

The SHORT WAVE Magazine

VOL. XXII

OCTOBER 1964

NUMBER 8

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Radio Communications Exhibition, London, 28th—31st October, 1964

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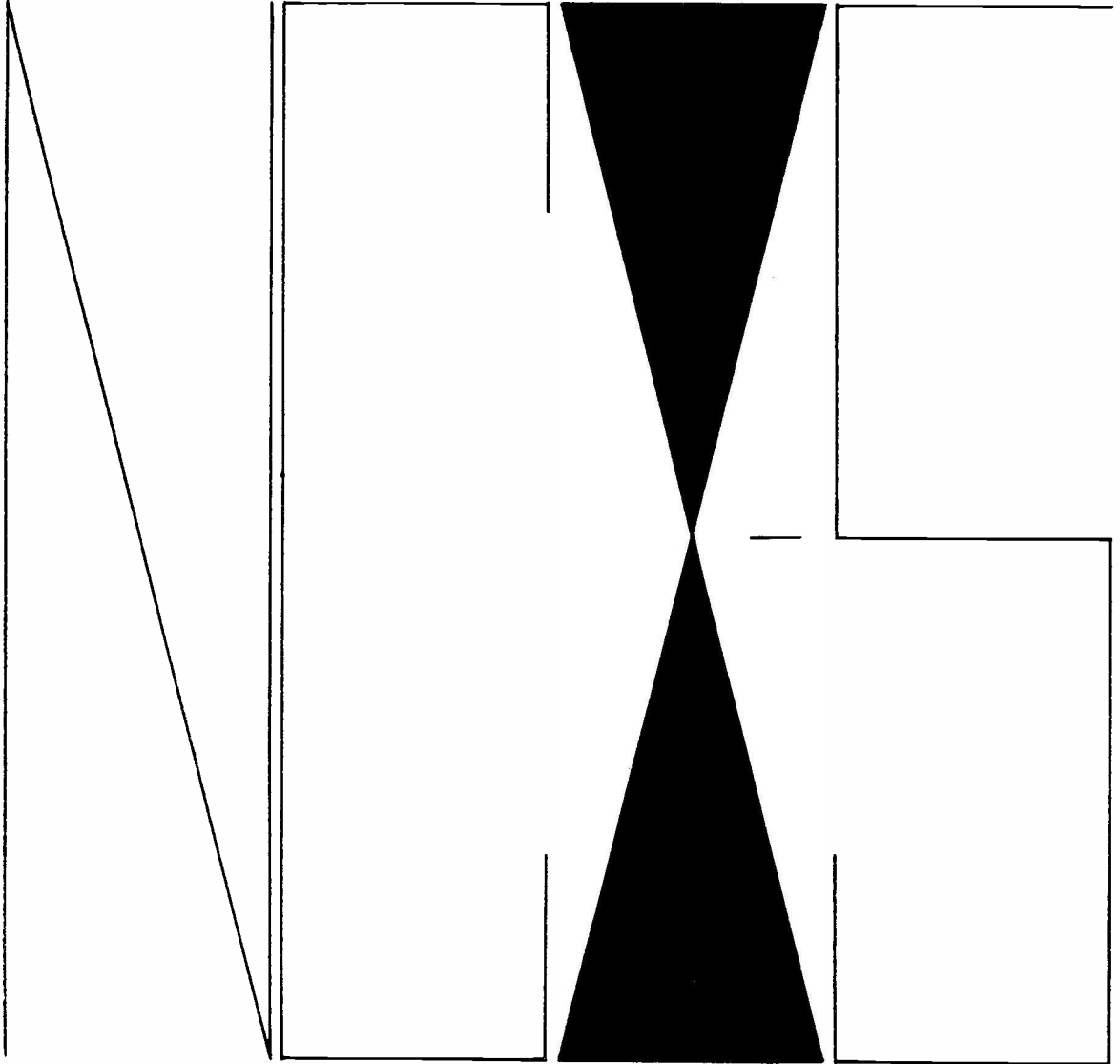
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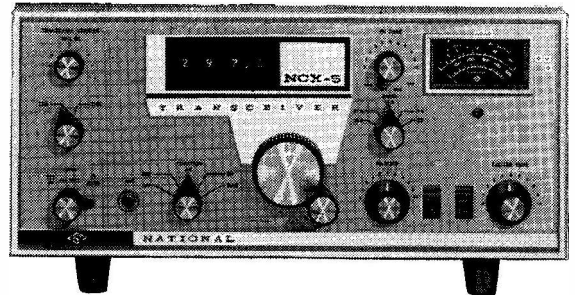


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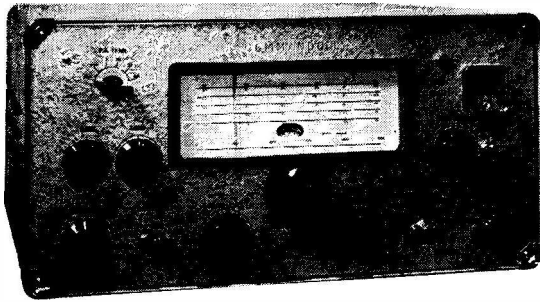
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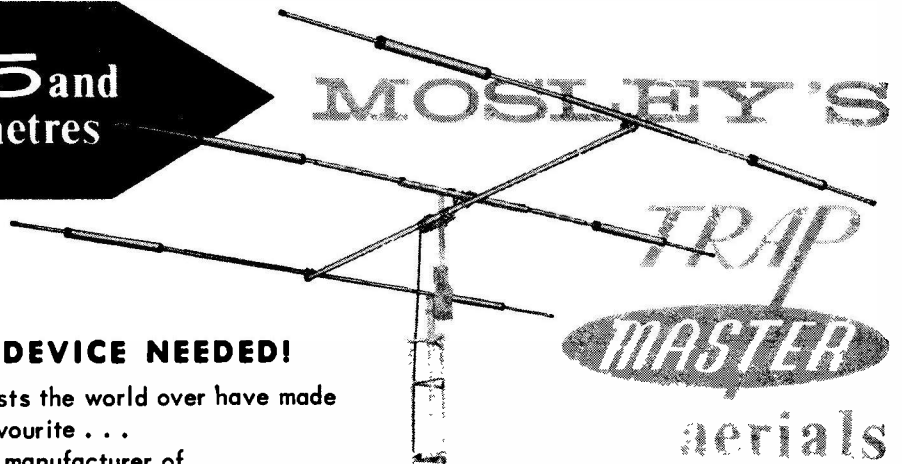
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		WORLD RADIO HANDBOOK 1964 (library edition)	34s. 0d.

All publications marked* were reviewed on pp.502-504 November 1963 Short Wave Magazine

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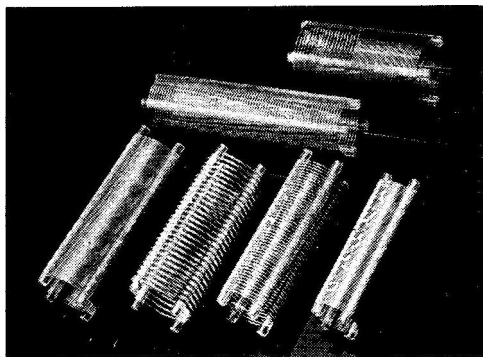
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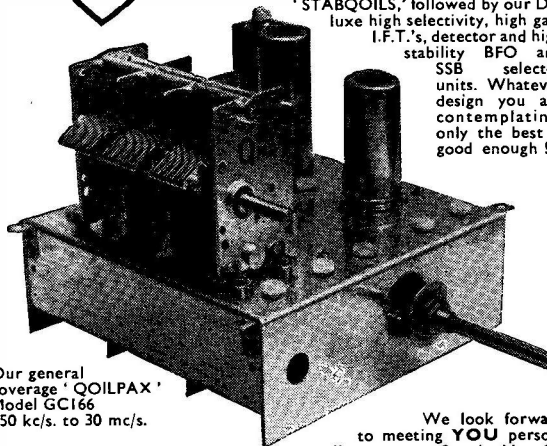


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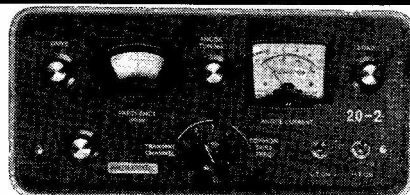
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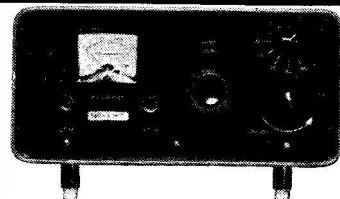
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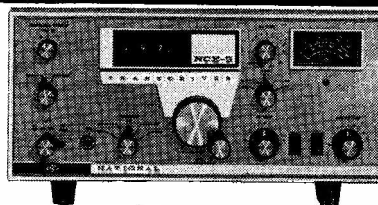
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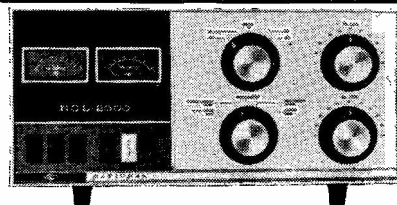
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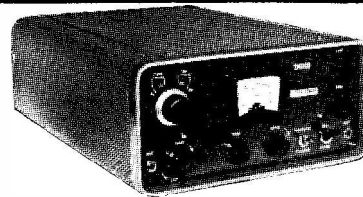
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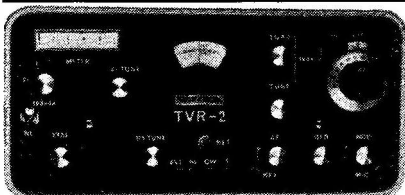
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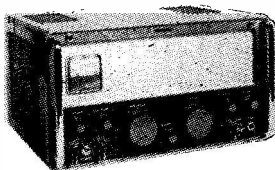
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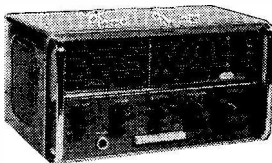
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SHORT WAVE MAGAZINE

(GB3SWM)

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OCTOBER, 1964

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FOR THE RADIO AMATEUR AND AMATEUR RADIO

The SHORT-WAVE Magazine

E D I T O R I A L

Showtime *We write to draw your attention to the fact that the International Radio Communications Exhibition (or Amateur Radio show) takes place at the end of this month, October 28-31, again at the Seymour Hall, Seymour Place, London, W.1 — which is in the neighbourhood of Marble Arch. The charge for admission is 3s. and once again a most interesting exhibition is assured, with something for everybody of the world of Amateur Radio to see, buy or discuss.*

After all these years, it hardly needs saying again that this is one of the most important events in the Amateur Radio calendar. It is not only an exhibition but also a convention, where people can meet, see and be seen. Several club groups and organisations within the orbit of Amateur Radio take the opportunity to hold their own annual meetings during the period of the Show, which attracts a large attendance from all over the U.K., with not a few visitors from overseas.

You cannot really afford to miss the Amateur Radio exhibition, and for those who prefer to avoid the crowds, the quietest times are usually Thursday and Friday mornings. As in previous years, you will find in your copy of this issue a ballot card that could win you a valuable prize, presented by the organiser — but please note that it is only valid if put into the box after you have paid your way through the door! We cannot act as agents for those who, unfortunately unable to attend in person, would like us to drop the card in for them!

As usual, we have a large stand, which will be fully manned by staff members throughout the period of the Exhibition. We look forward to meeting many new readers and old friends.

*Austin Foster,
G6FO.*

WORLD-WIDE COMMUNICATION

WIDE RANGE GRID DIP OSCILLATOR

WITH PLUG-IN COILS, AND
SELF-POWERED

J. M. COX

THE grid dip oscillator is probably the most described and constructed piece of test equipment to be found in the amateur context—and next to the soldering iron and test meter, it might also be said to be the most useful.

Most constructors have their own ideas about how a GDO should look, and operate—some say that the power unit should be separate, or otherwise; others that they prefer their GDO to have direct calibration, or separate calibration charts. On one occasion the writer heard someone remark that a GDO should have a rough note so that it could be recognised in our crowded HF bands.

Over the years, the writer has constructed a number of these versatile instruments, one of which, for the sake of miniaturisation, was built in a discarded IF can. About a year ago it was decided that a new GDO should be constructed and the following broad specification was put down: (1) Wide range, at least 2-200 mc; (2) Good bandspread, but not too many coils to get lost; (3) As stable as possible; (4) Compact, comprising only one unit; (5) Sensitive when used as a wavemeter; and (6) Sufficient power output for SWR measurements.

At first it was thought that a transistored circuit would fill the bill but on investigation it was found that a transistor that would oscillate reliably and give the required output at 200 mc was expensive.

After due deliberation the circuit shown in Fig. 1 on p.461 was decided upon.

Circuit

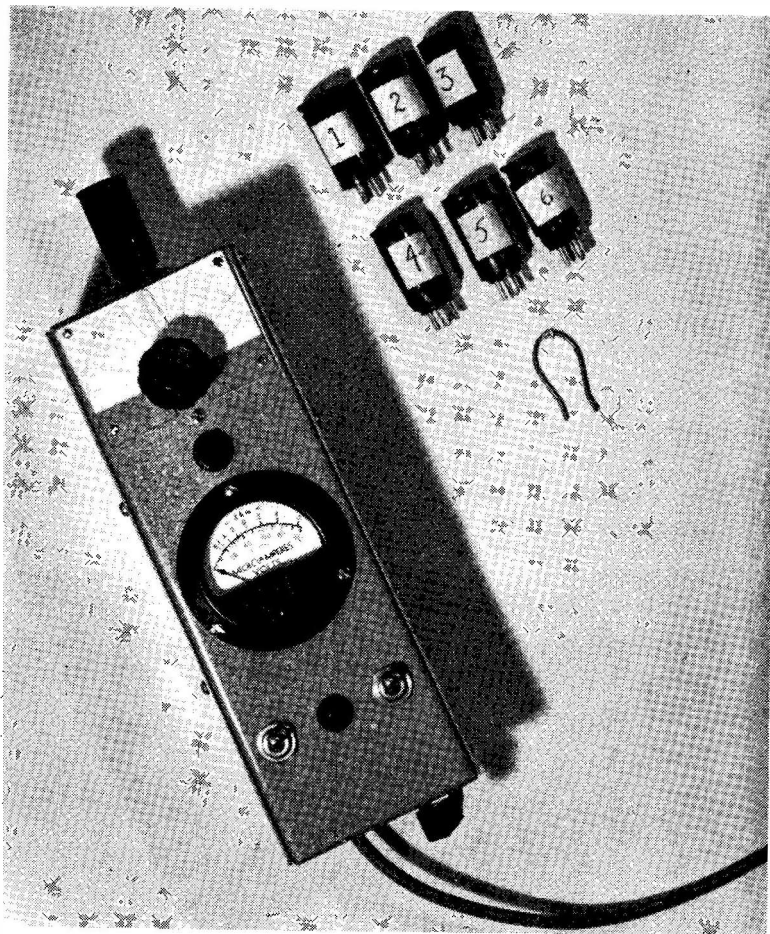
This consists of a Colpitts oscillator using a split-stator condenser to achieve the necessary feedback. An important advantage with this circuit is that two-terminal coils can be used. The HT

rail is stabilised, which precludes the use of the conventional variable resistor to vary the HT on the oscillator in order to keep grid current constant over the operating range—so the method shown was resorted to using R6. The shunted 0-100 μ A meter also means, of course, that the instrument has good sensitivity when used simply as an absorption wavemeter. The 75 μ F dual capacitor C6, C7 was chosen to effect a compromise between bandspread and the number of coils required; in fact the range 2-200 mc is covered with eight coil units.

Coil-Units

The coils, with the exception of Band 7, are wound on miniature Eddystone 763/765 formers. These are very suitable and have stood up to considerable wear-and-tear since the instrument was constructed.

Initially, a former was wound full of 36g.



General appearance of the GDO as built by the author, into a home-made mild steel cabinet. With the coils shown—wound on Eddystone miniature formers, except the U-shaped coil for VHF—the frequency coverage is 1.0 to 200 mc, making this GDO an extremely useful instrument for general bench work, as all amateur bands are covered up to two metres. The sensitivity is good and, with the RF-probe type pick-up suggested, calibration is adequate within reasonable limits.

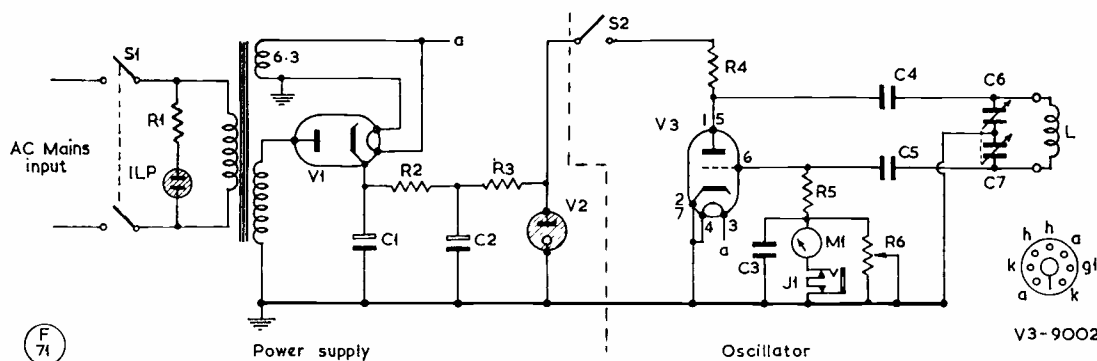


Fig. 1. Showing the circuit of the GDO with its power supply, which could be a separate unit (as shown dotted) and coupled by a long flexible lead. In the model as built by the author and shown in the photographs, the PSU is included with the GDO. The 9002 is a very ready oscillator at VHF and, though it has no direct equivalent, is a commonly-available surplus type. An additional refinement is to have a small link winding on each of the main coils L, terminated on the coil base, and taken out to a two-turn winding as an RF probe. The coils are wound on standard Eddystone miniature formers.

enamelled wire and checked against a signal generator. The technique adopted to calibrate the coils was to couple the signal generator to the coil via a two-turn link, monitoring the resultant beat note with a pair of phones in the jack socket. A receiver would have served equally well for the lower-frequency ranges but unfortunately one was not available for the VHF bands.

The first former wound full produced a frequency range of 2.05-3.95 mc. This was considered a good starting point so coil Nr.2 was wound, full of 30g. enamelled wire and with the appropriate adjustment covered the range 3.9-7.8 mcs.

This elementary approach was used for all coils for Ranges 1-5. The table shows winding details for all seven ranges. The coil for Range 6 was constructed by winding six turns of 18g. tinned copper wire on a 3/8-inch drill, spaced one wire diameter and inserted inside the coil former. Range 7 coil consists of a loop of 14g. wire (see photograph) measuring 1 1/4 x 7/8 ins.—this covers the range 97.5 to 200 mc.

Since first constructing the instrument a further range has been added to take in Top Band, 1-2 mc. This coil consists of a former wound as for Range 1, i.e. wound full of 36g. enamelled wire, but this time a piece of 1/2-inch diameter ferrite rod 1 inch long was inserted in the coil.

The scaling of the instrument presented something of a problem. At first an attempt was made to calibrate the scale directly, but due to the wide frequency range covered this resulted in an almost unreadable dial. The scale was finally divided into 15-degree divisions and calibration charts produced. Subsequently, a machine-engraved scale has been fitted measuring 2 1/4 inches in diameter and scaled with 100 divisions over 180 degrees, this being the *Bulgin* type K 412 scale.

Construction

The photographs show clearly the method of construction used for the case and Fig 2 is a detail

Table of Values

Circuit of Wide-Range Grid Dip Oscillator

C1, C2 = 16 μF, 350v. elect.	S1 = DPST, toggle
C3 = .001 μF, cer.	S2 = SPST, toggle
C4, C5 = 100 μμF, s/m	M = 0-100 μA, m/c
C6, C7 = 75 μμF twin (ex-RF27, etc.)	L = See Coil Table
R1 = 680,000 ohms, 1/2-w.	T1 = 230v. 20 mA, 6.3v. 1 amp.
R2, R3 = 15,000 ohms, 2w.	V1 = Rect., EY91 or similar
R4 = 22,000 ohms, 1/2-w.	V2 = Neon stabiliser
R5 = 47,000 ohms, 1/2-w.	V3 = 9002 (CV-664)
R6 = 1,000-ohm, var.	

TABLE OF COIL DATA

1-2 mc, 1A:	Wound full of 36g. enam., with 1-in. x 1/2-in. ferrite slug.
2-4 mc, 1:	Wound full of 36g. enamelled wire.
4-7.8 mc, 2:	Wound full of 30g. enamelled wire.
7.8-15 mc, 3:	Wound approx. half-full of 30g. enam.
14.9-29 mc, 4:	Wound full of 20 g. enamelled wire*.
29-51 mc, 5:	Wound half-full of 20g. enamelled.
50.5-100 mc, 6:	Six turns 18g. tinned, spaced one wire diameter.
97.5-200 mc, 7:	Loop of 14g., 1 1/4-in. x 7/8-in. (see photograph)

NOTE: * On Eddystone type 765 threaded former, grooved 21 t.p.i., 3/4-in. diameter. All other formers Eddystone type 763 plain, 3/4-in. diameter. Range 7 air supported.

drawing for those wishing to duplicate such a case. It measures 9in. x 3in. x 3in. and is formed from 18g. steel sheet, which is easy to work and gives strength although it adds considerably to the weight of the instrument. The twin tuning condenser C6, C7 and the 9002 oscillator valve are mounted on small aluminium brackets and the capacitor is coupled via a 10:1 slow-motion drive. The use of slow-motion drive greatly improves the apparent bandwidth. The HT rectifier, stabiliser and associated resistors and smoothing condensers are fitted on a paxolin panel, this whole sub-assembly being mounted on

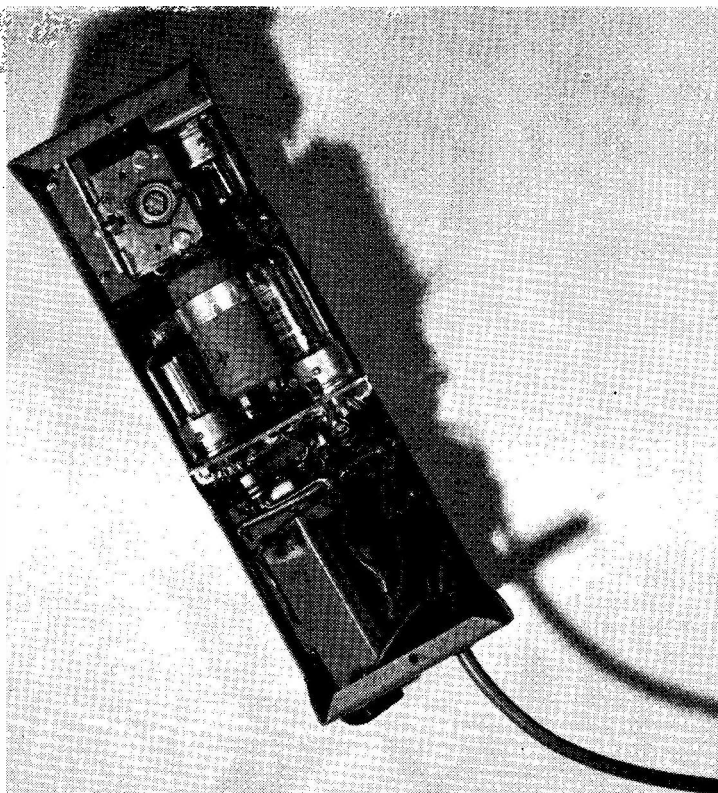
the meter terminals. The small neon indicator on the front panel is pushed through a rubber grommet of appropriate diameter and secured in position with a very sparing application of contact adhesive. The dial and pointer (in the prototype) were made from perspex, the pointer being fixed to the back of the tuning knob with 8 BA screws.

Modification

In addition to fitting the improved dial two further modifications have been carried out since the instrument was first constructed.

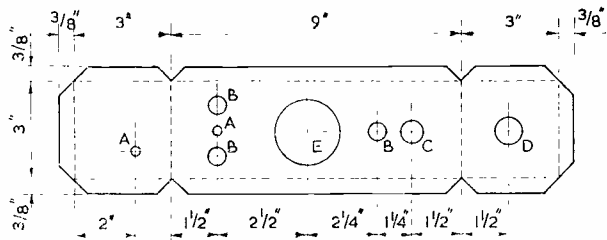
The first consisted of fitting a crystal socket in parallel with the main coil connections; in this way, with any coil removed and the C6, C7 capacitor set to minimum, the instrument can be used as a crystal marker.

The second modification was to put a link winding on the coils, connected across the spare pins on the Eddystone coil base. The two corresponding pins on the base are wired to a coax socket on the body of the instrument. These link windings enable the grid dip oscillator to be connected to any coax-fed aerial, via coaxial cable, for checking its resonant frequency—and, of course, for operating an SWR bridge. The link windings are, in each case, about 5 per cent of the main winding and of the same gauge of wire. The link for Range 6



Construction of the grid dip oscillator behind the panel, showing layout of the main components. Since a small power transformer is required, and the case is of mild steel, it is comparatively heavy, but the shape makes it very convenient to handle.

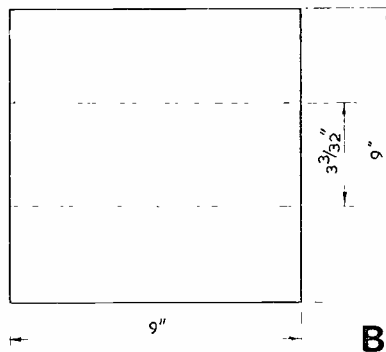
consists of one turn of 20g. p.v.c. covered wire. No link has been made for the Range 7 coil, though a small solid turn within the single loop would be worth trying.



----- indicates bend line

F
72

A



B

Fig. 2. Detail of the case for the GDO, made by bending up 18g. mild steel to the dimensions given. (A) is the top-and-ends of the case, the holing being: A, 3/8-in. diameter; B, 1/2-in.; C, 3/8-in., or to clear slow-motion drive; D, 3/8-in., and E, to suit meter. Sketch B) shows the cabinet bottom and sides.

CASCADE FRONT-END MODIFICATION

TO IMPROVE ALMOST ANY
HF-BAND RECEIVER

J. N. WALKER (G5JU)

MANY readers may not realise what a relatively simple matter it is to obtain an immediate improvement in the performance of an HF-band communications receiver which uses one of the older types of valve—for example, a 6BA6—in its RF amplifying stage. The modification—if that is the right word—is to change over to a cascode type of circuit in the RF stage, and this in a way which involves no alteration of any kind to the existing receiver wiring.

The necessary parts are few in number and the drawings give details. Two essential items are a B9A valve base and a B7G plug (assuming the existing valve has a B7G base). Wiring between one and the other is carried but as shown, using the smallest components available and keeping the leads to the minimum length. The unit is intended for receivers having a maximum frequency limit of 30 mc and, since the cascode circuit is inherently stable, there is little likelihood of instability arising. In the writer's experience, there has been no sign of it.

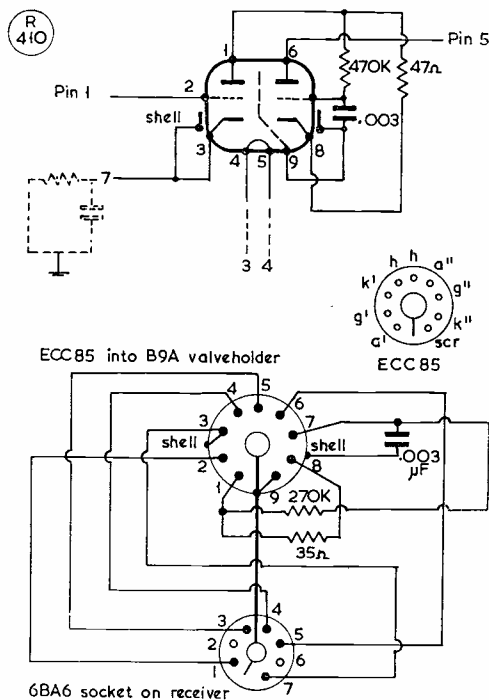
The modification will probably lead to a slight increase in gain and the noise factor will be improved, although this is of material benefit only on the highest frequency ranges. The main advantage is a lessening of cross-modulation and similar effects. Often strong signals, sometimes from a nearby transmitter but under some conditions from a distant one, affect reception of a weak wanted signal on a frequency not far removed. This is due to non-linearity in the amplification of the first valve and the cascode circuit shows a considerable improvement in this respect.

