
WINDER HOUSE • DOUGLAS STREET • LONDON • S.W.1 Telephone: VICTORIA 3404/19

THE MAIN AMATEUR SERVICE OF THE NORTH



YOUR NEW P.A. PROBLEM SOLVED

Brand new Push Pull P.A. Unit
(as used in the T1131).

Split stator grid, plate and aerial
coupling tuning.

Link input, swinging link output.

Telemetry monitor built in.

Meter switching for cathode and grid
currents.

Ready for connecting to supplies.

This unit tunes 100-150 Mcs. With plug-in coils it will cover 14 Mcs and all higher frequencies to 144 Mcs. Suitable for use with any triode valves. We hope to have the VT62 valves available shortly. Standard rack mounting. Price ONLY £6 each. Carriage paid.

POWER SUPPLY. A few only type 34 USA supply suitable for above and modulators. These give up to 1,250v 350 mills, and heaters. A lovely piece of work. Thermostatic automatic control. Push-button operated. Price only £15.

BEAMS. A complete 4-element 112 Mcs beam installation, cost £75 offered to clear at £10.

RADIOVISION COMMANDER. A demonstration model is available for your inspection. Price £48/10/- May we send you details if unable to call? Easy terms arranged.

EDDYSTONE 640. "Better than my H.R.O. G3SN." Illustrated brochure and details of the very easy payment purchase sent by return.

We are busy with Mail Order work, but always welcome callers. If unable to call, may we send you a copy of our list SWL?

AMATEUR RADIO SERVICE, GANNING STREET, BURNLEY

TEL
2999

R1224A. 5 VALVE BATTERY SUPERHET. Another purchase of these superb ex-R.A.F. receivers enables us to re-offer them to all who were disappointed two months ago. Covers 1-10 mcs in 3 switched bands, and circuit employs RF stage. Has Muirhead precision slow motion dial, aerial trimmer, sensitivity control, reaction control, etc., etc. Operating voltages 120v HT, 9v GB, 2v LT. Complete with valves in BRAND NEW MAKER'S PACKING. ONLY 99/6 (carriage 7/6). Jack plug, if required, 2/6.

THE AC R.1155 RECEIVER. This famous Bomber Command receiver can now be supplied for use on AC mains, and complete with speaker, for ONLY £18/10/-. The specification is too well known for us to repeat here, but a fully illustrated leaflet is available on request.

1½ METRE SUPERHET APW 4790. Contains 9 valves: 1 each RL7, RL16, EA50, and 6 of SP61. Has 6 I.F.T.'s of 12 mcs with 4 mcs bandwidth. ideal for use as a vision receiver. These are BRAND NEW, but some have had the coils removed for alteration by the makers, and in this case are supplied with three 11 mm formers for the coils to be wound to the range required. ONLY 59/6 (carriage, etc., 5/-).

INDICATOR UNIT 62A. A fresh purchase of these excellent units which contain so many EF 50 valves and the VCR 97 short persistence tube. The complete valve complement is as follows: 12 of EF 50, 2 EB 34, 4 SP 61, and 3 diodes EA 50. Saves pounds for anyone constructing a superhet TV. ONLY 89/6 (carriage 10/-, plus 10/- deposit on packing case).

TEST SET TYPE 74. These are RAF scopes used on VHF equipment, and only require modification to the time bases for normal use. Has built-in power pack for normal AC mains, and contains 3" tube VCR 139, 3 valves SP 61, 1 6J5G, 1 6Q7, 1 E 1148, 1 5Z4, 1 SU 2140A. Undoubtedly a "buy" at 110/- (carriage, etc., as above).

BATTERY SUPERSEDERS. Vibrator packs operating from only 2v input, and delivering 90v and 180v at 35 mills. A complete fully smoothed unit originally made for the Canadian Army by Electronic Laboratories of America, for use on "Walkie Talkies." Instruction book giving circuits is supplied with each unit, enabling necessary adaptation for use on normal commercial receivers to be made. Illustrated leaflet sent on request. ONLY 60/- (postage 2/-), or with 2 American "Willard" accumulators in steel case, 90/- (carriage 5/-).

THE RADAR UNITS FOR TELEVISION CONVERSION as advertised last month, are still available, although the demand is increasing. The data costs only 7/6 and this amount will be credited if the two radar units costing £6/10/- are purchased within 14 days. Send for your copy NOW.

C.W.O. Please.

S.A.E. FOR LISTS

U.E.I. CORP,

The Radio Corner, 138 Grays Inn Road, London, W.C.1

(Phone: TERminus 7937)

EDDYSTONE & THE AMATEUR

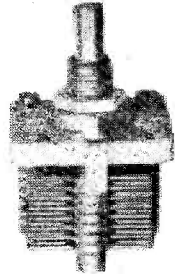
CERAMIC MICRODENSERS

The Eddystone Ceramic Microdenser is made to a rigid specification and possesses the essential features called for in a variable condenser used in modern receivers and test equipment. The use of a Microdenser will ensure minimum losses, maximum results and smooth control. Types are available for almost any amateur HF or VHF requirements—all except Cat. No. 738 have extended rear spindles for ganging up two or more. The majority are single hole mounting ($\frac{3}{8}$ "), the exceptions being Cat. Nos. 581 and 738. The ceramic end plate is $1\frac{1}{8}$ " square—hence a comparatively small mounting space is occupied. The vanes are soldered to their supports and all metal parts are heavily silver-plated.

Cat. No.		Cat. No.	
580*	12.5 pF single 6/-	476	15 x 15 pF Split-stator ... 7/3
588*	27.5 pF single 7/3	583	25 x 25 pF Split-stator ... 7/6
589*	54 pF single 7/3	739*	8 x 8 pF Butterfly ... 7/-
582	60 pF single 7/-	587*	15 x 15 pF Butterfly ... 8/-
581	60 pF single (trimmer type) 6/6	584	34 x 34 pF Butterfly ... 7/9
585	100 pF single 7/6	719	25 x 25 pF Differential ... 7/6
586	140 pF single 7/9	738*	100 pF High stability ... 15/-

* Possesses increased vane spacing.

The new illustrated Eddystone Catalogue (price 6d.) gives further details. Please order from your nearest agent—we do not supply direct.



No. 582

EDDYSTONE—"Puts Perfection into Performance"



STRATTON & CO., LTD.

EDDYSTONE WORKS,

WEST HEATH

BIRMINGHAM 31



GOOD INVESTMENTS

The simplest way of obtaining reasonable power at the lowest cost, together with reliability and efficiency, is to invest in a RADIOCRAFT TYPE 44 or 44P TRANSMITTER.

The TYPE 44 gives four-band coverage from a single crystal and uses an 807 as PA on all bands. For full details write for List M/9.

TYPE 44 TRANSMITTER	£7/-
TYPE 44P (incorporates power supply)	£13/2/6

EDDYSTONE S.640 RECEIVER

This popular receiver is still available on H.P. Terms, or £27/10/- cash sale. We will be pleased to forward all details and let you have H.P. Forms by return of post.

