The
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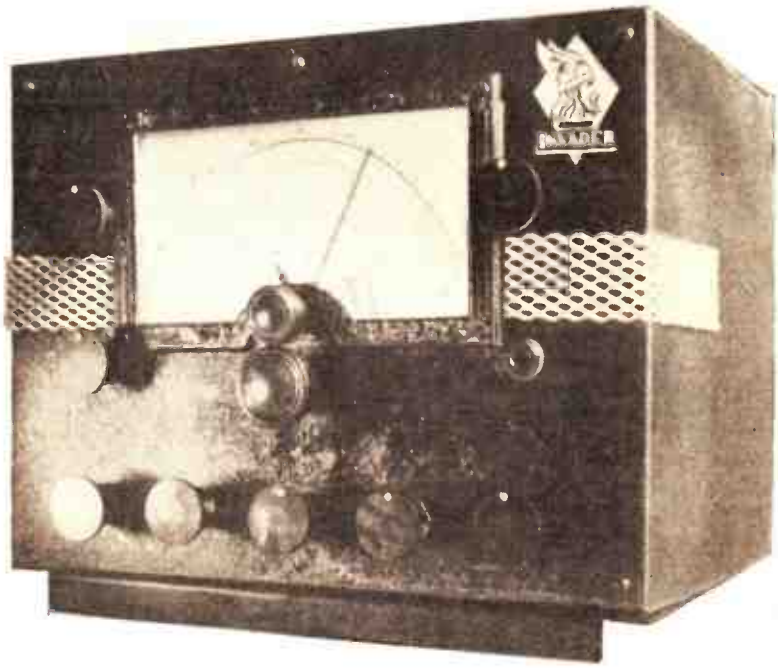
SPECIAL CONSTRUCTIONAL FEATURE

"THE INVADER"



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The
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EDITORIAL

We have devoted considerable space this month to an article which was circulated to the amateur radio press, describing a recent exhibition in Hastings at which a particularly fine amateur radio station was operated.

We have given up space for this article, because we feel that the question of publicity for our hobby is of vital importance at present. This article outlines the method of approach which should be adopted for these exhibitions; it points out the difficulties likely to be encountered; it draws attention to those features which are most likely to appeal to the public. In publishing it, we hope to stimulate other groups to put on similar shows and we feel sure that if these groups follow the advice set out in this article, they will save themselves much trouble.

Our hobby of SW transmission and reception is going through a very deep depression at present. The peak of interest which followed the war and coincided with high sunspot activity, has dropped off just about as severely as have DX conditions ! Counter attractions—particularly in the realm of TV—have taken many away and the difficulties and expense of TVI proofing the transmitter has delivered a further blow to our hobby. On the listening side interest also seems to have fallen off, due, we are told, to poor conditions and the extensive jamming which now ruins so much of the SW spectrum. On all sides we hear of dwindling society and club membership. Whereas a couple of years or so ago, one would drop in at some radio society meeting and find a healthy, active club of a couple of dozen or so members, now one is lucky if one finds a half dozen.

We feel that shows such as that described in this issue, have a two-fold function. In the first place, they show the general public that our hobby is not a cranky, haywire " ham " effort, but is highly instructive and educational and forms an important link in the technical training facilities available to the community. We hear much these days about the shortage of technicians and the inadequacy of the facilities for training them.

But apart from this important aspect, exhibitions such as these will help to attract the younger generation to our hobby and we certainly do need some new blood in our clubs and societies at the moment.

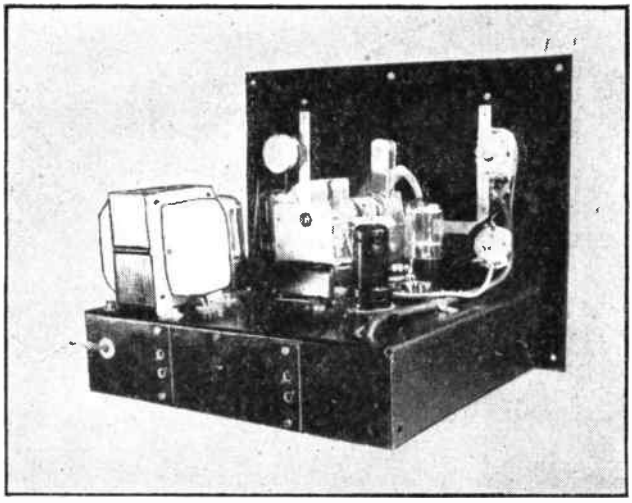
We are just entering on the season of exhibitions, both local and national. May we suggest that all clubs become publicity minded this winter and miss no opportunity of staging something like the show at Hastings. 2UK.

THE EDITOR invites original contributions on radio subjects. All material used will be paid for. Articles should be clearly written, preferably typewritten, and photographs should be clear and sharp. Diagrams need not be large or perfectly drawn, as our draughtsmen will redraw in most cases, but relevant information should be included. All MSS must be accompanied by a stamped addressed envelope for reply or return. Each item must bear the sender's name and address.

Component Review. Manufacturers, publishers, etc., are invited to submit samples or information of new products for review in the section.

CHEQUES and Postal Orders to be made payable to Data Publications.

ALL CORRESPONDENCE should be addressed to " The Radio Amateur," 57 Maida Vale, London, W.9. Telephone CUN. 6518.



"THE INVADER"

A

General Coverage TRF

15-50, 70-230, 190-520 Metres

by

FRANK A. BALDWIN

(This design, specially devised and constructed for us, is mainly for the interest of those contemplating the construction of their first TRF receiver. It could equally well serve as a standby Rx for those in need of such a unit.—Editor.)

Many newcomers to Amateur Radio and the Short Wave bands "arrive" via the use of the domestic receiver, and, once the interest is aroused, there soon commences a yearning for one's own receiver. It is usual at this stage for the enthusiast to construct a one- or two-valve Rx with the addition at a later date of an RF stage. Such a design, when completed, provided the circuitry and mechanical design are sound, can give a very good performance. The 1-V-1 type of receiver has always been popular both on account of performance and price, and while the selectivity does not compare with that of a superhet, it can, with careful design and the inclusion of an audio filter, somewhat approach that of the more comprehensive designs.

With the present high price of communication receivers, one that is home made offers the cheapest way out and, in addition, imparts to the beginner that skill in operation that is essential when one graduates as it were, from the straight to the superhet at a later date.

When completed as a 1-V-1 receiver, (see cover photograph), "The Invader" will prove to give a very good account of itself indeed. The design has been air-tested by using differing aerials under varying conditions with very satisfactory results. Plenty of audio gain is available, reaction is smooth and stable, while selectivity is of a high order due to the careful design and layout, which should be closely followed if maximum results are to be achieved. All components used are of high quality and easily obtainable on the market. Values and components specified should be adhered to as these were all specially chosen in order to achieve a sound design and performance.

Panel and Chassis

Drilling details of these are given in Figs. 1 and 2. The complete panel and chassis of aluminium together with the steel cabinet is supplied by Messrs Kendall & Mousley. Before drilling operations commence however, the following few points should be noted. The bottom portion of the outer case should be unscrewed, reversed (i.e., inner surface to become the outer so that the receiver will stand on the two runners—see front cover), and screwed back into position. The four corner supports at the chassis corners should be removed—these are not required owing to the lightness of the components.

Having drilled the chassis and panel, the components should be mounted with the exception of the tuning condenser and valve holders. The panel and chassis surface should now be painted with "Panl" (see small advertisements) and left to dry. The result, provided the instructions are carried out, is a perfect black crinkle finish. The remainder of the components should now be mounted.

Circuit

This has been designed to incorporate valves which are easily obtainable, both new and on the surplus market. These are—6SS7 RF stage, 6SN7 detector, and first I.F stage, 6V6 audio output and 5Y3 rectifier, all octal base types.

The power pack is included on the same chassis and provided the same lay-out is used, no hum troubles will be experienced. Each stage is earthed separately to its own earthing point. RF gain is achieved by means of the

Drilling details of the "Caliband" Dial and Drive are not shown. These will depend on the Dial position (height) most favoured, the Dial fitting assembly is adjustable.

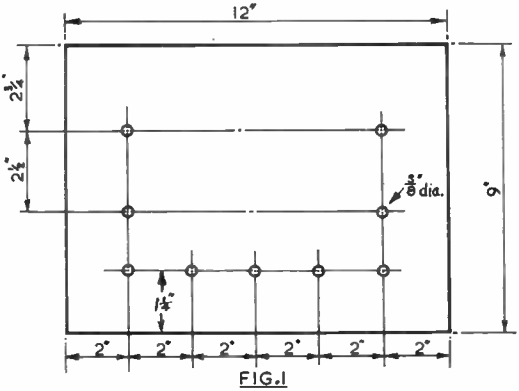


FIG.1
PANEL DRILLING DETAILS

variable resistor RK in the cathode circuit. The RF choke in the anode circuit is an Osmor type QC1, a most efficient component which mounts vertically on the chassis.

RF Stage

The most notable feature here is the inclusion of a split stator condenser in series with the aerial, and this effectively balances the aerial against ground. In practice, it is used as a selectivity control, at the minimum setting it is so arranged that the outer rotor vane contacts the aerial input stator vane, the aerial thus being fed direct into the coil primary. This is achieved by slightly bending the end aerial stator vane inwards so as to make contact with the rotor, or moving vane, at the minimum setting. On rotating towards the maximum position of the condenser, selectivity is greatly increased and where before a broadcast or amateur band appeared with overlapping stations, each transmission is now quite separate. Although unusual in such a design it is nevertheless responsible for much of the selectivity obtainable from "The Invader." C4 is the RF trim control.

Detector Stage

This stage (first half of the 6SN7), is a simple triode circuit with throttle controlled reaction acting as a leaky grid detector. The output from this is resistance capacity coupled into the second half of the valve which acts as the first audio amplifying stage. This section of the valve, using the component values specified, has sufficient output to drive the 6V6, thus allowing the latter stage to deliver plenty of audio—more than is normally required in the average shack.

The use of a 6SN7 as a combined detector/first audio stage is somewhat unusual in this country—at least in published circuits. Little use seems to have been made of this type of valve over here, while in some countries, notably the USA, a much greater use of them is made. Two valves (virtually), for the price of one is surely of some interest to the listening fraternity. It functions very well in the circuit design offered here, and while double triodes of greater gain are available, it was found in practice that the 6SN7 was most suitable in this unit. C13 is included as an RF filter to ensure that no unwanted RF appears at the grid of the first audio stage.

Reaction is smooth and stable but special note should be taken of the coil connections in this stage. Fig. 3 shows these connections for the RF stage while Fig. 4 gives details of the connections for the detector stage.

It should be noted that the grid condenser and grid leak resistor are mounted above the chassis on a separate tag board close to the tuning condensers, a fact which greatly assists in obtaining good reaction.

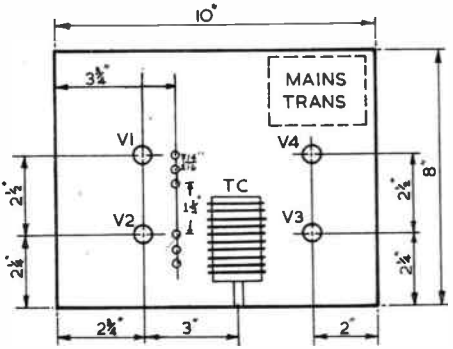
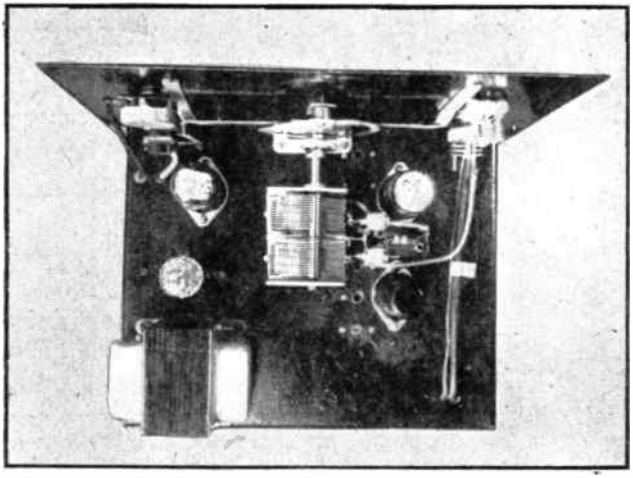


FIG.2
CHASSIS DRILLING
DETAILS

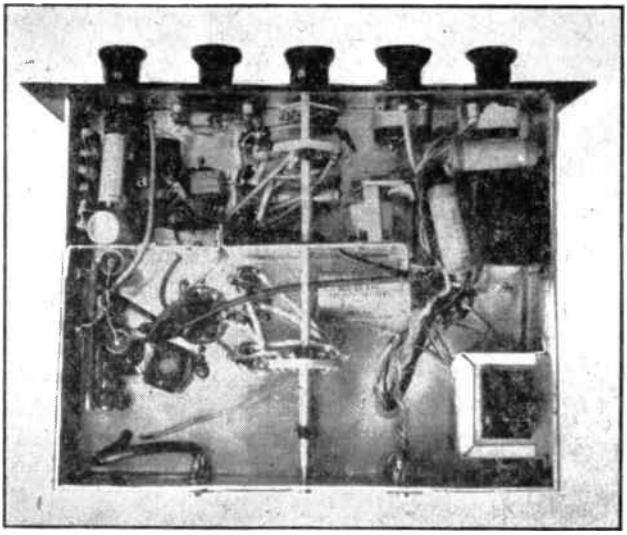


Plan view of the chassis. Note position of coils, also tag board with R6 and C11. Aerial input CO-AX cable is clearly shown.

The dial shown is the Jackson Bros. " Caliband "—one of the best full-vision dials that we have yet encountered. The lower pointer is a 6-to-1 reduction bandset, while the long pointer is the mechanical bandspread providing a reduction of 48 to 1. This dial is so arranged that 100 degrees of bandspread moves the bandset pointer over 10 degrees on the lower dial. The inclusion of this " Caliband " dial and drive obviates the necessity of a separate bandspread condenser, thus saving both space and cost.

First Audio Stage

From the anode of the detector the rectified signal is passed via a 0.01 condenser to the grid of the second half of the 6SN7 and the resultant amplified signal is then fed into the grid of the output stage via the audio gain control. The layout of this stage, as with the others is well shown in the accompanying illustrations. Most of the components are contained on tag boards which greatly assists in stability owing to the fact that secure anchorage is thus provided, thereby adequately



Under chassis view of " The Invader." Screening between RF and detector stages together with tag boards containing components are shown.

preventing any movement and consequent alteration of circuit constants due to stray fields, capacities, or other unwanted effects. As in all TRF receivers, the mechanical design and construction must be completely sound—hence the under chassis screening which can be clearly seen.

Audio Output Stage

From the circuit (Fig. 5), it will be seen that an audio filter has been included in this stage. This simply consists of an inter-valve transformer (see component list) connected from the grid to ground via a 50K potentiometer with switch. Tag No. 1 of the transformer is taken to the grid while tags Nos. 2 to 5 inclusive are connected to the variable resistor. The components and valves have been carefully chosen to give a high degree of bass cut on the audio frequencies, enabling both speech and CW to be effectively filtered when required. This control, in conjunction with C1, provides a very efficient means of selectivity, one acting on the RF frequencies and the other on the audio side.

Tone control is provided in the anode circuit and the headphones are fed through a separate 0.1 condenser. Insertion of the headphones automatically cuts out the speaker.

Power Pack

This is entirely conventional and should present no difficulty. The voltage and current delivered from this unit is adequate and the pack will be found to run quite cool even after prolonged periods of operating. S2 is incorporated with R13.

For those about to embark on the construction of this receiver, we would add that the detector and output stages may be tried out before the addition of the RF stage simply by connecting an aerial to C8.

The gold mesh seen on the front and sides is purely decorative and is, in fact, two pieces of speaker mesh cut to size, this mesh being available at most radio dealers.

When lining up the receiver, the dust iron cores should be adjusted for the loudest signal at the low frequency end of the waveband and C3 with C10 should be adjusted at the high frequency end. This should first be carried out on the 15-50 metre band, after which C3 and C10 should be left alone and trimming for maximum performance on the other bands carried out with the cores only.

Looking at the illustration of the receiver on the front cover, the controls are—top left Aerial Matching, immediately below is the RF Trim, bottom row from left to right are—RF Gain, Reaction, Wavechange, Audio Filter, and combined On/Off and Audio Gain. Above the Phone Jack is the Tone Control. Dial controls are—at top the Bandset, and below that is the Bandspread.

On the opposite page will be seen the under chassis view of the receiver. The aerial input is shown on the left, from where the CO-AX cable goes above chassis to the aerial matching control. The tag board containing the RF stage components and that of the detector stage are separated by a screen to avoid unwanted interaction effects. These tag boards are mounted close to the chassis wall. The position of the RF chokes should be specially noted.

The Audio Filter choke is shown mounted directly to the inter-stage screen and immediately behind the potentiometer R14. The smoothing choke can be seen at the bottom right hand corner of the chassis while the output transformer is mounted just to the rear of the Audio Gain control R13.

When completed, "The Invader," as will be seen from the photographs, presents a most pleasing appearance and it will be found by experience that the performance is in keeping with its looks.