Using an ECC85

The circuit diagram and the drawing are based on the use of an ECC85 valve in place of a 6BA6 and changes in the wiring may be necessary if other types of valve are involved. (The best valve for the job is really the ECC189, but this may not be easy to obtain.)

The resistors should be of the ¼-watt type and the .003 μF condenser a small disc ceramic. These few components are fitted close in to the valveholder and care must be taken to ensure that no short circuit can occur. Since usually the plug will have to fit into a screened type of valveholder, the components must be so placed that they do not foul the metal skirt.

The B9A valveholder taking the double triode valve should itself have a metal skirt and this is used as an earthing point. If the valveholder and the plug have central metal spigots, these should be connected together and to the skirt of the valveholder, as indicated in the drawing. No direct connection is



These sketches will explain the modification suggested by G5JU. The principle could be applied to almost any general-coverage short-wave receiver.

made (or needed) to the receiver chassis. Earthing as regards RF is through the cathode by-pass condenser associated with the original valve. Should there be any tendency towards instability, a second .003 μF disc ceramic condenser can be connected between the valveholder shell and pin 6 of the plug, so bringing into circuit the original G2 by-pass condenser as an additional RF path to the receiver chassis.

The suggested modification may well be tried with a receiver in which the first valve is of the octal-based type, with probably greater improvements than those found in the original case. The new valve will probably have a considerably higher mutual conductance than the older type of octal-based valve, and this might lead to instability which would call for the insertion of damping resistors.

TOP BAND CLUB CONTEST — "MCC"

Rules for the Nineteenth (how time flies!) Annual Club Contest on the 160-metre band, organised by SHORT WAVE MAGAZINE, appear on pp.498-499 of this issue. Non-Club stations, while being invited to participate, are specifically asked not to call "CQ MCC," as this is used by the Clubs to identify themselves for the 3-point contacts. As on previous occasions, we would be glad to have check logs from those who regularly monitor the Contest—and our own invigilators will be there to watch for any infringements!

THE HAMMARLUND HX-50

COMPACT SSB TRANSMITTER/EXCITER

TEST REPORT

THE Hammarlund HX-50 is a compact, self-contained SSB exciter unit also suitable for use as a low-powered transmitter. On CW and SSB it operates at an input of 90 watts to the final stage, and if AM operation is desired it will run in that mode with about half that input (without any adjustment other than moving the "Operation" switch to the AM position).

Well built, with high-quality components throughout, the HX-50 uses a crystal filter in the region of 3 mc with conventional circuitry, and covers all bands from 3.5 mc to 28 mc. A modification kit for 1.8 mc can also be obtained, but the transmitters are not normally supplied with this Top Band facility included. (The modification is straightforward but can hardly be described as "simple.")

Full and very effective Vox and Anti-Trip facilities are built in, an unusual feature being that when the transmitter is used for CW, the Vox relay may be brought into action, simply by setting a switch to "Vox," and full CW break-in is then available, using the internal aerial switching relay. No external modifications or additions are needed for this, other than the effective muting of the receiver, which has probably been looked after in any case.

On the front panel, to the left of the central Band Selector switch, are two more Yaxley switches labelled "Operation" and "Function." The first of these has five positions, marked Off, Standby, Mox, Calibrate and Vox. The "Function" switch, on the extreme left, has four positions marked USB, LSB, AM and CW. Thus the selection of the appropriate mode and the correct operating condition could hardly be simpler.

In the Standby position, power is applied, but the second mixer and driver stages are blocked off by bias; in the Mox position the whole transmitter is energised and ready for normal manual operation; in the Calibrate position the same conditions as "Standby" apply, but the bias is reduced, allowing a weakish signal to be monitored on the receiver, and the Vox relays are cut out. Finally, in the Vox position, the Vox

relays are energised by the audio, and, by reducing Vox sensitivity, a push-to-talk condition is provided.

The "Function" switch does everything for the operator, producing a carrier and *both* sidebands when switched to AM, and, of course, bringing the key-jack into circuit when switched to CW.

The only other main controls on the front panel are the normal PA tuning and loading, a single RF drive control, and three small knobs controlling audio level, meter sensitivity, and two positions for the meter itself—either reading PA cathode current, or RF output.

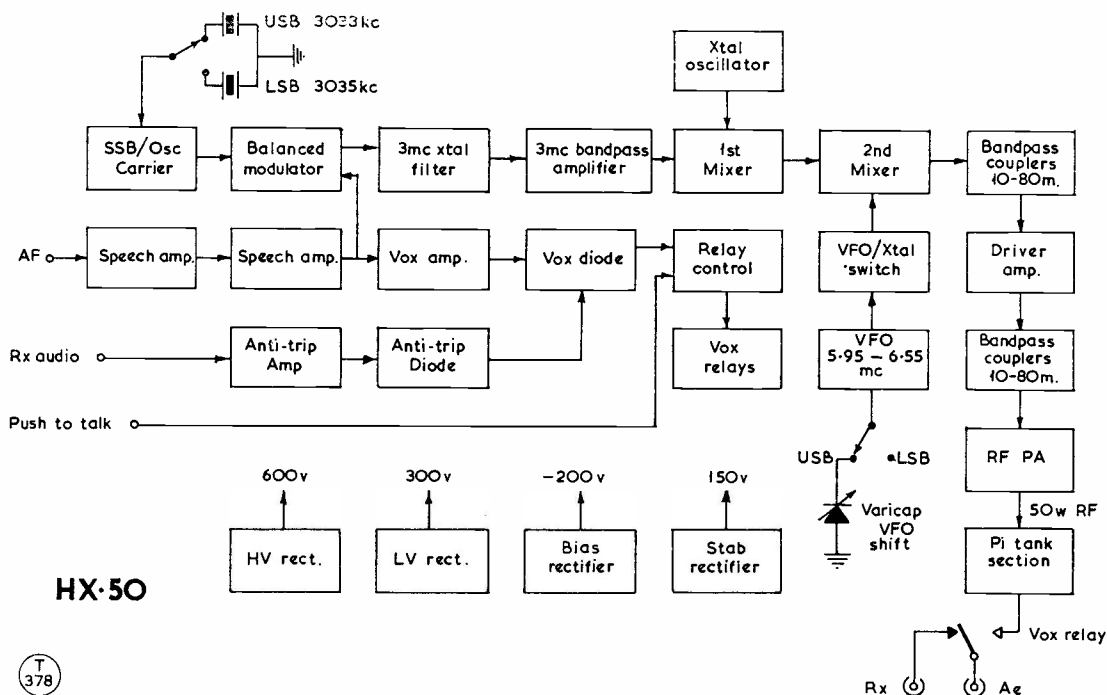
Setting-Up

The recommended method of setting-up is a little unusual, but is effective protection against overload through running off-resonance. The appropriate band having been selected, the RF drive is advanced until PA cathode current is 100 mA only; the meter is then switched to read *RF output*, and the PA tuning and loading controls set so that this gives a maximum reading. Having thus ensured a state of resonance, the meter is switched back to cathode current and the RF drive adjusted until this reads 180 mA—the safe limit for input. (The whole thing can be done with the meter in the cathode-current position, by tuning for a dip of the normal shape and size, but probably the makers' method is the better, especially for inexperienced operators.)

As the power supply gives 600v., the indicated input is now 108 watts, but this includes screen current; the power to the anode of the PA is about 90 watts.



General external appearance of the HX-50 Transmitter/Exciter, manufactured by Hammarlund and handled in this country by K.W. Electronics, Ltd. It gives CW/SSB output on all bands 10-80 metres, a modification kit being available for 160 metres, and is a very attractive piece of equipment, easy to handle and operate. It is reported on in detail in the article herewith.



Block diagram of the Hammarlund HX-50 Transmitter/Exciter, reviewed in the accompanying article. Though the circuitry is conventional Sideband practice, much care has gone into producing the overall effect of smooth operation under easy control. Points worth noting are the two crystals for instant sideband switching, and the varicap brought into the VFO circuit when the upper sideband is selected. The two units of the audio amplifier and the crystal-controlled carrier oscillator are three sections of a single 6C10 valve.

Circuitry

In view of the interest shown in modern commercial designs, the block diagram is reproduced, so that the broad outline of the design may readily be taken in. The first valve in the chain of operation is a triode-triode (6C10), one-third of which is the crystal oscillator, which operates on 3038 kc or 3035 kc according to the sideband selected. The other two-thirds of this same valve constitute the speech amplifier, the output from which, together with the output from the crystal oscillator, is fed into a balanced modulator using 1N634 diodes.

A 3 mc crystal filter and bandpass amplifier follow, feeding into the 1st mixer stage, which also takes the output from a second crystal oscillator, the crystal used being selected by the Band Selector switch. Thus to the 2nd mixer, into which the VFO feeds. This tunes from 5950 to 6550 kc, and a varicap produces the necessary shift when switching from LSB to USB. The 2nd mixer is followed by bandpass couplers into the driver stage; thence through further bandpass couplers into the PA with its normal *pi*-section output circuit. The driver is a 12BY7A, and the PA a 6DQ5.

The other "blocks" in the diagram are concerned with voice control and anti-trip circuitry, apart from the units of the power-pack, which supplies 600 volts for the PA, 300 and 150 volts for the earlier stages,

screens and so on, and 200 volts negative bias.

Fuller details can of course be investigated in the circuit diagram supplied with the rig, but there is a complete absence of unconventionalities, and the transmitter's success is due to the sound and practical use of good basic circuitry, well-known and well tested.

The manual provides a chart giving the voltages to be expected at each pin of each valve, and another showing the resistances to earth which should appear at each pin. These are invaluable for trouble-shooting, and worth a lot more than some of the unusually wordy instructions in print.

Incidentally, one unfortunate mistake has been made in the manual (as supplied to us, though it may have been corrected in later printings) by the interchange of two diagrams. Fig. 3, which purports to show the outside wiring necessary when using the *internal* aerial change-over relay, actually shows the arrangement for *external* change-over, and Fig. 4 is similarly reversed. When the internal relay is used, the receiver is fed directly from a socket at the rear of the transmitter, and not from the normal station switch.

Stability

The VFO uses an electron-coupled Colpitts circuit which gives excellent stability, both short- and

long-term. The slight drift on warming up lasts only for a few minutes, after which the frequency stays constant within a very few cycles over prolonged periods of operation. The anode and screen feeds to the oscillator (6AU6) are both stabilised; large swamping capacitors (500 $\mu\mu\text{F}$) are used; and the value of the grid-leak is only 10,000 ohms.

The end-product is an outstandingly stable VFO and a complete absence of invitations to "come on frequency—you're drifting." Which is, of course, no more than one has a right to expect from any well-designed SSB transmitter.

Station Control

There is a great deal of versatility about the methods of control which are feasible. On the back chassis drop there is an eight-terminal block which includes a pair for push-to-talk or foot switch; a pair connected to the receiver's audio output (for anti-trip purposes); a source of blocking bias (-100v .) and its associated earth connection; and a pair for controlling a linear amplifier, if one is used (again by block bias).

Also at the rear are coax sockets for aerial and microphone, normal type of socket for a key, socket for feeding the receiver through the internal change-over, socket for connecting an external VFO if required, and the bias-adjustment potentiometer.

The HX-50 is the sort of transmitter which can either be plugged straight into the mains, connected to the aerial, mike and key, and used straight away; or it can really be "built in" with all the possible connections for complete station control. Either way, it is equally efficient, of course, but it can be used, for example, for hurried /A or even /P operation without any wiring except to the three essentials mentioned (and perhaps only two, because either the mike or the key might well be omitted!).

Extra Refinements

Two small "trap-doors" on the front panel open to reveal, on the left, the Vox and Anti-Trip controls (including a separate adjustment for CW break-in), and on the right a five-position switch giving Internal VFO, External VFO, or choice of three crystals (not supplied) which plug in below the switch.

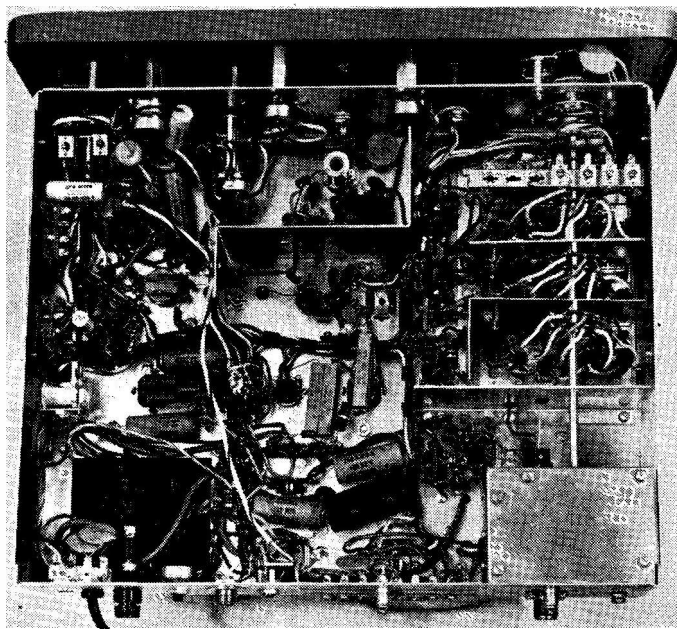
In short, nothing seems to be missing, and the average user should be more than satisfied with all the facilities provided. As a final provision, the deflection of the meter, when switched to RF Output, can be adjusted to give full-scale on carrier, and then the meter, reading backwards, is directly calibrated in dB, so that one can read off the degree of

carrier suppression. Full particulars of all these refinements are given in the manual, even if one has to wade through a great amount of verbiage to get at them (for example: "In all well designed communication equipment, maintenance and repair problems are generally confined to the checking and replacement of tubes which may have become defective . . . however, it is entirely possible that a more obscure malfunction may arise . . ."). In other words, it may be a valve or it may be something else.

Performance

Finally, the aspect that readers will be most interested in—how does it work? The HX-50 has been operated over quite a prolonged period in direct comparison with an early Viceroy Mk. I, running at its full 150 watts (as compared with the 90 watts of the HX-50). At no time, and in no QSO, has any major difference in performance been detected. One would not expect reports to vary more than perhaps half an S-point between 90 and 150 watts, assuming equal efficiencies; and this was exactly what was found. A change from one transmitter to the other was often made without eliciting any comment at all.

What matters far more than the actual output (whether this is 60 watts or 70 watts makes no significant difference) is the general controllability of the equipment; the *feel* of it when operating. And this is excellent. Switching from band to band is simple and quick; VFO-ing on to a station is equally easy whether on CW or SSB; keying is among the best ever encountered on a commercial transmitter;



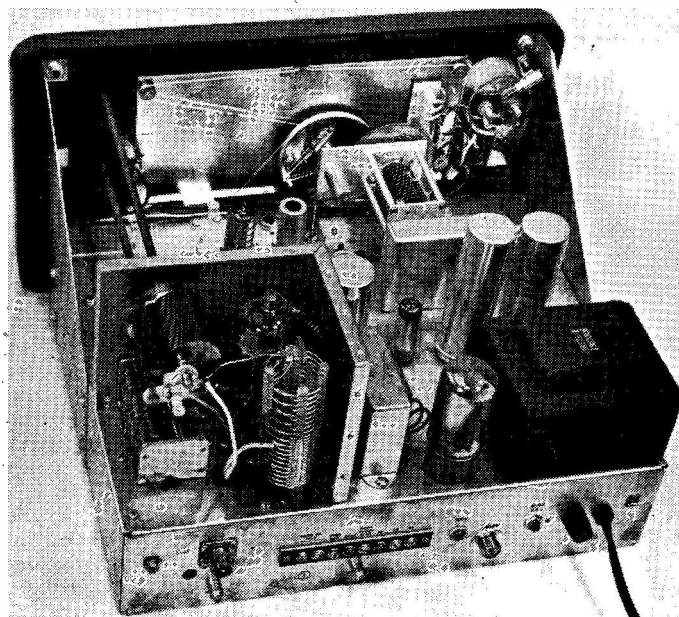
The band-pass couplers for the mixer and driver stages are grouped at the right, and the switch spindle is extended into the PA box in the bottom right-hand corner. The whole switching motion is operated by a cord drive from a knob in the centre of the main panel. Apart from the boxed VFO and the PA, which are above, practically every component in the HX-50 is below chassis. This accounts for the rather "busy" appearance underneath compared with the clean and simple layout evident in the upper-chassis view.

and speech quality seems to be purely a matter of how good a microphone is used.

The manual, which includes very full instructions for setting-up and also for re-aligning (if necessary) on each band, gives 50 dB as the acceptable figure for carrier suppression. On the transmitter tested, assuming the RF output meter to be accurately calibrated, this was easily achieved on all bands. Suppression of the unwanted sideband was of the order of 35 to 40 dB at least.

Summary

Altogether the HX-50 proved extremely satisfactory during quite a protracted test period. Points specially approved of were the ease of setting up after band-switching; the very wide scale and smooth control of the VFO, the grouping of major controls, with the minor ones conveniently hidden behind the small trap-doors; and the completeness of the facilities provided by the two switches, "Function" and "Operation." Weak points, it was thought, were the rather extensive use of cord drive (even for the



The very neat and clean interior found when the HX-50 is taken out of its case. The PA compartment (lower left) is fully screened when the Tx is assembled in its cabinet. The VFO is in the small box behind the main tuning condenser (top right). Plugs at the rear are, left to right, RF output with receiver connection below; external VFO, below terminal strip; key, and microphone; further right, bias control and mains input fuse. The terminals are for receiver muting, anti-trip, push-to-talk and linear RF power amplifier control.

band-switch) and the use of very inadequate fixed padding condensers across the final tuned circuits for the 80-metre band. One of these failed, but only on account of an accidental mismatch to the aerial circuit; it was very easily replaced by one of more suitable quality and rating, and its breakdown caused no damage to other circuit components.

In short, an extremely well-designed, well-built and workman-like exciter unit, whether used as a complete transmitter or as a driver. The HX-50 is distributed in the U.K. by K.W. Electronics, Ltd.

To go with their HX-50 as the Exciter unit, the Hammarlund Co. offer a matching Linear Power Amplifier, the HXL-1, which is a self-contained grounded-grid PA for SSB, AM and CW operation, conservatively rated at 1.5 kW p.e.p. or one kilowatt on CW.



BIG SALE AT SPILSBY. LINCS.

We are asked to announce that the annual AT sale organised by the Skegness & District Amateur Radio Group will take place this year at The Bull Hotel, Spilsby, Lincs., on October 16, starting at

7 p.m. This event has assumed a significance far beyond the local area, and further information can be obtained on application either to G2ABK or G3OTD, both *QTHR*.

THE PRACTICAL APPLICATIONS OF SEMICONDUCTORS

IN THE AMATEUR STATION

Part VI

AUDIO AMPLIFIERS (II)

M. I. DAVIS, B.Sc.

Previous articles in this series appeared in the April, May, June, July and September issues of SHORT WAVE MAGAZINE, covering a wide range of transistor applications and circuitry, with many useful and interesting ideas on the use of transistors in general.—Editor.

TAKING up the question of transformerless transistor amplifiers from the point at which it was left on p.408 September, the first example of one such is at Fig. 7 here. This is virtually a transformerless version of the circuit of Fig. 6 (p.407, September) and will give about 150 mW of audio out.

The circuit gain and the input impedance are around 44 dB and one kilohm respectively. The first stage, Tr1, acts as a Class-A voltage amplifier, its bias being set by feedback via R6, which maintains the condition that the point A will be at -6v. in the quiescent state. The collector current of this transistor develops a voltage across R4 which provides a small forward bias for the bases of Tr2 and Tr3 to eliminate cross-over distortion. These base voltages then move up and down in phase, depending on the voltage drop across R2 and R3. Since Tr2 and Tr3 require opposite potentials to turn them on, they conduct on alternative half cycles. These transistors are emitter-follower current amplifiers; the load, which consists of the speaker and C4, are in their emitters. This would cause a large amount of feedback, which would tend to reduce the gain of the stage too much. The effect of C2 and R2 is to counteract this by the application of extra AC feedback of opposite phase. If a centre-tapped supply is available, the point A may be connected to the centre tap and C4 omitted. This modification not only reduces the number of

components, but will also improve the bass response, since the effect of the lower 3 dB point of the speaker and C4 is now not felt. Some small DC current flows through the speaker, however. If the bass response needs to be improved without the use of a centre-tapped supply, the value of C4 may be increased.

A disadvantage of the Fig. 7 circuit is that it needs a high impedance speaker, but for those readers who have one to hand, or require an amplifier to drive a pair of headphones with an impedance of 50-300 ohms, the circuit should prove simple, reliable, relatively distortion-free, and extremely easy to construct. *Veroboard* with its holes punched on a 0.1in. pitch, or the *Lektrokit* punched bakelite panels, make a suitable "chassis" and if miniature 12v. electrolytics are used, the circuit will easily fit on a piece of board only one inch square. (*Note*: Don't use 12v. electrolytics on gear running from the nominal 12v. rail in a car—this can rise to 16.6v. under certain charge conditions, with strange results.)

In Fig. 8, the ideas embodied in the previous circuit have been developed to give two watts of audio output, and to get away from the difficulty of obtaining an n.p.n. power transistor, a low-power phase splitter is used in conjunction with a pair of p.n.p. power transistors. Tr2/Tr4 and Tr3/Tr5 each act in what is known as a "Darlington pair," and hence give the required current gain. Only two extra components (the output transistors themselves) are required. Note the use of the germanium junction diode D1. It replaces the resistor in the previous circuit to provide the offset voltage between the bases of the n.p.n. and p.n.p. transistors. The advantages of a diode over a resistor in this position are twofold: First, it maintains a voltage drop between the bases of the transistors which is substantially less dependent on current than would be the case if a resistor were used; secondly, this voltage drop goes down with temperature increases, and so tends to compensate for the drop in Vbe with

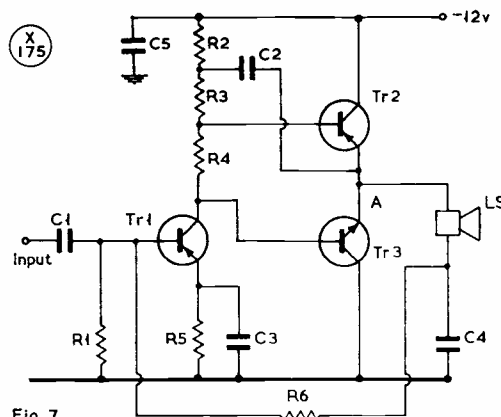


Fig. 7

Table of Values

Fig. 7. Transistorised 150 mW Amplifier, non-transformer

C1 = 10 μ F	R4 = 180 ohms
C2, C3 = 100 μ F	R6 = 33,000 ohms
C4 = 100 μ F	LS = 80 ohms
C5 = 250 μ F	Tr1 = OC71
R1 = 10,000 ohms	Tr2 = OC72
R2, R5 = 330 ohms	Tr3 = OC140
R3 = 1,800 ohms	

Fig. 7. Circuits which do not involve a transformer are of obvious interest, and here is one giving 150 mW audio output. An n.p.n. OC140 is used at TR3, and all other values are shown in the table.

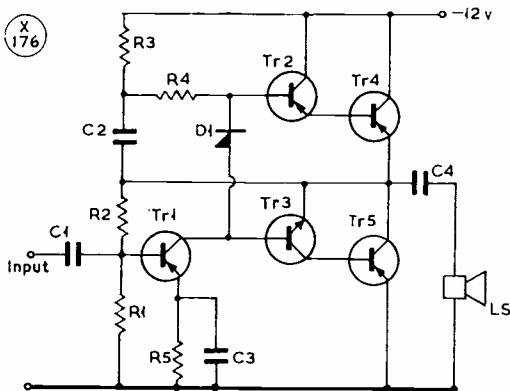


Fig. 8

Fig. 8. Another audio amplifier not requiring the use of a transformer is shown here. It is capable of giving 2 watts of audio output, taking Mullard OC30's in the final stage.

Table of Values

Fig. 8. Two-watt transformerless Amplifier

C1, C2,	LS = 5 ohms
C3 = 100 μ F	D1 = OA10
C4 = 250 μ F	Tr1 = OC71
R1 = 10,000 ohms	Tr2 = OC72
R2 = 33,000 ohms	Tr3 = OC139, n.p.n.
R3, R5 = 330 ohms	Tr4,
R4 = 1,800 ohms	Tr5 = OC30, OC16

increased temperature which takes place for Tr2 and Tr3.

Provided the amplifier is not required to reproduce a continuous sine-wave at full output for long periods, no heat sinks are required for Tr4 and Tr5, since the long-term dissipation (which determines the junction temperature) will be sufficiently small to merely raise the junction a few degrees above ambient when the unit is reproducing speech, music, etc. R2 should be adjusted to allow a quiescent current of about 5 mA with the input short-circuited.

Further Development

An economy-plus version of this circuit using only 14 components (including speaker) is shown in Fig. 9. This will not, of course, be so distortion-free as its predecessor, but this is simply the price to be paid for simplicity. Although it seems at first glance that Tr1 drives the speaker and the rest of the stuff is wasted, this is not the case. The speaker is still connected, in series with a large capacitor, between the "centre line" of the circuit and an AC earth point. A small DC current flows through the

Table of Values

Fig. 9. Two-watt transistorised Amplifier, Economy Design

C1, C2,	D1 = OA10
C3 = 100 μ F	Tr1 = OC71
R1 = 10,000 ohms	Tr2 = OC72
R2 = 33,000 ohms	Tr3 = OC139
R3 = 330 ohms	Tr4,
R4 = 2,200 ohms	Tr5 = OC30
LS = 5 ohms	

speaker, but this should not cause any trouble.

Fig. 10 illustrates a high-quality ten-watt amplifier, the circuit of which Newmarket Transistors Ltd. have kindly given permission to reproduce here. (This circuit, incidentally, with a suitable pre-amplifier and a simple capacitor-smoothed power supply, would make an excellent hi-fi rig, acceptable even to the XYL!). The unit requires six fairly inexpensive NKT-type transistors, and drives a 15-ohm speaker from a 48v. supply. Note again the use of D1 to provide the offset voltage necessary for correct phase-splitting.

As before, overall AC and DC negative feedback is applied to the base of Tr1 from the output via R4. R2 should be adjusted to give a suitable standing current, such that the cross-over distortion is kept to an acceptably low level. The ideal method of achieving this is to feed in a perfect sine-wave and to hang a 'scope on the output, adjusting R2 to optimise the output waveform. A comforting fact to bear in mind is that more cross-over distortion can be tolerated in a transformerless amplifier than in a Class-B amplifier using an output transformer, since the transformer tends to "ring" if the current is abruptly switched; this produces a most unpleasant effect.

R11 and C7 act as a top-cut filter for tone control purposes, and these components could be made variable if required.

If a 'scope is not available, R7 should be adjusted so that the collector current is between 10 and 20 mA.

Construction is again left to the reader's choice. The layout is in no way critical, and the only electrical requirement is that earth loops be avoided. Heat sinks for Tr5 and Tr6 are required; these could be a 7in. square of 16g. aluminium, painted matt black. These will allow the unit to run at full output continuously, or, if this is not required, smaller heat sinks could be used.

For further information on interesting circuit techniques made possible by the use of a combina-

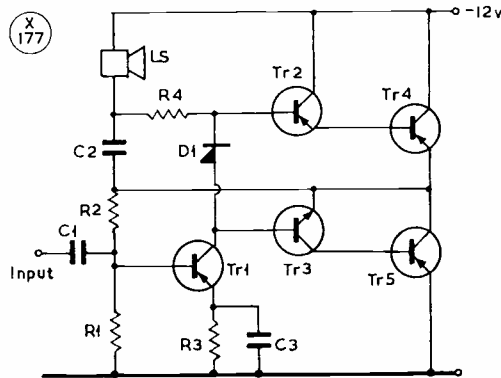


Fig. 9

Fig. 9. An economy 2-watt audio amplifier, using transistors all through, and again with OC30's in the output stage. All values are given in the table with this diagram.

tion of p.n.p. and n.p.n. transistors, readers are referred to a pamphlet entitled *NPN-PNP Circuits*, published by Newmarket Transistors.

The last audio amplifier circuit to be considered before we pass on to modulation systems is again a transformerless 10-watt design. This particular circuit is extremely popular, and gives very good results. It was first presented by Tobey and Dinsdale in *Wireless World* of November, 1961, along with a suitable pre-amplifier and a straightforward power supply. In the circuit, Tr1, which is responsible for most of the amplifier noise, is operated at a low collector current, and only a small potential appears between its collector and emitter; this reduces the noise factor (Fig. 11).

