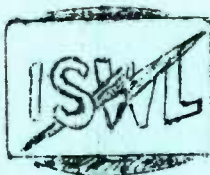


OFFICIAL REPORTS
OF THE



Q R P
RESEARCH GROUP

ISSUE 8 FOR
APR 1950

EDITED BY: J. Whitehead,
6, Abbot's Tilt, Hersham,
Walton-on-Thames, Surrey.

DEDICATED TO THE
ADVANCEMENT
OF LOW POWER RADIO.

QRP

STATION G3CED.

In my editorial I included a word of thanks to George Partridge, G3CED, for providing us with the gen for this, our first description of a complete transmitting and receiving station. My only regret is that we are not able yet to publish photographs and thereby do justice to his very attractive layout which is housed, in it's entirety, within an oak cabinet measuring only 15" x 7" x 7"

Whether the ex-services receivers which he uses qualify as QRP rigs is open to grave doubt and I have not the necessary data at hand to check the point. But there is no shadow of doubt whatever as to the QRP qualifications of the home constructed Tx which, to quote but one example of it's outstanding ability, recently provided George with a solid CW QSO with OHLNI at an input of only .46 watt. Well, that isn't QRP -- it's QRPP!

The Tx circuit diagram, Fig 1, shows it to consist of a pentode CO modulated by a triode. Perhaps the major point of interest here is the use of the 5:1 ratio transformer (an old battery Rx type), T2, in the PA anode circuit. This method, suggested by G3XT in the March 1949 Radio Constructor, achieves the necessary voltage drop to the CO by the resistance of it's secondary. At the same time it counteracts loss of modulation depth, which might be caused by the low power involved, by it's step up effect. G3CED has found that it does, infact, provide close on 100% modulation using, as he does, a No 4a ex-army carbon mike through the matching transformer, T1.

A recently added refinement is the DPDT switch, S2, which shorts the modulation transformer at the same time as it opens the V2 filament line, and vice versa, thus preventing any possible chirp on CW and loss of HT.

For the rest, the Tx, the chassis of which is built in two sections, bolted together and painted grey to match the existing Rx

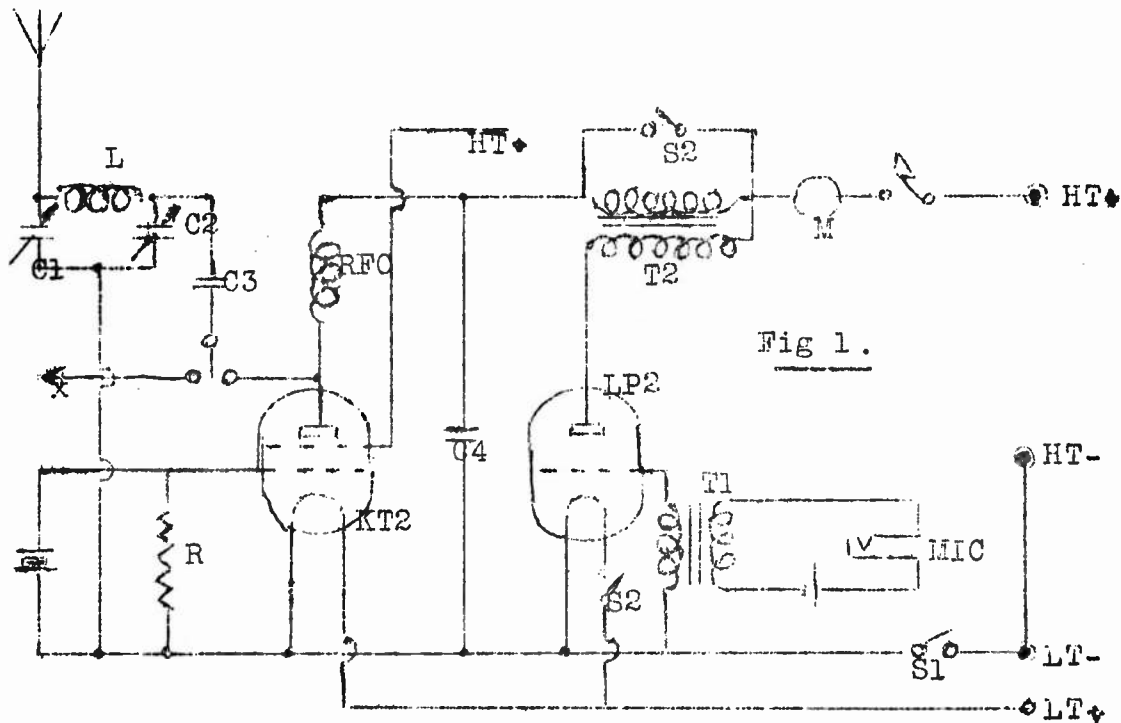
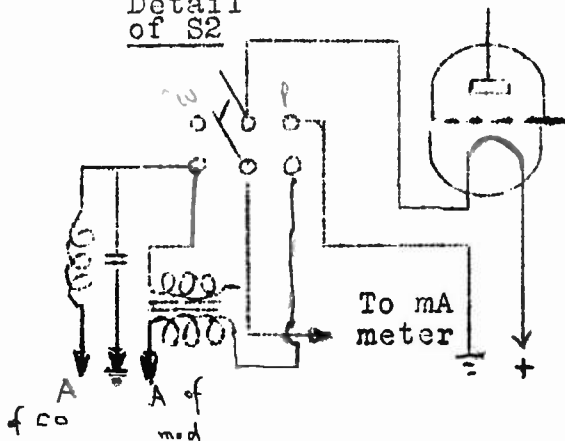