We can supply the new and improved 300 ohm Ribbon Feeder (can be used in wet weather without loss). Price 10d. per yard.

PLEASE NOTE OUR NEW ADDRESS BELOW :-

Radiocraft Ltd

25 Beardell Street, Upper Norwood, S.E.19

"Cyldon"

MICROELECTRIC TRIMMER CAPACITORS

Type No. 19
 $\frac{1}{2}$ " long
 $\frac{1}{8}$ " wide
 $\frac{1}{8}$ " high

Type No. 22
 $\frac{3}{8}$ " long
 $\frac{3}{8}$ " wide
 $\frac{1}{8}$ " high

SYDNEY S. BIRD & Sons, Ltd.
 CAMBRIDGE ARTERIAL RD., ENFIELD, MIDDLESEX.
 Phone: Enfield 2071-2 "Grams" "Capacitors, Enfield"

NEW BC221's IT'S NEW



**BUY NEW AND BE
SATISFIED**

only **£12.10.0** carr. paid

XTALS. Why not try the fixed osc. type of receiver using the main receiver as a variable I.F. amp? Xtals. of 8118 kc doubled will operate on the 21 mc band (receiver 4764kc) and with the Xtal. frequency trebled for 28 mc band (receiver 3646 kc); 8118.46 kcs and 8146.15 at 7/6, post free. Also 5 to 7 mcs for re-grinding, 3/6. For 144 mc 6000-6083 and 8000-8110, 12/6. R.C.A., 100 kcs, 25/-, also a few at 15/-.

T.V.I. Do you have trouble? Why not use the very latest methods which cure this? See Dec. 'QST' and put some W.E.50 pf vacuum capacitors rated at 5 kVA in the rig. Suppress those unwanted harmonics and make friends with your neighbours again! Only 7/6 each. We have had hundreds of delighted customers.

XTAL MULTIPLIERS. By the famous Wilcox-Gay Co. with 2 807's and beautiful 0-10 mil. grid meter, ideal for converting to a Clapp oscillator. Brand new and crated, 42/6. Please send for lists . . . we have thousands of new items at bargain prices, viz. —

VALVES. Special, 832's, new and boxed, 22/6.

METERS. Special, 6 in. A.C. Master Voltmeter by Metro-Vicks, with knife edge pointer and anti-parallel mirror, 0-20v. New. 27/6. All types new and boxed.

CHOKES. 9H 220 ohms, 4/6; 2OH 80 mil, 350 ohms, 5/6.

CONDENSERS. All types, large and small, all new.
BLEEDERS and RESISTORS. All types and sizes. new.

MIKES. No. 13 m.c., with switch. New and boxed, 7/6, LET US HAVE YOUR ENQUIRIES. WE WILL GUARANTEE COMPLETE SATISFACTION IN EVERY WAY or your MONEY RETURNED at ONCE! We do NOT deal with JUNK or second-hand stuff.

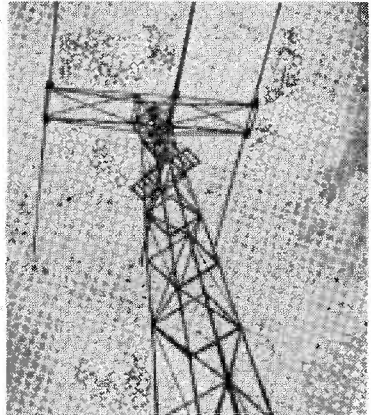
SPECIAL !! 100 micro-amp movements for field strength meters (oil thermometers), only 7/6.

THE "DX PANDA" BEAM!

EXPAND YOUR DX. When the wind blows this cradle WON'T rock !! You put it up and forget it. . . BUILT like a BATTLESHIP . . . to punch holes through QRM with BROADSIDES of RF!

10 m 3 el., as shown, £12/10/-, carriage paid. Also dual 10 and 15, 15 and 20 and a Triple Array, now being tested.

WRITE NOW for
ILLUSTRATED BROCHURE



THIS FB TOWER, 32 ft. high, delivered complete and ready to assemble. £18/10/-, carriage paid. ORDER NOW! Delivery in STRICT rotation.

WE SPECIALISE IN EXPORT ENQUIRIES and arrange freightage to ANY part of the world.

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82 MOLYNEUX STREET,
ROCHDALE, LANCs

PERSONAL SERVICE BY POST

Tel. : 3549

THE RADIO & ELECTRICAL MART (G3BSW) of 253-B PORTOBELLO ROAD, LONDON, W.11

Phone : Park 6026

Take pleasure in offering the following :—

R.A.F. Type 22 Transmitter-Receiver. 2-8 mcs. Crystal controlled. The superb 12-valve set complete with 12-v vibrator power pack, mike and m/c headphone set, comes to you tested and ready for use in green canvas holdall carrying case as new for bargain price of £15. Add 10/- for wood crate (returnable)

U.S. Signal Corps 15-watt Amplifiers. Complete in handsome green finished duralumin cases. Complete except for power pack. Contains tapped input and output transformers, etc. Two 1619 tubes (better than 6L6's). Price 50/-. T17 Carbon Microphone, as used with these sets, 10/- each extra.

FL8 AUDIO FILTER, as described in March issue, 10/6 each.

Type BC347 U.S. Signals Mike Amplifiers. Small and compact. Case measures 5½"×2½"×4". Price 10/-.

Test Set Type 46. We still have a few of these excellent battery-operated frequency meters covering 2 to 23.5 mcs. Made by Marconi Instruments. Can be adapted to all wave by inclusion of LW and MW Coils. Circuit supplied. 40/- each. Aluminium Rod Aerials for use with same, 3/6 extra.

Type TG10-F. This beautifully made 25-watt Amplifier in black crackle finished cabinet, 21"×14"×11", also contains a variable-speed motor, photo-electric cell, and exciter lamp.

We thank all who have written for our lists—these will be sent out shortly. They contain hundreds of items in short supply. Remember, money-back guarantee.

Ideal for conversion to sound unit of cine projector or for dance hall amplifier. New. £15. Add 10/- for crate (returnable).

2-Metre Oscillator or Signal Generator. We still have a few left of this most useful and interesting piece of equipment. Uses a CV1197 valve, requires only L.T. 6.3v and H.T. 120v supply to work. Complete with circuit, 16/6.

Khaki Canvas Parachute Cases. New. Ideal for school satchels, tool holdalls, shopping bags, brief cases, etc. Price 2/- each.

TR 1196 These 6-v Superhets are the best buy of the day. Just fit a 2-gang variable condenser and all-wave coil pack. Requires only five connections to frequency changer valve and set is ready for use. Price 27/6 with circuit.