Overall feedback is in this case between the output point and the emitter of Tr1 via R16 and R6, the combination of C3 and R5 serving to provide a standing base-emitter bias. R9 may be varied if necessary to set up the standing current of the circuit to between 10 and 20 mA. This particular version of the circuit gives its ten watts into a four-ohm speaker, from a 24v. supply, but readers could easily scale down the circuit values to suit their own particular requirements, e.g. a 12v. supply rail instead of 24v. Heat sinks as for the previous circuit are suggested for Tr5 and Tr6. C4 acts as a stabilising element, providing high frequency negative feedback to keep the gain-frequency characteristic of the amplifier stable under all conditions.

One point of a very practical nature: When testing a transistor circuit for the first time, it is always a good idea to connect the supplies through as high a resistance as possible, provided that an indication that the circuit is functioning satisfactorily can be obtained under these conditions. This statement applies particularly to circuits of the transformerless type, where virtually everything is DC-coupled to everything else, and a single wiring error can damage a large number of semiconductors.

A total harmonic distortion of a $\frac{1}{4}$ per cent is claimed for the unit, which has an output impedance of less than a quarter of an ohm, and an input impedance of 33K. The frequency response is excellent, the voltage gain being constant to within ± 1 dB from 40 c/s to 20 kc. Again, layout is not critical, and either of the two previously-mentioned "chassis" schemes might be used, or a printed circuit board made up specially from one of these do-it-yourself kits available from the London surplus stores.

Modulation

It can be shown mathematically, and will be familiar to most readers, that amplitude modulation of a carrier is better carried out at high level than at low level. This means that in a transmitter it is most desirable to vary some characteristics of the PA stage at audio frequency to achieve amplitude modulation.

Good linearity can be obtained if a Class-C amplifying stage is modulated in such a way that the effective supply to the stage varies as the audio signal. This is especially true of collector modulation of common-emitter Class-C transistor PA stages, since the low bottoming voltage allows the use of nearly 100 per cent modulation without distortion.

Table of Values

Fig. 10. Ten-watt 3-stage transistor Power Amplifier

C1 = 20 μ F	R7 = 8,200 ohms
C2 = 100 μ F	R8 = 470 ohms
C3, C6 = .001 μ F	R9, R10 = 1,000 ohms
C4 = 25 μ F	R11 = 22 ohms
C5 = 100 μ F	LS = 15 ohms
C7 = 0.2 μ F	D1 = OA10
R1 = 3,300 ohms	Tr1 = NKT226
R2 = 100,000 ohms	Tr2,
R3 = 150,000 ohms	Tr3 = NKT223
R4 = 22,000 ohms	Tr4 = NKT703
R5 = 1,500 ohms	Tr5,
R6 = 39,000 ohms	Tr6 = NKT403

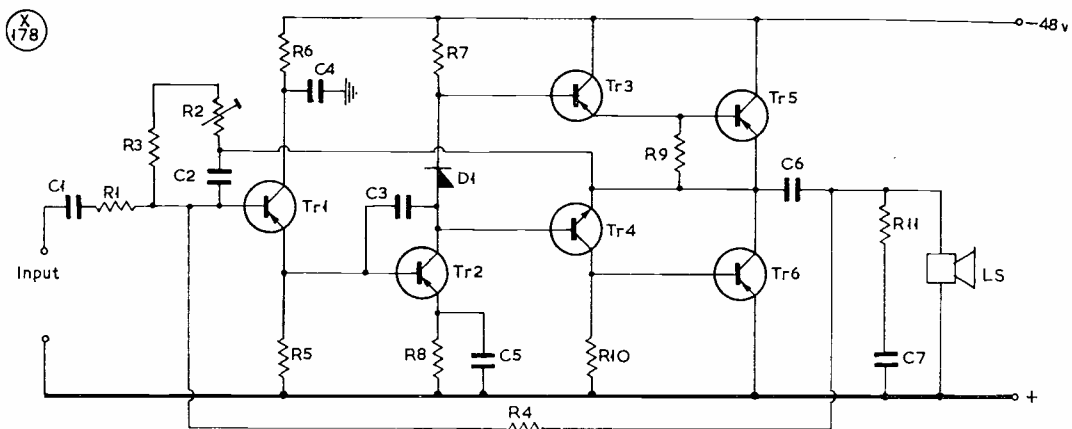


Fig. 10

Fig. 10. A transistorised amplifier giving 10 watts AF output in a 3-stage arrangement, very suitable for mobile or low-power portable working. A variety of transistors can be used in the output stage.

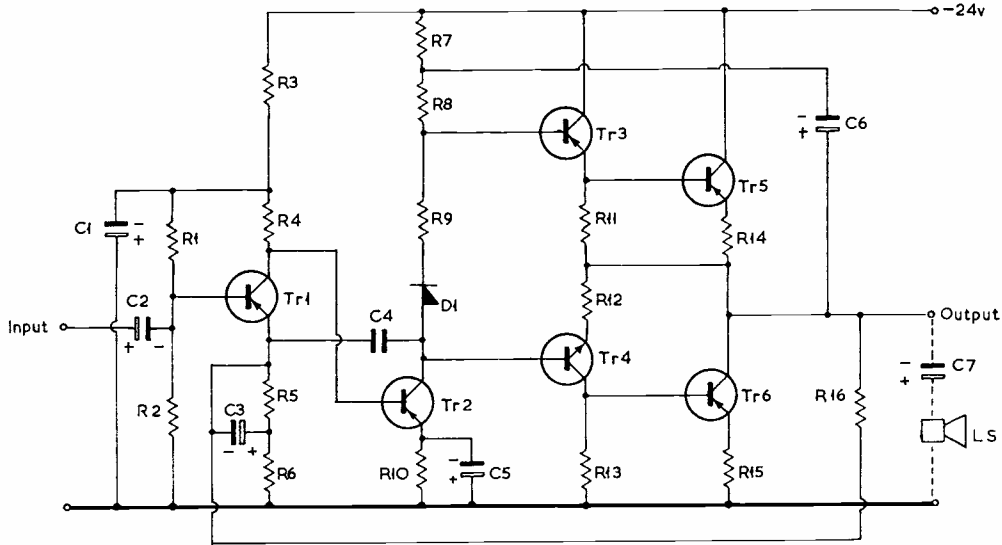


Fig. 11

Fig. 11. For those interested in a high-fidelity amplifier capable of 10 watts of audio, this is the circuit to use. The output transistors can be a variety of types.

Table of Values

Fig. 11. Ten-watt high-fidelity Amplifier, transistorised

C1, C6 = 50 μ F, 25v.	R12 = 3.3 ohms,
C2 = 1 μ F, 25v.	w/wound
C3, C5 = 100 μ F, 6v.	R14, R15 = 0.5 ohm,
C4 = .0022 μ F	w/wound
C7 = .0025 μ F, 25v.	R16 = 2,200 ohms, hi-
R1 = 330,000 ohms	stab.
R2 = 56,000 ohms	D1 = OA5
R3, R4 = 22,000 ohms	Tr1 = GET-874, OC44
R5, R11,	Tr2 = GET-102, OC71
R13 = 150 ohms	Tr3 = GET-102, OC72
R6 = 33 ohms, hi-stab.	Tr4 = 2N385
R7 = 470 ohms	Tr5 = GET-572, OC28,
R8 = 1,500 ohms	OC29, OC35,
R10 = 270 ohms	OC36

Sufficient drive must always be applied for this to be true, and if this is the case, then the amplitude of the output RF signal will be proportional to the amplitude of the audio input signal.

This system is shown diagrammatically in Fig. 12, and in both the cases of valves and transistors, three transformers are used. T1 couples the RF into the stage and T2 takes out the AM. T3 is the modulation transformer; the fact that the DC isolation is provided by this component means that a transistor modulator can be used to drive the PA stage of a transmitter which uses valves throughout the RF section.

The principal difficulty one encounters in achieving high-level modulation efficiently using semiconductors is surely the procurement of a suitable mod. transformer. The design and specification of this component is usually quite tricky. Certainly no space is available here to enter into the theory, but readers are referred to Chapter 8 of *The Junction Transistor and its Applications*, by E. Wolfendale, where this problem is analysed, and a worked example is given. Almost any of the amplifier circuits given previously could be adapted to drive a modulation transformer; which one is chosen depends of course on the output power required.

It is also possible to modulate at low levels, and this naturally implies that less audio power is needed. Assuming that ideal mixing takes place, the sources of distortion are the non-linearities in succeeding amplifier stages.

A typical circuit of this genre is shown in Fig.

13A, where Tr1 might well be a buffer amplifier stage in a multi-stage transmitter. It is operated in Class-A, bias being provided by R3 and C3 in the emitter, and the potential divider R1, R2. The junction of these two resistors is decoupled for RF only by the small condenser C2, and modulation is applied via C1.

In Fig. 13B, Tr1 is biased into Class-C operation by virtue of R2 and the parallel combination C1, R1, across which a DC voltage is developed by the rectifying action of the base-emitter diode. R2 is adjusted until the output of the stage falls on one-half of its normal value, and the audio signal is then applied.

A high-power transmitter could conveniently be modulated in this way by one of the transformerless amplifiers described earlier.

The author apologises for this rather brief discussion on modulation. No mention has been made, for instance, of SSB modulation using semiconductors. The reason for this (and other

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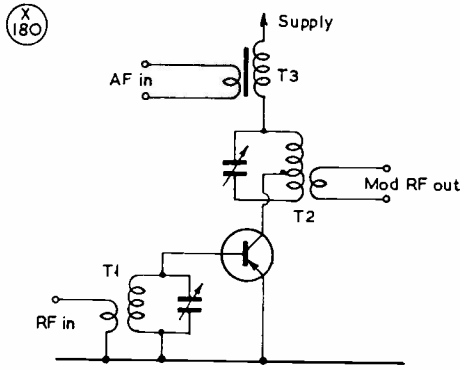


Fig. 12 a

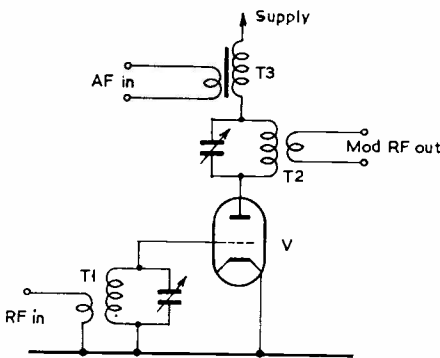


Fig. 12 b

Fig. 12. Transistors in high-level modulation, showing the circuit (a) Using a transistor, and (b) With a triode. Values are given in the table.

omissions) is that he feels that, in many cases, an illustrative circuit and a brief note are not sufficient information for readers to design similar circuits to

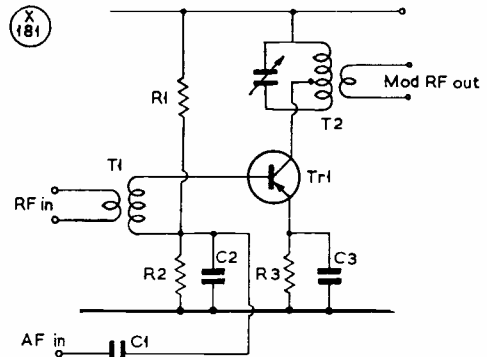


Fig. 13 a

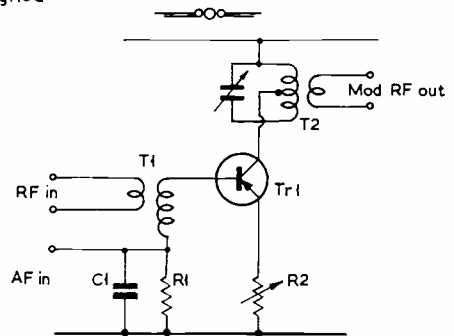


Fig. 13 b

Fig. 13. Low-level modulation, showing (a) The Class-A circuit configuration, and (b) The circuit for Class-C working.

suit their own requirements. The alternative to this is to discuss a wide range of variations on each design, which in a series such as this, is hardly practicable. The next article will deal with Oscillators.

Do You Know That —

— Experimental printed-circuit boards can be made up by drilling odd pieces of hardboard or paxolin strip and then threading tinned copper wire through the holes, these wires taking the place of the copper sheet that would normally be traced and then etched. (G. Coleman, Clacton).

— When thermo-couple RF meters burn out, the movement is worth salvaging by removing the thermo-couple, as you are then left with a sensitive moving-coil instrument which can be re-scaled and used as a milli- or micro-ammeter. Typically, the f.s.d. of such an instrument is 0.500 μ A or 0.1 mA. (J. M. Cox, Southall).

— Instead of using the so-called "low consumption" bulb as the indicator in an absorption wavemeter, greater accuracy and sensitivity, as well as

less RF power absorption, can be obtained with a miniature wire-ended neon across the wavemeter tuning condenser. (M. H. Judd, Peterborough).

— When using soft-drawn copper wire for coil winding, stretch it slightly by anchoring one end and pulling hard on the other, while running some smooth-handled tool along the stretched line. This has the effect not only of straightening the wire but also of "work hardening" it. The result is that self-supporting coils are stiffer and neater, and retain their shape better. (G3SFL).

— Harmonics from the local oscillator of an HF-band receiver can be used to provide a tuning signal and calibration point for a VHF converter. For example, a receiver having 465 kc IF, with the LO on the HF side of signal frequency, will give a strong beat on 70.2 mc if the main receiver is tuned to 22.935 mc; its local oscillator is then on 23.400 mc, the 3rd harmonic of which is 70.2 mc. Similar

tuning sequences can be worked out to cover other VHF ranges. (G3TKN).

— Plastic tops from empty containers can be modified to make excellent control knobs for radio gear. The smaller ones are adapted by drilling a hole in the side to be just a tight fit for a grub-screw, which is then self-tapped in. For larger bottle-tops, the bush can be extracted from an unwanted or broken knob and cemented into place with one of the plastic fixatives, a suitable hole being drilled to take the necessary grub-screw. (P. Holliday, Nottingham).

— There are two sorts of blue-glow effect in valves. The harmless, which comes from the deposit of getter material on the glass when the getter is fired; this appears well clear of the valve electrode structure. The other sort of blue-glow, which appears around or inside the electrode

structure, is a sure sign of a soft or otherwise faulty valve. (G3IHI).

— In the last few issues, the suggested possible uses for spent ball-point pen cases have included: Test prods, lead-through insulators, miniature coil formers, small stand-off insulators, and feeder spreaders—a pretty versatile range of applications for an item only costing 9d. before it has been used up as a pen. (As these suggestions started coming in, we eagerly began collecting the office spent ball-point pen cases. Now, with nearly 40 in the drawer, the question is: What on earth can be done with them !)

We shall be glad to pay 10s. 6d. for any DYKT item suitable for publication. No circuits or diagrams, please—just a careful explanation of what you consider to be a Good Idea. Payment is made immediately on appearance in print.—*Editor*.

SMALL TRANSMITTER FOR TWENTY CW

DESIGN, CONSTRUCTION,
AND SETTING UP

J. A. CALLOW (G3RBH)

WHEN the author decided to get on to 20m., it was necessary to build quickly a simple rig to run about 20 watts, which was both easy and economical to build and simple to put into operation. The transmitter described here is the outcome and has been found very useful both as a small Tx and as a driver unit for a QRO PA. Total construction time, starting from a flat piece of aluminium, amounted to about five hours, and all components were found to be available in the shack.

Circuit

The circuit is as Fig. 1 on p.475. VI is a crystal oscillator of the Clapp variable-frequency type, taking a 6CH6 and giving output on 7 mc. An output valve was chosen in this position so that adequate drive to the PA would be available without the need for a buffer stage. A 6BW6 was used satisfactorily although slightly less drive was available but it was found that an EF80 was useless in the VFO position, producing only a trace quantity of grid current.

The output circuit of the oscillator originally consisted simply of an RF choke in the anode and a coupling condenser to the grid of the PA. This arrangement was found to give a rather meagre value of drive but by adopting the tuned output circuit L1, C4, as shown in the available drive was more than doubled. No crystal pulling has been

noticed when tuning this circuit.

V2 is the PA stage which uses an 807, though a large number of other valves would be suitable, depending on the power required. A 6146 was avoided as it has been found by past experience that this valve is slightly more prone to TVI than the 807. Small parasitic chokes PC1, PC2 are included in the anode and grid circuits to suppress TVI. This stage is keyed in the cathode and a keying filter Ch1, C8, is incorporated to eliminate key clicks. In the prototype the choke used for Ch1 was the secondary of a low-ratio output transformer; and was quite satisfactory. The main requirement of this choke is that it should have a large current-handling capacity and a low resistance, so that it does not limit the PA anode current to any great extent. Owing to the small size of the unit no meter was fitted—cathode current being monitored at the key-jack for tune-up purposes.

The switch, S1, enables the oscillator alone to be switched on for netting, or oscillator-and-PA for "transmit." When in the "net" position a 100K resistor, R5, is connected in series with the HT supply to limit the output of the oscillator, which would otherwise cause objectionable overloading of the station receiver. With the switch in the centre position all parts of the Tx are switched off, while in the third position both the oscillator and PA are on. One contact on the three-pole, three-position switch is used to earth a lead from the receiver to mute it. Earthing this lead completes a relay circuit in the receiver which lifts up the cathodes of the RF and IF valves. This muting circuit, which has been found very satisfactory, was originally described on p.598 of the January 1964 issue of SHORT WAVE MAGAZINE.

Fig. 2 shows the circuit of the power supply unit which takes a 5U4G rectifier. This type was chosen only because it was available and other valves such as a 5Z4, 5R4 or GZ30 can be used, or silicon rectifiers if of sufficient voltage rating. The mains transformer is a 350-0-350v. type rated at 150 mA.

[over

This rating could be reduced to 100 mA without risk of any trouble, and the HT could also be increased to a maximum of 750v. if desired to run a greater input. With a 350-volt supply it was found unnecessary to use separate HT for the oscillator, although the rated maximum anode voltage for a 6CH6 is 250v. If a higher terminal voltage is used it will be necessary to drop the HT applied to the oscillator to about 300v. This can most easily be done with a series dropping resistor, or a separate transformer and rectifier could be used. A small neon is wired in series with a one-megohm resistor, R6, between the live side of the mains and earth, to indicate when the mains are on. It will not strike unless the chassis of the power pack is earthed. Paper smoothing capacitors are used for C13, C14, as these seem to be far more robust and reliable than their electrolytic counterparts.

Construction

The transmitter is constructed on a chassis size 8in. x 1½in. x 4in. The 6CH6 and 807 are to the left-hand end and the *pi*-section tank C9, L2, C10 occupies the right-hand end. Along the front chassis drop are mounted the crystal socket, grid tuning condenser, change-over switch and key jack—in that order from left to right. If a deeper chassis is used it would be possible to mount a 100 mA meter on the front drop to meter anode current.

The most important thing when wiring up is to avoid a layout of components which might cause feedback around either the PA or the oscillator, which leads to parasitic oscillation and can manifest itself in the form of TVI. The *pi*-coil L2 consists of 20 turns of 20g. enamelled wire on a 1½-inch diameter former, spaced 1/16th inch and tapped every other turn. The cathode lead of the PA is of heavy copper earthing wire and C7 is wired directly across the valveholder. PC2 is wired inside the screened anode cap of the 807. The manufacturers state that an 807 should not be placed in a screening can, otherwise overheating will result, and it was on these grounds that the PA was left unscreened. (Actually, until this was known to the author, he had used many a well-screened 807 with no ill effects!) If it is found difficult to eliminate TVI when the Tx is put on the air it will probably be worth while to screen the 807, though the screen should be made roomy in deference to the maker's instructions.

The power pack is built on a chassis of dimensions 9in. x 5in. x 1½in., though its actual size will depend mainly on that of the components used. Placing of the main parts is in no way critical except that the core of the smoothing choke and that of the mains transformer should be in perpendicular planes to avoid undue ripple in the output voltage, which would cause the otherwise T9x note of the transmitter to deteriorate. The power pack and transmitter are connected by a length of three-core cable with an octal plug at the end to go into the octal outlet socket on the PSU. (Broken valves make a good source of octal plugs.)

Table of Values

Figs. 1 and 2. Circuit diagrams of the 20m. Transmitter and Power Supply

C1 = 22 μ F	PC1,
C2, C5 = 100 μ F, 400v.	PC2 = 3t. 20g. on ½-w. carbon res. body
C3, C6, C7, C8,	J1 = Key jack and metering
C11 = .005 μ F, 400v.	S1 = 3-pole, 3-pos.
C4 = 150 μ F, var.	Ch1 = LF choke, 100 mA
C9 = 150 μ F, var, wide-spaced	Ch2 = Smoothing, 100 mA
C10 = 500+500 μ F (BC twin-gang)	N = Small neon
C12 = 100 μ F, 800v.	T1 = 350-0-350v. 100 mA, 6.3v. 1½A, 5v. 3A.
C13, C14 = 8 μ F, 500v.	V1 = 6CH6
R1, R2,	V2 = 807, or similar
R3 = 27,000 ohms, ½-w.	V3 = 5U4, etc.
R4 = 10,000 ohms, 1w.	L1 = 17t. 22g. on ¾-in. iron-cored former
R5 = 100,000 ohms, ½-w.	L2 = 20t. 20g., 1½-in. dia., spaced turns tapped alt. turn
R6 = 1 megohm, ½-w.	
RFC = RF chokes, 2.5 mH	

NOTES: Both C4 and C5 are Tx types, but C5 should have wider spacing; C10 is to make up .001 μ F variable. C12 could be rated up to 1 kV for safety. The RFC in the PA anode should be rated for 100 mA. Ch1 can be of quite low inductance, 3-5 Hy. Ch2 should be 10 Hy. The tank winding L2 should have turns spaced to about 1/16th in., with taps at every other turn; actual size may be matter of experiment. The crystal X can be anywhere between 7005 and 7050 kc, for CW operation on the 20m. band (14010-14100 kc).

Setting Up

When the transmitter and power pack have been completed, first check all wiring to ensure that no obvious short-circuits exist. Plug in the power pack and measure the HT which should be of the order of 400v. Connect the transmitter and check that the valves light up. Plug in a crystal and switch to "net." It should now be possible to hear the oscillator note in a receiver tuned to the crystal frequency. If no beat is heard it may be that the crystal is inactive or that there is a fault in the circuit. Most crystals that are in good condition should go off readily, though the author has found a number of the surplus variety which would not oscillate. A good drying out is usually all that is needed.

When the 6CH6 has been made to oscillate, switch off and connect an 0-5 or 0-10 mA meter between chassis and the earthy end of R3, putting the positive side of the meter to earth. Switch on and tune C4 for maximum drive. Adjust the core of L1 so that 7 mc is tuned with C4 at near maximum capacity and 14 mc is brought in with it nearly fully open. If an absorption wavemeter is available it would be a good idea to couple it up to L1 and check that the right harmonics have been found, though with the coil specified it would be difficult to tune anything but 7 mc and 14 mc. At least one mA of drive should be available, and in the prototype 4 mA came through. If less than one milliamp. of grid current is shown this could be increased by lowering the value of R2, or increasing the voltage applied to the oscillator --- but, of course, there are limits to this tactic!

Plug a 100 mA meter into the key jack and tune C4 through resonance, noticing the movement of the cathode meter. The grid meter can then be removed

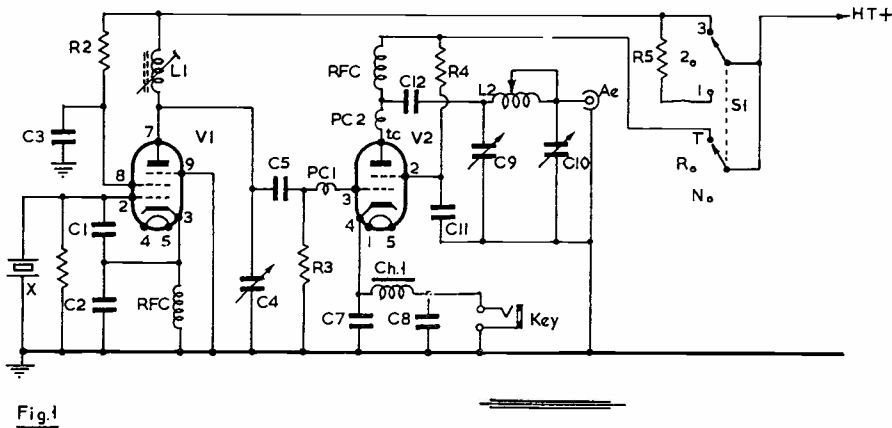
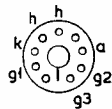
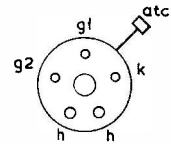


Fig.1



V1-6CH6



V2-807

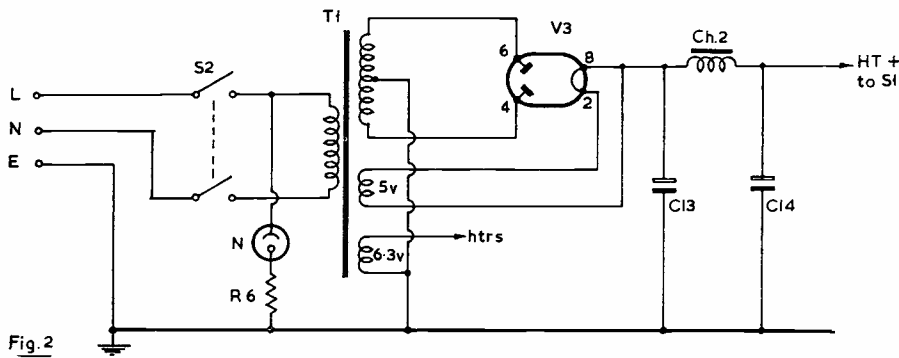
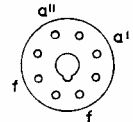


Fig.2



V3-5U4G



and the grid circuit tuned with the cathode meter. Connect a 15-watt lamp across the output of the Tx and tap the pi-coil at eight turns. The bulb should glow when C9 is tuned for a dip in cathode current. When all seems to be in order an aerial can be loaded and a signal put out.

TVI

Provided a little care is taken in construction and a low SWR is maintained on the feed line to the aerial, no trouble should be experienced from TVI. A small trace of herring-boning has been noticed on the author's own TV set in the shack with its aerial about three feet from the rig, but it was so little as to be unnoticeable to all except those who looked

carefully.

Should, however, TVI be really troublesome, the first thing to do would be to screen the 807. If TVI persists then the cathode of the PA should be well strapped to earth with the copper strip and the keying moved back to the oscillator stage. Some bias, of the order of 30 volts, will then have to be applied in series with the grid resistor; this should be slightly reduced in value so that less voltage is developed across it due to grid current.

It is very difficult to be specific about results as so much depends on the aerial used—and individual operating ability. Suffice it then to say that the PA stage has been found to have an efficiency of nearly 70 per cent, which does not seem unreasonable.

THE "NEW QTH" PAGE

Because of losing this space in the August issue (due to the July postal delays) and the increase in AT-stations licensed after successes in the May R.A.E. and the subsequent Morse Test, we are taking extra space to get the back-log of new call-sign/addresses and changes of address cleared off. It should be emphasised that any delay in publication here does *not* hold up notification of New QTH's to the publishers of the *Radio Amateur Call Book*, for which we are the agents for Europe and the U.K. (Current list pp.502-503.)

COURSES FOR THE R.A.E.

Readers are again reminded that as already explained, they should now apply to their local Education Authority office, and *not* to us, for information about courses of instruction for the Radio Amateur's Examination, Subject No. 55 in the City & Guilds of London examination syllabus. The local Club secretary is often armed with the details for prospective candidates. The point is that most R.A.E. courses will by now have started. The next examination is in December, but at certain centres only. The main sitting is in May next year.

VERTICALLY POLARISED FOR MOBILE

ON TWO METRES

S. F. BROWN (G4LU)

Our contributor is very well known on two metres, not only as one of the members of the G3BA/G4LU team, but also as a consistent and most successful 2m. operator, both fixed and mobile. Hence, his description of a neat, tidy, unobtrusive, practical and effective aerial system for two-metre [M will be of considerable interest. Though it is in effect a $\frac{1}{4}$ -wave ground-plane (to give vertical polarisation) there is a little more to it than that from the point of view of design and construction. An important result is that a properly matched vertical system has been found to be not altogether incompatible with the much more usual horizontal arrangement, and the loss due to cross-polarisation is a good deal less than might be expected.—Editor.

