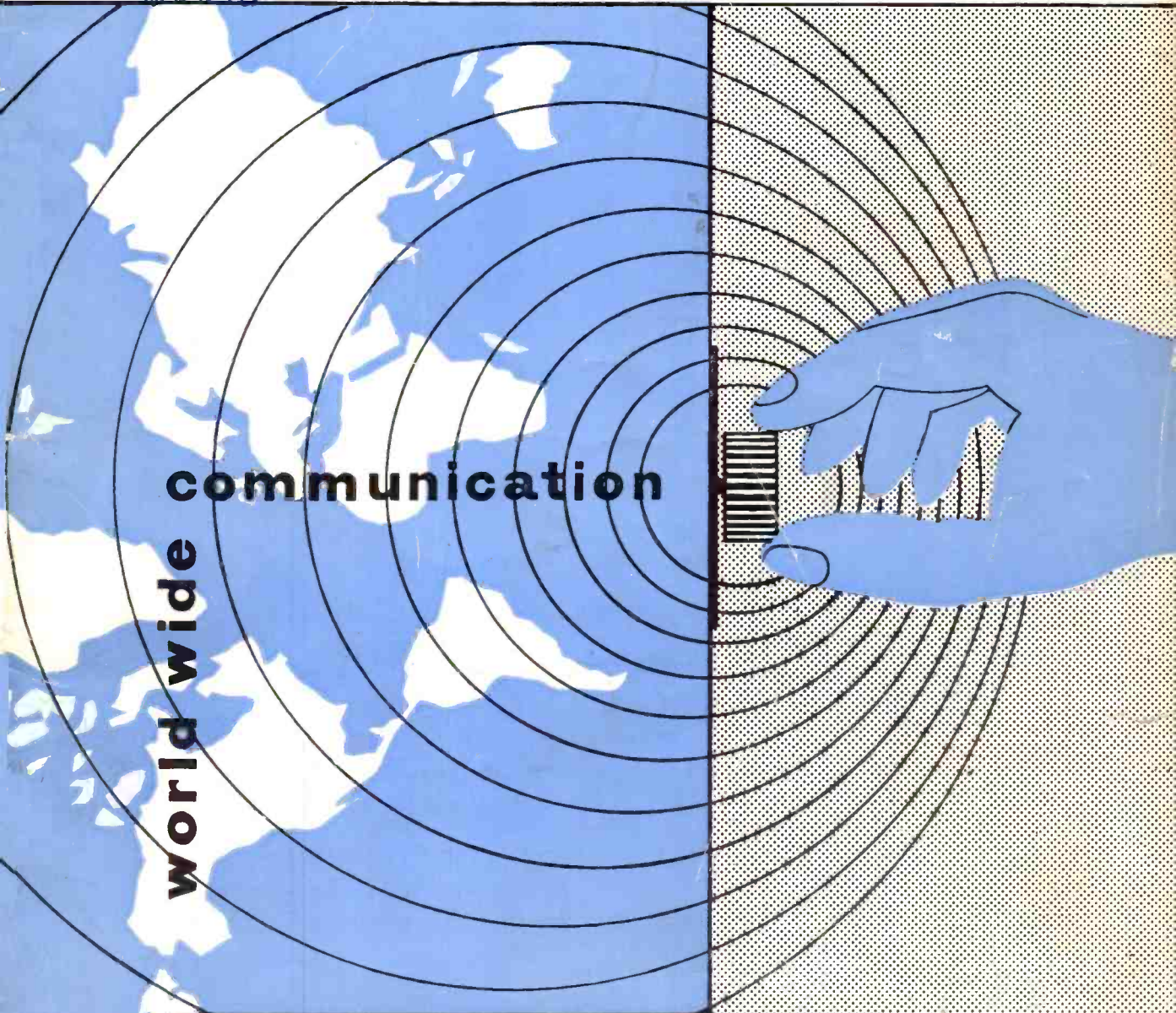


The SHORT WAVE Magazine

VOL. XVI *book*

FEBRUARY, 1959

NUMBER 12



communication

world wide

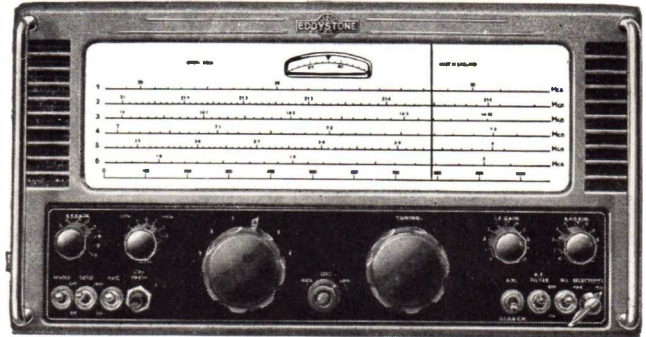
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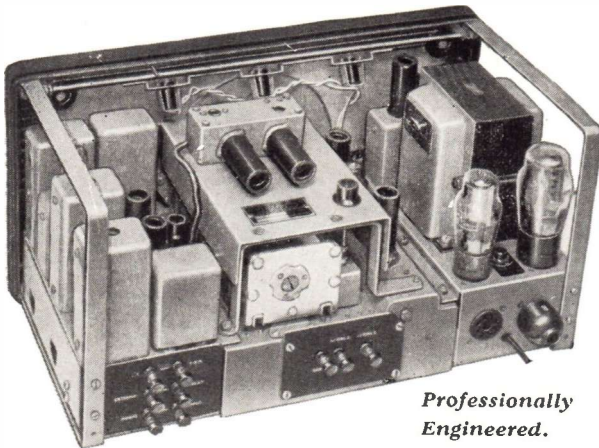
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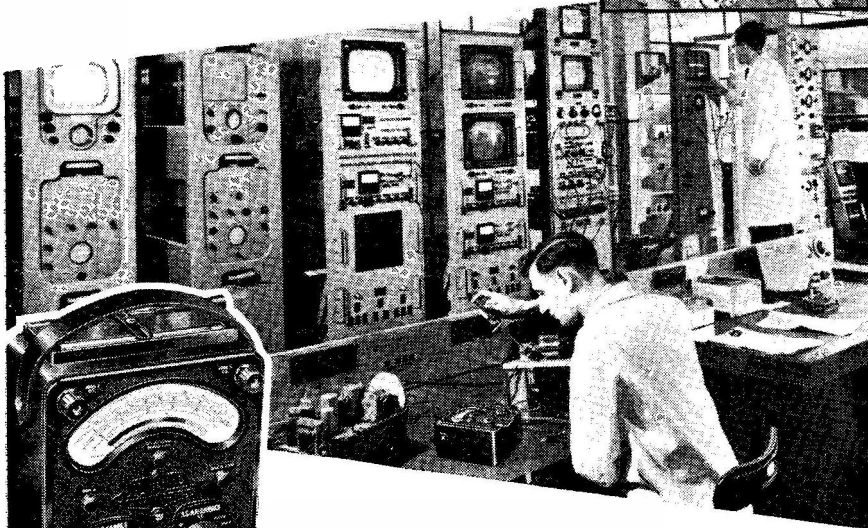
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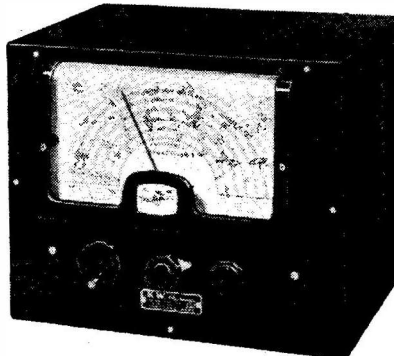
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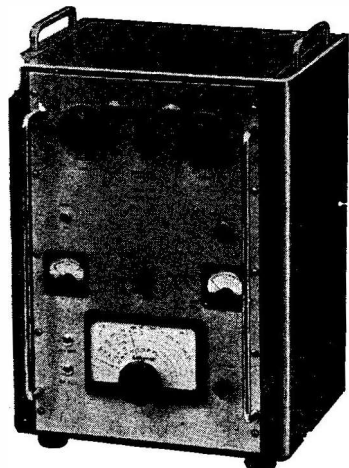
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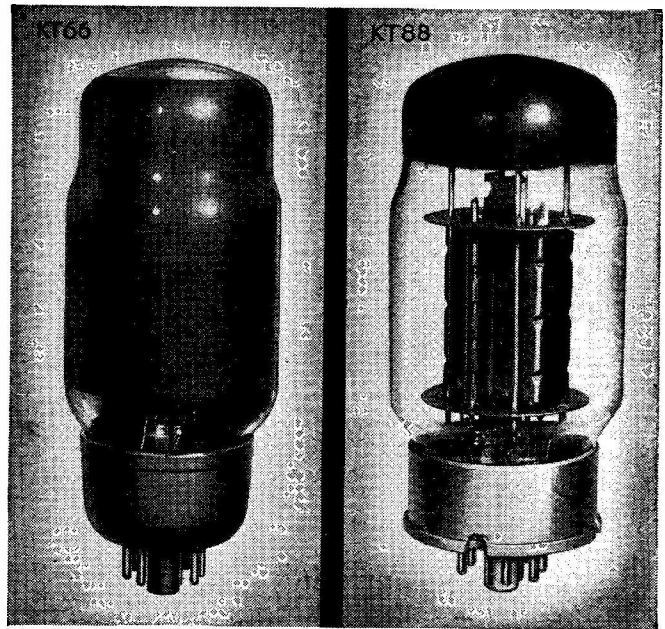
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VOL. XVI

FEBRUARY, 1959

No. 186

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Managing Editor: AUSTIN FORSYTH, O.B.E. (G6FO)

Advertisement Manager: P. H. FALKNER

*Published the Friday following the first Wednesday each month at 55 Victoria Street, London, S.W.1.
Telephone: Abbey 5341/2*

Annual Subscription: Home and Overseas 33s. (\$5.00 U.S.) post Paid.

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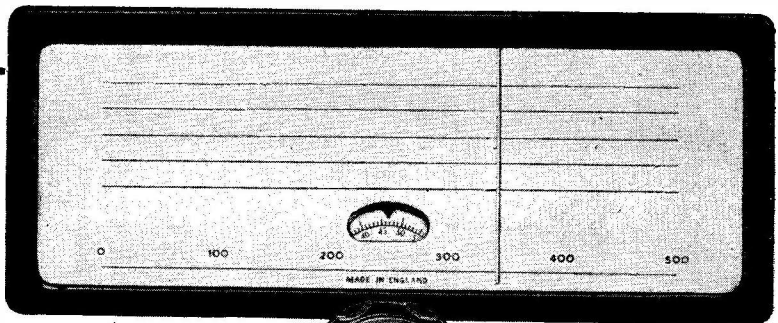
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The SHORT WAVE Magazine

EDITORIAL

Rejoinder *The Post Office has recently issued another warning about alleged interference on coast station frequencies by 160-metre amateur operators in the U.K.— this complaint again emanating from the Danish authorities. While it is certainly not our purpose to suggest that the warning can be disregarded, let us look into the factors on which such a complaint could be based.*

In the first place, coast stations and ships work cross-frequency, which means that the coast station should always be listening well HF of 2000 kc — if the ship is in its allotted frequency band. This makes it difficult to understand now any coast station, Danish or otherwise, can hear amateur interference on his own channel.

Secondly, if it is the ship reporting interference on the coast station “because of amateurs” (which is the sort of loose phrase used if any QRM comes up) it must mean that the ship was attempting to work the coast station at excessive range; the point here is that the geographical coverage of all coast stations is clearly defined and is such that no U.K. amateur could possibly put down a signal that would interfere in the normal coverage area of a high-powered Danish station. Of course, if the ship was trying to work into Denmark from, say, the mouth of the Humber, there could well be serious QRM from Top Band amateurs — but then the ship would be so far outside the official area of the Danish station that there could be no legitimate cause for complaint, because in such circumstances her traffic ought to be routed through local U.K. coast stations, Humber Radio or Cullercoats.

Thirdly, it is perhaps significant that the two official complaints have emanated from the same source — a particular Danish coast station (possibly even the same operator). In other words, without a clear statement of the facts supporting the complaint, it is difficult (in the light of the procedure as laid down) to see how it could be justified. We all know how strong the North European coast stations in the 1800-2000 kc band are after dark. The great majority of U.K. amateurs take care to avoid their frequencies for the obvious reason that they constitute strong QRM, even on local Top Band signals.

While it must be accepted that interference has been caused (because the Post Office says so) that does not mean that the Danish complaint was justified, or could not have been rejected had the full facts been given. In any event, on this band an interference situation vis-à-vis amateurs and coast stations can only arise after dark, and there is no justification whatever for threats to dispossess U.K. operators of the 160-metre band “because of interference with maritime services.”

However, while reserving an opinion on the validity of the current Danish complaint, we must support our own authorities in the matter, in the expectation that they, for their part, will reject complaints that are frivolous or unjustified. Because we hold what are called amateur licences, it does not mean that we are always in the wrong when someone chooses to make a complaint.

*Austin Fobell
G6FO.*

Army Sender Type 36

NOTES ON DESIGN AND
CONSTRUCTION—
MODIFICATIONS FOR
AMATEUR USE ON
10-40 METRE BANDS

G. N. FARE (VQ2GF)

As this article shows, the Type 36 "surplus" transmitter is a particularly interesting proposition in that it can be modified for CW/Phone operation on the four HF bands and is self-contained for power. Our contributor also makes suggestions for improving the general appearance of the equipment. No extensive reconstruction is necessary for any of these modifications.—Editor.

ONE of the better buys on the "surplus" market today is the transmitter known as the Sender Type 36. This was originally designed for use in the A.A. Defence System and covers a frequency range of 10-40 mc, thus taking in our 20, 15 and 10 metre bands. The power input can be run up to 65 watts on CW and phone, and it is one of the few "surplus" transmitters on the market which can be purchased as a *complete unit*—that is, with modulator and power pack.

The transmitter consists of two main units—an RF section which contains a VFO crystal oscillator, buffer/doubler and a PA stage. All the valves used in the three circuits of this section are 807's and the HT voltage to the VFO is stabilised by means of two type AW3 regulator tubes. An interesting feature is the use of tuning indicators ("magic eyes") in the tuning both of the crystal oscillator and buffer-doubler stages. The PA tuning is by means of a built-in 0-200 mA meter. The PA stage operates as a doubler on both bands, using two 807's in *push-push*.

The second main unit contains the power supplies, speech amplifier and modulator. There are separate HT circuits for the modulator and the RF stages and a separate bias supply feeds both the modulator and the RF stage grids. The main HT is brought on by means of a relay in the bias supply line which functions when the bias supply is earthed, to switch in mains voltage to the HT transformer.

The three full-wave rectifier valves involved are type AW4.

On the audio side, the speech amplifier consists of a 6C5 transformer-fed from a carbon microphone and transformer-coupled to a pair of 6C5's in push-pull, driving a pair of 807's as modulators in Class-B. The modulation transformer is mounted on the RF chassis. There is provision for modulating the transmitter from a remote source and an arrangement for feeding the audio output from a receiver to the GPO handset which is supplied as standard and incorporates a "push-to-talk" switch.

A 16-point connector mates the two units via a massive screened cable. The units are each mounted in a heavy hardwood case with sliding fronts, on the back of which appear miscellaneous data and circuit diagrams, including operating instructions. The installation complete weighs 210 lbs.—so it is no lightweight.

Band changing is by means of plug-in coils in the buffer and PA stages. Band 1 covers 10-20 mc and Band 2 covers 20-40 mc. The VFO is also calibrated 40-60 mc, but coils are not available for this band. The fundamental frequency range of the VFO is 5-10 mc.

Modifications for Amateur Use

The transmitter can be used exactly as received without modification. But the fact is that there are several inherent disadvantages, namely:

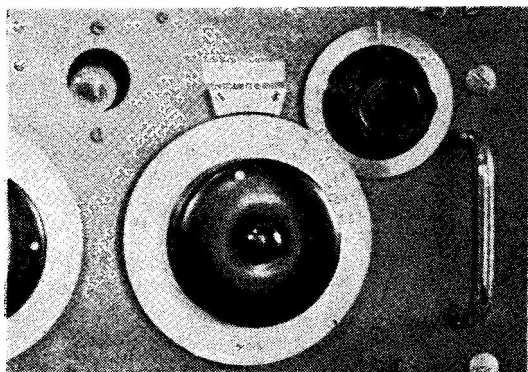
- (1) Bandsread is poor on the VFO and logging or tuning to a predetermined frequency (in an amateur band) is difficult,
- (2) In spite of its very robust construction, the VFO is liable to drift,
- (3) Harmonic radiation is excessive by any standards,
- (4) Excessive provision of safety and interlock circuits make adjustment and testing difficult,
- (5) Keying is not very well "shaped" and is inclined to be chirpy,
- (6) A minor criticism is that the equipment is not very good to look upon when used in its cases, and
- (7) The range covered does not include any of the "gossip" bands, in particular 40 metres.

Whilst some of these disadvantages may appear formidable, modifications to effect a cure are simple to carry out and quite inexpensive; most amateurs will probably be able to raid the junk box for the few spares required.

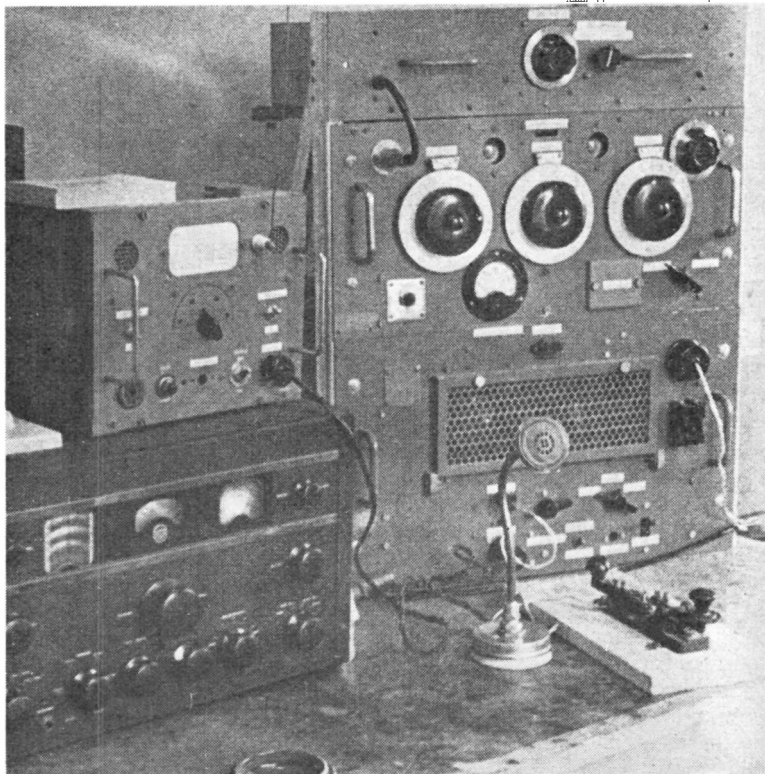
Increasing the Bandsread of the VFO.—It is quite a simple matter to increase the band-

spread of the VFO electrically, by putting a small variable condenser in parallel with the VFO tuning condenser. This condenser should be about $15 \mu\mu\text{F}$, of robust construction and preferably with ceramic insulation; otherwise, almost any type will do. If a $15 \mu\mu\text{F}$ is not available, a larger one can be used with all the rotor plates, except one, removed. It is necessary to bore a hole in the front panel to mount this new condenser (as a precaution, all the valves should be removed whilst this is done). Make sure that all metal filings are cleared out from the VFO compartment when the job is finished. The dial knob used by the writer was an ex-Service type that happened to be available, with a 3 in. skirt calibrated 0-100, but any dial which will fit in is suitable and it may be directly calibrated if so desired. A lead should be taken, in heavy wire, from the stator of the new condenser to the spare solder tag on the front gang of the main tuning condenser. The chassis forms the earth return.

Calibration is simple and can be carried out by means of an accurately calibrated receiver. Set the receiver to 28,000 kc exactly, which should be verified by means of a crystal calibrator or frequency meter. The new



View of the front panel showing the placing of the additional VFO dial, at upper right.



This photograph shows, on the right, the finished appearance of the Type 36 transmitter when modified as described by VQ2GF in his article. The general appearance of the Type 36 is very much improved by re-mounting the chassis in a framework made of $1\frac{1}{2}$ -in. aluminium angle, as explained in the text.

condenser should be fully in mesh and the main VFO dial set at 14/28 mc band edge. The transmitter is switched to CW and all calibration is carried out in this mode, with the key circuit open—the following stages thus being inoperative. With HT on (allow the transmitter to warm up thoroughly before switching on the HT), unscrew the Philips beehive condenser on top of the main tuning condenser until the signal is heard in the receiver or maximum deflection of the S-meter is obtained, if one is fitted. If, with the beehive condenser fully unscrewed no signal can be heard, insert a small value mica condenser (say $20 \mu\mu\text{F}$) in series with the new variable condenser. This should enable the signal to be tuned in with the Philips trimmer; reseal the latter (blob of wax on the screwed shaft) and recheck the calibration. The receiver should then be set at 28050 kc and the new VFO parallel dial adjusted until the beat is heard. This setting is noted and the process repeated until the condenser is fully out of mesh, having covered all the 10-metre band. The VFO is now calibrated and, of course, the reading if divided

by two will give the transmitter frequency at 14 mc.

To calibrate the VFO for 15 metres, the main dial is set to 21 mc and, with the new condenser fully in mesh, a beat at exactly 21 mc should be tuned in. If not, carefully rotate the main dial, using the slow-motion drive, and mark the skirt accurately. This mark can then always be used to set up for this frequency. Dial calibration at 50 kc intervals is carried out as before.

If the receiver does not respond to the beat from the VFO, switch the transmitter to "phone" and, using a dummy load, tune the following stages to resonance. Return the switch to CW and it will be found that the signal from the VFO will be very much stronger. In the case of a well-shielded (or an insensitive) receiver, a short aerial may be used, but in this case, make sure that the receiver is tuned to "Man.," *i.e.*, AVC off or the receiver may be over-loaded. It is now quite an easy matter to zero beat with any station on the band and the bandspread will be quite adequate for all normal purposes. If the dial is not directly calibrated the use of a graph is recommended so that any desired frequency may be selected.

The only thing to watch is that the main VFO dial is set exactly on 14/28 or 21 mc each

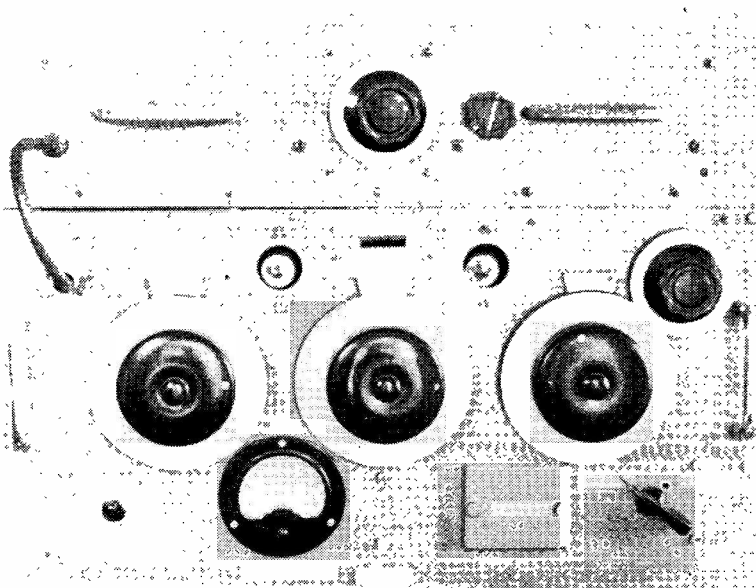
time the band is changed.

Increasing VFO Stability: As it stands the VFO is not very stable and the potential frequency drift, especially at 28 mc, is somewhat alarming, to say the least! This instability is mainly due to over-heating and can be almost completely corrected by lining the three sides of the VFO compartment with some heat insulating material, such as $\frac{1}{2}$ in. softboard, thick felt, asbestos or thick cardboard. Also, $\frac{3}{8}$ in. diameter holes should be drilled at 1 in. centres at the top and bottom of the side of the coil compartment to assist in producing better air flow past the coil. If all this is done, the VFO will remain very stable and drift will be reduced to negligible proportions. If drifting still persists check the voltage at the "cold" end of the anode coil; it should be rock steady at about 230 volts. If the voltage varies, suspect the voltage stabilisers and check the associated resistors.

Suppression of Harmonic Radiation

Harmonics are radiated from this transmitter in considerable strength and TVI certainly rears its ugly head. Fortunately, the remedy is simple and involves a minor operation on the tank coils and their base and the provision of an aerial tuner unit, together with more effective screening. (There is an item called the Harmonic Filter Unit, which was originally supplied to A.A. Regts. with this transmitter, Part No. ZA-10791. This, however, is not available on the surplus market.)

The original method of taking off the RF is by means of a tap on the tank coil and *via* a condenser to the aerial socket. This condenser should be unbolted from the chassis and its associated leads cut off; a link coil is now inter-wound with the tank coil; this coil consists of 16 gauge wire in insulated sleeving and is composed of two turns for the 20-metre coil and one turn for the 15- and 10-metre coil. The ends are connected to the two spare pins on the base (one of which was left by the removal of the tap from the tank). From this latter pin a screened lead is



Front view of the modified RF chassis, with the additional ATU (see circuit diagram) installed in the drawer. The coax cable at left pipes RF to the new aerial tuning unit. The knob to the right of the ATU dial is for switching in the dummy load. The switch to the left of the meter is mounted on a blanking plate over the hole formerly occupied by the 16-point connector (removed to the rear chassis drop). The secondary VFO tuning dial fitted is at upper right.

taken to the aerial outlet socket and the outer braid is connected to the other pin and earthed. This new link coil should be interwound at the rear end of the coil when it is mounted in position.

The next stage is to construct an aerial tuner unit (ATU). The circuit for this is given in Fig. 1. A length of coaxial cable is used to connect the ATU to the coaxial socket on the RF chassis. The drawer previously used to house spares is ideal for mounting this unit. The coil and condenser can occupy the centre compartment and the right hand compartment may house a change-over relay or (as in the writer's own transmitter) a switch for bringing in a dummy load, for testing and setting up. The aerial socket is fixed to the rear of the drawer.

