

OFFICIAL REPORTS



Q, R P :::::

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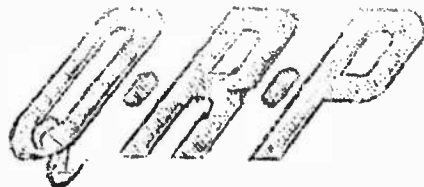
RESEARCH GROUP

ISSUES FOR  
OCT 1950

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Dedicated to the  
advancement  
of Low Power Radio

QRP



OCT. 1950

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EDITORIAL.

This issue carries our first description of a SH receiver. It is hoped that it will encourage interest in a receiver-type which is sadly neglected by the QRP SWL. There seems to be a feeling that a SH cannot be QRP on principle, which is most unjust. The example in this issue has not been "pruned" in any way to reduce it's RF consumption and still falls within the prescribed limits of 1.25 watts, though admittedly with little to spare. It is presented as a thoroughly tried and tested "going concern" to form the basis from which to start a group of experiments aimed at increasing the efficiency/power ratio, and not as the finalised ideal of a QRP SH. It is proposed to follow up the description with a series of experimental "suggestions" on SH topics which should help to develop a really QRP SH type. In the mean time, anyone who decides to build the present rig will have acquired a guaranteed Dx getter.

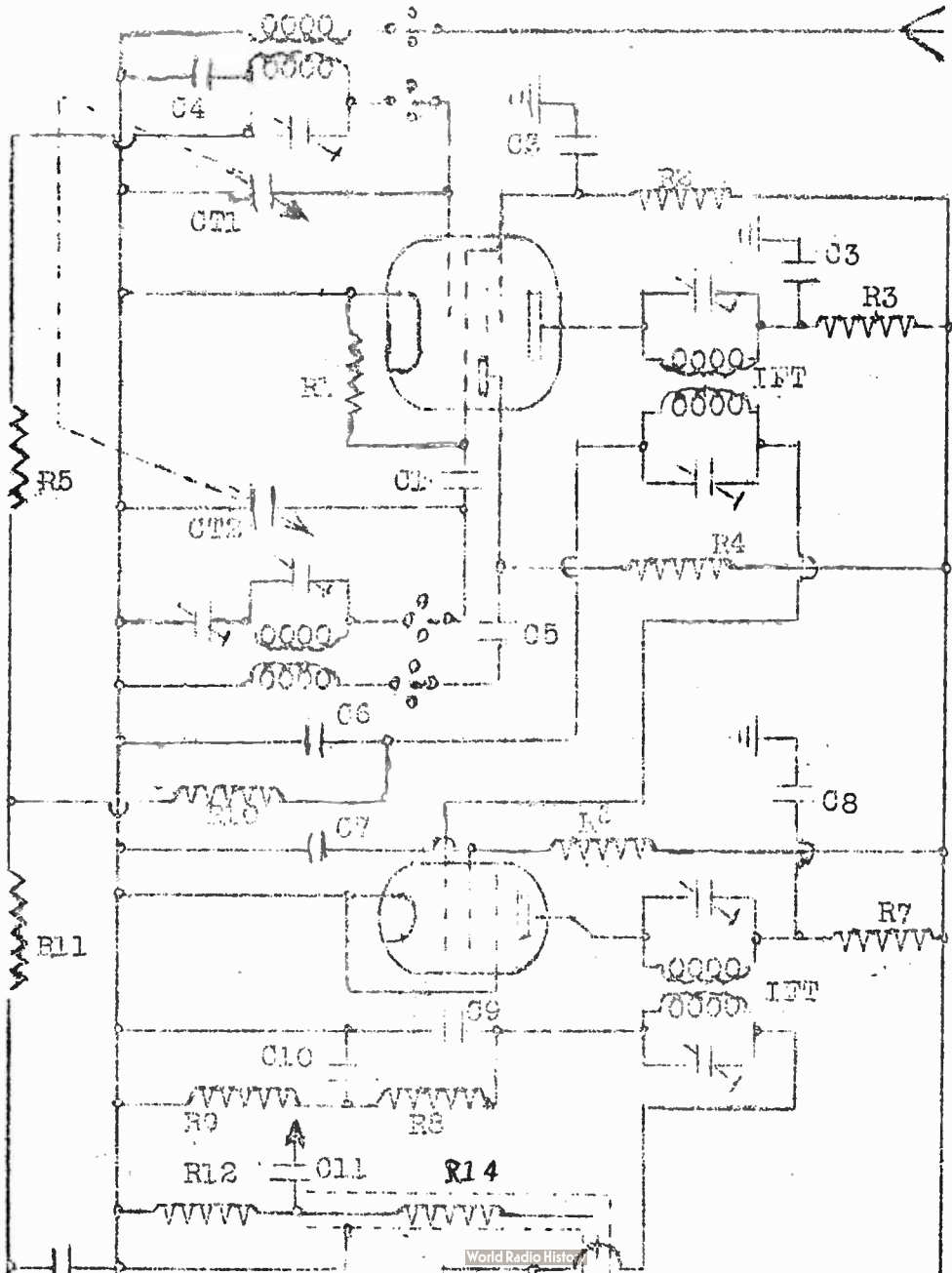
All Group members within reach of London should make a note of the dates November 22nd to 25th. The RSGB Amateur Radio Exhibition is being held for the fourth successive year at the Royal Hotel, Woburn Place on these days. The ISWL will be on stand 4, and "Q R P" will be among the many other items of interest there. I hope to be present myself each evening and all day on the Saturday and I am looking forward to a personal QSO with every Group member who can manage to get along.