Mains Power Supply Unit. This neat and handy unit in black enamelled case, 9"×6"×6", contains heavy-duty transformer, rectifier valve, smoothing choke, condensers, panel light switch and fuses. Input 200/260v AC. Output 6.3v at 3.5 amps. H.T. 350v at 80 mA. Larger output available by changing rectifier valve. Price £3/5/-, 250-watt Double-Wound Transformers. 230v/110v. Made by G.E.C. With steel shroud. New. £2/7/6 each.

RI132A. This grand 10-valve superhet, covering from 100 to 126 mcs, is easily adapted to 144 mcs band by simply moving connections on tuning coils. Large slow-motion dials, 5 meter, etc. Case measures 20"×12"×12". Price £5/10/-.

PRATTS RADIO

1070 HARROW ROAD, LONDON, N.W.10

(Nr. Scrubbs Lane)

Tel. : LAD 1734

NEW UNUSED GOODS ONLY

AMPLIFIERS. College general purpose amplifiers. Model AC10E. 10 watt 4-valve amplifier. Feedback. Separate mike stage and separate mike and gram. inputs. 2 faders and tone control. £8/18/6. Model AC15E. 6-Valve 15 watt P.P. output with feedback over 2 stages. Separate mike stage and separate mike and gram. inputs. 2 faders and tone control. £13/19/6. Model U10E. 6-Valve 10-watt amplifier for AC/DC mains. Particulars as AC15E. £11/11/-. All above are complete with case and chrome handle. Outputs match 3, 8 or 15 ohm speakers. Model AC4C. A.C. or U4C, DC/AC amplifiers. 3-valve record/radio reproducer. Output matches 3 ohm speaker. £5/9/6.

SPEAKERS. P.M. L/TR. 3½". Goodmans, 22/6; Truvox, 5" 10/-, 8" 14/6, 10" 23/9, 12" 45/-; Goodmans, 5" 14/9, 10" 28/6, 12" 130/-. P.M. W/Transfer. Plessey, 5" 12/3; Rola, 5" 13/6; 6½" 16/6; 8" 19/6.

VARIABLE CONDENSERS. Small 2-gang .0005, 5/6; 3-gang .0005 (small), with feet, 6/11 dielectric, .0003 or .0005, 3/- each.

I.F. TRANSFORMERS AND COILS. 465 kc/s. I.F.'s Atkins, 9/6 pr.; Philco, 7/6 pr.; Wearite, 10/- ea. or Midget M400, 10/6. Wearite "P" coils, all ranges, 3/- ea. L. and M.W. with reaction, 6/9 pr. Dual range coil with reaction, 4/6.

TRANSFORMERS. Mains. Porthminster. Shrouded, 350-0-350v, 6v, 5v, 80 m/a, 23/9; 100 m/a (also in 4v, 4v), 26/6; 120 m/a, 0-2-4-6v

4a, 0-4-5v 3a, 35/- (unshrouded); filament transfer, 6.3v 2a, 7/- each.

TRANSFORMERS. Output. 30 watt multi-ratio, 23/9. Ratios 20, 28, 32, 35, 40, 46, 54, 70, 80 and 140 to 1, all C.T. Pri. cur., 80 m/a. Each half, with shields and feet. 5 watt 6 ratio, 7/6. Both by Porthminster. Standard midget Pow/Pen, 4/6.

CONDENSERS. Plessey midget metal. 25 mfd 25v, 1/-; 4 mfd 350v, 1/6; 8×8×450v, 3/6; 8×16×450v, 4/-; T.C.C., 25mfd 25v Met., 1/6 T.M.C. Met. Tub., 8mfd 450v, 2/3; 8×8, 3/11; 16×450v, 3/11; T.C.C., 8×350v, C.B.D., 2/6 each. B.I., 8×550, 3/3; 8×8×550v, 4/9; .01mfd 1,000v, .05 500v, .1mfd 500v, 6d. each.

ELECTRONIC ENGINEERING TELEVISION. Booklet, 2/6, post 2/9. Scanco Deflection Assembly, 25/-; Focus coils, 29/6. EHT transfer, 4kV, 63/-; 5kV, 75/-; Coil formers, 10d. each. Complete set of resistances, 35/6. .1mfd con., 6,000v, 11/6. Mains transf., 2×350v 240m/a, 6.3v at 6a, 4v at 8a, 4v at 3a, 2v at 2a, 6.3v at 2a, £3/15/-. T41 valves, 12/10. Pen 46, 18/3. Pen 45, 12/10. Chassis, etc., available.

MISCELLANEOUS. Volume controls : L/Sw, 3/-; W/Sw, 5/-. Chokes, 60m/a 20hy, 6/3; 90m/a 200 ohm, 9/6; 150m/a 180 ohm 10hy, 14/3; 250 m/a 5 hy 50 ohm (Varley), 18/6. Octal bases, 4/6 doz. **VALVES.** Practically any valve available ex-stock. Stamp for List or enquiry. C.W.O. or C.O.D. Post paid over 1£.

RADIO CLEARANCE LTD.

27 TOTTENHAM COURT ROAD, W.I MUS 9188

U.H.F. RECEIVERS R.1481

To clear space in our warehouse prior to rebuilding, we are offering the remainder of our stock of these well-known receivers at clearance price. Freq. range, 65-86 Mc/s. 6" S.M. Dial, 10 6-3v Valves, 2 VR65a, 4 VR53, 1 VR66, 1 VR54, 1 VR57, 1 VR67. I.F. Freq. 12 Mc/s. B.F.O. These receivers are 19" rack mounting, brand new in transit cases, with circuit diagram. £4/19/6, carriage paid.

RECEIVERS R.U. 19

6-valve straight receiver with 3 R.F. stages, using plug-in coil packs, H.R.O. type. Valves : 3 78's, 2 77's, 1 1642. Black crackle case, 15" x 8" x 8". Provision for remote or local control. Dial cal. 0-100. Supplied new, complete with valves and 6 coil packs covering : O, 187-305 ; P, 281-455 ; Q, 524-844 ; E, 1285-2155 ; G, 2960-4620 ; H, 3865-6265 ; M, 5075-7780 ; K, 8750-1395 kc/s. £4/10/-, carriage paid.

PERSONAL RECEIVERS B.C.728C

7-valve receiver with 1-4v valves, R.F. VT173, mixer VT171, osc. VT173, i.f. VT173, det. and audio VT172, output VT174, bias rect. VT174 ; covers 2-6 Mc/s, with 4 push buttons adjustable 2-2.6, 2.6-3.5, 3.5-4.5, 4.5-6.0 Mc/s respectively. Operates from 2v acc by 2v vib., with 12v vib. for charging 2v acc. Carried slung on shoulder. Supplied brand new with valves, telescopic aerial, 2v acc., 2 vib., mounting accessories and instruction book. Built-in loudspeaker. £9/9/-.