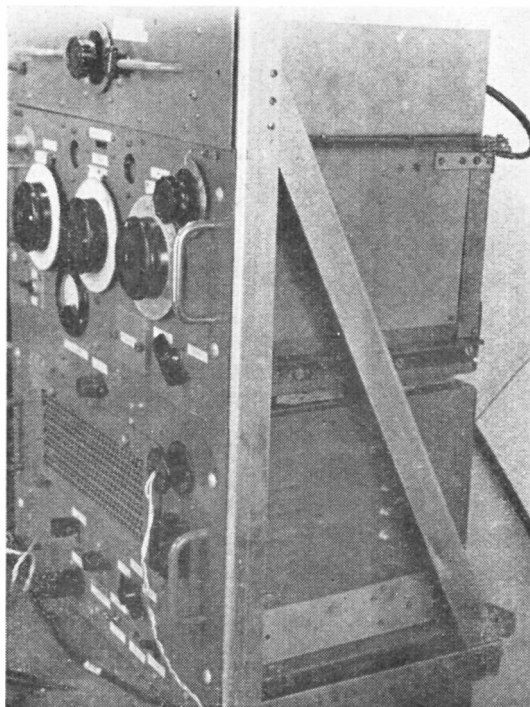
To load the transmitter, rotate C1, tune for maximum reading of the plate meter, retune the PA for maximum dip, and successively readjust on the ATU and PA until the transmitter is fully loaded. The dip at resonance should be very small (about 10 mA).

The third stage in the suppression of harmonics is to improve the shielding of the RF chassis. This was done by means of 18 gauge aluminium sheeting cut to size and fixed with self tapping screws in position along the back and alongside the PA stage. A lid for the drawer was made with a $\frac{1}{2}$ in. turn-down on all sides and is removable. There are no inherent difficulties associated with the shielding, and existing screws can be used in many cases to fix the sheeting. It should be noted, however, that with the shield for the side of the PA stage in position, it is not possible to use the coil clamps as they foul the side. These were therefore removed from the chassis.

After completing these modifications, the third harmonic was 60 dB down and could not be detected on a communications receiver 100 yards away.

Elimination of "Safety" Devices

This transmitter contains two switches which cut the HT if either the drawer is pulled or if the door on the front of the power unit is opened. As a licensed amateur knows what he is doing (presumably), such devices are an unnecessary luxury—in fact they are a confounded nuisance when it comes to checking HT voltages and general testing with power on. (In the original, these safety arrangements were incorporated to prevent tampering with the transmitter by "unauthorised Service personnel"—there being a distinction between operator and mechanics.) To eliminate these switches, terminals E and F are disconnected



Showing, from one side of the transmitter, how the new mount is constructed. Two frames are made like this, using $1\frac{1}{2}$ -in. aluminium angle, and the RF and power supply units are bolted on, using the original fixing holes. Note the heat-insulating pad under the VFO section for preventing drift.

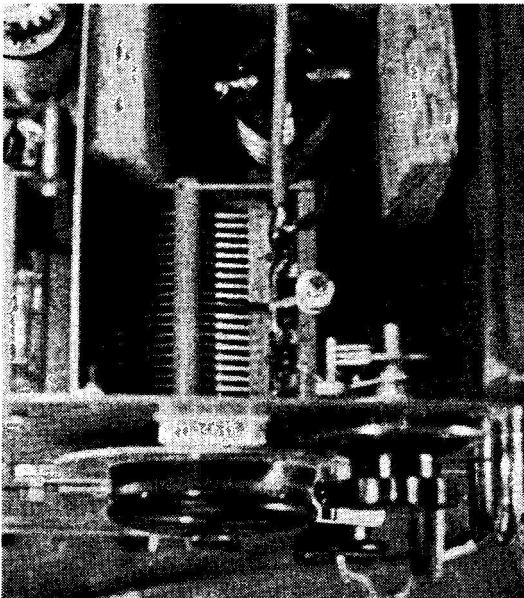
from the power plug, the wires soldered together, and the joint insulated. Similarly the wires to the pressel switch on the power pack door are removed from the switch and soldered together.

Keying Characteristics

There is a definite tendency, under certain conditions of loading, for a chirp to develop in the keying. This can be checked by obtaining a critical report from a nearby station. If there is a chirp, the remedy is to key the PA stage instead of the buffer, as normally wired. This is quite a simple job and involves disconnecting the lead from the cathode of the 807 buffer valve and earthing that cathode. The next step is to remove the wire running from the common cathode of the PA 807's to earth, and connecting the wire previously removed from the buffer to the PA cathodes. There were no apparent clicks emitted when this was done, and the chirp was completely absent. The usual key-thump filter should, of course, be fitted.

"Beautifying" the Type 36

The units when used in their cases are bulky



Looking into the modified VFO section, showing the new small tuning condenser immediately behind the panel, on the right. The Philips trimmer referred to in the text can be seen on top of the main tuning condenser assembly. The heat-insulating material for preventing drift is placed round three sides of the coil, as shown.

and unsightly, so it was decided to mount them on a rack. Two frames made up of $1\frac{1}{2}$ in. x $1\frac{1}{2}$ in. aluminium angle were devised, as shown in one of the photographs. The units were then bolted to the frame using the original mounting holes. The frame had to be cut away slightly to accommodate the various bolts, slides, and so forth which protrude from the sides of both units. The next step was to get rid of the untidy-looking cable connecting the two chassis together. First of all a 2 in. hole was bored in the back of the chassis of the RF unit and the socket was remounted there. This meant unsoldering all the leads, carefully marking them and refixing to the new position of the socket. Most of the leads can be shortened and one or two need replacing with longer lengths, but the job is not difficult if care is used.

The same thing was done with the power pack. In this case most of the leads needed lengthening. The hole was cut in the thin sheet metal back. The cable was then shortened to 9 ins. by taking off one socket, removing the shielding and cutting all the wires to the correct length. As the writer is not a great believer in multi-point plugs, all the pins of the RF chassis socket were cut off and their wires soldered directly to the remaining stumps. The plug was

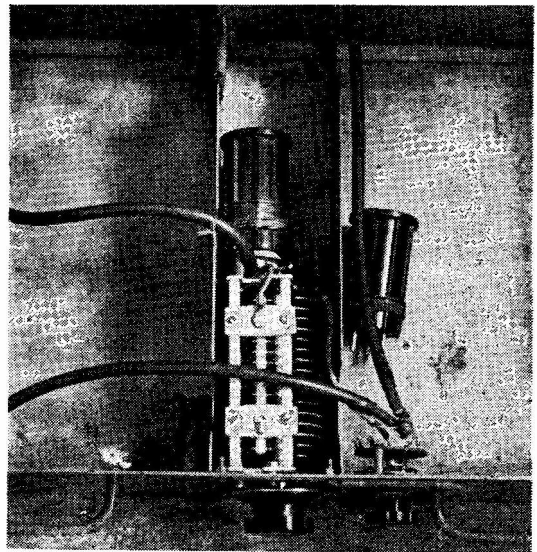
retained at the power pack end.

Though cable shielding was dispensed with, there was found to be no radiation from the wires. The two holes left in the front panels were covered with a small piece of aluminium sheet bolted in place. The drawer fits in its original position and is withdrawn for coil changing.

Increasing Range to Cover 40 Metres

The final modification is to increase the frequency range to bring in the 40-metre band. This is the lowest frequency that can possibly be obtained, as the VFO runs at 5-10 mc. This could be accomplished by winding another coil similar to the 20-metre tank coil, but with four more turns. However, there are difficulties in obtaining or making the coil base, so it was decided to add a fixed condenser across the 20-metre coil, in parallel with the tuning condenser. A 2-pin (FT243) crystal socket was soldered directly across the pins connected to the ends of the coil, and a $200 \mu\text{F}$ 1,000v. working silver mica condenser was fitted with two pins to mate with the plug.

The final modification (for 40-metre operation) is to incorporate a switch to cut out the heater of one of the 807's in the PA. It will be remembered that the PA is arranged in push-push; this being so amplification is almost impossible at the fundamental frequency, but if one valve is switched out, that valve serves



Showing the new ATU installed in the drawer; the coil holder is mounted on the end of the condenser. The loose coil unit is for tuning the 10-15 metre bands.

to neutralise the other, which does all the work. The switch was mounted in the blanking plate over the hole left by removal of the power socket, the unearthed side of the rearmost 807 was disconnected, and the two wires from the switch inserted in series.

To tune to 40 metres it is necessary merely to plug in the 200 $\mu\mu\text{F}$ parallel fixed condenser and switch off the one 807 heater. The tank can now be tuned to resonance in the usual way. The power input should be about 45 watts when fully loaded. Efficiency is not very high, owing to the poor L/C ratio for 7 mc—but the point is that 40-metre operation is obtained in an easy way.

Conclusion

With all the modifications as described, this transmitter has been found to be extremely reliable. It is well constructed and even after twelve hours of continuous contest operating, no trace of electrical strain or serious overheating of any component was observed. Much DX has been worked on the 7-28 mc bands and excellent reports have been received from all Continents. CW reports have always been T9 and the modulation has often been favourably commented on without any prompting from the writer's end.

This equipment thus provides a complete transmitter, of a very business-like appearance.

NEW PLESSEY VHF/FM TUNER

A new addition to the wide range of radio units already manufactured by The Plessey Company Limited is the P.B.2 VHF/FM tuner. This is designed around a double triode valve, one section of which is used as an RF amplifier and the other as a self-oscillating mixer. The unit employs eddy-current tuning and is available in two main versions, one having a tuning range of 87-101 mc and the other having a range of 87-108 mc. Consequently, tuners suitable for use in the U.K., Europe or North America can be supplied.

There are no oscillator drift problems with the unit and radiation is well within B.R.E.M.A. recommended limits.

THE MOBILE REGISTER

In the July, August, September and November, 1958, issues of SHORT WAVE MAGAZINE we printed lists of active /M operators, giving callsign with home QTH, band(s) worked, and make and registration number of vehicle. These four lists together registered about 100 known mobiles, and we already hold some more towards the next list. If you are operating /M, and intend to be out and about this coming Mobile season, let us have your QSL card, with the details for the Register.

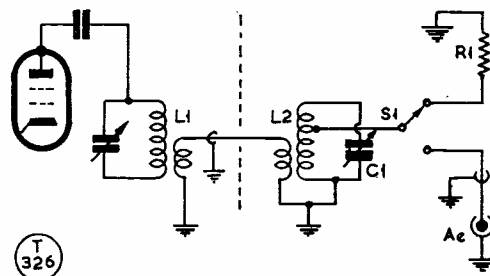


Fig. 1. Circuit diagram of the Aerial Tuning Unit suggested by VQ2GF for the Type 36 transmitter. That part of this circuit which is to the right of the dotted line is enclosed in the drawer—see photograph opposite.

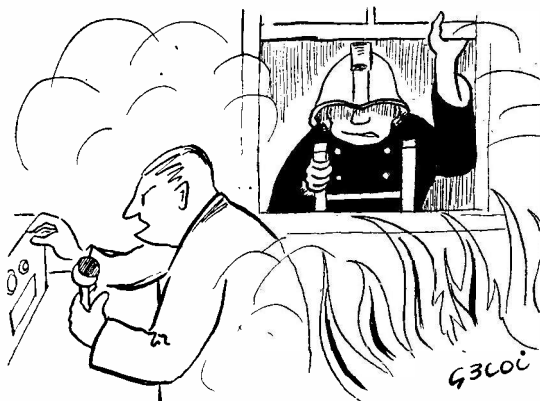
CONSTRUCTION OF THE ATU

- L1—Existing tank coil with pickup link (see text).
- L2—Plug-in coils (Eddystone Cat. No. 580).
 - 7 & 14 mc—10 turns $1\frac{1}{2}$ in. dia., 1 in. long, tapped 3 turns from "hot" end, with 2-turn link.
 - 21 & 28 mc—4 turns $1\frac{1}{2}$ in. dia., $\frac{3}{8}$ in. long, tapped 1 turn from "hot" end, with 1-turn link.
- C1—100 $\mu\mu\text{F}$ transmitting type variable condenser.
- S1—SPDT rotary ceramic switch.
- R1—75 ohm. dummy load, rated 50 watts.

It should give many years of trouble-free service as all components are rated well above anything they may be called upon to stand. With the modifications described here the Sender Type 36 should prove a pleasure to use for even the most experienced operator.

INDEX—VOLUME XVI

This issue completes another Volume of SHORT WAVE MAGAZINE. As usual, every copy of the March issue, No. 1 of Vol. XVII, will include, as a free loose supplement, a complete cross-referenced Index to the recent Volume. We also hope to be able to say, in the next issue, what back-number copies are available of Vol. XVI, as some months were sold out and are now out-of-print.



"... Seems to be a smell of burning ..."

An Engineered Cubical Quad for Ten

USING TV AERIAL PARTS

B. FOLDS (G3LIL) and J. A. GALE (G3LLK)

The merit of this design is that it should result in a high-gain 10-metre beam that is not only electrically efficient, mechanically strong and almost impervious to weather, but also good looking. The construction is from standard TV aerial fittings.—Editor.

THERE is no doubt that the Cubical Quad is one of the most popular and efficient aerials for the HF bands. It is capable of a gain of 10 dB over a half-wave dipole and its front-to-back ratio can be in the region of 35 dB. Apart from this, the angle of radiation is low—about 15 degrees at a height of one wavelength, and with no waste in any minor lobe at a high angle, as is the case with a normal beam at the same height.

However, it seems to be the practice to construct Quads of bamboo and wire, and several articles have appeared describing this method. Many operators have registered surprise at the idea of constructing a Quad from alloy tubing, but it is a very simple project having the following advantages:—

- (1) Greater bandwidth.
- (2) A stronger and better-looking job.
- (3) Standard TV aerial materials and fittings can be used.

Many constructional articles specify parts which the writer "happened to have by him." All the parts for this Quad have to be bought, but they are readily obtainable. It is not suggested that this is a cheap beam but the writers think its advantages are worth the extra cost.

As is well known, the Cubical Quad system consists of two elements, the driven element and the reflector (Fig. 1), each of which is in the form of a square. Both squares are the same overall size but the reflector is made longer electrically by the insertion of one or more stubs. The driven element is fed at the centre of the lower side of the square and, with the reflector spaced at about two-tenths of a wavelength, offers quite a good match to

80-ohm coax cable.

Construction

For the present design, this is shown in Fig. 2. The sides of the driven element are 9 ft. lengths of $\frac{3}{8}$ in. alloy tubing, each end of which is bent round to fit inside the $\frac{1}{2}$ in. alloy tubing which forms the top and bottom sides of the square. The bends can be made fairly easily provided a little care is taken; the best way to do this is to insert a solid alloy rod or something similar in the ends and gently hammer them round a water pipe of about $1\frac{1}{2}$ in. diameter. (Another method is to fill the tube with dry sand, which is afterwards run out.—Ed.). The top and bottom sides are 8 ft. 9 in. in length and the lower one is cut at the centre for the coax feed. At this feed point a television dipole insulator is inserted. This is chosen to fit the $\frac{1}{2}$ in. elements and a 1 in. boom. A similar insulator is inserted at the centre of the top side, but here the element goes right through without being cut and the insulator should be bored through accordingly.

Having inserted the bends previously made into the ends of the top and bottom sides of the square they should be made secure by two small self-tapping screws and the joint taped up and rendered waterproof.

The reflector is made in exactly the same way as the driven element, except that at the centre of the top side of the square the element is broken at the insulator and a stub made to

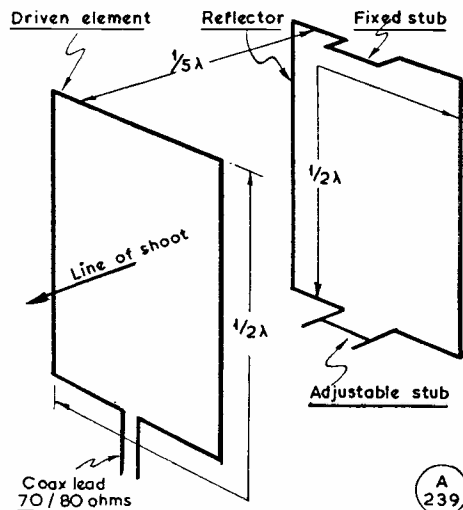


Fig. 1. Electrical layout for a Cubical Quad. With due regard to mechanical considerations, these dimensions can be applied to any band. Though a sticks-and-string method of construction can be used to build Quads, a more refined engineering approach is suggested in the article and shown in Fig. 2.

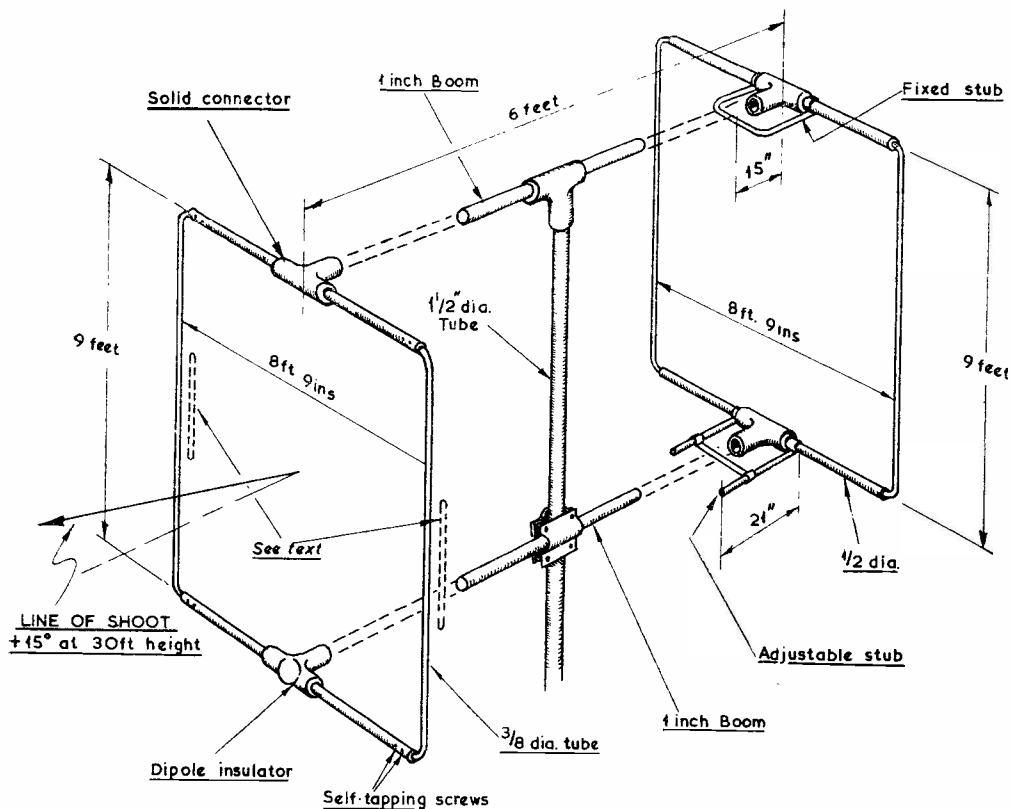


Fig. 2. Construction of the 10-metre Cubical Quad discussed in the text, using standard TV aerial fittings. This makes a neat, well engineered job of the mechanical part of the design. The dotted sections are for loading elements for frequency adjustment — see text — which may or may not be required. The feed-line can be taken along the lower 1-in. boom.

bridge it. If this top stub is omitted and the lower stub relied on to tune the reflector the symmetry of the system is upset and the main lobe, instead of being at right angles to the plane of the elements, will fire a little to one side. With stubs at top and bottom the beam fires directly ahead and a slight gain also results.

The top stub is made of a length of $\frac{1}{2}$ in. tubing, which is bent round in the form of a "U." The ends are flattened, bent round the element each side of the insulator and a 4 BA bolt clamps each end to the main element. The lower stub must be made adjustable so that the reflector may be tuned for maximum gain. This is conveniently accomplished by taking two 21 in. lengths of $\frac{1}{2}$ in. tubing, flattening the ends and clamping them round the element on each side of the bottom insulator. The shorting bar can be made with a short length of $\frac{1}{2}$ in. tubing, the tips being flattened as before to form a clamp at each end to grip the sides of the stub. It does not matter

LIST OF PARTS

FOR THE TEN-METRE CUBICAL QUAD

- Four lengths, 8ft. 9ins., of $\frac{1}{2}$ in. alloy tubing.
- Four lengths, 9ft., of $\frac{3}{8}$ in. alloy tubing.
- Two lengths, 6ft., of 1in. 20g. alloy tubing.
- One 9ft. length $1\frac{1}{2}$ in. 16g. alloy tubing.
- Seven feet $\frac{1}{2}$ in. alloy tubing for constructing stubs.
- One masthead mounting, 1in. cross arm, $1\frac{1}{2}$ in. pole fitting.
- Four insulators, Type PDH.
- One universal mast clamp, Type UMM/2.

Note: It is understood that all these parts can be obtained from: Fringevision Ltd., Elcot Lane, Marlborough, Wilts.

whether the stubs stick up or down or in any direction, but the neatest result is obtained if they are made to point towards the mast and inside the booms.

The Cubical Quad in itself is now complete; it only remains to hold it in the air with the elements six feet apart. Two 6 ft. lengths of 1 in. 20g. tube form the booms and these fit into the insulators which have been provided at the top and bottom of the two squares. Having got thus far, do not be disappointed if the beam seems fragile and wobbly. The whole thing becomes rigid when the stub mast is clamped to the two booms. The mast is a 9 ft. length of 1½ in. tubing fixed to the top boom by the appropriate television mast head fitting and to the bottom boom by a clamp designed to fit a stand-off arm to a mast by a "V" bolt action. This short mast can then be fixed to a main mast, rotary or otherwise, which the constructor will already have or about which he will have his own ideas. The completed assembly is quite light and can be carried up a ladder singlehanded.

Tuning Up

As described and illustrated here the driven element should be resonant somewhere near 28.5 mc. The writers have found that to bring it lower in frequency, *e.g.*, for the CW man, it is possible to load it with capacity at the voltage

points. Rods can be clamped to the centre of the sides and this will not only lower the resonant frequency but also broaden the bandwidth. These rods are shown dotted in Fig. 2. The reflector may be tuned for either maximum forward gain or maximum front-to-back ratio with a field strength meter at a suitable distance. However, it has been found more convenient to arrange an RF ammeter to bridge the tuning stub and the point at which the meter shows *maximum* current flowing in the reflector will be the point to bridge the stub for maximum gain.

The dimensions may appear at first sight to be rather high but it has been found that the normal formula, if used, produces a Quad which is actually resonant in the vicinity of 30 mc or higher! With the dimensions given a SWR of practically 1:1 has been achieved on 28.5 mc and the RF current across the tuning stub for 120 watts input to the PA has been over 1 amp.

If a Quad on similar lines is planned for 15 metres, the elements should preferably be of ¾ in. tubing and a look through a TV aerial manufacturer's catalogue would provide plenty of ideas with regard to the fittings to use.

Getting The Speech Out

SOME POINTS ON MODULATION, AND AN OUTPUT INDICATOR

UNDER the present congested conditions prevailing on the amateur phone bands, the importance of making the fullest possible use of one's carrier is well understood by all telephony operators. But there are many, particularly among the beginners, to whom a simple explanation of the methods of obtaining that magical "hundred per cent." figure may be helpful—and there are others of us, who imagine we are fully modulated, to whom a practical form of modulation percentage checker might be useful.

The original purpose of this article was to describe an easily constructed modulation meter-cum-phone monitor, but it is felt that some discussion on the subject of modulation, besides stressing the value of such an instru-

ment, might be helpful in introducing the subject.

Importance of Full Modulation

All methods of modulation aim at producing the maximum of audible output in the receiver, and (leaving aside SSB for the moment) this is effected entirely by variation of either the amplitude or the frequency of the transmitted carrier. In this article amplitude modulation alone will be considered, since this is the system still in common use on our communication bands.

Any full treatment of the theory of amplitude modulation would require a much longer and more detailed treatment than is possible here, and as the average phone beginner requires practical advice rather than large doses of theory and mathematics, some knowledge of the principles of modulation will be assumed.

Supposing, then, we have our unmodulated 100-watt carrier. To modulate this carrier to the 100 per cent. level requires the addition of 50 watts of audio to be superimposed upon it. This extra 50 watts is expended in the generation of the two sidebands on either side of the

carrier.

Under perfect conditions of modulation the positive and negative excursions of the radiated sidebands will be equal and opposite in amplitude, with the result that the S-meter of a receiver tuned to the signal will show no variation due to modulation. If the S-meter moves up or down to any degree it must be because the positive or negative modulation peaks are excessive.

When the carrier is 100 per cent. modulated, using a sine wave input, the average carrier power is increased by 50 per cent., whilst the *peak* power is increased to four times the carrier power. To modulate the carrier 50 per cent. only 12.5 watts of audio are required (again assuming a sine wave input) but in this case the peak power reaches only 2.3 times the carrier power.

As mentioned earlier, the audible output from the other fellow's receiver depends entirely upon the *range of variation in the sideband power* and from the figures given above it is clear that a 50 per cent. modulated carrier falls far short of the 100 per cent. modulated carrier in producing the maximum possible level of audio in the distant receiver. As a matter of interest, the accompanying table (Table I) gives a few pertinent facts concerning the comparatively steep falling off in peak carrier power and aerial current for four values of modulation percentage.

It must be stressed that the figures in Table I all assume a sine wave input to the modulator, as represented by a pure audio tone or a whistle. With normal speech input rather different conditions obtain, as speech wave-forms are very peaky and when a transmitter is adjusted for 100 per cent. modulation on speech *peaks* the *average* depth of modulation is in the region of 40-50 per cent. only.

Effects of Over-Modulation

The latter statement will make it clear why it becomes so easy to over-modulate on speech inputs, and why some method of modulation monitoring is necessary if BCI trouble and reports of spurious radiation are to be avoided.

But it is a common experience to be given, over the air, a report of under-modulation when a glance at an oscilloscope shows the signal to be fully modulated or even over-modulated on *speech peaks*. The explanation is, of course, that the station at the receiving end is judging modulation percentage by comparing the *average* speech level with the strength of the carrier. The high speech peaks, which on the oscilloscope are giving evidence

Table I

PERCENTAGE MODULATION	RATIO PEAK POWER TO UNMODULATED CARRIER POWER	PERCENTAGE AERIAL CURRENT INCREASE
100	4.0	22.5
70	2.9	11.6
50	2.3	6.1
30	1.7	2.2

of full modulation, contain very little power and simply add nothing to the audible signal—but at the same time they may over-modulate the carrier causing “sideband splash” and even BCI trouble at the transmitter end.

The only remedy for this state of affairs is speech clipping — or cutting-off the high frequency speech peaks — in the speech amplifier or modulator, by means of suitable audio filters. It is the only answer to the problem of putting out an AM carrier which is as fully modulated as possible on speech, while at the same time avoiding over-modulation. Briefly, by cutting off the peaks, the average depth of control can be increased without reaching over-modulation.

Observing Modulation Effects

The whole problem of modulation makes it a virtual necessity to have in the station some means of estimating modulation depth if over-modulation is to be avoided—or conversely, if it is evident from reports that modulation is down.