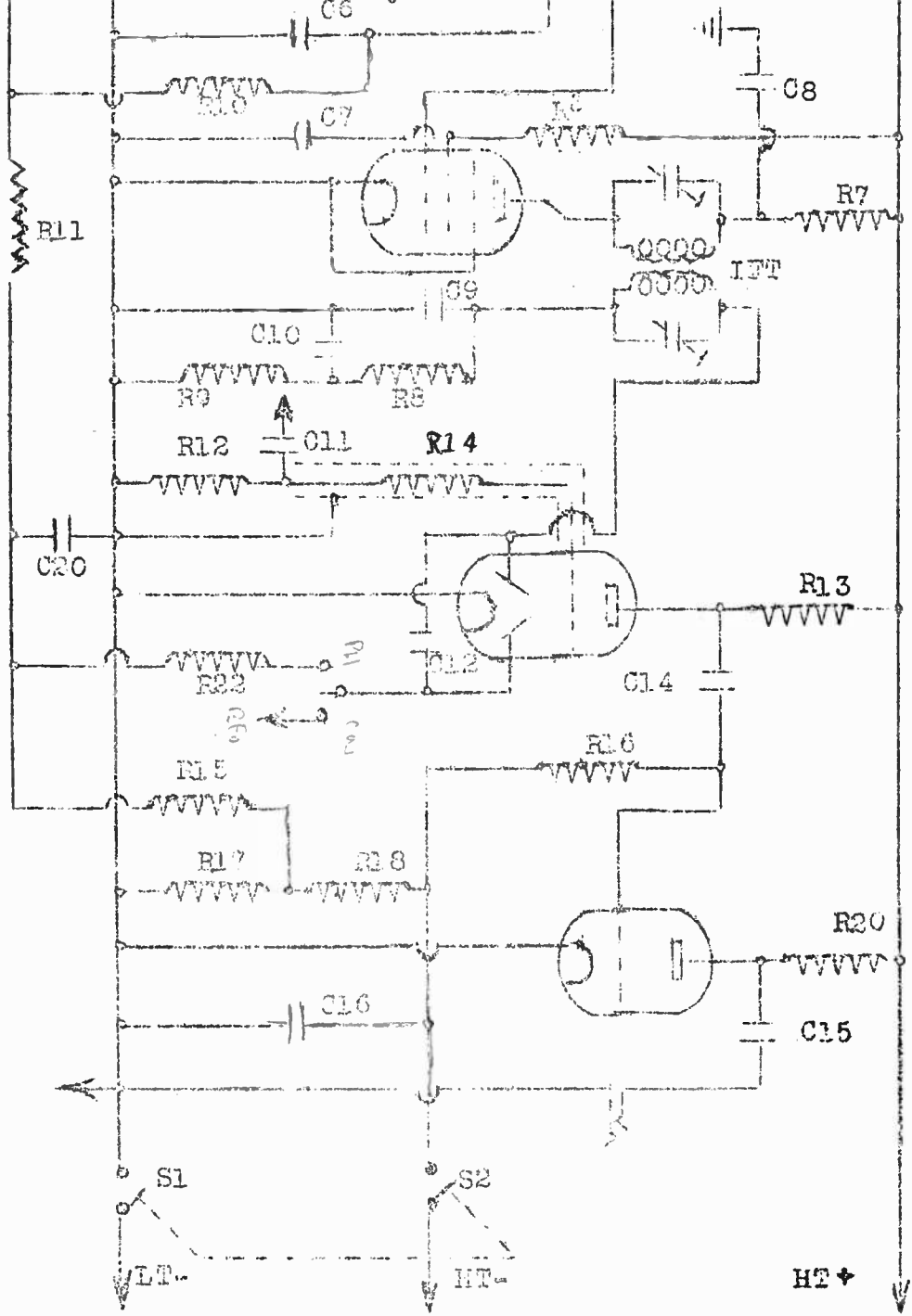
A QRP SH 4, by R.J. BROOKER.

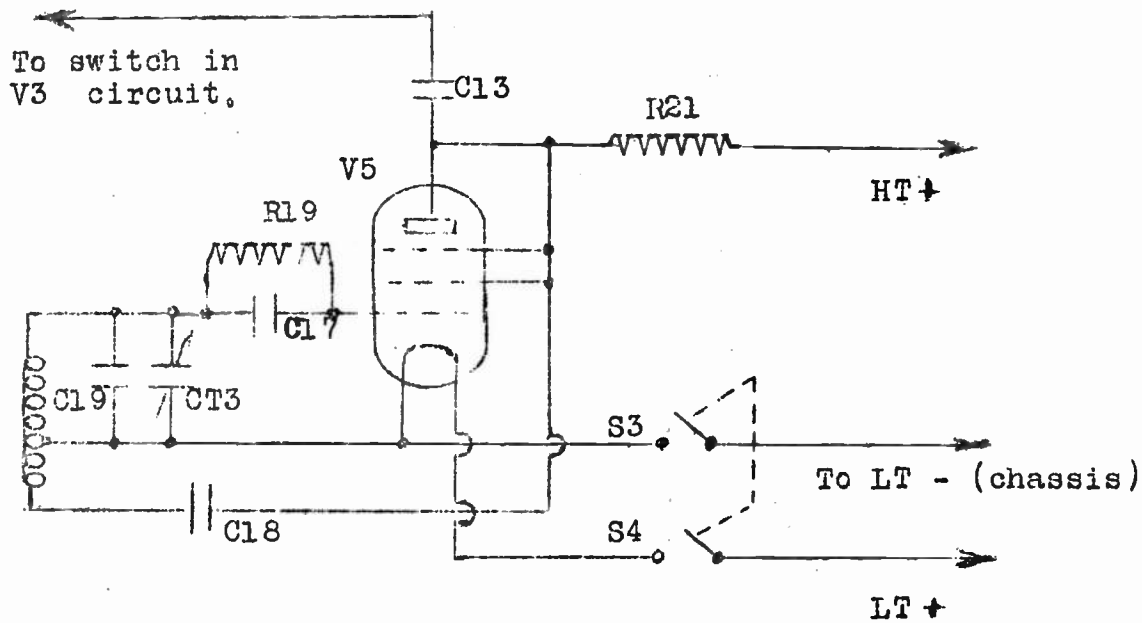
One great advantage that battery receivers have over equivalent mains operated gear is the relatively low inherent noise level. No reference need be made here to mains hum. A simple TRF circuit will always score over a superheterodyne in this respect since the noise generated in the average frequency changer is generally of a very high order, making it necessary to precede this stage with one or more stages of RF amplification. In the case of battery operated equipment the RF current drawn by the valves in any RF stages is bound to be considerable. In our case this has two important effects, (1) the cost of batteries and (2) the fact that the current may be so high as to disqualify the set from the classification of QRP.