MASTER OSCILLATORS

V.F.O. by Wilcox Gay. Type M.I. 19467A. Uses 807 electron-coupled osc., very stable, well screened. Employs 2 circuits : (a) Using cath. grid, screen, tuning 1-5 Mc/s in 6 bands. (b) Plate circuit as multiplier ; tuning 2-10 Mc/s in 3 bands. Incorporates grid choke, grid leak, grid current meter (0-10mA) for intermediate amplifier. Supplied brand new in original cartons, with installation accessories and instruction book. £5, carriage 5/-.

CRYSTAL MULTIPLIERS

Wilcox Gay, Type M.I. 19468. This is a xtal osc. using 807. Freq. range 2-7 Mc/s. Also incorporates 0-10mA grid current meter, etc. Supplied brand new in original cartons, with accessories, book, etc., 40/, carriage paid.

MAINS TRANSFORMERS

Primary, 0-110-200/250v 50 c/s. Secondaries, 230-0-230v, 100mA, 5v 2A, 6-3v 2A, C.T. 15/6.
 Primary 200/250v 50 c/s. Secondaries, 275-0-275v, 120mA, 4v 2A, 4v 3A, 13/6.
 Primary, 200/250v 50 c/s. Secondaries, 460v 200mA, 210v 15mA, 6-3v 5A. 18/-.
 Primary, 200/250v 50 c/s. Secondary, 110v. Rating, 60w. Enclosed. 19/6.

SMOOTHING CHOKES

15H, 200mA 150 Ω, size 6½" x 4½" x 3½" ...	7/6	5H, 200mA, 100 Ω ...	6/-
20H, 300mA, 150 Ω, Weight 13 lb., size 7" x 5" x 5" 20/-		5H, 200mA, 90 Ω ...	7/6
		5H, 120mA, 140 Ω ...	5/-

ELECTROLYTICS

8mF 170v, 1/9 ; 8mF 350v, 2/3 ; 8mF 450v, 2/6 ; 16mF 450v, 3/6 ; 8+8mF 450v, 4/- ; 8+24 350v, 3/- ; 16+16 350v, 4/- ; 16+24 350v, 4/6 ; 16+16 450v, 4/6 ; 16+8 450v, 4/6 ; 24mF 350v, 2/6 ; 16+24+8mF 450v, 5/9 ; 100mF 3v, 4d. ; 100mF 6v, 6d. ; 25mF 25v, 1/6 ; 25mF 50v, 1/9 ; 50mF 50v, 2/- . Post extra. 16+32 450v, 5/- ; 16+6 500v, 5/- ; 8+32 450v, 5/-.

LOUDSPEAKERS, P.M.

5", less trans., 13/6 ; 5", with trans., 16/11 ; 6½", less trans., 15/11 ; 10", with trans., 32/6. All brand new, boxed, with ali. speech coils.

METERS, MOVING COIL

Metal cased, 2" circular, 0-500 micro/amp., 7/6 ; 0-15/600v (requires ext. res.), 6/6. 0-20 or 0-40 amp. (with shunts), 5/- . Bakelite cased, 2" square, 0-500 micro/amp., 9/6 ; 0-1mA, 7/6 ; 0-5mA, 6/- ; 0-50mA, 7/- ; 0-150mA, 6/- ; 0-300v D.C. (series res. supplied), 7/- . Bakelite cased, 2½" circular, 0-100 micro/amp. F.S.D., scaled megohms -4-2-5m-inf., 18/6 ; 0-500 micro/amp., 16/6 ; 0-30mA, 7/- ; 0-50mA, 8/6 ; 0-100mA, 9/6 ; 0-200mA, 9/6 ; 0-1mA, desk type, 15/- ; 0-15v, 7/- ; 100-0-100v, centre zero, 1mA F.S.D, 7/-.

MODULATORS B.C.456B

3 Valves, 1-1625, 1-1215, 1 VR150/30. Brand new, 13/6.

R.F. UNITS

Type 24, with valves, used, good condition ...	8/6 plus 1/6 post
Type 25, with valves, used, good condition ...	10/6 plus 1/6 post

CONTROL UNITS

With 2 2" square moving coil meters, flush mounting, 0-5mA and 0-40v, toggle SW, 5- and 7-pin sockets. 8/6. Post 1/-.

F.M. RECEIVERS, B.C.603

10-valve receivers covering 20-28 Mc/s. Tuneable or 10 channels available by push buttons. I.F. 2.65 Mc/s. Bandwidth 80 kc/s. Power output, 2 watts to built-in 5" speaker. Provision for phones. Line up : R.F. 6AC7, Mod. 6AC7, osc. 6J5, 2 IF's 12SG7, limiter 6AC7, det. 6H6, A.F. and B.F.O. 6SL7, A.V.C. 6SL7, output 6V6. Brand new. £6/19/6.

U.H.F. MUSHROOM VALVES. Type 717A, new, 12/6.

CERAMIC SWITCHES

2P 3W 1 Bank ...	2/-	3P 3W 1 Bank ...	2/6
2P 6W 4 Bank ...	4/6	3P 3W 2 Bank ...	3/-

VIBRATOR PACKS

Input, 12v. Output, 250v 65mA, with 12v vibrator and OZ4 rectifier. Mounted on chassis 5½" x 3½" x 1½", with 8 ft. screened cable, on output. Brand New, boxed, 17/6.

S.M. DIALS, as used on R.F.26, etc., less Curser, 4/11.

SOLONS FOR YOUR SOLDERING JOBS !

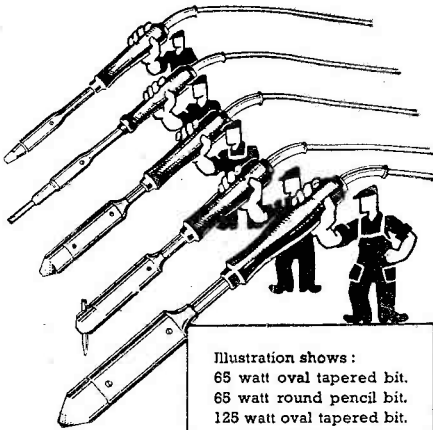


Illustration shows :
 65 watt oval tapered bit.
 65 watt round pencil bit.
 125 watt oval tapered bit.
 125 watt round pencil bit.
 240 watt oval tapered bit.

These five models will satisfy practically every soldering demand whether for the occasional household job or continuous soldering under workshop or factory conditions. With the Solon the heat is in the bit itself . . . continuously . . . hour after hour ; all connections housed at end of handle away from heat. Each model complete with 6 feet Henley 3-core flexible. Now available from stock. Write for folder Y.10.



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 TELEGRAPH WORKS CO. LTD.
 51-53 Hatton Garden, London, E.C.1

ODEON RADIO

(G4HV)

Offer you some useful lines

NEW VALVES AT LOW PRICES

GU50, 17/6 ; TZ40, 35/- ; 807/RK39, 15/- ;
 VR150/30, 10/6 ; VR105/30, 10/6 ; 9001, 7/6 ;
 EF50, 7/6.