THE halo aerial has been used almost exclusively by amateurs for VHF mobile operation mainly because its radiation is (supposedly) horizontally polarised and is therefore compatible with the radiation from the majority of aerials used at fixed locations. Recently, however, the writer has come to question whether an aerial, which is simpler mechanically, and which is more aesthetically desirable, might not be used with equal or near equal results. Ideally, the halo should radiate a uniform pattern in the horizontal plane, but in practice this is not so, because the current distribution around the circular element is not constant, unless a small diameter loop with capacitance loading between the ends is used. The net result is that the polar diagram from this type of aerial exhibits at least two sharp minima. In addition, its windage is high and consequent vibration when the car is in motion contributes considerably to mobile flutter. The unusual shape of the aerial also attracts attention and distracts other road users—a particularly dangerous situation when motoring along country lanes.

It was with these points in mind, when the recent Welsh tour with G3BA was first discussed, that some thought was given to the type of aerial we should use for car-to-car communication and possibly for the odd mobile-to-fixed-station contact. We both concluded that vertical aerials would be suitable, particularly in the light of our experiences with haloes on our previous tour, when considerable fading was caused when one car turned a corner ahead of the other and the aerials became mis-orientated from the maximum field strength direction. G3BA settled for a commercial vertical aerial (by J-Beams, Ltd.) which, mounted on his front wing, matched the BC whip mounted in a similar position on the other side of his car. In the G4LU installation, however, the radio

gear is not permanently fitted in the car and a removable aerial was desirable; this suggested a gutter-mounted type. Most of the commercial models inspected employed inferior grades of insulation for VHF purposes (though this does not, of course, apply to the J-Beam design) and would not have easily accommodated a matching circuit at the base. Home construction therefore appeared to be a necessary solution to the problem and the resulting unit is described in this article—and see sketches.

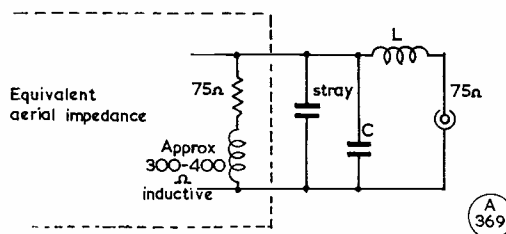
Design Consideration

Reference to some very useful charts published in *Electronic Engineering*, over twenty years ago, showed that a vertical aerial, roughly a third of a wavelength long, when operating over a ground-plane (the car roof) would have a base impedance of 75 ohms in series with an inductive reactance of approximately 300 to 400 ohms. This length of aerial is therefore attractive since by the addition of a suitable capacitive reactance in series with the base of the aerial, such that the net reactance is zero, a direct match to a 75-ohm cable would be obtained. Although this solution is theoretically possible, in practice one has to support the aerial on an insulator, which adds undesirable capacitance to earth and vitiates the simplicity of the scheme—but by the addition of a series inductance, the stray capacitance, augmented by sufficient extra shunt capacitance, can be used to form an L-matching circuit to provide an input impedance of 75 ohms, resistive.

Fig. 1 here shows the circuit as finally evolved, calculation giving the total capacitance required as $7 \mu\text{F}$ and the inductance as $0.32 \mu\text{H}$. A bridge measurement, at 1,000 c.p.s., gave the capacitance of the base insulator as approximately $2.3 \mu\text{F}$, so that an additional capacity of $4.5 \mu\text{F}$ is required. This can be conveniently provided by an $8 \mu\text{F}$ Philips trimmer, or a miniature trimmer having semi-circular vanes. Both types of condenser have been tested in the circuit using the high-power home station rig so they are adequately rated for most mobile equipments, which rarely run more than 25 watts input.

Constructional Points

The constructional arrangements are shown in Fig. 2 and can serve as a general guide. Some small alterations may be required to the basic design, perhaps to suit particular cars. The matching circuit components are housed in a small compartment



The circuit for matching the two-metre ground-plane, as described by G4LU. Values and a practical layout are shown in Fig. 2.

fabricated from 20g. brass. Dimensions are approximately 1in. by 1in. cross-section by 2½in. long, but the actual volume needed will depend on the type of condenser to be housed. The ends are closed by square plates of 16g. brass, suitably drilled, the bottom one to take a Belling-Lee coaxial socket and the top one for a ½in. length of ½in. o.d. brass tube. The tube, end plates and the seam of the square-section tube are all silver soldered together and with some care this can be carried out in one operation. A small piece of U-shaped brass channel section is silver soldered to the side of the box to form a clamp to the rain gutter of the car, being fastened by means of an O.BA screw tapped through the top face of the channel. To protect the paintwork inside the guttering, a small pad of polythene or nylon is used to take the pressure of the screw. The base insulator is turned and drilled from polythene rod and is made a tight force-fit in the brass tube. The central hole is drilled under size so that the aerial rod is also a tight fit in the insulator. The aerial rod is made to the dimensions shown in the diagram, the two parts being silver soldered together at the joint. The bottom half is a length of 3/16in. diameter brass rod and the top section is of 1/16in. diameter springy steel wire (tipped with a small ball for appearances' sake!). This part was actually a section of a discarded BC aerial, but can be fabricated quite easily.

An aperture is cut in the outside face of the compartment to facilitate adjustment of the coil and condenser; weather-proofing is afforded by a cover plate and rubber gasket held in place by two self-tapping screws. The condenser is soldered between the bottom end of the aerial rod and the inside of the box and the coil is connected between the aerial rod and the socket.

Setting Up

Adjustment of the components is quite simple, a reflectometer, monimatch or impedance bridge being required. With power connected to the aerial, the condenser is adjusted for minimum reflected power on the cable. A slight closing up or expansion of the turns of the coil may then produce a better minimum VSWR, which can be further improved by a second adjustment of the condenser. On the writer's model a forward/reflected ratio of better than 100:1 was obtained, which is equivalent to a VSWR of about 1.01:1.

Results

Side-by-side tests against G3IOO's halo from a site on the low side of Oswestry to G3BA in Sutton Coldfield, a distance of about 50 miles, showed that the signal from the vertical aerial was about two S-points down on the halo, taking into account the difference in the power outputs of the two transmitters used. This is the measure of the cross-polarisation loss. For this test both cars were stationary, but in actual mobile operation little difference will be noticeable between the two aerials. Comparing two journeys from Birmingham to Oswestry, one using a halo and the other the vertical, the latter aerial produced less mobile flutter and there were no sudden

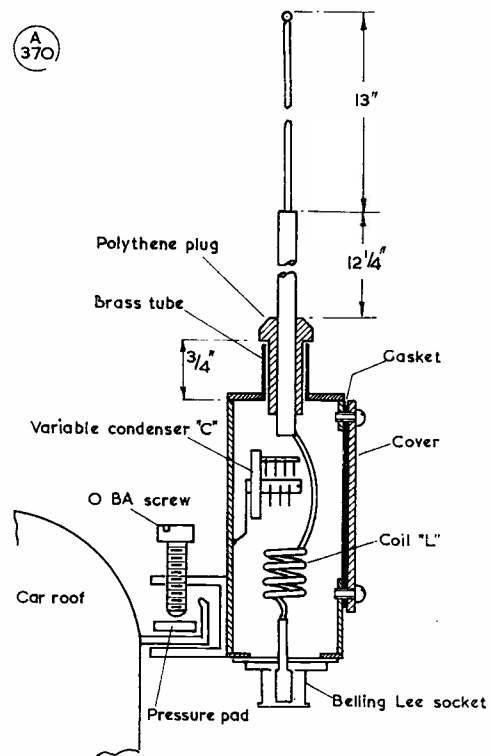


Fig. 2. The completed 2m. mobile aerial, a matched ground-plane giving vertical polarisation. Condenser C is an 8 μF variable, and the coil L consists of 5 turns of 22g. wound to quarter-inch internal diameter.

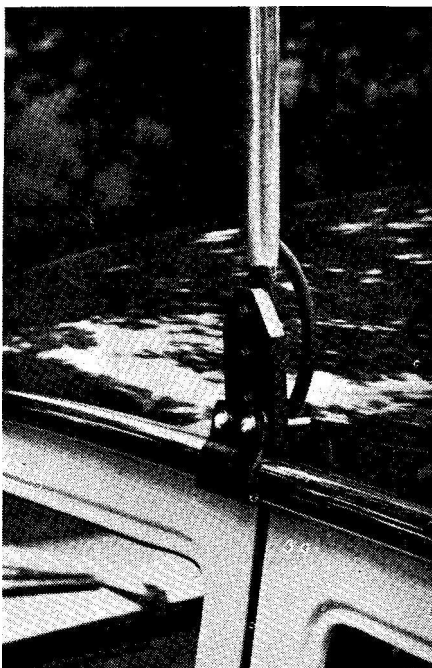
changes in signal strength when turning corners. Strangely, too, the vertical seemed to perform better than the halo when on low ground. For instance, when crossing the river valley just outside Shrewsbury, G3BA is a difficult signal to work using the halo, but with the vertical he was a solid R5. A reason for this might be a more favourable polar diagram from the vertical aerial in a vertical plane.

Other good contacts obtained with this aerial when mobile have been with G6FK in Wolverhampton from just outside Shrewsbury. This turned into a solid QSO lasting for the whole journey between these two points. G3ATZ, Chester, has also been worked from Montgomeryshire (190ft. a.s.l.) over a distance of 50 miles or so giving an S7 report, but the best result to date has been G3EDD in Cambridge at 150 miles, when both-way reception was obtained, though contact did not ensue due to competition from a stronger fixed station on the band at the time.

Conclusion

It seems then that results from a vertical aerial when actually mobile can be quite as good as from a halo with less trouble being experienced from mobile flutter. Cross-polarisation loss is obviously not a major factor to be considered and the results of the

foregoing tests should give some heart to those who are considering using the much neater and better looking vertical aerials for four-metre mobile operation. An appropriate scaling-up of the values used in the 2m. design should produce an equally useful /M aerial for the 70 mc band.



Close-up of the aerial mounting arrangement adopted by G3CQE for his mobile installation. It is quickly and easily detachable and leaves the car unmarked. (This has no bearing on the comments in G4LU's article.)

A G3GMN print

G9BF CALLING

Going Mobile With QRO!

Some readers chuntering because G9BF not producing real hot mobile dope—no need complain as of course G9BF fully mobile, in magnificent horseless carriage bought for SUSIE years ago (*still* no QSL that dratted woman; candle gone out now; she reported seen pillion on some cad scooter).

G9BF/M no minipower job using elaborate whip tuned resonance for high radiating efficiency and all that guff, but real hefty QRO Tx getting HT from 2½ kW 230v. AC engine-driven gen. belted to flywheel. Car 1927 Clyno (lovely job) with mechanical works open so no engineering problems at all involved. Only slight snag is engine has difficulty finding power for road wheels *and* genny together when Tx switched on and G9BF/M roaring through countryside working EDX like YU on 80m. Not possible make really satisfactory QSO's unless coasting (helping drive genny) and Tx must be switched off if approaching rising ground. Driver sensation rather like over-take braking when towing caravan, except that power goes off when needed most and with hood up catch lots wind. Otherwise no trouble at all.

Radiating element 2½-in. dia. 10ft. pipe bolted near-side rear suspension making 45° angle to ground (this real secret success G9BF/M plus of course plenty RF urge bottom end pipe).

Can recommend flywheel-belted 2½ kW AC gen. for PSU any mobile really keen for high-level opposition-crushing /M signal, guaranteed wipe out any Rally control station.

Must admit some few U.K. mobiles not too keen working G9BF/M on grounds signal too strong, unstable, badly over-modulated, high ambient noise (phenomenon unknown G9BF), incoherent speech quality and similar jealous excuses. But EU reports on 80 always "Vy vy FB speech dr OM pse ur QSL mine sure tnx vy pse repeat sri terrible QRM hi." Only fly G9BF ointment SUSIE not alongside operate with me G9BF as driver concentrating road safety, keeping look-out for bluebottles wanting know why car not licensed, where is certificate insurance, does it always make such noise, and embarrassments like that.

This feature naturally assuming considerable importance so Editor desperately anxious ensure continuance. Advice for all beginners remains: Crowd in behind me G9BF for full coverage all current topics Amateur Radio.

We had hoped to be unable to find space for him this month but, as so often happens, circumstances were against us, and we can only hope for better luck next time out.—*Editor.*

SCOUT INTERNATIONAL EVENT — SEVENTH JAMBOREE-ON-THE-AIR

The annual Scout radio-QSO party—called the "Jamboree-on-the-Air"—has now become an established event in the Amateur Radio calendar. It is *not* a contest. The idea is simply that Scout stations, or AT-stations operated in the Scout interest, should be on the air to make as many contacts as possible between themselves. While there are now quite a large number of Scouts licensed in their own right for operation on the amateur bands, support for local Scout groups unable to put a station of their own into operation is always welcome. Hence, you can issue an invitation, through your local Boy Scouts Association, for members of Scout or Guide troops in your neighbourhood to be in your station while you try to work other groups of Scouts or Guides. It is simply a matter of making QSO's, on any amateur band, CW or phone, during the period midnight October 17 to midnight October 18, using the identifying call "CQ Jamboree," and looking for stations also putting out this call. Scout stations throughout the world will be on for the event, and it is just a case of what band(s) and/or mode you can use for making contacts. The U.K. organiser is: Leslie Mitchell, G3BHK, Katoomba, Tyneham Close, Sandford, Wareham, Dorset, who will be glad to give any further information (s.a.e. please); to receive reports from stations participating in the U.K.; and to issue participation certificates on receipt of activity reports, stating bands used, Scout stations worked, local Scout group supported, and other relevant details.

COMMUNICATION and DX NEWS

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

CONDITIONS during the past month have been far ahead of the predictions. In fact, were it not for the quietness of the 21 mc and 28 mc bands, no one would know that we were right down in the trough of a sunspot cycle. As a W station remarked recently, "These are the best bad conditions I've ever known!"

Best news of all, for the DX-hungry types, was the arrival of Pacific DX in full force, shortly after last month's offering was in the printers' hands, and, of course, too late even for a "Stop Press" item. (It always happens this way.) From about August 25 onwards, KH6's began to appear on *Twenty*, peaking at 0800 GMT or even later; they were soon joined by KM6, KS6, KJ6, VR2 and ZL1ABZ (Kermadecs), who was working Europe day after day, with no "ordinary" ZL's audible at all. It just shows what a few hundred miles will do for one.

There was a slight lag, as always, before the 'chasers caught up with the good news, and some of the lucky ones who were in on the first Pacific openings reaped a rich harvest.

Along with this came far better openings in the late afternoons and early evenings; W6's and 9M2's could be worked with equal ease, although for the former the short path still seemed far better than the long way round. And, later, VK's and ZL's emerged from their hiding places and were no longer rarities over either path.

In short, *Twenty* is (or was, at the time of writing) in business again, in a big way. And, most delightful of all, some of the liddery thereon faded down to quite weak signals. Just a taste of joys to come?

So much, then, for September, and, for those who thought August was poor, W5QK reports that he worked 113 DXCC countries during that month, all on CW, and all but one on 14 mc. (And to put this in some kind of

perspective, don't forget that it *used* to take anything up to *five years* to attain the heights of DXCC, with one hundred worked.)

Beating the Pile-Up

G3RFH (Highbridge) was urged to write about pile-up operation by the recent notes on full CW break-in working—and he should know, since it was he who operated VP8HF from the South Sandwich Is. last year. Ken says "the operator who got through was the one who just sent his own call sign *once*, immediately I had finished transmission." And he didn't need a crashing signal . . . just a slick change-over, since "the pile-up reached a crescendo about two seconds after my 'K'—just long enough for a good operator to get his call sign off *once*."

The people who just kept on sending "VP8HF" a dozen times or more got nowhere . . . if a station was on the pile-up frequency it was obvious who he wanted. Choice of frequency was

important, too—Ken says he used to listen right on the edge of the clutter, where there was always someone standing out more than the rest.

All QSL's for VP8HF/MM have now been sent off, and Ken is waiting for Naval permission to operate from the married quarters, where space is a bit limited and he will use a multi-band vertical.

Piracy

How do you sort this out? G3SVI (South Benfleet) worked G3SQX/A at Bognor, but shortly afterwards he received a QSL from G3SQX stating that he had worked a pirate. Later, he had another from G3SQX confirming a QSO on July 2, but this had not happened, and so he had to write back to G3SQX stating that he, too, had worked a pirate! Several other Top-Band cards were received—all for QSO's that had never happened. G3SVI now wants to meet "Gerry" and hand over the cards—personally! [over

ZONE-BAND TABLE

Station	Zones Worked						Total Zones
	28 mc	21 mc	14 mc	7 mc	3.5 mc	1.8 mc	
G2DC	40	40	40	36	25	5	186
W6AM	36	39	40	37	23	9	184
G6QB	38	40	40	34	20	7	179
G3IGW	36	38	38	32	18	11	173
G3DO	39	40	40	25	24	2	170
OH3NY	32	30	40	25	10	7	144
G3NOF	34	38	49	9	8	1	129
G3PEK	2	21	35	30	17	4	109
G3RDC	3	14	38	11	3	1	71
G3OLN	2	7	11	16	3	4	42
G3PLQ	1	8	7	3	3	5	29

(Entries for this new table are invited; scores are post-war, i.e. starting from any time back to January 1946.)

G3JHY (London) is another who has been getting DX cards for non-existent QSO's, and points out that he works on one band only, thus giving the callsign-filcher a choice of bands upon which to hang himself. QSL's have been "suitably acknowledged" and the GPO notified.

Easier for SWL's?

G3PQF (Farnborough) strayed into our "SWL" section and found some of the listeners saying that there was no shortage of DX. "Certainly there isn't," he says, "for an SWL who just wants the callsign and nothing else." He suggests that when some of the said SWL's join in the competition for a DX QSO, they may find out how rough the going really is. And he adds that he would welcome reports from listeners more than 20 miles away on his SSB signals on 28,400 kc . . . he has plenty of blank QSL's ready to acknowledge worthwhile reports.

Laurie Margolis (Ilford), who is an SWL but also the son of G3NMR, sends a list of the countries he has heard recently on ten metres—nearly 30 European prefixes have been logged, with a total of some 200 stations, as well as the DX log, which includes 9Q5, 5N2, VQ2, 5Z4, 5A4, HZ2, UL7, 9G1, 5H3, 5X5, 4X4 and 7X2. Nearly all of them were heard between 1400 and 1900 on a Mohican with a 60ft. wire. Hardly a "dead" band, is it?

G3LQI (North Kyme, Lincs.) would welcome the idea of a Counties Worked table for Ten Metres—chiefly because it might encourage a greater number to migrate from One-Sixty to Ten. We are going to take this up, starting in a month or so. The Activity Periods certainly attracted lots of people on to the band who, otherwise, wouldn't have bothered with it; now that they have "discovered" it, they are listening and putting out the odd call more frequently. If they would like a competitive interest of some sort to stimulate activity, let's give it to them.

Ten-Metre Locations

SWL W. H. Gundill (Dewsbury) modestly describes himself as a "Medium Timer"—he only

started in 1924! And he comments on last month's remarks concerning the fact that some receivers are not all that they might be. He writes "If you have ever toured around the deep narrow valleys in these parts, you must have realised that it is possible (in fact it happens every day here) for two stations both in the same town, however good their receivers, to have vastly different results. I would quote Halifax, although there are others; anybody living in the bottom is lucky if he can see more than 500 yards in any direction, yet, less than a mile away in the same town is a hilltop station wide open in nearly all directions. According to your reasoning, the low station has a dud Rx because he can't hear 'em (whereas his Rx is possibly good, and the hilltop bloke's poor!)." Yes, point taken . . . but there *are* instances of people in similar QTH's who have greatly different opinions about the band. And there are many who even *admit* that their receivers are not so hot on Ten.

SWL Gundill mentions two ten-metre items: LU1DAB working a G on phone, August 23, and a DL asking if GB3LER (the beacon station at Lerwick) was beaming East as well as N.N.E., because he could hear him. Incidentally, don't overlook the fact that GB3LFR is on 29005 kc. DLØAR on 29,000 kc and 5B4WR (but see later note about Cyprus) on 29,008 kc.

Intrusions

Day by day, it seems, we lose a few more kilocycles of our bands (even the so-called "exclusive" ones) to various Things that shouldn't be there. As for the "shared" bands, of course there's nothing to be done about *them*—but when you get a harmonic of an unlicensed broadcasting station causing intolerable QRM, what do you do? The Medway Towns and Kentish amateurs in general have been furious about the second harmonic of Radio Invicta (another of these purple-heart stations), which operates on 980 kc and apparently puts out at least half its power on 1960 kc.

G3ORP (Maidstone) sent along a lot of gen. about this one, and although there is reason to believe

that the transmitter was badly adjusted, and that things may now have improved, it is a sorry story in any case. (*Later*: We have been assured by those responsible that the trouble has now been rectified.)

On *Eighty*, at least half of the non-amateur QRM appears to come from queer stations that seem quite pointless. One such is an MCW outfit that sends **five dots — pause — five dots — pause**, interminably. One can hardly believe that it is a beacon or that it serves any useful purpose at all—it's simply a "noise" to stake a claim to the channel. And as for those chirpy things that seem to emanate from the French police . . . have they been buying up some surplus from the 1914-18 war, or what? But they can be shifted, as we have proved to our own satisfaction several times—just a carrier on the frequency sends them into complete confusion. (The receivers must be of the same vintage as the transmitters!)

Intruders in the exclusive bands (such as *Twenty*) can also be shifted. G2DC (Ringwood) mentions a "commercial pest" who tried to establish a channel on 14050 kc, signing EZH2 and calling UAJ55. He met with a very hostile reception and eventually moved off, which shows that we *can* help ourselves occasionally. Some teletype stations around 14020 kc have been known to pack it in when a good lusty amateur signal has parked on them . . . there must be many occasions when an amateur signal from the right part of the world can garble their copy with great ease.

But as for those broadcast stations on *Forty*! *That* really is the most flagrant defiance of all agreements, and the so-called exclusive amateur band (7000-7100 kc) is just a great big unfunny joke (after dark, at all events). Ah, well—all the more reason why we should all use ten metres a great deal more; or as soon as band conditions improve, we shall find *that* one full of hairy great commercials. There seem to be some there already, but who on earth they are working remains a mystery. "Keeping the channel open" is an absolute fetish with some commercial organisations.

They burn away kilowatts just to establish a squatter's right.

Back to the Dark Ages?

Direct from Cyprus, we heard that the Cypriot Government revoked all amateur licences on September 4. The local postmasters made the rounds of all stations to see that the QTH's on record were correct; and then, with a "police escort," went all round again, confiscating all transmitters and receivers. (Asked why they had to take the receivers, they replied "these sets are capable of receiving messages from foreign countries.")

The amateurs on the camps in the Base Areas have not had their gear confiscated, but no transmission is allowed; all that the others have is a receipt for the gear and a vague promise that they will get it back "when it is all over."

We don't want our informant landed in jail, so he remains strictly anonymous. And he and all the other "deprived" 5B4's have our sympathy, and best wishes for their return to a civilised country.

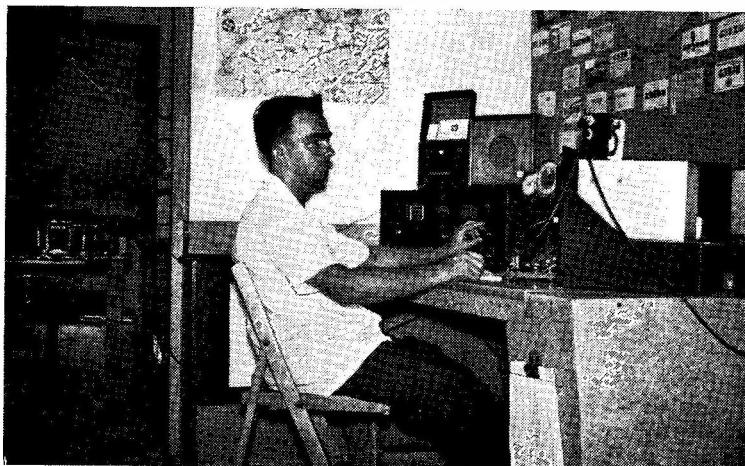
DX News from All Over

All sorts of exotic spots are now regularly on the air—countries that no one had ever thought of working a few years ago. FB8WW and FH8CD (Crozet and Comoro Is. respectively) are two good examples; and there has been a spate of operation from FP8, with FP8CK covering Eighty and One-Sixty as well as the HF bands. FP8CA has been very active on Twenty, too.

KS6BN has really been putting Samoa on the map, both SSB and CW; KC6BK has been on every day on SSB; and W5VWU/KJ6 has been kind to everybody by operating SSB and CW on alternate days.

The Singapore boys have just about got used to signing 9M4 now—they have kept their original call letters and just substituted 9M4 for VS1. (In fact VS1ME did just that during a QSO with G3HDA at midnight, local time, on August 31, when the change came into force.)

Gus, W4BPD, is *not* going to the Caribbean, despite rumours to that effect—he is returning to AC3, as previously announced, but may pay a few unscheduled calls.



When Denzil Roden, G3KXF (Lancing, Sussex) was in Malta, he signed ZB1BX and this is a picture of the station of the Safi Radio Club, where they have an AR88D and a 150-watt Tx for 10-15-20m. Actually, the club now needs another operator to take G3KXF's place, as the gear is all there with nobody to put it on the air! There have been a good many posting movements amongst the ZB1's recently, several of whom are either home on leave or off to other prefix-parts.

VU2NR is due in the Andaman Islands in November, for a stay of several months. He will take his SSB gear along for some activity under the VU5 prefix.

G3NIR promises some pretty exotic operation from late October onwards, and the present time-table looks like this: October 28—November 2, from VR2; October 3-7, from VR5; October 9-13, from YJ1; November 14-18, from FK8. He expects to be running his Vice-roy on 14112 kc SSB.

ZL4JF (Campbell Is.) is on Twenty and Forty CW most Saturdays, 0430-0600; there's nobody on Chatham Is. at present, and Ian, ZL1ABZ, is about due to leave the Kermadecs without an amateur operator, having done a wonderful job, especially in the last two months.

HK0QA is on SSB again from San Andres . . . FO8AA is reported on 14035 kc CW . . . KP6AZ is said to be very active on 7010 kc CW . . . PJ2SD has been heard on 21 mc AM from Saba Island.

Deception Is. (South Shetlands) is now represented by LU1ZC and LU8Z1, both around 14050 kc CW . . . VR4ED has been heard in U.S.A. on 7005 CW . . . HC8FN is occasionally on 21 mc SSB, 21-2200 . . . FK8AB has been worked on 7008 . . . VK9XI is on most weekends from Christmas Is., 14105 kc SSB, listening 14250-260.

New Marathon?

You can't keep the competitive spirit out of it! The Long Island DX Association proposes to start a contest based on *yearly* totals of confirmed QSO's, with prizes and certificates. More on this when we get the gen. (Fine idea for the lean years, but it might get a bit strenuous when the sunspots come to life again?)

W2GHK of Hammarlund has a new call in the bag for future use—OY2GHK! No details yet of dates . . . A very surprising one due to show up in October is W8NRB/UA under the auspices of the U.S. Information Agency ("Communications-U.S.A."). He will operate portable from Kiev until October 31, and again from Moscow during December and January, with Halli-crafters equipment.

Latest phoney with a supposedly comic call is NH4CL (chemists and dry-battery fanciers will recognise that one), claiming to be in Antarctica. Some people would even go back to a station signing H2SO4!

DX on Forty

If *Forty* is your band, all you have to do is—get out that spade and *dig*. There's no shortage of DX; just an excess of other things! Heard, recently, on CW (all 1800-2300):

FB8WW, JA6AK, VP8HJ, 9M2LO, 9M4LP, 9Q5AB, 4W1E, KG1AW, GP5EZ, ZS's. And on SSB: EP2AZ, OY7ML, VQ2WR, VS1LP, 5H3HD, 5N2JKO, 5Z4AA, OX3JV, ZS3HX, 9G1DV, FH8CD, OD5AX, VP6KL, 7Q7PBD (all evenings) and OA4KY, TI6CAL, FO8BJ, PJ2MI, TG9SC (mornings).

On the CW end, the W's break through quite early in the evenings, and do their share towards masking the DX, but it all makes it more interesting (or does it?)

As soon as the grass-cutting season is over, we know of some very efficient 40-metre ground-planes going up once more, and there's no doubt that DX'ing will be in full swing as soon as the dark evenings arrive.