It was with these things in view that, when it was decided to try to build a superhet for reception of the amateur bands, no RF stage was considered. There are several battery frequency changers that have a very low noise level and the Mazda TP25 was chosen mainly for this reason.

The heart of any receiver is, of course, the tuning coils, and the best should be used. One can always wind ones own coils, but in this case it was considered good policy to use a commercial coil pack with dust cored coils. The pack used was originally intended to cover the long, medium and short waves. The long wave coils were removed and replaced with coils to cover 80 and 160 metres. The original SW coils cover the 20 and 40 metre bands, and the medium wave band comes in useful when there is nothing doing on the HF bands, or when "Kush Binding" is required as a relaxation from Dx hunting. Ten metres and, perhaps, the higher frequencies should be well taken care of by suitable converters, but, in my own case, a O-V-1 is used for ten and I have not yet got anything for two etc.







B F O circuit for the SH 4

No trouble should be experienced in wiring up the frequency changer if a ready-made coil pack is used, modified as described. If the pack is to be built up, or home wound coils are to be used, it is necessary to take the usual precautions regarding short leads and it would be essential also to use a switch that is designed for use at high frequencies to prevent losses which would otherwise occur through using an inferior component.

The IF stage is biased from the same line as the FC. Also the AVC is fed along the same line. It should be noted that when the BFO is switched on the AVC is switched out while the fixed bias is not. This is rather important since overloading would result if AVC were still in operation. The AVC diode is used to inject the BFO voltage although it actually reaches the signal diode via the coupling condenser between the diodes. When being used for phone reception the fixed bias for the FC and IF stages also provides the AVC delay voltage. In this respect it is important to ensure that the correct connections are made to the signal and AVC diodes which, in most battery double-double-triodes, and certainly in the case of the HL23DD, are placed at opposite ends of the filament so that there is actually an inherent delay of nearly two volts due to the voltage drop across the filament. Hence, if the signal should inadvertently be taken to the AVC diode, there will be a delay on the signal which will preclude any chance of hearing weak stations which produce a signal of less than two volts after the IF stage.

It would have been quite possible to take the output direct from the anode of the triode section of the D.D.T since it was only required to use headphones, but another stage of triode amplification was found to be an asset and certainly does not just amplify a lot of noise since, as has already been explained, the signal to noise ratio is already very high. The extra stage makes

a weak Dx signal a lot more easy to read.

The tuning condenser is driven by means of a  $4\frac{1}{2}$ " drum drive and cord which, in conjunction with an epicyclic drive, gives a combined ratio of nearly 100:1. A large linear scale is used and the brackets which hold this and the carriage for the pointer were made from strips of mild steel and small pulley wheels purchased from a toyshop.

To obtain results from a receiver of this kind the initial alignment must be carried out with a signal generator although it is possible to get results by tuning in an air-born signal and then peaking it up with the trimmers. This is not a satisfactory method and is not to be encouraged. A set of this kind is capable of giving really excellent results with minimum running costs. A 120 volt HT battery lasts about seven months in my own case and it doesn't get spared either since the set is in use for long periods whenever possible.

The values of R17 and R18 should be experimented with to ensure that the grid bias is of such a value as to give a low value of HT current, consistent with good quality.

(EDITORIAL NOTE: For the sake of clarity in the diagrams, only one range of coils have been fully drawn, the other ranges being, of course, identical as regards wiring. The BFO circuit has been drawn as a separate unit since it is not a "working" circuit in the sense that it is not essential for the functioning of the set (other than on CW). Moreover it is not entirely necessary to use an additional valve for this purpose. A method of electronic injection from the demodulator D-D-E valve will be described in our next issue.

Any enquiries for further information on this set should be addressed to: E.J. Brooker, 77 The Cottages, Rosendale Road, Herne Hill, S.E.24, but PLEASE do enclose postage for reply.