LOW-LOSS FEEDER

Telcon K25 300 ohm transmission line, twin conductors in a flexible telcothene ribbon, approximately 1/2" wide. Attenuation at 30 Mc/s 0.6 db. per 100 ft. Ideal for construction of folded dipole. **9d** per yard

CERAMIC SWITCHES

Yaxley type switches with four ceramic wafers, each 2 pole 4 position. Suitable for receiver switching or band-switched exciter. **12/6** each.

MORSE KEYS

American streamlined type key on cast metal base with shorting switch. A well-balanced key with a good action. Made by Lionel Corp. of U.S.A. Limited quantity at **3/6** each.

We still have a few items of equipment from our recent stock-taking sale, as follows :-

1,500v Power Pack, for rack mounting, Woden transformers and chokes, complete with 866 rectifiers. Original price, £27/10/-.
ONE only, offered at £12

LABGEAR CRYSTAL CALIBRATOR

100/1,000 Kc/s, with optional modulation. For 200-250v operation. New and unused.
 Reduced from £15 to **£10**

1,200V 300 Ma POWER PACK

Standard rack mounting, with mercury vapour rectifiers. Complete with GU50 valves.
 Reduced from £25 to **£12**

MODULATOR and exciter decks from Philco T43 Transmitter, brand new rack-mounting units, supplied without valves but with circuit diagram at **£3** each, carriage 7/6 extra.

COLLINS TCS 12 Receiver, 1.5 to 12.0 Mc/s, with fine slow-motion tuning drive, BFO, etc. New and complete. *One only at £5* Carriage 7/6

ODEON RADIO

(G4HV)

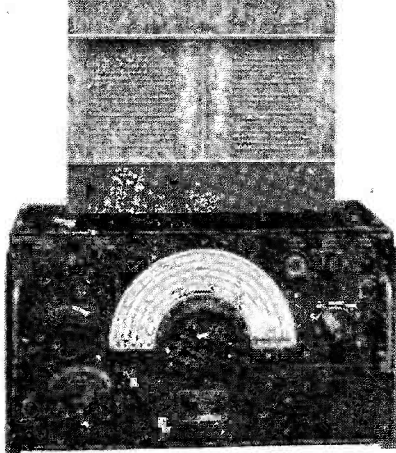
Everything for the Amateur

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Telephone HARrow 5778

5 VALVE BATTERY COMMUNICATION RECEIVER

Brand new SUPERHET. Exceptionally sensitive and Selective, a super D.X. Receiver, precision Motorband Drive. Simple to operate. Ideal for radio amateur, yachtsman, for remote situations where no mains available; uses 120v H.T., 2v L.T., 9v G.B. All leads clearly marked, 3 wavebands 30-70m, 70-150m, 150-300m, complete with valves, VP23 as RF amp, FO2A frequency changer, VP2B L.F. amp, H.L.2 first L.F. and PM2A output, low H.T. consumption, two output jacks for phone or loudspeaker. Output, complete in cabinet, size 15x10x8. MADE ORIGINALLY FOR SERVICES SO OBVIOUSLY A REALLY GOOD RECEIVER. Complete, ready to operate as soon as batteries and phones or speaker are connected. Price £4/10/6, plus 10/6 carriage and insurance, or if you prefer send 37/6 deposit and promise to pay balance by 6 fortnightly instalments of 13/4 each. ORDER Receiver Type R1224A.



STATION R1155

A DUAL PURPOSE RECEIVER

This is the way we might well describe the R1155 Communication receiver, for with this you can relax and listen to the B.B.C. or you can search out the weakest station on your favourite band. Frequency range 75 kc/s to 18 mc/s, 10 valves. Black crackle case. Ex-R.A.F. Not new so we have graded them into three classes according to external condition. Class A at £12/10/- being as new, class B at £10/10/- slightly soiled, and class C at £8/10/- being rather well used. Even the class C ones, however, are in thoroughly good working order for all classes have been checked, adjusted and serviced in our workshops. You can't go wrong by buying one of these for it will give you years of useful service. We shall be glad to dispatch a receiver to you if you can't collect but please add 15/- extra to cover carriage charges, and wooden transit case. If you wish you may return the case when 7/6 will be refunded.

To save you having to make any fiddling alteration to your R1155 we have developed a unit which is a combined mains power pack, loudspeaker 6V6 output stage and set switching unit. This is enclosed in a very fine cabinet and stands on top of the set as illustrated. It is fitted with two leads, one-plugs into the mains, the other plugs into the receiver. Your R1155 is then mains operated, and will work right away without modification. The price of this unit is £7 carriage paid.

STOP PRESS.—A few £N1 model R.1155 receivers have just arrived. The price is £15 (plus carriage).

H.P. terms if desired on any goods.

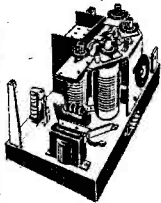
W. D. SALES

3 Electron House, Windmill Hill, Ruislip Manor, Middx.

CONSTRUCTORS' COLUMN

WIN £10

FOR 5/- we will send you an ex-R.A.F. transmitter Type 22 as illustrated. These transmitters have been made inexpensive (Government orders) by the removal of the valves and some wires, but what a lot of useful parts remain. You will be able to make all sort of Radio, Electrical and Mechanical gadgets. Just a few of the items contained are, valve holders, switches, coil formers, silver-plated wipers, prongs, counting-relays, contact arms, knobs, rods, ratchet, condensers, resistors, etc.



Send only 5/- plus 1/6 carriage for this unit and details how to win £10.

TELEPHONE KITS

These contain enough ex-R.A.F. equipment to make two telephone stations enabling two-way speech over long or short distances. When complete your telephones will be in every way equal to manufactured articles costing £10 or £12. The complete kit consists of 2 microphones, 2 headphones, 2 switches, 2 batteries, length of wire. The only other equipment you have to find is sheet metal or wood to use for the containers. Price 8/6, post free. Order Item No. 290

YOU ARE INVITED

to call any day during transmitting times, and to judge for yourself the quality of the picture given by our W.D. Television Mark 2. If you can't call, send 7/6 to-day for the data so that you can get to work right away. All parts may be purchased by calling or writing. Cost 2/8

TELEVISION AERIAL—tabular, aluminium-designed for fitting in the loft, bedroom, boxroom, etc., 15/- post free. Outdoor type, 37/6.

MASK white plastic—designed to suit 6" tube. Will put professional finish to your home-built television, 7/6 post free.

MAGNIFIER—super quality 30/6, others very good from 27/6. SPECIAL OFFER OF ELECTROLYTIC CONDENSERS. 450-500v working: 8 mfd, 1/11; 16 mfd, 2/8; 8 mfd x 16 mfd, 3/4; 16 mfd x 16 mfd, 3/9. 350v working: 8 mfd, 1/6; 16 mfd, 2/4; 11; 32 mfd, 1/11. 200v working: 25 mfd plus 16 mfd; 25 mfd, 3/11; 32 mfd, 1/8. Cathode bias types, 50-12v, 10d., 25v-50v, 1/5; 25v-25v, 1/-; 10v-25v, 10d.

