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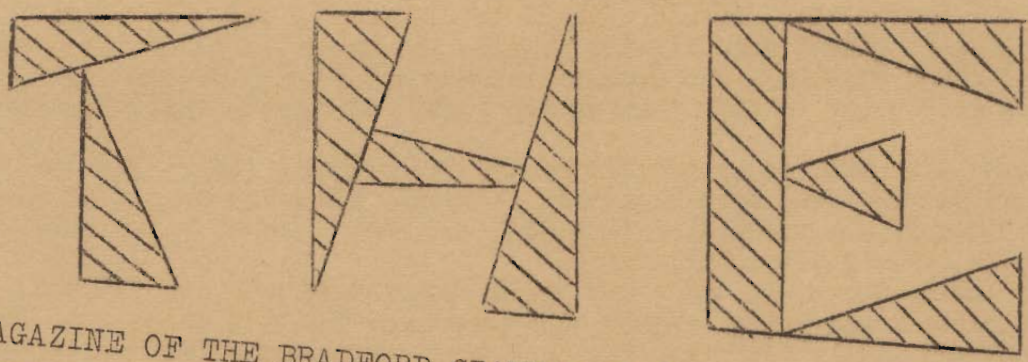
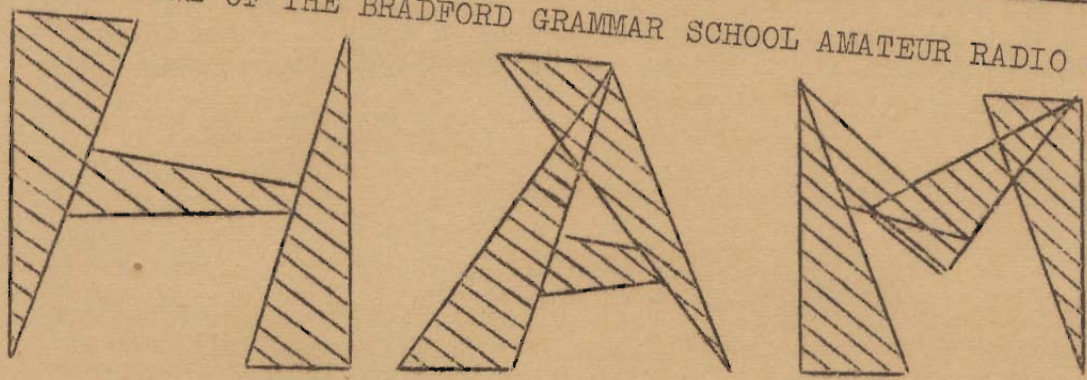


THE MAGAZINE OF THE BRADFORD GRAMMAR SCHOOL AMATEUR RADIO CLUB



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EDITORIAL.

Winter is now almost upon us, and with it the DX season. This is particularly so on Top Band, which is almost dead all the summer. In winter a considerable variety of DX comes in. Although Scotland, The Channal Islands and such places may not seem very far away, it is good going to work them on Top Band, but usually quite possible in winter.

The effect is not quite so noticeable on the other bands. 80m is just as full of teleprinters and 40m has even more broadcast stations. 20m is good most of the time anyway. 15m is usually a little better than 20m. and 10m. depends on the sunspots, though it usually opens a little in winter.

The Club's R.A.E. course is under way again, boosted by this year's successes. The number of pupils is, however, rather disappointing. The work which goes into such a course is not really justified for less than six pupils. There is, of course, no obligation to take the City and Guilds Examination at the end of the course, but it can prove a useful qualification. Anyone who is interested should consult any Officer of the Society for further details.

John P. Stott, G3MAB
Editor.

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Direction-Finding News
by John P. Stott, G3MAB (Editor)

The main item of news this issue is that, owing to lack of interest, it has been necessary to cancel the 3rd. contest. This is a pity, because this sort of activity is the only real opportunity thatmembers of the Club have of comparing the performances of their receivers.

For those who are new to the idea here is a summary. A transmitter is concealed at some place. The competitors are taken to another place, the location of which they are not told until the day of the contest. They then have to find the transmitter.

The first few to reach the transmitter receive prizes of equipment, worth several pounds. If the contest has to be called off, the prize is shared by the competitors who turn up at the start. There is no entry fee, and competitors only expenses are bus fares.

The difficulty lies in finding the transmitter, however this is not much of a difficulty. It does, of course, require a battery receiver. Any receiver with two or more valves will be adequate.

The way of finding the transmitter, however, is to use a special aerial. The type required is a 'frame' aerial, which consists of several turns of wire wound on a wooden frame. This aerial has the peculiarity that the signal is much stronger at one point.

The direction of the transmitter can be found by rotating the aerial until the weak point is found. The transmitter then lies on a line along the top of the aerial. Two such bearings plotted on a map will locate the transmitter.

After this it is just a race to see who can reach, and find the transmitter first. There will be another contest in a few weeks, so now is the time to prepare. Any Officer of the Club will help you.