It will now be clear that one cannot altogether rely on reports received over the air unless the distant station is checking the transmission on an oscilloscope—though the effects of a grossly over-modulated or very under-modulated carrier are obvious without actual measurement being necessary.

All the text-books say that when modulating, the PA plate meter needle must be stationary, and that an upward or downward kick of the needle is proof of faulty operation.

A downward kick of the needle can, however, indicate poor regulation of the PA plate power supply, especially where the PA and modulator are receiving current from the same power pack—always bad practice. Under these conditions it will usually be found that an RF ammeter in the aerial feeders will kick upwards despite the fact that the PA meter would seem to indicate “downward modulation.”

The usual reason for the unsteadiness of the PA plate meter is *carrier shift*, caused by the carrier power shifting upwards when the average power in the positive half-cycles of the

speech wave form exceeds that of the negative half-cycles, and *vice versa*. A similar movement can be observed on the receiver S-meter, or on the meter of the diode phone monitor which it is the main purpose of this article to describe.

Several conditions can cause carrier shift. First, for 100 per cent. modulation the PA must be capable of *quadrupling* its power output on peaks. Most modern RF valves, if run under the conditions and within the ratings specified by the manufacturers, can be used in a PA with the assurance that a modulation capability of 100 per cent. is possible, provided the following precautions are taken:

The driver stage must be capable of supplying sufficient drive to the PA grid or grids. Lack of drive is the most common cause of downward carrier shift and should be the first point to be given attention if "downward modulation" becomes evident.

Secondly, the PA must be adequately biased to beyond twice the cut-off value if it is to be run in true Class-C. It is no use decreasing the bias on the PA in an endeavour to increase the grid current, as by so doing the operating conditions are changed and the PA will no longer present a pure resistance to the modulator, as it would do in Class-C—that is, the PA plate current will not vary in direct proportion to the plate voltage when the latter is swung upwards and downwards under modulation.

Thirdly, it is clear that to preserve these conditions the correct load must be applied to the PA by varying the aerial coupling until the PA is drawing the amount of current specified under given values of plate and screen voltages.

Thus, any attempt to increase the PA output by increasing aerial coupling beyond its optimum value will result in improper conditions of modulation, as the downward kick of the PA plate current meter will show.

Visible Indications

Upward carrier shift, as shown by a kick up of the plate meter or receiver S-meter, can mean over-modulation, but can also be caused by self-oscillation in the PA stage, either parasitic oscillation caused by wrong disposition of the components or wiring, incorrect values of by-pass condensers, or by self-oscillation caused by incomplete neutralisation.

And so, whilst the plate needle will indicate whether or not all is well with our modulation, we are still in the dark regarding the actual *depth* of modulation.

Use can be made of a lamp link-coupled to the PA tank to indicate modulation, but

here the indication is rough-and-ready, and merely gives visible assurance that the PA is being modulated. With practice it does become possible to judge by the relative increase in brilliance of the bulb whether the carrier is being adequately modulated—but that is all.

Then, again, it is possible to estimate modulation depth by noting the increase in aerial current in accordance with the figures given in Table I. The usual thermo-coupled meter is, however, heavily damped and sluggish in operation and while a sustained sine wave input (or whistle) to the speech amplifier will produce an increase in the meter reading, it cannot possibly follow the rapid fluctuations produced by speech.

On speech input the increase in aerial current is a measure of modulation percentage only to this extent: No increase indicates very low percentage, a slight increase of from 5 to 10 per cent. indicates a fairly high percentage, while an increase of 15 per cent. is almost certain to mean over-modulation.

The ideal method of checking modulation is by means of a cathode ray oscilloscope, which will give a picture of the actual carrier under modulation. An oscilloscope is the only instrument which will follow, faithfully, the vagaries of the speech wave form, enabling the operator to see at a glance whether the speech peaks are over-modulating the carrier. The actual modulation percentage can also be estimated with some degree of accuracy by connecting the oscilloscope so as to present the familiar trapezoid pattern when the carrier is being modulated, and then comparing the lengths of the vertical sides of the trapezoid pattern.

But again, unless the source of modulation is a sine wave (which it never is on speech!), the shape of the trapezoid will be constantly changing and it is difficult to measure the actual percentage of modulation when speech input is being used.

Simple Modulation Meter

The circuit on the next page shows a very simple form of modulation meter which does not require the use of an oscilloscope (apart from the initial calibration of the instrument) and yet enables the operator to form a fair estimation of the depth of modulation.

The circuit of the instrument as given in the figure is the basis of most modulation monitor circuits. Whilst it will naturally not follow the peaks of speech, the *average level of speech modulation* can be read off from the meter, due allowance being made for peaks.

Table of Values

The Modulation Meter

C1, C3 = .001 μ F, mica	RFC = 2.5 mH, RF choke
C2 = 100 μ F, air-spaced trimmer	J = Closed circuit jack
C4 = 0.1 μ F, paper	M = 0-1 mA, milli-ammeter
R1, R2 = 50,000 ohms	S = SPDT toggle
R3 = 150,000 ohms	V = 6H6

The instrument also functions as an excellent phone monitor and gives a visible indication of the amount of hum and noise on the carrier.

In effect, the modulation meter consists of a linear AC voltmeter, which compares the average RF carrier voltage with its audio frequency component, one diode of the 6H6 serving as a rectifier of the carrier RF voltage, the other diode rectifying the audio voltage.

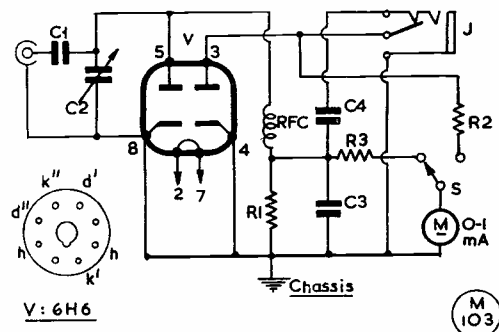
Construction Points

Construction of the meter can take any convenient form. The actual disposition of the components is not critical so long as the audio side is kept well clear of the RF components. Voltage is picked up by a 2-turn insulated link placed a few inches from the modulated PA tank and is fed into the modulation indicator *via* a length of 72-ohm coax cable.

With the carrier on and the meter switched in series with R3 the needle will be deflected to an extent dependent upon the proximity of the link to the PA tank coil. C2 should now be adjusted to balance out the reactance of the length of transmission line, and should be tuned for maximum deflection of the meter. The coupling of the link to the PA tank coil should now be adjusted so that the meter reads, say, 0.8 mA, in an 0.1 mA instrument—although the setting is purely arbitrary and may be adjusted to any convenient figure. The meter is now reading the *average carrier voltage*.

Switching the meter in series with R2 will return the needle to zero unless there is hum or noise on the carrier, when the meter will be deflected accordingly. A sustained whistle into the microphone will send the meter needle upwards to an extent depending upon the depth of modulation and if the carrier is being modulated 100 per cent. the needle will go to the point of the original setting — in the example just given, 0.8 mA. Modulation percentages of less than 100 per cent. will result in correspondingly lower readings, whilst any deflection beyond the carrier level figure indicates over-modulation. The meter reading is linear and modulation percentages may thus be read off directly from the meter.

In this connection it would probably be more convenient to set the carrier level figure



Circuit of the modulation meter. As explained in the article, it can be calibrated to read average modulation depth directly. By plugging headphones in at the jack point, the speech can be monitored.

at precisely 1 mA when the percentages can be read off with greater ease, although in this case little allowance can be made for over-modulation indication. Plugging a pair of headphones into the jack enables the transmission to be monitored, although under these conditions the meter reading is meaningless.

“SSB TRANSMITTER FOR TWENTY AND EIGHTY”

With reference to this article in the January issue, readers interested should note the following slight amendments and corrections to the circuit diagrams:

Fig. 1, p. 570. C23 is 50 μ F, and goes between pin 2 of V5 and R15; it corresponds to C20 at the grid of V4. R39 should be marked as going to the lower “D” point (junction R76, R77) in Fig. 3, p.575.

The resistor below R31 should be shown as R35.

Fig. 2, p. 572. A cross-over should be made above pin 5 of V6, so that R47 goes direct to the HT line at J, upper left. Points J/K on the relay coil above V12 could have been differently lettered—they go to points J/K at R71, R72 in Fig. 3. The 12v. AC lead, marked Y, is only required if the 12v. version (5B/257M) of the Brimar 5B/255M is used. The connections E1/E2, meter switch, across R53, are shown reversed.

Fig. 3, p. 575. The upper “D” point, from R72, R76, goes to R42 in Fig. 2. The speaker impedance should be 3 ohms, and not as given.

Fig. 4, p. 577. The surge-limiting resistors in the anodes of V1 are only required if Brimar valves are used, and can be half the ohmic value stated in the caption.

In circuits Fig. 1 and Fig. 2, one side of each heater not shown earthed should be taken down to the base-line; and on the base-line in Fig. 1, the marking should be “HT neg. 300v.” For the RFC’s mentioned on p.575, the wire is 38g. SSC, and not SCC.

Several readers wrote in to draw attention to some of these points—but not a single one of them succeeded in spotting them all!

DX COMMENTARY

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

THE longish period of poor conditions, mostly due to the notorious out-size sunspot, came as a nasty shock to those who had settled down to a continuous festival of DX. For the best part of a fortnight we were reminded of what conditions may be like in four or five years' time—except that the HF bands always opened up for some part of the day, to some part of the world.

One of the unusual features of the month has been that even when DX has been non-existent on Fifteen and Twenty, there has usually been something of interest on Ten—not rarities or even exciting DX, but *something!*

Mornings have been "spotty" . . . one day Fifteen would be full of JA's, and the next morning there would only be two or three ZL's, all with terrific signals. Perhaps for the next two or three mornings there would be little but Europeans, all much stronger than they ought to be. Ah, well—it all makes for variety.

A very old problem seems to have become a popular debating-point once more. In short, it is this: Why, under certain conditions which often prevail, do DX phone stations seem so much stronger than CW from the same part of the world? There are several possible answers, most of them logical; one is that when conditions are really good, the CW men go on phone for a change. (There is a certain amount of truth in this.)

Another suggestion is that many well-known receivers rather favour phone reception, since their best operating point for CW is with the RF gain well down and no S-meter readings available. Time and again, especially on Ten, we have



DL4WX

CALLS HEARD, WORKED and QSL'd

worked stations on CW with a 579 or 589 report, then QSY'd up to the phone band to be informed that we are "S9 plus 20." (Of course, a lot of receivers give completely false S-meter readings, anyway!)

One aspect of the Phone-CW question is that the habitual phone operator, having found it more difficult to raise rare DX in the early stages than his CW competitor, has by now equipped himself with better gear and, in particular, a better aerial system. In some cases this is proved by the fact that when some famous phone station *does* venture on to CW for some contest or other, his signal is quite phenomenal. (But then his operating is often a bit rusty, and chaps with weaker signals can make rings round him.)

Controversial Stuff!

Before this subject is allowed to drop (and someone is pretty certain to pick it up again), we must state that the amount of phone

operation is increasing week by week, and CW losing ground accordingly. But we do feel that the most popular mode of the future for DX work will be SSB. Already there is a tremendous amount of it on all the DX bands, and apart from the fact that it undoubtedly does its stuff, it seems that the people who use it are generally DX-minded.

Furthermore, they are often more enlightened about operating matters than the average AM-phone station, in that they work snappy contacts, using break-in tactics, and don't waste time. SSB, with the fascinating voice-control facility, lends itself to this, and encourages fast working, with short "overs."

A lot of listening during the last month has convinced us that (apart from the progressive types just mentioned) many AM phone operators take *longer* to impart a given amount of information than do the CW types. Too many people are transformed into windy

bores as soon as they grasp a microphone, and nothing but a few tapes played back would convince them of that fact. The main failing we have noted is that of saying everything two or three times, in different words.

For instance, we heard a G-ZL contact going on, with S9 reports both ways, and this was happening: "Yes, you have a very fine signal. No doubt about it at all, your transmission is very FB to-night. There are others coming through, but you are better than any of them. Yes, whatever the others may sound like, you have the edge on them to-night. There's absolutely no doubt about it, your signal is very, very fine indeed." (Lest you think this an exaggeration, it happens to be *verbatim*, taken off the tape!) With the portentous pauses in between sentences, the above took quite a long time. The CW man would have conveyed it with "599 very FB, best sig going," or something like that, in a fraction of the time.

Listen to the repetition in any local net, and you will encounter even more waste of time. There always seems to be *someone* who just has to get hold of the mike, and there he is for twenty minutes, after which he says "Well, I'd better not hold it now . . . oh, by the way . . ." and he's off again!

This is not meant to be an argument that CW is quicker; just a plea to the long-winded phone operators to think about procedure and become a bit snappier. Most of them could get three contacts for the price of one, without leaving anything out except the repetition.

DX Gossip

There has been a shortage of DX-peditions of late, but quite a few are planned for the coming months. Danny Weil has been handing out contacts from St. Lucia (VP2LW) and Dominica (VP2DW), and at the time of writing is on from St. Vincent signing VP2SW. After a visit to Grenada, he intends to head for the Pacific, but where he will operate from is not yet settled.

Sundry rumours that VQ8AQ was planning to operate from VQ9 are scotched by a letter in

which he says: "It's just one of those rumours. I regret not being able to go, as apart from the amateur point of view, the Seychelles are beautiful islands. But I emphasise that I am *not* going to VQ9, and there is not even a possibility of my going there."

VP5FP will be active from Grand Turk Island, he hopes for several months, and is putting up a better aerial system; he was also VP2LU, and apologises for delay with cards from there . . . A Japanese IGC station in Antarctica will soon be signing either 7J1AA or 8J1AA; the gear used will be the same as that of JA1JG, last year . . . New one from Formosa is BV1USB, active on Fifteen CW.

FB8CD, until recently in Paris, is reported as returning to the Comoro Islands about now . . . XW8AH has gone QRT . . . FU8AD is off the air with receiver trouble, but YJ1OM is active from the same islands . . . MP4DAA (Das Island, but counts as Trucial

Oman) is active week-ends, mostly 14040 kc . . . CE3AG was expecting to go and join CEØZA about January 25.

VS5AT has been active around 14060 kc, 1400 GMT . . . ZD9AF is also on 14 CW, 1700-1800 and sometimes 0730-0800 . . . VK9LE, the only station on Cocos-Keeling, is on 14300 kc SSB . . . Two 9G1's were planning to put French Togoland (FD8) on the air late in January. We hope you found them and worked them! (*Later*: They did get on, signing FD8DZ.)

CR5AR is on St. Thomas Island and quite active . . . VS9AT is returning to the U.K. and will be signing G13MUS . . . LA2TD is on Spitsbergen, but no QSL's until May or June . . . VP2MR is resident on Montserrat and hopes to be more active . . . OD5CI seems to be a new one in Lebanon.

Phoneys all: MT4TG, VK4HK/VR4, FG7XF and probably ZC6AA! The five-year OK Expedition will not, it seems, be leaving until March. Rumours that OK1HZ was undergoing

**FIVE BAND DX TABLE
(POST-WAR)**

Station	Points	Countries					Station	Points	Countries						
		3.5 mc	7 mc	14 mc	21 mc	28 mc			3.5 mc	7 mc	14 mc	21 mc	28 mc		
DL7AA	905	113	171	245	199	177	260	G3FPK	350	36	75	118	74	47	144
G2DC	758	83	112	224	187	152	255	ZB1CR	343	1	5	97	114	126	159
G5BZ	756	64	118	258	191	125	267	G3INR	336	46	60	131	62	37	141
G3DO	672	24	47	243	182	176	269	MP4BBW (Phone)	309	1	5	112	118	73	155
GW3AHN	631	16	55	195	225	140	250	G6TC	307	17	67	128	59	36	145
G3BHW	554	15	32	189	177	141	229	UR2BU	286	12	22	98	92	62	126
G3ABG	551	48	87	177	123	116	208	G8DI	286	29	59	78	68	52	120
G3WL	545	41	92	176	129	107	206	G3DNR	253	10	21	87	65	70	117
W6AM	518	30	58	288	86	57	288	G2DHV	233	21	27	126	44	15	136
G2YS	508	71	90	164	111	72	180	G3JVU	215	26	38	79	34	38	95
GM2DBX (Phone)	427	34	31	160	102	100	176	UR2BU (Phone)	185	1	7	58	68	51	97
G6VC	416	34	54	153	106	69	178	G3KXT	157	8	6	41	13	89	115
G3HZL	391	38	73	114	94	72	142	W3HQO	153	3	6	35	82	27	94
G3JLB	379	43	51	101	90	94	168	G3NBE	141	14	20	35	22	50	70
G3IGW	369	38	73	103	66	87	139	G3DNF	133	7	30	41	35	20	60
W6AM (Phone)	369	13	32	264	39	21	264	G3IDG	117	11	15	29	27	35	51
G3LET	368	18	68	159	90	33	173	G3MMP	80	3	22	7	19	29	50
G3JZK	355	17	57	82	124	75	168								

(Failure to report for three months entails removal from this Table. New claims can be made at any time)

amputation operations were, however, untrue; he has been seriously ill, but is on the way to recovery. (Incidentally, this is a good example of the hazards that beset expedition planning.)

The former FK8AO is now FB8CJ . . . ZD6JL is about to QRT, and ZD6RM will also be coming to the U.K. on leave before long . . . VK2FR should be on by now (from Lord Howe Island) with SSB . . . Two from that rare spot, KS6, are KØEPO/KS6 (14 CW) and KH6SS/KS6 (7 CW) . . . UAØOM is said to be going to Tannu Tuva on or around March 19; for how long we don't know.

VS2DB expects to use his new call 9M2DB with SSB . . . CR10AA has been heard on 14 CW around 1400 GMT . . . CR9AI is putting in excellent phone on 28100 kc . . . OY1J is a new one in the Faeroes, mostly 7 and 14 CW . . . Macquarie Island has not been closed down by the leaving of VKØTC and ØKT; VK4CC has arrived there, and announces that he will be signing VKØCC for the whole of 1959 on CW, AM and SSB. For those with beams, Macquarie Is. bears 118° magnetic and is distant about 11,500 miles, from the U.K. (See "DX Zone Map"!)

A few W's report working a character signing ZM7BJ, said to be on Tokelau (rather doubtful) . . . Lots of people who have worked "AC5PN" in the last six months are due for disappointment: he has been very inactive compared with the European phoney who has been using his call-sign . . . ZP5IT will be on SSB shortly . . . PY7SC (Fernando de Noronha Island) expects to have his call changed to PYØSC; he will be very busy on 21 mc, 2000-midnight. Two other stations on the island will be operating 7 mc phone only!

PY4KL badly needs QSL's from ZD7SA, VS1BB/VS9, VS9AI and VS9AJ . . . VS1BB/ZC5 says all cards were on their way before Christmas . . . VQ4EO is now 9G1CX; enquiries for QSL's on his recent Trans-African SSB safari will now reach him at Box 26, Akwatia, Ghana . . . HI8CJY, in the Dominican Republic, is ex-

KH6CJY.

FK8AV is a new one on 14 CW . . . ST2GL is now VS9AH . . . ZL5AC is on SSB from Halley Bay, so he may have a new call-sign soon . . . Easter Island, though not often heard, seems to have a good population: CEØAA is said to be on 28. 21 and 14, CW and phone; similarly with CEØAE; CEØAC was due to come on in January; CEØAF was active until the end of 1958, since when he has transferred to Juan Fernandez. (But where do they all hide themselves?)

G3IJU, later ZB1EB, is now in Singapore and hopes to be signing VS1EB shortly . . . Anyone who lacks a card from VS1FW or VS2FW may now write to the operator, who is G3MRC (B. J. Poole, 53 The Walronds, Tiverton, Devon).

Malta Amateur Radio Society will be holding a ZB1 Activity Week-End from 1200 GMT, February 28 until 2300 GMT, March 1. Phone and CW, all bands . . . G3LK is now active as VS1JU, and would particularly like contacts with anyone in the North Bucks. net . . . JZØAM, worked on 7 mc by G3MAY, is described as "probably some goon operating ex-Army equipment." When G3MAY informed him that he didn't work pirates he was greeted with silence, but later replied to CQ's with a 589 signal. Contacts continue to be reported with JT1AA, although he is supposedly QRT for good . . . ZD9AF, active on 14 CW, is now joined by ZD9SCA on 21 mc phone . . . W6YLI is also said to be licensed as ZD9AH.

VS9AS is due for a six-month spell in Oman, whence he hopes to work as VS9OM—but he only has an 8-watt rig . . . ZD1GM is returning to the U.K. in February . . . 9M2FO is said to be regularly on 14 CW . . . 9M2GA is on 21 phone with 25 watts.

According to G3LET, VK3IB is going to VR1-land for two years, leaving this month; he has no call yet, but promises operation on all the HF bands.

For all the above news, acknowledgments and thanks, as usual, to the West Gulf DX Club, to W4KVX's "DX," and to the

many individual correspondents who pass on every piece of gossip they hear. Also to W1BB, whose invaluable Top Band news appears further on.

(Late Flash): Conditions over the BERU week-end (January 17-18) were pretty good, and lots of unusual CW DX showed up on Ten and Fifteen in particular. Nothing exotic seems to have been worked, but the stirring up of activity showed the bands in a truer light, and they were all quite interesting.

News from Overseas

ZB1CR (RAF Luqa) tells us that ZB1DS, 1DZ, 1GUH, 1SS, 1RT and 1VV have all gone QRT recently, but there are others to replace them. Recent DX from ZB1CR has been VK9DB and YN1CJ on 28 mc phone. He joins our Five-Band DX Table, too.

UR2BU (Tartu) is also in the Table, and has now worked 173 countries in 40 Zones. Among them, the recent ones have included OHØNC on 3.5 mc; UA9KCC on 7 phone, KL7CTG and UAØKAD on 7 mc CW; and a long list on 14 mc, among which we find BY1PK (Peking), KG6FL, XZ2TH, FB8XX, XW8AI, ZK1AK, SM5WN / LA / P, LA4CG/P, UM8AG, KC6SP, and many other good ones on CW; as well as TI, HK, HP, HR, HZ and other nice DX on phone. Karl says he has been less active on the higher frequency bands, but we have heard some pretty potent 28 mc phone emanating from him at times.

MP4BBW has been home on leave, but he came by way of VU, 4S7, VS1, VK6, VK2, KH6, W6, 5, 4, 8, 2 and VE3! On that mammoth trip he says he was made welcome both by operators he had worked and by others who would like to work him. At a dinner of the New Jersey DX Association it was discovered that the average number of countries worked by those present was 215! MP4BBW has returned to Bahrain and should be on the air again by now.

EI6X (Limerick) is "overseas," if only just! His December note, which arrived a couple of days too

late for the last issue, told a tale of some good DX worked; his January missive, however, tells a sad story of a 65 m.p.h. gale, a 36-foot mast snapped off at fifteen feet, and the wreckage of what was a nice Quad spread all over the garden. While waiting for some fine weather, he is getting to work on receiver mods., and hopes to see us again "around March." Hard luck, Bryan, and may a bigger and better Quad go up—and see "The Other Man's Station," in this issue.

Translate, Please!

Last month's "Things They Mean" has brought the following worthy additions. From G3MCY (Chichester): "Sri QRM and QSB" . . . QRS; "QRZ?" . . . QRS; "M-E-S-M . . . G3; "Won't hold you" . . . Getting fed up with this QSO; "My QSL 100 per cent OK for you, dear friend" . . . I want your QSL; "Ur 569" . . . You gave me 569.

And from G3JZK (Cambridge): "QRU?" . . . QRU!; and "CQ DX" . . . WSEM. (Incidentally, as he says, the latter word means "to everyone" and is not a set of initials standing for something else.)

Things They Say

"In YU-land, CQ DX means anyone outside one's own country" . . . (G3JZK); "Worked more countries last year than in all the previous years since I was licensed" . . . (G3HZL); "Received my HV1CN card posted from Amsterdam in an envelope belonging to the Grand Hotel" . . . (G5BZ); "The appearance of G7AE calling G7AA on 7035 kc one night caused quite a stir, with half Europe chipping in between transmission breaks" . . . (G3FTK); "I have found a place where I can buy a teleprinter, so perhaps you will have to run an RTTY column after all" . . . (G3MEW).

Around the Bands

Quite a few of our "regulars" are now active on six bands, and as most of our readers recently signified that they preferred to have the bands separated out under individual headings, this



Station of DL6DZ, Caustrop Rauxel, in the Ruhr, who has been licensed about three years. He runs a Geloso VFO-807 PA transmitter, at 50w., for the HF bands and is also equipped for two metres. The receiver is the German RX-57, a modern communications type designed to D.A.R.C. specification. On the 10-15-20 metre bands, DL6DZ has two dipoles at right angles for each, also a tuned doublet fed with 600-ohm line. His main interest is phone and CW working on the HF bands, helped by a good knowledge of English. Though DL6DZ QSL's 100%, for all first contacts, and is now working for his WBC, he complains that far too many U.K. operators fail to reciprocate with a card. So if you owe him one . . .

means that many letters must be referred to six times! Out of kindness to your commentator, we therefore ask you all to show good, clear headings under which the various doings are detailed. A long letter in which DX on all bands is sprinkled like pepper from a pot takes quite a lot of dealing with, especially when it is just one in a large pile.

The ideal set-up is a description of the best DX worked, band by band, followed by the Five-Band score and any general chit-chat. Such letters awaken so much joy at the receiving end that we can almost light a neon on the typewriter! And so to this month's six-band survey.

Ten Metres

Still one of the most interesting, but not, alas! for the CW man. The real DX on Ten is nearly all phone, and that space between 28200 and 28500 kc gets quite crowded at times, especially weekends.

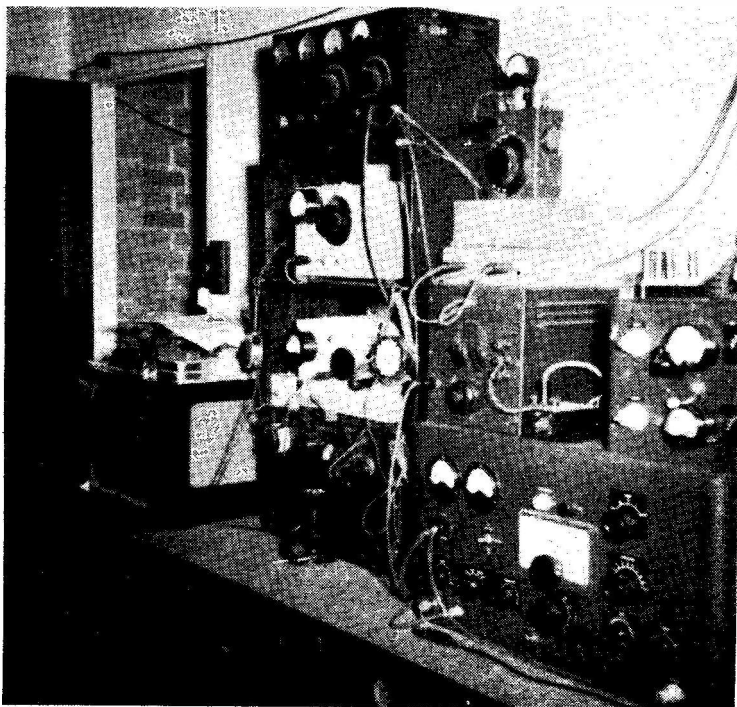
G3HZL (Isleworth) worked FA, KZ5, FQ8, CO and CR9AI on phone and a KR6 on CW; ZS3AG (phone) got away. G3DO (Sutton Coldfield) found a new one in the

person of IS1ZDT. G5BZ (Croydon) collected KG4AY, but says the W's dominate the band so strongly, as far as CW is concerned, that he can't get enthusiastic.