P.M. SPEAKERS, best makes, Rola, R. & A. Plessey, etc.: 3", 10/6; 5", 10/6; 8" with O.P.T. 11/2; 6" with O.P.T. 17/6; 8" with O.P.T. 15/3; 10" with O.P.T. 27/9.

MAINS TRANSFORMERS—standard primaries, 6-3v 3 amps, 5v 2 amps, 350-0-250, 60-70 m.a., 13/8, plus 1/3 postage.

MIDGET TUNING CONDENSERS. 2-gang -00055 fitted with METAL TRIMMERS and complete with perspex dust cover. These condensers, made by "PLESSEY", are of the type used for tuning personnel receivers. Price is 6/6, plus 1/3 postage.

4-GANG TUNING CONDENSERS. -0005 each section—fitted trimmers—ceramic insulation. These are complete in a very useful chassis, and are fitted with a drive. Government surplus equipment but new and perfect. Price 2/9, plus 1/3 postage.

2-GANG -0005 CONDENSER. Standard size—ceramic insulation. Price 4/8, plus 1/3 post.

CHOKES, Iron Cores L.F. 250 m.a. 10 henry, 9/6; 200 m.a. 6/-; 70 m.a., 4/6; 50 m.a., 3/9.

E.H.T. CONDENSERS. -1 mfd 5,000v, 3/9; -02 mfd 5,000v 1/6.

PAPER CONDENSERS. We have all types in stock up to -1 mfd, 6d. each; -25 mfd, 6d. each; -25 mfd, 8d.; 5 mfd, 11d. Parcel of 36 assorted, no more than two of any value, 12/6.

RESISTORS. Full range in stock, ½ and ¼ watt, 4d. each; 1 watt, 8d. each. Parcel of 100 assorted, all useful sizes, no more than two of any one type, 12/6.

VALVES BARGAIN PRICES

024	13/3	6B4	9/6	6I7	9/6	128Q7	8/6
1R5	10/6	6B7	10/2	6N7	10/-	128R7	6/6
1S4	8/-	6B8	8/6	6O7	6/6	1496	9/6
1S5	5/-	6C6	9/6	6SH7	6/-	2516GT	7/6
1T4	6/-	6D6	6/6	6SK7	6/6	25V5	10/-
2A7	10/2	6F5	6/6	6SL7	13/3	25Z6GT	7/6
3T4	8/-	6G6G	6/6	6SN7	6/-	80	10/-
5U4	7/6	6H6	3/6	6V6	7/6	83	8/-
6V4	13/3	6I6	12/6	6X5	6/6	89	8/-
823	13/6	6J7	7/6	7C7	7/6	807	7/6
8Z4	7/6	6K7G	7/6	12A6	6/-	84GZ4	8/-
6A3	10/6	6K7GT	9/6	12K7	8/6	866A	15/-
6AC7	8/-	6K7 MET	7/6	12K8	8/6	1299A	9/6
6AG5	8/-	6K2 MET	7/6	12SH7	7/-	9001	8/4
6AG7	6/-	6L6G	10/-	12SK7	8/-	9002	8/-

G6YA

**WESTERN GATEWAY HEADQUARTERS
FOR RADIO AND TELEVISION EQUIPMENT**

G2BAR

BC 610 Exciter Tuning Units
Brand New, TU 61, 1.5-2.0 Mc/s, 8/6 ea. TU 62, 1.0-1.5 Mc/s, 6/6 ea., plus 1/3 postage.

Tank Coils
BC 610 Top Band, 5-pin on ceramic strip, swinging link, made by Barker & Williamson, 7/6 ea., 1/- postage. Sockets for above coils, 2/6 set of five.

Change over Relays
6-pole 2-way, as used in the 1154 transmitter, operates on 6/9v, will switch complete transmitter and receiver station, including aerials. 7/6 ea.

2-pole 2-way c/o relay. Made by Leach, U.S.A., large positive contacts, 24v D.C. coil. Size 2 3/8" x 1 1/2" x 1 1/2" each, including post.

Eimac & Jennings
High voltage vacuum condensers. 50 pf. and 100 pf. 7/6 each.

Johnson Transmitting Condensers
500 mmfd., good spacing. Ceramic insulation. 5/- each. Split Stator condensers as used in the 1154 Tx., 150 mmfd. plus 150 mmfd., 5/- each. 9d. postage on both of above.

1196 Transmitter Receiver
Operates phone and M.C.W. from 4.3-6.7 Mc/s. Easily modified for other frequencies. 45/- each. Transic case, 2/6. Type 12, push-button controller with trans. rec. switch, 5/- ea. Crystals 5100, 5980, 6180, 6720 kc. 4/6 each. Carriage, add 5/- goods, 7/6 passenger train in England and Wales.

Radio Interference Mains Suppressors
Neat aluminium case, two wires in and out. 7/6 each, postage 9d.

Oil-impregnated Condensers for T.V. and H.V.

Capacity	Working Voltage	Size	Price
4 plus 4 mfd	3,000	9" x 7" x 5"	25/-
4 mfd	2,000	5" x 5" x 2 1/2"	15/-
4 mfd	1,500	5" x 5" x 2 1/2"	12/6
.1 mfd	4,000	5 1/2" x 2 1/2" x 2"	5/6
.1 mfd	3,000	5 1/2" x 2 1/2" x 2"	5/6

Transformers and chokes for use with above condensers available.

Television Lead-in Cable
80 ohms twin co-ax cable. Any length cut. New. 9d. per yard, postage 1/- per 10 yds.

5-Pin Plug and Sockets
Centre locating key, excellent insulation, with plated connecting pins. 2/- pair, 20/- per dozen pair.

5-Way Rubber Insulated Cable
Cotton covered for use with the above connectors. 9d. per yard.

Visual Indicators
Type 1. Has two 160 microamp movements with crossover pointer indicators.
Type 3. Has two 160 microamp movements, one F.S.D., one centre zero. 7/6 each, plus 1/- postage.

A.C. Meter
0-1 m/a with 4-in. open scale, beautiful instrument. 25/- ea., 1/6 postage.

We guarantee satisfaction with all our equipment. Write to us for all your requirements.

ARTHUR H. RADFORD 28 Bedminster Parade, Bristol, 3

A.M.I.E.E. G6YA A.M.Brit.I.R.E. Phone : 64314 Open Saturdays : 9-5.30 p.m.

G2AK

The Month's Bargains

G2AK

Transformers. Input 200/250v in 10v steps. Secondaries, 500/500v 120ma, 4v 3.5A c.t., 4v 4a c.t., 4v 4A c.t. and 10v 1A. 4v can be connected to give 6v if required. Beautiful job, not pitched in junk. Our price 30/-, packing and carriage 1/6. Some of the above have broken terminal strips, but are guaranteed perfect otherwise.