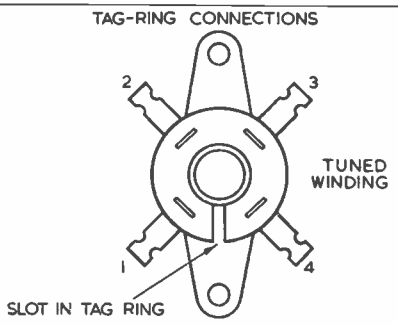


FIG 3
R F COIL CONNECTIONS

1 TO EARTH
2 TO AERIAL INPUT (C1)
3 TO EARTH
4 TO GRID

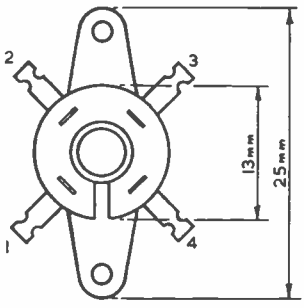


FIG 4
DETECTOR COIL CONNECTIONS

1 TO ANODE
2 TO REACTION CONDENSER
3 TO EARTH
4 TO GRID

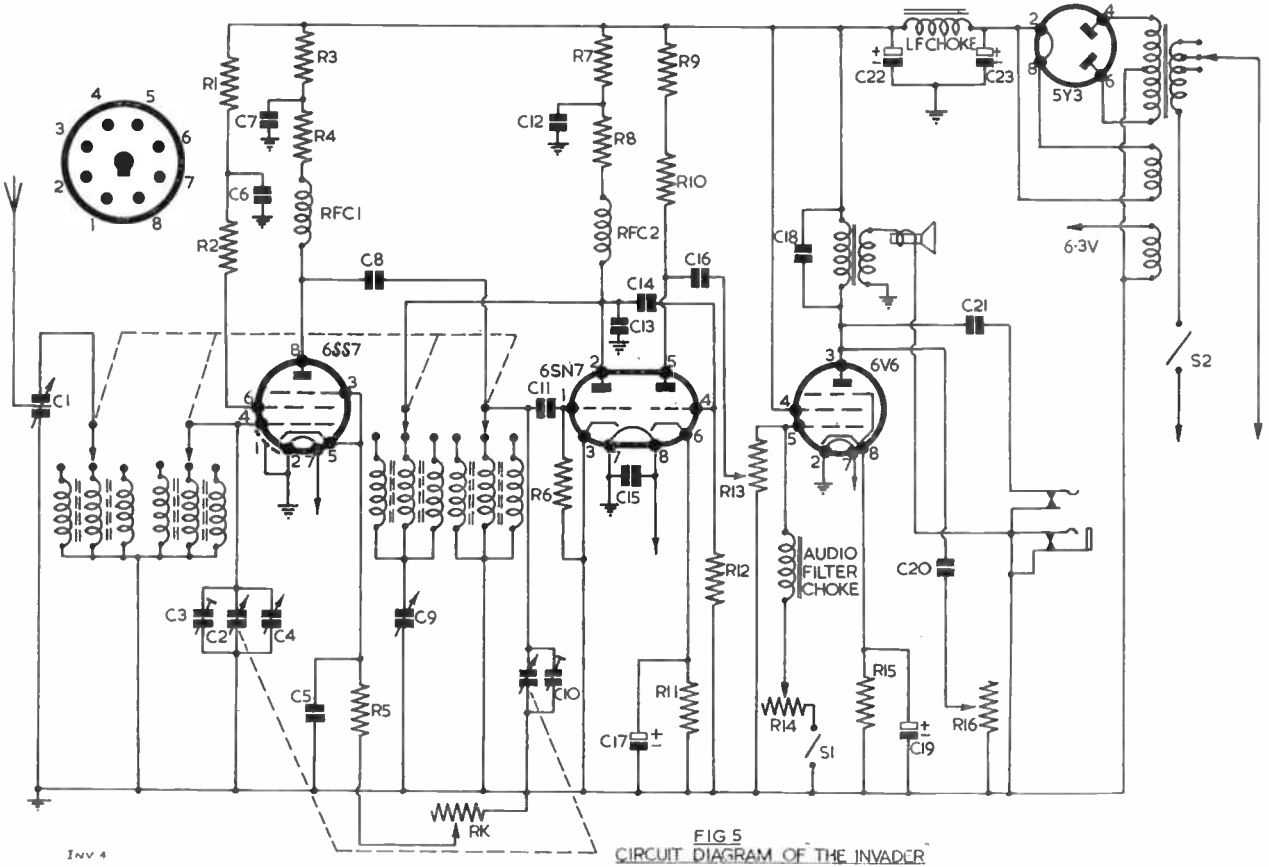


FIG 5
CIRCUIT DIAGRAM OF THE INVADER

In conclusion, the writer would again stress that before commencing construction of the circuit shown on the opposite page, the exact component values and makes be obtained. In the component list below will be seen shown alongside each item the manufacturer's or supplier's name. All components used should be of high quality if maximum performance is to be obtained.

(Readers interested in receiver construction are advised to obtain copies of our companion journal The Radio Constructor*—in which such units are often described. "The Voyager"—a five-valve TRF using the Mullard B8A valves and incorporating a noise limiter circuit using two Germanium Crystal Diodes, designed and written by the same author, is shortly to be published.)*

"THE INVADER"

COMPONENT LIST

R1	47K 1 Watt		(Dubilier)
R2	20K ½ ,,		,,
R3	20K 1 ,,		,,
R4	10K ½ ,,		,,
R5	330 ohms	½ Watt	,,
RK	5K pot	,,	,,
R6	2 Meg ohms	,,	,,
R7	20K ½ Watt		,,
R8	47K ,,		,,
R9	20K ,,		,,
R10	47K ,,		,,
R11	1K ,,		,,
R12	470K ,,		,,
R13	500K pot. with switch		,,
R14	50K ,,	,,	,,
R15	330 ohms 1 Watt		,,
R16	50K pot		,,

Coils

Osmor QA2, QA4, QA11—Detector QHF2, QHF4, QHF11—RF Stage. RFC1, RFC2—Osmor Type QC1.

Dial—Jackson Bros. "Caliband."

Audio Filter—Elstone Type LF36 Kendall & Mousley.

Speaker—Goodmans Type R4/306/3. 3½ in.—mounted in separate cabinet.

Mains Transformer—Ellison Type MT 162, Solidas Ltd.

Yaxley Switch—Oak Type Switch Service—see Small Adervtisements.

Phone Jack Igranic. Spkr-Transformer—to match Spkr.

C1	100 pf Split Stator	
C2	0.0005 variable two gang (Jackson Bros.)	
C3	3-30 pf Phillips	
C4	50 pf variable	(Jackson Bros.)
C5	0.1 μF	(T.C.C.)
C6	0.01 ,,	,,
C7	0.01 ,,	,,
C8	100 pf mica	,,
C9	0.005 mica dialectric (H. L. Smith & Co.)	
C10	3-30 pf Phillips	
C11	100 pf mica	(T.C.C.)
C12	0.1 μF	,,
C13	100 pf mica	,,
C14	0.01 μF	,,
C15	0.001 ,,	,,
C16	0.01 ,,	,,
C17	25 μF, 25 v wkg Electrolytic	,,
C18	0.0003 mica	,,
C19	25 μF, 25 v wkg Electrolytic	,,
C20	0.1 μF 350 v wkg	,,
C21	0.1 μF 500 v wkg	,,
C22	16 μF, 500 v wkg Electrolytic	,,
C23	8μF ,, ,, ,,	,,

Valves

6SS7—Solidas Ltd.

6SN7—Kendall & Mousley, Brimar.

6V6 — ,, ,, ,,

5Y3 —Solidas Ltd.

Cabinet, Chassis and Panel, Kendall & Mousley—see advert.

METER SHUNTS for BEGINNERS

by A. E. GARSIDE, B.Sc.

Often the amateur finds it necessary to measure voltage and current. In a previous issue the construction of a multi-range AC/DC voltmeter was described. As a companion piece of equipment here are details for constructing multi-range ammeters.

To extend the range of an ammeter the meter must be shunted by a resistance i.e. a resistor connected in parallel with the meter. There are two methods of doing this, (1) by separate shunts (2) by a universal shunt.

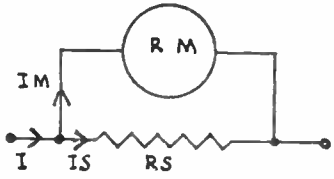


FIG. 1. METER & SIMPLE SHUNT. RA217

Let us consider method (1). Suppose we have a 0-5mA meter and we wish to extend its range to 0-25mA. To do this we must know the resistance of the meter. Normally this is stamped on the face of the instrument. Now to calculate the value of the shunt.

Let the full scale deflection of the meter be Im
the resistance of the meter be Rm
the resistance of the shunt be Rs
the extended full scale deflection current be I

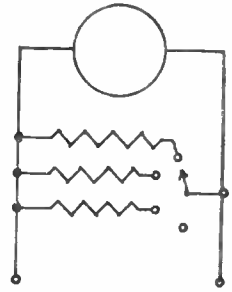


FIG.2 MULTIRANGE AMMETER WITH SIMPLE SHUNT. RA218

Then the current which must be diverted from the meter through the shunt is I — Im = Is. Now the voltage across the shunt and the meter must be the same, as they are in parallel.

Hence $Im.Rm = Is.Rs$ (Ohm's Law)

$$Rs = \frac{Im.Rm}{Is}$$

Now let us put this into practice and calculate the value of the shunt required in the example. We shall assume that the meter resistance in this case is 8 Ω.

Then $Is = 25 - 5$
$= 20$ mA.

$$Rs = \frac{5}{1000} \cdot \frac{1000}{20}$$
$= 2\ \Omega.$

Other values may be calculated in a similar manner. For a multi-range ammeter the shunts are arranged as in Fig. 2.

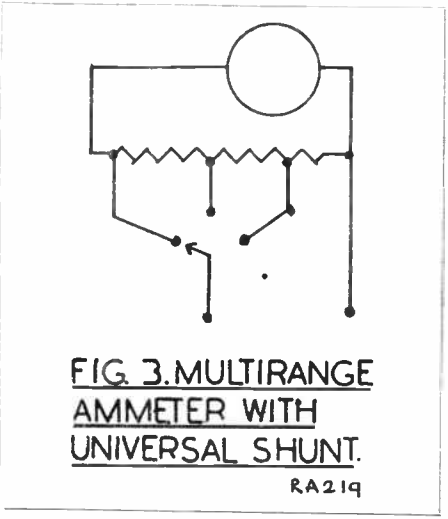


FIG. 3. MULTIRANGE AMMETER WITH UNIVERSAL SHUNT. RA219

Three shunts on a 0-5 mA meter will provide a very useful range of readings meeting with most requirements in radio work. (0-5, 0-25, 0-100 and 0-250 mA.)

Now let us consider the universal shunt. In this case one shunt is wound, connected permanently across the meter and tapped at various points along its length. Its main advantage is that it eliminates errors due to contact resistance which are unavoidable in the previously described method. Although

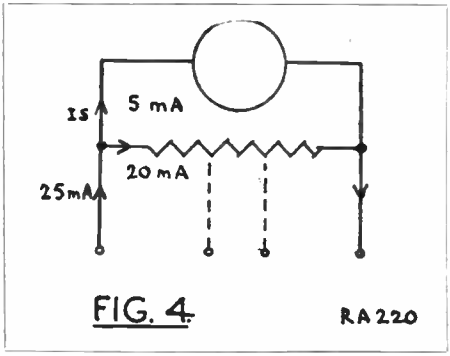


FIG. 4. RA220

this may not affect the lower ranges appreciably it can have disastrous effects on the higher current ranges where the shunt value required, in our example, would be 0.1635 Ω. A dirty or poor switch contact may easily contribute more than 0.02 Ω and this value would make the FSD less than 230 mA, instead of 250 mA which is quite serious. There are other advantages from the constructor's point of view. One is that only one shunt is required, thus, less resistance wire is needed. Another is that the arrangement simplifies the construction of shunts for higher current ranges which will be better shown by means of an example. One disadvantage of the shunt is that as it is permanently connected across the meter the lowest current range is that with the whole shunt connected.

Let I, Is, Im, Rm, Rs, denote the same quantities as in our previous example. Then as before we have $Rs = \frac{Im.Rm}{Is}$ Rs being the resistance required for the lowest current range.

Let us assume we have the same meter as in the first example and we wish to design a universal shunt for the current ranges 0-25, 0-100 and 0-250 mA. We first calculate the value of the shunt for the lowest current range namely 0-25 mA.

$Rs = \frac{Im.Rm}{Is} = 2\ \Omega$ as in the previous case.

Now we come to the difference between the two cases. To obtain our 100 mA shunt we utilize part of the 25 mA shunt. The part of the shunt not actually in use is now in series with the meter and may be regarded as increasing its effective resistance. Our circuit is now as Fig. 5 and may be treated as before except that Rm is the resistance of the meter plus that part of the shunt not in use. Let us call this Rt. The resistance of the section of the shunt used on this range is say R1.

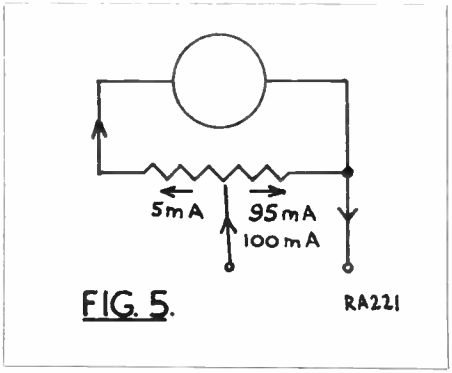


FIG. 5. RA221

$$\text{Then } R1 = \frac{Im.Rt}{Is}$$

$$R1.Is = Rm.Im + Rs.Im - R1.Im$$

$$R1\ (Im + Is) = Im\ (Rm + Rs)$$

$$R1 = \frac{Im\ (Rm + Rs)}{I}$$

Now for Our calculation.

$$R1 = \frac{5}{1000} \cdot \frac{100\ (8 + 2)}{100}$$

$$= 0.5\ \Omega.$$

For the 250 mA range.

$$R2 = \frac{5}{1000} \cdot \frac{1000\ (8 + 2)}{250}$$

$$= 0.2\ \Omega.$$

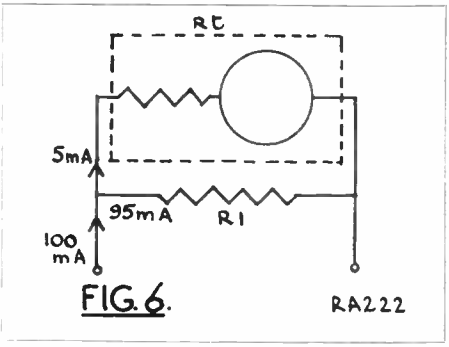


FIG. 6. RA222

At this stage we can compare the values of shunts required in the case of simple shunts and universal shunts.

	Simple Shunt	*Universal Shunt*
25 mA	2.0 Ω	2.0 Ω
100 mA	0.42 Ω	0.5 Ω
250 mA	0.164 Ω	0.2 Ω

It can be seen that the value of resistance required for the 250 mA shunt is about 25 per cent. higher than that for the simple shunt. This may not seem important at first but it means that instead of having, say, four inches

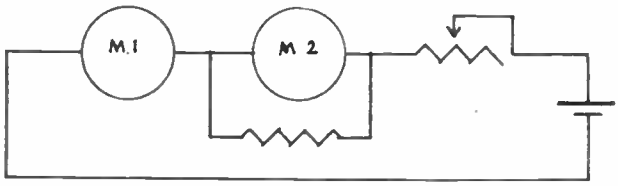


FIG. 7. CALIBRATION CIRCUIT RA223

of wire we now have five inches, and thus greater accuracy can be obtained.

Having dealt with the theoretical side, we may now turn our attentions to the practical construction of shunts and their calibration. The heavier the gauge of wire we use, the greater the length will be, and so it will be easier to obtain a reasonable degree of accuracy in our measurements, but the cost will be increased and the shunts will be bulky, so it is usual to choose a wire which is of sufficient gauge to carry the current. This may be done from wire tables but a point to note is the condition under which the current carrying capacity is stated. This may be given as " wound on spool " or " wound on slab." In the latter case the rating is much higher due to the additional ventilation (about 3-5 times higher).

On examining the wire tables for our 25 mA simple shunt we find that 37-SWG Eureka will carry 29 mA spool wound, so this wire is suitable from the current aspect, but as it is 0.162 ft./ohm and we require only 2 Ω, the length would be just over 3.8 in. This does not leave much room for errors, so it would be better to choose a heavier gauge wire, say 30 SWG. This will allow us about 13 in. of wire which is a much better proposition.

About 15-17 in. of wire should now be cut off and wound on a former (a flat piece of paxolin is suitable).

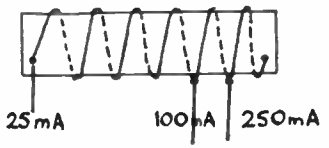


FIG. 8 UNIVERSAL SHUNT WOUND WITH ONE GAUGE OF WIRE. RA224

The next process is to calibrate the shunt. The ends of the wire should be anchored, one end permanently and the other end temporarily. The next essential is to beg, borrow, or steal, a calibrated meter; an AVO meter would be ideal. This should be connected in series with the meter under calibration and the combination connected as in Fig. 7. The rheostat should be fully in circuit initially so that the meters are not damaged by overloading. The rheostat is now adjusted so that the main meter is set on a specific reading e.g. 20 mA.

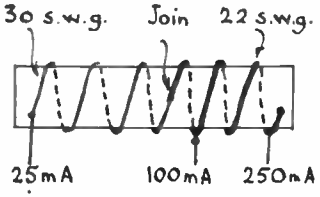


FIG. 9 UNIVERSAL SHUNT WOUND WITH TWO GAUGES OF WIRE. RA225

This enables greater accuracy to be obtained than by using an arbitary value of current. The length of wire on the shunt is then altered until the readings on the two meters are equal.

N.B. The shunt must NOT be disconnected from the meter to make adjustments while the supply is still on or the meter may be damaged. The shunt may now be connected permanently to the meter by means of heavy gauge copper wire and the calibration checked at several points over the scale. If the reading is too low it is obvious that the shunt is taking too much current and hence its resistance is too low. This may be increased slightly by scraping the wire lightly with a knife. If, however, the

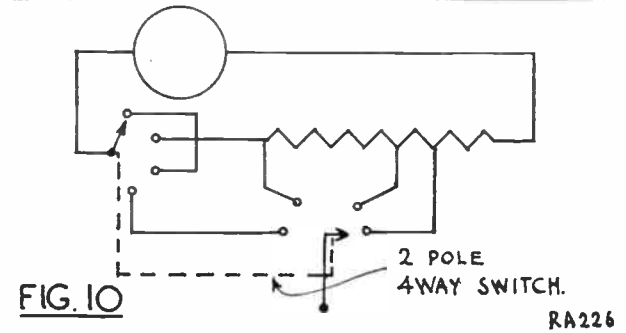


FIG. 10

reading is too high the length of the wire may be reduced by running the solder a little way along the wire from the connection, or alternatively by cutting a small piece off the wire and resoldering.

All switching should be of the make before break type. If these are not available the meter must always be disconnected or the circuit switched off before changing its range. The connections from the shunt to the meter should be of heavy gauge copper wire and as short as possible.

The universal shunt is normally made from a combination of several wire gauges when a wide range shunt is required, so that it is not too bulky. The average constructor is not likely to have three or four gauges of resistance wire at hand, so if the ranges are not too wide one gauge can be used for the whole shunt. In this case the length required will be that for the lowest current range and the current carrying capacity must be sufficient to carry the highest range of current.

In our example for a universal shunt we found that for the 25 mA range we required a resistance of 2 Ω. From wire tables it is found that 22 SWG Eureka would be suitable. The length of wire required is approximately 5.5 ft. tapped at 1.375 ft. and 0.55 ft. from one end. This may seem to be an excessive length but as it is not always possible to buy wire by the yard an apparent extravagance on one hand is an economy on the other. The shunt may be made from two gauges of wire e.g. 1.4 Ω of 30 SWG Eureka (about 9 in.) and the remaining 0.6 Ω of 22 SWG (1.65 ft.). By using a slightly shorter length than is necessary of the finer wire the tapping for the 100 mA position falls on the heavier gauge wire thus making adjustment simpler. The method of calibration is exactly the same as for a simple shunt.