G3BHW (Margate) worked phone with FM7WU, FS7RT, CR9AI, HC4IM, HH2FB, HR2MT, HP1CC, TG9US, VP2GX, VP3HAG, XW8AJ and 8AL, and YN1CJ. (That's the sort of list that vindicates Ten as a real DX band.)

G3LET (Westcliff) raised VS6BJ, VS9AQ, ZD7SE, UA0OM and a gent, signing IT0AA, said to be in the Pelagic Islands (QSL via 11SM). G3ABG (Cannock) got his phone to 5A1TG, CR7LU, ZS5 and ZD2FNX. G6TC (Wolverhampton) worked ZE1JV, CR6CK and CX2BT.

GW3AHN (Cardiff) collected CR9AI and VP1EE on phone. G3GQK (London, S.E.23), reports on Ten phone only, to the extent of VQ3PBD, XW8AL, VS9AS, 9G1AA, 5A5TO, ZS and VK; heard but not worked were VS6AD (1045), TG9AD (1435), FF8AP (1400) and TI2PR (1600). G3MBL (London, N.12) raised CR6CA, ZB1CR, UB5 and ZC4.



G2BFN is at Bedford, and has a fine array of gear. Above is the receiver assembly, with an HRO Senior, a National 1-10, an Eddystone S.640, an RME-69 with DB20 pre-selector, and a Denco DCR-19; a Philips 600A TV projection receiver is used for monitoring, with a tape recorder also available. On the transmitter side (lower half photograph) G2BFN has a Minimitter and two home-built transmitters; one is for Top Band, running VFO-6L6-807, and the other (for car, caravan and general portable work) is VFO-6L6 with a 6N7-6N7 modulator. Licensed in 1946 for on-the-air operation, he was AA-2BFN in 1936 and would have been granted a licence in August 1914 had the First World War not started before it could be issued — from which it can be deduced that our present G2BFN is one of the respected band of real old timers.

G3JLB (Gravesend) says "Ten is still the best band when it's open, and WAC in a few hours is quite simple." New ones were VP3HAG, CN2BE, ZP9AY, ZD2JM, VP4LA, HK7LX and "literally dozens of KR6's."

G3JZK worked VS9AO, UA9OI, VP3HAG and ZP5JP for new ones, plus all W and VE (except Yukon), VK, ZL and the like. G6VC (Northfleet) got on the band and raised VE6 and W7 with good reports. G3IGW (Halifax) collected some DX on CW—CR7BN, ET2HM, FB8CJ, HZ1HZ, IS1ZDT and OD5LX. Phone brought him MP4BCI, PJ2MC, ZD1FG, ZP9AY for new ones, as well as FF8, HK7, KZ5, OQ5, VP9, ZD6, 9G1 and so on. His "heard" list looks like a directory of Central America, with HP, HR, TG, VP1, YS, HH, HI, PJ and all.

G2DC found 10 metres sparsely populated, but there were many good openings, especially around 1300 GMT; one day he worked CX2BT, LU7AS, YV5HL, CR6AI and CR7BN in successive QSO's. VP2DW, VP2LW and ET2HM were new ones; others accounted for were CN8, OD, VQ2, ZE, PY, LU, CX, UA9 and UA0.

Fifteen Metres

Something for everybody on this band! Phone, CW, DX, FOC, SSB, RTTY, Lids' Corner—the lot . . . and at most times of day, especially weekends. It's better than Twenty from the point of view of short-skip nuisances, but even they can do their share of damage. And this seems to be the band responsible for most of the big jumps in the Five-Band DX Table these days.

G3HZL collected lots of new ones such as FF8, HZ, KD6, CR6, UF6, ST2AR, SV0WAE (Rhodes) and BV1USB—all CW except the ZD6; gotaways on CW were YK1AT and VK9DB; on phone HL9KT escaped. G3DO added three to his score with OY1R, VQ1ERR and VK9AD (Norfolk).

G5BZ reports encounters with VK9AD, BV1USB, OR4VN, HZ1HZ, UA0KAR, JA, W6 and 7, VE6, VK and ZL. G3BHW worked AP2AD, HL9KT and ZS7C on phone; BV1USB and

VP7BT on CW. G3LET was another who hailed with joy the appearance of VK9AD on CW (1300); VR2DG was also raised, and several new Europeans added, as well as ET2HM, ZD2, VQ3, KA9PW, 9K2AN and 5A3TQ (G3FJU's new call, by the way).

G3ABG raised UQ2AE/MM, UF6FB, CR6AI and FA9VN on CW; ZS5RO/ZS7 on phone. G6TC's best were VE7KX, VK7CH and CX2BT. G3MBL worked CN8, PY and W on phone, having only just come on the HF bands with 35 watts and a dipole.

GW3AHN, as usual, is worth a paragraph to himself with PJ2AL, TI2PI, VP2DW, 2LW, 6KL, 6WR and 8DG, VS9AH and ZD1FG worked on phone; CW fetched in BV1USB, CX2BT, KL7, KH6, KP4, KV4, OR4VN, VP2DW, VP2LO and VP2LW.

G3JLB found VS2UW, HL9KT and BV1US. G3JZK worked phone with 9G1, PYØNA, JZØPB, ZS3D and a UR2. CW raised VK9AD and HZ1HZ. G3JZK says he has now joined the "nine-

till-six brigade" and can no longer get on at slack periods; he finds his beam helps greatly on Fifteen and Ten under QRM conditions.

G6VC was thrilled to get FS7RT on phone, also IT1PA, UF6 and UN1. G2DC found conditions falling off and QRM increasing, but YK1AT, VP2DW and VP2LW gave him three new ones for the band.

Twenty Metres

G6QN (London, S.W.19) is an Old Timer now back in circulation, using a B2, 15 watts, a dozen crystals and 33 feet of bell-wire! Best DX so far has been two QSO's with VS6EC, also ZS2CV (Marion Is.), other ZS's and plenty of W and VE. G3MBL's QRP raised OD5AC, 4X4HA and a PY7. GW3AHN, not often on 20 metres, collected VP2DW and HZ1HZ.

New for G3JLB were EA6AF, ZK1AK, UN1AE and ET2KY. G3JZK found the band good in the mornings, but reports only ZK1AK and KM6BL from the Pacific direction; other new ones were VP2DW, VP6 and 4X4. G6VC caught up at last with FB8ZZ and also raised ZA1AB (?).

G3HZL collected an LX on phone for his only new one; a KH6 was also worked, but G3HZL didn't like the noises and the milling Europeans. G3DO worked 9G1CB and was delighted to receive his card from ZL1ABZ (Kermadecs), whom he worked last October but wasn't claiming owing to the QRM at the time.

G5BZ's long list includes KM6BL (twice), KG1DT (Fletcher's Ice Island), KG1EG (the last two both on 14335 kc), ZD2JM, ZS's, VK's, KX6BP, KH6's, ST2KO, VP9EB, VQ3HL, OY1L and lots of lesser fry.

Two interesting ones for G3BHW were ZD7SE and CR5AR; others, DU1DR, HS1C, PY7AFN, VP2LW, VS9MI. G3LET mentions openings to the Far East as early as 1100, and CE8AA comes over the long path day after day. BV1USB was also worked, together with VS9MA and 9MI, HS1C, ZK2AD, VQ8AD, FG7XC, LA4CG/P, LA1VC/G (Antarctica), VP6, VP7 and so on.

G3ABG, on CW, worked

VP2DW and 2LW, HS1C, ET2KY, FQ8AP, OD5LX and ZD2GUP. G6TC booked in KH6IJ, KL7CDI, UAØKAR, VS6DX, XW8AI and OX3UD. G3LNR reports hearing FO8AG, on 14330 kc at 1010 GMT.

G2DC says there's plenty of DX, but not at convenient times. One morning, when he was braving the cold at 0300, he found KH6's, VE4, 5 and 6 coming in strongly. New ones were VP2DW, VP2LW and 3A2CX; others worked, CE8AA, KM6BL, KR6AK, LA2TD/P, ZD2GUP, ST2AR and VK4FJ/M; the latter was S7 when driving in his car on the Queensland Gold Coast.

Forty Metres

This band seems to be attracting more attention, but the main trouble, as always, is lack of DX activity. If they'd get on, we'd hear them! But it's not everyone that likes doing things the hard way.

G3LNR got across to W1DUP as late as 1000 GMT; he heard all W districts, VE, CN8 and PY, both phone and CW. G6TC worked ZL3GU, VE7ALR, W5 and 6 and sundry PY's.

G3ABG collected YK1AT for a new one, also UA9's, UF6, FA, 5A3TQ, PY and many W's. G3LET didn't manage any late sessions, but filled in some gaps with UD6, UF6, UG6, UH8, UL7, UN1, UP, UR and UAØOM; he also worked ZD2GUP (2000), ZC4, CN8's, CT2, OY and PY. Nice going for Forty, and it shows what can be done.

New for G3HZL were TI2PZ, SM5WN/LA/P and IS1FC; plenty of W's were also worked, as well as 4X4, CN2 and the like, while YK1AT and CX got away. G6VC worked W's as early as 2045 GMT, and raised ZB1NR for a new one. G3JZK was hardly on the band, but did get a KP4 on CW; he has local trouble in the form of — an ionosphere-sounding station!

G2FTK (Coventry) had a spell of QRP work on the band, and his 15 watts raised UA9's, UL7, ZB1, IT, PY's, TF2WDR and LA7CF/Y, well up in the Arctic Circle; LA4PF/P (Svalbard) was also heard around 7030 kc.

TOP BAND COUNTRIES WORKED

(Starting Jan. 1, 1952)

Station	Confirmed	Worked
G2NJ	98	98
G6VC	96	96
G2FTK	91	94
G3FNV	91	92
G2AYG	88	88
G3KEP	85	85
G2CZU	79	79
G3DO	75	76
G2CZU (Phone)	62	63
G3LBQ	61	67
G3KQN	60	72
G3KEP (Phone)	60	62
G3APA	60	61
G3LHJ	56	66
G3JSN	49	62
G3MCY	47	54
G3MCP	46	54
G3LNR	42	48
G6QN	41	50
G3LNO	23	41

"CT2AT" on this band is apparently a phoney; G2FTK's card has been returned.

G3LPS (Blackburn) reported just too late for last month, when he mentioned "plenty of W's" (including W6MOJ and W6YMD), LA2JE/P and PY7VBR. Heard around 0830 were VK, ZL and HC4IM. This month he worked OY1J, TF5TP, CN2AY, W6AIL and UA9KCC; G6QN, with his little B2 and 15 watts, worked UA9CM, UL7DA and a whole bag of W's and VE's.

G2DC reports VP2DW, VP2LW and HZ1HZ for new ones, as well as W's, PY's, VE's, VO, UA9 and UAØ; he found good openings between 0600 and 0730 on several mornings.

Eighty Metres

G2DC worked both VP2DW and 2LW on skeds; UO5AA was another new one, and others worked were HZ, PY, VO and many W's and VE's. WIZQX, on some QRP tests, was S4-5 with 2 watts, and S2 at 50 mW. G2DC thinks this band has been quite good from midnight onwards.

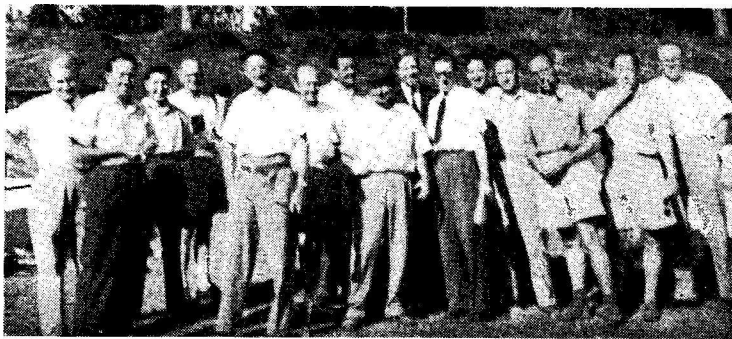
G3HZL completed his WAC on Eighty with 5A1CJ, and also worked 4X4, CT1, UA9, W and VE; he heard W6 and 7 as late as 0830. G3LET raised UC2AX, UB5KDZ and UA9CM. G3ABG worked 4X4KK but missed HZ1HZ.

Top Band

One-Sixty came alive for DX on January 11, when, despite a U4 from WWV, high noise level, and poor conditions expected, WIPPN worked G3PU for the first Trans-Atlantic of the season; W1BB worked G6BQ soon after; W2GGL worked G3ERN. VP7BT and VP9EP were on, working W's, and it really seemed that the jinx was broken at last. (Incidentally, this is again a case of G3PU being first across.)

January 4 and previous weekends were failures, but on the other side there is plenty of activity, with W5SOT, W6KIP, K6HXT, W7QAK, VP3AD, VP7BT and VP9EP all mixing it with the East Coast stations.

G3CNM (Stockport) heard W1BB on January 4 (449 at 0530,



Group of VO4's at a recent meeting at the QTH of VO4AA, Nairobi, Kenya. Left to right are: SWL, VO's 4AQ, 4FO, 9HAY, 4ERR, 4EV, G3KQW (ex-VO4FW), VO4AA himself, SWL, 4CH, 5FS, 4GQ, 4KPB, 4ET and VO4KPL (extreme right). VO4CW took the photograph.

and 229 at 0705) but conditions were bad. G3CNM adds that many G stations were calling during the "W" transmission times, and presumably listening at the wrong times, too. If you do get up so early on a cold morning it seems a pity to make such a mess of it!

Although the DX situation is so grim, the local sport of county-chasing continues, and in this sphere the activity seems to have stepped up a little. Recent claimants for WABC are G3KQN (Co. Durham) and G3JVI (Ongar), bringing the number of WABC's issued up to 180 (which represents quite a large number of Top-Band QSO's!).

G3MCY (Tangmere) finds conditions very good, and his score stands at 54 counties worked. OK1WR is frequently 599, and G3MCY has got his phone across to him at R5 and S6.

ZC4IP is active around 1820 or 1800 kc most Saturday nights, and G3IGW (Halifax) heard him on December 20, peaking 569 while working DL1FF. Up to January 10, ZC4IP had not raised any G's, though he has worked UA9CM, OK's and DL's; he is running 100 watts to a 137-ft. wire.

G2CZU (Bath) worked his tenth country with HB9QA (579) and also reports contacts with DL1YA, GM3HGU/A and GI2DZG. He still needs Northumberland on phone to complete his bag of "G" counties—any offers?

G3LNR has been working and hearing stations as far as 60-80 miles distant at times like 1115 and

1210, but hasn't worked anything new. G2FTK returned to One-Sixty after a long absence and worked his 94th county (GM3LKF, Orkney). This QSO was made at G2FTK's request, after which the GM returned to 14 mc! Other interesting ones were GM3HGU/A (Renfrew) and GD3LXT. Badly needed—Sark, Scillies, Dumfries and Stirling.

G6QN, using "33 feet of wet string" (suitably loaded, though!) gets into the Counties table with 50 worked, 41 confirmed. He hopes to make WABC before the string breaks. . . . G2NJ (Peterborough) worked DL1YA and heard DL7DZ.

Miscellany

That "EET2EY," queried by G3EFB last month, was obviously EA2EY; several readers, including SWL's, write to say they have heard or worked him, and that his QTH is Marquina, Vizcaya.

G3LTH (Starcross), whose December letter arrived only in time for us to extract one hot item, says "what a smashing band Fifteen would be if all the jingle-bells, jammers and what-have-you would only blow up!" He adds that he has often heard rumours about DX-peditions and so on, and promises to send them along in future.

G3NBE (Oxford), who is also VE7ASP, heard and worked the FD8DZ expedition, who just gave a report, said "QSL via W2KUW" and went on with QRZ! He says "Another of the thought-transference boys—wonder how

they keep their log?" We heard VP2SW doing the same, only 12 hours before writing this. Danny's QSO's consisted of "W4KVE 569 K," followed a few seconds later by "dit dit." For 15 minutes we didn't hear a call-sign except those of stations worked. Does this constitute a QSO within the meaning of the act? And if the definition of a QSO included a proper exchange of information, what would the scores of the present top-scorers be? We leave you with that thought . . .

G3NBE joins the Five-Band Table "just to get the G3N . . . series on the list." He is going to be in England for another six months and hopes to make DXCC-plus before he leaves. Best of late have been KH6, VS9, 9G1, JA, CR6, UI8, HZ and of course the FD8 just mentioned.

G3JZK thinks we should make a public announcement to the effect that when we call "CQ DX," we mean "DX." As previously reported, with regard to the YU's, he feels that many Central European countries will reply to every such call, believing any station other than their own to be DX! Another profound thought from G3JZK: "I don't think I will ever reach the top of the Honor (*sic*) Roll, because they are creating new ones faster than I work them!"

SWL Corner

The American magazine *Popular Electronics* has begun a "Monitoring Station Registry Bureau," the purpose of which is to "register

all short-wave monitoring stations throughout the world." All monitors who apply will receive a certificate of registration with the station's "call-sign" printed across the face in large block letters. This idea appears to apply mainly to SWL's, who are invited to forward name, address and details of receiving equipment, with one IRC, to *Popular Electronics*, 1 Park Avenue, New York 16, N.Y.

Much of the SWL material is held over for their own column in the March issue, but there is room here for some of the unusual DX reports. Incidentally, we want to make it quite clear that our new feature, "SWL," to appear every alternate month, will *not* become a sort of second DX Commentary for listeners—it is intended that it shall be a forum for all their problems and interests, more on the technical than on the operating side.

Meanwhile, a few DX "shorts": C. N. Rafarel (Birmingham) heard XW8AL, CR9AI and CEØZG (Juan Fernandez) on Ten phone: ZS5RO/ZS7, FS7RT, VK9AD, VP2DQ, VP2DA and YJ1OM on Fifteen; and VP1EI, FO8AC and PY7SC on Twenty. L. D. Strange (Leeds) chased CW on Forty and logged OY1J and OY7ML, YK1AT, VO1DQ, W6AIL, EA6, UD6 and UO5's; on Eighty he heard FA9VN, LX1DE and ZL3QX.

P. Day (Sheffield) covered seven bands (including 50 mc, where he is still logging W's) and also says that the USA medium-wave stations have been heard at S9 plus

20 dB at 0300-0500 GMT. (WMEX was S9-plus as early as 0100 on one occasion.) Peter is now equipped for the 70-72 mc band as well. During the month he logged AP5B, CO's, FA, PY and VP6ZX on Forty CW; VP2DW and 2LW, VQ8AQ and XW8AH on Twenty CW; VK9SB on Fifteen phone; and XW8AL (many times), XZ2SY and CR9AI on Ten phone.

S. R. Smith (Crewe) says that MP4BBE is on Forty CW on Fridays, 0100 onwards, and wants reports. P. G. Harris (Rotherham) heard HE9LAC, VK9AD, HZ1HZ, CR6AI and "AC4A" (?) on Fifteen CW; on phone he logged VK9SB, VR2AZ, FQ8AJ, 9G1CN and ZD1EO.

J. W. Bluff (Harrow) is another who covers the 50 mc (6-metre) band, and between December 14 and 31 he logged a long list of W's and one VE. He also comments on the excellence of Forty-metre *phone* for Trans-Atlantic work in the early mornings. Quite large nets have formed on occasions, with several G's and W's together. He quotes W3PHL as an outstanding signal, heard as late as 1015 GMT.

And so to the end of this month's news, with the reminder that next month's deadline is **first post on Friday, February 13**—the Friday following publication date. Please get down to it right away, and address your letters to "DX Commentary," *Short Wave Magazine*, 55 Victoria Street, London, S.W.1. Good Hunting, 73, and BCNU next month.

PLANS FOR A MOBILE CLUB

With the object of forming a Club to cover every aspect of Mobile activity, a meeting has been convened by R. J. Toby, G2CDN/M, for 4.00 p.m. on Sunday, February 22, at the "Rising Sun," 46 Tottenham Court Road, London, W.1.

It should particularly be noted that the Club, if formed, is to be an entirely independent organisation operating in the Mobile interest only; that the meeting to inaugurate it has been called by G2CDN in his personal capacity; and that *only* those who have received the circular letter from him should attend—this is simply because the accommodation available at the "Rising Sun" precludes a general invitation being issued. Those who have been invited are all known as interested in /M, and it is felt that if a Club is to be formed the decisions affecting it should rest with them. And recipients of the letter

from G2CDN who may not yet have responded to it are asked to acknowledge to G2CDN, either "Yea" or "Nay," at the address given on the circular, as soon as they see this, for catering arrangements have to be made.

TUNING IN SSB PHONE

Those who possess a BC-221, or some other type of accurate and stable frequency-meter, may find that when using a standard communications receiver, *i.e.*, without a product detector, the SSB signal is much easier to resolve if the frequency meter is used as an external BFO. It is then simply a matter of adjusting the coupling between frequency-meter and receiver to get the carrier injection the SSB signal calls for, and tuning on the main receiver in the ordinary way, with the internal BFO off. A "creepy" or even slightly modulated external oscillator is useless.

Simple TVI Filter

HIGH-PASS UNIT FOR
FITTING TO THE
RECEIVER

R. R. FLAUM, Grad.Brit.I.R.E. (G3BDH)

Those whose experience of Amateur Radio goes back to the early days of BCI, and who found a cure by fitting a wave-trap to neighbours' receivers, will appreciate the point of this article. It describes a simple type of high-pass filter which should go a long way to eliminating TVI where the cause is shock excitation of nearby TV aerials.—Editor.

IN the area of the writer's QTH, which is in a district getting a fairly good TV signal, a considerable amount of trouble was being experienced when working 10 and 15 metres, due to the swamping of the front-ends of neighbours' TV sets when tuned to Channel 1. A check-up on the situation made it clear that about fifteen separate rejector units would be necessary if G3BDH was to be able to venture out without an armed escort.

Since 15 filters could cost a lot of money, it was decided that an attempt must be made to produce a very cheap and simple device which, if necessary, could be given away free to sufferers from G3BDH's transmitting activities. The end-product so evolved and described here may possibly be the answer for others in the same sort of spot.

Three or four different versions have been made up and tried, but as the simplest design was found to work well on 90% of the TV receivers affected, it is as well to try it first.

Design and Construction

Equipment required comprises: A calibrated grid dip oscillator, for tuning adjustments; a flat 2 oz. tobacco tin (any brand!); a Belling-Lee plug and chassis-mounting coax socket; a short length of TV coax cable; some tag strip; wire in 16g. tinned for making up the coils; and one fixed condenser, any value from 100 to 200 $\mu\mu\text{F}$. Also required, and this is important, is faith that a simple old-fashioned wavetrapp of the type shown in Fig. 1 will probably do the job!

Tune the L1, C1 section on the bench, using the GDO, by opening or closing the coil spacing; as a megacycle either way will not seriously affect performance, it is sufficient to

COIL DATA FOR THE 21/28 MC FILTER

L1—21 mc: 8 turns 16g. tinned, $\frac{1}{2}$ -in. diameter, self-supporting and spaced to tune.
28 mc: 4 turns, as for 21 mc.
L2—21 mc: 8 turns 16g. tinned, $\frac{1}{2}$ -in. diameter, self-supporting and spaced to tune.
28 mc: 7 turns, as for 21 mc.
(C1, 100-200 $\mu\mu\text{F}$, see text; C2, 20 $\mu\mu\text{F}$)

get the circuit resonant at mid-band on either 21 or 28 mc, as required. Solder L1, C1 into place in the tin and check the tuning again; when that is done, solder in L2 and fit the terminals.

Two-Section Filter

For really obstinate cases, two such filters can be placed inside the same tin, in series, with a shield between the two sections. This now begins to look more difficult, but if both sections are tuned separately before fitting C2 the job is easy—see Fig. 2.

At this point, it will also become evident that a two-band rejector can be made in exactly the same way, to the circuit of Fig. 2, if one section tunes to, say, 21 mc, and the other to 28 mc. It may be advisable to solder down the lid of the box at a few points, in order to complete the screening, but as most flat tobacco tins are made with tight-fitting lids, this should not be necessary.

Embellishment

Finally, give the tin a smooth coat of grey enamel to smarten it up and complete the job. There is an important psychological point here, for no self-respecting viewer will tolerate the idea of having a loose, grubby-looking tobacco tin hanging down behind his precious "telly"—but a technical looking grey box, with coax connectors, is quite another matter, and will be accepted with grateful thanks! The filter unit is, of course, fitted in the aerial lead to the TV receiver, close to the set.

The insertion loss of these simple rejectors is fairly large, which means advancing the gain control of the TV set slightly. It also means that in its present form as described, the device is unsuitable for fringe areas, or where there is no gain in hand on the TV receiver itself. In such cases, series tuning of L2 should be tried as a method of improving performance and reducing insertion loss.

Since these filters can be knocked up for a couple of shillings—depending on what you

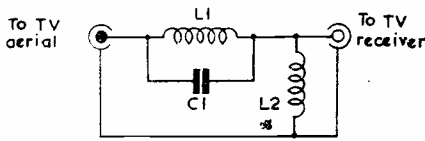


FIGURE 1

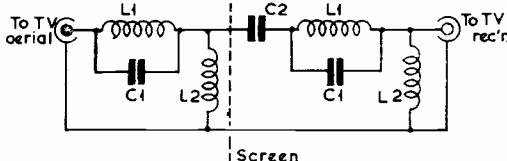


FIGURE 2

Q 189

The high-pass TVI filter sections discussed in the article. Fig. 1 is a single-section filter for either 21 or 28 mc, and Fig. 2 is the two-section arrangement. This can be either two-band, or incorporate two similar sections for one band, for more effective suppression.

have in the junk box and whether you have to buy the tobacco to get the tin — it is well worth supplying them *gratis* where a definite cure is affected. The “public relations” value of a successful result is out of all proportion to the cost of making and fitting the filter.

Editorial Note: The sample filters sent in by G3BDH are neatly made and finished and show an excellent attenuation factor for the 21 and 28 mc bands. The results amply prove the practical utility of this simplified filter design.)