Fig 1.

Detail of S2



- C1, C2: 150/250 pF R: 50 K
 C3: .002 μ F RFC: 2.5 mH
 C4: .001 μ F M: 0/50 mA m

Values of L.

- 80 M: 30 turns 26 swg.
 40 M: 17 turns 24 swg.
 20 M: 9 turns 18 swg.
 all on 1 $\frac{1}{4}$ " diam., $\frac{5}{8}$ " long.

Lead "x" goes to grid of 1st. RF valve in use.

101.

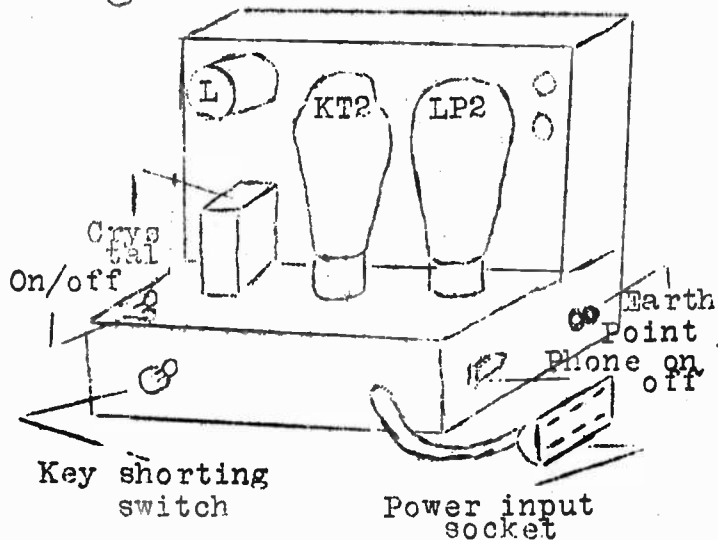
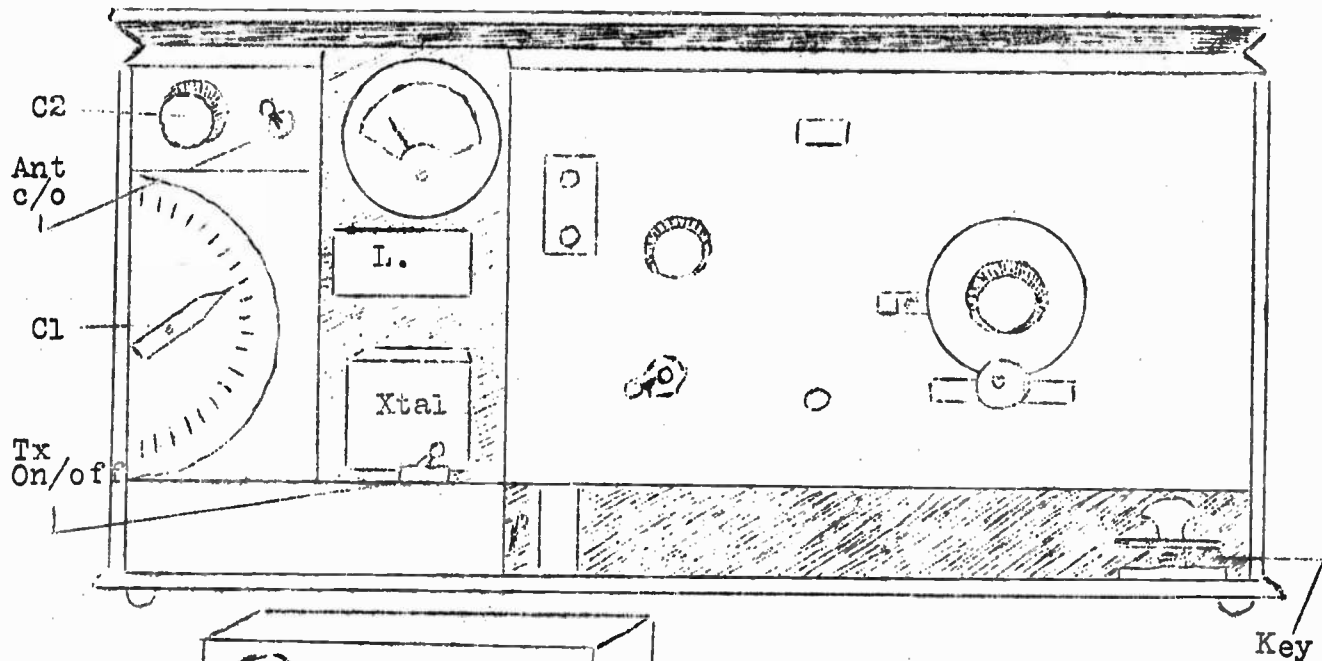
unit, is simply enough to follow from the very comprehensive sketches which George has supplied. Any lack of draughtsmanship in these illustrations must be blamed on my poor attempt at transcribing them to the wax duplicating stencils. The originals are quite a work of art. I hope, however, that the results will be sufficiently clear to give some idea of the compact and carefully considered layout.