TOP BAND COUNTIES LADDER

Station	Confirmed	Worked
<i>Phone and CW</i>		
G3REA	98	98
G3GGS	98	98
G6VC	98	98
G5JM	98	98
G2NJ	98	98
G3NPB	97	98
GM3KLA	97	97
G3LWQ	96	96
G3PLQ	92	94
GM3IKD	86	90
G3RHM	73	78
G3NOW	68	72
G3NLR	67	67
G3RTU	61	65
G3PPE	56	73
G3IDG	51	55
G3SNU	37	59
GW3ITZ	35	61
G3SJJ	33	65
G3SXW	23	45
<i>Phone only</i>		
G3NPB	87	87
G3RHM	69	70
G5JM	67	73
G2NJ	54	54
G3REA	53	66

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

General Chat

G3NYQ (Otley) was unable to get an EA6 (Balearic Is., Med.) licence on his recent trip, but he did unearth the information that EA6AF, 6AM, 6AI, 6AR, 6AS, 6AU, 6AV, 6AZ and 6BB are all licensed. He did some Top-Band listening through heavy QRN and noise; the only clearly identified signal was G3RBP at 1010 GMT, peaking S6 on CW. He also heard a G3IU? using a kite or a balloon in the West Country—this was on phone at 2345. On his return, G3NYQ had a small blitz on Twenty SSB and worked a nice bunch of DX, but is now getting ready again for the DX season on 160.

G3HAL (Winslow) comments on our mad friend Arabackle Oblifork's proposed tactics (communicating by unreadable CW). He has already found someone doing it . . . an F3— with his dots and dashes just about interchangeable.

G3OPI (Walney Is.) had visions of being the centre of many pile-ups, when he read about the Islands-on-the-Air Award. He is quite undoubtedly on an island (can you find it on your map?) . . . but latest gen. on IOTA is that they are going to draw the line short of small off-shore islands.

G3NWT (Stapleford) has recently gone through all the pain and pleasure of setting up in a new QTH. For a pretty spectacular reason, too . . . the M1 extension is about to devour the previous one. He says that having wired up the rig once more he decided to apply an earth. Immediate result—an enormous blue flash and the acrid smell of molten fuse-wire. A relay, never suspect before, made a low-resistance path between the live side of the mains and the metalwork of all the gear! Following this, a "shocking" episode with a soldering iron convinced Geoff that if you are going to start earthing things—earth *everything*.

Shortly afterwards a cat went missing, and was eventually found (we nearly wrote "run to earth"!) nestling on the HV power unit, with her tail on the relay that switches it on. In short, there's nothing like a new QTH for shaking one's ideas up!

Information, Please

G3IDG (Basingstoke) asks "Why are 'nets' usually anything but?" And we answer, "Why, indeed?" Lots of people still seem to imagine that 5 kc is quite a close tolerance—even on Top Band! So G3IDG continues: "Why, in phone QSO's, is every bit of information 'duly noted' at the receiving end?" Well, it's just another of those clichés, and we would be inclined to say that "All your remarks duly noted" really means "I heard most of what you said, but a lot of it was such a bore that I didn't really take it in." Finally (still G3IDG): "Why, in so many QSO's, do we have to put up with 'Ur sigs RST . . . , my QTH is Blankville, my name is Fred.' Why not a standard contraction to '569, Blankville, Fred'?" Everyone would know what that meant, so why all the *my's* and *is's*?" Well, in an ideal society, one could get a "standard contraction" adopted overnight; but only the more enlightened of the whole 350,000 of us would pick up an improvement in the first ten years, judging by the paleolithic behaviour of many amateurs even today. Go ahead and set an example—it will spread, but, oh, how slowly!

Top Band Notes

We have no doubt that in a couple of months the Top-Band News will be occupying at least a couple of columns once again—this will surely be the best winter of them all for DX on One-Sixty. Meanwhile, G3RBP has worked ZE3JO (increasing the number of "possibles" from the U.K. to 88); VQ2W is QRX every Monday, 2030–2115 GMT; K1KSH was on the band from Pakistan in mid-September (but no news at the time of writing); and 9M4LP (*ex*-VS1LP) hopes to work G's on SSB this season.

9L1HX, on 1838–1840 kc himself, tunes 1804 kc for Europeans at 2100 GMT; and G3PLQ has had a personal chat with 9G1DV, who promises to be on for the DX season—as soon as his licence for the band arrives. Activity from various parts of MP4, and from Saudi Arabia, is also promised. So, already, there's plenty to go for, for those with the aerials and the patience.

On the home front, G3REA (Warrington) joins the top rung of the ladder with 98/98, thanks to GM3KEP/P in Kirkcudbright. Other QSO's included EI4AS/M, EI5AP (Killarney) and GM3RHP/P (Raasay Is.) G3REA says it's remarkable how many counties you have to work twice, in order to get the necessary confirmation.

GI3CDF (Portadown) writes to say that as activity from Co. Fermanagh has been virtually *nil* on all bands, a little expedition has been arranged. From 1800 on October 10 until 2359 on October 11, six operators (including GI3RKE, now resident in Fermanagh) will keep up activity on Top Band, Four and Two. The Top-Band station will be GI6TK/P; operation will be mainly on CW, but phone will be used when the occasion demands. QSL's will be sent to all contacts and outgoing cards should be sent via GI3HXV. Skeds can be pre-arranged by writing to GI6TK.

More Strays

GI3CDF remarks in his letter that conditions on Forty have been excellent in the mornings; in the evenings QRM is more troublesome. On the morning of September 12, he worked fourteen VK's on SSB, with reports of S5 to S9! Another excellent signal in the mornings is VP6KL. In the evenings, Les thinks anyone ought to be able to make a DXCC in a few weeks. But he's still looking forward to the full opening of the 80-metre season . . . that is his favourite band, on which he already has 106 confirmed on SSB.

GM3JDR (Sutherland) has built himself a new transmitter, using a mechanical filter and a pair of 6146B's. The previous one was for 14 mc only, so Don is now renewing his old acquaintance with 21 mc—and finds SSB stations pretty few and far between. But he has pulled off SSB-to-AM contacts with 9Q5, TJ8, 7X2, 5A1, 5B4 and the like—all in one week and on a dipole. No shortage of DX on 14 mc either . . . mostly on SSB but including a few JA's on CW.

G2HFD (London, S.E.3) performed his usual "summer sortie" this year as a GD, instead of his

more familiar GC. For three weeks he operated as GD2HFD/A, using a KW-2000 and a home-brew linear. Aerials were a 41ft. vertical with radials for 40 and 20 metres, and a 250ft. wire. Operation mainly SSB, with a bit of CW. Results—700 QSO's in 71 countries, with "fairly leisurely operating, and time deliberately restricted to the necessity of providing the family with a good holiday." DX worked on both Twenty and Forty SSB included VS1LP, EP2BQ, 7Q7PBD, 9Q5AB, OY7ML, OX3JV and others; Forty alone provided contacts with VK2AVA, VQ2WR, 5N2JKO and ZS's; Twenty provided the bulk of the DX, too numerous to list. Six skeds were made and kept with ZS6BBB, and fourteen Johannesburg stations were worked. And it was an excellent holiday!

G2DC says he "had a nose round during the Labre CW Contest, but found few stations interested, and when I worked nine PY's on the trot on 21 mc CW, and not a single one of them was in the contest, I called it a day." And he tells us that OR4VN, a good signal on three bands, says he will be on daily. Best times, 0600 on 14 mc, 1100 on 21 mc and 0700 or 1800 on 7 mc. Finally "the new Quad is going strong—had rather a windy weekend and she rode it with a lazy indifference."

G3RHM is also beam-conscious, with a new Mosley TA-32 up 35ft. After getting it there, he worked more countries in eight weeks than in the previous two years. Examples (on Twenty SSB): HM1AX (1400), 9M2GF, 4S7IW, 9N1MM, VS9MB (all afternoons); XE1RM, YS2SA (both 2320).

Speaking of ten metres, G3RHM says that a local friend of his, G3SFZ, has worked 35 countries and 186 different G stations since January 1, with 50 watts of AM and indoor dipoles. And thence to One-Sixty, where G3RHM thinks that SSB activity will increase a lot. He was recently in a three-way with G3BA

and another station, all three using "translators" from 7 mc exciters. Possibly we shall have to run a WABC Ladder for SSB only, before this season is over? Once the DX shows up on SSB, some frenzied activity is certain.

Mystery Explained

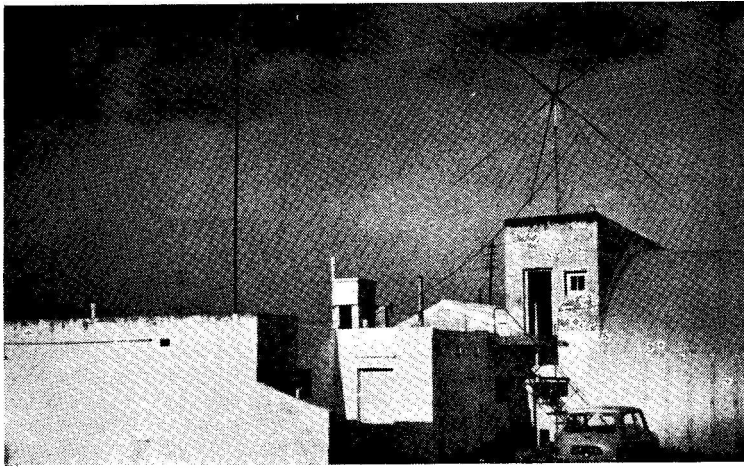
It's all clear at last! Your conductor missed it, to his eternal regret, but a friend saw it and passed on the details. It was a film of a Youth Camp in a country somewhere in Eastern Europe (not quite clear whether it was LZ, YO, UB5 or what . . . but one of those countries that licences "Klub" stations, anyway).

All the normal healthy youthful activities in full swing—hiking, swimming, athletics, tracking, cooking—and, then . . . what on earth is this? Why, it's a "Ham" station in a tent. Above it is a "piece of wire"; inside it is the station, consisting of an obvious Army-surplus type transmitter and receiver.

The transmitter is powered by a hand-generator, which itself is powered by a hefty lad on a stationary bicycle, pedalling like mad. Somewhere around the corner there must be a Morse class in full swing; probably a technical class as well. Because a string of boys approach the transmitting tent to "have a go" on the key. One only sees them pounding it with great enthusiasm, but one can imagine the precise sound that emerges (somewhere on Twenty, no doubt) as the latest graduate rips off a fast CQ and the boy-on-the-bicycle finds his calf muscles tiring. What, no stabiliser tube? Use a smaller boy, we're getting too many volts off this one!

According to the commentary, there was great competition among the lads to see how many countries they could work in a given time. Those who got the best results were rewarded by a Diploma of International Communication—regarded as half-way house to a plum job in

Reporting the HF Bands



This picture is of the aerial arrays left behind by G3KXF (ex-ZB1BX) at Safi, Malta. The assembly includes a three-band Quad, a ground-plane for 40m., and an 8KW multi-band dipole—quite a nice assortment for anyone to take over!

Electronics or Communication thereafter. And there was a hint that those who made out best would, at the very least, receive a grant towards their education.

According to our informant, there seemed to be little joy about the whole business . . . all deadly serious. CQ DX, CQ DX, CQ DX . . .

Late Flashes

Top Band—VE's and W's audible every weekend, 0500 onwards. *Eighty*—ZL's now appearing, both CW and SSB, early mornings. *Forty*—KH6's and KL7's around 0600, W6's occasionally, Caribbean and

South America around midnight and again in early mornings. *Twenty*—wide open for almost anything.

KC4USN is operating Twenty SSB from the Geographical South Pole, using Collins gear and a rhombic. Queer thought—whichever way you erect a rhombic there, it must be facing North!

TR8AD is on Twenty CW and Fifteen SSB; TZ2AF also reported on Twenty CW . . . VQ8AM will be signing VQ8AMR from Rodriguez Is. in November, all modes.

Too late now, probably, but there should have been activity from Cambodia (W9WNV/XV?) during

late September. Also from Kure Is. (WA6ZIQ/KH6), same period. Hope you found them.

Reference comments p.421 September, OY7ML (Torshavn) writes that LA2VF, OZ1JB, OZ7BL and OY7BS are "just plain pirates," as at present neither Norway nor Denmark licence for Top Band. The real OY7BS has been in Siam for seven years, and the other three ginks are probably "jokers" in the U.K.! However, OY7ML himself hopes (genuinely) to be on 160m. this coming season.

Sign-Off

Next month's offering will be largely written from a rather exotic spot, and it may not be possible to make use of the normal volume of letters that come in. But please do send anything of more than usual interest, by the usual deadline, which will be **first post on Monday, October 19**. After next month we resume the routine and also start a Ten-Metre Activity table, so get your figures ready for Countries and Counties Worked since June 1, 1964. And how about some new entries (there must be lots who qualify) for that Zone-Band Table? For the present, though, your conductor is going QRT for three weeks or so. Address your letters for next month, as usual—"Communication and DX News," *Short Wave Magazine*, 55 Victoria Street, London, S.W.1. And until then, 73, Good Hunting and—BCNU.

GETTING INTO THE MARKET

Whether you are trading, or are a private buyer, *SHORT WAVE MAGAZINE* gives by far the largest coverage for advertisers interested in the U.K. radio amateur market. This is, by its very nature, highly specialised—as a glance through Readers' Small Advertisements in any issue of the *Magazine* will show. As it is true to say that there is "Always a market for a Rolls-Royce or a Bentley," so it is true that radio apparatus of any sort—provided it is right in the Amateur Radio context—can be sold through the advertising pages of *SHORT WAVE*

MAGAZINE. This applies equally to a manufacturer in a large way of business, or to a small firm just starting out to produce some specialised item of gear for the radio amateur—or a private advertiser wanting to sell or exchange apparatus. Through our Small Advertisement columns, many £100's worth of equipment changes hands every month. There is a large and bouyant market in the specialised equipment for amateur-band operation—transmitters, receivers and all the ancillary items. Whether you are a buyer or a seller, use *SHORT WAVE MAGAZINE* advertising.

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RTTY Topics

MORE NEW STATIONS COMING
ON—OCTOBER RTTY CONTEST,
RULES AND SCORING—
NOTES ON A. T. M. TEST
EQUIPMENT MODEL 1B,
AP.101455, FOR RELAY
ADJUSTMENT

W. M. BRENNAN (G3CQE)

This feature appears in alternate months, and is intended to keep the radio amateur teleprinter operator up-to-date on progress and the general reader informed as to what is happening and what is possible in this sphere of AT-station activity.—Editor.

THIS month sees the start of the indoor season, when much more time is spent in the shack and RTTY activity really begins to get under way after the Summer lull. The World-Wide RTTY Sweepstakes Contest commencing on October 17 will certainly give the season a good send-off; this year the contest will no doubt break even more records, since there are again more countries and stations on RTTY. Later this month, at the International Radio Communications Exhibition, G3BPT and G3IIR will be running an "On The Air" RTTY station which should give the uninitiated a chance to see what radio T/P operation is all about.

The past few weeks have not, however, been uneventful, and there is quite a bit of news to report. More new countries have recently joined the ranks of the keyboard pounders and they should help to make the Sweepstakes Contest more and more of a tussle. Close to home, the first GI-to-G two-way RTTY QSO took place recently between G12AFW and G2FUD and at the same time G15AJ was printing the contact. Both GI stations are now active on 80m. and they make a very welcome addition to the list of active European countries. G13GQB, G13GXP and G13HCP should also be joining in shortly.

The RTTY population of Denmark rose from three to 55 almost overnight as a result of the release of a number of Creed 7B T/P's by the Danish Post Office. Two of these machines found their way over to Greenland with the result that OX3KW and OX3SL are now adding that prefix to the active list. Some of the OZ stations on are OZ1NA, 2JZ, 2OR, 3LR, 3PL, 4AU, 4AR, 5BA, 5LY, 5PE, 5PR, 5RU, 6AL, 6BM, 6ER, 6OJ, 7LM, 7ST, 7YK, 8RA, 8RH, 8SN, 8US, 9FM, and 9NK!

There are also reports of several new French stations and F9RY/FC has been working a large number of W's, providing them with a new country. FG7XT reported printing a signal signing VQ8OM but was not able to make contact with him before band conditions changed and signals faded out. FG7XT was in fact planning an RTTY DX-pedition for the early part of September when he hoped to operate from St. Martin, St. Bartholomew and Aruba, using a KWM2 and a small Siemans tape printer with a transistorised T.U. At the time of writing, however, there is no news of this enterprise. Two new stations in Asia, recently worked by DL3IR, are KA5MC and KA9MF. It seems there is now quite a fair RTTY population in Asia, certainly sufficient to make the RTTY WAC very much easier now than two years ago. Before long 9M2CR, who is at present building a T.U., hopes to put Malaysia on the map for the first time. Still in Asia ex-KZ5DS has now moved to Taiwan (Formosa) and intends to carry on with his RTTY activities from BV1USC this autumn and perhaps in time for the S.S. battle. The hardy bunch down-under, namely ZL1WB, ZL3HJ, VK2EG, VK3KF and VK4RQ are all highly active and have started looking for European QSO's on 7020 kc as well as the usual 14090 kc spot where they have been working into Europe very consistently for the last two months. Across the other side of the world, LU1AA mentioned that there is now a Bolivian station on the keyboard. YV5AFA has moved to an apartment at the top of a 150ft. high block of flats and has parked a 20m. six-element beam on a 60ft. tower on the roof. This should give his 1 kW RTTY signal quite a nice send off!

World-Wide RTTY Sweepstakes Contest

This annual event is perhaps the real highlight of the year as far as most RTTY operators are concerned. It gives everyone a chance to work a little DX and produces a very high level of activity. Although not everybody can spare the time (or has the gear) to enter the contest seriously, everyone can help to make the event go with a bang by putting in *some* operating time during the contest weekend. The rules this year are the same as previously, and are as follows:

The contest starts at 0200 GMT on October 17 and runs through until 0200 GMT on the 19th.

Contacts are permitted on the 3·5, 7·0, 14·0, 21·0 28·0 mc bands only.

Stations may work each other only once on any one band, although additional contacts are permitted on different bands.

A country may be claimed each time it is worked on a different band. On the other hand each of the U.S. States may only be claimed once. For the purpose of this contest, KH6, KL7 and VO are counted as countries. All other countries will be as listed in the A.R.R.L. Countries List.

Message exchanges between stations must consist of the following: (1) Message Number. (2) Report (RST). (3) Time in GMT. (4) Country or State. [over

Scoring

All two-way RTTY contacts by countries other than those in North and South America score ten points. All stations score 200 points for every country worked other than their own. The total score is the number of exchange points multiplied by the number of States worked *plus* the number of country points multiplied by the number of Continents worked. For example :

30 QSO's x 10 = 300 points, and 20 Countries x 200 = 4,000 points. Making

300 x 10 (States)	3,000
4,000 x 4 (Continents)	16,000
Final score	19,000

Logs should be sent to: RTTY Inc., 372 West Warren Way, Arcadia, California 91007, U.S.A. In order to qualify, they must arrive before November 27, 1964.

All contestants are invited to submit logs even if they show only one or two QSO's. It should be remembered that *all* logs are of help to the contest committee and of interest to every participant.

Useful Addition To The Shack

In recent months, RTTY enthusiasts in this country have been fortunate in obtaining a number of different surplus items suitable for amateur RTTY purposes. For example, no less than four different types of terminal unit have been available at one time or another and at least one type of FSK exciter. The photograph shows still another item well worth a place in the shack. It is in fact a piece of test gear for adjusting polar relays to a very high degree of accuracy and also to measure telegraph distortion on a T/P signal. Manufactured by the Automatic Telephone & Electric Co. Ltd., this apparatus goes by either of two titles, one being "Transmission Distortion Measuring Set and Relay Tester Model 1B," and the other (the Services title) of "Cathode Ray Relay Test Set AP.101455."

Basically, the instrument consists of a small cathode ray oscilloscope with a circular time-base which is provided by three ECC35 valves. The signal under test is injected at the CRT grid either as a square-wave or as a spike from a differentiating network and the resulting trace registers the information about the signal. There are in fact two models of this piece of apparatus, the 1A which will deal with signals at speeds of either 75 or 50 bauds and the 1B which handles signals of 50 or 45.5 bauds. This latter is of course the most useful to amateurs, although the difference between the two models lies purely in the time-base speed, and since to change this merely means replacing three small components, the Model 1A should not be overlooked.

This instrument is intended to test Carpenter Type 3 relays and a socket for this type of relay is provided on the front panel of the apparatus. However, any other type of polar relay can be tested with the aid of a base adaptor. The relay

under test is energised from a 50 c/s source and the contacts connected so that a dot appears on the circular trace on the CRT each time the relay tongue touches. With a completely bias-free relay the dot produced from each side-contact will be superimposed on the other. Thus, a relay with bias will show two dots some distance apart. The relay is merely adjusted until the dots coincide. Since a bias of only 1 per cent gives an angular displacement of 7.2 degrees between the two dots, it can be seen that a really high degree of accuracy can be achieved. In addition the relay contact and transmit time can also be checked and any contact bounce is readily apparent on the CRT trace.

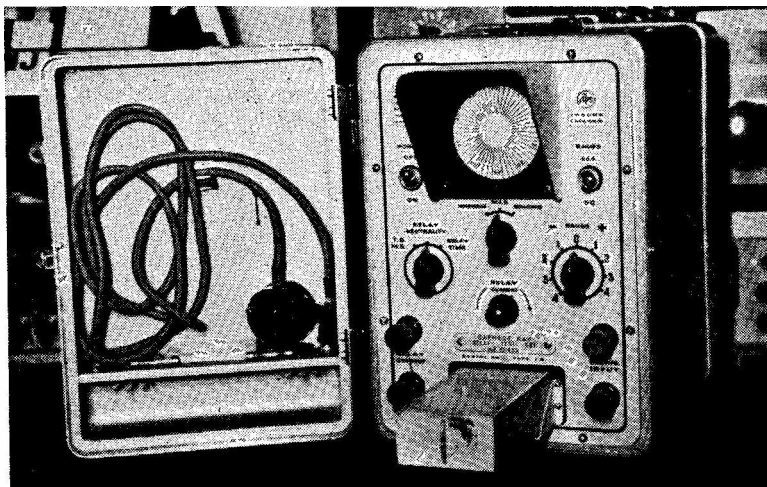
Distortion Testing

In order to measure Telegraph Distortion, the signal must be derived from a steady source—such as a tape transmitter or a T/P running at maximum synchronous speed, as when the transmitting cam dent is lifted and one of the keys is pressed. The signal under test does not have to be repetitious, or of reversals, so long as it is transmitted at full speed. A spare Carpenter Type 3E1 polar relay is provided with the set for the purposes of Telegraph Distortion measurement. The relay is plugged into the socket on the front panel and adjusted for bias free operation. The signal to be checked is then fed to the operating coils of the relay and the output from the relay contacts arranged so that a differentiating network provides a sharp pulse each time the relay makes with either of the side contacts. The resulting pulses are applied to the CRT grid and the steady trace is suppressed. This produces a bright dot each time the relay makes contact. The circular time-base is then adjusted for frequency so that the trace completes two revolutions of the CRT for each element of the telegraph signal. This allows for the 1.5 unit stop pulse and gives a total of 15 revolutions of the trace for each T/P character. In the absence of any telegraph distortion, all the reversals in the signal and thus all the bright dots will occur at the same point of the trace and be superimposed. Any distortion will show up as a scattering of the dots and the degree of scatter is directly proportional to the distortion. This can be measured direct from a scale provided on the CRT mask. Of course, for these tests the time-base must be in synchronism with the speed of the machine under test. For adjustment purposes there is a fine frequency control directly calibrated in bauds and gives an adjustment of \pm four bauds. A separate switch gives the two normal operating speeds of either 45.5 or 50 bauds. It is useful to note that, since the time-base of this apparatus is accurate in frequency to \pm 1 per cent, it can be used to measure machine speed also with a pretty fair degree of accuracy.

Obviously, then, this is a piece of gear which should prove invaluable to the RTTY operator. Moreover, there is no reason why, with a little care, it could not be used for checking incoming signals from other RTTY stations. Care must of course be taken to ensure that the signal is first of all correctly tuned in and that any T.U. and relays

before the TDMS are themselves correctly adjusted. Furthermore, with a little modification, this unit could also be pressed into service as the station RTTY tuning 'scope whilst still retaining its usefulness as a test instrument, thus making it an even more useful item for the shack.

Finally, there is word from one GW correspondent who says that he hopes to be on the air with RTTY shortly, but bemoans the fact that his QTH is rather a long-winded thing to send on a keyboard, being some 22 letters long! Since there is a complete lack of RTTY activity from GW it is to be hoped that a slight disadvantage of QTH does not put this budding RTTY op. off altogether! After all, his QTH could be that well-known spot called LLANFAIRPYLLGWYNN etc. Just imagine "The QTH here is . . . !" Imagine also the difficulties one might have in trying to persuade the RTTY operator at the other end that the garble wasn't in fact garble—that there was no CW QRM on the channel!



The A.T.M. Transmission Distortion Measuring Set and Relay Tester, Model 1B (AP.101455 in the Service nomenclature) as discussed by G3CQE in his article this month. It is an extremely useful piece of test gear and is shown here with a polar relay plugged into the Relay Test socket.

See you in the S.S. Test. Please try to put in at least a couple of hours' operating to give those contest types something to get their teeth into. And, of course, don't forget the earplugs and the aspirins. Till December then—73 de G3CQE.

SPECIALLY ON THE AIR

We seem to be getting to the end of the special-event arrangements for this year, though this space is always available for any such considered to merit advance publicity.

GB3UCL, October 5-15: Operated by the University College, London, Amateur Radio Society for the College Freshers' Conference, running all bands 2-80m. Contacts with other College and University stations will be specially welcomed. An appropriate QSL is being issued, and the QTH is: D. J. Bradshaw, G3SUX, Amateur Radio Society, University College of London Union, Gower Street, London, W.C.1.

GB3BPH, October 16-18: The Baden-Powell House Scout Amateur Radio Station, operating four transmitters covering all bands 2-160m., looking for other Scout stations taking part in the Jamboree-on-the-Air. GB3BPH will be in the foyer of Baden-Powell House, Queen's Gate, London, S.W.7, and visitors will be very welcome.

HB9RAS, till October 25: All-band operation will continue as previously notified (see p.429, September). Visitors welcome at the Hotel de l'Europe, Lausanne, Friday evenings, 8.30 p.m.

GB2SFW, November 30-December 4: Operated by members of the University College of North Wales Amateur Radio Society, Bangor, for the 1964 Science Festival in North Wales, running CW/AM/SSB on all bands 2-160m., contacts and

(informative) SWL reports to be QSL'd by special card. QTH: R. L. Dilworth, GW3NWD, University College of North Wales, Bangor, Caernarvonshire.



The new PACO V.70 Valve Voltmeter employs a balanced bridge circuit for maximum sensitivity and stability. This instrument has seven DC and AC ranges covering up to 1500v.; a range of 0-4000v. peak-to-peak; an ohmmeter coverage of 0-1000 megohms; and can make decibel measurements between -6 dB and +66 dB. It is £22 12s. nett, and is available in kit form at £20 8s.

VHF BANDS

A. J. DEVON

AS this is being written, a great yellow moon is climbing into a clear night sky, with just a few thin cloud layers, a high barometer and falling temperature—just the Wx condition to presage a late-evening opening on two metres. And, of course, it came, as on a number of occasions during September.

Indeed, we have been having it pretty good this back-end (as we in the country say of the harvest) and it is beginning to look as if the autumn is going to produce the best of the year's conditions on VHF—as has so often happened in the past. However, few short-term openings ever recorded have been better than that of Tuesday, September 1st, when the Lerwick (Shetlands) beacon GB3LER on 149.995 mc was S9+ in the southern part of the U.K., holding steady for hours on end. In fact, this most remarkable, tropospheric condition lasted for the best part of 12 hours, from early on the Tuesday till late into Wednesday morning, 2nd. Conditions over the U.K. continued good until the evening of Friday, 4th, when GB3LER was still being read in the London area.

The main opening was missed by a great number of people. One of the exceptions was G5MA (Gt. Bookham, Sy.), who from 2145 to 0030 worked GM3BOC/A (Sutherland), GM3GUI (Angus), GM3FYB (Fife), and GM2FHH (Aberdeen) on CW and phone,

getting a second (solid two-way phone) QSO with GM3BOC/A at 2347. Bob stayed on until 0130 and also worked SM6ANR and SM6CSO—as the times given here are GMT, the probability is that many people, having turned in before midnight, missed the best of the opening.