UNCLAIMED QSL CARDS

We are asked by the Malayan Amateur Radio Transmitters Society (P.O. Box 777, Kuala Lumpur, Malaya) to publish the fact that cards are held for a large number of VS1, VS2, VS4, VS5, ZC3 and ZC5 operators. These cannot be delivered because the addresses of the amateurs concerned—no less than 46 of them, incidentally!—are not known. It seems that over the years the Malayan group have had many temporary members, due to Service postings, survey and prospecting work, and the general ebb and flow of Europeans in the area. All who have at any time held a call sign under a prefix as listed above, and are *not now* members of M.A.R.T.S., are asked to write in for any cards there may be for them. Some of these QSL's are, of course, for the piratical gentlemen who have from time to time adopted one of these call signs for their own nefarious purposes. But out of the 46, there must be at least 30 that are genuine!

Table of Values

Microphone pre-amplifier for Low-Impedance Output

C1 = 50 μ F (12 volt)	R5 = 820,000 ohms
C2, C5 = 0.5 μ F	R6 = 100,000 ohms
C3 = 4 μ F	R7 = 1 megohm
C4 = .01 μ F	R8 = 1,000 ohm
C6 = .001 μ F	potentiometer
R1 = 5 megohms	V1 = 6SJ7
R2 = 10,000 ohms	V2 = 6C5, 6J5, L63
R3 = 2,200 ohms	
R4 = 220,000 ohms	

Microphone Pre-Amplifier Unit

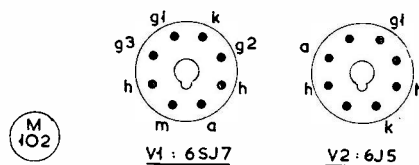
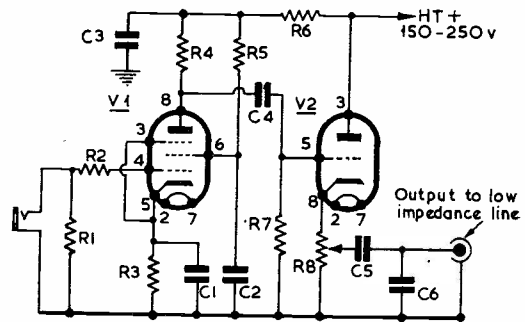
WITH LOW-IMPEDANCE OUTPUT

J. N. WALKER (G5JU)

THE unit described here was made for the primary purpose of providing pre-amplification for a crystal microphone which necessarily was separated by some distance from the main modulating equipment. But it obviously has other uses also—for example, for inclusion when a change is being made from a carbon to a crystal microphone.

It will be appreciated that a long microphone cable, used with a high-impedance microphone, will have a serious effect on the top note response and, further, trouble due to RF pick-up is likely to be encountered. Also, it is usually desirable to have some control of gain at the point where the microphone is in use, rather than have to move across to the main modulating equipment every time an adjustment is needed.

So the requirement comes down to a small, compact and well-screened unit which can be sited at the operating position; gives high gain to suit the microphone; and has an output at a low impedance which will permit a long length of cable to the amplifier, the gain of



Circuit of the microphone pre-amplifier unit described by G5JU. It is designed to feed into a low-impedance line, to facilitate remote control of speech equipment.

which need not be so high as would otherwise be the case.

The circuit is shown in the diagram; it will be seen to be quite straightforward. Ordinary octal-based valves can be used, since there is no great point in selecting miniature types, although of course substitution can be made if desired. The use of metal valves ensures very complete screening; if glass valves are fitted instead, it is essential that the first high-gain stage be screened. This valve is a 6SJ7, with component values such as will give high gain with low distortion. The output is taken to a cathode follower stage and this second valve can be a 6C5, 6J5 or L63. The output, from a potentiometer which acts both as cathode bias and load resistor, is at low impedance and can be fed into a long length of coaxial or ordinary screened (audio) cable. The terminating impedance at the far end is not important—if maximum voltage is wanted, a step-up transformer can be used, but generally the termination can feed directly into the grid of the first valve in the modulator chain. If necessary, it will be an easy matter to insert at this point a simple resistor-condenser filter system to counteract any RF picked up on the

cable. (It is assumed that any "tailoring" of the audio frequency response, as may be necessary, will be looked after in the main equipment.)

Constructional Points

To achieve the desired degree of screening, the model is built into an Eddystone diecast box (Cat. No. 650), with the valveholders mounted on one of the longer side walls. By choosing small-size components, it is quite easy to find room for all of them within the box. With the lid screwed on, one has a neat and unobtrusive unit which can be mounted conveniently somewhere near the operating position. And a spray of paint will add a nice finishing touch.

Power supplies are fed in through a light three-core cable, and can usually be taken from an existing source capable of providing 6.3 volts 0.6 amps and up to 250 volts at 10 mA. An alternative is to put together a small power unit, using a miniature transformer (as sold for television pre-amplifier units) and a metal rectifier. If large capacity electrolytics are used, resistance smoothing is satisfactory and an HT voltage of 150 is usually ample.

LOG BOOK FOR MOBILES

Eric Martin, G6MN, the original printer of QSL cards, and himself a keen mobile operator, has produced a Mobile Log Book which is designed to meet the practical requirements of log-keeping in /M operating—that is to say, it accommodates the situation in which a mobile, working a fixed station or series of fixed stations, obtains reports at different locations along his route. The Log allows for five different QTH entries on one line, and 25 separate entries at an opening. The total capacity of the Log is 525 entries, and the price is 9s. 6d. post free, from G6MN, Printer, Worksop, Notts.

RUSSIAN 7-METRE BAND

From the context of the traffic and the call signs used, there is apparently some sort of Russian amateur emergency network in the 37-39 mc frequency area. On January 4, between 0930 and 1045, a number of stations were identified using calls like RA9ABU (Magnetogorsk), RA9ABB (Kiev), PA4XAM, PA6AAP and RA6ABK. Signal strength varied from S5 to S9, and a great many stations could be heard, all on phone.

THE NEW DX ZONE MAP

Since being announced in the November issue, our new *DX Zone Map* has proved a best seller—and at the price for the information it gives, well it might! The printing on linen paper is now exhausted, and we can supply only the version on ordinary map-mounting paper—which, indeed, is quite adequate for

the purpose, and the cost is but 9s. 3d. post free, in a special tubular packing to prevent damage in the post. Though there will probably have to be a reprint there will be no revision of this Map for a very long while yet, so if you are thinking of having one, get it right away.

POSTING FOR G5OG

In the reshuffle of junior Ministerial posts announced on January 17, Mr. Charles Ian Orr-Ewing (G5OG) leaves the Air Ministry to become Parliamentary and Financial Secretary, Admiralty. He will thus be the senior Government spokesman for the Royal Navy in the House of Commons, as the present First Lord of the Admiralty sits in the House of Lords.

ENTRIES—MAY RADIO AMATEURS' EXAMINATION

Prospective candidates for the next R.A.E. sitting, to be held in May, are reminded that their application to take the Examination should be in by the end of this month. Entries should be made through their school, technical college or the local office of the county Education Authority. Direct applications are *not* accepted by the City & Guilds.

THE BC LICENCE TOTALS

The G.P.O. announces that by December 31 there were 8,899,067 sound/TV licences in issue, the number for sound-only being 5,853,549, of which 371,391 were for car radio receivers.

SSB Topics

SUBJECT OF LINEAR AMPLIFIERS: The G2MA, ZL1AAX and W6EDD Circuits — NEW AMERICAN PHASING-TYPE SSB EXCITER — CURRENT COMMENT

Conducted by J. C. MILLER, DJ0BX (W9NTV)

THE technique of generating and amplifying an SSB signal offers a wealth of opportunity to the amateur who is interested in the field of experimental development. Most sideband operators have a continuing desire to put new ideas to-the-test. While this may be simply an effort to improve one's existing equipment—through minor circuit modifications—it can often lead to the design and construction of a completely new piece of apparatus. The experimenter who uses a new design approach to an old sideband theme—and perfects an unusual circuit—is sure to arouse interest among the Sideband fraternity.

Correspondence received from many readers during the last few months has indicated that there is considerable interest in the subject of new linear amplifier designs. Several of the unusual types of amplifiers are frequently heard discussed on the air and seem to be successfully in use at a number of stations throughout the world. However, details regarding the circuitry and operation of these linears have not been readily available. The following descriptions of several interesting types of linear amplifier are presented in response to numerous requests. It is hoped that the circuit you have been

looking for—or have heard about—is included!

The G2MA Linear Amplifier

This very popular circuit was originally conceived and designed by G2MA in 1957. Initial operation on 14 mc proved highly successful and prompted a number of Sidebanders to construct amplifiers based on details given to them individually by G2MA. The arrangement he had evolved was first published in "SSB Topics" in the June, 1957, issue of SHORT

Table of Values

Fig. 1. The G2MA Linear Amplifier with Screen Control

- | | |
|--|--|
| C1, L1 = Normal High-Q grid tank | R3 = 100 ohm, 1 watt |
| C2 = 400 μ F | M1 = Grid meter, 0-20 mA |
| C3, C5, C11 = .002 μ F | M2 = Screen meter, 0-25 mA |
| C4 = .001 μ F | M3 = Anode meter, 0-500 mA |
| C6, C7 = 500 μ F | M4 = Screen voltmeter, 0-500 volts |
| C8 = 500 μ F to .002 μ F, high voltage | RFC1, 2, 3, 5 = 2.5 mH RF choke |
| C9, C10, L2 = Normal Pi-output network | RFC4 = As normally rated for this position |
| R1 = Screen dropper (see text) | V1 = 813 |
| R2 = 250,000 ohm potentiometer, 2 watt | V2 = 6AL5, EA50 |
| | V3 = 6Y6, 6L6, 807 etc. (see text) |

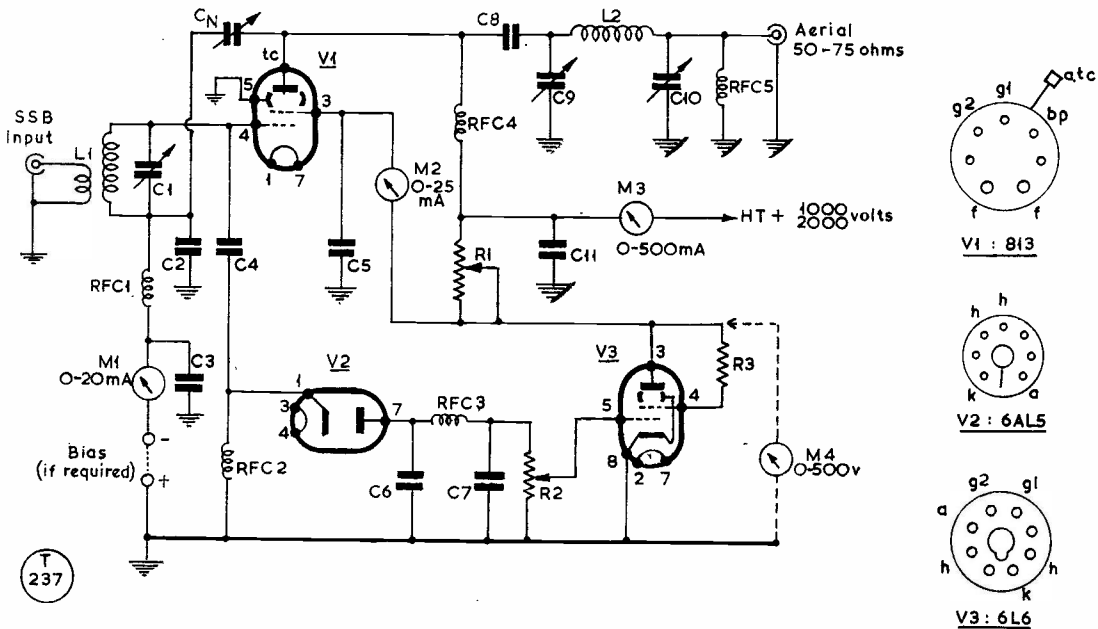


Fig. 1. The RF Linear Amplifier circuit evolved by G2MA, using a clamp valve to control the screen voltage of the 813 PA. The RF drive is rectified by a thermionic diode (crystal types are not recommended in this position) the output of which is applied as bias to the control valve. The size and rating of R1 is determined by the HT available, and is usually 50,000 ohms at 50w. During initial setting up, M4 is used to check on the screen voltage — see text.

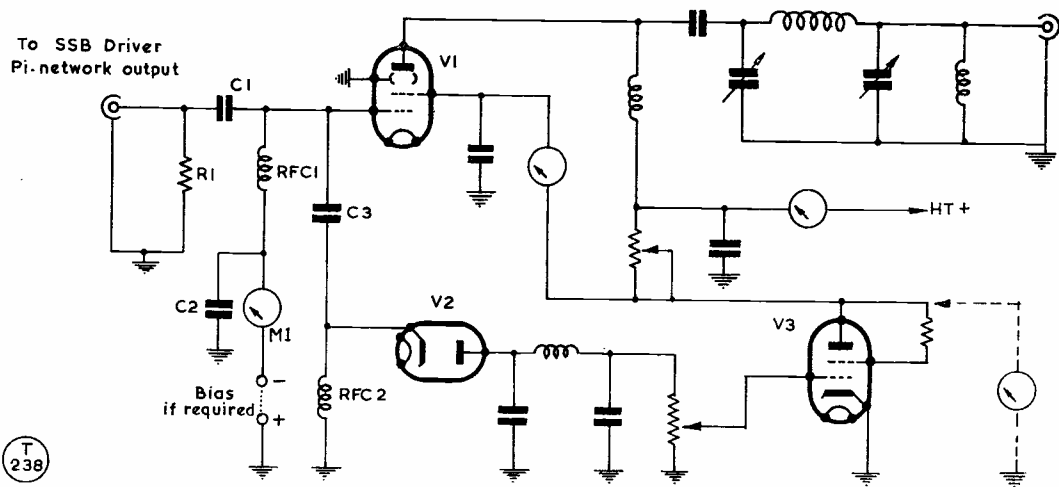


Fig. 2. A variation of the original G2MA Linear PA in which a passive grid circuit replaces the normal grid tank. Grid resistor R1 should equal the value of the input line impedance. This arrangement has the great advantage that no neutralising is needed. Circuit elements not numbered are as in Fig. 1.

WAVE MAGAZINE. Recently, G2MA forwarded additional information regarding his amplifier, including operating suggestions, improvements and applications to other types of circuit. With G2MA's generous assistance and ready co-operation, here is the updated description of the "Scotsman's Dream" linear amplifier.

The basic circuit uses a tetrode valve in a grounded-cathode arrangement, with a "clamp-valve" controlling the screen voltage. It is the action of this "clamp" control valve that is of interest. The operation of the circuit may be followed by referring to Fig. 1. With application of SSB drive to the grid of the amplifier valve, V1, the developed voltage is applied to the cathode of the diode, V2, through coupling condenser C4. This voltage is rectified by the diode, passed through the RF filter (C6, RFC3, C7) and applied to the grid of the control valve, V3, as a negative DC voltage. This DC (cut-off bias) voltage fluctuates at the audio rate in a negative direction and in turn, varies the DC current flow through V3 and the screen-dropping resistor, R1. With the reduction in current flow through R1, the voltage drop across it is also reduced, thus increasing the positive voltage at the anode of V3, which is applied to the screen of V1.

In operation, the screen voltage is held to a very low value in the absence of drive (static condition) and low anode current is drawn by V1. With RF drive the "clamp" is opened, V1's screen voltage rises and its anode current increases. This increase will be in proportion to the grid drive applied to V1.

During initial amplifier adjustments it is desirable to measure the screen voltage of V1 with a high resistance voltmeter. This is to make sure that under peak grid drive conditions the screen voltage does not rise to a maximum and then start to drop

Table of Values

Fig. 2. G2MA Linear with Passive Grid Circuit

C1 = 500 $\mu\mu\text{F}$	R1 = 50 to 1,000 ohms
C2 = .002 μF	non-inductive
C3 = .001 μF	RFC1, 2 = 2.5 mH RF choke

All other values as listed under Fig. 1.

again through the onset of high screen current. Amplifier limiting ("flat-topping") can also be avoided by observing the screen current meter, to ensure that under peak conditions the current does not exceed 15 to 20% of the total bleeder current through the control valve and screen dropping resistor under static conditions. This all sounds very complicated—actually, all that is necessary for proper operation is to see that the adjustments of grid drive and plate tank loading are such that the control valve always reduces its current faster than the amplifier valve screen consumes it with increasing voltage.

While Fig. 1 shows an 813 as the amplifier valve, the circuit is equally applicable to any tetrode. G2MA advises that any of the popular tetrodes, such as 807, 6146, 4-125A, 4-250A, 4-400A, and such will work equally well in this arrangement. Diode V2 can be a 6AL5, EA50 or similar valve. Crystal diodes may also be used here if capable of withstanding 100 volts or more peak inverse—however, they can easily be damaged. It is recommended that the control valve, V3, be a 6Y6G, as originally specified. The 6L6 or 807 also work well but have a higher voltage drop; they would thus require more bias for a given HT voltage. The very low-impedance regulator tubes, such as the 6AS7, would be ideal for the "clammer," but may be difficult to obtain.

The size of screen-dropping resistor, R1, is

determined by the available anode voltage. It is adjusted to pass 30 to 50 mA for the 813 and larger valves under static conditions, and about 15 to 20 mA for 807's and other 25 to 50 watt valves. This value of resistance is not critical as far as linearity is concerned, but it does determine the maximum input for a given valve type before limiting occurs.

Bias voltage for the amplifier grid will depend upon the available anode voltage and the amplifier screen voltage under static conditions. The latter will be determined by the voltage drop across the control valve. Generally, only a few volts of bias will be required—even when using high anode voltages. This can be easily obtained from batteries, so that under static conditions the anode dissipation will not exceed approximately 25 to 50% of maximum.

For example, the 813 will require *no* bias at anode voltages up to 2,000 volts. At this voltage the static anode current will be 25 to 30 mA. When using 3,000 volts on the 813, the same static current will be produced using about 12 volts of bias. (Yes, the 813 will take it!)

When bias is applied to the amplifier grid, condenser C4 isolates this voltage from the control valve grid and the DC return is completed through RFC2. These two components can be omitted if no bias is required and the diode cathode can be directly connected to the amplifier control grid.

G2MA advises that with two-tone test input to the amplifier the oscilloscope waveforms indicate excellent linearity—fully comparable to the same valves in Class-AB1. Grid swamping seems to be unnecessary, as current is drawn throughout the entire RF cycle.

Other G2MA Amplifier Circuits

G2MA has designed and tested several variations of the original amplifier circuit, which have proven very satisfactory. He has found that there are many other ways of applying his principle, but most are either too complicated or expensive to justify the effort.

However, the linear amplifier circuit of Fig. 2 is a variant which uses a non-inductive resistor to replace the normal grid tank, thereby eliminating grid tuning adjustments. As the resistor is non-reactive, the stage cannot oscillate—if the other elements are properly by-passed. Neutralization is not required, because of the low grid impedance. In this version, the pure resistive load which is presented to the exciter would tend to improve its performance.

While the passive grid circuit version is somewhat similar to the amplifier shown in Fig. 1, it will require *considerably more drive*. If this additional drive is available the advantage of extreme simplicity will be of obvious interest.

Ideally, grid resistor R1 should have a value equal to the line impedance. If drive requirements are too high with this value, the resistance may be increased somewhat. The drive can be approximated

Table of Values

Fig. 3. Grounded Grid G2MA Linear Amplifier

C1	.01 μ F	RFC1, 2	Filament chokes	RF
C2, C3,	.01 to .001 μ F	RFC3	2.5 mH RF choke	
C4, C5				
C6	.001 μ F			

All other values as listed under Fig. 1.

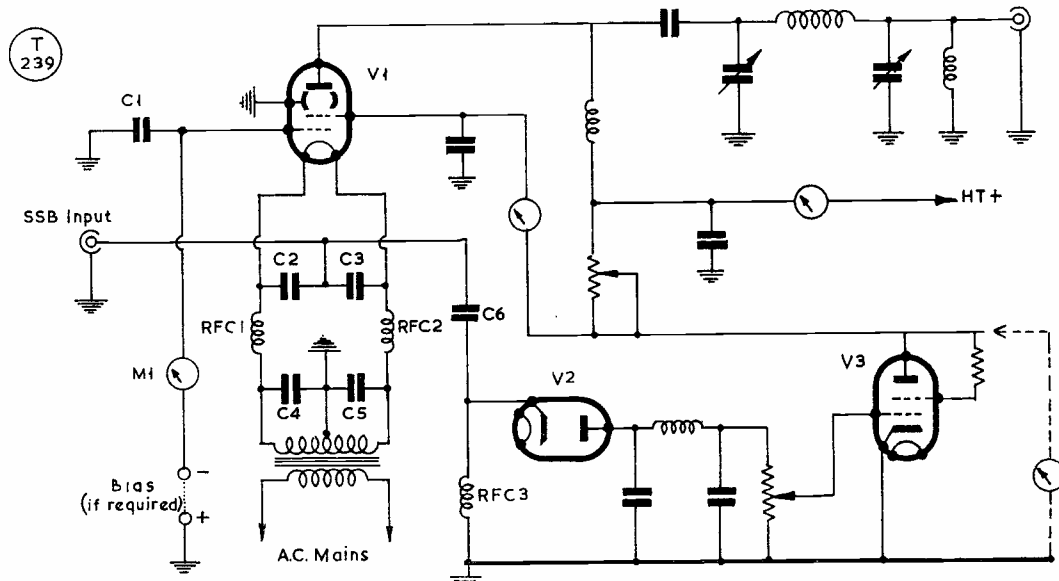


Fig. 3. Yet another variant on the original G2MA Linear Amplifier. In this grounded-grid circuit more drive would be required than in the grounded-cathode version. However, very stable operation will be obtained, to achieve which the cathode input side must be well screened from the anode output circuit, with grid and screen by-pass capacities mounted directly on the amplifier valve socket. Except as marked, all circuit values are as given with Fig. 1.

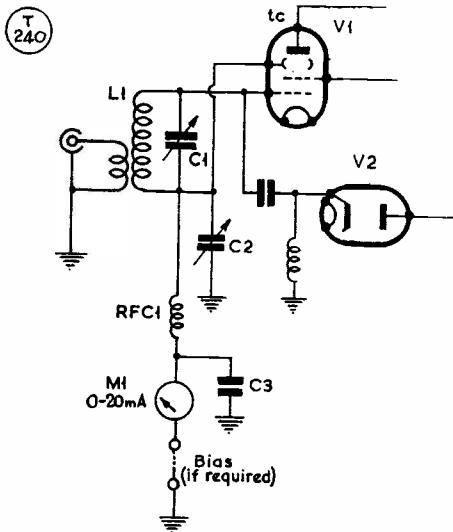


Fig. 4. This modification of the neutralizing circuit shown in Fig. 1 is suggested by G3MY. The beam-forming-plate capacity is used for the neutralizing condenser Cn. This circuit can be made very stable over all HF bands, and is of particular interest to those running an 813. Values are: C1, chosen for high-C grid tank; C2, 750-1500 $\mu\mu\text{F}$ variable trimmer; C3, .002 μF mica; RFC1, 2.5 mH; M1, 0-20 mA.

by obtaining the peak-to-peak voltage requirement for the valve and calculating the amount of power across the resistance needed to develop this voltage.

In Fig. 3 the G2MA principle is applied to a grounded-grid linear amplifier. Very stable operation is assured by this method, as the amplifier is degenerative and self-oscillation cannot occur—of course, assuming complete screening between the

input and output circuits. Grounded-grid operation requires considerably more drive than when the valve is used in the conventional grounded-cathode circuit of Fig. 1. However, this extra drive is not lost, as it appears as useful output in the amplifier output circuit.

The SSB drive voltage is capacity-coupled into the low-impedance cathode circuit of the amplifier. Filament chokes are necessary to keep the filament transformer capacity to ground from shunting the RF driving voltage.

Additional Comments on the G2MA Amplifier

The second linear amplifier using the original G2MA circuit was constructed and put into operation by G3MY. He has offered the following interesting suggestions regarding his experiences with the amplifier; they should prove helpful. As the amplifier is operating in zero-bias (813 with 2,000 volts) Class-B, the grid impedance is very low. This requires careful impedance matching between the drive source and the amplifier grid, and a very high-C in the grid tank circuit. He suggests approximately 100 $\mu\mu\text{F}$ capacity on 14 mc.

G3MY points out that the potentiometer in the

Table of Values

Fig. 5. The "ZL Linear" designed by ZL1AAX

C1, L1 = Normal high-Q grid tank	R2 = 220 ohms, 1 watt
C2 = 250 $\mu\mu\text{F}$	R3 = 40,000 to 50,000 ohms, 50 watt
C3, C4, C5, C9 = .001 μF	RFC1, 3 = 2.5 mH RF choke
C6 = 500 $\mu\mu\text{F}$ to .001 μF , high voltage	RFC2 = As normally rated for this position
C7, C8, L2 = Normal Pi-output network	M1 = Screen meter, 0-25 mA
Cn = Neutralizing condenser suitable for 813	M2 = Anode meter, 0-500 mA
R1 = 10,000 ohms	V1 = 813
	V2 = 12A6, 6F6, 6L6, 5881, KT66 (see text)

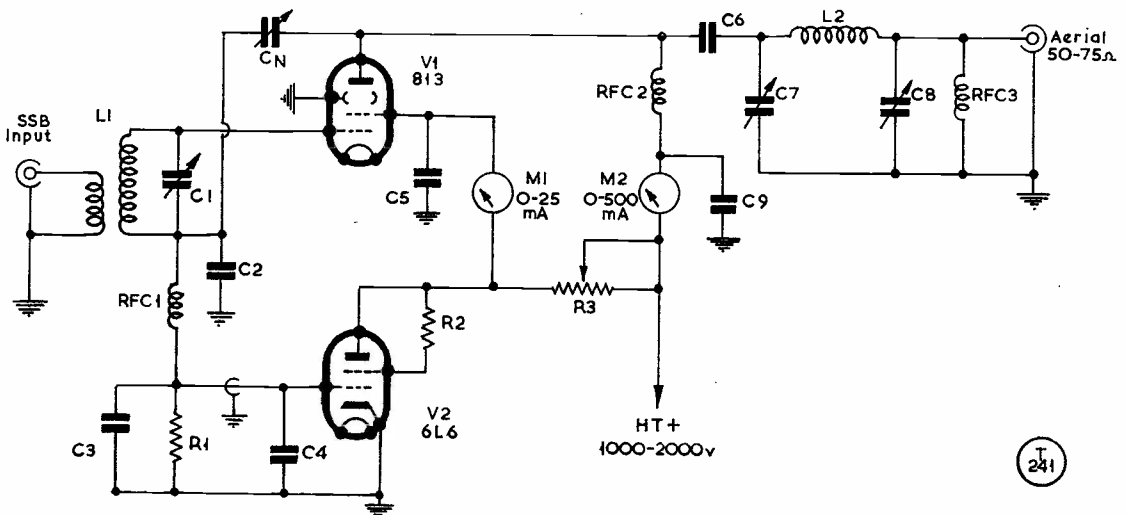


Fig. 5. Circuit arrangement of the "ZL Linear Amplifier," designed by ZL1AAX and discussed in the text. It should be noted that in this no external bias supply is required and the screen voltage is not regulated. Bias voltage for the clamp valve is developed across the RF stage grid resistor R1 when SSB drive is applied to the amplifier grid.