Regarding the Rx section (quite apart from any discussion of the QRP values involved) there are two points that are worth the attention of everyone who desires high reception efficiency.

The first is that George, who at present works on three bands, uses three separate and interchangeable receivers, each peaked to its maximum efficiency for one particular band. The receivers in use are a No 18, a 68T and a 68P, and, whichever one is in use at any time, it is slipped into the main cabinet through the back of which it is locked in position with a bolt and wing nut. In that position the panel is recessed $1\frac{1}{2}$ " below the cabinet front and all necessary connections are made via a four pin plug (ex-valve base and socket). There is no doubt at all that this is the ideal reception technique and that such high specialization of receivers does enable a great increase in efficiency even at these relatively low frequencies. It is a scheme which, given the necessary depth of purse, should be adopted much more than it is.

The second point of interest is that, whichever Rx is operating, it benefits by the use of the PI section tuner of the Tx when the latter is switched to receive. In other words the antenna is always correctly matched. As I have stressed more than once in the Practical Aerials series, this is a point which is really essential if more than "mediocre" results are expected.

Finally, the antenna and earth connections are brought out at the rear of the cabinet, and the power, fed through a 6-pin Jones socket is obtained alternatively from batteries or from an ex-service 58 set vibrator which gives an output of 1.5 v LT and



The sketch above shows the complete assembly with hinged cabinet lid part open, Tx on the left and Rx on the right.

Sketch at left below shows Tx removed from cabinet

Space below Rx will house phones etc.

90/180 v HT at 35 mA.

It is planned to use a light sectional dural mast for /P work during the summer months when it is hoped to carry out a number of antenna experiments. To this end any antenna suggestions would be welcomed.

Latest QSOs (14.3.50) on 80 metres, using the vibrator to give 180 v HT, and thus raising the input to 1.5 watts ("nearly QRO", says George!) are:

G2BYI, Peterborough, RST: 599.

DL7CG, Berlin, RST: 569.

DL1FY, ? RST: 579.

the last in heavy QRM.

Tx TOPICS.

A. R. Knight (G2HKQ), Poole, being deprived of mains, makes unusually full use of batteries for, not only does he run a O-V-1, but also an RL155. He says that, with an HT voltage of 120 he finds the signal/noise ratio very satisfactory. But what a drain on the batteries! The Tx at HKQ is a 6J5 CO into a 6L6 PA, plate modulated by a 6J5 driving a 6V6, and inputs vary from 2 to 9 watts. Let's have the full gen on that rig, OM -- and on the O-V-1. HKQ is active on 7 and 14 Mc/s, phone. Have a go, chaps, and let's have your reports.

Ron Finch (G3FJW), Ilford, is nearing completion of a new Tx for 14 Mc/s -- an EF50 (ECO) on 7 Mc/s into a PP doubler using KT33Cs. FJW may be testing any time now, so listen out, OMs, and give him a welcome. Ron has also recently completed a mains O-V-1 which will be appearing shortly as a feature in these pages. In designing it he has paid more than usual attention to "safety" measures which makes it an unusual and interesting rig.

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A. R. Painter (G3BPF), Ludlow, is another battery Tx operator who, having been QRT for some time hopes to be on the air again very soon.

J. Allnutt (G4QW), Merton Park, who's station is particularly well provided with wavemeters, signal generators and measuring equipment, is anxious to arrange scheds with other QRP transmitters and will gladly send reports to any QRP member desiring to make use of his very fb offer. Thanks, OM, I hope many others will follow your lead. That is the sort of spirit we want to encourage.

SCHEDULES.