Dummy Aerials. Brand new in metal case, complete with 5, 10, 20 ohm vacuum type 100-watt non-inductive load resistor. A rare bargain at only 7/6 each, postage and packing 1/-.

Brand New Power Packs by RCA. 115 v input, fully smoothed with F.W. metal rectifiers. Output 200v 80/100ma. Price only 22/6, carriage 2/6. We can supply a small 80-watt auto for use with the above at 10/-.

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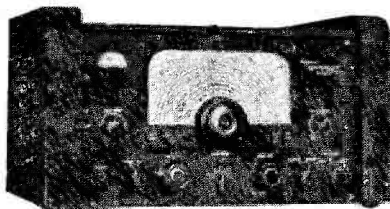
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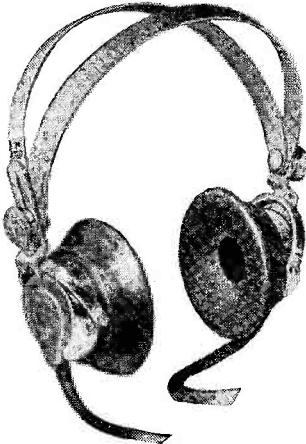
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Type CA6	6 pin	11-25 metres	7-8 microhys grid winding	4/3
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Type CC6	6 pin	44-100 metres	61-35 microhys grid winding	4/9
Type CD6	6 pin	80-180 metres	239-5 microhys grid winding	4/9
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8 mfd.	350v peak wkg.	1" dia. x 1 1/2" long body	CE24L	3/9
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16 mfd.	450v peak wkg.	1 1/2" dia. x 2 1/2" long body	CE27P	4/6
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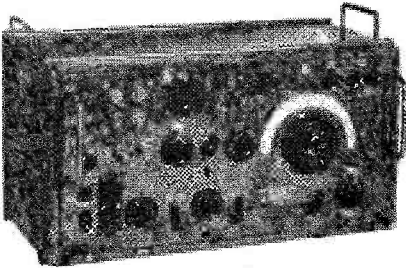
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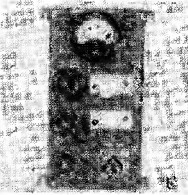


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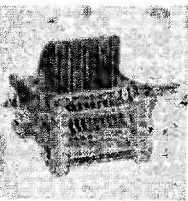
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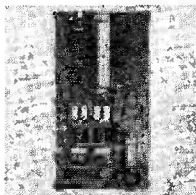
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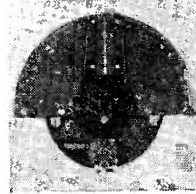
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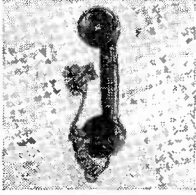
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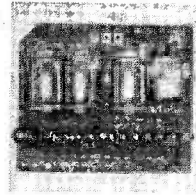
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Include three IT4 valves, 12-1 Midget Trans., three ceramic valveholders, 18 condensers and resistors, etc., 20/- Without valves, 5/-.



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Consisting of Transmitter 7H7. Pierce oscillator. 7C5. P.A. Average R.F. Power 5 watts. Receiver superhet 7Q7 frequency changer. 7H7 I.F. amplifier. 7H7 in transmitter functions as A.F. amplifier. Audio power output, 100 milliwatts.

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Few only available. 15 valves: 4 6K7, 2 6B8, 2 6F6, 2-2051, 1 6N7, 6SC7, 6L7, 6H5, 5Z4. Coverage 200-1,750 kc/s in three bands. Power supply incorporated 115v 400 cycles. Makes a fine broadcast receiver. Price £4/17/6, carriage paid.

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SHORT WAVE MAGAZINE

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Vol. VII

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No. 69

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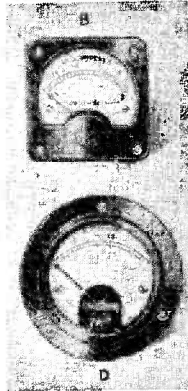
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EDITORIAL

Surplus

While it is in some ways much to be deplored that Amateur Radio has come to be so dependent on the surplus market for the supply of components and equipment, there are also many reasons why the ready availability of surplus is greatly to the general advantage. The quality and range of such equipment, as well as its wide distribution during the last three years, has enabled considerable progress to be made in almost every aspect of Amateur Radio—to a degree which certainly could not have been possible had we been forced to rely upon what was until recently a meagre and uncertain supply of new but comparatively high-priced products.

In fact, it would be a fair generalisation to say that had there not been this big release of ex-Service equipment, Amateur Radio (in the sense of technical progress and new stations licensed) would virtually have been brought to a standstill two years ago.

From this, it can be argued that the existence of surplus has actually created, and is creating, a potential market of great value for the manufacturer of new equipment. With the steady increase in stations licensed—now nearly three times the number on the air before the war—the capacity of the Amateur Radio market to absorb new business is also steadily increasing.

It may well be some time yet before this tendency becomes a really important factor for the trade generally, and for the present the manufacturer of parts and equipment for the Amateur Radio market is not being greatly encouraged. But the time will assuredly come when Amateur Radio will offer great and lasting opportunities to progressive firms able to supply the particular needs of British amateurs.

Thus, it can be said that Amateur Radio and therefore amateurs themselves have gained much from the activity on the surplus market, and that in due time it will be found also to have been of considerable benefit to the trade generally.

*Arthur Fooks
G6FD*

The great majority of amateurs operate with high-level amplitude modulation in which the audio power is strictly related to the carrier input to be controlled. Comparatively little has been done in this country with FM control, largely because effective working is confined to the 28 mc band. The author of this article describes a NBFM exciter for DX phone operation on ten metres which incorporates an original and ingenious modification of his own—the injection of low-level AM in an early stage, in combination with the FM, a system of operation for which he claims greatly improved performance. The chief advantages of any FM system are much simplified audio equipment and minimised BCI and TVI.—Ed.

FM/AM Exciter Unit

For Ten-Metre Phone

By R. P. ELLIS (G3SN)

BEFORE describing the construction of the exciter, the writer would like to recount the reasons for designing the apparatus.

The rather poor quality and readability of DX signals using narrow-band frequency modulation had for some time been noticed, when being taken on the normally selective communications receiver.

As the use by amateurs of special FM receivers was very limited it was decided that any improvement in the reception of NBFM would have to be made at the transmitting end.

First Experiments

About twelve months ago, experiments were commenced on various methods of producing FM signals. The phase method of FM was tried and rejected; the quality was fairly good but distortion was severe at low signal levels and during fades. It was eventually decided to concentrate on the reactance type of FM modulator. A narrow-band FM exciter was built, using a single-stage audio amplifier into a reactance modulator driving an ECO of usual design.

The results were very promising, but distortion was still apparent during a signal fade and the quality was not good when received on an AM receiver.