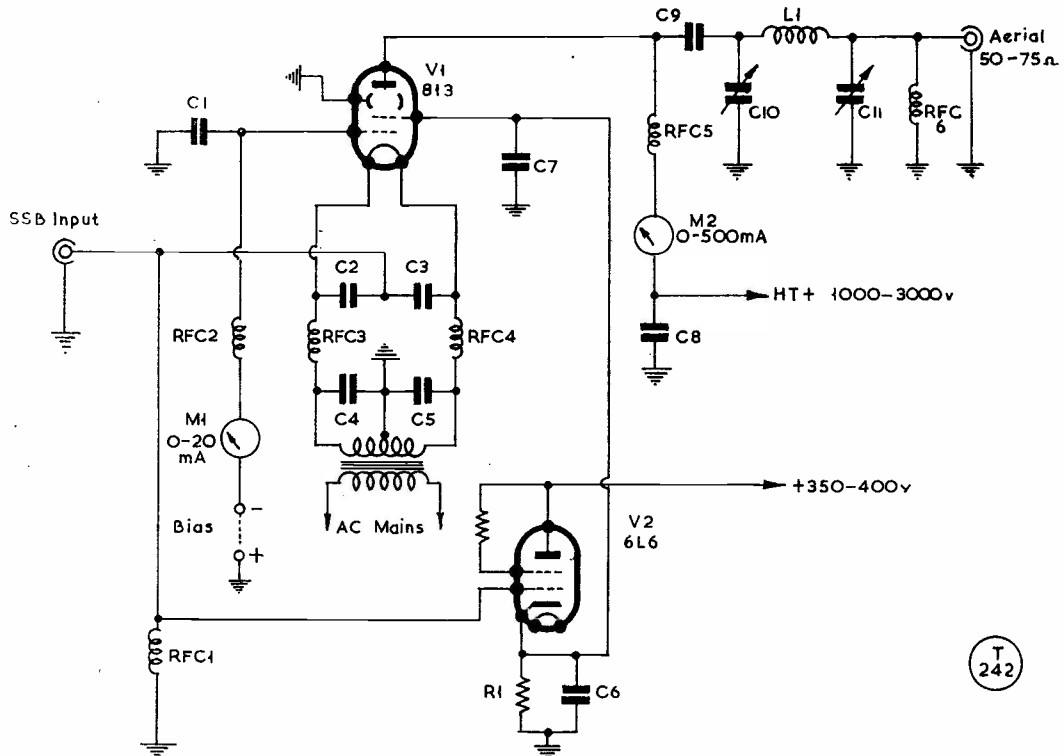


Fig. 6. The grounded-grid gated Linear Amplifier designed by W6EDD. It is claimed that it requires less drive than the usual grounded-grid arrangement. The positive RF cycle in the SSB drive causes V2 to draw more current and so increase the amplifier screen voltage.

control valve grid (R2 in Fig. 1) is used to adjust the control bias to the clamper tube. Once this pot. is adjusted, it should never require readjustment—if the loading remains the same on all bands.

The "Bruene" capacity-bridge neutralizing circuit is shown in Fig. 1. G3MY uses a little known special trick in this circuit, which is shown in Fig. 4. For those having 813's the plate-to-beam-forming-plate capacity can be used for the neutralizing condenser, Cn. This avoids increasing the plate circuit capacity. He suggests that a compression trimmer condenser of from 750 to 1,500 μμF be used to permit exact adjustment. The average effective capacity for neutralization should be between 1,000 and 1,250 μμF. Although the writer has not determined the exact beam plate capacity, it has been found that a fixed .001 μF condenser for C2 in Fig. 4 has given excellent neutralization for parallel 813's, used in a conventional linear circuit some years ago.

The ZL Linear Amplifier

An unusual circuit that is rapidly becoming popular among the VK and ZL sideband group is shown in Fig. 5. The ZL Linear, which was designed by ZL1AAX, also uses a "clamp-tube" in conjunction with a tetrode amplifier valve. However, the control valve bias voltage is developed across the 813 grid leak resistor, R1, and not in a diode as in the G2MA circuit.

Table of Values

Fig. 6. Grounded-Grid Gated Linear Amplifier, by W6EDD

C1, C7, C8 = .005 μF	RFC3, 4 ~ Filament RF choke
C2, C3, C4, C5 = .01 μF	RFC5 ~ As normally rated for this position
C6 = 2 μF, 600 volt, oil-filled	M1 ~ Grid Meter, 0-20 mA
C9 = 500 μμF to .001 μF, high voltage	M2 ~ Anode Meter, 0-500 mA
C10, C11, L1 = Normal Pi-net- work	V1 = 813, RK65, 807, 6146, etc.
RFC1, 2, 6 = 2.5 mH RF choke	V2 = 6F6, 6L6

The original circuit used an 813 in a *Class-C* amplifying stage. As a 10,000-ohm grid resistor and a 40,000-ohm screen resistor were specified for the 813 in this service—at 1,500 anode volts—they were used in this amplifier.

In the ZL Linear, the action of the "clamp" valve is similar to that in G2MA's linear. Without drive there is no rectification in the grid circuit of the 813. No voltage is developed across the grid resistor, no bias is applied to the control valve grid, and it draws a large current through the 40,000-ohm screen dropping resistor. This results in a large voltage drop across the screen resistor and low voltage on the screen. When SSB drive is fed to the 813 there is some rectification at the grid,

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voltage is developed across the grid resistor and is passed to the control valve as bias to unclamp the valve, thus allowing the 813 screen voltage to rise and anode current to increase, in proportion to the grid drive applied. This will be true only if the clamp valve begins unclamping the instant that negative bias is applied to its grid.

It is claimed that the loading effect of the amplifier on the driver is the same as that of a zero-bias Class-B linear, where grid current is drawn for all amounts of input. Excessive grid drive will push the 813 into the Class-C region and should be avoided. Using 1,000 volts on the 813 anode, about 2 mA of grid current seems to be about maximum on a two-tone test. As the anode voltage is increased, the grid drive requirement will decrease.

The choice of a suitable clamper control valve, V2, is somewhat critical. The 12A6, 6F6, 6L6, and 5881 are excellent valves. The 6Y6 is *not* recommended here as the clamping action is too severe.

Efficiency of the ZL Linear is reported to be better than the zero-bias Class-B linear. Tests at ZL1AAX indicate that the circuit can be applied to almost any tetrode or pentode valve.

Gated Linear Amplifier

Another form of screen controlled linear amplifier that is gaining popularity among the W6-Sidebanders has been devised by W6EDD and is shown in Fig. 6. While this circuit is of the grounded-grid configuration, it can be—and has been used as—a gated grounded-cathode amplifier.

In this arrangement the control valve, a 6L6 or 6F6, is connected in series with the amplifier screen and the 350-400 volt supply. In effect, the control valve, V2, acts as a series gate valve, rather than for clamping the screen voltage to ground as in the ZL1AAX and G2MA amplifiers. Under static conditions the grid of the control valve is at DC ground. The control valve anode current starts to rise as SSB drive is applied to its grid and the voltage drop across its cathode resistor, R1, results in a cathode voltage rise, thereby increasing the amplifier screen voltage.

The control valve cathode condenser, C6, must be an oil-filled type. It is used to remove high peaks (smoothing action) and to improve the 3rd order harmonic distortion. The screen and control grid by-pass condensers, C1 and C7, should have very short leads and be mounted near the valve socket.

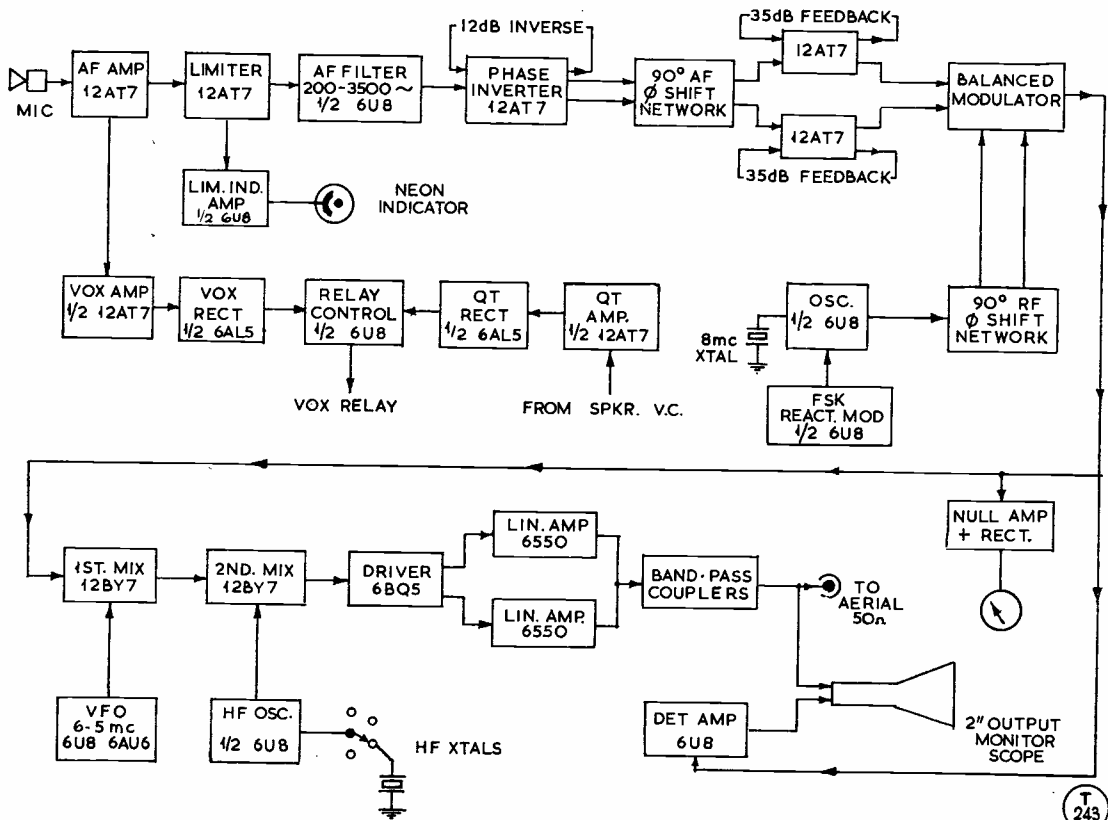


Fig. 7. Simplified block diagram of the new Model 100V SSB transmitter-exciter now being marketed by the American firm of Central Electronics. As mentioned in the text, the design incorporates many sophisticated refinements, such as a built-in oscilloscope for checking linearity.



A new phasing-type exciter-transmitter, the Central Electronics 100V, for which the block diagram is shown in Fig. 7. The main dial is for VFO control, and is calibrated 1 kc per division. A 2-in. oscilloscope is incorporated for output monitoring. All adjusting controls (such as audio gain, balancing potentiometers and bias setting) which once set up are seldom touched, are mounted behind the lower escutcheon doors; these are held closed by magnetic locks.

The 350-400 volt supply should have 10 to 15% regulation, or better; if this voltage is obtained from the HT bleeder, the connection to the anode of the control valve should be regulated.

It is stated that this circuit can be used with almost any tetrode; that all of the advantages of grounded-grid are retained; and that much less drive is required than with a conventional grounded-grid circuit.

New SSB Equipment

A new single-sideband transmitter-exciter has been announced by the first commercial manufacturer of amateur SSB equipment, Central Electronics, Inc., of Chicago. Their well-known Model 10A and 20A sideband exciter line has been augmented by the addition of the Model 100V Transmitter. A basic block diagram of this equipment is outlined in Fig. 7 and the front panel appearance of the unit is shown in the photograph. Some of the features are as follows: The only tuning control is the VFO dial, which is calibrated in 1 kc divisions. All other RF circuits use broad-band couplers, including the amplifier output circuit. RF output may be varied from 10 to 100 watts PEP, while the meter reads: carrier suppression, watts input and RF ampere output. There are speech level and load mismatch indicators built in, and a 2 in. 'scope is included for monitoring RF output. An audio limiter, audio frequency filter and inverse feedback are included for improved sideband quality. 50 dB of carrier and

sideband suppression are claimed for the 100V. This phasing transmitter is quite flexible, with a choice of SSB, DSB, AM, PM, CW and FSK emission available on one selection switch.

News and Views

A note from G3HJF (Enfield) advises that he is progressing with the construction of a new filter rig and hopes to join the sideband gang shortly. Now that the unit is working, he believes that the minor troubles that have plagued him during the last month of testing are worth the time and effort expended.

K4ZZV, who is well known as ex-HR2WC, YN1WC, recently acquired an XYL and has now settled in the state of Florida. K2AOS is at present in Europe directing the production of stereo recordings; many fine records have been released which were directed by him.

The annual SSB dinner will be held in New York City on March 24, and all Sidebanders are invited. This year the price of admission will be as follows: Single-Sideband Operators—*Free*. Double-Sideband Operators—*Double Price*. AM operators admitted only as a guest of one SSB op. or two DSB ops. and must carry a sworn statement that they will suppress their carrier within 30 days!

MP4BBW has paused in his around-the-world trip to bring us up-to-date on his activities. Writing from England, he mentions that he has visited VU, 4S7, VS, VK6, VK2, KH6, W6, W5, W4, W8, W2

and VE3 since leaving MP4 in October. His travels have permitted many meetings with SSB operators and operation from some of the well-known SSB stations. He was to return to MP4 in late January and will be active again with some newly-acquired equipment.

G3DXJ (Reading) passes along information regarding SSB activity on Top Band. A number of stations are on 1925 kc each evening at 2200 GMT. He says that the 160-metre band has proved ideal for inter-G working and that excellent coverage is the rule with QRP. Barefoot excitors of simple design and "baby" linears are in general use by this group. Look back to p.425 October, 1957, "SSB Topics," for some ideas about Top Band SSB.

K2MGE reports that Eva and Alex of CN8MM fame visited the U.S. in late 1958, meeting with many of the Sidebanders. She is also looking forward to the arrival of ZK1BS in March or April.

An SSB net is meeting on 7060 kc each Sunday morning at 1030 GMT. It is hoped that those interested in 40 will use this frequency as a meeting place for regular chats.

Recent visitors to the writer's station (which,

incidentally, was shown on p.426 of the October 1957 issue—*Ed.*) included W2NSD, Editor of *CQ Magazine*, and W6QYT, who will be remembered for starting the Sideband interest in the U.S.—Mike put W6YX on SSB in 1947 and got the ball rolling. And by the way, have you sent your single-sideband QSL to "SSB Topics" yet?

In Conclusion

After more than four years of continuous Sideband operation under the call of DL4SV, your conductor has been issued a new call-sign. It seems that the authorities have decided that all DL4 calls will be held by U.S. military personnel only. A re-licensing procedure has produced the new "DJØ" prefix for all non-DL nationals not in that category. After so many years, changing one's call is rather like changing one's name!

Many thanks to all for the helpful correspondence and encouraging comment. The next appearance of "SSB Topics" will be in the April issue, for which all correspondence should be received by February 28. Address "SSB Topics," c/o Editor, SHORT WAVE MAGAZINE, or direct to your conductor at Mauerkircherstrasse 160, Munich 27, Germany.

Vy 73 de Jim, DJØBX *ex DL4SV!*



The new AVO Transistor Analyser is a battery-operated instrument suitable for testing small and medium n-p-n or p-n-p transistors. Provision is made for the measurement of transistor noise by comparing peak noise against an equivalent signal calibrated from the internal 1000 c/s oscillator. The Analyser can also be used as a multi-range test meter for servicing transistorised apparatus.

As in previous years, "VHF Bands" is held over for this issue. All correspondence for A. J. Devon's feature in the March issue should reach him by February 18.

Some Crystal Checker Circuits

FOR BAND-EDGE MARKING & RECEIVER CALIBRATION DOWN TO TWO METRES

THERE are large numbers of surplus crystals, to be obtained quite cheaply at the present time, apparently on frequencies of no practical value. Many of these crystals are not so useless as might at first be thought.

Although they may be of little value for transmitter control, it is often the case that some odd harmonic may fall into, or close to, an amateur band; the harmonic can then serve as a check point for a receiver operating on that particular band, and will also assist in compiling a calibration chart for the receiver.

Surplus crystals can be obtained with widely differing fundamental frequencies, so that an oscillator is required which is to a large extent independent of the crystal frequency, and will also oscillate readily with "difficult" crystals. The Pierce circuit, as shown in Fig. 1, satisfies these requirements admirably; crystals of almost any frequency will oscillate immediately in the circuit, provided that the fundamental is not lower than the resonant frequency of the anode side of the Pierce oscillator. Uses to which the oscillator may be put come to mind at once: When grinding crystals to a required frequency, the crystal after having

been ground can be tested by connecting it into the circuit, when it should oscillate easily; for it is a general rule that a crystal which will not go off in this oscillator will not perform in any other type of circuit, and will have to be reground and reactivated before further use.

One version of the oscillator used an EF54, which oscillated strongly enough to produce S9 harmonics on 2 metres—strangely enough, the least efficient EF54 (for ordinary amplifying purposes) produced strongest harmonics.

A modulating valve is useful for identifying the signals, and a resistance-capacity oscillator connected as shown in Fig. 1, is found sufficient to modulate the signal up to about 50 per cent.

Modifications

For low-frequency crystals, a small feedback condenser may be needed; this is shown as Cf in the circuit diagram, and will usually be about 20-50 $\mu\mu\text{F}$, but the smallest value necessary for stable oscillation should be used to prevent the frequency of the crystal being "pulled."

A number of crystals may be incorporated

Table of Values

Fig. 1. The Pierce Oscillator

C1, C3 = .001 μF	R6 = 250,000 ohms
C2 = 10 $\mu\mu\text{F}$	R7, R8 = 470,000 ohms
C4 = 150 $\mu\mu\text{F}$	R9 = 1,500 ohms
C5 = .005 μF	R10 = 1,500 ohms
C6, C7, C8 = 500 $\mu\mu\text{F}$	RFC1 = VHF RF Choke
C9 = 2 μF	RFC2 = S/W RF Choke
Cf = see text	V1 = EF50, EF54 or similar
R1, R3 = 50,000 ohms	V2 = SP61, or similar
R2 = 500 ohms	S = Crystal Selector Switch
R4 = 25,000 ohms	
R5 = 2 megohms	

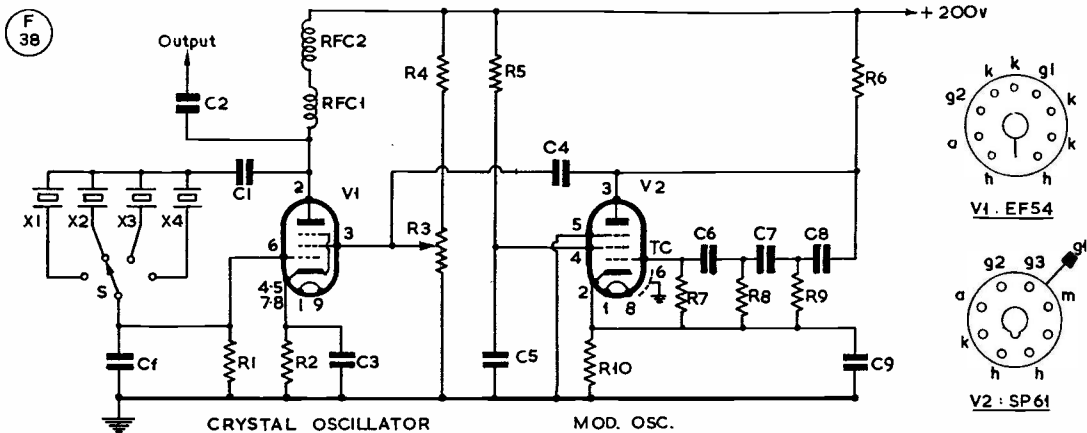


Fig. 1. In this arrangement, the oscillator V1 is in the Pierce mode, the crystal frequency being selected by the switch S. A resistance-capacity coupled audio oscillator V2 modulates the signal, so that it is instantly recognisable amidst the variety of beats that may be heard when tuning across an unfamiliar band. The potentiometer R3 is for controlling the harmonic level; good output is obtainable over a wide range of harmonic frequencies.

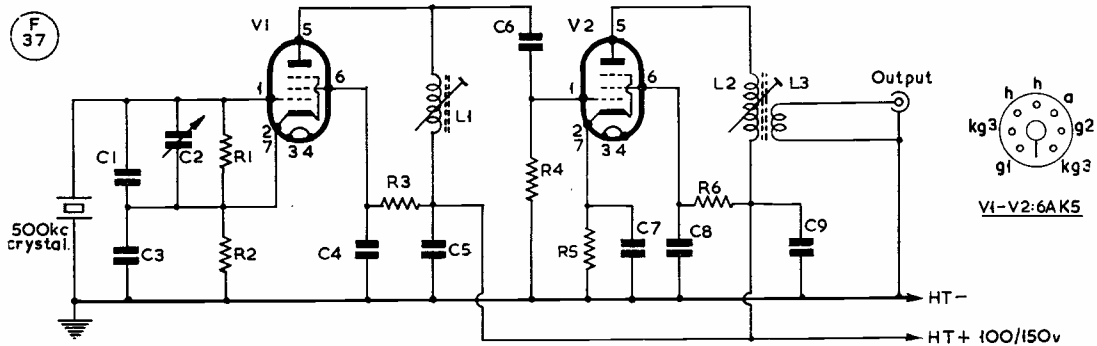


Fig. 2. A circuit for providing accurate marker points through the two-metre band, using a 500 kc bar. The variable capacity C2 allows the oscillator to be brought to zero-beat with a standard-frequency signal, such as WWV or MSF. In most cases, this little unit can be run from the receiver power pack.

in the unit and brought into circuit by means of a multi-way switch, thus giving numerous calibration points. If the harmonics are too strong for the required purpose, the output can be reduced by lowering the potential of the oscillator screen by means of the potentiometer R3.

Originality is not claimed for the circuits shown, but it is hoped that they will illustrate the usefulness of the Pierce oscillator, besides giving some idea of its performance; perhaps a use will also be found for some of those crystals lying about in the shack!

The next unit to be described was developed for the express purpose of supplying 500 kc marker points in the 2-metre band. Most converters and receivers acquire a certain amount of frequency error due to drifting or mechanical shock, so a suitable frequency standard to check this point from time to time adds up to better operating efficiency.

With a 500 kc crystal, five marker points are provided in the 2-metre band; these are useful for making a suitable calibration chart. When the calibration is completed and can be relied upon, stations not already listed can be measured and their actual operating frequencies filed. The unit was designed to be really accurate all the way from 500 kc to 150 mc. Power consumption is so small that it could probably be bled off the HT/LT supplies to any existing receiver. With 100v. or so HT and using 6AK5 valves, harmonics in the 144-146 mc band are strong enough to be picked up with only a few inches of wire connected to the calibrator output terminal. The physical size can be kept small for the convenience of tucking the unit out of the way in some corner, to be switched on as required.

Table of Values

Fig. 2. CC Marker Unit for Two Metres

C1 = 22 $\mu\mu\text{F}$	L1 = 200 turns, 40
C2 = 100 $\mu\mu\text{F}$, variable	SWG, on slugged
C3, C7,	poly styrene
C8, C9 = 500 $\mu\mu\text{F}$	former
C4, C5 = .003 μF	L2 = 3 turns, 24 SWG,
C6 = 80 $\mu\mu\text{F}$	on slugged poly-
R1 = 500,000 ohms	styrene former
R2, R3,	L3 = 2 turns coupled to
R6 = 10,000 ohms	L2
R4 = 100,000 ohms	Valves = 6AK5, 9001, 9003
R5 = 220 ohms	(see text)
	Xtal = 500 kc bar (Q.C.C.
	Q5/500)

Circuit

The oscillator circuit is not at all critical and once it has been well constructed with good components (the most important being the crystal) no further adjustment is required other than to zero the crystal beat-note with one of the WWV transmissions, or MSF on 2500 kc. The particular components specified are correct for a QCC Q5/500 crystal. Should some other make of crystal be used it may be necessary to change the values of the 22 $\mu\mu\text{F}$ and 500 $\mu\mu\text{F}$ condensers (C1, C3) slightly in order to have an equal amount of frequency correction either side of zero beat. The frequency correction is adjusted by the variable 100 $\mu\mu\text{F}$ condenser, C2. Several crystals were tried in this circuit, including a 1000 kc bar, and all worked very well.

The valve complement can be quite varied—types 9001, 9003 (EF91, EF92 with wiring modification) and 6AK5 are all suitable. The 6AK5 gives the strongest harmonics, but the 9001 is good enough.

There are no particular tuning adjustments other than to peak the oscillator plate circuit on either 3 or 4 mc. This can be checked by listening for maximum signal on the regular

communication receiver adjusted to 3 or 4 mc. The three-turn output coil L2 is peaked for the strongest signal by listening on 145 mc. The coil formers are small polystyrene type. The 200-turn coil L1 can be either wave- or scramble-wound and doped to keep the turns in place. The output coil is three turns of

24g. enamel.

The chassis size of this unit is 4in. long by 3in. high and 3in. wide. Actual size is not important so long as grid and plate leads are kept to one or two inches. Once constructed, it will be found essential for its purpose, and it is cheap and easy to build.

THE RUSSIAN MOON ROCKET

SOME FACTS FOR THE RECORD

D. G. Quarrington (G3KSL)

FOR observation of the last stage of the flight of the Russian Space Rocket—launched on January 2, on the eve of Mr. Mikoyan's "state visit" to America—three radio transmitters were used. These transmitters only continued working for about 62 hours, till the batteries ran out. One of the transmitters operated on two frequencies, 19.997 and 19.995 mc; this transmitter emitted beats lasting 0.8 and 1.6 seconds. The second transmitter operated on 19.993 mc, emitting beats of variable duration of the order of 0.5-0.9 seconds. These two transmitters were used to send back the scientific information such as the moon's magnetic field, cosmic ray intensity, and the gaseous components of interplanetary matter. The other transmitter was on 183.6 mc, which was the tracking frequency to measure the parameters of the rocket's movement.