Will ALL Tx members please let us have lists of frequencies and approximate times at which they are normally on the air. The publication of such a list in these columns, while it will no doubt assist other interested Tx members, is essentially for the benefit of our Rx readers who have for many months been expressing their keenness to listen for QRP transmissions.

A VERSATILE EARTH.

From G.H.M. Yule comes a suggestion which might be usefully adapted in many a "shack". The original rig was fairly easy to erect since G.H.M.Y. is one of the lucky ones who really does possess a shack -- an all wood one measuring 8'3" x 5' inside. Across the width of it he has fitted a $\frac{1}{4}$ " diameter copper rod, at the back of and level with the bench top. From both ends of this

heavy gauge wires run down to a pair of well buried copper plates, 3/16" thick by 1ft square. Thus he can make an excellent earth connection by merely fixing one crocodile clip at any position on the bench. Now I'm not suggesting that anyone should drive a couple of holes through the dining-room floor, but the copper earth bar along the back of the bench is well worth serious consideration and, incidentally, would look very effective if kept properly polished as it should be for earthing purposes.

QRP C - Z PANEL.

Is anyone else interested in a countries heard (C) and zones heard (Z) panel? E.A.Herridge has started it off this month with the score shown below. I know that the accent in our Group is mainly on construction, but here's the panel if you want it and there is a fine framed Certificate of Merit (presented by our Group President, Bill Overland, G2ATV) waiting for the winner at the end of the year.

	3.5	7	14	28	Total	Total.
	Mc/s.	Mc/s.	Mc/s.	Mc/s.	C	Z
E.A.Herridge (Balham):	12C	33C	29C	12C	50C	16Z

This panel shows the countries heard on the various frequencies shown, followed by the C total, the final entry being the total of zones heard. Come on now, don't let E.A.H. have it all his own way! Send us in your totals for this year so far and then keep your scores adjusted month by month. It's easy to follow as there are no points to worry about -- and it's exclusively QRP.

ACTIVITY.

Ron Turner (2985), Brierly Hill, has now completed his wave-meter and has promised to send us the gen as soon as he has thoroughly checked it over and verified calibration. Referring to G.H.M. Yule's Rig (Jan issue) he points out that as a substitute for low impedance phones which require a matching transformer he has used a standard bell transformer with marked success, finding that the higher ratio did in fact give an improved performance.

J.P. Lamant (3214), B.A.O.R. 4, is hankering after a very small portable Rx. These "vest pocket" modles are certainly raising a lot of interest lately. Let's know how you get on, OM.

D.R. Hutchings (1834), Birmingham 14, asks pardon for letting his attention wander to TV lately. Now I know nothing at all about TV but I am prepared to express the opinion that QRP interest will long outlive the novelty of TV construction and that the few who break away will come back to QRP work with renewed zest. Incidentally Laurence asks how many copies of "Q R P" go out each month. It will be over 100 this month, OM -- and by way of comparison, we sent out 18 of issue one!

Bob Murray (3038), Perthshire, has just completed a O-V-1, using a KF35 and a KL35. He expects to have some results for us next month. I hope the 'flu is OK again by now, Bob.

J.A.P. Garner (98), Peterborough, has been suffering from a severe attack of that repugnant disease, "Overtime", lately. His radio activity has naturally suffered, but he hopes to be "convalescent" after Easter. He certainly has not forgotten the Group however as witness his grand offer in Gear-Change this month.

Ian Glen (3036), Berwickshire, has become more than ever convinced that "there's something in this QRP". He was having a snoop round 20 the other day on an RL155 and could find nothing but a load of QRM. Then he tried out the O-V-1 (still on 20) and within a few minutes had logged two VKs, three Ws and a VE. Well -- it just shows!

THE EAST BRIGHTON GROUP, IS'7L, are threatening to make an intensive effort to add the Carter Shield to the decorations of their club room. For a newly organised Group, Brighton is showing most excellent progress and is full of ideas and enthusiasm. They are not, of course, exclusively QRP, but a number of their members are very keen on low power development and we are looking forward to regular and valuable reports from their most energetic Secretary, W. Jardine (2428).

Ray Griggs (3387), Margate, is busy on an all-dry O-V-1 using 1C5GT valves. We shall be having more to say about this rig as soon as air tests are complete. From the details and diagrams which we have already received it looks a really neat and workman-like little job. Keep us in touch with developments, Ray.

A.D.H. Looney (2959), Liverpool, has been having a pretty bad time in bed with quinsy. But before he staggered off upstairs he tucked the QRP rig under his arm and collared a bit of wire to sling round the bedroom wall. The results are occupying top place in this month's logs -- not so much for their Dx value as for the grand spirit shown in collecting them. Very glad indeed to see you're about again, Arthur -- I know what a miserable thing that is.