Here is a circuit using a single-tapped shunt which although destroying the advantage of having no contact resistance troubles has the constructional advantages of the universal shunt. This could be used with a 0-5 mA meter to give ranges of 0-5 mA, 0-25 mA, 0-100 mA and 0-250 mA.

G6HH/A Hastings Calling

by W. E. THOMPSON

Remember it? The station that came up for a week and went down with flying colours, leaving those who heard it wondering what had hit them. The station that wrapped S-meter needles round their stops. Here's a bit of its history, a record of its butterfly existence.

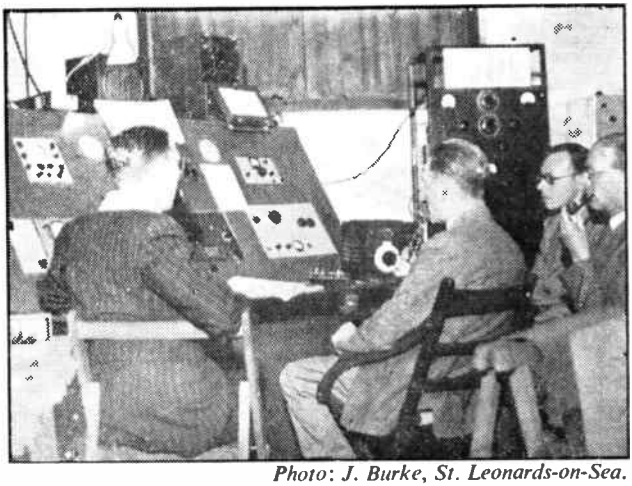
It seems way back in the dim and distant past when in February the Hastings and District Amateur Radio Club decided to participate in the Hobbies Exhibition, to be held on July 4th-11th. Looking back over the intervening period one realizes that even with five months to prepare for the event life often seemed too short to ensure that our exhibit would materialize: so much had to be prepared and taken into account that at times it appeared doubtful whether we could beat Father Time.

The Hobbies Exhibition is an annual event forming one of the many attractions of Hastings Carnival Week, all proceeds from the week's activities being devoted to charities. This was the first time that amateur radio would be in the show; in addition, it was the first time that the Club had ventured on such a project. It was therefore necessary and most desirable that the best possible show should be put on, not only to do the Exhibition credit but to ensure at the same time that the Club should bring no discredit upon itself from a mediocre display. As there was obviously a can just asking to be taken back, a sub-committee was elected to shoulder the responsibilities of organizing the event in all its aspects. Although its terms of reference are not given here, they amounted to instruction to produce the goods—or else . . . !

It was not long before the sub-committee came to realize the complexity of its task. All sorts of things had to be intelligently anticipated and suitable arrangements made accordingly. Where were the Club's stands going to be—how much space could we use—how much space would we be allotted—what other stands would there be around us—could we get a mains feed to our stand, and where from—where could we put up aerials and masts—what aerials would we need—who could provide apparatus and such-like for exhibits, and what sort of stuff would they show—who would decide whether the standard of workmanship was tolerable—what about transport for all this gear—who can provide aerial masts—will the Police let us haul a couple of 50-footers through the streets—who is going to operate the /A station—what days, and what times, could operators attend—what precautions should be taken against failure of equipment—how much will it all cost: these, and dozens of other matters loomed up and had to be grappled with and a solution found for each. Not the sort of thing the amateur normally takes in his stride, albeit, the very kind of problem he revels in and surmounts even if he does tear his hair out in the process. There are five bald heads in the Club now!

It was decided to operate mainly in the 80-metre band, and G5RO doctored up his all-band rig for use at the exhibition. This transmitter was to be operated remotely from a control console which would also contain the receiving equipment, and serve as an operating position. In its final form the console was 6 ft. long, 5 ft. 6 in. high and 2 ft. 6 in. in depth, the operating desk being a little over 1 ft. wide. The panel containing the control gear and receiving apparatus sloped back from the desk at an angle of 45°. A sketch showing roughly the disposition of the equipment on the panel is given here; it can also be seen in the photograph. The console comprised a wooden framework covered in hardboard, which latter was wax polished. Due to its appearance, it soon became known as "The 'ighly-polished Console." It was made in sections for ease of transportation so that it could be assembled on site, and later dismantled and stored for future use. Considerable credit is due to our member R. G. Ford, who spent many hours of his spare time constructing it, and to the members who expended much elbow grease producing the polish. XYLs who dare mention anything about giving the floor a doing-over run the risk of having something thrown at them.

It so happened that the exhibition buildings were in a clear open space, on a hill behind the White Rock Pavilion overlooking the sea. Adjoining the buildings were two bowling greens, one of which was not turfed. Permission was obtained to erect aerials and masts on this ground. Two masts were set up in diagonally opposite corners; one was a 50 ft. wooden pole, the other a screw-jointed 2 in. diameter steel mast 52 ft. high. Between these was suspended a 130 ft. span of wire, centre-fed, with co-axial cable which dropped straight down to the ground and then ran underground to the exhibition building, gaining access to the transmitter through a convenient window. A horizontal dipole for 10 metres was also erected, and the receiving aerial was a long wire 20 ft. high and fixed to the remote mast. A five-element Yagi on a 30 ft. pole was mounted beside the building for 2 metre reception, and the earthing system was four 3 ft. spikes driven into the ground immediately below the aforementioned window. From the consistently good reports received there is no doubt that the 80-metre dipole produced the goods.



Left to right: *W. E. Thompson*; *D. Raitt, G3IKE*; *J. D. Heys*; *L. H. Thomas, G6QB.*

Photo: *J. Burke, St. Leonards-on-Sea.*

There certainly seemed to be no difficulty in securing contacts; our main trouble was how best to handle the queues of stations when conditions were good. The QRM from the fun-fair right alongside us made our receiving conditions a bit grim, for we could not get our aerial out of the interference field produced by dozens of DC gennies, dodgem cars, flashing signs, pin-tables and such-like abortions. Our best results were always secured before 3 p.m. when the fair was QRT—any time after that we suffered from continual QRM, and it wasn't flea-powder either !

The exhibition opened at 10 a.m. on Saturday, July 4th. We set up our aerials on the evening of the 2nd, and installed the transmitter and the rest of the show on the afternoon and evening of July 3rd. Of course, something would have to go wrong. '5RO's rig, which had behaved itself up to now, apparently took umbrage at being carted through the streets and saw fit to develop a fault almost at zero hour. At midnight on the 3rd, we were searching for a missing HT supply for the modulator, and as everybody had just about had enough of it for one day it was decided to let the rig sulk, and tear it apart the next morning. Having just settled down to put things aright, in blows '3CMN, sizes up the position in a flash and straight away offers the use of his Varney rig, with an 813 in the final running 150 watts, provided that the rack-mounted gubbins can be got down to the show. No sooner said than done: hordes piled into '5RO's car, skated off to '3CMN's shack, dismantled the rig and brought it down to the exhibish. Once there, it was assembled, wired up, and was on the air within a couple of hours. And thus started the great sizzle—Jack's rig saved the situation, did yeoman service without complaint, and made the show a success.

In order that onlookers could hear what was going on, the HRO in the control panel was fed into two 5 in. speakers mounted in the panel. This was later augmented by a third speaker which stood on top of the console. Our own transmissions were picked up on a monitor receiver situated on a distant stand and worked into a Williamson amplifier, running at low level. Even so, there was a certain amount of " echo " effect in our transmissions which brought comment from various operators. The building is of concrete throughout, with a glass roof (and didn't we stew, Hi !); it is about 120 ft. long, 50 ft. wide and over 20 ft. to the roof peak. Acoustics were therefore conductive to reverberation effects which enabled the operator to be heard with ease all over the building. One of our operators, '3HRI, seemed to produce what was described by more than one contact as a " metallic " modulation. There seemed to be no apparent reason why this should be so, but to account for it '5RO did suggest on one occasion that John had got his gold teeth in for a change, whilst '6QB proffered the explanation that he was munching chocolates without first removing the silver paper.

Talking of operators recalls one of the snags that was encountered with regard to the licence. In past years the Club had held the call sign G6HH, but for various reasons the licence had been allowed to lapse and had, in fact, been pretty well forgotten. At one time it was decided, for the purpose of the exhibition, to request /A facilities for G2RG, one of the Club members, with permission for alternative

operators to be recognized. The snag here was that '2RG could not be in full attendance whenever the station was operating, and the rota of alternative operators produced what amounted to Club licence conditions. We therefore resolved to have G6HH taken off the hook, with a /A tacked on, which put the thing in official order and permitted our licensed members to be cited as alternative operators without fear of running into trouble. Of course, the call sign G6HH happens to be rather apt, and the many town dignitaries who visited us were agreeably impressed with our phonetic " Happy-Hastings-stroke-Able." Well wasn't Hastings in merry mood during Carnival Week ?

During the week of operating 246 QSOs were held, the majority of these taking place up to the Wednesday. Conditions tailed off on the Thursday, Friday and Saturday and produced only about 50 or so QSO's. The way things had been going up to the Wednesday, it looked as though we could chalk up about 400 before we went QRT on the Saturday, but it was not to be. Of course, the HRO had to fade out on us early on the Saturday afternoon just when the crowds were gathering, so another receiver had to be pressed into service. Naturally, it didn't fit in the Console—what else do you expect, hi ! Anyway, with a bit of BF and BI, we won. This particular receiver, belonging to a Club member, is one of only a few that were produced a few years ago by a firm then known as Kaysales, and though perhaps not in the top rank so far as communications receivers are concerned, it had its uses. If nothing else, it looks most impressive with its two 6 in. circular tuning scales and the host of knobs to twiddle—a conglomeration of things which made spectators goggle a bit. The operator at one station we contacted remarked that the name reminded him of a pair of shoes. We dispelled this by explaining that the beast went like old boots and used shoe-laces and wet string for an aerial.

In the course of a QSO with G6QB on the Thursday morning a crowd of schoolgirls breezed in, and invaded the stand. Unknown to them, and to us, '6QB got it all down on a tape-recorder, and caused a mild flutter when he played it back to us. The look of consternation on some of those girls' faces when they heard their own voices coming back at them had to be seen to be believed. They thought their remarks were in the background, and it was the last of their thoughts that stations far and wide might hear them. Having listened to it all, they seemed to agree among themselves that these electrics are wonderful.

When we were talking to some French amateurs in French and English, some of the onlookers appeared mystified, apparently wondering how we could make our gear talk in foreign languages ! During one such QSO, the Carnival Queen and her four attendants, Beauty, Glamour, Charity and Gaiety, paid a surprise visit. G3BDQ was operating at the time, and had a few awkward moments trying to explain to the French op. that Miss Connelly was *not* his XYL ! The large crowd that had followed her in and gathered round the Console literally whooped with glee at all the frantic explaining that was going on. '3BDQ got a bit warm round the collar, the " Queen " looked as coy as possible, her attendants did some quiet sniggering, while the Club members promptly grasped the opportunity to utter the usual spontaneous remarks. Throughout it all the French op. seemed to be completely indifferent to the stir his repeated references to " YOUR WIFE, JOHN," were causing. Of course, what he didn't appreciate was the fact that the cream of Hastings' feminine charmers were standing there munching hot dogs which oozed grease, procured from the Scouts' field-kitchen across the way !

Some 30 QSL cards were received and displayed during the week, and several letters from SWLs came in. It is the Club's intention to QSL wherever possible, and certainly to those who asked for cards. Particularly does this apply to the SWLs, some of whom sent in very fine detailed reports. If cards are not yet received by these folk, we hope they excuse the delay, but they will get them in time. We did not have time to get cards for the occasion and we are, at the time these notes are being written, negotiating to have cards supplied to us. We tried to convince certain people before the event that to provide us with QSL cards would be to their advantage, but they could not see it. Now that the exhibition is over, they realize that there was some truth in our view, so now we are awaiting the cards. In the meantime, there is not much point in our purchasing cards if we are likely to get some without cost to us. What say you ?

One interesting report arrived from ZS5QV who was holidaying in Yorkshire. Extracts from his note read: " Talbot Hotel, Malton, North Riding, Yorks. July 8th, 1953. Dear OMs, Just a line to let you know that I have been listening to you on my car radio, in the forecourt of this hotel. Time 8.58, called by PAØIZ Amsterdam who I received Q5-S9. His report to you the same and you gave him Q4/5-S7. Your signals have been a consistent Q5-S8/9, definitely the loudest signal on the band. Cheerio, best 73, ZS5QV, Tom. P.S. I have only a 5 ft. 0 in. car aerial fitted."

It seems to be pretty general that G6HH/A was getting over well, for almost every QSO revealed that we were riding over the QRM. Some of the reports like S9 + 40 made our ears tingle, but we suppose that those who gave us + umpteen over S9 were greatly impressed with our signal strength. We suggest the S-meters are now reset to their

(*Contd. on p. 390*)

TALKS ABOUT VHF

by H. E. SMITH, G6UH

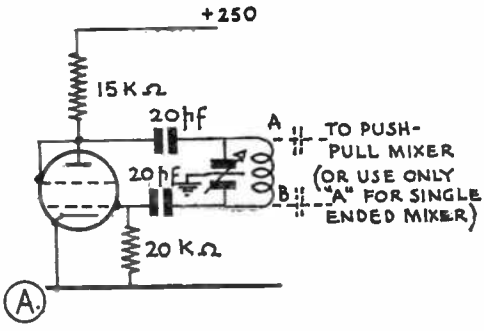
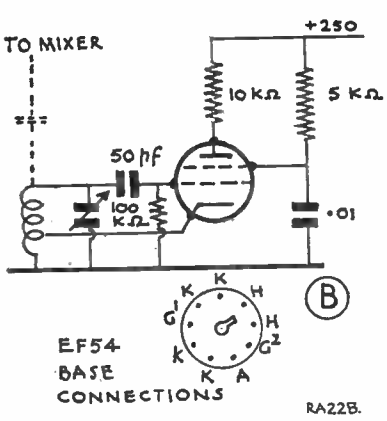


FIG. 1.

EF54 in Colpitt's Oscillator Circuit. R and C values suitable for VHF work.



Electron-coupled Oscillator circuit using the same valve. Position of cathode tap on coil is fairly critical. For a 3-turn coil, tap at one complete turn from earth is usually sufficient.

Oscillators

One of the main requirements for an efficient converter is that the oscillator should be absolutely stable (once it has warmed up), free from parasitics, and produce a clean ripple-free heterodyne signal into the mixer stage. An unstable oscillator stage will make it extremely difficult to receive weak signals due to the constant re-tuning necessary in order to hold the signal. Instability may evidence itself in several ways. There may be sudden changes in frequency; jumps of several kcs up or down, or the oscillator may gradually drift 50 kcs or so during the course of an hour or less. Or again, the note may change suddenly from T9 to something less than T6, and return to T9 if the converter is tapped or jarred. Remember now, we are dealing with older type valves still, in particular the EF50, EF54, 954, and the B7G type Z77. We will rule out the first one entirely as an oscillator for 145 Mcs work as we have yet to find an EF50 that will produce a real T9 note at frequencies around 125-135 Mcs. The EF54 will work well, either as a pentode or triode, in a Colpitt's circuit or as an electron coupled oscillator (cathode tap circuit). There is just one snag with these B9G valves. The valve pins tend to oxidise very rapidly, and the contact between the pins and the socket becomes intermittent, causing noise. Much of the trouble can be overcome by using a locking ring-type valveholder, found on some surplus equipment. The valve is pushed into the holder, and the locking ring dropped over the valve and screwed down hard. Fig. 1 shows an EF54 in a Colpitt's circuit (triode connected), and as an electron coupled oscillator (pentode connected). Now let us look at some of the causes of instability. In the case of sudden changes in frequency, the valve itself is the first suspect, and should be replaced. If the trouble persists, examine the socket for poor connections, and check *every* soldered joint carefully. If the components used in the circuit (resistors and condensers) have been removed from some surplus equipment, replace them with reputable components. It is, in fact, never wise to use components taken from surplus units for VHF work. There is always the risk that the unit was a reject because of faults in the very components that you are using.

Another fault may be a gradual drift of frequency after the initial warming up period. In most cases this will be due to ineffective stabilisation of the HT supply. When neon stabilisers are used, it must be remembered that

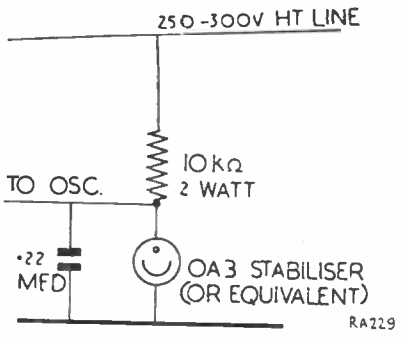


FIG.2. STABILISING CIRCUIT FOR USE WITH ANY TYPE OF OSCILLATOR

effective stabilisation is only obtained when the stabiliser is drawing about 10 milliamps or so. (Not less.) The circuit shown in Fig. 2 is suitable for most oscillator valves and a 250 volt HT supply. The stabiliser is the 75 volt type (VR75-Brimar OA3). Parasitic oscillation, evidenced by spurious whistles over the scale, may be due to overcoupling between the grid and anode circuit of the oscillator, i.e. the coupling condensers in the Colpitt's oscillator may be of too high a value. Twenty pf is about the absolute maximum for any coupling condensers in this type of circuit for VHF work. In the ECO circuit, the position of the cathode tap is important. Parasitics may occur if the tap is too far "up the coil." It is not easy for the beginner to determine the optimum position for the tap, but if a 0-10 mA meter is available, this can be placed in the anode circuit and the readings noted. If there is a change of over three to one between the oscillating and non-oscillating current, the tap should be reduced towards the earth end of the coil. Very little is required from the oscillator for effective mixing so there is little point in having a fiercely-oscillating stage. Whatever type valve is used as a mixer, the value of the coupling condenser from the oscillator should never exceed three pf. A usual value is two pf. If this can be made variable so much the better, as the oscillator injection voltage may then be adjusted on a weak signal. The oscillator section of the converter should always be screened from the rest of the circuit as there is always the risk that direct coupling from the coil will cause an excessive voltage to be injected into the mixer.

(Several readers have asked for further discussions on stacked arrays, notes on impedance matching, etc. Next month we shall therefore revert to aerials again, and we plan to deal with simple and multiple stacks, with and without reflectors, methods of determining the impedance, construction of matching transformers, and other points of interest. It will probably be necessary to spread this topic over two months at least.

Would everyone please note the following. When you write letters containing queries which you would like answered, PLEASE enclose a S.A.E. After all, all information is free for the asking, and our postage bill is quite a heavy one. Finally, we regret that we just cannot deal with queries other than VHF in these columns. A VHF section must remain exclusively VHF.)

Seventh Annual R.S.G.B. Amateur Radio Exhibition.