Unfortunately, GM3JFG (Invergordon) was apparently not on for the occasion—at any rate, we cannot find the reverend's callsign in any of the GM/DX worked reports—which is a great pity, as unquestionably it would have been a field-day for him, there being very few G's who have ever worked Ross-shire!

By September 4, the eve of the IARU Region 1 Contest, conditions had begun to fold in (how often *this* happens), and though on the Saturday evening of the contest, 5th, a number of the /P's were able to work EU's for good scoring QSO's, by Sunday, when activity was at its highest, conditions were no better than average. And it rained on the /P's on Saturday night. Conditions then proceeded to pick up again during the week immediately following the contest and continued good for GDX, even if variable, until it was time to write this piece. The contest itself followed the usual pattern for these events, the scoring (in terms of stations worked) being generally on the high side. For instance, G3OHF/P (Leek, Staffs.) raised 220 stations on two metres, covering 9 countries, 50 counties, and 70 /P's. G3BAK/P worked 4m./70 cm., also for the North-West VHF Group, and found things rather disappointing on both these bands. But the seven members of the Group running the two stations had a good time, and feel that their score totals justified the effort—which they later celebrated by a dinner-and-natter at Oswestry, attended by 30 or so VHF types from around those parts.

More EDX by MS

There is no doubt that those who know how to use this propagation mode do get remarkable results. Gaby Felix ON4FG (Bornem), has succeeded once again with another new one

—during the August Perseids, he worked UP2KAB, 05-09 GMT on August 11, the path both ways being exceptionally good on this occasion, with long sustained periods of signal—so much so, says Gaby, that one could “nearly carry on a normal QSO.” He thinks that possibly the MS reflection was being helped by some tropospheric back-scatter and that actually both modes were in action together. At any rate, while listening to the G3LTF-UP2ON sked, he was getting pings from G3LTF with his beam on UP2ON. Gaby has now put ON4FG on the 26th rung in Countries Worked—*very* well done! And he remarks that he has some good tape recordings of all these proceedings, including confirming records from UP2KAB of the Vilnius State University, Lithuania.

Harold, G5YV (Leeds) has not been idle either—he made a magnificent MS contact with YU1EXY on August 11, 20-22 GMT (Perseids again), with sustained bursts up to 50 secs. duration each way, signals being S9 at times. This likewise puts G5YV up one more, to 22 countries now worked—and very nice, too. Actually, he also had another very

TWO METRES

COUNTIES WORKED SINCE

SEPTEMBER 1, 1964

Starting Figure, 14

From Home QTH only

Worked	Station
34	G3GWL, G3HRH
28	G3AHB
27	G3CO
23	G2BJY, G3LAS
18	G3PTM
17	G2AXI, G3KWH
14	G3KQF

This annual Counties Worked Table will run till August 31, 1965. All two-metre operators who work 14 or more Counties on the band are eligible for entry. QSL cards or other proofs are not required. After the first 14 worked, simply claim from time to time with counties as they accrue, giving callsign and date for the county worked. To keep the Table up-to-date, claims should be made at frequent intervals. Operators new to VHF are particularly invited to join Annual Counties.

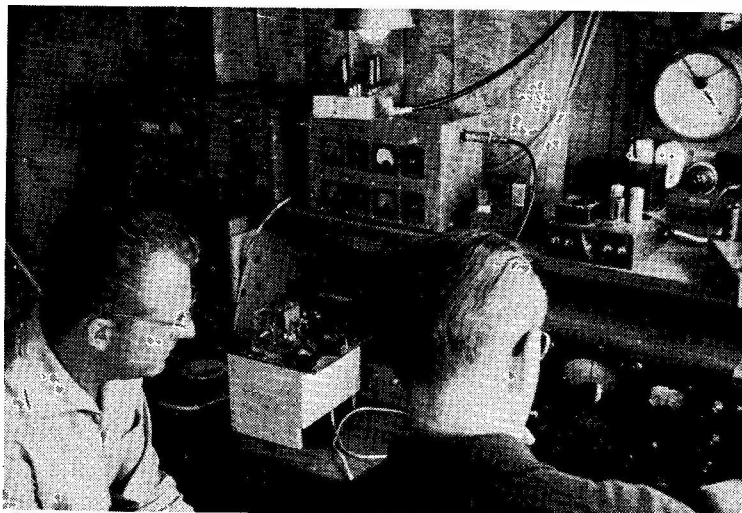
interesting meteor-scatter QSO, with SP5FM on August 9, though it does not increase his Countries score as Harold has worked SP by both tropo. and MS in previous years.

SWL M. J. Summers (Market Harborough), who knows about MS phenomena, sends us a list of those predicted for the next few months—indeed, the appearance of the following can be regarded as quite reliable: *October*, 9th Giacobinids; 18th-23rd, Orionids. *November*, 14th-18th, Leonids; and *December*, 10th-13th, Geminids. There are some lesser showers that may be effective on other dates, e.g. Taurids, October 31st-November 6th—and he adds that the best time to play this MS game is in the early hours of the morning.

The Tabular Matter

Final placings in Annual Counties for the year ending August 31st appear on p.490—from which you see that G3BA (Sutton Coldfield) is handsomely in the lead, with 74C. Tom was also leader in the '62-'63 Annual, but then he had 81C. The total number of entries in the Table for the last two years has been about the same, though whereas for '62-'63 six stations worked more than 60C in the year, this time it is only five, with a rather lower scoring rate. This reflects the generally poorer conditions during this year's Annual period compared with last time. Stations doing very much better this year relative to the '62-'63 Annual include: G3GWL, up from 42 to 60; G3NUE, 38-57; G2CDX, 24-41; G3LAS, 36-48; and G3IOE, 14-28. Two very new stations in this year's list who have hardly had time to score, yet who have done well since first coming on the air, are G3TEJ (Hunts.) and G3THC (Bucks.). And unique in the whole list is G2DHV/M, at 16C.

The new Annual has got off to a good start, with some nice totals of counties worked since September 1st this year—again reflecting the much improved conditions during the last few weeks. We hope to see a large number of new claims for this table as time goes on.



Operating position inside the cliff-top blockhouse used by F8MX/A at St. Valery-en-Caux, on the northern coast of France. On the upper shelf, left to right, are the 2m. exciter, 2m. PA, 70 cm tripler and PA (on top), 70 cm converter, 2m. converter, PSU and 1296 mc converter. On the lower shelf, left to right, are the modulator, 2C39A tripler to 1296 mc, and the SX-28 main receiver, on which all the tuning is done. F8MX (back to camera) does very well on VHF from this regular summer location. When this photograph was taken, by G3HRH, F9QW (left) was also visiting, from Paris.

Expedition News

The GB2GC boys (G3OUF, G3PSH, G3RRU and G3SHK) acquitted themselves very creditably from Alderney, on 2m./4m., giving many new contacts and scoring the GC/GW "First" for 70 mc, when they worked GW4CG/P on 4m. on September 5th. Incidentally, their visit has apparently activated GC3LPV, who lives on Alderney and is said "to have become very interested in the band."

We are informed that during October 10-11, a group of GI's will be taking GI3CDF/P (4 metres) and GI3KYP/P (2 metres) to the pretty rare GI county of Fermanagh. Operation will be continuous, 1800 10th to 2359 11th, mainly on CW but with phone available if conditions are suitable, and skeds can be made by arrangement with the ops. mentioned, who are *QTHR*. QSL's will be sent for all contacts made and SWL reports received. (Those interested should note that there are now only a very few days left in which to get skeds fixed; send an s.a.e.)

General Notes and News

There is a good deal of this. G3CO (Dartford, Kent) took a

quick holiday in West Wales early in the period and, with a 12v. transceiver and a 4-ele knock-up Yagi on four 3ft. mast sections, had an hour or so's operation most evenings, signing GW3CO/P, on three occasions from the exact spots used by G3BA/G4LU during their July tour. Jack says that though it was an interesting and rewarding exercise, with a number of good QSO's made, he thinks he could have done much better if (a) He had been able to spend more time on the air late in the evening, (b) Had fixed some advance publicity, and (c) Had been able to dodge round the band. However, having now developed a taste for GW/P working—even if on this occasion it did mean that he got home just in time to miss the week of tropo. openings—G3CO intends to have another go in the future.

An interesting letter from Harry, EI2W, who is fully operational on all bands 4m.-2m.-70 cm, and has now made yet another "First" (his 23rd for EI on VHF!) by working GC3OBM on September 13, this being the result of a series of carefully-kept skeds, with both-way reception on several occasions before contact was finally made. Harry also records

the first EI/EI QSO on 4m., with EI2A in Co. Meath. On two metres, a very fine 350-mile contact with GM3BOC/A (on holiday in Sutherland—and it seems to have been a very productive one, VHF-wise, for G3BOC this year) gave EI2W his 95th county for the All-Time, in which Harry is well in the lead—nice going! And on the 70-centimetre band EI2W's signals have been heard by G13KYP, also by EI4Q—so, as he puts it, "it is hoped to have two-way QSO with these stations at an early date."

GC3OBM (Guernsey) himself, writing a few days before his 70 mc QSO with EI2W, was able to claim 9C for the 4-metre table, with 16S as the total of different stations worked. GC3OBM (QTHR) would still like to make some 4-metre skeds, and says he is pushing the beam up to 30ft. for a better signal.

Writing with two-metre claims G8VZ (Princes Risborough) mentions that his regular schedule with G3JWQ (Ripley, Derbys.) though now cut to thrice-weekly, is approaching the 2,000-mark in terms of G3JWQ/G8VZ contacts made! Jack, whose other hobby is the Auxiliary Fire Service, says that always takes a good deal of his spare time, but he is able to keep the two-metre gear ticking over nevertheless.

As well as his successes during the early-September opening, Bob, G5MA, has been working some very nice GDX—he mentions EI2A, EI5AI/M for Co. Wicklow, G3BJD in Cumberland and G3BJD/P for Westmorland.

Multi-VHF-band man is G3LHA (Coventry), who is now active on 4m.-2m.-70 cm, and is able to claim in the tables for them all. Ray was there when the band opened on September 1, working GM2FHH and SM6BCD for two new countries, and remarks that the "SSB from GM2FHH was a joy to listen to, and no difficulty for a phone QSO." At the time, GB3LER was a good S9+ and much more EDX/GDX could have been worked to the north and north-east if the stations had been on—in fact, as several of our correspondents this month have said, a two-metre station in the Shetlands would have been a push-over from the Channel coast! G3LHA has worked more than 50S on two metres in the period, and about 30S on four metres, fixed and /P; his 4m. Tx takes a QQQ03-20A at 50w., and the Rx is a modified FM tuner.

G3GWL (Bletchley) found some EDX on 2m. during the week before the deadline, and G2AXI (Basingstoke) reports SM6BCD worked during the opening, with a number of other SM's heard at up to 59+ on CW. Incidentally, G2AXI runs 100w. of NBFM, and

TWO METRES
ANNUAL COUNTIES
FINAL PLACINGS
Starting Figure, 14
From Home QTH only

Worked	Station
74	G3BA
67	G3LRP
60	G3GWL
57	G3NUE, G3SAR
55	G3CO
52	G3PTM
49	G3AHB
48	G3LAS, G4LU
46	G2BJY, G3HRH, G5JU
44	G2AXI
42	G3SML
41	G2CDX
40	G3DVQ, G3PSL
37	G3KQF, GM3LDU
35	G3CCA
32	G3OWA
31	G3PKT
30	G3CKQ
29	G8VN
28	G3IOE, G5UM
26	G3GSO, GW3PWH
24	G2BDX, G3ONB, G3TEJ
23	GW3CBY
22	G3HWR
21	G3EKP
19	G3KPT
16	G2DHV/M, G3OJY, G3THC
15	G2DHV/P
14	G3OZF, G5KF, G5ZT

This annual Counties Worked Table closed on August 31st, 1964, for the year from September 1, 1963. Above are the final placings. The new Table for 1964-'65 opened w.e.f. September 1, 1964.

is doing very nicely with it, though for proper FM reception one needs a discriminator in the Rx; it is, of course, possible to take NBFM on an ordinary detector by tuning-off, but the result is not so good. The great advantage of FM is that it almost guarantees immunity from TVI, other things being equal.

G3KQF (Borrowash, Derbys.) worked some EDX when the going

TWO METRES

COUNTRIES WORKED

Starting Figure, 8

- 26 ON4FG (DL, EA, EI, F, G, GC, GI, GM, GW, HB, HG, LA, LX, LZ, OE, OH, OK, ON, OZ, PA, SM, SP, UA, UP, UR, YU)
- 24 G3LTF (DL, EI, F, G, GC, GD, GI, GM, GW, HB, HG, LA, LX, LZ, OE, OH, OK, ON, OZ, PA, SM, SP, UA, UR)
- 22 G5YV (DL, EI, F, G, GC, GD, GI, GM, GW, HB, HG, LA, LX, OE, OH, OK, ON, OZ, PA, SM, SP, YU)
- 21 G3HBW
- 19 G3CCH
- 18 G2JF, G6NB, ON4BZ, OK2WCG
- 16 G3BA, G3BLP, G3CO, G3GHO, G3KEQ, G5MA, G6RH, G6XM, PA0FB
- 15 G2CIW, G2XV, G3AYC, G3DKF, G3FZL, G3HRH, G3RMB, G4MW, GM3EGW
- 14 G2FJR, G2HDZ, G3AOX, G3FAN, G3HAZ, G3IOO, G3JWQ, G3KPT, G3LAS, G3NUE, G3PBV, G3WS, G4LU, G5BD, G5DS, G6LI, G8OU
- 13 G2HIF, G2HOP, G3AOS, G3DMU, G3DVK, G3EHY, G3GPT, G3GWL, G3IIT, G3LHA, G3NNG, G3OHD, G6XX, G8VZ
- 12 EI2A, EI2W, F8MX, G2BJY, G2CDX, G3BNC, G3GFD, G3GHI, G3JAM, G3JLA, G3JXN, G3OBD, G3WW, G5CP, G5JU, G5ML, G8DR, GW2HIY
- 11 G2AJ, G2AXI, G2CZS, G3ABA, G3BDQ, G3BOC, G3GSO, G3IUD, G3JYP, G3JZN, G3KUH, G3PSL, G3PTM, G4RO, G4SA, G5UD, G6XA, GC2FZC, OK1VR, PA0VDZ
- 10 G2AHP, G2FQP, G3BK, G3DLU, G3GSE, G3JHM/A, G3KQF, G3LAR, G3LRP, G3LTN, G3MED, G3OSA, G3OXD/A, G5MR, G5TN, G5UM, G8IC, GW3ATM, GW3MFY, GW5MQ
- 9 G2BHN, G2DHV, G2DLU, G2FCL, G3BOC, G3BYY, G3FIJ, G3FUR, G3OJY, G4LX, G8GP, GC3EBK, G13ONF, GM3DIQ, GM3LDU
- 8 G2BDX, G2DDD, G2XC, G3AEP, G3AGS, G3AHB, G3CCA, G3EKX, G3GBO, G3HCU, G3HWJ, G3KHA, G3PKT, G3MPS, G3VM, G5BM, G5BY, G8SB, GM3JFG

was good but, oddly enough, did not hear GM/OZ/SM. Sad note from G3LAS (Berkhamsted): "Finding SSB produces relatively few contacts, except from other SSB stations, am rebuilding for AM with 150w. into a QY3-65." Yes, that's what he says—yet your A.J.D. can testify to the excellent Sideband signal heard from G3LAS over the contest week-end, and easily resolved by proper use of BFO and RF gain.

G3KWH (Welwyn Garden City) mentions DX contacts with DJ and GC, and claims for the two-metre tables. G3OWA (Coulsdon,

Sy.) has been getting his share of the stuff on 2m.-4m. and, in fact, on the latter band has now worked no less than 176 different stations in 28C. And on two metres, with only 7w., his GDX includes GC, GI and GW. Gear for the 430 mc band is now in hand. GW3CBY keeps at it, with 122 different stations now worked from away down in Swansea, and G3AHB (Slough) is able to show a total of 28C already for the new Annual; he is getting a Tx ready for 70 centimetres, and has heard a dozen or so stations on the new A.2521 converter.

G3PTM (Solihull) writes in with claims for all the two-metre tables, including Countries, in which he now stands at 11C, with 451S in 16C for the All-Time. He is another who missed September 1, but nevertheless has worked some EDX, including F1CW (the phone-only station!). Gear for 430 mc is also in hand at G3PTM, with a converter already going and signals heard.

G3HRH (Welwyn) has made an excellent start for the new Annual, and is putting out a very fine signal—whether it is with that new VFO, we are not quite sure. Anyway, your A.J.D. has come to the firm conclusion that we must have more single-channel working, if only within zones (this would at least inculcate the habit of listening on one's own freq. first), because it is quite evident that cross-frequency operation is wasteful of both channel space and time—one can call oneself black in the face trying to raise someone in another part of the band, only to be told, when you do raise him, that your signal is S9++ and he can't understand why he didn't hear you the first time. All this takes up two channels and can last for half-an-hour or more. As things are now, many calls are fruitless due only to the search procedure losing CQ's and answers to CQ's. So let's start tackling the problem of rubber-crystals, and do it the modern way.

With time and space running out, we can now only acknowledge claims and first reports from G3DVQ, G2BJY, G3RDC, G3PQR and G3RTU.

And if you want to get advance

SEVENTY CENTIMETRES

ALL-TIME COUNTIES WORKED

Starting Figure, 4

Worked	Station
41	G2XV
37	G2CIW
36	G3JMA
35	G3KPT, G6NF
33	G3JHM/A, G3LTF
32	G3JLA, G3LHA, G3LQR, GW3ATM
31	G3JWQ, G5YV
30	G3KEQ
28	G3HAZ, G3HBW, G3NNG
26	GW2ADZ
23	G3BKQ, G6NB
21	G3AYC, G3IOO
18	G5UM
17	G3BA, G3BNL, G3MPS G5QA
16	G2DDD, G3BYY, G3MED
15	G2OI, G4AC, G4RO
14	G2BDX, G2HDZ, G3FAN, G5DS
13	EI2W, G6XA
12	G3HWR, G3NJO/T, G5BD
11	G3HRH
10	G3IRW, G3LZN
7	G2HDY, G3JHM, G3OBD/P, G6RAX/T
6	G3EKP, G3FIJ, G3KHA, G3WW
5	G3FUL, G3IRA, G3IUD, G3LTN, G5ML
4	G3JGY

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

gen. on *Oscar III* listen on Fridays, 0530-0700 GMT, on 3507, 7015 or 14030 kc (whichever you receive best) when the latest position is discussed, presumably on CW, for the information of all interested.

Deadline —

This must be **Wednesday, October 21** certain if A.J.D. is to get this piece cleared before Exhibition-time. So, till then or November 6, *Urs as ever es 73 de A.J.D.*

FOUR METRES

ALL-TIME COUNTIES WORKED LIST

Starting Figure, 8

From Home QTH Only

Worked	Station
49	G3IUD
47	G3OHH (169)
45	EI2W
43	G3EHY
37	G3PJK
33	G2OI, G5JU
32	G3NUE, G5FK
30	G3JHM/A, GM3EGW
28	G3PMJ, G3OWA (176)
26	G3LQR
25	G2BJY, G3AYT
23	G3BOC
22	G3LZN
20	G2AXI, GI3HXV
19	G3BNL
16	G3BJR, G3FDW, G3HWR
14	G3OKJ
12	G5CP, G5DS
11	G3LHA, G3SNA, G5UM
10	G2BDX, G3OJE
9	G3EKP, GC3OBM
8	G3PRQ

This Table records Counties Worked on Four Metres, on an all-time basis. Claims can be made as for the other Tables, e.g. a list of counties with the stations worked for them, added to from time to time as more counties accrue. QSL cards or other confirmations are not required. Totals in excess of 100 different stations worked can be claimed and will be shown in brackets after the call.

• • • The Mobile Scene • • •

MORE RALLY EVENTS REPORTED IN PICTURES—GOOD

ATTENDANCES IN GENERALLY FINE WEATHER

ONCE again, we are reporting recent Mobile Rally events in pictures—not because it's easier (and it is a good deal more expensive, with all those blocks!)—but because the many who are interested in /M working on the amateur bands seem to prefer it that way.

An idea to put forward now to next year's Rally organisers is that, on every such occasion, the local police should be invited to send a small representative contingent, with a radio-equipped car or motor-cycle, ready to answer questions and to give demonstrations—even of that "radar" speed-checking device now in general use. They should be asked to a Rally, *not* to look for trouble, but as guests, (a) To help work up a better relationship with the motoring public, which is so badly wanted, and, just as important (b) To give the police themselves some idea of what amateur /M working is all about, what is possible in the way of operating results, and how amateurs fit and use their /M gear.

By this time next year there will probably be about 2,000 U.K. amateurs licensed mobile, and the more the police locally know about what goes on, the better it will be for all concerned.

The close of the Rally season does not mean the end of amateur /M working till next year—far from it. Most /M's keep their gear on board and ready to go on the air all the year round. Many new equipments will be planned and installed, and we shall be running articles on the subject of Mobile during the coming months.

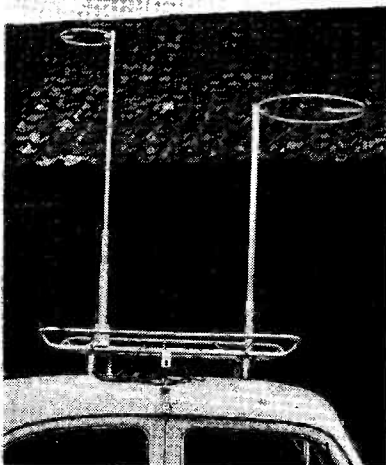
And now, a final reminder about dates for next Season: The R.N.A.R.S. have booked *May 30*, and the Derby & District A.R.S. *August 15*, for their 1965 events. With such long notice, there should be no clashing, as happened so unfortunately this year. Indeed, we shall be glad to publish firm dates as they come up. But please *don't* book a date unless it is intended to keep to it and put on a large all-comers effort.



Can you find yourself here? Taken by G3GMN at the Derby Mobile Rally on August 16, when they had an attendance estimated at about 700 people in some 250 cars, of which 170 were fitted mobile. This is always a very well supported event in the Mobile Calendar, for which this year the weather was mainly fine.



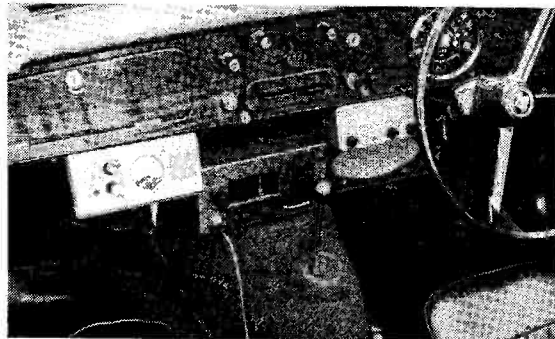
If you look closely at this, you will see that it is (or could be) an inverted plastic funnel—it protects the loading coil on G3RRL's whip aerial. *A G5CP print*



The miniature-halo system for two-metre mobile (left) and four metres, developed by G4AC/M, Woodbridge, Suffolk. An article covering his design is in hand for publication in an early issue.



General view of the Cannock Chase Mobile Rally on August 23, when they had 35 cars out of the 75 present fitted mobile. G3RXC/P on 160m. talk-in worked 23 of them on to the tarmac of Hednesford Camp, one of the highest points on Cannock Chase.



The very neat /M installation fitted in his Triumph Vitesse sports car by G3IGW (Halifax). The main units are of Mini-mitter manufacture. *A G3MZC print*



Personalities seen at this year's Derby Rally. Left to right G3JXL, G6XM (ex-DL2XM), and G3EKL. *A G5CP print*

The new Webster Type W-600 Band Spanner is a VHF design, with a 5/8th-wave whip length and an adjustable loading coil (by an ingenious barrel-lock arrangement) to give resonance at frequency. Three models are available for coverage in the range 144-470 mc, each giving an all-round gain of about 3 dB. The mounting is a single 7/8-in. hole. The U.K. agents for Webster products are Ad. Auriema, Ltd., 125 Gunnersbury Lane, Acton, London, W.3.



*Photographs on
this page
by G3AGP*

A row of mobiles — this could be the scene at any English rally, but actually it is of a French occasion, near Saujon (Bordeaux), on the Atlantic Coast, and all those /M's were on 80 metres. Among the 40 or so F's present (middle group photograph) were several F7's (U.S. Forces in France), WA8HJL, and G3AGP, who provided these pictures. Below is the G3AGP mobile camping outfit — Fred believes in doing it in comfort, and in style!



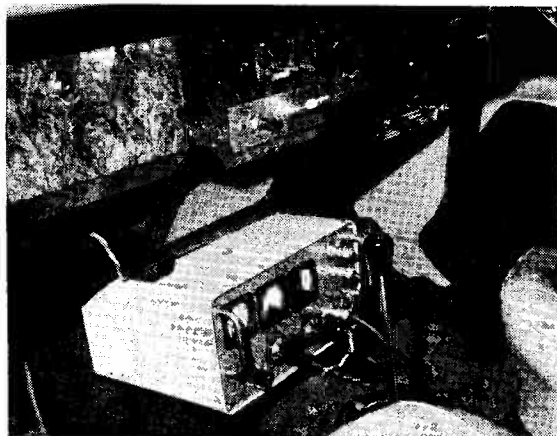
*The next
“ Mobile Scene ”
will be in
the June, 1965
issue*



A distinguished old-timer, present at the Derby Mobile Rally, Mr. A. T. Lees was licensed as LYW in 1911! On the left, Mrs. Lees wears her XYL-LYW lapel badge.
A G5CP print



One of the attractions at the Derby Rally was a display of radio-controlled model aircraft flying, put on by the local Model Aero Club. Here a model is seen ready for take-off after re-fuelling, the control Tx (27 mc band) being the pack at right, with the short whip aerial.
A G3GMN print



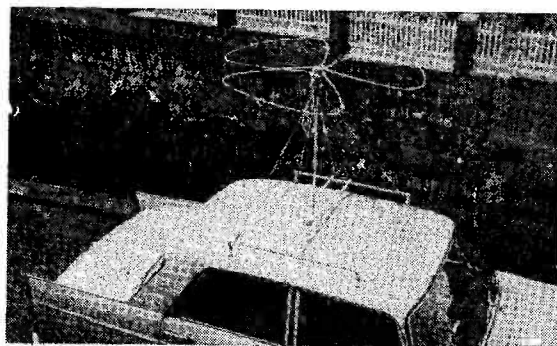
G3BG/M has this outfit in his MG 15/60, consisting of a 12w. AM Tx for 80-160m., with a VT501 PA and 6N7 modulator, and a transistor PSU. The Rx is a converter working into the car broadcast receiver.
A G3GMN print



Two very well-known callsigns seen at the Derby Mobile Rally. On left, Ron Plant, G5CP of Wingerworth, Ches., with Bob Palmer, G5PP, Coventry. Both seem very pleased with their "loot" from the prize draw!



Also at Derby this year were, left to right: G3OTO, G3OS, G2BNL and G4JW.
A G5CP print



Taking 2m. mobile seriously. The big-wheel aerial used by F9QW on his Peugeot 404. It is built to the design in the September '61 issue of "QST" and was photographed by G3HRH.

THE MONTH WITH THE CLUBS

By "Club Secretary"

(Deadline for November Issue: October 16)

(Address all reports for this feature to "Club Secretary")

ONCE again, "MCC" is almost upon us (for the Nineteenth time), and the rules and details of the scoring system appear in this section. The general idea of the contest, and the operating hours, are unchanged, but the scoring system has been altered once more, and we hope that this new scheme will prove satisfactory enough to be kept for the next few years.

Briefly, this is the new set-up: Instead of scoring different numbers of points for contacts with the different Zones, all Club contacts will now count for three points, as for so many years in the past.

The handicap system is introduced by setting a different overall multiplier for each Zone, to be applied to the total points made up from Club contacts. If the handicappers have done their homework well, this should result in another very close finish. (If applied to last year's top scorers in each Zone, the proposed multipliers put stations from four different regions within about two points of each other, as far as their Club contacts are concerned.)

This scheme has made it unnecessary for Clubs to use their "Zone letter," since only they themselves need to know which Zone they are in! So the operating will be slightly faster, with five-character groups being sent; and if the number of contestants increases again (as it always has done in the past) the four-hour periods will necessitate very slick operating, just to contact all the Club stations on the band. Last year at least 120 were active (102 sent logs in, but seven were too late); this year should see at least as many, or possibly more, battling it out.