Peter Short, B.A.O.R. 15, has a number of very useful suggestions to make this month and they will all receive due attention. Thanks for your interest, OM. He had the misfortune to have the rig go dead on the 20th but sends in his log for the first part of the month. Incidentally, Peter, when making up your log try and record the dates and times (approx) -- it makes it more useful as a comparison.

Bob Brooker (3457), Herne Hill, has achieved such an interesting letter this month that I am quoting parts of it verbatim,
(Page 108).

GEAR - CHANGE.

FREE and POST FREE to the first Research Group applicant who's letter reaches J.A.R.Garner, 81 St Paul's Rd, Peterborough, Northants;-- One set Eddystone 6-pin coils as follows: 6BB (1), 6LB (2), 6Y (1), 6R (2), 6W (2), 6P (2), giving complete coverage from 33,3 Mc/s to 924 Kc/s. Also several other useful miscellaneous items. J.A.R.G offers to help any member, so far as he can, with components.

WANTED: One FL8 audio filter, sound but reasonable price. Offers to Box 193, c/o "Q R P".

A HORSE PRACTICE OSCILLATOR, by F.A.Herridge.

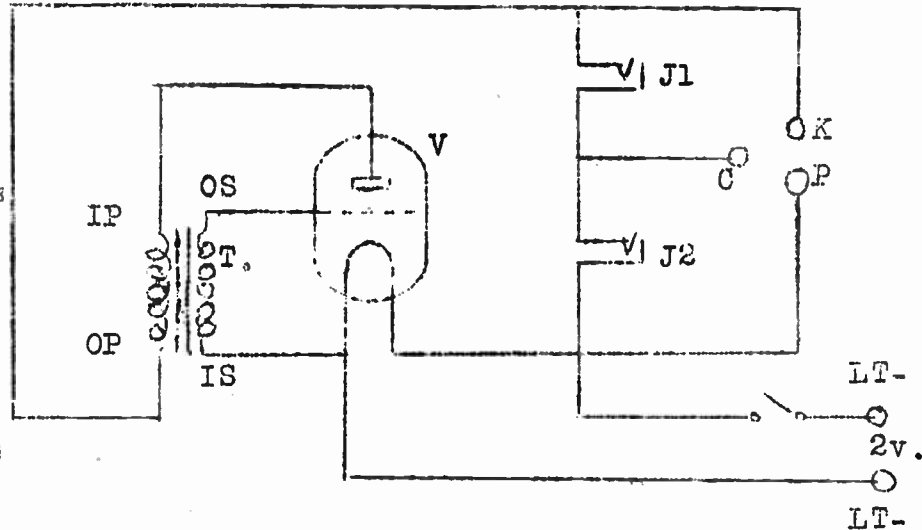
This 2 volt duplex CW practice oscillator is notable for two features. One, that it utilises a 2 volt accumulator for both LT and HT; and, second, that it enables duplex operation to be worked, thus allowing the second operator to work from a remote position, avoiding confusing key thumps and allowing the receiving operator to repeat back without the necessity of the two operators changing places.

The leads connecting the two positions can conveniently be of double screened cable, using the screening as one lead.

It may be necessary to try several valves before a suitable one, giving the needed oscillations of the required frequency, is found. The original model uses an old Mullard PM1 and it would appear that older valves work better in this application than new ones. It is possible to adjust the note by wiring a condenser across OP and IP.

At the remote end of the line a second pair of phones is wired across pins C and P and another key across pins C and K. This set-up enables each operator to hear his own sending and allows for "break in" working.

T, 3½:1 AT trans
 V, 2v triode
 J1, Key jack
 J2, Phones jack
 CKP, miniature
 3-pin socket
 (C, common pin;
 K, key pin;
 P, phones pin.)



NOTES ON COMDX, by Bob Brooker.

I mentioned last month that 20 metres seemed to be waking up. It certainly has done so and no mistake. The strange thing is that 10 metres is just as good as ever although I can't spend all the time I should like to on that band since it is only open by day, as a rule, while 20 is, of course, open all night.

One event of interest on 20 was on the 13th March, when, during early evening the band was packed to capacity with VKs at S9, almost to the exclusion of everyone else. I've only entered three in my log because to have put them all down would have taken up far too much room, as is also the case with those Ws.

I was also very pleased to hear the KL7s coming in, which not only gave me a new country but a new zone as well.

RESEARCH GROUP JUNK BOX.

What have you got in YOUR junk box, OM? If there is anything in it that you have no immediate use for, or would not mind parting with as a sale or an exchange, would you list it with as much data as you can, and send your list to: GEORGE PARTRIDGE, G3CED, 17 ETHEL ROAD, BROADSTAIRS. George has volunteered to run a communal junk box for us and will file all the lists sent in so that any member wanting any parts need only write to him and, if the "bits" required are on the lists, George will forward the request to the proper quarter. Lists of available junk will appear regularly in "Q R P" and the idea should develop into a unique and most useful service. But first George wants your lists, OMs, so will you get down to it over the weekend?