COMPONENT VALUES:--

C1, 5: 50 pF. C2, 3, 4, 6, 7, 8, 15, 20: 0.1 uF. C9, 10, 17, 19: 100 uF.  
 C11: 0.005 uF. C12: 30 pF. C13: 5 pF. C14: 0.05 uF  
 C16: 50 uF, 12v working. C18: 140 pF. CT1, CT2: 0.0005 uF,  
 ganged. CT3: 75 pF, variable.  
 R1, 13, 20, 21: 50K. R2, 6: 60K. R3, 7: 10K. R4: 15K.  
 R5, 9, 10, 11, 12, 15, 16, 22: 1Meg. R8, 19: 100K. R14: 20K.  
 R17, 18: 200 ohms.  
 V1: TP25. V2, 5: VP25. V3: HL23DD. V4: HL23.  
 IFT: 465 Kc/s IF transformers.  
 S1, 2: On/Off switch, DPST. S3, 4, 5: BFO switch, TPDT.  
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SIDELINE HOBBIES.

One of the fascinating features of making so many new friends during the past year has been the insight I have gained into the hobbies that interest other folk. Naturally radio is the CHIEF hobby in each case, but as a "second string" I have noticed such diverse interests as (1) cycling (with O-V-1 attached to the carrier), (2) motor cycling (with YL attached to the carrier), (3) yachting (small sailing boat), (4) stamp collecting, (5) paper hanging (not QSL type), (6) football (supporters club), (7) you'd never guess -- bellringing!

Yes, that last one did make me sit up. The writer enquired "if we have any more campanologists among the Group". Have we, OMs? If your secondary hobby is at all unusual let us know about it in your next letter -- especially if it happens to be MODEL MAKING.

AUGUST PORTABLE CONTEST RESULTS.

I suppose August is about the worst possible time to choose for a radio contest from whatever angle you look at it. This year, in addition to the counter attractions of holidays and gardening, we had to contend with Wx and Condx. Even so we had six entries for our bit of portable fun. What was not so good was that three proved to be non-starters due in two cases to specially built new rigs refusing to "answer" and in the third to that old time nightmare, a mix up in the HT/LT leads. (Incidentally, the effect of that is not nearly so picturesque these days as it used to be with bright emitters!). The three stalwarts who sent in logs were, in the eventual order of merit, MICHAEL WASSSELL, BOB BROOKER and BOB MURRAY. Congratulations, Mike, and I hope it wasn't too long before you got dry again, OM?

Mike Wassell chose the 6th August for his effort and his site was an open field two miles NW of Ensworth in Gloucestershire, 300 feet above sea level, with very hilly country on all sides. He took a tent with him to make an all night session and actually sent in nine logs from which we selected Log No 5, covering 2300/2400 hours as the best. His antenna was a directional frame on a 10ft rotatable pole and what Mike has to say about putting your arm out of the tent in a downpour of torrential rain to rotate the beam is beyond the capabilities of my typewriter! The Rx was his own special SH4 with a line up of three VP23s and an HL23DD, running at 100v HT. As probably all of you have noticed in the past this rig is an outstanding Dx model and, at 100v HT, it was running at the astonishing consumption of only .585 watts. This goes to prove what I said earlier in this issue, that a SH CAN be truly QRP. We shall try to get Mike to give us a description of his rig very shortly. As to

his log, though it contained nothing outstanding, it was very creditable in the circumstances, consisting of CO2CE, CO8MP, LU1AA, LU5BN, NF2AA, VE2GO and VP4TE.

Bob Brooker went to Chelsham in Surrey on Sunday the 26th and he gives the compass bearing as 51 18' N, 0 02' W. The site was 800 feet above sea level and the weather was fine and sunny after rain. Conditions, however, were very bad and for most of the day there were no signals to be heard at all. During the afternoon some Gs filtered through and AP2N rose to S4 and faded again to zero within ten minutes. The aerial was a 130ft long wire, running NE/SE, and 50 feet up, supported by trees. The Rx was Bob's latest I-V-1, a most interesting rig which promises to be a worthy successor to his very popular O-V-1 recently described in these pages. The new set will be the feature of next month's issue, and it is unfortunate that condx did not allow him to show off it's paces in the contest. His log consisted of AP2n, EA6AR, FA3KC, 11NMC/MM, ZB2A.

Bob Murray also sent along a midnight log (2250/2350 hours!), collected in a tent on August 17th during an increasingly heavy rain storm. The temporary QTH was 600 feet up a hill which the map tersely refers to as O47615 whereas the more poetic locals know it as Beinn an Aorich Mhoir, near the village of Onich in the parish of Ballshulish, 12 miles from Fort William, in the county of Inverness-shire. The Rx, I regret, was not half so romantic, being an 18 set with 87 volts HT from two deaf aid batteries, the actual current consumption falling to .609 watts. The whole rig was carried in a small haversack and the aerial consisted of four yards of wire stretched from the tent pole to a tree branch. The log was EI6G, DL1YP, HB9BM, LA4PA, OZ4WJ, PAØIDW, ØIMK, ØNU.

Well, thanks for your efforts, OMs, and I'll promise to pick better weather next year. Seriously, though, where are all these other portables? The above is a pretty poor showing for OUR Group

which should bristle with portables and miniatures and the like. Funny enough nothing of this type has turned up as a Carter Shield entry yet either, which makes me wonder if it is not a case of lack of interest in the type rather than any other cause. It certainly isn't lack of enthusiasm in a general sense for we have an abundance of that. Perhaps it is simply that we don't like breaking away from fixed station working.