Stability

At this stage in the experiments a discriminator circuit was being used to lock the ECO against a quartz crystal. The main drawback of this arrangement was that the FM transmission was more or less tied to one frequency. This could, of course, be changed by inserting a different crystal, but then the discriminator transformer would require further adjustment. It was decided to eliminate the discriminator circuit entirely, and

construct a really stable ECO which could be frequency modulated even up to 15 kc deviation, with no shift in mean carrier frequency. This was rather a stringent requirement, and it was realised that careful design and voltage stabilisation of the ECO would be necessary.

Unfortunately, one of the effects of FM is that the addition of a reactance modulator upsets the performance of an otherwise stable ECO. However, by the use of high-C value in the grid tuning circuit, and a rigidly wound coil, plus screen and anode voltage stabilisation, the resultant ECO was rock-steady under all working conditions. It will be realised that as the ECO is operating on 3.5 mc to control a transmitter working in the 28 mc band, even the slightest variation in the mean carrier frequency would be serious, as it would be multiplied by the doublers in the main transmitter. Though here it can be definitely stated that provided the recommended layout is followed as closely as possible, and only good quality components used, the intending constructor will not have any difficulty in emulating the extremely good frequency stability obtained with the original FM/AM exciter.

At this stage in the writer's experiments, the exciter was putting out good quality, stable, FM transmissions with a deviation of approximately 10 kc, which was found to be about the correct value for reception on normal communications receivers.

First Tests

The exciter was used for a period of two months, working U.S.A. stations in the 28 mc band. An analysis of the reports received indicated that the quality of the FM was well above average as received by numerous DX operators.

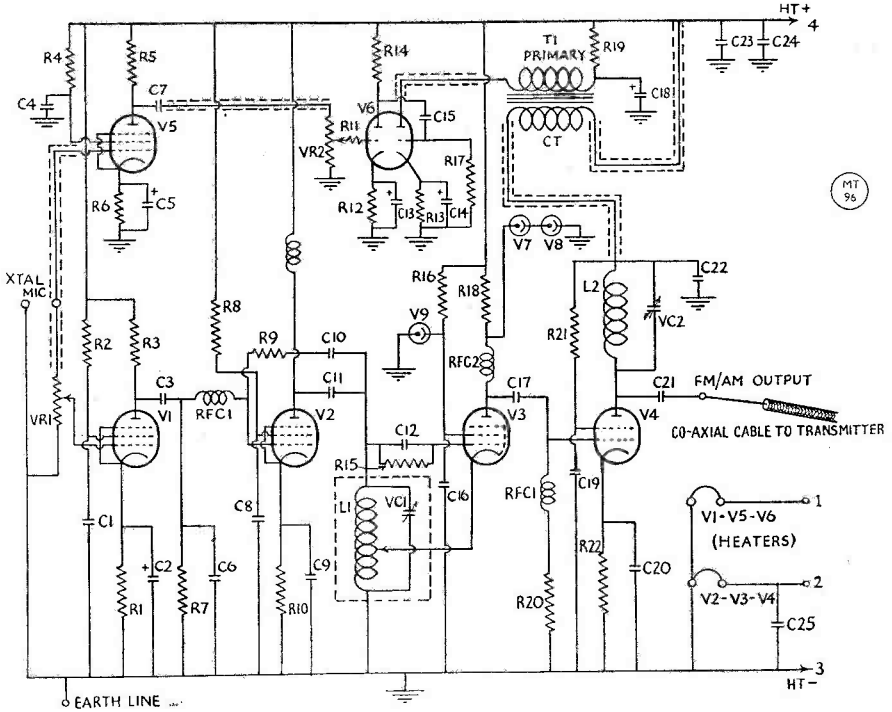


Fig. 1. Circuit details of the G3SN FM/AM Exciter Unit. FM is applied to the drive oscillator V3 via V1, V2; a small percentage of amplitude modulation is simultaneously imposed on the RF buffer stage V4 via V5, V6. The working of the system is discussed in the text.

Table of Values

Fig. 1. Circuit of the FM/AM Exciter Unit.

- R1 = 1,500 ohms ½ watt.
- R2 = 1 megohm ½ watt.
- R3 = 500,000 ohms ½ watt.
- R4 = 1 megohm ½ watt.
- R5 = 500,000 ohms ½ watt.
- R6 = 2,500 ohms ½ watt.
- R7 = 500,000 ohms ½ watt.
- R8 = 50,000 ohms ½ watt.
- * R9 = 50,000 ohms ½ watt.
- R10 = 450 ohms ½ watt.
- R11 = 5,000 ohms ½ watt.
- R12 = 2,000 ohms ½ watt.
- R13 = 1,000 ohms ½ watt.
- R14 = 100,000 ohms ½ watt.
- * R15 = 50,000 ohms ½ watt.
- † R16 = 30,000 ohms 5 watt.
- † R17 = 250,000 ohms ½ watt.
- † R18 = 1,000 ohms 5 watt.
- † R19 = 12,000 ohms 5 watt.
- † R20 = 10,000 ohms 5 watt.
- † R21 = 15,000 ohms 5 watt.
- † R22 = 300 ohms 5 watt.
- VR1 = 1 megohm potentiometer.
- VR2 = 1 megohm potentiometer.
- V1 = 6SJ7.
- V2 = 6SJ7.
- V3 = 6F6.
- V4 = 6L6.
- V5 = 6SJ7.
- V6 = 6SN7.
- V7 = VR150/30.
- V8 = VR150/30.
- V9 = VR150/30.
- RFC1 = Eddystone type 1010.
- RFC2 = Eddystone type 1066.
- VC1 = .00016 μF.
- VC2 = .00006 μF.
- T1 = Class-B driver transformer. Step-down ratio 1.5:1.
- C1 = .1 μF tub. 350v.
- C2 = 25 μF elect. 25v.
- C3 = .01 μF tub. 1,000v.
- C4 = .1 μF tub. 350v.
- C5 = 25 μF elect. 25v.
- C6 = .0001 μF mica 500v.
- C7 = .01 μF tub. 1,000v.
- C8 = .25 μF tub. 1,000v.
- C9 = .01 μF tub. 1,000v.
- * C10 = .005 μF mica 1,000v.
- * C11 = .005 μF mica 1,000v.
- C12 = .0001 μF mica 500v.
- C13 = 25 μF elect. 25v.
- C14 = 25 μF elect. 25v.
- C15 = .01 μF tub. 1,000v.
- C16 = .005 μF mica 1,000v.
- C17 = .0005 μF mica 1,000v.
- C18 = 2 μF elect. 450v.
- C19 = .05 μF tub. 500v.
- C20 = .05 μF tub. 500v.
- C21 = .001 μF mica 1,000v.
- C22 = .002 μF mica 1,000v.
- C23 = 8 μF elect. 450v.
- C24 = .05 μF tub. 500v.
- C25 = .002 μF mica 1,000v.

* = Close Tolerance.
 † = Wire-wound.