Oh, and PLEASE don't forget when you write to ask for a part, to send along a stamp or s.a.e. for reply or for forwarding on your request. You know, when a fellow volunteers to do a job for YOUR benefit, it's hardly fair to make HIM pay for it!

D X HEARD.

PETER SHORT (DL2/5468), BAOR 15, 0-V-1 (.13 watts), 14 Mc/s:
 AR8BO; CN8BV, EO, ET, MZ; OQ2CQ; CR5UP; CX2CO; EKLAB, HB, SA; FA3JY,
 KC, 8JO, 9KI, WU; HZ1KE; OHLNK, 2QM, RU, ST, TT, VN, VU, WO, 6NS;
 OK1MB; PY6CO, 7VA; SB5SG; SVQAG, AJ, WY; UA3AF, AM; VQ2WP; VS7SV;
 ZL2AFU, JB, ZB, 3MA; ZS1GG; 3V8AJ, 4X4BL, CO.
 (The above are from Feb 1st to Feb 20th inclusive)

S. B. FARRELL (321), York, 1-V-2 (1.2 watts), 14 Mc/s phone:-

15.2.50 (2220/2229): CX2CO; CELOR; PY1IA,
 16.2.50 (1913/2248): EA4BG; 4X4AV; OX3BD; CO2BS; YV5AY; VE1BF
 18.2.50 (2310/0026): TI2OA; W8JXY, LRJ, KBL, RHP, 91BA, 0F0G, (MCO;
 VE2CA, 3JU, 1HL, 1KF; VP3MCB; CR5UP (good sig).
 19.2.50 (1838/2145): EA2CA, 5AE, 4CK; FA3FB; AK2CO, HS, LD (very
 good sigs from these AKs)
 20.2.50 to 24.2.50: Band closed -- high sun spot activity
 25.2.50 (1940/2255): AK2AZ, CO; VQ4SC; ZC6JM; ZBLAK, SS; PY1EH;
 W8RHP; CO8MP.
 28.2.50 (2235/2318): TA3FAS; HP1FG; KP4JA; PY1JK; W4BYY, 8BF; LU3BH.
 1.3.50 (2220/2240): YV5AY; 4X4AD (poor Dx)
 3.3.50 (2225/2255): HP1FG; LD7WE; ZBLSS; CO8MP; TA3FAS (a good R9).
 4.3.50 (1900/2220): ZC6JM; PY6CO, 2CK, 4CL
 5.3.50 (2215/2254): CO8MP; VE2LH, CA; PY5CT 2CK; LU1OD.
 6.3.50 (2055/2240): YO3RZ; 4X4ad; SV5UM (poor Dx).
 9.3.50 (2225/2255): CO8MP; VP9F; W8HUP; PY2BF; ZBLBA.
 12.3.50 (2214/2245): ZD1SS; CO8MP; PY5DH; KP4AZ; CO7AA.
 15.3.50 (2240/2249): EK1MD; PY1FG, 5GH; W8RLT (and plenty of W1, 2,
 3 and 4 but no real Dx).

A. D. H. LOONEY (2959), Liverpool, 0-V-1 (1.06 watts), 14 Mc/s:

Antenna: external Di-pole:-

26.2.50: CR5UP; KP4AZ.

27.2.50: LA8MA; SM4HI; OZ5BW; MB9BB; UA1BE.

28.2.50: SM7QK; CR5UP.

5.3.50: VE2E; LU1OD.

Antenna: 15ft of wire draped round the bedroom wall:-

6.3.50: FA9WV, DX1WV

7.3.50: CX1BC; DL4DI; HB9IQ; ILFRR (this station announced as
 experimental and requesting a QSO London area as an English-
 man wished to contact his home to find out how his daughter
 was as he had just heard she was very ill; G4LS answered,
 phoned his home and gave him the news he wanted, A vy fb

111.

piece of work for a few minutes QSO).

8.3.50: HB9HH; OZ3PO, 7EH, 5RS.

9.3.50: LX1DC, 1BR; HB9BJ; OZ2LP; LA3CB.

Antenna: the di-pole again.

10.3.50: OX6NF (50 watts); PY5DH.

11.3.50: LU4BH; CN8EX

12.3.50 (0001): CE3AJ.

{0015/0025}: HH3DL with GW5DH in bad QRM.

{0030/0050}: VP3MCB (Mackenzie City, British Guiana, 100% QSO with G2TMT, No QRM).

13.3.50 (0630): OK2SO, 1HI; SM5AI; SP1KM.

19.3.50 (0100): VP4TB (very bad QRM owing to competition).