### RECOMMENDATION !

The O-V-1 from the Brooker stable, described in the March "Q R P" (No 7) is coming in for widespread praise. Last month we reported John Anderson's pleased comments on it, Now G.H. Tillett says he has been getting "very excellent results" from a recently constructed copy of it, and Ian Glenn is so enthusiastic about it that he has written to us twice and has posted on his thanks to Bob direct. Ian says that he is using Eddystone 706 coils to cover 10, 20, 40 and 160 metres.

Bob has continued experimental work on the set and finds that he gets very good loudspeaker results from it on TV sound, In fact it is so satisfactory that he is thinking of leaving it that way. Incidentally he is now using a pentode detector instead of the original triode. If anyone would like details of this modification we will endeavour to publish it in the near future.

Those who have had experience of Bob's handiwork will be particularly interested in the Brooker 1-V-1 which will be in next month's "Q R P". It really is quite out of the average in it's handling qualities and Bob himself thinks it is the best job he has ever done.

A SIMPLE OUTPUT METER, by Michael Waesell.

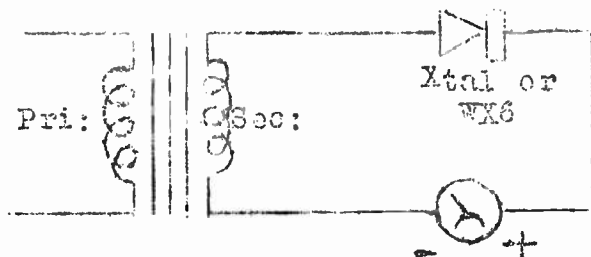
Most readers possess a low reading milliamperes meter. The usefulness of such an instrument can easily be increased by adapting it to read the output of a receiver. Checks can be made on the behaviour of the Rx and even small troubles like bad reception conditions can be watched if the meter is left permanently in position.

Such a conversion is cheap to make and does it's job as well as many of the more expensive instruments. The unit which I have been using for some time consists of a 0-1 mA meter, a carborundum crystal of the type that was so popular a few years ago, and a 1/1 ratio transformer of the old battery Rx pattern.

The output from the Rx under test is taken to the primary of the transformer so as to isolate the meter from the output valve anode voltage. The meter is in the secondary of the transformer and the crystal, in series with it, acts as a rectifier in the usual way, converting the speech currents which of course are alternating, into a steady DC that can be registered on the meter. Thus, when a station is tuned in, the meter will give a reading varying in proportion to the strength of the station.

A half wave Westector of the WX5 type will work as well as a crystal and may be more easy to obtain than the now almost obsolete carborundum crystal.

(ED:- It should be realised that the reading obtained, useful as it may be, will be purely comparative and cannot in any way be regarded as quantitative. Also, such a unit could not be used in the sense of an "S" meter owing to the probability of variation in Rx amplification. It's greatest value is, obviously, for Rx testing and aligning in conjunction with a signal generator.)



Circuit for the Output Meter.

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PERSONAL Q S O s.

The number of meetings between members during the recent holiday period demonstrates the very healthy spirit of comradeship which exists in our Group.

S.J. Erocker paid a visit to the "Q R P" den which he stoutly claims he enjoyed despite the fact that he spent most of the time entertaining the "very junior-ops" who promptly adopted him as "Uncle Bob"

Bob Murray came down from Fife and "had a wonderful time" with Ian Glenn at Coldingham, this being a renewal of an old friendship.

Ian Glenn, in turn, spent a week with GMSDDL and was on the air several times,

George Yale of Neasden put in two visits to G3 CHD during his holiday at Ramsgate.

Arthur Looney has visited G3DOK on a number of occasions and they have become firm friends, though Arthur is a little peeved that he can't get DOK to enthuse over anything much less than 150 watts.



"Q R P" C - Z PANEL.(The figures in brackets show  
calls verified by Q. S. La.)

	MEGACYCLES				TOTAL	
	3.5	7	14	33	C	Z
Bert Glass	14	19	137(27)	32(4)	140	37(14)
Bob Brooker	12(3)	12(1)	131(11)	54(16)	136(30)	33(17)
D. Gordon	12	15	62	34	110	31
F. Huntsman	18	22	97(4)	--	98(4)	33(2)
Peter Short	9	8	79(10)	--	79(10)	31(8)
F. Howridge	15	33	59	33	78(1)	28(1)
Miko Wassell	8	14	72	--	72	29
Bob Murray	5	16(3)	71(12)	--	72(14)	23(7)
H. G. Wells	--	--	68	--	68	22
Arthur Looney	--	--	60	--	60(16)	19(6)
David White	4	3	24	--	30	10
Ian Allan	4	4	25	--	29(1)	8(1)

NOTES AND NEWS, by R.J. Brooker.

(Ed:-- We have persuaded R.J.B. to expand his previous "Notes on Condx" to cover any news of interesting QSOs. Hence the change of heading. Please do note down anything which might be useful to Bob in his effort to maintain the interest and value of his contribution, and let him have any such gen direct to: 77 The Cottages, Rosendale Road, Herne Hill, S.E. 24.)

Although 10 metres has been showing signs of waking up we must not expect a lot from it this winter since, theoretically, we are at the period of minimum activity. Twenty has suffered many periods of short skip and complete fade-out punctuated with periods of extremely high Dx activity. The week preceeding Aug 20th was very good. The 19th produced much Eastern Dx (PK4, KX6 etc.) and then on the 20th came a complete black-out which continued until the 23rd when condx improved steadily until VK1RB, (Macquarie Is.), heralded a week of MKs and South Pacifics in the mornings, and Far Easterns in the afternoons, culminating in a riot of Dx on Sept 3rd (when yours truly wasted the day in a fruitless search for Zone 23). This was followed by another week of short skip and fade out, one high light being the extraordinary strength at times of the signals from VQ4RF and VP6SD with no other Dx at all and lots of Europeans and Ws.