November 25th — 28th, 1953

The Seventh Annual Amateur Radio Exhibition, organised by the Incorporated Radio Society of Great Britain, will be held at the Royal Hotel, Woburn Place, W.C.1, from Wednesday, November 25th, to Saturday, November 28th, both dates inclusive. The Exhibition will be opened at 12 noon on the 25th by Mr. Rene Klein, Founder-Member and Vice-President. Mr. Klein, who is Managing Director of McMichael Radio, founded the Society (as the London Wireless Club) 40 years' ago last July.

As in past years, the Exhibition will be supported by a number of companies who specialise in the provision of valves, apparatus, equipment and publications for the radio amateur. In addition, the Services will be represented.

Members of the RSGB will exhibit a wide range of home-constructed equipment of modern design, whilst the British Amateur Television Club will again display Amateur Television equipment.

Amateur Bands Commentary

STAN. HERBERT G3ATU

After the thin time we experienced in July, the past month's conditions must have seemed like a beautiful dream to many chasers ! At any rate, DX *was* a little more plentiful on 20, while the LF bands, even including Top Band, started to throw up some quite unseasonable offerings. Indeed, it begins to look as if the coming Winter will see things happening in a Big Way on both 80 and 160. In the meantime, let us press on with a resume of recent happenings. All reports are Phone unless noted otherwise.

Twenty Metres

We start with two reports which just missed last month's closing date.

D. E. Nunn (Hove) hooked CR5SP (St. Tome), VQ2WC, ST2NW and FF8AB for a new one, with I5ZC on CW.

P. Q. Dodson (Rhuddlan) heard some good ones in CR4AP, CR5NC 5SP (both St. Tome), CX2CX, I5SG, 5GO, ZD2RR and KA8SC.

R. Goodman (Edgware) found things positively exciting at times. He heard 3A2AP, CR5SP and VU2RC (1740) for new ones and in addition snagged FQ8AE, KA2, 4MC (SSB), 7PL, 7LW (1450), KH6MG, KR6AF, KX6BC, (who was heard four times in a week), TI4KG (0000), VQ3PBD, VP4AV and VS1.

Ron mentions a daily sked between KH6OR, VR2CG, VR3C, VR4AE and KP6AR (14200/10-0630). He has heard nothing of that lot yet himself, but keeps trying. ZM6AA, KJ6BA and CEØAA were missed also, giving R.G. grey hairs and bitten finger-nails ! Never mind, they'll come again in time (the DX, we mean !).

P. Hunt (Ellistown) settled for H16EC, TG9RB, KA2LN, ET2ZZ, KR6KS, VS6CS, KX6AZ, VR6C(?) and VQ8RO (who may well be VQ5RO on his travels). The aerial at P.H. is a Double Zepp.

R. J. Holliman (Cambridge) kept in touch with the DX even while on holiday. He took his receiver along and heard such stuff as MP4K, ST2NW, VQ2DT, LU and three new ones, CR7IT, JY1XY and VK2FA, the last two on a wire 9 ft. high !

D. Woodward (Manchester, 21), aided by an SX 24 and 100-ft. wire, got new ones KX6BC, VP2MG, 5AK, 5AR and ZD2RRW, making his total 38Z and 155C.

D. J. Newton (Catford) has done himself proud to the tune of eight new ones, CE1BE, CO, VQ2 and VS1CZ on Phone and FP8AK, KZ5IL, UA6 and VP8AJ (589) on the key. This was with a Hambander, but D.J.N. has built an 0-V-0 and has had fun with it too.

G. Curtis (South Harrow), now the proud possessor of VERON's 25 WPM certificate (nice work, G.C.), got weaving among the " Dits and Dahs " and emerged with VQ7UU (Aldabra Island), 9UU (Amirante Island), VS9UU (Oman), CEØAA, KG6FAA, KH6ES, VP8AJ, FQ8AP, OQØDZ (perfectly good—Uranda-Urundi), OA4AY, VE8 and ZS7D. XZ2AC was heard creeping in at S 8/9 when VS1 was unreadable. Dodgy, yes, but could be !

Two stations were heard to call FD4BD around 14050, but no joy. G.C. mentions AC4NC and AC3SQ as being around and we shall refer to those two later. Anyone know the QTH of VK1AA ?

J. A. Stringer (Holywood, N.I.) mentions the grim early morning conditions (CTs and 11s are all *we* hear at that time !), but his 0-V-1 did bring him the much sought CEØAA, VS6CL, VU2CS, UG6KAA, XK1AH, AP2K and KX4DH on CW. We mentioned the latter last month as being on Iowa Island, but we still don't much care for him.

Phone brought John KH6OR (was he working all those VRs ? !), W7BVO and KS4AU.

Congratulations to him on getting his RAE and Senior Cert. Exam passes, by the same post, too ! So we can expect another " GI " call soon.

A. Kennedy (Blackhill), still using his 0-V-0, got OA5MH (1845), KP4s, VO6DA, VQ2CG, HP1AD and VS9UU as his best.

Bill Hardie (Hawick) found CS3AC, ET2KE, KAs 2LK, 2LN, 2WW, VS2UW, 1BO and VU2RC all putting signals over his local hills.

H. Lee (Oslo), now back from that mountain holiday (he was chasing rare butterflies as a change from rare DX), found conditions as bad as usual ! One afternoon, he *did* find the band full of W5s, but for most of the time, things were quiet. CT2LV, KV4BB, OY3IGO, VS6CR and 3A2AN were his best.

S. J. Melvin (Nuneaton) took advantage of improved late afternoon conditions and grabbed AC3SQ, JA1AC, 5AB, VQ9UU and UR2ML, the last two being new. CW accounted for them.

R. Winters (Melton Mowbray), refreshed after his holidays, notched ET2NX, KA2LN, 2PL, 7PL, M1B, TA3LB/AM, ZD2, ZD4.

C. J. Goddard (Warwick) missed CEØ, FB8 and VS9UU, but clicked with VQ7UU and VQ9UU. Also on CW, John heard CE1BX, EQ2HY, HS1ES, I5FT, JA1 and 3, LB8BD, MP4BBD, VS9LO (QTH anyone ?), VS1FZ and ZC3AA. Phone accounted for CT2BR,

FQ8AQ, I5RM, KA2LK, TA3XOX, VS1FD, 1FS and the peculiar FE8CSN (14230-1125).

H. J. Hill (Whitley Bay) slips in an early report, prior to joining pal Mike of GM3IGW, for a week or so of operation—/P and otherwise. Harry thinks he snagged CEØAA on Phone (August 8th—2305 GMT—14125) and we see no reason to doubt that it was in fact the " gen." KV4BB's S8 sigs stopped further research, but we would think all would be OK there. A definite miss was from VK1HM (Cocos Island). Harry heard a G3H ? ? working him, when a terrific blast of power from AG2 ? (" May his PA blow up on him," says Harry), put paid to any further investigations !

However, H.J.H. grabbed new ones GC3GS, ZB2I and an OK, plus VK2FA, VS1, 2, ST2NW, VQ2, HC1MB and MP4ABW, OY2Z and sundry KAs.

He wonders how many countries can be squeezed from the various MP4 prefixes. We make it five—Bahrain, Kuwait, Oman, Trucial Oman and Quatar.

R. Balister (Chorley Wood) is settled in his new QTH and has a 100-ft. wire. It was originally tied to a tree, but said tree was felled ! Another spot of bother happens when Roger's brother (G3IQB), fires up in the next room. R.B.'s 0-V-1 gets the full benefit, but through it all, in came HI6EC, LU and ZD2RRW, with CE3, CP5EK, KL7AQZ, ST2UU, UG6, UI8 and UR2ML (working Gs, etc., Hmm !), YV and ZD2S on CW.

Roger asks if VS1 and 2 are separate. Yes.

G3IQB himself, with 15 watts to a WØWO aerial, worked SU1SS, W6WVU/1 (Rhode Island) and LZ1KPZ.

D. J. Wright (Forest Hill) changed his 80-ft. wire for a dipole and finds a big difference. His latest are SU1MR, ZD4BK, FQ8AQ, I5, HP1, KL7 and ZE2KH.

D. L. McLean (Yeovil) caught much of the better DX such as CP5EK (1818), CR4AP, 5NC, 5SP, 6BH, 6CM, EL9A, FF8, FQ8BA, HP1AP, I5FT, KA2, 4, 7LJ, MP4ABW (who is in Oman, not Quatar, as we said last month), VP4TO, VQ3RJB, VS2BS, ZS8D (14130-1730), 3A2AM and 3A2AY.

B. J. C. Brown (Derby) hopes his next report will be of stations worked. Congratulations to him on passing his Code test and we look forward to hearing him on the LF bands, where he will be to begin with. Bernard heard CR10AA doing a " CQ Europa " (S7-1930), but doesn't think much about him ! Genuine DX was from CE, CR5SP, OA4BC, OQØ, VK2FA, VP2LF and VU2RC, with KP4CC and MP4BBD on CW.

R. Nixon (Stockport) used his 0-V-1 mostly and picked up some nice DX, the plum being KAØIJ (Iwojima-1445). LX1DC, FM7 and VP3YG were also new ones and FI8AC, KG6AEO, KR6KS, VS6CL and 4X4AS/MM were logged.

P. Morgan (Stourbridge) pressed on with his 0-V-0 and got HI6EC, LU5CZ, VQ2DT and, on CW, 9S4AX.

J. Corbett (Birmingham) offers the suggestion that during present conditions, a tape or record of super DX, to be played in the shack during black periods, would prove a valuable morale booster !

G. H. Elleson (Malvern Link) starts off with AC4BC, heard twice one evening with a T7 carrier. Very nice if OK. Anyone know ? Other Phone was from HP4FF/P (QSL arrived, too), HH7HB, PZ1WK, VP6, 3A2AM and lots of Africans.

P. M. Crawford (Darlington) heard OP7LJ working PY and SM and causing terrific QRM. Half the world appeared to be calling him. Martin wonders where on earth he's supposed to be. So do we ! M1B caused a sizeable racket, too, but the S750 stood up to it and pulled in AP2N, EL6Q, HR2SO, 1UA, OA4AW, OY2Z, VQ2AT, VS1EV and by no means least CEØAA, logged on CW on both 20 and 40. MP4K was heard with OD5AD at the mike and he gave the interesting " gen " that the station belongs to H.R.H. The Prince of Kuwait.

Roy Patrick (Oldham) snagged HZ1AB and VQ4AC for new ones and hopes they will QSL ! He wonders what bands G3ATU uses. That character is mostly on 20—brooding—these days !

N. C. Smith (Petts Wood) hooked CEØAA on CW and Phone, which produced CE2AN, HK, KL7, KA, PZ1WK, VP6GN and VU2EH also. On CW, Norman heard VQ's 7 and 9UU, CR6AR, 6AS, CX8OT, FB8BE (1740), JY1US, KH6ES, VE8YC, VP9BG, VP4LZ, ZS3KG, ZS7D (1805), VUs and one of those rare Mexicans—XE1H.

Norman heard that LB8BC was on " A Christmas Island " and so wondered when he heard LB8BD. We can't help on '8BC, but we *do* know that '8BD is on board ship and did operate from or near to the ZC3 Xmas Island. We heard him last at sea, off the West Australian coast, but whether his Christmas Island activity was land-based or not, we can't say.

A near miss for N.C.S. was VR5AA, being called on CW by a 4X4 and an OK.

P. Conway (Birmingham) found lots of " semi-DX," including HI6EC, HK3IK, 4FV, HP1EV, VP5AR, VQ5CB and VE8NQ (who should be in Zone 1).

Some new reporters are welcomed to these pages.

The first, **Dr. T. B. Williamson (Eltham)**, used an S740 to pick up CR4AI, 5MC, 5SP, CX4CL, ET2VD, KG4, KR6KS, KZ5GS, TI2CAF, 2TG, VP4TS, 5AO, VQ3RJB and ZP4CF. An HC8 (presumably HC8GI) was heard calling " CQ DX from the Galapagos." A nice one to catch, too.

David Morgan (Earley, Bucks.), who is thirteen, heard HZ1AB (1895), MP4K, ZS1 and G3ATU ! A R1448 is used.

M. A. Wassell (Birmingham) remarks that plenty of spare time is quite an asset for the DX chaser. (How right he is !) He lists some useful Phone DX such as MP4HBK, FB8BJ, FI8AC, KAØIJ, KA6RU, KX6BC (1630), KR6LW, VS1, 2, VK2FA, 4S7FG, TI3LB *and* XE3BR (14245-0700). His plum on CW was VR2AS, with ZL2KM, KH6ARL and 3A2MV.

VU7AH, also heard, is not Nepal, unfortunately. He's in India.

R. W. Pinnell (East Ham) thinks 20 is improving slightly, but finds it very erratic. His 1155E netted him DU1AL, ET2CG, HH3LR, KG4AT and VP3DU, plus lots of W/VE. XZ1SA was heard (4 and 6) and seems quite genuine. R.W.P. wonders if anyone else heard him.

Peter Home (Sunderland), using an 0-V-1 and a tiny 16-ft. Zepp, bagged DL4EJ/AM (off Bhengazi), EA6AT, VP6IC, PY and KP4AZ.

Mike Whitaker, GM3IGW (Alloa) is still piling up the Top band counties. The recent GM5RI/P trip, which took in Roxburgh, Wigtown, Inverness, Ross, Sutherland, Caithness and Kircudbright, put him up to 83, with Guernsey still missing. (How about it, GC3HFE ?)

Mike is after a Phone " WABC " and would welcome period and comparative reports from readers.

J. L. Hall (Beckenham) heard of the Top band DX and gave the band a try. Result, W4KFC, 0422, peaking S8 and working VP4LZ ! The VP4 didn't come through, but nice going, all the same, especially as the aerial, a temporary 100 ft.'er, is 5 ft. high at one end and 15 ft. at the other ! On 80, this noble wire collected LU1EP, 3DDH, 5EK, 5ZO (South Shetlands), ZS2BC (0430), UA9KCA (2150), KP4UE and VP4LZ, all CW, while on 40 CW, John heard ZD2DCP, ZS1, 2, VS9AS, VK2, VE8PO, VP6UN and PZ1WX. A QSL arrived from FK8AB, confirming 7 Mcs CW reception. The interesting thing is that FK8AB confesses that he has never, ever heard a European on that band !

G3CMH (Yeovil Radio Club) used 15 Metres Phone to work CE3CZ, KZ5CP, PY5UG, VQ4, YI3WH and ZD4AE. They are doing all right on 20, too.

Ron Goodman combed 80 in the wee small hours for OX3BB, OH (both new ones), KP4EE, 4EA, 4CP and sundry W/VE. He remarks that Xtal and Audio filters in both ears would come in useful !

P. Hunt wonders where all the 80 DX is. (See above.) And went on to 40 CW for ZL2IQ, ZC4IP, UI8KBA, UA9KCC, UQ2AN, UG6 and UF6.

H. J. Hill heard G3ARK (Hereford) in broad daylight on Top band. Two hundred miles, using an indoor 14-Mcs dipole. Harry thinks county chasing this Winter will be tough going through all the queer noises now to be heard. We agree. OY2A on 40 Phone was a new one for him.

B. J. C. Brown heard TI2PZ calling FO8AD on 40, but no sign of the FO8. However, ZL2IQ, 2LB, KP4 and LU *did* come through.

N. C. Smith, on 40 CW, dug out ZS2HI, ZS3E (2245), UL7, VP5AO, W5, Ø and eight ZLs. On 80 CW, he heard UQ2, UC2, UB5 *and* UA9KCA (2009).

Dr. T. B. Williamson had FF8AK, HC1MB, HP3FL, KZ5CP on 15.

G3HSL (West Hartlepool) worked FI8AD and 4S7XG to make his 20 CW score 99 C. W5CKY (Miss) was a new State for him.

G3ATU picked up some bits and pieces of " gen " as follows. One recent evening (1800), a bunch of EA's, I1's and CT's were heard on Phone calling AC4NC (14100 kcs). A little investigation revealed the AC4 in the middle of the mess, calling G6YQ *on CQ* ! He was weak—RST 449X—and apparently got tired of listening to the awful din all around him. Anyway, he vanished. Some few kcs lower, we were somewhat startled to hear AC3SQ, blotting in at RST 588C and drifting more than somewhat, while working stations in rapid succession. We have heard AC3SQ on three occasions, this last being the only time he has been anything but T9X, S2 to 3 *and* Xtal controlled. So !

For good measure, Don McLean heard AC3SQ on Phone, also at 1800. This one had an Italian accent and was calling "CQ" at S7!

YI2AM, with 112C worked, still needs 10 cards for DXCC. This despite a 100 per cent. QSO/SWL QSL policy. They put such a big signal over here that they almost cease to count as DX ! Look for '2AM also on 3520 and 7040 kcs.

HB1EQ/VS was attracting considerable attention on CW. However, he's no Asian. The " VS " bit stands for the Swiss Canton of Valais and he uses it to help chasers of the " Helvetia 22 " Award. Anyone caught up with the CW sigs of DI9AA ? It takes some doing. He has the snappiest HF drift we've ever heard. RST 587C one evening, calling an EA8 and making rapid tracks for the 15 Mcs Broadcast band. QTH ?—We wouldn't know.

Good news for Jan Mayen seekers. LB8YB is active from that island. We came across him on 40 CW (0530 GMT), working a W6. He closed down for work so we missed him, but at least we know he's around.

* * *

All for this month. We have condensed things rather, due to shortage of space, but hope everyone is still happy. Your reports please by October 8th, and, for the next issue, November 7th, to G3ATU, Roker House, South Cliff, Roker, Sunderland. Till next month, excellent hunting and 73.

Broadcast Bands Review

All Times G.M.T. **"Nf" New Frequency.** **by J. FAIRS**

As the available space for these notes has now been reduced by about one-third, we are adopting a new layout of countries in strictly alphabetical order, and a more abbreviated style with a minimum number of comments. It is now impossible to answer questions via this column, and the " Honour Roll " may have to be dropped in the near future as it is, of course, only of interest to very few readers.

Brazil. Sidney Pearce has got a souvenir card and letter in English by express airmail from " Radio Cultura de Pouos de Caldas." The call-sign on 9645 kcs is ZYV40 and *not* PRH5 —this is the MW station on 1350 kcs which it relays. QRA: Praca Pedro Sanches 145 (or Caixa Postal 143), Pouos de Caldas. The city is in the State of Minas Gerais and *not* Sao Paulo.

ZYS8 " Radio Difusora Amazonas," Manaus, 4805 kcs: good signals at 2200-2230. (John Whitington, Worthing.) ZYY9 " Radio Timbira," Sao Luiz, 4975 kcs: good from 2200 to 0200. (Dr. T. B. Williamson and Scribe.) ZYN6 Fortaleza, 6105 kcs: S9-plus with some QRM at 0115. (Williamson.)