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G 3 M H B

The following have not yet paid their licence fees:
A.F.Fell, G3LXF; G.F.Firth, G3MFJ; P.J.Barowitz, G3LZW; A.M.Pomfret, G3LZZ; R.L.Hodgson
4s. 6d. should be paid to the Secretary without delay. G3MAL

A Simple Valve - Voltmeter.

by John P. Stott, G3MAB (Editor)

The valve voltmeter is a very useful piece of test equipment. It has a very high input impedance and can be used, therefore, to measure voltages with almost no load on the circuit. It enables you to measure voltages of the cathode, anode, and screen of valves, giving an accurate value. It also enables you to measure the a.c. input to the grid, an otherwise impossible task.

The circuit given uses a double triode valve in a bridge circuit. A.C. is rectified by a double triode.

The best meter to use is one from the 19set, as it is scaled 0-15 and 0-600. In any case, the meter should have 500micro amps F.S.D.

V1 is an EB91; V2 is a 12AT7, or equivalents.

S1 is the range switch. Its positions are: clockwise Off/600V/150V/15V /6V.

S2 arranges for the meter to deflect whether the measured voltage is positive or negative with respect to earth.

S3 is the AC/DC switch.

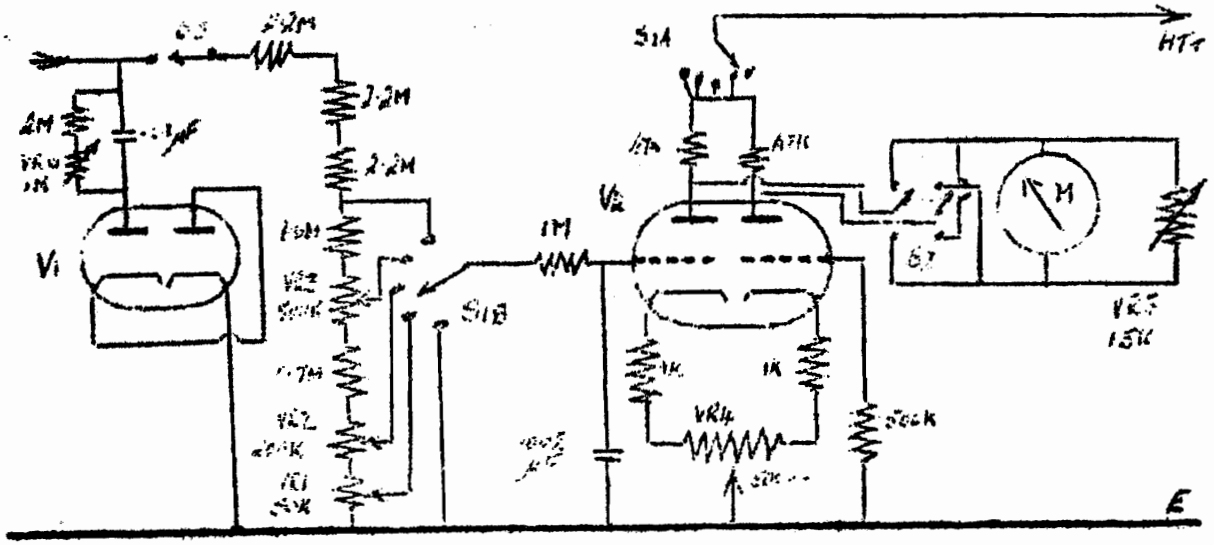
The alignement procedure is:

Switch to 6V range. Short input terminals (A & B). Adjust VR4 for no deflection. Put standard voltage across the terminals. Switch S2 for meter deflection and adjust VR5 until the deflection is correct for the voltage.

Switch to 15V range and adjust for no deflection with VR4. Apply standard voltage, and adjust deflection with VR3.

Repeat 15V adjustment for 150 & 600V, using VR2 & VR1.

Adjust for A.C. with VR6 so that the meter reads RMS values.



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THE DEAD-LINE FOR THE NEXT HAM IS THE LAST DAY OF TERM

RADIO AMATEURS' EXAMINATION

by DAVID NOBLE, G3MAW (Assistant Editor)
Hon. Instructor R.A.E. course

ELECTRICITY

The lectures for the R.A.E. are being held during the next two terms, Mondays and Wednesdays in Room 3. For those who are late joining the course, or who have to leave early, or merely as a permanent record, some of the basic facts are put down here.

Electricity and magnetism;

Section 1.

OHM'S LAW

Flow of current through a resistance

$E = I \times R$ E volts

$I = \frac{E}{R}$ I amps.

$R = \frac{E}{I}$ R ohms

Power dissipated in a resistor:

$EI = I^2R = \frac{E^2}{R}$

Note that the voltage across the resistor is what counts, not the supply voltage.