Bert Glass managed to collect some nice new countries, one of which was C3MC. He mentions CS3AA, who is in the Azores, and says that QSLs should be sent to Box 406, c/o Postmaster, New York.

Arthur Looney had bad luck with the special O-V-1 for the Portable Contest and could not get it right in time, but, while trying out the rig, he heard ILLMC/MM, first in the Mediterranean and later, on the 22nd, in Cadiz. He also mentions that a S W N



report sent with his QSL card has produced very good returns "even from SP10M".

No one has mentioned VK1RB who made a brief appearance on phone on Aug 28th on 14 Mc/s. He was coming over between 0600 and 0700 GMT at R4, S4. The QTH is Macquarie Is. QSL via Box 2611W, GPO, Melbourne, Australia.

KX6BA is also active from the Marshall Is on phone and CW. QSL via Navy 3234, c/o FPO, San Francisco, California, USA.

Q R P Tx ACTIVITY.

G3FDW, Rayleigh, Essex, managed to overcome the months very erratic condx on a couple of occasions, in QSO with:--

G3AAQ,	Kidderminster	(130 miles)	, on	1.7 Mc/s,	input	1 watt.
PA07G,	Haarlem	{180 " }	, "	3.5 " , "	1 " :	
DL1ET,	Ramenlin	{370 " }	, "	3.5 " , "	0.5 " :	
ON4IE,	La Panne	{150 " }	, "	3.5 " , "	0.5 " :	
GM3ADR,	Dunfermline	{350 " }	, "	7 " , "	1 " :	
SM4APZ,	Karlstad	{750 " }	, "	7 " , "	2 " :	
HB9ET,	Geneva	{450 " }	, "	7 " , "	2 " :	

The rig used for the above was still the 6SH7 Clapp and 6AG7 PA, but Peter is now testing a new QRP rig with 6F50 Clapp, 6SH7 FD and 6AG7 PA using plug-in coils. He hopes to use this Tx in the RSGB QRP contest.

G3CND/P, working portable at the Sea Scout's camp at Basty, near Sandwich, Kent, reports CW contacts on 3510 Kc/s with:--

G5JP,	Hawkinge,	RST 329,	time	0700	on	29.8.50
DL6OV,	Nr Moers,	" 559,	"	0530	"	30.8.50
G3ARM,	Guildford,	" ---	"	2240	"	"

FAGDL,	Mr Utrecht,	RST 359,	time 0710	on	31.8.50
CSFDY,	Shoreham,	" 569,	" 1545	"	"
"	"	" 569,	" 1535	"	1.9.50
"	"	" 579,	" 1455	"	2.9.50
G3WA/A,	Letchworth,	" 359,	" 1530	"	"
G3EAG,	Reading,	" 569,	" 1605	"	"

The 2PDY contacts were not scheds! CIEDs rig was the one described in the April issue of "Q R P" with 1 watt input to both Tx and Rx (a GST, SH4) and the antenna was approx 555 ft long at an average height of 15 ft and bent amongst trees averaging 60/70 ft. George tried to keep a kite flying for his antenna but there was not enough wind. He has just completed a version of G3XTs O-V-2, described in Radio Constructor and finds results very fb with no band capacity and smooth reaction.

#### RAISING RECEPTION REPORT STANDARDS.

The quantity and the value of logs sent in during the past twelve months have increased so satisfactorily that there is no doubt that the time has arrived to set a higher standard for our Reception Reports. The following list of prefixes has been drawn up as a guide to what should be regarded, normally, as "poor" Dx on the popular 14 Mc/s band. It should be used with discretion as there are, of course, circumstances, such as /P, /MM and QRP Tx calls to which it will not apply. For instance an entry such as "IIABC (0.5 watt Tx)" or "ILXYZ/MM" will still command inclusion as valuable Dx.

Those of you who study the general logs published in contemporary "National" magazines will, I am sure, agree that some such "pruning" would not be out of place in many of the entries from

QRO Rxs. It seems that, once again, it has been left to the QRP Research Group to lead the way to more consistent "quality" in Dx logs. Therefore, as from our current August reports, all prefixes listed below will be deleted from 14 Mc/s logs unless some "special value" circumstance is mentioned against the call.

The list of NON-Dx calls is:--

CNB; CT1,2,3; DL; EA; EI; EK; F; FA; G; GC; GD; GI; GM; GW; HA; HB; I; LA; LB; LU; LX; LZ; MB9; MCl; MD1,2,3,5,6; MI3; MT2; OE; OH; OK; ON; OS; PA; PX; PY; SL; SM; SP; SV(Grecco); TA; TF; UAL,3,4,6; UB5; UC2; UO5; UP; UQ; UR; US; VEl,2,3,4,5; W1,2,3,4,8,9; YR; YT; ZU; ZA; ZBL,2; 4X4.

AUGUST RECEPTION REPORTS, 14 Mc/s.

INDEX TO OPERATORS:-

- "RB" :- R.J.Brooker, 3457, Home Hill, 1-V-1 (0.8 watt).
- "SB" :- S.Beharrell, 321, York, 1-V-2 (1.2 watts).
- "AG" :- A.E.Glass, 2597, Plymouth, O-V-1 (0.5 watt).
- "AL" :- A.D.H.Looney, 2959, Liverpool, 1-V-1.