The payload carried the now conventional spring-loaded whip aerials. This rocket actually had four, which sprang into position as the protective cone fell away. Gas was made to circulate at roughly a third above normal atmospheric pressure, inside the container. Its temperature was maintained at approximately 68° F.

The launching of the rocket was carried out vertically and it was then guided into its correct trajectory by remote-controlled (by radio) secondary rockets. It was sent up over the eastern frontiers of Russia, it being easier to break through into outer space in that direction. Obviously, this must be so when one remembers that the speed of the Earth's rotation can be added to the launching speed of the rocket. After the initial break-through had been achieved, the rocket's flight varied. Between 6 a.m. and 4 p.m. on the day after launching took place, it covered 62,000 miles, an average speed of 6,200 m.p.h., but in the following five hours it covered only 28,000 miles, an average speed of 5,600 m.p.h.

Now that the "tenth planet" is in orbit around the Sun, its speed will continue dropping steadily for about six months, when it reaches its farthest point from the Sun. Then it will accelerate again to its original speed. In its orbit the average speed should be about 17½ miles a second—compared with the earth's 18½ m.p.s. It has been calculated that the fastest the "planet" will travel will be in the region

of 20 miles a second.

The seasons of the new planet, whose year is nearly three months longer than ours, will be as follows: *Midsummer*, April to May 1960; *Midwinter*, September 1959.

The temperatures will fluctuate between approximately 42° and 11° F.

The rocket will return to its starting point and meet the Earth after 125 revolutions around the Sun. This should occur in 2113, but changes in the rocket's orbit caused by the influence of the moon and the other planets rule out any possibility of a collision with the Earth. The rocket will be closest to us early in 1975, as far as the next few years are concerned. At this time it will be approximately 9,300,000 miles away.

It has been reported in the Russian Press (from which most of the foregoing has been taken) that one of the next space vehicles to be launched will be used as a "vision sputnik"—to relay TV programmes originating in Moscow over a wide area of the earth. It was decided at a special meeting in the USSR to speed up the work on this project so that the satellite could be launched at the earliest possible moment. It is probable that the main frequencies used will again be as quoted in the first paragraph—so you know where to tune when it is reported "off."

POST OFFICE LINKS FOR BURNHOPE ITA TRANSMITTER

With the opening of the new transmitter for the ITA at Burnhope, a variety of vision links provided by the Post Office come into operation.

(a) *Manchester-Carlisle*: This will be a single-way section. It is being provided on co-axial cable and with carrier line equipment which operates in the 0.5-4.0 mc band. The Post Office terminals in this section will be at Telephone House, Manchester and Carlisle (Harraby) repeater station.

(b) *Carlisle-Pontop Pike*: Eastwards from Carlisle (Harraby) the various signals will be carried by a micro-wave radio link operating at about 4,000 mc. This radio link will consist of two sections. The first section, from Carlisle (Harraby) to an intermediate repeater station sited at Hopealone Farm, near Haltwhistle, will be about 23 miles long. The length of the second section, from Hopealone Farm to Pontop Pike, will be about 28 miles.

The radio stations will have no resident maintenance staff. Fault indication will be extended, by a system of automatic alarms, to other centres where Post Office maintenance engineers are always available. In addition, a duplicate set of equipment will be provided which will be automatically brought into

service on failure of the operational channel.

The aerials consist of parabolic reflectors, each of 10 ft. diameter, and these are elevated on masts and towers to obtain unobstructed paths for the micro-wave radio signals. The above-ground height of the aerial at Carlisle (Harraby) is 150 ft., and at Pontop Pike 40 ft. Siting of the mast near Haltwhistle has presented some difficulty, because the high ground which would offer transmission advantage is situated within an area which is reserved for a National Park. For this reason, the mast has been erected at a lower level, at the Hopealone Farm site. A mast height of 260 ft. is, therefore, necessary.

(c) *Pontop Pike-Newcastle*: The link between Pontop Pike and the Post Office Network Switching Centre at Newcastle will be routed in a new 6-tube cable equipped to operate in the 3-7 mc band. This line section is about 13 miles in length and, in order to provide the necessary amplification at two intermediate points, the cable has been intercepted at Swalwell and Burnopfield.

(d) *Newcastle-Burnhope*: The connection between the Post Office Network Switching Centre at Newcastle and the Burnhope transmitter will be by a 3-7 mc carrier channel from Newcastle to Pontop Pike, on co-axial cable. A 5-mile unbalanced video link, on a new co-axial cable, from Pontop Pike to Burnhope has also been provided.

(e) *Newcastle Studio Links*: Four vision links (two in each direction of transmission) are being provided on co-axial cable between the Post Office Network Switching Centre at Newcastle and the Newcastle Studios of Messrs. Tyne-Tees Television Ltd. Each of these links will be $\frac{1}{2}$ of a mile in length and will be operated in the unbalanced video mode. All active transmission equipment will be located at the Post Office terminal station.

WORLD'S LARGEST AUDIO AMPLIFIER

What is claimed to be probably the largest sound or audio amplifier in the world is now under construction by Gresham Developments, Ltd., a subsidiary of the Gresham Transformer Group, Twickenham Road, Hanworth, Middlesex. With a finished weight of approximately 10 tons, in a "cabinet" 23 ft. x 10 ft. x 10 ft., it will have an output of 300 kilowatts of audio! The frequency range will be from 1000-5000 c.p.s., with a low distortion of 5 per cent. at full power and a high signal-to-noise ratio of 40 dB. The output stage consists of four large, water-cooled Mullard transmitting valves in parallel push-pull, and the driver stage comprises four water-cooled Mullard valves operating as cathode followers. The circuit arrangement includes negative feed-back.

When installed, the amplifier may often have to work through several continuous 24-hour operations. Thus it must have the utmost reliability, with the minimum of maintenance. The basis for this is the experience of the staff of Gresham Developments, combined with the facilities of Gresham Transformers, Ltd., in the design of transformers for many special purposes.

MOBILE RALLY DATES

For the information of all concerned, the following dates have been notified for proposed Mobile Rallies, full details of which are to be published later:

April 26: North Midland Mobile Rally, Trentham Gardens, Stoke-on-Trent.

September 6: London Mobile Rally, Festival Gardens, Battersea Park. This will include an exhibition of amateur equipment, and river berths will be provided for /MM's. Concessional tickets will be available for those attending.

September 13: Woburn Abbey Mobile Rally.

September 20: Hamfest and Mobile Rally, Lincoln.

To avoid any unnecessary clashing, it is hoped that these dates, which are all Sundays, will be noted by potential Rally organisers. So far as we know all other dates are open—but as the holiday months of July-August are not very convenient, and it is almost essential to choose a Sunday, in fact there are not many dates available if the event is to take place with a chance of reasonable weather.

BOOKS FOR SWL'S

The books we recommend as being of direct interest and value to short wave listeners are *How to Listen to the World* (general coverage, beginners); *the World Radio Handbook* (full details of the broadcasting systems and stations of the world); *Radio Amateur Call Book* (directory to the world's amateur stations, with 250,000 call signs, names and addresses); and *Better Short Wave Reception*, of technical interest, with circuits and receiver data. There is also our *DX Zone Map*, which was fully described on p.514 of the December 1958 issue of SHORT WAVE MAGAZINE, and is an essential buy for all with a practical interest in DX working or listening.

These publications can be obtained direct from us, from stock — see our Publications Dept. advertisement in this issue.

THE JANUARY SUN-SPOT

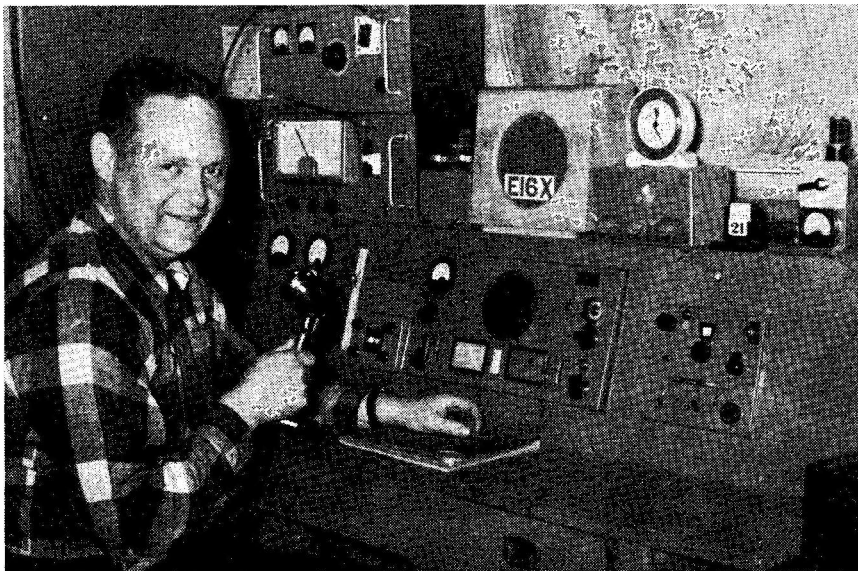
The largest spot on the face of the sun for the last twelve years was visible during January 8-12—when we had that hard weather and the sun was actually shining. It moved "from left to right," just above the sun's equator, and one only needed a blackened glass to see it.

QUESTION PAPERS—RADIO AMATEURS' EXAMINATION

Specimen question papers, as set for the R.A.E. in recent years, can be obtained from the City and Guilds of London Institute, 76 Portland Place, London, W.1. The cost is 6d. each paper and when applying be sure to quote "Subject No. 55, Radio Amateurs' Examination." For an s.a.e., the City and Guilds will also supply a list of recommended books for reading for the Examination.

The Other Man's Station

EI6X



THE station of EI6X—owned and operated by Bryan Fogerty at Hillcrest, Plassy Avenue, Corbally, Limerick, Eire—has often been quoted in our “DX Commentary” feature and, as we see here, he has a particularly neat and efficient-looking layout.

When first licensed in April, 1950, activity was confined to 3·5 and 7 mc only; it was not until October, 1956, that EI6X became what he calls “DX-conscious.” Since then, and in pursuance of that interest, he has been very active on 10-15-20 metres, with 21 mc as the favourite band. Having done a good deal of experimenting with aerials, EI6X put up a Lazy-H, a W8JK, a multi-band dipole with traps and a two-band Cubical Quad for 10-15m.—the latter, incidentally, being by far the best of them all.

The main HF band transmitter runs 100w. to a pair of 1625's in parallel, the RF output being taken at 72 ohms to three coax feeders, for the two sections of the Quad and the dipole. The VFO is a Geloso unit with one stage of “extra urge” added, and band-switched with the VFO. The PA is modulated by another pair of 1625's, in Class-B zero bias, and the speech amplifier section consists of 6J7-6J5-6V6. The main HT rectifiers are 866A's, with a Woden 650v./450 mA transformer.

Though the receiver is apparently an old HRO-MX, actually it has been extensively modified and modernised internally, together with external

auxiliaries such as an R9'er and a Q-Multiplier. The whole station is relay-controlled, the change-over switch giving “transmit-receive-net,” and always with the same aerial for reception as is being used on the transmitter.

The equipment is installed in a garage extension measuring 9 ft. x 12 ft., and one side of the room is fitted out as a workshop. EI6X says it is just as well he is at ground-level “as the beam is turned by the well-known Armstrong method!”

There not being a great deal of EI activity on the DX bands, EI6X finds himself in some demand. The QSL policy is 100% *via* bureaux—unless it happens to be some country he wants himself, in which case his card goes off express airmail! The present DX rating of EI6X is 140 countries worked, 120 confirmed, with 38 Zones also confirmed; numerous operating certificates are held, including DXCC, WAE and WAS, all on phone.

As EI6X himself is a control room supervisor at the hydro-electric generating station near Limerick, he works watches which, as he explains, gives him the opportunity to get on the air during favourable periods when the bands are less crowded. However, activity is at a minimum during the summer months, when EI6X likes to make a change by taking a holiday, doing some gardening, and getting on with new constructional work, always in hand or in mind.

Always mention Short Wave Magazine when writing to Advertisers—It Helps You, Helps Them and Helps Us

NEW QTH's

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

- G3III**, G. P. Lovelock, 65 Warwick Road, Scunthorpe, Lincs.
- G3III/A**, G. P. Lovelock, Jolly Trooper Caravan Site, Bradenstoke-cum-Clack, nr. Chippenham, Wilts.
- GM3MVL**, W. Campbell, 22 Burnmouth Road, Barlanark, Glasgow, E.3.
- G3MWR**, R. T. Mills, 218 Stretford Road, Hulme, Manchester, 15. (Tel.: Central 4810.)
- G3MWW**, T. S. Skelton, 60 Leas Avenue, Netherfield, Holmfirth, Huddersfield, Yorkshire.
- G3MYD/T**, R. J. Newey, 23 Lea-House Road, Oldbury, nr. Birmingham.
- G3NAD**, N. Richardson, 19 Lambton Street, Shildon, Co. Durham.
- G3NAJ**, H. J. Ballinger, 5 Offer-ton Avenue, Derby, Derbyshire.
- G3NAO**, J. Buckley, 412 Leeds Road, Dewsbury, Yorkshire.
- G3NAR**, B. E. Monk, 137 Lower Dale Road, Derby, Derbyshire.
- G3NCW**, S. E. Wright, 88 Blackman Avenue, St. Leonards-on-Sea, Sussex.
- GW3NDR**, D. Harris, 27 Stanfield Street, Cwm, Ebbw Vale, Mon.
- GM3NEQ**, A. D. Finlay, 24 Firwood Road, Newton Mearns, Glasgow.
- G3NEV**, B. Cadd, 40 Streatfield Road, Dallington, Northampton.
- GM3NEX**, Rev. C. P. Nicholas, St. Michael's Retreat, Dankeith, Kilmarnock. (Tel.: Symington 254.)
- G3NEZ**, J. Sole, 38 8th Avenue, Greenwood Avenue, Hull, Yorkshire.
- G3NFD**, N. V. Parker, 51 New Ward Road, Bulford Camp, Wilts.
- G3NFI**, R. G. Thornton, Brecken Lawn, Sydenham Road, Cheltenham, Glos.
- G13NFM**, K. McElhatton, 21 Keeragh, Pomeroy, Co. Tyrone.
- G3NFN**, J. Phillips, 7 Seaton Avenue, Bedlington, Northumberland.
- G3NFT**, P. M. E. Pavey, 45 Mincing Lake Road, Stoke Hill, Exeter, Devon.
- G3NFV**, R. Sykes, Greengates, Uplands, Ashtead, Surrey.
- GM3NGC**, M. Bell, 54 Market-hill Road, East Kilbride, Lanarkshire.
- G3NGD**, J. Beaumont, 76 The Esplanade, Fleetwood, Lancs.
- G3NGE**, B. Cheffings, Grimoldby, Louth, Lincs.
- G3NGH**, T. J. Glave, 75 Stacey Avenue, Wolverton, Bucks.
- GW3NGM**, W. E. Matthews, 193 Gower Road, Sketty, Swansea, Glam.
- CHANGE OF ADDRESS**
- G2AUA**, W. Bigley, 17 East Square, Shortstown, Cardington, Beds.
- G2COT**, H. T. Stott, Cotswold, Bourne Bridge Lane, Stapleford Abbots, Romford, Essex. (Tel.: Stapleford 312.)
- G2DTQ**, A. Goode, Ivy Glen, Church Lane, Shareshill, nr. Wolverhampton, Staffs.
- G3AAZ**, G. G. Gibbs, Coopers Close, Harmer Green, Welwyn, Herts. (Tel.: Welwyn 78.)
- GM3EQY**, D. A. E. Samson, 46 Rosebery Street, Aberdeen. (Tel.: Aberdeen 52823.)
- G3FKM**, E. J. Allaway, 10 Knightlow Road, Birmingham, 17.
- G3FZG**, A. Treanor, 13 St. John's Road, Waterloo, Liverpool, 22.
- G3HIS**, G. Berrisford, 16 Kings Ride, Deer Park, Tylers Green, Bucks.
- G3HOI**, H. B. Heath, c/o 34 Stanley Crescent, Uttoxeter, Staffs.
- G3HTQ**, F. Burbridge, 35 Lam-berhurst Green, Gillingham, Kent.
- G3IKT**, W. R. Midgley, 20 Park Close, Longmeadow, Stevenage, Herts.
- G3IVH**, E. J. Younge, 33 Cannorby Lane, Sprowston, Norwich, Norfolk.
- G3JKX**, M. J. Street, 278 High Road, Kilburn, London, N.W.6. (Station in Shropshire.)
- GM3KPD**, A. M. Coutts, 5 Park-grove Loan, Barton, Edinburgh 4.
- G3LBR**, F. Richardson, 61 Hamp-ton Road, Stockton-on-Tees, Co. Durham.
- G3LDO**, P. G. Dodd, 21 Whitley Road, Dishforth, Thirsk, York-shire.
- G3MBW**, J. E. Collins, 15 Hillside Avenue, Guiseley, nr. Leeds, Yorkshire.
- G3MJB**, B. A. Toseland, 9-B The Fairway, Goldington, Bedford.
- G3MKG**, D. T. Grafham (*ex-G13MKG*), c/o 85 Heatherside Road, West Ewell, Surrey.
- G3MKU**, A. F. Bower, Flat 10, Mayfair Court, The Marina, Deal, Kent.
- G3MQD**, P. T. Greed, 8 Round-way Park Estate, Devizes, Wilts.
- G3MWC**, B. Crump, 34 Lancing Road, Sheffield, 2, Yorkshire.
- G3PH**, C. W. Bassford, 42 Church Walk, Mancetter, Atherstone, Warks.
- GM3UU**, A. S. McNicol, 7 Tay-vive Terrace, Newport-on-Tay, Fife.
- G5JM**, H. E. James, Red Lion Hotel, Banbury, Oxon.
- G8KS**, S. L. Hill, Devon, Holwood Park Avenue, Farnborough, Kent.
- CORRECTION**
- G3AHE**, G. James, Basement Flat, Broadwater House, 1 Clifton Terrace, Southend-on-Sea, Essex.

THE MONTH WITH THE CLUBS

By "Club Secretary"

(Deadline for March issue : FEB. 13)

REPORTS are very numerous this month, and space is precious, but we would like to refer to the many news letters, duplicated broadsheets and circular letters that we receive from an ever-increasing number of Clubs.

This month we acknowledge the following: News Letter (**Purley**); Newsletter (**Enfield & District**); Circular Letters (**North Kent**); News Sheet, "5 & 9" (**Liverpool**); "Lea Valley Reflector" (**Enfield**); "Radial" (**R.A.I.B.C.**); S.R.C.C. Monthly News (**Surrey**); News Letter (**Midland**); Ham Hop News (**Ham Hop Club**).

A point we want to make here is that Secretaries might help their own publicity along by including, with the news letter, a postcard with details of forthcoming meetings. So often it happens that we read through the material forwarded and find nothing therein but past history, which does not always justify a paragraph on its own. It is *future* information that we need, and if Club Secretaries wish their forthcoming meetings to be mentioned, they need only add a slip of paper with the date and, if possible, the subject of the meeting.

All news letters and similar publications will be welcomed, as ever, but will not necessarily always result in the automatic appearance here of a paragraph about the Club concerned.

We are most anxious that this feature should not only help Clubs to increase their membership, but also encourage unattached readers to join their local Club—this is not quite like saying the same thing, because (a) If honorary secretaries do not send us an activity report, their Club cannot be publicised in this space, and (b) The report we can print should contain the sort of information that is likely to attract potential new members.

It frequently happens that we get enquiries from readers anxious to join a Club, very often from districts where we know an active Club exists. Such enquiries suggest that some Clubs are not making use of their own local Press facilities as much as

they might. Editors of local papers are usually only too glad to have a paragraph or two covering the activities of an Amateur Radio group in their district, especially if the DX theme can be brought in.

Incidentally, readers now thinking of writing in to "ask about a Club in my district" should first look carefully through the panel of names and addresses in this and recent issues of *SHORT WAVE MAGAZINE*. In any period of three or four months, nearly every Club that is active will have been reported in "Month with the Clubs."

Barnet meet on February 24 for a talk on Transmitter Construction from G3AAZ (at the Red Lion Hotel, High Barnet, 7.30 p.m.). At their March meeting (on the 31st) G6CJ will be giving his well-known lecture-demonstration with model aerials. Their Christmas Party was attended by about 150 and was most successful.

Blackpool & Fylde have just obtained their own premises after being in existence for nearly 20 years! They hope to meet every Tuesday at 8 p.m. in Squires Gate Holiday Camp, Blackpool, S.S., with more frequent meetings later on. Ten members are taking the R.A.E. Course. (Over



Hastings and District Amateur Radio Club, G6HH/A, gained 9th place at their first attempt in MCC. Here we see G3BDQ (at the controls), G3FXA (at the score-board), G3HRI (who is sightless) and on the right G3MQT, the Hastings hon. secretary. Gear used was a K.W. Vanguard transmitter modified for Top Band, with an HRO receiver. Their aerial was a 275 ft. wire, 100 ft. high at one end and 60 ft. at the other.

Bradford meet for a lecture on Colour TV at the Bradford Institute of Technology on February 10; on the 24th G3KEP will talk on Transmitter Design and Construction, at their own headquarters. **Bury** continue to gather at the George Hotel, Kay Gardens, on the second Tuesday; on February 10 the subject is Construction Practice, by G8UF. Membership has almost doubled since this Club was formed, three years ago.

Cornish have had talks on the Radio Sonde, RAEN, the Jodrell Bank Telescope, and Valve Construction, and they now publish an interesting monthly news sheet, copies of which we acknowledge. Their January meeting attracted 42 members—the largest gathering yet.

Cray Valley will be at the Station Hotel, Sidcup, at 8 p.m. on February 24 for a talk on KW Products,

by G8KW; their AGM will be held on March 24. **Halifax** heard a talk on Crystal Microphones at their December meeting; two events in January were a dinner at the Sportsman Inn, Bradshaw, and a talk by G3KLZ on Fault Finding. The speaker for February is G3IGW, on "DX-peditions," and for March the lecture is on Hi-Fi Reproduction.

London Short Wave Club are now on the air with the call G2CLR, on Fridays between 7.30 and 9.30 p.m. They meet every Friday, 7.30 p.m., at the LCC Men's Institute, Latchmere Road, S.W.11. A large Mobile Rally is planned for September 6, in the Festival Gardens.

Northampton held their AGM and elected G2HCG president, Mr. I. C. Millar chairman and G3LGT secretary. They will be meeting every Thursday at 8 Duke Street. **North Kent** had a Film Show on January 8 and a talk on Power Packs by G3BHF on January 22; on February 12 the subject is Electronics in Industry, and on the 26th, Tape Recorders for the Amateur.

Spen Valley join with Bradford on February 10 for the lecture on Colour TV at Bradford Technical College; their meeting for February 28 is still "to be arranged"; and on March 4 G3KLZ will be talking on Receivers for 420 mc. **Slade** will hear about The Human Ear on February 13; on the 27th G2AK will give a talk called "Round the Local Hams," with colour slides of many Midland stations. On March 6 there will be a special Mullard Film Show at the YMCA, Snow Hill, Birmingham.

Tees-Side held their annual Dinner, with a record attendance of 46. This event was combined with a raffle, a demonstration of the K.W. Vanguard, and a "swap table," from which much useful gear changed hands. February meetings are on the 6th and 20th—the latter it is hoped that the subject will be Stereophony.

Torbay, who recently announced their scheme for helping the local hospital, now acknowledge the gift of a Model 40 Avometer, from the company, to help with this work. Recent events have included a Junk Sale, a talk on "Ham Hop" activities and a lecture on Tape Recording. Their annual dinner will be held on March 7 at the Abbey Lawn Hotel—tickets 11s. 6d. Club Hq. are nearing completion and membership approaches the 50 mark.

Wellingborough have a meeting (left blank) on February 12, and a Junk Sale on the 19th. On the 26th a member will talk on "The Mystic East," with colour slides. **West Lancs**, now well established in their new headquarters, have a TVI Discussion on February 10, a talk by G3FZG on Practical Alignment on the 17th, and one by G3GST on Morse Procedure on the 24th.

Acton, Brentford & Chiswick recently heard a lecture by G6RC on Operating Procedure for Beginners; on February 17 there will be a talk by Miss R. Anderson, with slides, on a Tour of Greece and Yugo-Slavia. Morse practice for beginners, every Tuesday, 7.30 p.m., at the Clubroom, 66 High Road, Chiswick, W.4.

Bournemouth write to notify us of their Annual Hamfest, but unfortunately the date is February 7—immediately after publication. Festivities will be at

NAMES AND ADDRESSES OF CLUB SECRETARIES REPORTING IN THIS ISSUE:

ABERDEEN: W. K. Heggie, 80 Leslie Terrace, Aberdeen.
ACTON, BRENTFORD & CHISWICK: W. G. Dyer, G3GEH, 188 Gunnersbury Avenue, London, W.3.
BARNET: E. W. Brett, G3LUY, 28 Edward House, Edward Grove, New Barnet.
BLACKPOOL & FYLDE: H. G. Newland, 161 Penrose Avenue, Marton, Blackpool.
BOURNEMOUTH: F. G. Hamshere, 55 Maclean Road, West Howe, Bournemouth.
BRADFORD: D. M. Pratt, G3KEP, Glenluce, Lyndale Road, Eldwick, Bingley.
BRIGHTON: E. Roberts, 9 Clifton Hill, Brighton 1.
BURY: Mrs. Jean Hodgkins, G3JZP, 24 Beryl Avenue, Tottington, nr. Bury.
CAMBRIDGE: A. H. G. Waton, G3GGJ, New Road, Barton, Cambridge.
CLIFTON (London, S.E.): C. H. Bullivant, G3DIC, 25 St. Fillans Road, London, S.E.6.
CORNISH: J. Brown, G3LPB, Marlborough Farm, Falmouth.
COVENTRY: A. Noakes, G2FTK, 4 Barons Field Road, Coventry.
CRAY VALLEY: W. Sutton, G3FWI, 30 Sherwood Park Avenue, Sidcup.
EAST KENT: D. Williams, G3MDO, Llandogo, Bridge, nr. Canterbury.
ENFIELD: V. Croucher, G3AFY, 15 Nelson Road, London, N.15.
HALIFAX: A. Robinson, G3MDW, 7 Upper Brockholes, Ogden, Halifax.
HASTINGS: W. E. Thompson, G3MQT, 8 Coventry Road, St. Leonards-on-Sea.
LINCOLN: F. B. Travis, G3BCA, 202 Monks Road, Lincoln.
LIVERPOOL: W. D. Wardle, G3EWZ, 16 Mendip Road, Liverpool 15.
LONDON SHORT-WAVE CLUB: K. R. Piper, G3LOO, 2 Catherina Terrace, S.W.8.
LOTHIANS: L. Lumsden, 33 Hillview Drive, Edinburgh 12.
MIDLAND: C. J. Haycock, G3JDJ, 360 Portland Road, Birmingham 17.
NORTHAMPTON: J. Tate, G3LGT, 57 Edinburgh Road, Northampton.
NORTH KENT: D. W. Wooderson, G3HKX, 39 Woolwich Road, Bexleyheath.
NOTTINGHAM: E. C. Weatherall, 276 Percy Road, Sherwood, Nottingham.
OVERSTONE: G. C. George, 75 Broadway, Northampton.
PURLEY: E. R. Honeywood, G3GKF, 105 Whytecliffe Road, Purley.
R.A.I.B.C.: W. Harris, 25 Playford Lane, Rushmere, Ipswich.
SLADE: C. N. Smart, 110 Woolmore Road, Birmingham 23.
SOUTHGATE: A. G. Edwards, G3MBL, 244 Ballards Lane, North Finchley, N.12.
SOUTH MANCHESTER: M. Barnsley, G3HZM, 11 Cemetery Road, Denton, Manchester.
SPEN VALLEY: N. Pride, 100 Raikes Lane, Birstall, nr. Leeds.
SURREY (CROYDON): S. A. Morley, G3FWR, 22 Old Farleigh Road, South Croydon.
TEES SIDE: A. L. Taylor, G3JMO, 12 Endsleigh Drive, Middlesbrough.
TORBAY: G. Western, G3LFL, 118 Salisbury Avenue, Barton, Torquay.
WELLINGBOROUGH: P. E. B. Butler, 88 Wellingborough Road, Rushden.
WEST LANCs: A. Crighton, 77 Myers Road West, Liverpool 23.
WIRRAL: H. V. Young, G3LCI, 9 Eastcroft Road, Wallasey.