There's not much time left to get organised . . . read the rules carefully, and, in particular, don't let anyone be disqualified for sending the log in too late, or by not complying with the instructions. Last year at least three clubs sent in logs without a hint of their own callsign; this year, anything as silly as this will simply mean disqualification. So now get to it!

ACTIVITY REPORTS

Wolverhampton (*Newsletter*, August/September) hold their A.G.M. on October 5, 8 p.m. at Neachells Cottage, Stockwell Road, Tettenhall. Their next meeting, on the 19th, is "to be arranged." Their president, old-timer G2JZ, has retired to become GC2JZ; he presented some very interesting gear, which could form the basis of a museum, to the club.

Acton, Brentford & Chiswick at their meeting on October 20, will hold "a general discussion on sub-

jects selected by the members." This will be at 66 High Road, Chiswick, at 7.30 p.m.

Wessex report that their membership has now topped the 50 mark. They meet twice a month at the Cricketers Arms, Windham Road, Bournemouth, in the loft of an old stable, which has been decorated and furnished, and fitted with strip and tungsten lighting. Thence, G3FVU is operational on Twenty SSB at every meeting. The rig is also available for hire by members, in between meetings—an admirable idea which might be adopted elsewhere. An R.A.E. course is being run at Bournemouth Municipal College, for which a DX-100 is available for practical work; and a Morse tape service is organised instead of Morse classes at meetings.

A.E.R.E. (Harwell), will gather on October 20, in the Social Club, A.E.R.E. at 7.30 p.m. Visitors are always welcome. As always, VHF is very much to the fore, and their secretary, G2HIF, states in *QAV* (August) that his present project is the transistorisation of the whole of his portable VHF outfit.

Uxbridge have changed their meeting place to the Railway Arms, Vine Street, and they also have a new secretary (*see panel*). They get together on the first and third Mondays — also the fifth, if there is one. On October 5 they will be preparing aerials for the Jamboree-on-the-Air, and on the 19th they will hold a post-mortem on that event, and also a Junk Sale.

Blackpool & Fylde continue their full weekly programme as follows: October 5, visit from G2AMV; 12th, G3AOI on his sailing trip to Lisbon, 19th, G3PNQ on his experiences with "Vertical Backyard Antennas"; 26th, Questions and Answers; and November 2, G2MT's tape lecture on International Conferences.

Sutton Coldfield will be erecting their aerial and putting the club station on the air, on October 7; on the 21st, there will be a talk on Adding an RF stage and Determining Sense on a D/F receiver.

Grafton (*Newsletter*, 1964/65 Season) are in full swing again, meeting every Friday at Montem School, Hornsey Road, London, N.7. The A.G.M. is on October 2, and on the 9th there is a double meeting: In Room 34, a Practical Evening and programme-planning, and in Room 35, a special session for juniors and R.A.E. students. The R.A.E. and Morse courses are run on Mondays and Wednesdays, and new members can enrol at the School on any day of the week.

Kingston will include a "Grand Raffle" in their

A.G.M. which is on October 15, and a fortnight later they will hold their "Cups Night" — the meaning might be ambiguous, but we think we know what happens. **Echelford** look forward to hearing G6CJ's well-known lecture on Aerials, on October 28 at the Grammar School, Ashford, Middlesex (7.30 for 8 p.m.).

Surrey (*SRCC Monthly News*, September) have been very active with outside visits and a D/F Hunt. Their October meeting, on the 28th, brings a talk by G5DJ on Cables. (We are told that he has been "connected" with them for many years).

The full programme at **Liverpool** includes their A.G.M. on October 6, a Film Show on the 13th, a talk on Fire Precautions (G3LIU) on the 20th, and a Hi-Fi Night on the 27th. November 3 is the date for their Construction Contest.

Luton, meeting on identical dates, have a tape lecture on DX-peditions on October 6, a Bring-and-Buy Sale (G3HEO) on the 13th, a Quiz (G3RXW) on the 20th and a visit from the Sheffield Group (including a Junk Sale) on the 27th. And on November 3 they have a demonstration by J-Beam Aerials.

Spen Valley expect a visit from other societies on October 15; on the 29th the subject will be Radio Astronomy, and the lecturer Mr. W. J. Baggaley of Sheffield University. Meetings are 7.30 p.m. at Heckmondwike Grammar School. **Stratford-upon-Avon** have now acquired new premises at the Mason's Arms, College Street, and also a new secretary, whose QTH is given in the panel.

Midland, meeting on October 20 at the Midland Institute, Paradise Street, Birmingham 1, will hear a general talk on Amateur Tape Recording Techniques. The November meeting will be a Film Show.

Southgate will be gathering on October 8 at Atlasta Lodge, 7.30 for 8 p.m. — subject unknown at the time of writing. They held an interesting event during August, in the form of a Mobile Treasure Hunt; at each clue the mobiles had to call the base station, and on each occasion a signal-strength check was taken. G3NLD/M took the special award for the most consistent signal over the whole course. This seems an excellent idea, which other clubs might like to adopt — it has lots of scope, especially in the presentation of the clues. Southgate hope to make it an annual event.

Reigate (*Feedback*, August and September) have held several very successful meetings, and continue in October with a Junk Sale on the 17th and a Jumble Sale on the 24th. The latter, which is in aid of club funds, will be at St. Philips Hall, Nutley Lane, Reigate.

The **Roding Boys' Society** recently organised a camp near Nazeing, Essex, combining it with a private field day of their own. G3JIX did most of the operating. They are now sorting themselves out in readiness for their exhibit at the Show, at the end of October. And they have acquired a treadle-type platen printing press, quarto size—what will they be up to next!

Northern Heights had two very busy months, with at least four demonstration stations being organised, as well as their Pea-and-Pie Supper on September 2,

to which Manchester were invited. Principal event for them during October will be the Jamboree-on-the-Air, which they will be discussing on the 14th. On the 21st they will hear a tape lecture, by W1BB, on Top Band DX'ing; on the 28th they have a ragchew, and on the 31st a mass visit to the Radio Communications Exhibition.

The **British Amateur Television Club** reports an increase in membership of 50 per cent during the last two years. They now number more than 900, and the figure of 1,000 is expected shortly. Their journal, *CQ-TV*, is mostly devoted to technical information; their chairman's report shows a very satisfactory state of affairs. Note new secretary's QTH, in panel.

South Hants (*QUA*, September) includes the Southampton Group and the Wessex A.R.S. whose report appears separately. The next Southampton meeting will be on October 10, and we gather that new premises are now available for the coming season.

Wimbledon, at their recent meetings, heard talks on Receivers (G3EPU) and Radar (G3MFB) and saw a Film Show. Next meeting, on October 9, is booked for a Junk Sale, and the A.G.M. will be on December 11.

Reading will go into BCI and TVI at some length at their meeting on October 31, which, they suggest, should be of special interest to newly licensed amateurs in the district. On November 28 the subject will be Government Surplus and its conversion. Both meetings are at 7.30 p.m. at the Palmer Hall, West Street. On January 10 the Annual Dinner will take place.

Norfolk, in their autumn edition of *NARC Challenge*, are very strong on technical gen — to the tune of 20 pages in all, which includes some social news and details of local activity. (This is one of the club publications which even your "Club Secretary" tends to read from cover to cover).

South Birmingham (*QSP*, September) appear to be flourishing, and hold their A.G.M. on October 17. They were recently involved in a Mobile Rally (jointly with Sutton Coldfield) and an exhibition station at the Barnt Green Flower Show; now they are hopefully surveying a possible location for their future headquarters.

South Shields (*Spectrum*, August/September) will meet on October 2, our publication day, for a talk by G3NOQ on Transistor Techniques. They, too, were recently concerned with a Flower Show! And their fifth Mobile Rally went off very smoothly. The September meeting was their A.G.M.

Baden-Powell House will hold their next meeting on October 15, on the eve of the Jamboree-on-the-Air; they are hoping to have a demonstration of the

"MCC" — MAGAZINE CLUB CONTEST

Rules and Club identification groups appear on pp.498-499. Any Club not listed and desiring to enter the Contest should apply immediately for identification letters, which will appear in a supplementary list in the November issue.

EA12 receiver on this occasion. All those interested are invited to visit or work them (G3TGS) over the week-end of October 17-18.

Basingstoke meet on October 10 at Emanuel Hall, Wate Street, for a Constructors Competition -- full details in advance from the secretary.

Worcester (*Newsletter*, No. 12) continue to meet informally every Saturday evening, and working parties gather at the Hq. on Sunday afternoons. The A.G.M. is on November 7 at 8 p.m. Note secretary's new QTH, in panel.

Chester have a full October programme, with Net Night on the 6th (160 and 2 metres), G3ATZ on Antennas on the 13th, G3OWY on Receiver Selectivity on the 20th, and a G.P.O. talk on Interference Detection on the 27th -- all 8 p.m. at the YMCA, Chester.

South Manchester, likewise, have all dates filled. October 2, Mullard Film Strips; 9th, Activity Night; 16th, Odd Ideas, by G3HZM; 23rd, Discussion on Home-Built Equipment; and on the 30th, more Mullard Film Strips. They recently paid a visit to Jodrell Bank and members were much impressed by the Mark II telescope, undergoing tests at the time.

Crawley have held a profitable Junk Sale, and their Mobile Evening attracted a good attendance. Three more members are now licensed (G3TIR, 3TJS and 3TNJ), and G3PHG is again running the R.A.E. course at the local Evening Institute. The October meeting (subject not fixed) will be on the *third* Wednesday (the 21st) to avoid a clash with the Exhibition.

Loughton resume their regular sessions from October 9, on which date they will hear their first YL lecturer -- Miss M. Clark: she will talk on studio and laboratory processes in film work. On October 23 G2BCX will be talking on Transistorised Tx's, with some notes on improving loaded whips.

Peterborough will be meeting every Friday, 7 p.m., in their new headquarters (The Old Mill, London Road -- opposite the football ground), and visitors will always be welcome. The new shack will be open throughout the winter months, and the Tx on the air regularly.

Salop have just celebrated their first anniversary, and are very glad to have succeeded where previous efforts failed. They had three R.A.E. passes this year, and they have run special events at the Church Stretton Traction Engine Rally, and at Shrewsbury Carnival. On October 8 they visit the power station at Ironbridge.

North Notts opened their new clubroom with a fine attendance of fifty, including 18 callsigns. There was an exhibition of domestic receivers, all over 40 years old, along with the latest UHF valves from STC. An R.A.E. course began in September, and meetings will now be every Thursday at the new QTH. -- 13-15 Gateford Road, Worksop, where the room is available at all times for special events -- at no charge!

Plymouth are holding a return Quiz against Torbay on October 13, at their own clubroom. All licensed amateurs in the area are invited -- free tea thrown in as an inducement!

[cont'd p.500

MCC—NINETEENTH ANNUAL TOP BAND CLUB TRANSMITTING CONTEST RULES

- 1. Duration :** Saturday, November 14 and Sunday, November 15; on both days between the hours of 1700 and 2100 GMT (eight operating hours in all).
- 2. Frequency and Power :** All contacts to be made in the 1800-2000 kc band, using CW, with a power input not exceeding 10 watts to the final stage. All reasonable precautions will be taken to avoid interference with other services using the band.
- 3. Call Signs :** Where a Club has its own transmitting licence and callsign, that callsign is to be used. Clubs without their own call may nominate a member's station as their official entry.
- 4. Calling :** Clubs with call "CQ MCC," using the "three times three" technique. Infringement of this rule by the use of long CQ calls may entail disqualification.
- 5. Scoring :** Other Club stations may be worked on each of the two days, and these contacts will count for three points each time. Non-Club stations may be worked once only, and will count for one point only. Inter-Club contacts will take the form of an exchange of five-character groups comprising RST and Club identification letters.
- 6. Non-Club Contacts :** Contacts with non-Club stations, counting for one point, will take the form of logging the RST and the other station's QTH. The Club's own QTH, not the identification letters, should be sent to complete the QSO.
- 7. Logs :** Contest logs are to be neatly set out as follows: One side only of quarto or foolscap sheets should be ruled into eight columns, with *name and callsign of Club station on each sheet*, headed thus: Col. 1, *Date and Time*. Col. 2, *Callsign of station worked*. Col. 3, *Outgoing five-character group*. Col. 4, *Incoming five-character group*. Col. 5, *RST out-going* (to a Non-Club station). Col. 6, *RST incoming* (from a Non-Club station). Col. 7, *QTH of Non-Club station*. Col. 8, *Points claimed* for contact. Col. 8 is to be totalled at the foot of each page, and the running totals brought forward. The last page of the log should contain the following summary:
Total score for Club contacts, at three points per contact; this figure then to be multiplied by the Zone multiplier (*see opposite*), e.g. a station in the GW Zone making 150 Club contacts would give the figure of 450, and then apply the multiplier of 1.1, giving a Club score of 495; total number of non-Club contacts; total score. Comments on the equipment used, number of operators employed, general impressions and experiences are also invited, and should be added at the end of the log.
- 8. Any Club station radiating a note consistently worse than T9 will be liable to disqualification.**
- 9. Logs, addressed to "Club Secretary," SHORT WAVE MAGAZINE, 55 Victoria Street, London, S.W.1, must be posted to reach us not later than Friday, November 27, 1964. The Editor's decision on the results will be final, and will be published in the January, 1965 issue of SHORT WAVE MAGAZINE.**

THE MCC ZONES

Although, under the new rules, all Club contacts count for the same score of three points, and there is thus no need to know the Zone in which the station worked is located, it is necessary for each Club to know the Zone in which it is itself situated, for the purpose of applying the multiplier to its own final score of Club contacts. The Zones are as follows:

- GM Zone: All Scottish counties.
- Northern Zone: Northumberland, Durham, Cumberland, Westmorland, Lancashire and Yorkshire.
- Midland Zone: Cheshire, Derby, Shropshire, Stafford, Hereford, Worcester, Warwick, Nottingham, Lincoln, Leicester, Rutland, Northampton, Bedford, Huntingdon, Cambridge, Norfolk, Suffolk.
- Southern Zone: Somerset, Dorset, Gloucester, Wilts., Berks., Hants., Oxford, Bucks., Herts., Middlesex, Surrey, Sussex, Kent, Essex, London.
- South-Western Zone: Cornwall and Devon.

- GW Zone: All Welsh counties.
- GI/GD Zone: All GI counties and the Isle of Man.
- GC Zone: Channel Islands.

Scoring

The score for Club contacts only will be arrived at by counting three points per contact (irrespective of Zones) and then applying to the total the following multiplier:

- GM Zone: 2.0
- Northern Zone: 1.25
- Midland and GW Zones: 1.1
- South-Western Zone: 1.5
- GI/GD Zone: 1.6
- GC Zone: 1.3
- Southern Zone: 1.0

It is emphasised once again that all Club contacts count three points; but that the total of such points (not including non-Club contacts) is multiplied, at the end, by the appropriate factor shown here.

IDENTIFICATION LETTERS FOR CLUBS IN "MCC"

Aberdeen	AB	Deal	DL	Oxford	OX	South London Mobile	SL
Acton, Brentford & Chiswick	AC	Derby	DR	Paddington	PD	South Manchester	SM
Ainsdale	AI	Dollis Hill, GPO	DH	Painton (Northants)	PN	South Shields	SS
Aldershot	AL	Dursley	DS	Petersfield	PT	STC, Harlow	ST
Albright & Wilson	AW	East Cheam	EW	Plymouth	PL	Stevenage	SV
Aquila	AQ	East Kent	EK	Port Talbot	PO	Stoke on Trent	SX
Arborfield	AR	Eccles	EC	Preston	PR	Stockport	SP
Ash Green	AG	Edware	ED	Purley	PY	Stourbridge	SU
ATC (Staffs)	AT	Exeter	EX	Radio Club of Scotland	RS	Stroud	SG
Bagshot	BO	GEC Research	GE	R. Sigs., Catterick	RP	Surrey (Croydon)	SY
Bangor University	BU	Grafton	GN	RAF Little Rissington	RL	Sutton & Cheam	SZ
Barnet	BA	Gravesend	GR	RAF Sealand	RZ	Thanet	TH
Barnsley	BR	Greenford	GF	RAFARS, Locking	RF	Torbay	TY
Basingstoke	BZ	Grimsby	GY	Ravensbourne	RV	University of Keele	UK
Bath	BJ	Guildford	GD	Reading	RD	Verulam	VR
BBC Bush House	BH	Halifax	HA	Reigate	RA	Vickers-Armstrong, Hurn	VS
BBC Langham	BL	Hallamshire	HL	Reigate 2	RB	Wanstead & Woodford	WD
BBC Evesham	BD	Harlow	HR	Reigate 3	RC	Wakefield	WK
BBC Lime Grove	BB	Harwell (AERE)	HX	Rhondda Valley	RH	Wellingborough	WL
Blackburn	BN	Harrow	HW	Rotherham	RO	Wimbledon	WS
Blackpool	BP	Hartlepoons	HT	Royal Naval RS	RN	Wirral	WR
Blackwood, Mon.	BM	Kingston	KN	Rugby	RY	Wolverhampton	WO
Bradford Grammar School	BG	KW Radio Club	KW	St. Benedict's	SB	Wolverton	WV
Brentwood	BW	Leeds University	LS	Salisbury	SA	Worcester	WT
Bristol	BI	Leeswood	LY	Scunthorpe	SC	Yeovil	YV
British Timken	BT	Leicester	LC	Scarborough	SR	42nd Sig. Regt.,	
Buchan	BC	Leven, Fife	LF	Sheffield	SD	Liverpool	LP
Burnham-on-Sea	BS	Lossiemouth	LO	Sheffield 2	SJ	92nd Sig. Regt., Forfar	RF
Burslem	BX	Liverpool	LV	Shefford	SH		
Bury	BY	Loughborough	LH	Sole Bay	SK		
Cheltenham	CA	Loughton	LD	South Birmingham	SO		
Chester	CE	Lymington	LM				
Chiltern	CH	Macclesfield	MA				
Chorley & Leyland	CY	Manchester	MZ				
City of Belfast	CB	Medway	MD				
City & Guilds	CG	Midland ARS	MS				
Civil Service	CS	Midland RCC	MR				
Clifton	CL	Midland YMCA	MY				
Clifton, No. 2	CZ	Mitcham	MH				
Cornish	CO	Morecambe	MO				
Cotswold RCC	CW	Newcastle University	NU				
Coventry	CV	Newark	NK				
Crawley	CR	Newbury	NY				
Crawley, No. 2	CX	Norfolk	NR				
Cray Valley	CF	Norwich	NW				
Dalriada	DA	North Kent	NO				
Danbury	DB	North Notts.	NN				
		Nottingham	NT				
		Overstone	OV				

(NOTE: This list includes all Clubs recently taking part in "MCC." Other Clubs desiring to enter for this year's event should write in for identification letters, enclosing a stamped addressed envelope, before October 12, for publication next month. Letters should be addressed "MCC," Short Wave Magazine, 55 Victoria Street, London, S.W.1.)

EXAMPLES FOR OPERATING

Wellingborough works Ash Green, sends 569WL; reply from Ash Green could be 578AG. Surrey works Basingstoke, getting 599BZ, and sending 589SY.

EXAMPLES FOR SCORING

Belfast (CB) in GI/GD Zone makes 70 Club contacts and 10 non-Club single-point QSO's. Thus, final score would be $70 \times 3 \times 1.6 + 10 = 346$ points claimed.

Clifton (CL) in Southern Zone makes 123 Club contacts and 12 non-Club; their final score would be $123 \times 3 \times 1 + 12 = 381$ points claimed.

Names and Addresses of Club Secretaries reporting in this issue :

- ACTON, BRENTFORD & CHISWICK: W. G. Dyer, G3GEH, 188 Gunnersbury Avenue, W.3.
 A.E.R.E. (HARWELL): C. Sharpe, G2HIF, Building 347.3, A.E.R.E., Harwell, Berks.
 BADEN-POWELL HOUSE: A. Watts, G3FXC, 8 Thornycroft Court, Kew Road, Richmond.
 BASINGSTOKE: P. Jackson, G3ADV, 11 Oaklands Way, Basingstoke.
 BLACKPOOL & FYLDE: J. Boulter, G3OCX, 175 West Drive, Cleveleys, Blackpool.
 B.A.T.C.: J. E. Tanner, G3NDT/T, 1 Radnor Avenue, Harrow.
 CHESTER: R. Trickey, G3DRB, 31 Penzby Avenue, Chester.
 CRAWLEY: R. G. B. Vaughan, G3FRV, 9 Hawkins Road, Tilgate, Crawley.
 CRAY VALLEY: S. W. H. Harrison, G3KYV, 30 Plaistow Grove, Bromley.
 ECHELFPORD: L. Seaman, G3ATF, 40 Park Road, Ashford, Middx.
 GRAFTON: A. E. Bristow, 37 Tyndale Mansions, Upper Street, London, N.1.
 KINGSTON: A. G. Wheeler, G3RHF, 22 Meadow Road, Ashford, Middx.
 LIVERPOOL: H. James, G3MCN, 448 East Prescott Road, Liverpool 14.
 LOUGHTON: A. W. Sheppard, G3JBS, 11 Barfields, Loughton.
 LUTON: D. J. Pinnock, G3HVA, 265 Chesford Road, Luton.
 MEDWAY: P. J. Pickering, G3ORP, 101 Chatham Road, Maidstone.
 MIDLAND: C. J. Haycock, G3JDJ, 360 Portland Road, Birmingham 17.
 MORAY FIRTH: G. M. Grant, Cairnfield Lodge, Buckie, Bannffshire.
 NORTH NOTTS: M. Dann, G3NHE, 4 Wright Street, North Anston, Sheffield.
 NORFOLK: A. W. Preece, G3TCO, School of Biological Sciences, Wilberforce Road, Norwich, NOR.54.H.
 NORTHERN HEIGHTS: A. Robinson, G3MDW, Candy Cabin, Ogden, Halifax.
 PETERBOROUGH: D. Byrne, G3KPO, Jersey House, Eye, Peterborough.
 PLYMOUTH: R. Hooper, G3SCW, 2 Chestnut Road, Peverell, Plymouth.
 READING: R. G. Nash, G3EJA, 9 Holybrook Road, Reading.
 REIGATE: F. D. Thom, G3NKT, 12 Willow Road, Redhill.
 RODING BOYS: R. J. Phipps, 51 James Lane, London, E.11.
 SALOP: Dr. K. E. Jones, G3RRN, Greystones, Shrewsbury Road, Church Stretton.
 SCOTLAND: A. Barnes, GM3LTB, 7 South Park Terrace, Glasgow.
 SOUTH BIRMINGHAM: A. E. Bishop, Jr., 40 Cecil Road, Birmingham 29.
 SOUTHGATE: R. E. Wilkinson, 33 Amberley Road, London, N.13.
 SOUTH HANTS: G. J. Meikle, G3NIM, 34 Victoria Road, Netley Abbey.
 SOUTH MANCHESTER: M. Barnsley, G3HZM, 11 Cemetery Road, Denton, Manchester.
 SOUTH SHIELDS: D. Forster, G3KZZ, 41 Marlborough Street, Shields.
 SPEN VALLEY: N. Pride, 100 Raikes Lane, Birstall, Leeds.
 STRATFORD-UPON-AVON: G. Mayo, 28 Middlefield Lane, Newbold-on-Stour.
 SUTTON COLDFIELD: K. H. Varney, G3DMV, 149 Whitehouse Common Road, Sutton Coldfield.
 SURREY: S. A. Morley, G3FWR, 22 Old Farleigh Road, Selsdon, South Croydon.
 UXBRIDGE: F. J. P. Offord, 43 Greys Road, RAF Uxbridge.
 W.A.M.R.A.C.: Rev. A. Shepherd, G3NGF, 1 North Street, Crewe.
 WESSEX: P. Cutler, G3MXF, 43 Langside Avenue, Wallisdown, Poole.
 WIMBLEDON: E. N. Hurler, G3RZN, 156 Monkleigh Road, Morden, Surrey.
 WIRRAL: A. Seed, G3FOO, 31 Withert Avenue, Bebington, Wirral.
 WOLVERHAMPTON: J. Rickwood, G3JJR, 852 Stafford Road, Fordhouses, Wolverhampton.
 WORCESTER: G. W. Tibbetts, G3NUE, 25 Greenford Gardens, St. John's, Worcester.

At **Cray Valley** they announce what they call "Le Grande Vendre" (and mind you bring good gear only!) for November 5, 7.30 p.m. at 1 Court Road, Eltham, S.E.9. Recent events have included a station description, by talk and film, by G3GJW, and an all-band Club activity week-end.

The **Moray Firth** Amateur Radio Society has now been formed, with their own accommodation at 42, Eastchurch Street, Buckie, and callsign GM3TKV. They plan to be among the GM's in on this year's MCC.

Wirral hold their A.G.M. on October 7, and on the 21st they have a film evening. No less than five teams turned out for their recent evening D/F contest; the R.A.E. class seems more popular than ever this year; and altogether things are going well under the G3NWR callsign.

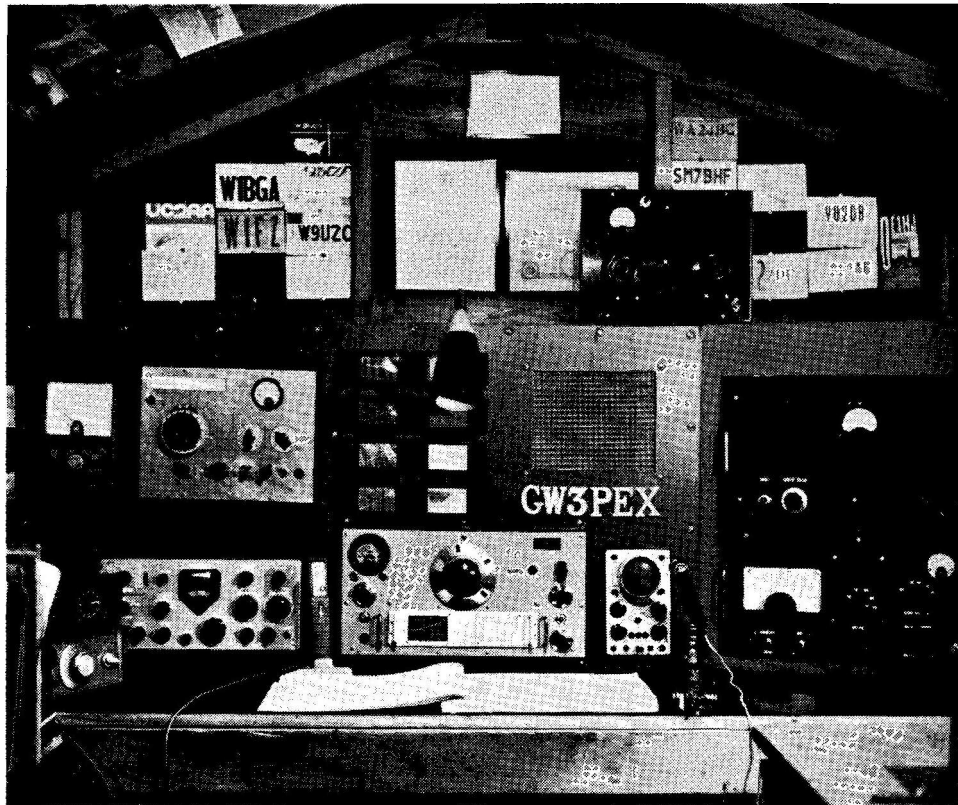
The advertising in the **Midland News Letter** for the M.A.R.S. annual dinner on October 2 included the suggestion that it was a good opportunity to soften-up the YL/XYL's before declaring the intention to buy a KW-2000! The statement of accounts,

Club Publications are acknowledged from the following: **ISWL** (*Voice of the ISWL*); **Cray Valley** (*Newsletter*, September); **Medway** (*Newsletter* Nos. 9 and 10); **WAMRAC** (*Circular Letter*, No. 46); **Southgate** (*Newsletter*, September); **Plymouth** (*QUA*, September); **Radio Club of Scotland** (*GM Magazine*, August); **ARMS** (*Mobile News*, August); **Midland** (*News Letter*, September); **Medway** (*Mavis Newsletter*, August); **Wirral** (*Newsletter*, No. 6, Vol. 17).

circulated with the current *News Letter*, shows M.A.R.S. to be in a strong financial position, with another surplus in hand on the year's operations.