TIME INDEX:-

- (1) 0001/0300, (2) 0301/0600, (3) 0601/0900, (4) 0901/1200,
- (5) 1201/1500, (6) 1501/1800, (7) 1801/2100, (8) 2101/2400.

- 1.8.50 (RB3): KH6FQ; ZL2FO. (SB8): VP6SO; ZD1SS.
- 2.8.50 (AG8): VP3MCB, 7NH; W5GMB; ZL4JA. (AL3): ZD1SS.
- 3.8.50 (AG7): KH6ES; PK1HX, 4VD; UA9KCA, ØXB; W4AWS.
- 4.8.50 (AG5): VK2AMB, 5FL; W6TT, 6TZD, 6UDX, 6YAW; XELAC; ZL3OX
- (AL3): VP6SD.
- 5.8.50 (AG3): KH6LG; TI3OH; VK3UX; W6EEM, 6LMD, 6SYG, 6YO, 6YX.
- 6.8.50 (SB8): TI2RC

3.8.50 (AL8): VQ4SC. (SB8): VP4TH.  
12.8.50 (SB8): VP6SD.  
13.8.50 (RB6): HY7Q (?phoney); VK3RW; VS6AC.  
(AL8): VP4TH. (SB8): OX3BD; VP4TH.  
14.8.50 (RB7): VS2BS.  
15.8.50 (RB6): SULMR; ZS3C. (SB8): CX2CC; VP6SD.  
18.8.50 (SB8): VQ5GM; YO7WL.  
19.8.50 (AG3): CO2IB; FF8JR; VE7HC; W7JYZ, ØNUC.  
20.8.50 (AG3): VE7AX; W6CEA, 6PFD, 6NKW. (RB5): AP2N; I1MMC/LM.  
(AG8): CE3AG; CS3AA; VQ4BB. (SB8): SULMR.  
21.8.50 (AG3): KH6ES, 6IJ; ZL2BJ. (AG8): FKS8AD; VP8AP.  
22.8.50 (AG7): C5MC; UL7AB; W6EUM; ZS5IO, 5KA, 6AN.  
(AL8): CX1CG; I1MMC/MM. (SB8): HZ1KE; VP4TH, 6SD; Y03GH.  
23.8.50 (RB6): KX6BA; ZS3X.  
24.8.50 (AL8): SVØWZ.  
25.8.50 (ALL): CE2CC.  
26.8.50 (AL8): VE3MD.  
27.8.50 (RB4): KL7GG; UM2KAA. (SB8): ZD2FAB.  
28.8.50 (RB3): VK1RE.  
29.8.50 (RB5): OX3RG; UL7AB.  
30.8.50 (AL8): VP6SD. (SB8): VP6CDI.  
31.8.50 (AL8): HP1LA; KP4EE.

AUGUST RECEPTION REPORTS, 1.7 Mc/s.

P. Huntsman, 1266, Hexham-on-Tyne, O-V-2:--

Phone: G2ABK, 3BTJ, 3DTR, 3ECW, 3FEW, 3FGI, 3GT, 3ZV, 4JA;

GMEUSD; GWRBG,

GW; G2JF, 5DKI, 3GQV, 4AU, 5SK.

MODULATION SYSTEMS, PART 2, by GW2DDX.

PLATE MODULATION :--

In order to obtain 100 % modulation the voltage at the plate of the modulated stage must vary from twice the amount of the DC supply voltage to zero. The peak power output of the transmitter is, as we saw last month, four times the carrier output. The average output, under conditions of 100 % modulation, is equal to 150 % of the unmodulated carrier output and the added 50 % must be supplied by the modulator.

This magazine is devoted to QRP, so we will discuss a transmitter that is low power. The above conditions, of course, still hold. Our power amplifier takes, shall we say, 5 watts. The audio requirement for full modulation is half this figure -- 2.5 watts. For such low power Plate Modulation is practically a necessity.

Most 2 volt battery pentodes are rated at .5 of a watt output. One or two give as much as one watt. This is, of course, operating the valve under class "A" conditions which, you will remember, is where the current taken by the valve is constant. Even so, with such low power output, the drain on the battery supply is terrific!

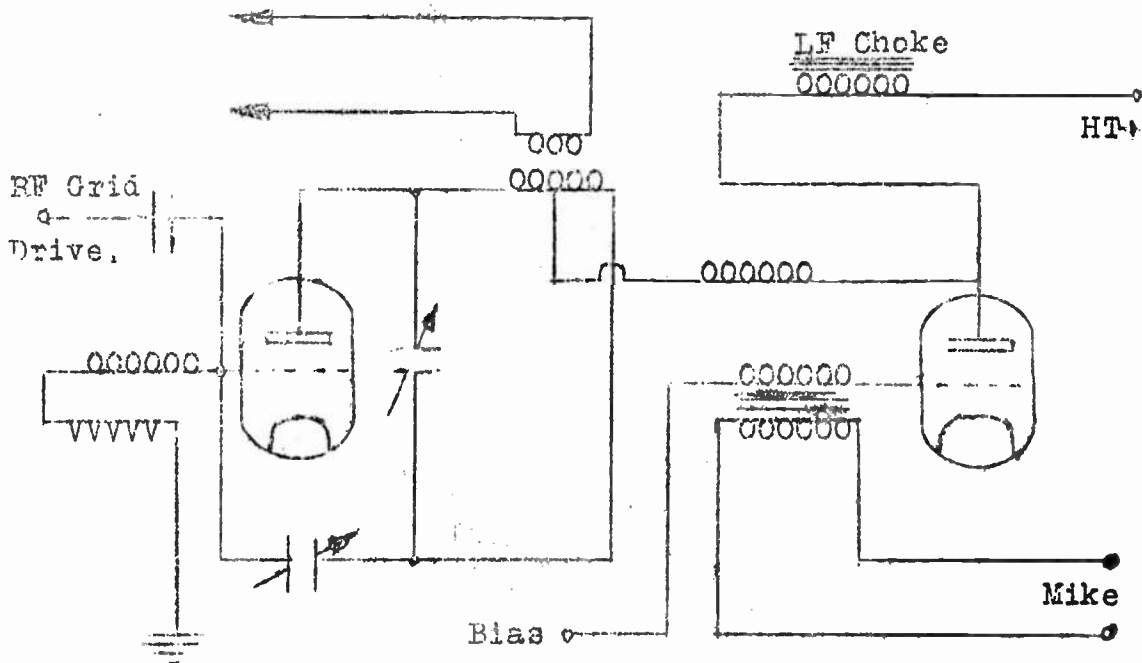
How, then, can we obtain our two watts?