Jameson Hall, Jameson Road, Winton, starting at 6.30 p.m., and it is expected that amateurs from Poole, Dorchester and Southampton will be attending.

Nottingham hope to have a talk on the Civil Defence Communications System, by G3ATL, on February 10; the 17th is still "open"; and the plan for the 24th is a Technical Forum run by G3QC. Meanwhile G3EKW is on the air (Top Band) and regular Morse practice continues. **Overstone** have been meeting weekly for the last six months, catering mostly for the younger radio-minded enthusiasts in the districts round Northampton. Subjects discussed include General Radio Theory, Aerial Systems and the like. (See panel for secretary's QTH.)

Purley will be holding their Club Social on February 20, 7.30-11 p.m., in the Large Hall, Railwaymen's Hall, Whytecliffe Road, Purley. Members are urgently requested to turn up the previous evening and help to decorate the hall! March 20 is booked for a Junk Sale.

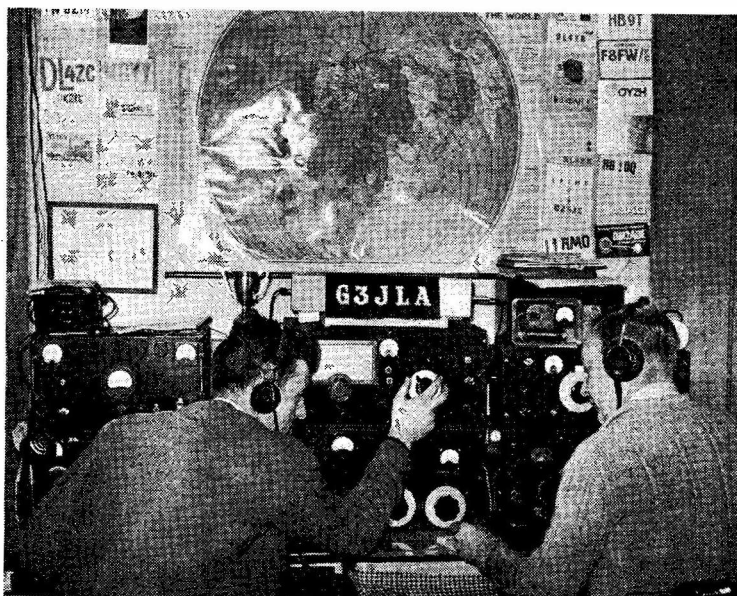
South Manchester are holding their annual Hot-Pot Supper at 7.30 p.m. on February 13, at the Wellington Hotel, Nicholas Croft, High Street, Manchester. An honoured guest will be Dr. R. C. Jennison, of Jodrell Bank, who has kindly consented to give an illustrated talk on some of the work of the Establishment.

Hastings are busy re-decorating and re-furnishing their clubroom, and plan to run an extensive programme of films and tape-recorded lectures as soon as the work is completed. A Spring Mobile tour is also projected, probably along the south coast to Land's End, then to Bristol, visiting as many Clubs and Groups as possible *en route*. Interested Clubs are asked to communicate with the secretary as soon as possible. There will be a "Grand Sale of Surplus Equipment" on February 24—not the usual Junk Sale, but a large-scale affair involving the Club's former transmitting gear and receiver. Neighbouring Clubs cordially invited!

Brighton will be hearing a tape-recorded lecture on Radio in Antarctica on February 11; on the 18th they will discuss NFD tactics; and on the 25th G3YY will be telling them about DX Operating. Wednesday is Club Night, instead of Tuesday, from now on.

Cambridge will meet at 7.45 p.m. on February 20, at The Jolly Waterman, Chesterton Road. No programme has been arranged, but members are asked to come prepared with any resolution that they wish to put at the AGM on March 2.

Clifton held a Grand Junk Sale on January 23; for February 6 they have a novelty programme called "Your Questions Answered"; and on the 20th committee-member R. G. Poppi will conduct a Quiz.



G3JLA was the station of Stevenage and District Amateur Radio Club for the recent Magazine Club Contest. G3JTF and G3JLA (right) were the operators, and they gained 15th place out of the total entry of 45 Clubs.

The other two Fridays will be constructional evenings. The uncertainty about the clubroom has been resolved, and meetings will continue on every Friday, as before.

Southgate, Finchley & District, meeting on January 8, heard G3AAE on "Working DX," followed by a talk on the "Small World" balloon. On February 12 G5DJ will give hints on aerial erection. Meeting-place is the Arnos School, Wilmer Way, N.14. **Aberdeen** have a talk on RF Converters on February 13; "What's Doing?" on February 20; and an RAE-series talk on Aerials and Transmission Lines on the 27th. The Morse class meets at 7 p.m. every Friday, before the main meeting.

Coventry will be hearing about Transmitter Design and TVI (G3BTM) on February 9; on the 16th they have a Special General Meeting; on the 23rd the subject is Licence Conditions (G3RF) and on March 9 Contest Operating (G2LU)—both the subject and the speaker should be of considerable interest, as C.A.R.S. were second in the recent MCC.

East Kent held their AGM in January and elected G3MDO hon. sec., G3NFS chairman, G3LIG and G3MLO committee-men. **Lincoln** had their annual dinner on January 7, and thirty members and guests braved the snow and ice to attend. Meetings, on alternate Wednesdays, now include an RAE course; next meeting is on February 11.

Lothians will be hearing "More About SSB" from GM3EDL on February 19, and on March 5 GM3EGW, well known for his two-metre activities, will talk on VHF Propagation. Meetings are at 25 Charlotte Square, Edinburgh, 7.30 p.m., and all local amateurs are cordially invited, as well as any other interested visitors.

Wirral have a flourishing new Morse class which

meets each week. On February 20 G3LUG will demonstrate his new transmitter, and on March 6 G3LCI will talk on the Eddystone S.750. The annual dinner is fixed for April 10 at the Coach and Horses, Moreton, Wirral. All enquiries to the hon. sec.

FIVE-YEAR PLAN FOR RESEARCH

Expenditure on research by the Department of Scientific and Industrial Research will be nearly doubled in the next five years. Under its second five-year plan, for the period 1959-64, approximately £61 million will be made available to the Department, compared with £36 million for the first quinquennium which ends on March 31, 1959.

The largest expansion is to take place in the field of scientific grants to the Universities. Post-graduate awards to students will, it is hoped, be increased by about 10 per cent. each year until in 1963-64 some 3,800 students will be receiving D.S.I.R. grants for research training. In the same year it is expected that D.S.I.R. support for special investigation in the research departments of universities will be operating on a scale of about £1½ million per annum.

In support of additional research carried out in the Department's own laboratories, expansion of staff at the rate of about 6 per cent. per annum—or approximately 30 per cent. over the five years—is included in the plan. It has also been decided to devote much more attention and more money to ensure that the *results* of scientific research are known and applied.

NATIONAL LENDING LIBRARY FOR SCIENCE AND TECHNOLOGY

The Department of Scientific and Industrial Research will take over part of the former Royal Ordnance Factory at Thorp Arch, near Boston Spa, Yorks, for the use of the new National Lending Library for Science and Technology. Present proposals indicate that the library will begin to function at Thorp Arch in 1961 and become fully operational during the following year. Existing large single-storey buildings will be converted into offices and book-stores, and the site provides adequate room for expansion in the future. The new library—the nucleus of which already exists in the D.S.I.R. Lending Library Unit now at Chester Terrace, Regents Park, London—will cover all subjects in science and technology, except for some fields of medicine. It will take over the responsibility for the lending service now provided by the Science Museum Library, which in future will concentrate on serving the needs of the enlarged Imperial College of Science and Technology. It is also taking over some of the literature now held by the Science Museum Library.

The present Lending Library Unit has been collecting literature for the National Library since 1957. It already operates a loan service for Russian literature which is being progressively extended to cover publications from other countries. Eventually, much of the scientific and technological literature in the world will be included in this collection, to make it the most comprehensive of its kind in the U.K.

RESULTS OF A HYDROGEN EXPLOSION

It was reported (by a speaker in the BBC's "Science Review" on January 7) that the American hydrogen bomb explosion on Johnson Is. on August 1st, 1958 had far-reaching effects on radio communication in the Pacific area. Contact was lost over long-distance links, and an aurora appearance was noticed over Samoa, some 2,000 miles from Johnson Island. It is surmised that the disturbance may have affected the Van Allen Belt, the "new" layer of powerful radiation discovered far outside the known layers, and thought to be trapped by the earth's magnetic field. The existence of the Van Allen Belt was confirmed, and its thickness measured, by the abortive American "Pioneer III" moon probe fired on December 6 last. Though "Pioneer III" failed to escape, its radio equipment worked perfectly throughout the flight, and it passed through the Van Allen Belt in both directions.

AMATEUR LICENCE TOTALS

As at December 31, 1958, the total number of U.K. amateur licences in issue was 8,409. This represents a nett increase of 118 new operators licensed in the four months since August 31 last. The mobile licences total 637 (increase of 29) and the amateur TV transmitting licences 73 (as before). These are official figures, issued by the Post Office.

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CHOKES, 10H, 50 mA, 340 ohm, 7/-; 8H, 250 mA, 90 ohm, potted, 14/-; 7H., 100 mA, 400 ohm, 8/-; 1.7H, 200 mA, 10 ohm, 11/6; 10v. 7A, Ph.1, 50c., 7/9. W7282 weatherproof junction box, 6/6. Also items advertised last month; all items new and carriage paid.—J. Ayres, 151 Brighton Road, Surbiton, Surrey. (ELM. 5660.)

BRAND-NEW RF Units: RF27 or RF26, 19/6; RF24, 16/6; RF25, 11/6; postage 3/6. Bendix Receivers RA-10, four-band superhet, 150 kc-10 mc, complete with valves, second-hand, but in good general condition, £4 5s. 0d., carriage 10/-.—R. Jay, 69 Church Road, Moseley, Birmingham, 13.

TRANSMITTERS T1131, £7; Marconi AD67B, 270 kc-550 kc, and 1500 kc-3600 kc, £9 10s. 0d. Walkie-Talkie WS58, £10. SCR-828, 27 mc-38.9 mc, £24. Power Units RA-62, £9 10s. 0d. Midlands.—Box No. 2078, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

DISC RECORDER, H.M.V. portable model 2300-H, complete mic./P.A. Playback. Marconi "Sea Mew" Marine radio telephone trans/receiver. Marconi "Lodestone" radio direction finder. Marconi "Salvita" portable lifeboat transmitter. RCA ET4336H Transmitter. General Electric BC375E TU10B transmitter.—Best offer: Rees, 82 Western Street, Swansea (Tel. 50280), S. Wales.

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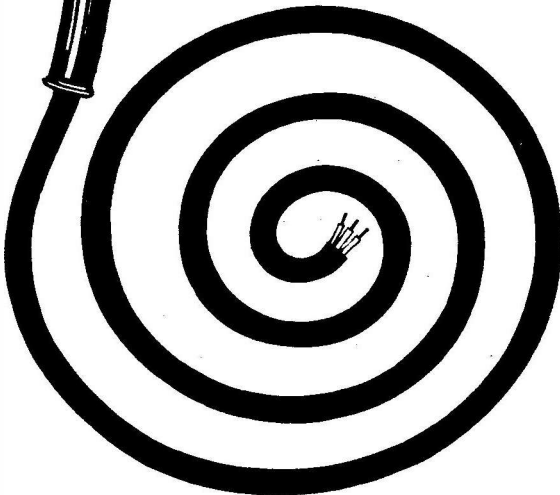
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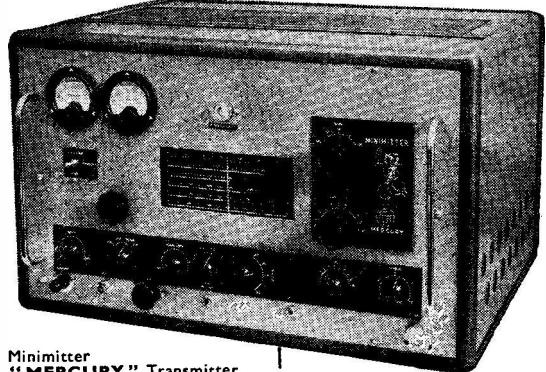
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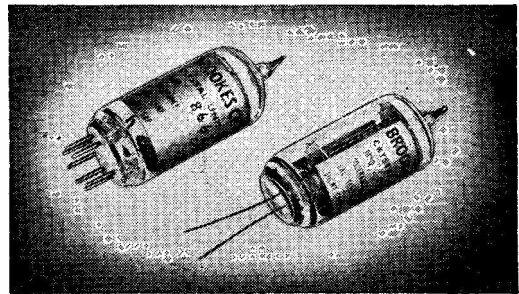
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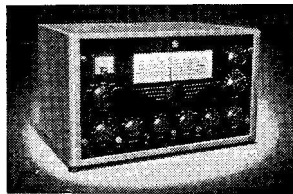
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FOR SALE: Radio and T.V. News for 1958, excellent, £1. **QST** for 1957 and 1958, all very good condition, £1 per year. **Short Wave Magazine**, 1958, excellent, 15/-. **R1132** and power unit, very good condition, £5 10s. 0d. **RF27**, unmodified, 10/-. **RF26**, 40-55 mc, 10/-. New **RF unit**, 20-35 mc, motor tuned, £1. Post and carriage extra. — M. Button, 7 Upper Flowerfield, Nunney, Frome, Somerset.

FOR SALE: AVO Valve Charac. Tester; 3½ in. 'scope, factory-built; sig. gen, 70 kc-70 mc; output meter; Wearite tape deck and amplifier; 200 valves, meters and components; best offers (owner going U.K.).—Box No. 2085, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

HALLICRAFTERS S20R, 550 kc-32 mc, good condition, £10 (carriage paid).—Box No. 2086, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

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WANTED: Circuit and full instructions for U.S. Signals Corps communication receiver, Type BC-1147A. — Lumsden, 33 Hillview Drive, Edinburgh. 12.

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SALE: B2, as issued, unused, complete Tx/Rx, S/P/P, key, phones, spares, box coils, aerial and earth wire, mains and battery leads, mains plug, fuses. Offers, plus carriage.—Box No. 2088, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

750, £55 carriage paid. Twelve clean U.S.A. valve publications, 55/-, post paid.—Box No. 2089, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

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PANDA ATU, as new, £10 10s.; Variac, £5.—Howard, 92 Arlington Road, Southgate, London, N.14. (Tel.: ENT. 3219.)

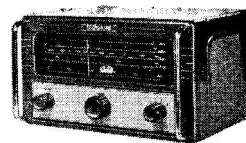
CR/100/8, S-meter, noise limiter, manual, complete spares kit, Eddystone 688 speaker, Browns F Phones, £20. R.M.E. DB/70 Presselector, £8. QST, Apr.-Nov. 1958, 15/-. 112 Short Wave Magazine, 1947-58; 45 Short Wave Listener, 1948-53; 50 Short Wave News, 1949-53. Offers? 1953 Call Book, 10/-.—Swallow, 74 St. Augustine Road, Southsea, Hants.

EDDYSTONE 680X, as new, only used 4 weeks, guaranteed, £85. Buyer collects.—Moor, Westray, De Maulleg Road, Canford Cliffs, Bournemouth, Hants.

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RECEIVERS, CR100, £11; 1155 £2; Pye Television, 12-inch, good tube, £5. — Buckley, 6 Keats Way, Croydon, Surrey.

AR 88LF, £45 (o.n.o.). SSB filters, 3x, full lattice, 100 kc, unwanted sideband over 70 dB down, USB or LSB, £5 each. R1475, 2-20 mc, as new, £15. —A. R. Williams, 24 Marlborough Road, Ipswich, Suffolk.

R. 107 with manual, £8; would deliver 20 miles. Transformer, 1450-0-1450v. 450 mA, 4v. 0-5A, 30/-. WANTED: Cables for Collins TCS Tx and Rx.—Thom, 12 Willow Road, Redhill, Surrey. (Tel.: Reigate 5033.)

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R. 107, perfect condition, output modified two watts, £10, plus carriage. — G3JLF, Howard Private Hotel, 292 North Promenade, Blackpool, Lancs. (Tel.: 25467.)

FOR SALE: CR100, S-meter, black crackle, good condition, works well, £21. Also general purpose oscilloscope, mains, very well made, cheap at £12.—Write: Passer, 111 Hodford Road, London, N.W.11.

ZC1 Mk. II, 10w. Tx/Rx, 1.8 to 8 mc, modified for mobile, £6 10s. Od. Hallicrafters S39 portable communications receiver, 540 kc to 30.5 mc, 110-240 AC/DC or own batteries, good condition, £17 10s. Enclosed rack, wire-mesh sides, 5ft. 6ins. x 12ins. x 22ins., "rusty," 30/-. Purchaser collects.—G3KLM, Laburnums, Chertsey Road, Chobham, Woking, Surrey.

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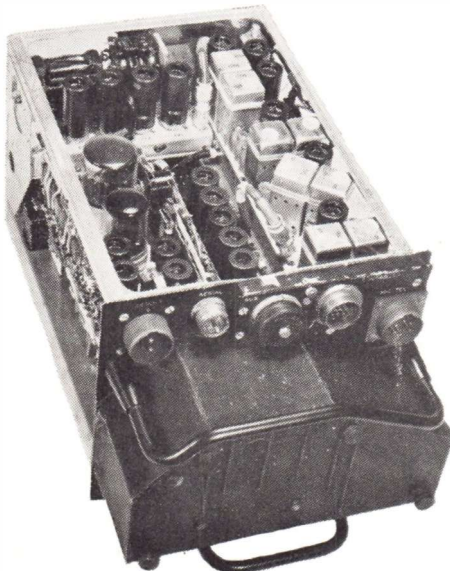
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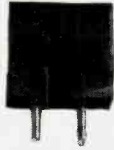
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Complete with the following valves: 2-6C4; 832A; 829B; 2-5R4G; 3-6AC7; 6V6GT; 931A photo multiplier with associated network. Also 2-blower motors. Input 30-115 volt 400 to 2,600 c/s. cd 26v. d.c. BRAND NEW and boxed. **£6/10/-** Post free.

CRYSTAL CALIBRATOR For No. 19 Set

10 Kc/s.; 100 Kc/s.; 1 Mc/s.; spot frequencies; Crystal controlled oscillators; includes 5-12SC7 valves, neon modulator handbook, etc. BRAND NEW **£4/19/6** Post free.

MIXER UNIT TYPE 79

Frequency range 172 to 190 Mc/s. Comprising: VCR139A Cath. ray tube; 7-EF50; EF55; 4-EA50; 2-EB91; 5U4; VUJ20 and EC52. Standard mains input 200-250 volts 50 c/s. Ideal Scope Basis. Carriage **£5/10/-** 5/-.

WALKIE/TALKIE TYPE 38 TRANSMITTER/RECEIVER

Complete with 5 valves. In new condition. These Sets are sold without Guarantee, but are serviceable. **22/6** P.P. 2/6. Headphones 7/6 pair, Junction Box, 2/6. Throat Mike, 4/6. Canvas Bag, 4/-, Aerial Rod, 2/6.

TRANSMITTER/RECEIVER, Army Type 17 Mk. II

Complete with Valves, High Resistance Headphones, Handmike and Instruction Book and circuit. Frequency Range 44.0 to 61 Mc/s. Range approximately 3 to 8 miles. Power requirements: Standard 120 v. H.T. and 2v. LT. Ideal for Civil Defence and communications. BRAND NEW **45/-** 44-61 Mc/s. Calibrated Wavemeter for same, 10/- extra.

STROBE UNIT

Complete with: 6-EF50 5-EA50; SP61. Relays etc. **35/-** P.P. 2/6.

APQ9 HF UNIT

Includes 931A photo-multiplier, 2-807, 3-6AC7, 2-8012 HF. Gear drives. Blower motor. Mains transformer, etc. **£7/10/-** P.P. 7/6.

VHF TRANS./REC. TYPE 1986

FREQ. RANGE 124.5/156 MC/S. I.F. 9.72 B/BWIDTH 23 KC/S.

Sub-Units	Type 81	With Valves	Less Valves	Post/Packing
TRANSMITTER	...	75/-	25/-	2/6
RECEIVER	.. 114	27/6	7/6	2/6
I.F. AMPLIFIER	.. 476	37/6	12/6	2/6
MODULATOR	.. 105	20/-	7/6	2/6
24v. ROTARY	.. 3	15/-		2/6
CONTROL UNIT, 10-way	.. 382	6/-		9d.

ALL IN ABSOLUTE NEW CONDITION
Full Circuits 1/9 post paid.

VHF TRANS./REC. TYPE 1920

FREQ. RANGE 100/120 MC/S.

Four-channel V.H.F. crystal controlled trans./rec. I.F. 9.72 mc/s. bandwidth 40 kc/s. Complete with 21-valves and Tx crystal and 24v. rotary power unit in metal case. Ex-Air Ministry, first-class condition with full circuit.

£8/19/6 carr. 10/6. Circuits sold separately 1/9.

RF WATTMETER TS/87/AP

Three switched positions 0/10/15/30 watts. Complete with photo-cell spare lamps; calibration charts; leads and transit case. BRAND NEW **£8/19/6** P.P. 7/6.

SYNCHRONIZER UNIT

Includes: 3-6L6M; 12-6AC7; 6SQ7; 5-717A; 6-6SN7GT; 6H6; slow motion drive, blower motor, transformers **£4/19/6** P.P. 5/-.

INDICATOR UNIT TYPE 247

R.F. Power Wattmeter. Complete with 4 1/2 in. 1 mA. Meter, Magic Eye indicator; 2 EF50 diodes and rectifiers. Inputs -12v.; 80v. D.C. or 100/240v A.C., 50 c/s. **£3/19/6** NOW ONLY

ROTARY CONVERTER

24v. D.C. to 230v. A.C. 50 cycles. 100 watts. Brand new and unused. **£5.10.0** Carr. 7/6.

PYE 45 Mc/s. STRIP TYPE 3583

Complete with 12 valves. 10-EF50; EB34; EA50, with modification data. ABSOLUTE **39/6** Carriage BARGAIN 5/6.

"373" MINIATURE IF STRIP 9.72 Mc/s

The ideal F.M. conversion unit as described in "P.W." April/May, 1957. Complete with 6 valves, three EF91's, two EF92's and one EB91. I.F.T.'s, etc., in absolutely new condition. With circuit and conversion data. **12/6** NOW **37/6** (with (less valves) valves) Postage and packing 2/6 (either type)

RF UNITS TYPE 25

Switched Tuning 30 to 40 Mc/s. Includes 3 SP61's. Carriage **10/-** 2/6.

TYPE 26; Variable tuning, 50 to 65 Mc/s. Including 2 EF54's and 1 EC52. Carriage **25/-** 2/6.

(Circuits in stock for both types 9d.)

SCR522 TRANSMITTER RECEIVER

All complete in new condition less valves. **35/-** P.P. 5/-.

TRANSISTORS (Junction Type PNP)

EDISWAN
XA104 6 Mc/s. osc./mixer; R.F. amplifier **18/-**
XA103 4 Mc/s. I.F. and R.F. amplifier **15/-**
XB104 1 Mc/s. Audio output and driver **10/-**
(A pair in push-pull will give up to 250 mW. audio output.)
Continental:
OC44 12 Mc/s. osc./mixer; R.F. amp. **30/-**
OC45 6 Mc/s. I.F. and R.F. amp. **25/-**
OC72 325 mW in push-pull Red Spot 800 Kc/s. Audio Amplifier **7/6**
White Spot 2 to 5 Mc/s R.F. and I.F. amp. **12/6**
Green/Yellow 600 Kc/s. Audio Amplifier **7/6**
Red/Yellow 1.5 to 8 Mc/s. R.F. and I.F. amp. **15/-**
NEWMARKET POWER TRANSISTORS IN STOCK. Send for Complete Free List of Transistors, Data and Circuits.

PACKARD BELL PRE-AMP

Complete with screened case with 6SL7 GT; 28D7; leads, jack plugs, relay, handbook, etc. Sealed in carton. Only **12/6** P. & P. 2/-.

RCA 6 1/2-inch P.M. SPEAKER in Cabinet

With vol. control and 600 ohm Line Trans. **27/6** P.P. 2/6.

WAVE-GUIDE WATTMETER

Type WB921 10 cm. Complete in transit case. BRAND NEW.

£5/10/- P.P. 7/6.

426 CONTROL UNIT

Includes: 4-EF50; 2-SP61; EB34; multi-bank switches; pots; transformers, etc.

ONLY **30/-** P.P. 5/-

LARGE RANGE OF TRANSISTOR COMPONENTS; QUARTZ CRYSTALS AND VALVES. SEND FOR THE NEW FREE LISTS

Printed by The Courier Printing Co. Ltd., Tunbridge Wells, for the Proprietors and Publishers, The Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1. The Short Wave Magazine is obtainable abroad through the following: Continental Publishers & Distributors, Ltd., William Dawson & Son, Ltd.; AUSTRALIA AND NEW ZEALAND—Gordon & Gotch, Ltd.; AMERICA—International News Company, 131 Varick Street, NEW YORK. Registered for transmission to Canada by Magazine Post. February 1959.