WARNING — MORE POSTAL DELAYS

Just as this issue was going down, there was talk in the newspapers and on the BBC air about delays in mail delivery, of up to three or four days. There seems to be no adequate or reasonable explanation for this—unless it is that the recent Post Office advertising about "Somebody, somewhere is waiting for a letter from you" is really beginning to have some effect! Yet it does not seem long since the Postmaster-General stood up in the House of Commons and declared, with his hand on his heart, that the increased postal charges then being introduced would increase the efficiency of the postal service to the extent of guaranteeing next-day delivery, anywhere, of anything posted in the U.K. Since then, the service has got steadily worse. It is a serious matter for us, for—apart from office mail inwards—we despatch direct-subscriber copies in accordance with the GPO's own rules for next-day delivery. If you are on direct subscription (in the U.K.) and your copy is ever later than the first Friday of the month, look at the postmark on the wrapper and take the matter up immediately with your local head postmaster, asking *him* for an explanation for the delay. It is no use writing a furious letter to *us* if the wrapper is correctly post-marked, as there is nothing we can do once the bulk delivery has been made to the Post Office.



THE OTHER MAN'S STATION

GW3PEX

BEFORE becoming licensed in August 1961, the owner of GW3PEX — Leslie France, 4 The Copse, Trefechan, Cefn Coed (Brecks.), Nr. Merthyr Tydvil, South Wales — did eight years as an SWL. So he started as an active AT-station operator with a very good idea, and much practical experience, of what Amateur Radio is all about.

Much of the gear shown here is home-made, including the 80-metre phone Tx, running 65 watts to a TT21, modulated by a pair of 807's in Class-AB2; this rig is on the right. At centre is a modified HRO as main receiver, beside which is the OS-1 'scope for modulation checking with, on the left, a KWM-1 transceiver for 20-metre Sideband telephony. At top left is a home-constructed 160-metre transmitter, with a TT11 RF amplifier taking 9 watts input, modulated by a single EL84.

Other equipment inside includes an LM-14 frequency meter, a good selection of test gear, and a transceiver for two-metre phone.

Outside, the antennae comprise a 265ft. aerial, 30ft. high, for Top Band and 80 metres; a dipole for 20 metres, with a beam for that band in prospect; and a 4-over-4 slot-fed beam for two metres, at a height of 25ft.

The main interests at GW3PEX are phone on 160 metres; portable operation on two metres to give the rare county of Breconshire (his QTH is actually just over the county boundary with Glamorganshire); AM phone on 80 metres; and chasing the DX on 20-metre SSB. All of which adds up to a pretty active and interesting programme of work, and in connection with which we feel sure his SWL background has proved most useful.

"Short Wave Magazine" covers the whole field of Amateur Radio, has been established for more than 25 years, is independent and unsubsidised, and circulates in 75 countries outside the U.K.

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 U.K. section 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.

- EI3AU**, T. P. O'Brien, 43 Manor Street, Waterford.
- EI6AU**, M. F. Whelan, 44 Synge Street, South Circular Road, Dublin, 8.
- EI7AU**, P. J. Fagan, 50 Belton Park Road, Donnycarney, Dublin, 9.
- GM3DPK**, W. C. McGowan, Old Manse Farm, Boyndie, Banff, Banffshire (*re-issue*).
- G3SIV**, D. Amer, 77 Woodland Avenue, Overstone, Northampton.
- G3SKA**, R. A. Yardley, 14 Haggerston Road, Boreham Wood, Herts.
- G13SMO**, J. B. Holmes, 9 Coleraine Road, Portstewart, Co. Derry.
- G3SUW**, R. W. Cresswell, Beaulieu, Woods Lane, Cliddesden, Basingstoke, Hants.
- G13SXG**, H. E. McNally, 9 Kensington Road, Belfast, 5.
- G3TAA**, K. F. Jessop, 26 Larchwood Road, New Eltham, London, S.E.9. (*Tel. ELT. 5418.*)
- G3TAR**, R. E. Roberts, 108a Weston Road, Lichfield, Staffs.
- G3TEJ**, M. C. Dighton, 7 The Close, Godmanchester, Hants.
- G3TEX**, P. Painter, Caxton Villa, Park Lane, Knebworth, Herts.
- G3TFX**, R. Fusniak, 95 Pelham Road, Bexleyheath, Kent.
- G3TGE**, D. M. Cahill, The Cottage, 53 Holywell Road, Studham, Beds. (*Tel. Whipsnade 580.*)
- G3TGF**, C. R. Bonner, 29 Hillcrest Road, Orpington, Kent.
- G3TGY**, J. A. Lush, 55 Edgcumbe Road, St. Austell, Cornwall. (*Tel. St. Austell 3866.*)
- G3THG**, A. J. Kent, c/o Cadets' Mess, R.A.F. Technical College, Henlow, Beds.
- GM3THI**, Dr. R. D. Harkess, Gibbysyard, Auchincruive, Ayr.
- G3THM**, L. P. Best, 10 Lyneham Road, Luton, Beds.
- G3THN**, R. H. Delves, 7 High Street, Ticehurst, Wadhurst, Sussex.
- G3THQ**, B. F. Greenaway, 5 Lansdowne Grove, Neasden, London, N.W.10.
- G3THR**, D. N. Hall, 27 Ravenscroft Park, Barnet, Herts.
- G3THX**, C. A. Collins, 32 Albany Road, Skegness, Lincs.
- G3THZ**, E. F. Spiers, 15 Hall Green Road, West Bromwich, Staffs. (*Tel. Stone Cross 2767.*)
- G3TIC**, G. K. Devenish, Three Chimneys, Nipsells Chase, Mayland, Chelmsford, Essex.
- G3TID**, D. P. Bray, 24 Old Hatch Manor, Ruislip, Middlesex.
- G3TIF**, W. Metcalfe, Cairndhuna, Little Hyden Lane, Clanfield, Hants.
- G3TIH**, A. A. Bickers, 192 Garretts Green Lane, Garretts Green, Birmingham, 26. (*Tel. Sheldon 5833.*)
- G3TII**, J. Burgon, Anvil House, 36 King Street, Winterton, Lincs. (*Tel. Winterton 312.*)
- G3TIN**, B. M. Taylor, 36 Jessel Road, Walsall, Staffs.
- G3TIR**, D. A. Stewart, Mount Pleasant Farm, Peas Pottage, Crawley, Sussex.
- G3TJA**, R. G. Street, Hill House, 38 Wyvern Road, Sutton Coldfield, Warks. (*Tel. Sutton Coldfield 2138.*)
- G3TJD**, N. A. T. Hardy, Ballindoney, Bury Ring, Billington, Haughton, Stafford. (*Tel. Braedley 366.*)
- G3TJH**, W. B. Bickham, Evergreen, Comeytrowe Road, Trull, Taunton, Somerset.
- G3TJP**, D. J. Pratt, 8 Fairfield Avenue, Brown Edge, Stoke-on-Trent, Staffs.
- G3TJQ**, D. J. Bean, 51 Heathfield Square, Wandsworth, London, S.W.18. (*Tel. VANDyke 1227.*)
- G3TJV**, S. R. Vann, 78 King Street, Enderby, Leicester.
- G3TKL**, W. R. Longmire, Overlea, Stanah Road, Thornton Cleveleys, Lancs. (*Tel. Thornton 2563.*)
- G3TKN**, V. C. Lear, 49 Cliff Road, Wallasey, Wirral, Cheshire.
- G3TKR**, D. J. Raven, 9 Meadow Close, Harden, Bingley, Yorkshire. (*Tel. Cullingworth 8909.*)
- G8AAY**, J. D. Merifield, 45 Mellstock Road, Poole, Dorset.
- G8ABU**, M. Davidson, 49 Honeycroft Hill, Uxbridge, Middlesex.
- G8ABZ**, A. Tinsley, 6 Hirst Drive, East Herringthorpe, Rotherham, Yorkshire.

CHANGE OF ADDRESS

- G2ACC**, C. A. Harley, The Haven, Clive, Shrewsbury, Shropshire.
- G2DN**, N. Guy, 3 Manor Wood Road, Purley, Surrey.
- G2DVA**, D. R. Bradley, 3 Keswick Drive, Frodsham, Cheshire.
- G3AAO**, W. H. Longhurst, 11 Wood Hill Crescent, Cookridge, Leeds, 16.
- G3AGD**, A. L. Drakeford, Beacon Heights, Cheltenham Road, Painswick, Glos.
- G3ALI**, R. S. Small, 39 Langley Way, Watford, Herts.
- G3AYT**, A. Smith, 4 Primrose Avenue, Hyde, Cheshire.
- G3CDK**, R. I. Clews, 153 Boundary Road, Wallington, Surrey.
- G3HCM**, D. Dumbleton, 29 Sebastian Close, Stonehouse Farm Estate, Coventry, Warks.
- G3HDA**, M. E. Bazley, 98a Lea Green Lane, Grimes Hill, Wythall, Birmingham.
- G3KAS**, F. H. Sturdy, Tudor House, 21 Hurst Rise Road, Cumnor Hill, Oxford. (*Tel. Cumnor 2121.*)
- G3LL**, K. N. Holland, 260 Abbeydale Road South, Sheffield, Yorkshire.
- G3LQB**, K. M. Bishop, 12 Oakfield Drive, Kempsey, Worcester.
- G3LSL**, D. Lunn, 4 Farnham Avenue, Macclesfield, Cheshire.
- G3LVC**, G. Reid, Lawrence's Cottage, Abbotsbury, Dorset.
- G3LWF**, L. R. Franklin, Brookfield Service Station, Low Lane, Middlesbrough, Yorkshire.
- G3LWF/A**, L. R. Franklin, R.E.M.E., 151 Inf. Wksp. R.E.M.E., Brambles Farm, Middlesbrough, Yorkshire.
- G3MCM**, G. C. Moore, c/o Officers' Mess, R.A.F. Thorney Island, Emsworth, Hants.
- G3NKQ**, C. R. Burchell (*ex-ZBICR*), c/o Officers' Mess, R.A.F. Northwood, Middlesex.

- G3NUI**, A. T. Dobson, 156 Oswald Road, Chorlton-cum-Hardy, Manchester, 21.
- G3NXM**, W. G. Borland (*ex-GM3NXM*), 4 Heath Row, Bishops Stortford, Herts. (Tel. *Bishops Stortford 51274.*)
- G3NYK**, A. J. Melia, B.Sc., 27 Bromley Mount, Wakefield, Yorkshire.
- G130FG**, L. F. Garland, 516 Antrim Road, Belfast, 15. (Tel. *Belfast 79918.*)
- G30GK**, G. R. Kennedy, 28 Haywood Road, Bromley, Kent. (Tel. *RAvensbourne 9484.*)
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- G5BR**, G. F. Mason, 8 Highbury Road, Streetly, Sutton Coldfield, Warks. (Tel. *Streetly 7419.*)
- G5MR**, V. G. Mellor, M.A., Butts Farm, Stelling Minnis, Canterbury, Kent.

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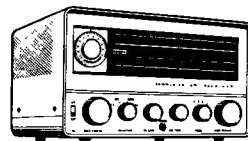
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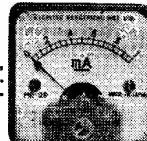
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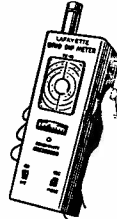
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SSB MOBILE! W2EWL phasing Tx, VFO, two 1625's PA up to 230w, p.e.p. input, 80 and 20 metres, £15 o.n.o.? Heathkit RA-1 Rx, xtal calibrator, speaker and handbook, £35 o.n.o.? BC-221, charts, stabilizer PSU, £13 o.n.o.? Labgear LPF, £2. Xtal Calibrator No. 7, Mk. II, 10/100/1000 kc with modulation, 50s. Jap xtal mike/stand, 10s. Jap III, S-meter, 15s. Two min. 5R4's, two min. 5U4's, 7s. 6d. each. Two 2E26's, 7s. 6d. each. New 300 mA meter, 7s. 6d. Small American 60w. CW Tx (HWD 6in. x 8½in. x 11½in.), xtal controlled 80-10 metres, complete with auto-transformer, two spare valves, handbook and 110v. AC coax C/O relay, £19 o.n.o.? Heathkit VF-1U VFO (FB with Eico 723), £6. Buyer collects or carriage extra. —G3JFC, 18 Glenluce Road, Blackheath, London, S.E.3.

JAGUAR 1.5 S.E., 1948, completely overhauled mechanically, satin-wood interior with matching 160-metre Mobile Rig. — Further details: Please phone *Bexleyheath* 4773.

FOR SALE: Pye Ranger Radiotelephone 25 kc bandwidth, 12v. 150 mc type, complete with control box, cables and handbook, Deliver G-land, £45. **WANTED:** Marine Radiotelephone 12v. DC, also 62 Set.—Everard, 16 Hammy Way, Shoreham-by-Sea, Sussex.

AERIAL Equipment: Minimitter 10-15m. Beam, £6. Joystick, 30s. Both unused, Labgear Bi-Square, 28 mc; Tiger Z-Match Coupler, offers?—Napper, 15 Hall Green Close, Malvern, Worcs.

FOR SALE: CR-100 Receiver, works well. Buyer collects, £14.—Hopkins, Eastwynch, 46 Carlton Road, Redhill, Surrey.

WANTED: One Beginner's Communications Rx. —Thomas, 28 Leslie Terrace, Porth-Rhondda, South Wales.

MOSLEY TA-33Jr. Beam in unused condition, offers over £15? Also Cossor 339 DB Oscilloscope, good working order, £7 10s. Buyer collects, near Oxford.—Box No. 3094, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

SALE: LAB Oscilloscope, 4in. tube, excellent for servicing work, T.B. up to 750 kc, double beam. Offers? Free delivery 50 miles.—Box No. 3095, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

FOR SALE: TA-12G Tx, good condition and unmodified, with fitted wavemeter, £4. CNY-1 Rx, working FB, 0.4 mc-10 mc, £4. Bendix RA-1B Rx with commercial PSU, £9; s.a.e. details.—Crook, 39 Tonge Park Avenue, Bolton, Lancs.

K.W. Corner No. 4

(A monthly review of news, views and advice)

Viceroy Works. Plans have been made for the removal of our Production line to the new factory on 3rd October, 1964. It will take a little time to become established but, by the end of the year, our present output should be doubled and trebled by next Easter.

Two new callsigns have joined the K.W. staff recently, Ron Sykes ZL1AHO and Arthur Tuckfield VQ2AT, both are due to get 'G' callsigns. This brings the number of callsigns at KW to 14.

The space at present occupied by Production at Vanguard Works will become a development laboratory. This will mean increasing our laboratory staff and we are now ready to receive applications from top rate radio communications design engineers for permanent and interesting work. Those interested apply to the Managing Director—G8KW.

Exhibition 1964. Some of our plans for 1965 will be seen at the Radio Communications Exhibition in London at the end of October. In addition, you can see the greatest range of radio amateur equipment ever to be assembled in this country at Stands 21 and 31. Be sure to call and see our equipment and perhaps meet some of the K.W. staff. Remember, your interest and patronage helps us to develop the best and most up-to-date equipment with built-in reliability; this in turn helps our export drive.

Lerwick Beacon, GB3LER. This beacon participating in the IQSY programme operates day and night on 29,005 kc. The transmitter, a special crystal controlled K.W. "Vanguard" has been in continuous operation since early July without one single breakdown (touch polythene and whistle!).

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Field Strength Meter. Model RF40, 55/- each

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SMALL ADVERTISEMENTS, READERS—*continued*

SALE: R.C.A. AR88D Rx, 540 kc-32 mc, very good order. New valves fitted, complete with headphones and loudspeaker. Buyer collects. —Rogers, 2 Boxhurst Cottages, Sandhurst, Kent.

SWL, own equipment, offers free accommodation in N.W. London to *working-class* licensed amateur, in return for help in passing R.A.E. and M.C.—Apply Box No. 3096, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

OLYMPIC ATU/Z Match 160-10 metres, 150w. model, £4 post paid. WANTED: TA-33Jr. Beam.—Denman, G3MEW, 17 Testcombe Road, Gosport, Hants.

MINIMITTER De Luxe Tx, 150w., mike, key, £45 o.n.o.?—50 Peterfield Road, Whitwick, Coalville, Leics.

HRO MANUAL INFORMATION. Theoretical circuit and pictorial diagram, adjustment points all stages, with complete re-alignment procedure. Component lists, values, etc. Installation, operation, special features, notes, etc., 15s. 6d. Send s.a.e. for indexed details (overseas enquiries acknowledged airmail).—G3ANK, 145a Station Road, Sidcup, Kent.

LG.300 80-10 metres, 150w., matching PSU/Modulator; really good; going SSB, £55.—Berry, 12 Warwick Crescent, Harrogate. (Tel. 3807.)

150W. TRANSMITTER, good components, including Labgear WBC and Eddystone dial, £9 10s. SCR-522 Transmitter, 15s.; American Signal Generator, 100-150 mc, 15s.; AR88 Cabinet, £3; *Short Wave Magazines*, 1956 to 1963, 30s.; SCR-522 modulation transformer, 10s.; power units Type 247, 600v. 200 mA and 6.3v., £3. All carriage extra.—G3GVV, Hughes, Farleigh, 65 Harland Road, Haywards Heath, Sussex. (Tel. 50961.)

BRAND NEW and boxed Gelo G.212 Transmitter, £50. G.209 Receiver, £60; Lafayette HE-80 Receiver, £47; also S/H TA-32Jr., £10 o.n.o.? All plus carriage.—G3IDW, Reynolds, Orchard Cottage, Hook, Swindon, Wilts.

EDDYSTONE 940 with matching speaker, unused condition, £90.—Willmott, 59 Green Lane, Eastwood, Essex.

VICEROY Exciter, BK CW, silicon rectifiers, above average, little used; with this goes 6146 Linear sub-chassis less PSU, £65; TCS-12 Receiver, £5; R.C.A. transformer 2000-0-2000v. 0.5 amp., £5; Dubilier 4 µF, 4 kV, £1. Carriage extra.—G3NYQ, 24 Wrenbeck Avenue, Otley, Yorks.

SALE: Eddystone 640 Receiver with matching speaker. Good condition, £15 o.n.o.?—G3GIW, 99 Stoddens Road, Burnham-on-Sea, Somerset.

PARTLY constructed 50w. AM/CW Tx with Gelo 4/104/S, valves and dial, UM-1, Philpotts cabinet, mains transformer, 3 x 6146, etc., sold whole or separately. WANTED: Vanguard or similar (Nottingham).—Box No. 3097, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

SALE: Gelo VFO 4/101, 80-10 metres, with S valves, £4. *Beam Antenna Handbook* (W6SAI), 15s.; AR88 loudspeaker, 45s. p.p. Beam motor, reversible, 12-24v. AC or DC, with indicator and potentiometer, £2. Standard 19in. rack cabinet, 26in. high, door at rear, black crackle finish, 30s. 36ft. sectional steel masts, complete halyard, guys, base-plate and pickets, £4. Two 829B, 15s. each; one 813, new boxed, 35s. Buyer collects heavy items.—G3JFO QTHR.

SMALL ADVERTISEMENTS, READERS—continued

SALE: DX-100U Tx, £40 o.n.o.? Can deliver locally.—G3NFO, Welch, 18 Lichfield Drive, Bury, Lancs.

WANTED: 23 cm. Tripler and Converter or parts, also aerial.—G3JGJ, Rope Cottage, Pepperdon, Moretonhampstead, Newton Abbot, Devon.

QRO VHF! Pair Amperex 4CX250B (new) with Eimac air-system sockets, chimneys and blower (cost £40), offers? Sun-Air 12v. Transipack, 300v. 100 mA, 5 gns.; 4 x 150 valves, 17s. 6d.; 813, £1; 811A, 29s. 6d.; 6146, 19s. 6d. Thordarson multismatch mod. transformer, 100w., 39s. 6d.—Box No. 3098, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

£90 SECURES as new, one owner, Hammarlund HQ-170 Communications Receiver, 17 valves, triple superhet, complete with instruction manual and auto-transformer; also Master Mobile whip antenna, 80-10 metres, bumper mounting, and instructions, £5.—R. S. Scales, 17 Westfield Avenue, Scarborough. (Phone 1238, after 6.30 p.m. 623.)

HEATHKIT Mohican Receiver, good condition, £25, or EXCHANGE for all-mains Communication Receiver, or 35mm. Camera.—Habesch, 19 High Street, Rhyd, Flintshire.

R. 107, mint condition, £12. Buyer collects.—P. Collett, 52 Orchard Drive, Part Street, St. Albans, Herts.

FOR SALE: BC-348L Rx, with AC PSU, slight modifications.—Offers to P. Robbins, 35 Farley Farm Road, Luton, Beds. (Tel. Luton 24014 after 4 p.m.)

WANTED: ZC-1 Rx/Tx, covering 160 and 80 metres. Mains power pack preferred. All letters answered.—Box No. 3099, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

SALE: National HRO PSU, two coils 10-160 metres, S minus 40 metres, B/S on 80 metres, S-meter, 6BA6 RF's, good condition.—Dunthorne, 36 Alexandra Street, Warrington, Lancs.

WANTED: A Novice Band in the British Isles.—C. Forrister, 368 Rush Green Road, Romford, Essex.

APR4 Rx with TN.18 300-1000 mc, £25; BC-221AK with modulation, £12 10s.; ARC-1 VHF 100-156 mc Tx/Rx, complete with 27 valves, but less two 832A, £5 10s.; 18 Set, £3; General Radio 804C Signal Generator, 7.5-330 mc, £20; TCS-13 PSU, 12v. to 440v. 200 mA and 220v. 100 mA, £5; Command Tx T-21, 5.3-7 mc, 45s.; Rx 28-42 mc, 50s.; 1.5-3 mc, £5; 3-6 mc, 45s. R.1155 Rx, working but needs slight adjustment, no case, £2. EE65F Telephone Test Set with meter, 45s. Carriage extra all items. Official maintenance manuals ARC5 LF and HF equipment, almost 300 pages, 1953 edition, £3 10s.; ARC5 VHF equipment, R.28, etc., £3; BC-221, £1; ARR5, £1; T.1946, 15s.; 38 Set AFV instructions, 10s.; *Surplus Conversion Manual*, Vol. I, 10s.; WANTED: Manuals for R.209, R.216, R.220, ALA2, ARC12, etc., what have you?—Clarke, Copper Coin, Old Galgorn Road, Ballymena, N.I.

HEATHKIT MOHICAN, nine months old, little used, good condition and perfect working order, £30 o.n.o.? Buyer arranges carriage.—Davis, G3TDL, 91 Harbury Road, Dorridge, Solihull, Warwicks. (Tel. Knowle 2413.)

K. W. VALIANT Tx, 160-10m., little used, £25; •25w. 2-metre Phone Tx, with PSU, £12.—H. A. Spashett, G3RK, Bungay, Suffolk. (Phone Bungay 88.)

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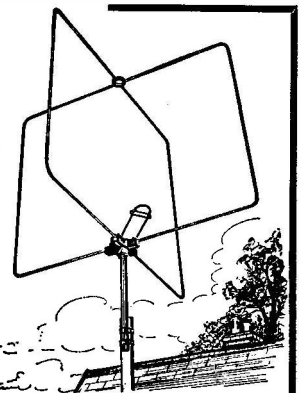
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SMALL ADVERTISEMENTS, READERS—continued

SALE: CR-100 and Manual, £12; also 1943 Canadian 9 Set, Rx, Tx and PSU, sold to callers only, s.a.e. details, offers please? **WANTED:** Good Heathkit RA-1 or Hallicrafters SX-140.—Write: Gallafent, 18 New Forest Lane, Chigwell, Essex.

WANTED: Heathkit Mohican, about £20. Price, condition, if home or factory built.—Burton, 159 Redworth Road, Shildon, Co. Durham.

WANTED: Small Topbander or Minitopper, also 2-metre Tx.—Jones, 24 Forest Avenue, Foresthall, Newcastle-upon-Tyne.

WANTED: Panda ATU for cash, or EXCHANGE 60w. Tx.—J. Sharratt, 12 Pebblemoor, Edlesborough, Dunstable, Beds. (Tel. Eaton Bray 297.)

150W. TRANSMITTER, 1200v. + 1350v. power packs, TZ40's Class-B Modulator, stabilised VFO, 813 output; R.1155 receiver; Oscilloscope: offers?—Roach, North Street, Crediton, Devon.

BRAND NEW QV06-40A, 40s.; 6146, £1; 807, 5s.; 6V6, 6J5, 6Q7, 6K7, 6K8, 2s. 6d. each; used 12AT7, 12AU7, 2s. 6d. each, 6 for 10s., postage extra.—J. McVicar, 3 Pittsville, Edinburgh, 15.

EDDYSTONE 888A, Mint condition and excellent performance, matching speaker and instructional manual, £68.—G3OFU, Hyde, Glendale, Bollinway, Prestbury, Cheshire. (Prestbury 89710.)

K.W. -2000 Transceiver, Shure 401A Mic., AC and DC supplies, not separating. Hy-Gain TH4 Beam, new and never assembled. Master Mobile Whip with coils 160, 80, 40, 20, 15 metres. BC-221T with calibration book. Dependapac 12v. +ve earth transistorised supply.—GM3PZR, 36 Oxhill Road, Dumbarton.

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FOR SALE: DX-100U, all bands, QRP on 160m., 7 months old, immaculate condition, factory built, never been used, cost £104, accept £55.—J. W. Garrett, 21 Meadow Road, Tonbridge, Kent.

FOR SALE: AR88LF, £23; Class-D Wavemeter, £2 10s.; Mohican Rx, £20; QY3-125 (new) with holder, £2 5s.; Halson Whip Aerial with four loading coils, £6; 250 FT243 crystals for regrounding, 2s. each or £15 the lot; new 4X150A and P.T.F.E.E. holder, £4; Eddystone 680X, £60.—Beaumont, 8 Ashfield Avenue, Morley, Leeds.

150W. Tx Geloso VFO, all-band pi-output, fully metered. £45 o.n.o.? Buyer collects.—G3IWB, 190 Hamstel Road, Southend-on-Sea.

SALE: Geloso 4/102 VFO with new dial and escutcheon, complete with valves, in mint as-new condition, in original packing, £6; Codar RQ10X Q-Multiplier, latest model, self powered, AC mains, brand new, cost £8 8s., £6.—Osborne, G4OV, Pucksknoll, Marshwood, Bridport, Dorset. (Tel. Hawkechurch 392.)

K.W. -160 (wkd all 98 U.K. counties), £20.—Further details, etc.: G3NPB, Springfield, Haydon Bridge, Hexham, Northumbs.

SMALL ADVERTISEMENTS, READERS—continued

FREQUENCY SHIFT KEYING UNIT. 1.7-9 mc. complete with PSU made by Redifon 1959, model GK185A, shift variable 0-1 kc, less crystals, £25; wavemeters S.T.C. 100 kc-48 mc, £2 10s.—L. Riches, Lexden Lodge, Hallsfield Road, Bridgewood, nr. Rochester, Kent. (Tel. Chatham 61476.)

WANTED: All-Band Tx, prefer factory built, no TVI; TA-33 Beam or similar; BC-221; Multi-meter. Could collect Southern England and Midlands.—Full details and lowest price to: Box No. 4000, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

SALE: Geloso 4/102 VFO, with valves, Eddystone dial. £4; Woden 750v. 250 mA transformer, £3; UM-1. 30s.; Parmeko 620v. 200 mA transformer, 30s.; two 250v. 150 mA transformers, 10s. each; Eddystone 358X cabinet. £2; (buyer collects). Meters: 3 mA. 30 mA. 200 mA, 7s. 6d. each; 50 assorted octal valves, £1; large assortment of components, £3 (buyer collects) or exchange lot for small 2-metre transmitter (about 15w.).—Tibbert, 397 Uttoxeter Road, Derby.

EXCHANGE: Mosley 4-band vertical Ant. for car Radio, W.H.Y.?—G3NQX, 1 Gib Lane, Hoghton, nr. Preston, Lancs.

EDDYSTONE S-640 Receiver for sale. Offers? **WANTED:** National 1-10 Receiver and HRO bandspread coils, 7 and 28 mc.—Box No. 4001, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

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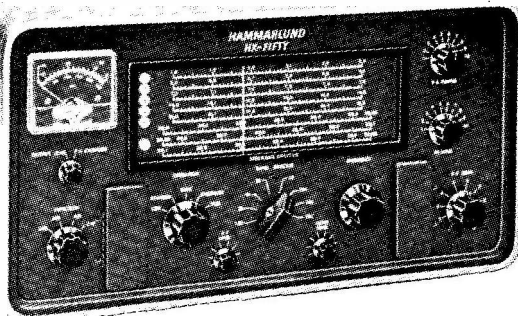
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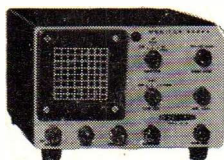
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