British Honduras. ZIK2 Belize on 6100 kcs was dug up during " a combined oil-burning session " by Stanley Coppel and Carl Shapiro (both of Belfast). A Spanish programme was heard until 0115, music to 0130, then the call " This is the BHBS "; the carrier of " Radio Yugoslavia " wiped everything out at 0150.

Canada. CJCX Sydney, 6010 kcs: good signals at 2345 but very heavy QRM, (Williamson), and Q2-3 S3-4 at 0045 with a bad hetro. (Ted Classe, Vienna, Austria. Nova Scotia counts in along with Canada, OM; we assume that Libya makes your 65th country verified ? Scribe.) CJCX and CHNX Halifax, 6130 kcs, were both logged S7-8 around 2300 by Philip J. Vincent, Shepperton, Middlesex. (Have never received any list that you mention for the " HR," OM !) CFRX Toronto, 6070 kcs: Q2-3 S4-5 at 0100-0125. (Shapiro.)

Canary Islands. EA8AB Santa Cruz de Tenerife was noted Q4-5 S7 on the old 7517 kcs channel at 2205. (Classe.)

Cape Verde Islands. CR4AB " Radio Club Mindelo," St. Vincent on 7180 kcs is very seldom reported heard, but Ian Hardwick (Thames Line, New Zealand)found it a weak signal at 2206 to fading out at 2227.

Colombia. HJEX " Radio Pacifico," Calif., 6054 kcs: Q5 S8 at 0030-0100 with sponsored musical items. (Whitington and Shapiro.)

Cuba. COJK " La Voz del Camagueyano," Camaguey, has moved from 8663 into the 31-mb to 9620 kcs (Nf). (*Universalite*, bulletin of the Universal Radio DX Club, USA.)

A seemingly new station on 9320 kcs is " Radio Reporte de la Hora," Havana, heard in the USA around 1130-1320 with the time announcements about every 30 seconds intermixed with " commercials." (URDX). However, COCW on 6320 kcs (" Cadena Roja ") is listed by the *New Zealand DX Times* with apparently the same transmission and the call as for 9320 kcs above.

Dahomey (FWA). " Radio Cotonou " at Cotonou is using 1484 kcs MW (1 kW) and an unknown frequency in the 7 Mcs band with 250 watts. Schedule: 0645-0700, 1725-1830 (Sat. to 1900). (WRH.)

Ecuador. HCJB " The Voice of the Andes," Quito, is now broadcasting from the new Tx site at Pifo with a greatly increased effective radiated power—shown below as " Erp." Calculated output from the existing transmitters is as follows. 6050 kcs (1 kW), Erp: 18 kW. 9745 kcs (1 kW), Erp: 49.5 kW. 11915 kcs (1 kW), Erp: 51 kW. 11915 kcs (10 kW), Erp: 51 kW. 15115 kcs (1 kW), Erp: 54 kW. 17890 kcs (10 kW), Erp: 57 kW. (*Sweden Calling DXers.*)

Egypt. Cairo on 9620 kcs (reported as 9615 last month) has been S9-plus opening at 1800; is joined by 11815 kcs at 1820 for news in French, followed at 1830 by news in English. Both channels continue in parallel until close at 2200. (Pearce, Classe and Scribe.)

El Salvador. YSS " Radio Nacional," San Salvador, 9555 kcs: heard during the very early mornings sometimes in parallel with 6010 kcs. (Pearce.)

Ethiopia. " Radio Addis Ababa, The Voice of Ethiopia " is frequently logged on a varying 15045-15060 kcs with dance music around 1800 to close at 1920 or 1930. According to announcements they are on " 19 and 46 metres," and the sign-off tune is " Cradle Song." (G. Vials, Market Harborough, Williamson, and Pearce.)

Germany (Federal Republic). " Radio Liberation " or " Radio Azadlik " is reported by WRH on 15105 kcs at 1730-2230 with Russian language transmissions. Marvin Robbins, Indianapolis, USA, tells us the location is Munich, and the station is being operated by an anti-communist Russian refugee organisation. We understand other frequencies to be 6055, 6175, 7130 and 9585 kcs.

Gold Coast and **Nigeria.** ZOY Accra and "Radio Nigeria," Lagos, are both due to increase power to 20 kW. (*Radio and Television News*, USA.)

Guatemala. The station presumed to be located at Zacatecas (see June "Review") is now heard in Texas on 6037 kcs (Nf) and the call seems to be "TGTO Radio Popular, La Voz de Zacatecas, Guatemala"; is irregular with erratic signals, QRM is heavy and identity not positive. (URDXC.)

Haiti. "Radio Commerce," Port-au-Prince, mentioned last month, is now reported by WRH to be broadcasting at 1130-0400 over 4VA on 1080 kcs MW (1 kW) at 2100-0400 over 4VB on 6140 kcs (7.5 kW) and at 1130-1330 over 4VC on 9485 kcs (7.5 kW). The correct QRA is P.O. Box 1143, Port-au-Prince. Carl Shapiro has been hearing the 6140 kcs channel at 0200, and lists it as "Radio Commerce, La Voix de la Republique d'Haiti." URDXC reports 4VB on a varying 6085-6100 kcs at S9-plus level in various parts of the USA.

Petionville Broadcasting System, "Radio Petionville," is now using two SW Txs: 4VPL on 5900 kcs (last heard on 5902—Scribe), and 4VPB on 9000 kcs (last reported on 8984—Scribe), in parallel with MW station 4VP on 1020 kcs; output is 150 watts on all channels. (WRH.)

Indo-China (Vietnam). "Radio France-Asie," Saigon, uses 6116, 7230, 9750, 11935, 11950 and 15430 kcs. "La Voix du Vietnam," also at Saigon, broadcasts on 838 kcs MW (1 kW), 4959 kcs (1 kW), 7288 kcs (12 kW) and 9500 kcs (12 kW—Nf, ex-9620). "Radio Dalat," Dalat, is on 7255 kcs (1 kW), and "Radio Hue," Hue, on 7205 kcs (1 kW). "Radio Hanoi," Hanoi, has moved from 9670 to 9555 kcs (Nf). (WRH.)

Indonesia. Marvin Robbins has sent along the current station list of "Radio Republik Indonesia" from which we note the following items. YDA Bandung (Java) is now on 3205 kcs (1 kW—Nf, ex-3390). YDA4 is a new station at Cheribon (Java) on 2390 kcs (100 watts). YDG3 Surakarta (Java) is a new one with an old call-sign on 7250 kcs (3 kW). YDK2 Palembang (Sumatra) is on 2340 kcs (150 watts). YDN2 Kutaradja (Sumatra) is a new one on 4985 kcs (1 kW). YDR2 Ternate (Moluccas) shares 2446 kcs (150 watts) with YDB. YDC 15150 kcs, YDE 11770 kcs, YDJ 5060 kcs and YDP2 3350 kcs will all be increased to 7.5 kW shortly.

Japan. "Radio Japan," the 50-kW International Service of NHK has, since August 1st, been extended from five to ten transmissions daily, and the schedule from September 1st, is passed on by Ron D. Young of Chelmsford. (Hope the XYL is well again now, OM.) Call-signs are JOA3 (9695-Nf), JOA6 (15135), JOB2 (7180), JOB4 (11780-Nf) and JOB6 (11725-Nf). JOA3 and JOB4 are used at 0500-0600 (for Pacific Coast of North America); JOA6 and JOB4 at 0700-0800 (for Hawaii); JOA6 and JOB6 at 0900-1000 (for Australia) and 2100-2200 (for South America); JOA3 and JOB2 at 1100-1300 (for China) and 1900-2000 (for Europe); JOA3 and JOB6 at 1330-1430 (for Philippines/Indonesia), 1445-1545 (for Indo-China/Thailand/Burma), and 1600-1700 (for India/Pakistan). During August 9675 and 11705 kcs were used for the European Service and were occasionally audible when the jamming noises abated. (Ron Young, Stan Coppel, Sid Pearce.)

Nicaragua. "Radio Mil," Managua, 6200 kcs, is relaying MW station YNVP on 1000 kcs. (WRH). YNVP is (or was) however, the call-letters for the SW station "La Voz de Nicaragua" last reported on 6185 kcs (February "Review"). URDXC gives the identification as "Radio Mil en Managua" or "En Managua, Las Emisoras de Radio Mil" and the frequency of 6097 kcs; when on 6185 kcs, YNVP used to announce: "YNVK Radio Mil; YNVP La Voz de Nicaragua." Sidney Pearce hears this station to close at 0435 and adds that it may be YNVP. (So it is not a new station after all, and it looks as if the call-signs have just been switched around. Scribe.)

YNOW "La Voz de la America Central," Managua, has moved from 6055 to 6077 kcs (Nf). (URDXC.) YNBH "Radio Panamericana," Managua is still shuttling between 6015 and 6547 kcs; URDXC reports a return to 6015, while Stan Coppel has heard them recently (we hope !) on 6550 at 0100.

Northern Rhodesia. Lusaka has moved from 3275 to 3346 kcs (Nf), 7220 and 4826 kcs remaining unchanged. (WRH.)

Philippines. DZ16 Manila (FEBC) on 17805 kcs: Q4 S6 at 1550. (Vincent.)

Roumania. Bucharest is operating on 9570 kcs (Nf), in parallel with 9254, 12032 and 6210 kcs. English is at 1930-2000 daily and they say the next broadcast is at 2330 on 9570 and 1935 kcs. (Sidney Pearce and Ted Classe.)

Syria. Damascus Radio has English programmes at 1000-1130 on 7145 kcs (7.5 kW), and 2130-2230 on 11915 kcs (20 kW), plus an Arabic/English broadcast at 1445-1545 on 11695 kcs. 11695 kcs is in parallel with 11915 for the Central and South American service at 2400-0200, according to a schedule received by Alan Kennedy, Blackhill, Co. Durham.

Tahiti. FZP8 Papeete was a nice piece of DX logged by Richard Moore (Clacton) 6135 kcs at 0500. Records and English announcements were heard at 0515 until submerged by QRM at 0530; signals were Q3 S3-4 with rapid QSB. 6980 kcs is now the only channel in use (FO8AA), reports the "NZ DX Times."

Taiwan. Bill Griffith of Ashtead has received a handwritten verification from Lt.-Col.

Liang Hang Chung, Director of Station BEC26, who kindly enclosed two photos of Taiwan and their schedule. Outlets are given as 1310 kcs MW and 10200 kcs SW (heard nearer 10070); times are 2230-2330, 0330-0530 and 1130-1600. Programmes comprise news, talks, Western and Chinese music and "anti-Communist songs." The QRA is: Military Broadcasting Station (BEC26) of Tso Yin, Taiwan, Free China.

Turkey. The Technical University of Istanbul is now using a new 1 kW Tx on 6400 kcs (Nf) in parallel with 7030 kcs (500 watts) at 1815-2000, excepting Saturdays. (WRH and Roy Patrick, Oldham.)

U.S.A. in Europe. QSLs from "Radio Free Europe" give the locations of transmitters as follows: 5960 and 7155 kcs near Manheim, Germany, 9145 and 10315 kcs at Munich and 9695 kcs at Lisbon, Portugal. (Ian Hardwick.)

Venezuela. A QSL card received by Bill Griffith from "Provensa," Caracas, lists YVKC on 790 kcs MW, and YVKB (*not* YVKD or YVKF !) on 4890 kcs as "Radiodifusora Venezuela." Also YVKU on 880 kcs MW and YVKT on 3530 kcs as "Radio Liberador." (We agree with the call-letters—other papers once again please copy !—but YVKT is really on 3350 kcs. Scribe.) Marvin Robbins has a fine letter from Arturo Culbis, station engineer of "Radio Liberador," which states that the station was opened in 1936; the studios are located in the centre of Caracas and the transmitting plant at Catia, a suburb of the city.

Zanzibar. There is only one broadcasting station operating on Zanzibar Island: "Sauti ya Unguja" on 4795 kcs (250 watts) at 1500-1600 in Swahili language only. (RTN).

Odds and Ends

DZI4 Manila, Philippines, has moved from 6110 to 5990 kcs (Nf) . . . Jannina, Greece, from 7085 to 7075 kcs (Nf) . . . ZQI Kingston, Jamaica, has returned to 3360 kcs from 3305 or 3295 or-what-had-you. . . . Harbin, China, has ceased broadcasting on SW (Griffith). . . . "Radio Malaya," Singapore, is now on 3330 kcs (Nf) (NZ DX Times). . . . "Radio Noumea," New Caledonia, is heard well on 3375 kcs (Nf) at 0700-1030, also still on 6030 kcs (NZ DX Times). . . . XEBR "Radio Difusoras de Sonora," Hermosillo, Mexico, on 11820 kcs, has been heard in early mornings relaying XEBH on 920 kcs; sends QSL card promptly by airmail (Pearce). . . . CR7BE "Radio Clube de Mozambique," Lourenco Marques was S7 on 11985 kcs (Nf) in Portuguese around 1815 (Scribe). . . . "Radio New Guinea" at Hollandia, Dutch New Guinea, will shortly return to Biak; it will have a new studio and a 5 kW Tx (RTN). . . . Hollandia has moved the testing frequency from 5045 to 4865 kcs (Nf) according to NZ DX Times. . . .

Conclusion

And so we hope we have covered just about everything this month and included something from everyone; it is regretted that many reports have to be "pruned" or, in some cases, omitted entirely to avoid repetition of items mentioned during the past two or three months.

Positions listed in the Honour Roll below are as at September 1st. This is for Shortwave broadcasting stations only, and we start at 30 countries verified.

The Editor and your Scribe thank all readers and overseas DX editors who sent along news for this column, and all contributions are acknowledged. Credit should be given to *The Radio Amateur* on re-publication of any information. News for our next issue should be *received* by the 8th of this month. (We humbly point out that unless Express Letter Rate is paid, no advantages as regards speed of delivery are gained by marking your envelope in any way whatsoever—the best idea is to mail your report just one day earlier !) The address for everything is, as usual, J. Fairs, 2a Durham Road, Redcar, Yorkshire.

Good DX to everyone until next month.

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ON THE HIGHER FREQUENCIES

Monthly Notes and News

by H. E. SMITH, G6UH

Ireland and VHF Band Planning

We were somewhat disturbed to hear from Ei2W that the now " officially adopted " VHF Band Plan is finding no favour with the Ei and Gi stations. There are two main reasons for this. Firstly, when the RSGB convened the Conference on VHF Band Planning, no invitation was extended to any Irish representative to attend this Conference. In view of the rapidly growing activity in Ireland, we consider this to have been a serious oversight on the part of the organisers of the Conference. (We did in fact, raise the question of IVHFS representation with the President of the RSGB just before the Conference began, and were somewhat surprised to learn that no invitation had been extended).

The second main reason is that the Irish stations have been allocated a band of frequencies well outside the tuning range of most of the G DX. We are inclined to agree that there is some cause for complaint. A station operating on say, 144.220 Mcs, is most unlikely to tune through to the extreme HF end unless he particularly *wants* to work an Ei or Gi station, but at the same time, we feel that most G stations are keen to work the Irish stations, and if they know that the Irish stations are actually operating in their correct zone, *will* tune through to it. The main trouble here is that someone else calls them *before* they reach the Irish zone, and thus, many contacts will be lost. Most of the Irish stations agree that a plan is necessary, but do not agree with the present one in so far as they are concerned. The more one ponders on this question, the more apparent it becomes that some action is required to remedy this state of affairs. Unless something is done, there is bound to be a decline of activity in Ireland.

Another significant reason for the dissatisfaction in Eire is that the RSGB are supporting a Zone Plan for a country which is debarred from entering RSGB Contests. The RSGB should remedy this *at once*. If they champion the " British Isles Band Plan " for VHF operation, they should amend the rules for VHF contests and accept entries from Ei stations. *RSGB Contests Committee please note.* This kind of thing is very disturbing to those who wish to see 100 per cent. co-operation among all interested parties for the cause of VHF. Such discrimination is unfair and unfriendly, more especially in view of the fact that the *Irish VHF Trophy is being awarded to a G station this year.*

We feel that we should mention another matter which is causing some little speculation and " eyebrow raising." The Irish Radio Transmitters Society failed to make one single comment regarding the Transatlantic VHF Tests in its issues of the *IRTS News*, both before and after the event. In spite of the fact that several prominent members of the IRTS were operating the station at Kilkee, and that the tests were taking place right on its own doorstep, the National Society of Ireland were either not aware of it, or just couldn't care less. Here is *another* instance of a National body showing no interest in the VHF bands, which will be the amateurs " place in the sun " tomorrow. The *IRTS News* must have been about the only magazine in Europe which failed to even mention the VHF Transatlantic Tests. What is the matter with them ? Perhaps the 40 or so active VHF stations in Ei and Gi are *not* an indication that there is any interest in VHF in the country. We can partly understand the position, because in spite of there being over 500 stations active or semi-active in this country, the RSGB has only shown lukewarm support for the VHF man. Up to now, the only real evidence it has shown of interest in VHF is its support for the VHF Band Plan. There is still no sign that they intend to go farther than that. However, as always, we are still hoping !

Transmitter Reports

G3WW (Wimblington, Cambs.) sends us an interesting little list of LA QRGs passed to him via ON4BZ. They are as follows:—

LAIKB 144.430, LA2GC 144.200, LA4VC 144.275, LA7Y 144.580, LA8AB 144-130, LA8RB 144.500, LA9T 144.300. All these stations beam south at 2100 GMT daily. On August 10th, G3WW worked DL3FM, PAØFC, Ei2W, ON4BZ, F8MX, and of course, G5TZ/A ! On the 11th, G3BW was heard for the first time since August 1952. On the 16th, 'WW visited G6NB on his way home from Cheltenham. He says " At the sight of G6NB's new QTH I nearly swore to give up ever trying for anything again on VHF. The land rolls away for miles and miles from his pinnacle." On August 30th, G3WW went portable at Glatton, Hunts. at 240 ft. above sea level, but only had seven QSOs. Among the stations called hopelessly were G3BEX/P, G6AG/P, G5ML/P, G2HQ/P, G2FNW, G4JJ/P, G6NB and G5TZ/A.

Important Notice to reporters and correspondents

As from October 8th, 1953, your conductor will be at his new QTH on the Isle of Wight. All letters, reports, and whatnot, should be addressed to G6UH at 198 Mill Hill Road, West Cowes, I.O.W. We hope to be in active operation by the end of October and we shall be looking for our old friends in the London area, and of course, for some DX to the North. The new QRG will be about 144.200 or thereabouts.

G5LK (Reigate, Surrey) very much appreciates the response to the appeal we made in these columns for any surplus gear to assist some sightless friends of his to get on VHF. In particular, he mentions the generous help given by G3MI and G3GBO. Leslie also informs us that due to the grand co-operation of G3FAN, G3EHT, G3GBO and G3FOU, Gw3CYB a sightless amateur in South Wales, will be operating on two metres sometime in October. G5LK has made some new contacts recently. He has also moved his frequency to avoid QRM but finds that he has settled on top of his old friend G3GSE ! He finds it a bit of a problem to find a clear space within the correct zone. (We don't think *anyone* would object to you working a little bit outside of the zone OM. Why not go a little LF of your old QRG ?) Les informs us that Old Fergy G6FS, is starting up shortly on two. (If he makes as much noise as he did on five metres in the early 1930s, his signals *should* be heard by *somebody*. Hi.)