BOB BROOKER (3457), Herne Hill, O-V-1 (.53 watts), 28Mc/s:-

18.2.50 (1030/1825): CN8EW; MD2MD; SV0VL; TA3GVU; VE4LC; VK6DD;

W1TQX, 2JDA, 3DHM, 4QBL, 5LJI, 6ICG, 7IEY,

8HG, 9ITW, 0HPY.

19.2.50 (1607/1708): W1JCX; 2BXA, 3OJY, 4FT, 5ASG, 6ITY, 7TJ, 8HUD,

9QWJ, 0VSK.

25.2.50 (1045/1115): UB8BV; VS9AH.

26.2.50 (1316/1700): CO2JL; HC1KX, OY; KP4AJ; W5KCL, 6AOR, VJH.

4.3.50 (1125/1154): CN8BA; HA7XZ (C7); MP4BAO; VS7PW.

5.3.50 (1158/1630): CO2H; SV5UN; VP6SD.

11.3.50 (1200/1405): KG6GU; KR6AD; KZ5PC; MD2AC; SV0VB; TA3GVU;

W5OYH; 4X4CZ.

12.3.50 (1020/1331): CN8AJ; EK1BC; KP4BY; MP4BAB; PY7QD; ST2KR;

SV5UN; VP5FR, 6SD.

(1825/1852): VE6EL, VE; W6WSX, 7KJX, KSA.

13.3.50 (1815/1830): VE5LY, 7AAD, UN.

BOB BROOKER, SH4 (1.2 watts), 14 Mc/s:-

18.2.50 (1901/2020): AK2CO, HH; CN8EO; CT1UY; PY6CO.

19.2.50 {0745/0825}: VE8MI; F11LC

{2006/2205}: VO1DX; W3LTU

20.2.50 (0750/----): VK2ATW.
 22.2.50 (0740/----): EK1DI.
 (1630/2040): EA4CK, PG; MD7WE; OE5YL; PY6CO; ZC6JM.
 25.2.50 (1815/1915): EA7CR; VQ4SC; YV5AY
 26.2.50 (0855/1615): IS1AW; MB6BM; MF2AA; OE5KM; YN4CB.
 (1955/2210): CO8MB; YO3RZ
 27.2.50 (0740/----): YN4CB
 (2208/----): FA3DF.
 28.2.50 (0750/----): VK4WG
 1.3.50 (0745/0800): PY2JU; VK3HF
 (1900/2310): CE3CZ; CN8EO; W5QS; YO7WL
 2.3.50 (0030/----): W0FEY
 (0745/----): ZL3JD
 (2225/----): CO8MP
 3.3.50 (0745/0755): EA9AI; MF2AA; OE7FA
 4.3.50 (0810/----): VK5RM
 (1642/2145): CT2AE; FA3PX, 9VD; PY2CK, 6CO; UQ2AB; VK3AUP,
 MM; VP9HH; 3V8AI.
 12.3.50 (0040/0930): CT1PK; MB9BL; SP5AB; VE8MI; VP3MCB; W6FTU
 (1925/2250): CO8NT; LULOD; TI2OH; VP9F
 13.3.50 (0730/0750): KL7UM; UA3CK (CW); VK2NO.
 (1950/2245): VK2XG, 4WJ, XD; VP9KK; ZC6JM
 14.3.50 (0750/0752): KL7YY, UM: ZL3JD
 15.3.50 (0015/----): HK1DZ
 (0745/----): XE1AC
 (1820/----): OX3BF.

::
 OP-AID will be back from the printers shortly. Have you placed your
 order yet? (1/4 post free through "Q R P").
 ::

No. 8.

Q. R. P.

April 1950.

EDITORIAL

This month has been most encouraging. Tx operators have responded with enthusiasm to the extension of the newly formed Research Group to cover all aspects of QRP interest, and I take this opportunity of thanking all those who have come forward so promptly. Special thanks are due to G3CED for his most interesting station description, featured in this number, and also to G2HKQ who has put forward what seems to me to be a most brilliant suggestion.

2HKQ says, "...if all QRP transmitters would call 'CQRP' instead of the normal 'CQ' it would identify them to each other and Rx operators could report on their fellow member's signals."

The merit of this idea is so obvious that comment from me is unnecessary, but I would like to know the reactions of other Tx readers. All our Rx members will, I am sure, follow up the scheme keenly and, if the verdict of the Tx operators is favourable I will certainly do all I can to obtain it's adoption as a recognised call -- say one "CQRP" after every second "CQ", which gives a nicely balanced call in either phone or code.

Thank you, HKQ.

Finally I must draw attention to a marked falling off this

month in activity reports and logs from our Rx members. No doubt this is due to a variety of circumstances beyond our control, but do try and get your monthly letters in, OMs, if only to assure me that your interest has not flagged even if your activity has been curtailed.

WHAT IS A QRP RECEIVER ?