The answer is to operate the valve or valves under class "B" conditions. This is where the standing current (that is, with no signal applied to the grids) is in the order of a few mills, say 4 mA, kicking up on signal input to, say, 18 - 20 mA.

The peak output of such a system is in the region of two or 2½ watts of audio. Using this method, not only can we obtain our 2 watts required to modulate, but we can get it much more economically because, until the mike is spoken into, the valve consumption is reasonably low. In passing it must be stated that, at the

FIG 1.  
 BASIC CIRCUIT FOR  
 CONSTANT CURRENT, CHOKE, or HEISING  
 MODULATION

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peak of signal, this current rises to a high value, so the supply source, should it be a HT battery, must be of the heavy duty type to give long life. We can now 100 % modulate our 5 watt input.

It is advisable to run the filaments of the modulator from a separate LT battery, and it is advisable that the HT supply should be separate as well. both in the interests of stability and economy. This station uses this modulation system on the 160 metre Tx, Fig 1 gives the circuit of the modulator.

It may be mentioned that, running the PA stage at 2 watts input, it is quite easy to overmodulate, causing the carrier to split and resulting in distortion. Should the Tx be MC - PA, frequency modulation is also likely to take place. So remember, if the PA is run under the 5 watts, turn down the audio. A check from a local station on an oscilloscope will soon give the correct position to adjust the modulator.

From the quality point class "B" is not so pleasing to listen to as class "A". When operating on pure DC supply, however, the class "B" system will give quite good quality and certainly good speech quality.

Next month we will consider Suppressor Grid Modulation and follow up with a discussion of Cathode Bias Modulation and a practical QRP Tx using this system.

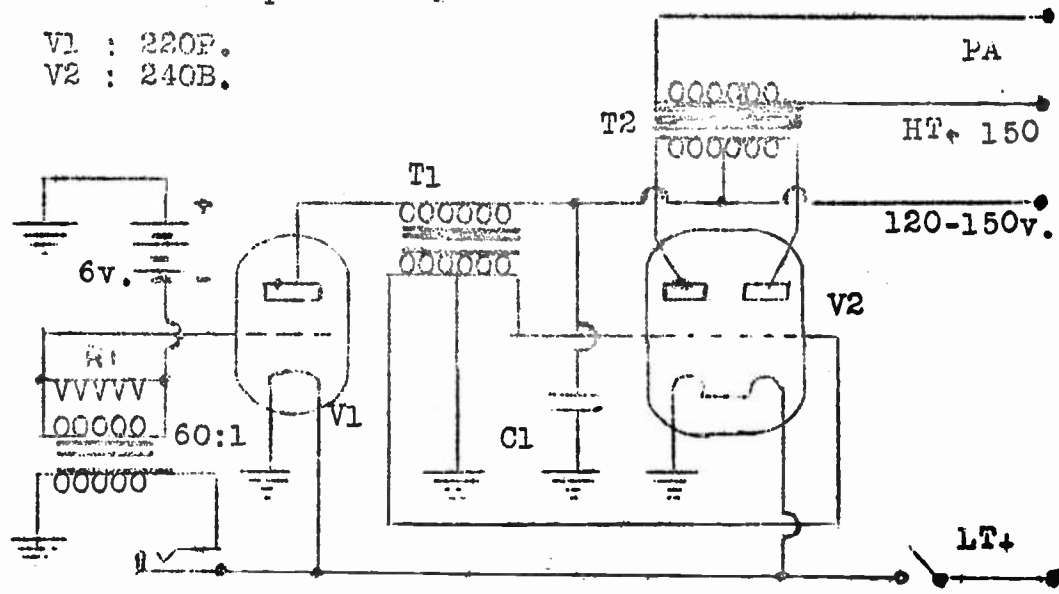
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Gen for next month's issue must be in hand by October 17th and a special effort is required from all of you to make it a notable one as copies of it will be available on the ISWL stand at the RSGB Exhibition in November.

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C1 : 2 uF. R1 : 5 K,  $\frac{1}{2}$ watt. Load presented to modulator : 5 K,  
 PA : 4,5 watts M : Carbon type mike,  
 T1 : Class "B" input transformer,  
 T2 : " " output "

V1 : 220P.  
 V2 : 240B.



Primary, T2 : 10 K, plate to plate.  
 Secondary, T2 : 300 ohms DC resistance.

TWO WATT AMPLIFIER.