* * *

Many of our regular reporters seem to have forgotten us this month.

Thanks to Ei2W, G3WW and G5LK, we have just about managed to keep the Transmitter Section alive this time ! ! ! However, we still have some active listeners ! !

Listener Section

The Listener response has been good this month and all the reports received are much appreciated. As stated in our last issue we have discontinued our Award scheme, but we are very pleased to make two Awards this month due to the generosity of *G5GX* of Leven, Yorks. Malcolm has sent us two beautiful shrouded mains transformers suitable for receiver use, to be presented to the two best listener reports received for this issue. We have most carefully checked every report and have decided to award the transformers to R. W. Russell of Southampton and Don Hayter of Worthing, Sussex. Reg Russell sent in the most detailed and comprehensive report, and the award to Don Hayter is not only based on his report, but also on his success in passing the Amateur Radio Exam and CW Test. It is much to our regret that space will not allow us to deal with each report in detail, but as most readers agree, the Calls Heard and QRG lists are most important, so we are leaving as much space for them as possible.

R. W. Russell (Southampton) found the band open every night from August 1st, to the 18th. Conditions fell right off until the 25th, when stations over the 100 mile mark began to creep in again with erratic QSB. The RSGB Field Day produced conditions which were far from ideal until about 1800 GMT, when the band opened up quite rapidly with loud signals from the London and Cambridge areas. The portable stations were amazingly strong, notably G3ERD/P, G3APY/P and G3GWB/P.

M. McBrayne (Westcliffe-on-Sea, Essex) has not been spending much time on the band of late, due to business QRM taking him to Lancashire. (His report was, in fact, post-marked Manchester.)

His general impression of the month was that conditions were good up to the 10th, after which only locals and semi-locals were to be heard. Conditions improved during the last week and, in all, 79 stations were logged during August. The most consistent station around the 200 mile mark was G2BMZ (Torquay), who was heard many times during his sked with G8OU of Ashtead, Surrey.

A. W. Blandford (Mitcham, Surrey) sends a useful list of Calls Heard during August, and says that had the general activity been as high as the conditions were good, the list would have been very much longer. A new converter is being tried out using a 12AT7 in a Cascode circuit, and although it is working very well, it does not come up to the converter in use at the moment, which is a 6BQ7/6J6.

Don Hayter (Worthing, Sussex) reports on the August conditions with the period between the 7th, and 10th, being the peak. Good signals were heard from G2BAT, G3AUS, G3BA, F8MX, F9CQ/P, F8KF, F8JR and ON4HC. During the Field Day, Don went to a site at 500 ft. above sea level on the South Downs. Thirty-three stations were logged, including 10 portables. (Congrats. on passing the Amateur Radio Exam and Morse test Don. How soon do we hear you on two ?)

Peter Blair (Mill Hill) is still listening on the Super-regen, but is testing out several converters, including a G2IQ type. The total of stations heard is now 86 in 14 counties. Very few portable stations were heard during the Field Day and Peter puts this down to the fact that some faults exist on the aerial system, coupled with his bad screening to the NW and NE.

W. Burton (Sunderland, Co. Durham) sends his first report to us. (You are more than

welcome OM.) He has the distinction of being the only active listener on VHF in Sunderland. (We don't think there are any transmitters either !) The QTH is not a good one for VHF and nothing outstanding has been heard. The best DX was G5YV and G3WW. An Eddystone converter is in use, feeding an EF54 (IF) 6SQ7 (Det. AVC and 1st Audio) and EL32 (AF). The beams in use are a four-element Yagi and a stacked turnstile array. OM Burton says "I trust this report will prove that VHF activity is not completely at a standstill up here in the NE. It's not far off it (Hi). (It's nice to hear from Sunderland. How well we remember going for a Sunday morning walk from Sunderland to Roker on a bitterly cold January day in 1942 !)

Harry Parker (Smethwick, Staffs) who uses a 954 RF stage ahead of a 955 Super-regen was unable to devote very much time during August. The best DX heard was G3BA at 40 miles. Other stations heard were G2ATK, G2HCJ/P, G3BKQ, G3EJO, G5ML, G5JU, G6AS and G8SC.

L. A. Whitmill (Harrow Weald) reports that August was a very good month for him. Among the many stations heard were F8MX, F9CQ, F3JN, Ei2W, G3CFK and G5TZ/A. Len was extremely pleased and surprised to receive *two* QSL cards from G5TZ/A, one being a picture of the QTH. (We were very fortunate during the summer. We actually took several photographs of the G5TZ/A QTH. One of these shows Old Jumbo himself looking out of one of the ruined windows !) Len has built up a new converter using a 9002 as oscillator, EF54 Mixer and a Z77 as RF stage, and finds the noise level as good as the G2IQ converter. (The Z77 valve seems to have been very much overlooked by many VHF operators. It is easily obtainable and performs excellently on 144 Mcs, both as RF and mixer.)

Jim Symes (Streatham, London, S.W.16) finds the new QTH inferior to his old one at Streetly, Staffs., and expects to move shortly to an even worse QTH at Richmond, only 24 ft. above sea level. (Not much of a prospect OM but take heart. Remember that G8IP used to get some fine results from his QTH at Hampton, only about 15 ft. above sea level. Jim will be at Richmond for about a year and then hopes to make another move to a more favourable QTH.

* * *

We were pleased to hear from so many listeners this month. It seems that the interest is growing again. Thanks everybody.

Two Late News Flashes

G3WW informs us that on the evening of September 6th, G6NB worked OZ2FR as also did G2BMZ. G2BMZ has also heard a G3 in Cumberland. At 0025 on September 7th, G6NB worked LA1KB and at 0035, LA8RB. G5BD was heard calling SM5AN. G3WW heard nothing of the LA or SM stations.

G2HCG on 144 had a duplex QSO with G3FAN on 70 cms.

* * *

On September 7th, Ei2W established a record for himself by working 19 stations in one day. These included G5TZ/A, Gm3IBV, and Gm6WL (Wigtownshire, a new county for Ei2W). On this same day PAØPF and PAØFB were both well heard in Dublin.

CALLS HEARD SECTION

Peter Blair (Mill Hill)

G2ANT, AHP, BZ, DD, FKZ, HDZ, WA. G3CAT, FQS, FYY, GBO, GDR, GHI, GSE, HBW, HWJ, IEX. G4KD. G5BC, MA, NF, QL, SZ. G6AG, AG/P, JK/P, RH, UH, XH. G8DV/A.

A. W. Blandford (Mitcham)

G2BMZ, DD, DDD, DTO, FSY, FTS, HAZ, HCG, KF, LW, MR, MV, PU, WA, XV. G3AGR, BA, BNC, BUN, BUG, BKQ, CGQ, CAT, CFK, CUC, DBM, DIV, DUV, EGU, ENI, ERD, EYV, FAN, FSD, FD/P, FQS, FUH, FUL, GAV, GBC, GRJ, GSL, GOP, GUC, GWB/P, GHI, HVD, HZJ, IEX, IIT, SM, WS, WW. G4CG, CI, IB/P, KD, RO, MW. G5AA, DT, FF, HB, QL, RD, MR, SZ, TP, TZ/A, UM, YU. G6AG/P, JK/P, LL, NB, GN, RH, TA, YP, XH, OU. G8DV/A, HY, OU, PX, SC, SK. Gw2ADZ, 8UH. F8MX, 9CQ/P.

R. W. Russell (Southampton)

100-150 miles:—F8MX, MX/P, 9CQ/P, 9RL. G2ATK, FJR, FNW, PU, WJ, XV. G3ANB, BKQ, CJY, FUW, HAZ, IIT, IUK, IKW, WS, WW. G5JU, ML, MR. G6SN, WF. G8SY.

150-200 miles:—G2BAT, BAT/P, HQ/P. G3AGA, APY/P, CFK, CUZ, ERD/P, IOO. G4JJ/P, PV. G5YV. G6XX.

Over 200 miles:—G3BW. G6XM/P. Ei2W. F3JN. F8GH.

M. McBrayne (Westcliff-on-Sea)

Over 50 miles:—G2BMZ, FMK/P, HCG, HIF, PU, XV. G3BA, BEX/P, BKQ, CGK, DIV, DIV/P, DJX, EEV, FAN, GBO, GBW/P, GDR, GHO, WW. G4MW, RO. G5NF, RO, TP, TZ/A, YV. G6NB, OU. G8IL, OU, ON4BZ, 4HN, PAØFP, DL3FM. F8MX, 9CQ/P.

J. C. Symes (Streatham)

G2AHP, AIW, ANT/A, ATK, BMZ, DD, DHV, MQ, MR, MV, PU, TP, YB. G3BKQ, BOV, BRR, CGQ, DIV, EGV, FAN, FQS, FUH, GBO, FDR, GHI, GVC, IAM, IEX, ISA, MI, WW. G4KD, MW, SA. G5BC, DS, DT, FF, MA, MN, NF, TZ/A, UM, YV. G6AG, PG, RH. G8DV/A, HY, OU, SK. Gw8UH. F8MX.

Don Hayter (Worthing)

Heard when /P on South Downs:—G2AHP, AIW, AOL, DD, DTO, DVD, TP, YB. G2APY/P, BEX/P, CGQ, DIV/P, EGV, ERD/P, FD/P, FMK/P, FOU, GBO, GSE, GWB/P, HBW, HWJ, ISA/P. G5BC, FF, LK, NF, TZ/A, US. G6AG/P, JK/P, YP. G8OU.

* * *

(We much regret that other calls heard have had to be omitted due to lack of space.)

QRG SECTION (continued from last month)

Call-sign	QTH	QRG normal	QRG when last heard
G4AP	Swindon, Wilts... ..	145275	144215
G4AU	Grove Park, London ..	145090	same
G4CG	Wimbledon, London ..	145070	,,
G4CI	Worcester Park, Surrey	144940	,,
G4CR	Sheldon, Birmingham ..	144875	,,
G4DC	New Cross, London ..	145090	,,
G4FB	Tonbridge, Kent ..	144860	,,
G4GR	Newport, Mon. ..	144990	145765
G4HT	Northwood, Middx. ..	145008	same
G4HQ	Woodford, Essex ..	144885	,,
G4HW	Thaxted, Essex ..	145190	,,
G4IG	Beckenham, Kent ..	145380	145140

Call-sign	QTH	QRG normal	QRG when last heard
G4JJ	Barnsley, Yorks.	144200	144445
G4KD	Edgware, Middx.	145330	same
G4LU	Oswestry, Salop.	144180	,,
G4LX	Newcastle, Northd.	144225	,,
G4MR	Slough, Bucks.	144665	144890
G4MW	Cambridge	144480	144350
G4NB	Coventry, War.	144465	144665
G4OS	Chester	145050	144160
G4OT	Nr. Malden, Essex	145385	same
G4PV	Lowestoft	144675	,,
G4QL	Horndean, Hants.	145560	,,
G4RK	Coventry, War.	144540	,,
G4RX	Bridgewater, Som.	145800	145380
G4SA	Steventon, Herts.	145315	same
G4VH	Malvern, Worcs.	145385	,,
G5AA	Anerley, Surrey	144720	145150
G5AS	Kingston, Surrey	145250	same
G5BC	Pinner, Middx.	144910	,,
G5BD	Mablethorpe	144435	,,
G5BM	Cheltenham, Glos.	144055	144285
G5BY	Bolt Tail, Devon	145515	same
G5CD	Hendon, Middx.	144010	,,
G5CP	Sale, Cheshire	144180	,,
G5DF	Reading, Berks.	145140	,,
G5DT	Park Lane, London	145700	,,
G5DS	Surbiton, Surrey	145115	,,
G5GX	Hull, Yorks.	145380	,,
G5IB	London, W.1	145300	,,
G5IG	Cambridge	145120	,,
G5HB	Nr. Swindon, Wilts.	144120	144900
G5HF	Chelmsford, Essex	145170	same
G5HN	Reading, Berks.	145340	,,
G5IW	Hollywood, Worcs.	144430	,,
G5JM	Hillingdon, Middx.	144170	,,
G5JO	Cambridge	144840	,,
G5JU	Birmingham	144670	,,
G5KH	Putney, London	145730	145785
G5KX	Southport, Lancs.	144360	same
G5LJ	Sutton Coldfield	145360	,,
G5LK	Reigate, Surrey	144805	,,
G5LN	Notting Hill, London	145060	,,
G5LO	Nr. Oxford	145300	,,
G5LQ	Chiswick, London	144960	145305
G5MA	Ashtead, Surrey	145070	,,
G5MA/P	———	145067	,,
G5MB	Heaton Mersey, Lancs.	145260	,,
G5ML	Coventry	144650	144630
G5MR	Hythe, Kent	145165	145150(?)
G5MQ	Liverpool	145450	,,
G5NF	Farnham, Surrey	145060	,,
G500	Harrow, Middx.	145380	,,
G5PB	New Milton, Hants.	145530	,,
G5QA	Exeter	145230	145620
G5QU	Redcar, Yorks.	144120	same
G5PP	Coventry	144445	,,
G5RP	Abingdon, Berks.	145267	,,
G5QL	Watford, Herts.	144740	,,
G5RW	Ilkston, Derby	144625	,,
G5SK	Coventry	144630	144540
G5TH	St. Anne's, Lancs.	144299	same
G5TP	Stoke Row, Oxon.	145300	,,
G5TZ	Newport, I.O.W.	145200	,,
G5TZ/A	St. Catherines, I.O.W.	144999	,,
G5UF	Nr. Sherbourne, Dorset	145390	,,
G5UM	Knebworth, Herts.	144785	,,
G5US	Frimley, Surrey	144730	,,
G5SZ	Watford, Herts.	144125	144890
G5YV	Morley, Leeds	144240	same
G5WP	Woking, Surrey	145050	145170
G5YK	Bristol	145370	same
G5YM	Wallington, Surrey	145600	,,
G5XA	Wembley, Middx.	145310	,,
G5VN	Blackpool, Lancs	144535	144400
G5YK	——— Glos.	145000	same

(to be continued)

"THE RADIO CONSTRUCTOR"

If you are interested in constructional work you will enjoy our companion journal, *The Radio Constructor*. It is obtainable from all bookstalls. Contents for October are as follows:—

Suggested Circuits: "Start" Muting Circuit for Tape Recorders, by G. A. French.

In Your Workshop, by J.R.D.

From Our Mailbag.

Can Anyone Help ?

Overload Protection for Moving Coil Meters, Part 1, by W. E. Thompson, A.M.I.P.R.E.

Oscilloscope Traces No. 5: Tracing Distortion in IF Stages, by A.B.

Radio Miscellany, by Centre Tap.

The Optics of Projection Television, by Frank W. Cousins, A.M.I.E.E., A.C.I.P.A., F.R.A.S.

Query Corner—A Radio Constructor Service for Readers.

The "Pattern-Master"—A Versatile TV Pattern Generator convering 40-70 Mcs, Part 1, by D. Allenden, Grad.I.E.E.

LC Ratio, by H. E. Smith, G6UH.

Some Useful Hints, by J.S.K.

Something New—Circuitry Using the new Mullard EABC80, by James S. Kendall, Assoc.Brit.I.R.E., A.M.I.P.R.E.

The "Minivox" Amplifier, by C. Noall.

Let's Get Started—The TRF Receiver, by A. Blackburn.

Valves and Their Power Supplies, Part 12, by F. L. Bayliss, A.M.I.E.T.

Radio Snapshots Competition.

STRICTLY FOR THE BEGINNER

PART 9. by O. J. RUSSEL, B.Sc., A.Inst.P., G3BHJ

THE P.A. STAGE

The PA stage being the high-power level stage in the Tx, it is necessary to avoid taking liberties. Basically, we must arrange that the grid has adequate drive applied, that electrode voltages accord with the maker's recommendations, and arrange that the anode tank circuit is matched into the antenna so that efficient power transfer occurs. Thus, the correct operation of the PA stage depends upon the balance of a number of factors. As in most things, a judicious balance is better than pushing things to the limit. This pays good dividends, as striving for the highest efficiency generally results in excessive creation of TVI harmonics, while a PA valve comfortably running within its ratings is likely to live very much longer than a valve squeezed to the limits of its ratings. Accordingly we can examine the various factors necessary for optimum efficiency in the PA stage, and it is logical to consider the grid drive question first, for an adequate grid input is the first essential for the stage to amplify !

The questions of " power sensitivity " and overdriving have already been dealt with in considering buffer amplifier stages. However, in the drive stages power levels are low, and very little drive power is required. When we come to driving the final stage, however, it is necessary to ensure that drive power is adequate. Although the question of matching the PA anode to the antenna is given due attention, as we are clearly handling sizeable amounts of power, it is not too well appreciated that the grid of a Class C stage is a power-consuming device, and that it is necessary to match its impedance to that of the power-supplying device . . . that is the final drive stage. This is often overlooked in view of the high-power sensitivity of modern tetrodes, but many complaints of " low drive " upon the higher frequency bands can be overcome by ensuring that the drive stage is matched to the PA grid circuit. In practice, this comes down to ensuring that the LC ratio of the grid tuned circuit is designed to suit the grid impedance of the PA. This is precisely analogous to the rather better known fact that the anode tank circuit should be designed to match the anode operating conditions. Provided that the grid circuit has an adequate LC ratio, it will be found easily possible to transfer drive power efficiently by any of the drive coupling methods to be considered later.

The question of actual driving POWER as against the more usual criterion of " mils of grid current " is one that needs a little consideration. To cut a long story short, we shall say here that " grid drive power " is the basic factor, and that " grid mils " are the OPERATING INDICATION that adequate drive is being applied. The grid mils are of course easy to measure with a grid milliammeter, while the actual grid drive power is a difficult quantity to measure. However, it cannot be too strongly stressed that the grid current only indicates that correct drive is being applied IF the bias values are those specified by the maker. Curiously enough, the valve manufacturers often do know what is best for their products, and one should not depart too far from their recommendations unless you know precisely what you are up to. On the other hand, one need not worry if one cannot attain precisely the exact values specified, as a reasonable tolerance is permissible. Generally, plus or minus 10 per cent. is a reasonable tolerance, with the exception that maximum limits on current and voltage permissible should not be exceeded. Some valve lists are kind enough to give the headings of " design centre " on figures where a judicious variation is permitted, and values which should never be exceeded are generally indicated by an " absolute maximum " heading. In view of the expense of the modern hairtrigger bottles, particularly the VHF variety, some study of the listed ratings is well worth while. The supply of cheap surplus bottles cannot last indefinitely !