The idea still seems prevalent among most of our newcomers (and more than one older member) that the abbreviation QRP indicates a receiver which has a minimum number of valves.

As I pointed out in the November issue, the Q code clearly gives the translation as meaning LOW POWER, with no reference whatever to the valve line-up or to the type of circuit. Therefore it seems necessary to stress once again that it is quite possible for a 3-valve TRF rig to require 6 watts while a 4-valve SH can run on under one watt. These are not "fiddled" figures -- I have run a 6 watt 1-V-1 myself and I am now "laying the keel" of an SH4 pocket portable whose 1.4v valves will require only .9 watts at 67 volts.

The controlling factor therefore cannot be based on the number of valves -- it MUST be taken on a basis of power consumed, using the formula:

$$\frac{V_a \times I_a}{1000} = \text{watts.}$$

It remains necessary only to standardise an upper limit of power and, though 1 watt is a nice "round" figure, I do not feel that we are justified in consigning a .105 watt rig to the realms of QRP. It seems fair to assume a tolerance of a quarter watt and thereby fix our hard and fast top limit for QRP at 1.25 watts.

It must be understood that this quarter watt tolerance, though it may be used to the full, must not be abused, and any operator whose Rx comes beyond that absolute limit has no grounds for complaint at being excluded from the ranks of QRP.

PRACTICAL AERIALS, (5): "Bent" Doublets.

The half-wave doublet which we considered last month is capable of a large number of variations. For instance, when designed for the higher frequencies it may economically be made from tubing, since the length of each half is sufficiently short to be self-supporting. For lower frequencies it can, without too great loss of efficiency so far as reception is concerned, be bent into some shape suitable for location in a restricted space such as an attic. This question of "bending" a doublet is one which could with advantage receive a lot of careful investigation. There must be thousands of SWDs who's reception is hampered either by genuine lack of space or by landlords who say "you can't erect that there here!" The number of revolutionary "substitute" aerials on the market is ample proof of this ("Absolutely invisible, sir. It gives marvellous results, positively guaranteed to improve your reception. You'll be amazed.") Well, you will be amazed -- at the price! I feel that it is high time it was pointed out that a few bobs worth of wire and insulators, judiciously arranged in the attic (if you can't get outside), is worth as much as any commercial catch-penny at several guineas a time.

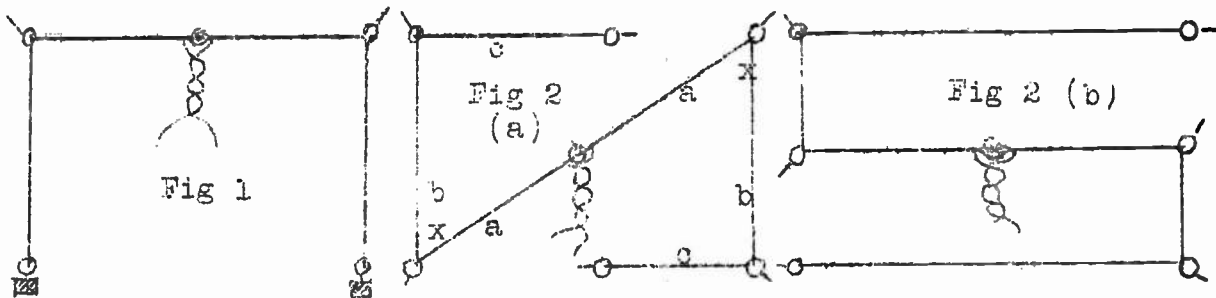
But how best to "bend" such a rig ?

There is really only one rule to remember and this is that the whole assembly MUST remain symmetrical. We have already seen that the impedance of an aerial varies along it's length and there are a number of other variables which we have not yet touched upon. It is the necessity to keep these factors in true balance in both halves of a doublet which makes it so important to maintain symmetry in their layout.

Three diagrams are included here and it must be realized that

they are purely suggestive and do not in any way exhaust the arrangements which can be created to meet individual circumstances.

Fig 1 is a side view where the main horizontals are suspended fairly close beneath the ridge of the roof, the vertical portions being kept taught either by tying down to the rafters (through insulators) or by suspending weights (clear of rafters etc) from the loose ends. Fig 2 (a) and (b) are both "plan" views in which the



greatest possible use is made of the available space. This type of layout is very suitable for erection on a flat roof as well as for attic use, but in any case the final variation depends upon the particular situation. Fig 2 (a) illustrates the question of balance, each straight section being shown to be equal and parallel to its opposite straight (as a-a, b-b, c-c) and opposite angles equal (x-x)

Any of the above suggestions are applicable to half-wave doublets up to 28 Mc/s. Above that frequency it becomes easier to use self supporting tubing, and little trouble will be experienced here since the overall length is so short.