While the rated figure for " RF grid drive power " is often published in the data lists, it has not received much attention from amateurs. There is indeed a strong feeling that the rated " grid drive power " is purely fictitious, and merely published to mislead. Most people are well aware that they have to supply much more output from the driver than the rated power. Thus, the old familiar 807 is rated to give a very healthy carrier with an input grid drive of one-tenth of a watt. This would appear to imply that a midget drive stage running at say a quarter of a watt would be more than sufficient to overdrive an 807. As it is a matter of experience that a driver somewhat more sizeable than an Acorn tube is required to swing an 807, no one pays much attention to the rated grid drive power figures. However, the grid drive power figures are NOT a device invented by unscrupulous publicity men to bolster up claims that a given valve is super-sensitive ! The grid drive figure is in fact an IDEAL figure, and in fact represents the drive power dissipated at the PA grid. This is the basic " drive power " requirement. However, as in any practical Class C stage the grid current has to be pumped into the

bias circuit, the minimum grid drive power we can ever use in practice is TWICE the rated grid power ! However, due to losses in the coupling circuits between driver and the PA grid, the PRACTICAL minimum is 2½ times the rated drive power ! However, as the frequency of operation is raised, various losses all tend to increase, so that the driver stage must be capable of proportionally greater power output to maintain the grid drive. Despite this, the ACTUAL grid consumption of the PA itself is still only the IDEAL figure quoted . . . the extra power of the driver is used up in overcoming various circuit losses. When the VHF region is reached, the driver stage may have to supply some 15 to 30 times as much power in order to supply the ration of grid drive to the PA grid ! In fact it is often the case that the drive stage may run at around the same input as the PA . . . as in the popular 832 tripler driving a 420 Mcs 832 stage !

With this explanation of the discrepancy between the IDEAL drive requirement quoted by the maker, and the ACTUAL driver output needed to drive the PA, the values in Table I show the multiplying factor needed to assess the safe minimum drive power output that should be available from the driver stage, for the more popular bands.

Providing that reasonably efficient coupling circuits are in use between the driver stage and the PA grid circuit, the values of Table I will provide for adequate drive. However, as the provision of adequate coupling between the driver and PA stage is of importance, this may very well be our next consideration.

Table I. Drive Power Requirements

Frequency	*Makers Ideal Drive Figure*	*Actual Drive Power Needed*	*DC Anode Power Input of Driver*
1.8 Mcs	P	3 × P	6 × P
3.5 Mcs	P	4 × P	8 × P
7 Mcs	P	5 × P	10 × P
14 Mcs	P	7 × P	15 × P
21 Mcs	P	10 × P	20 × P
28 Mcs	P	12 × P	25 × P
VHF Region	P	30 × P	100 × P

The above multiplying factors apply to the so called IDEAL drive figures usually quoted. In some cases makers may quote (particularly for VHF) the actual drive power that should be available at a given frequency. The figure of 30 × P for the VHF region only applies to valves suited to operation at VHF, as unsuitable valves may require excessive drive power at VHF.

G6HH/A *Contd. from p. 376*

normal zero and pointers straightened out if they can be got at.

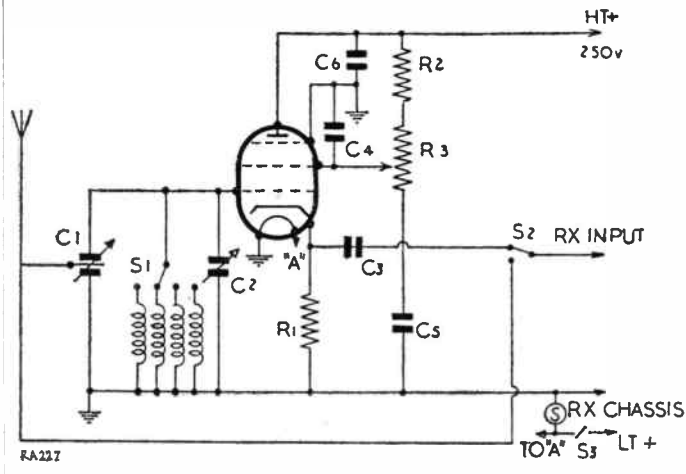
There are lots of other things we could discuss here if only space permitted. It goes without saying that everyone in the Club put up a fine show and willingly gave 100 per cent. co-operation. We have gathered in some new members, including our first YL who, it seems, is a keen SWL. Margaret, meet the boys ! Stand back, there ! ! Apart from this achievement, we think we created the desirable impression that amateur radio is not a thing set aside for chaps with a kink who talk in mumbo-jumbo, but is something enjoyed by reasonably intelligent people, something that creates good friendships and encourages happy relations with all classes and creeds.

We have learned some useful lessons too, for, notwithstanding the careful preparations and the fond hopes that perfection had been attained, a review of the event shows that there are quite a few loose ends to be tied up the next time we put on a similar show. Most of these seem to be peculiar to our own circumstances, so will not be laboured here.

One of the things which might be of general interest is the appearance of stands and exhibits. Good as our lot turned out to be, with 60 ft. of stands crammed with gear of all sorts, it soon looked like a still-life study in a shop-window dressing. The few oddities that worked or did something to catch the eye created enormous interest. More of this sort of thing will be a must for another show. As instance of the popularity of things that work, '5RO's rotating 70 cms Yagi with a meter to indicate the cardinal point to which the aerial was directed was drawing good crowds; his demonstrations of sharp directivity, nodes and absorptions with a 1200 Mcs Klystron and ground plane antenna had quite a small procession following him around the hall, watching the effects of moving the tiny Yagi as they were displayed on the GDO. '3HCK put on a mystery box containing an electronic El-bug. On the outside was a straight key and a buzzer, and visitors were invited to " Have a Go." Controls enabled them to adjust tone and speed of the electronic what-not, and the thing was worked to death. Some of the things we read were rather unorthodox, and could not be repeated in print, hi !

An Aerial Matching Unit

by E. GOVIER



C1—50 *pF differential*
C2—*Variable, to suit*
C3, 5—0.01 *μF tubular*
C4. 6—0.1 *μF*, 350v *wkg*
Valve—*EF37, EF39 or 6J7, etc.*
R1—470 Ω ½ *watt*
R2—25 *k* Ω ,,
R3—50 *k* Ω *pot*
S1—4-*way Yaxley type*
S2—2-*way* ,, ,,
S3—*On/Off toggle switch*

Most communication receivers are designed to have an impedance at the aerial input terminal of some 400 ohms and, when used in conjunction with a correctly matched feeder, a good transfer of power is obtained.

For several reasons however, it is not always possible to comply with this ideal. Consider the use of an 80-ohm impedance feeder into a receiver having an impedance of 400 ohms. The resultant mismatch is five to one, quite a serious matter where the reception of weak signals are concerned. Again, the use of an end-fed long wire aerial, the " Inverted L " for example, introduces complications in that the degree of mismatch will vary greatly according to the frequency to which the receiver is tuned, and only on certain small portions of the spectrum will the match be satisfactory.

With specialised aerials, the " VS1AA " for instance, or its derivative the " SWL Special," the input impedance is such that a fairly good average match is obtained over the amateur bands—but what of the broadcast bands and other frequencies ? Here, a varying mismatch of between some 50 and 2,000 ohms, according to the frequency in use, is commonplace, with the attendant loss of power transfer from aerial to receiver.

It is an old adage in the Shortwave World, that " if you can't hear 'em, you can't work 'em," and similarly for the SWL, " if you can't hear 'em, you can't QSL 'em." Fortunately, the answer to this problem of correctly matching an aerial to the receiver is a relatively easy one, and it consists of constructing an aerial matching unit, simple to operate and comparatively easy to construct.

The Circuit

From this it will be seen that it is little more than a cathode-follower stage, and the whole secret of correct working lies in the fact that the cathode circuit, as shown, provides a correct match to a receiver having an input impedance of 400 ohms. The tuned circuit portion, with its switched coils, takes care of the frequencies which it is desired to cover—these are then fed to the receiver via the cathode, at the correct impedance. Thus, any range of frequencies may be covered, using almost any aerial, with the assurance that no losses due to mismatching will occur providing the unit is tuned to resonance with the receiver.

The aerial is fed through a differential capacitor, the sole purpose of which is to balance the aerial against ground. The capacitor C2, in conjunction with the switched coils, tunes the unit to any selected frequency in the normal manner. The coils may be a commercial pack or a series of coils, selected for their individual ranges, and wired to a Yaxley-type switch, or plug-in coils could equally well serve. Whichever are chosen, only the secondary (grid) winding is utilised, i.e., aerial and/or reaction windings are not used but may be left *in situ*.

The valve used may be either an EF37, EF39 or a 6J7 or similar type, although the writer prefers the EF39 in practice. All resistors except R3 are the half-watt type. R3 is a variable pot., which varies the applied screen voltage and therefore the gain of the valve. This control has proved most helpful in reducing the noise of static, etc., when using the

(*Contd. on p.* 394.)

MEASURING AERIAL POWER

O. J. RUSSELL, B.Sc., G3BHJ

A problem facing the amateur is the measurement of power which is supplied to the aerial system. As we are still thinking mainly in terms of top band operation, a method capable of fair accuracy for the relatively low frequency of the top band may prove of some interest. It is also capable of giving a value for the effective resistance of the aerial system. Ideally this would be the radiation resistance, that is the value of resistance representing the fact that radiated power is dissipated into space. Regarding this as a " power loss from the aerial system," the radiation resistance is the value of resistance that would be needed to account for the power absorption if we were innocently unaware that energy was being radiated into space ! The fictitious " radiation resistance " has the feature that a high " radiation resistance " clearly means that a large amount of energy is being dissipated into space . . . that is to say usefully radiated. Other things being equal therefore, an aerial of high radiation resistance is an efficient aerial, which is desirable. It should be noted that in the case of a loudspeaker, an important fraction of the " load impedance " is the " radiation resistance " term which represents the fact that the loudspeaker is radiating part of the energy supplied to it as sound, as well as the losses in the speech coil which only serve to warm it up !

It is of course true that any real aerial system contains a certain amount of resistance due to various losses, including the actual resistance of the aerial conductors, which uselessly heats up the conductors. This is particularly true of the Marconi systems, where the losses in the earth lead are important, so to see how the power in a Marconi type aerial may be measured, Fig. 1 shows the equivalent circuit of a length of wire forming part of a Marconi system. In fact it is nothing more or less than a capacity and a resistance. The resistance represents the combined resistance comprising the useful radiation resistance and losses in the aerial itself. The usual series tuned loading circuit for such an aerial merely adds inductance, so that the inductive reactance cancels the capacitative reactance at the operating frequency, and only a resistive term is left. Fig. 2 shows this in the case of a perfect resistanceless earth connection. Consequently in an ideal perfect aerial system with no resistance losses, we should be feeding a pure " radiation resistance," and every microwatt supplied to the aerial would be radiated . . . a very satisfactory state of affairs ! However, in real life, the resistance we are left with after the aerial has been resonated is the sum of the useful radiation term, and the useless resistance representing losses in the aerial and earth system. To be highfalutin' we can call these R_{rad} and R_{dis} respectively.

To give some idea of the magnitude of these terms, the radiation resistance of a full quarter-wave Marconi is 36 ohms, which is a usefully high figure. Unfortunately, for shorter aerials the radiation resistance drops rapidly, and for an eighth wave aerial it is only some 5 ohms. As the earth resistance may easily be some 10 ohms, a little figuring shows that while with the 36 ohms of the quarter wave section a further 10 ohms makes the total 46, so that $\frac{36}{46}$ of the total power i.e. just over 78 per cent. is radiated, with the aerial of 5 ohms radiation resistance, the 10 ohms earth resistance

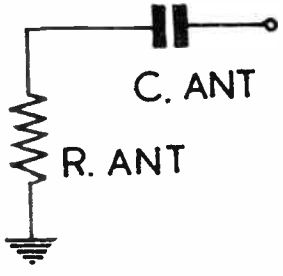


FIG 1.

RA 204

The " equivalent circuit " of the " short " Marconi aerial is a capicity and resistance. The resistance comprises both radiation resistance and earth losses.

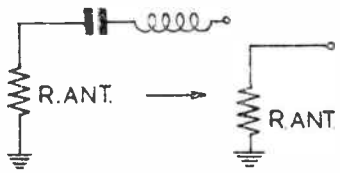


FIG. 2.

RA205

The purpose of the usual series loading coil in the usual Marconi tuning circuit is to cancel out the aerial capacity at resonance, so that the "aerial resistance" can be fed efficiently with power.

brings the total up to 15 ohms, so that only $\frac{5}{15}$ parts of the total power supplied to the aerial or 33 per cent. is radiated. This enormous difference between a 132-ft. aerial and a 66-ft. aerial on top band shows why the top band addicts are in favour of long wire aerials ! It is important to note, however, that this difference is largely due to the effect of earth resistance . . . but for earth resistance, even a small aerial could be efficiently operated, and in fact by various devices it is possible to considerably increase the radiation resistance of small aerials, so that they become efficient top band radiators. However, the importance of the above figures should stimulate keenness in measuring aerial power and resistance.

A fair measurement can be made by the following method. A non-inductive resistor of low value, say 10 ohms, is required. A carbon composition resistor is suitable, and two 20 ohm two-watt composition resistors in parallel, or two 2-watt 5-ohm resistors in series will safely handle the power level in a 10-watt top band rig. Tune up the aerial to resonance in the usual way, and lightly couple to the transmitter until the final draws a convenient input, say 10 watts. A thermal ammeter gives the aerial current value. Note this value and call it I-. Now connect the 10-ohm resistor in series with the aerial (Fig. 3) and readjust the loading to the Tx, until the final is again drawing the standard input. The aerial ammeter will be reading a somewhat lower figure I-. It should be noted that provided the final was resonated correctly in the first place, and provided the loading was light, the final loading can be brought back to the standard value purely by coupling adjustments.

From the previous arguments, when correctly tuned, the Marconi system behaves as a resistance, so that if R_{ant} is the aerial resistance, in the first case by Ohms Law, the power in the aerial is I_1^2 times R_{ant}, while in the second case with the added series resistance, the power is I_2^2 times (R_{ant} plus 10 ohms). As we have arranged that the final draws the same power in both cases, the power taken by the aerial is the same in both cases, so that $I_1^2 \times R_{ant} = I_2^2 (R_{ant} + 10)$. In a typical case, with the Tx running at eight watts input, the aerial currents were 0.4 amps with the auxiliary resistance in series (I_2) and P 0.5 amps without the resist-

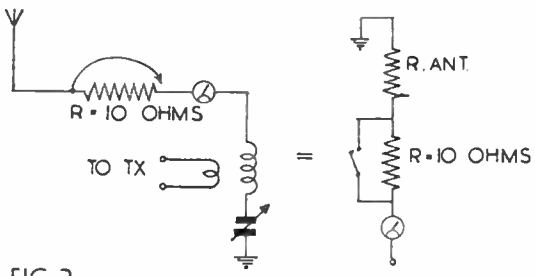


FIG. 3.

RA206

An additional series resistance, together with the aerial ammeter readings, enable the aerial resistance and power to be measured.

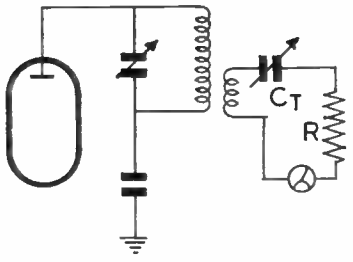


FIG 4

RA207

A non-inductive resistor R enables a check to be made on Tx efficiency. The variable CT enables the circuit inductance to be tuned out, and may require some .001 pf for top band. This can be a receiving .0005 variable padded with fixed capacity, and it will be found that the tuning is very broad. The coupling coil is the usual "link winding" of from three to ten turns depending on the tank inductance.

ance (I_1). Hence, $(0.5)^2 \times (R_{ant}) = (0.4)^2 \times (R_{ant} + 10)$. Hence, $R_{ant} \times 0.25 = (R_{ant} + 10)\ 0.16$. So that $R_{ant}\ (0.25 - 0.16) = 10 \times 0.16$, or $R_{ant}\ 0.09 = 1.6$ ohms, whence

$$R_{ant} = \frac{1.6}{0.09} \quad \frac{160}{9} = 17.8 \text{ ohms.}$$

This is a value to be expected with a short aerial, particularly as it includes the effect of earth resistance, and in fact any improvements in earth resistance can be detected by such measurements. Also now that the aerial system resistance is known, we can also calculate the power delivered by the transmitter. Thus, as the aerial resistance of 17.8 ohms takes 0.5 amps, the power delivered to the aerial system is $(0.5)^2 \times 17.8 = 0.25 \times 17.8 = 4.45$ watts. With the input of eight watts, this is an efficiency of 55.6 per cent.

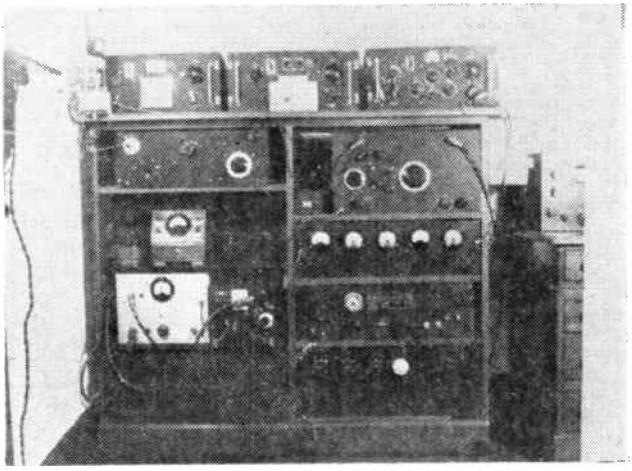
If the efficiency figure you obtain in this way for the Tx needs checking, it is possible to use the 10-ohm resistance as an artificial aerial. Loaded in as shown in Fig. 4, the current measured will give the power dissipated, and provide a check on transmitter efficiency. While such methods can be applied to other bands and aerial systems, it is in the relatively easy case of the top band that the simple system described can be employed. If a selection of resistors is available, cross checks can be made with a variety of resistors, and while not all will be interested in making such measurements, they are valuable in giving an insight into the factors making for efficiency in top band operating. While a high radiation resistance is the aim, IF one obtains a very high value for the measured resistance of a short aerial. . . . it is a certainty that the earthing system is of high resistance. As shown earlier, the earth resistance is such an important factor on top band Marconi aerials in determining the actual radiated power, that a low-loss earth system is vital. Consequently, if such a state were revealed by measurements of the type discussed, the correction of high earth resistance would be amply repaid in terms of improved working and a stronger signal. So even the most rabid DX hunter would be well rewarded by a rapid resistance measurement ! Try it and see.

Aerial Matching Unit. (*Contd. from p.* 391.)

unit on the 3.5 and 1.7 Mcs bands. The power requirement is small and may be taken from the receiver supply.

S2 allows the operator to switch the receiver input from the unit direct to the aerial, a most useful feature and one which adequately proves in practice the apparent gain of the unit. The term "apparent gain" is used here to explain that, although there is theoretically little stage gain in a cathode-follower stage, there is an appreciable gain when the unit is switched into circuit, due to the correction of any mismatch previously present between the receiver and aerial. Where before a five-to-one mismatch was the probable result, we now have a correct input match. In operation, all that is required is to keep the unit in tune with the receiver or pre-selector ahead of which it is connected.

AROUND THE SHACKS



G8GI

Ben Raithby, Martin, Lincoln

The photograph shows the main transmitter used at G8GI. A description of the control system of the station was published in the March issue of this journal. The output from the VFO, which is located on the operating desk, goes to the input of the doubler unit which consists of a number of VT501 valves giving outputs on 7, 14, 21 or 28 Mcs, together with a "straight through" position for operating on 1.8 or 3.5 Mcs. This unit is built in a TU6B case. Range switching and switched anode current metering is provided and the appropiate screen supply is disconnected from the valves not actually in use. The screened PA stage uses an 807 valve in a pi-section tank circuit. This has switched grid coils covering all bands from 1.8 to 28 Mcs. Besides having the usual fixed switched loading condensers, and variable fine loading capacity, variable inductance tuning is also provided for. This has proved very useful. For 1.8 Mcs an extra inductance is switched into circuit.

The power supply for the PA is orthodox and uses 5R4-GY rectifiers. DC outputs of 800, 600 and 250 volts are available. The maximum rating used on the 807 is 500 volts, Ia being 100 mA, Is 11 mA and Ig 5 mA. Bias is obtained from a stabilised 70 volt supply. A separate HT supply of 300 volts supplies the doubler unit. The aerial tuning unit used on the three lower frequency bands is also a pi-section type. On 14, 21 and 28 Mcs, an orthodox aerial tuning unit is used.

The main modulator consists of a 6J7 in a grounded grid stage with cathode injection, RC-coupled to a 6J5 which is further RC-coupled to a 6L6 which drives, via a step-up transformer, two 807s in zero bias class B. The microphone, an ET1013 sound cell, feeds into a 6J7-6J5 arrangement contained in a separate pre-amplifier. The audio output is taken from the 6J5 cathode. Both the pre-amplifier and the main modulator have DC heater current, a 6.5 volt 6 amp rectifier unit providing the supply.

Series-connected "Elf" automatic cut-out switches control the various supplies. As has been previously described, single switch control is available via appropriately delayed relays, from the operating desk. A 132-ft. aerial is used on all bands, an aerial relay providing changeover from transmit to receive.

CLUB NEWS

Club Secretaries are invited to submit notes for this feature by 15th October, for inclusion in next month's issue.

Leicester Radio Society. Hon. Sec.: N. Wibberley, 21 Pauline Avenue, Belgrave, Leicester.

The coming Winter session will open with a series of interesting lectures which have been compiled, and details will be issued at the end of the month. A complete programme of forthcoming activities can be obtained from the Hon. Secretary, and new members and/or visitors will be welcomed at the Club Room, Holly Bush Hotel, Belgrave Gate, on any second and fourth Monday in the month. The meetings commence at 7.30 p.m. Arrangements are now being put in hand for the Society's Annual Dinner and Dance which is held at the end of the year and members who cannot attend meetings are requested to advise the Hon. Secretary how many tickets will be required as soon as possible, to avoid disappointment.

Surrey Radio Contact Club. Hon. Sec.: S. A. Morley, G3FWR, 22 Old Farleigh Road, Selsdon, South Croydon.

On October 13th, the Club is to have a visit from Mr. John Clarricoats, G6CL, of the RSGB, to speak on the importance of International consultation and agreement as a matter of utmost importance to every radio amateur. It is hoped that G2MI and G6LJ will also be present.

On November 10th, a demonstration and talk on the Metropolitan Police Wireless System will be staged by their Engineer representative, Mr. Andrews.

Meetings are held on the second Tuesday of each month at the Blacksmiths' Arms, South End, Croydon (Coombe Road corner) at 7.30 p.m. Visitors most welcome.

Birmingham and District Short Wave Society. Hon. Sec.: F. C. Cook, 69 Regent Road, Handsworth, Birmingham, 21.

For the month of October, the Society will have a discussion by one of their members during the General Meeting on the second Monday of that month, and no doubt a further discussion will be made on the Field Day results which are being held on September 20th.

All visitors will be welcomed, and further details of the Society's activities can be obtained from the Secretary.

Acton, Brentford and Chiswick Radio Club. Weekly meetings are held at the AEU Rooms, Chiswick High Road, W.4 every Tuesday evening from 7 p.m. to 10 p.m., when the Club transmitter, G3IIU is on the air looking for QRP contacts in the 80 and 160 metre bands.

New antennas have been erected and an S640 receiver has been added to the existing club gear. The winter Morse Session (7-8 p.m.) and General Instruction has commenced.

Membership is not confined to those living in the above London districts. All are welcome, hams and SWLs alike.

Torbay Amateur Radio Society. Hon. Sec.: L. H. Webber, G3GDW, 43 Lime Tree Walk, Newton Abbot.

A hearty welcome was extended to our old friend, Tom Smith, G3EFY, CR of Devon, RSGB; also to two visitors—G3IEA of Manchester, and G3JDZ (ex-VS2DH), of London, who are both temporarily resident in this area.

Congratulations were also extended to two members of the Society—Messrs. Ferrar and Slee—both of whom have passed the R.A.E. Examination for their Licences.

Various members spoke of RSGB matters. G2GK — the Chairman — detailed the programme for the forthcoming South-Western "Hamfest" on October 11th, next — see announcement in the September issue of the RSGB *Bulletin.*

Next meeting will be held on October 17th, 1953, at 7.30 p.m., at the Y.M.C.A., Torquay.

Lancaster and District Amateur Radio Society. Hon. Sec.: A. O. Ellefeen, 10 Seymour Avenue, Heysham, Lancashire.

Our last meeting was held at the George Hotel, Torrisholme, September 2nd.

A most interesting film show was staged, members viewing films kindly loaned to the Society by an industrial concern, and dealing with the manufacture and uses of solder. Further films screened were supplied by the RSGB and of these one showing the 1952 National Field Day stimulated particular interest.

Members of the Barrow Amateur Radio Society were welcomed to the show, the proceedings being enlivened by their presence, and giving local members the opportunity for a lengthy "rag chew."

Future plans include a "junk" auction on October 7th, a talk on Two Metre Transmission and Reception by G3BAP in November, and for December a Christmas dinner and social is being planned.

Since the Society's foundation in May this year, it has gradually been attracting more

new members and it is hoped that the winter months will provide a further incentive for prospective members to join.

Willesden Radio Club. Hon. Sec.: c/o 5 Princess Road, Kilburn Park, N.W.6.

With the acquisition of new premises at Scout House, Willesden High Road (near bus garage) the Club has re-opened with an election of officers—Chairman: J. Theobald, G3EQM; Secretary: E. Mitchell, G3GZW; Treasurer: T. Stonestreet.

Meetings held fortnightly on a Wednesday at 7.30 p.m. as from September 30th, onwards. Technical lectures and Morse classes have been arranged. Junk sales will be held once a month.

New members will be welcome to call.

Other premises have been acquired for use as a workshop and shack for the Club transmitter G3BFZ, which will be on the air in October.

QRP Research Society. Hon. Sec.: J. Whitehead, 92 Rydens Avenue, Walton-on-Thames, Surrey.

The principle event this month is the " Kaleveld Cup " contest, an annual competition for QRP enthusiasts. This year the event will take place from 0001 hrs. on October 3rd to 2359 hrs. on October 11th. Previous winners have been GC2CNC and VE7BS—ex-G3AGQ. Full details appear in *QRP*, the Society's monthly journal. Also in *QRP* are more articles on antenna design, and the start of a new series, " Design of QRP Superhets."

If your interest lies in the design of simple or low-power transmitters and receivers, why not add your name or call to our ever-growing list of members.

Hounslow and District Radio Society. Hon. Sec.: R. J. Parsons, 16 Cypress Avenue, Whitton, Middlesex.

The Autumn Session opens on Thursday, October 1st, at 7.30 p.m., with a meeting at Grove Road Junior School, Grove Road, Hounslow. Thereafter meetings will be held at the same time every other Thursday.

East Surrey Radio Club. Hon. Sec.: L. G. Knight, 6 Maderia Walk, Reigate, Surrey.

For the October meeting the Club will assemble at Caterham School on Thursday, October 29th, where they will be entertained by Mr. Norman Maddox, G2AJS. Mr. Maddox has a very interesting series of demonstrations arranged and the programme promises to be one which is fully up to his highest standard.

The Club Room at the Ex-Servicemen's Club at Redhill will be open as usual for members and visitors on Monday, Thursday and Saturday evenings for practical work, etc.

Pontefract Area Transmitting Group. T.R.: D. I. Thompson, G3IDT, " Strathmore," Baghill Lane, Pontefract.

On September 10th, 11th and 12th, the members of the Group manned a stand at the Leisure Hour Exhibition. An impressive array of gear, a fair proportion being home-built, was on display, a particular source of interest being a " Grundig " tape recorder. A station, under the special call-sign GB3PA, was in operation continuously, mainly on 80-metre Phone, and over 100 QSOs were made, signal reports being mainly R5, S9 ! A G5RV transmitter, running at 50 watts, fed an aerial of some 150 ft., mainly indoors, but with a maximum height of 75 ft. or so. The receiver was a BRT-400. A good time was had by all, and the members look forward to any similar show in the future. All stations contacted will receive a GB3PA QSL card, as will listeners who kindly sent reports by post *and telegram.*

Tops Club. Hon. Sec.: J. P. Evans, 2 Ffordd Ty Newydd, Mebden, Flintshire.

A most enjoyable meeting was held at Chester on September 12th, and the following members and friends were present G2YS, 2FCV, 3ABG, AHF, BGH, BZT, GD3FBS, G3FOO, G5PP and XYL, G8NH, 8PG, QO, GW8WJ and DL7AH. There were also several SWLs including Hans from Munich.

OH2MA sent greetings by post and apologised for his non-appearance due to his visa (to enter the UK) not having arrived. In fact, it looks as tho' Eero will have to return to Finland without paying a visit to this country.

The Topsfest proper commenced at 1830 and included a short address of welcome by Gus Taylor G8PG the President and Chairman and he concluded by handing over the Hester Trophy to the present holder DL7AH.

GW8WJ the Secretary, followed with a resume of Club news to date and drew attention to the need for a typewriter at HQ.

The guest speaker 2YS then gave a most interesting lecture on Recorders and " wound up " by a practical sound demonstration during which he recorded the voices of members of the audience and then played them back. No doubt some of us vowed we would stick to CW after hearing our voices.

Harry Lilienthal, DL7AH, gave some interesting answers to questions fired at him regarding Ham conditions in Germany. He spoke glowingly of the assistance given to German Nationals by the occupation authori-

ties during the years when DARC were negotiating the official licences.

It appears that the German licences are granted in two parts. Class A allows a maximum of 25 watts and Class B a maximum of 50 watts.

Another interesting fact was that the drive to any stage must not exceed 5 watts. So there is little likelihood that DL nationals will ever be heard exceeding their licenced power.

A " swindle " was held during the evening and the sum of 23s. 6d. helped to swell the " Mill " fund which now stands at £6.

The following new recruits have been enrolled G2YM, G3ITT and G3JRB (ex-VS6CM).

A number of complaints have been received regarding deliberate jamming of the VERON Code proficiency runs. In one case a two letter G was the offended, maintaining that the Code runs were non-amateur . . . nuff said ! We do hope fellow amateurs will play ball in future. It is hoped to publish a list of VERON Certificate holders in the not too distant future.

SHORT WAVE BROADCAST STATION LIST

(I) Denotes Tentative Frequency or Station Under Construction.
(V) Denotes Frequency Liable to Variation.
(E) Denotes Experimental Channel.
(I) Denotes Inactive at the time of publication.

Kcs	M	Call	Location
6220	48.23		Alma Ata, Kazakh, SSR.
		HC2LT	Salinas, Ecuador.
6223	48.21	CE622	Santiago, Chile.
6225	48.19	HJFB	Manizales, Colombia.
(V)			Madrid, Spain.
6230 (V)	48.15		" Basque Freedom Station " (Calandestine).
6235	48.12	APK	Karachi, Pakistan.
		HRD2	La Ceiba, Honduras Rep.
6240	48.08		Milan, Italy.
		HSK5	Bangkok, Thailand.
			Mytilini, Greece.
6242	48.06		" Free Albania " (Clandestine.)
6243	48.05	HRSU	San Pedro Sula, Honduras Republic.
6248 (V)	48.02		Budapest, Hungary.
6250	48.00		Murree, Kashmir.
			Pyongyang, North Korea.
		CP22	Potosi, Bolivia.
6255	47.96	TGRA	Guatemala City, Guatemala.
6260	47.90		Palermo (Sicily), Italy.
		HC2AX	Vinces, Ecuador.
6270	47.84		Komotini, Greece (FBS).
6275	47.81	ZPA1	Asuncion, Paraguay.
6282	47.75		" Free Yogoslavia " (Clandestine).
6285 (V)	47.73	TGTQ	Guatemala City, Guatemala.
6295	47.66	OTM1	Leopoldville, Belgian Congo.
		TGLA	Guatemala City, Guatemala.
6300	47.62		Kalgan, China.
(I)		YNAS	Managua, Nicaragua.
6301	47.61	4VWA	Cap Haitien, Haiti.
6307	47.50	OAX4H	Lima, Peru.
6310	47.54		" Radio Free Japan " (Calandestine).
6315	47.50	COCW	Havana, Cuba.
6320	47.47		Baden-Baden, Germany (French Zone).
		OBX4P	Miraflores, Peru.
6330	47.40		Athens, Greece (FBS).
6335	47.35	OAX6E	Arequipa, Peru.
(V)		TGTA	Guatemala City, Guatemala.
6340	47.31	4VGS	Les Gonaives, Haiti.
6345	47.28		Ulan Bator, Mongolian Republic.
			Shanghai, China.
6360	47.17	CSA38	Lisbon, Portugal.
		HRP1	San Pedro Sula, Honduras Republic.
6363 (V)	47.15	4VCP	Cap Haitien, Haiti.
6374	47.06	CSA21	Lisbon, Portugal.
6397	46.90		" Free Greece " (Clandestine).
6405	46.84		Moscow, USSR.
6407	46.83	4VCN	Port-au-Prince, Haiti.
6410	46.80	HRLP	Tegucigalpa, Honduras Republic.
			Sian, China.
6422	46.71	ETA94	Addis Ababa, Ethiopia.
6438	46.60		Omdurman, Sudan.
6450	46.51	COCY	Havana, Cuba.
		CE645	Antofagasta, Chile.
6465	46.40	YNWA	Managua, Nicaragua.
6480	46.30		Moscow, USSR.
			Herakleion, Crete.
6500	46.15		" Basque Freedom Station " (Clandestine).
6507 (V)	46.10	TITH	San José, Costa Rica.
6512 (V)	46.08		" Free Albania " (Clandestine).
6520 (V)	46.01		Chios, Greece.
6550	45.80	YNBH	Mangua, Nicaragua.
6552	45.78		Samandaj, Iran.
6560	45.73		Tirana, Albania.
		OAX4C	Callao, Peru.
6562 (V)	45.72		Shiras, Iran.
6565	45.70		Tihwa, China.
6570	45.66	TGCB	Antigua, Guatemala.
6580	45.60		" Free Slovakia " (Clandestine).
6590	45.52	TGBA	Mazatenango, Guatemala.
			" Free Ukraine " (Clandestine).
6600	45.45	TAZ	Smyrna, Turkey.
6620	45.32	TG2	Guatemala City, Guatemala.
6633	45.22	HCR2RL	Guayaquil, Ecuador.
6645	45.13		Wuhan (Hankow), China.
6660	45.05	HROW	Tegucigalpa, Honduras Republic.
		TGZA	Zacapa, Guatemala.
6672	44.96	HBQ	Geneva, Switzerland.
6677	44.93	PJC2	Willemstad, Curacao.
6680 (V)	44.91		" Free Russia " (Clandestine).
6690	44.81		Istanbul, Turkey.
6700	44.78		Stalinabad, Tadzhik SSR.
6701	44.77	OAX1A	Chiclayo, Peru.
6725 (V)	44.61	4XB44	Tel Aviv, Israel.
6744 44.48		TIHH	San José, Costa Rica.
6750	44.50	XE14A	Ciudad General Aleman, Mexico.
			Larissa, Greece (FBS).
6770 (V)	44.31		" España Independiente " (Clandestine).
6790	44.23	ZJM6	Limassol, Cyprus.
6800 (V)	44.12		" España Independiente " (Clandestine).
6810	44.05	TGBC	Mazatenango, Guatemala.
6825	43.96		Tashkent, Uzbek SSR.
6830	43.92	4XB31	Tel Aviv, Israel.
		HC1FM	Ibarra, Ecuador.
6845	43.83		Ispfahan, Iran.
6850	43.80		Moscow, USSR.
6870	43.67	CR6RG	Dondo, Angola.
			Tripolis, Greece (FBS).
		HC4EB	Manta, Ecuador.
6887	43.56		" Free Jugoslavia " (Clandestine).
6890	43.54	HC2CA	Salinas, Ecuador.
6925	43.32		Tihwa, China.
6945 (V)	43.20		Almeria, Spain.
6950 (V)	43.16		Leon, Spain.
			Kunming, China.
6958 (V)	43.12	EAJ3	Valencia, Spain.
6967	43.06		Magadan, USSR.
6970 (V)	43.04		" Free Greece " (Clandestine).
6980 (V)	42.98	EAJ9	Malaga, Spain.
		FO8AA	Papeete, Tahiti.
6992 (V)	42.91	BEC22	Taipeh, Taiwan.
6993 (I)	42.90	CQM7	Bissau, Portuguese Guinea.
6994 (V)	42.89		Valencia, Spain.
7000	42.86		Brazzaville, French Equatorial Africa.
			Katmandu, Nepal.
7004 (V)	42.83		Valladolid, Spain.
7008	42.81	APK2	Karachi, Pakistan.
7015	42.76	HS3PN	Bangkok, Thailand.
7018 (I)	42.75		Lisbon, Portugal.
7030	42.67		Istanbul, Turkey.
7040 (V)	42.61		Kermanshah, Iran.
7042	42.60	CR6AA	Lobito, Angola.
7049 (I)	42.56		Lisbon, Portugal.
7050 (V)	42.55		Salonika, Greece (FBS).
7055 (V)	42.52		La Coruña, Spain.
7062	42.48		Baghdad, Iraq.
			" Free Yugoslavia " (Clandestine).

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