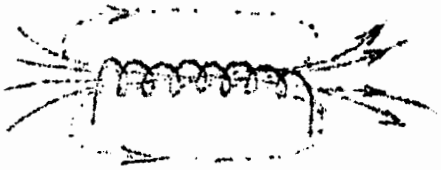
Resistors in series: If resistors are connected in series, they are the equivalent of a number of resistors as given by the formula:

$R_t = R_1$ plus R_2 plus R_3 .....

Resistors in parallel:

$\frac{1}{R_t} = \frac{1}{R_1}$ plus $\frac{1}{R_2}$ plus $\frac{1}{R_3}$ .....

A current flowing through a coil produces a magnetic field along the axis.



Mnemonics for N and S poles

Note that the arrow is in the direction of the so-called positive current. In actual fact, electricity really comprises the motion of tiny negative particles (called electrons) from negative to positive, the other way. This is only really important when discussing how a valve works.

The use of the electromagnet (its effect can be very greatly increased by winding it on a core of iron) is in relays, or it is used in loudspeakers together with an energising permanent magnet: This may be replaced by an E.M. with D.C. energising.

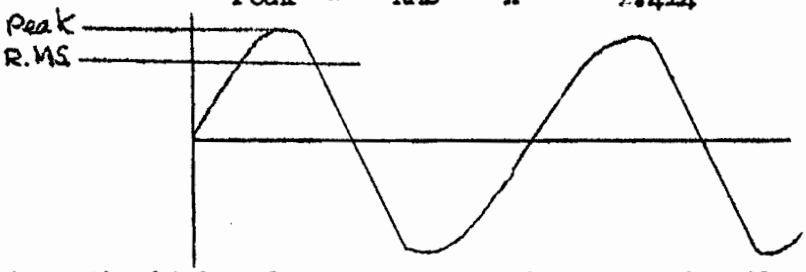
Alternating Current

Alternating current is current which goes alternately positive and negative. It is used because it is very simply to transform to other voltages, as a mains supply: the characteristics of very high frequencies are used in radio transmission. A diagram af A.C. waves is shown.

The wave form is called a 'sine-wave'. The maximum voltage reached (the 'peak') is considerably higher than that marked on the meter. The voltage on the meter is defined as the voltage that produces the same amount of heat in a resistor as the corresponding D.C. Current.

The relation between this voltage (the root mean square or, more shortly, the RMS value) and the peak is

Peak = RMS X 1.414



As we get on the higher frequencies, condensers and coils (chokes) get up to funny tricks. While not dissipating heat, they tend to reduce the current in a circuit: this is called their reactance.

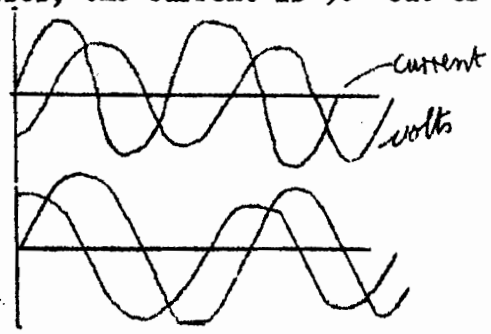
The relation between reactances is given by

$$X_C = \frac{1}{2 n . f. C}$$

$$X_L = 2 n . f. L$$

units: ohms, cycles, farads, henrys

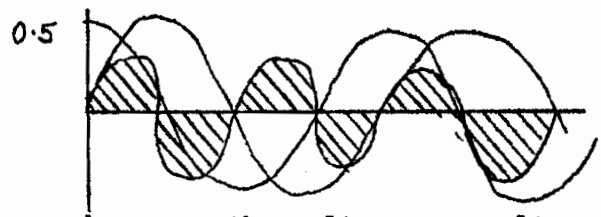
In such cases, the current is 90° out of phase with the voltage.



Condensers: the current leads by 90°

Inductances or chokes: the current lags by 90°.

The result is that no power is dissipated so long as there is no resistance in circuit. Remembering the rules about multiplying negative numbers.



In this case, as can be seen, the voltage goes alternatively positive and negative, and resultant power is 0.

The resultant value pf Condensers and inductors in series or parallel are given by:

$C = C1 + C_2 + C_3$ .....condensers in parallel

$\frac{1}{C} = \frac{1}{C1} + \frac{1}{C2} + \frac{1}{C3}$ .....condensers in series

$L = L1 + L2 + L3$ .....chokes in series

$\frac{1}{L} = \frac{1}{L1} + \frac{1}{L2} + \frac{1}{L3}$ .....chokes in parallel

Note that chokes have the same formulae as resistors; condensers have them changed round.

If, in a circuit we have a choke and a condenser, then at a frequency such that their inpedances are equal, i.e. $f = \frac{1}{2\pi/LC}$, they are said to be 'resonant'.

A 'series tuned' circuit, is called an 'acceptor circuit' because it acts as a low impedance to A.C. at its resonant frequency. A 'parallel tuned' circuit is a high impedance circuit at its resonant frequency. Actually both circuits are purely resistance at this frequency.

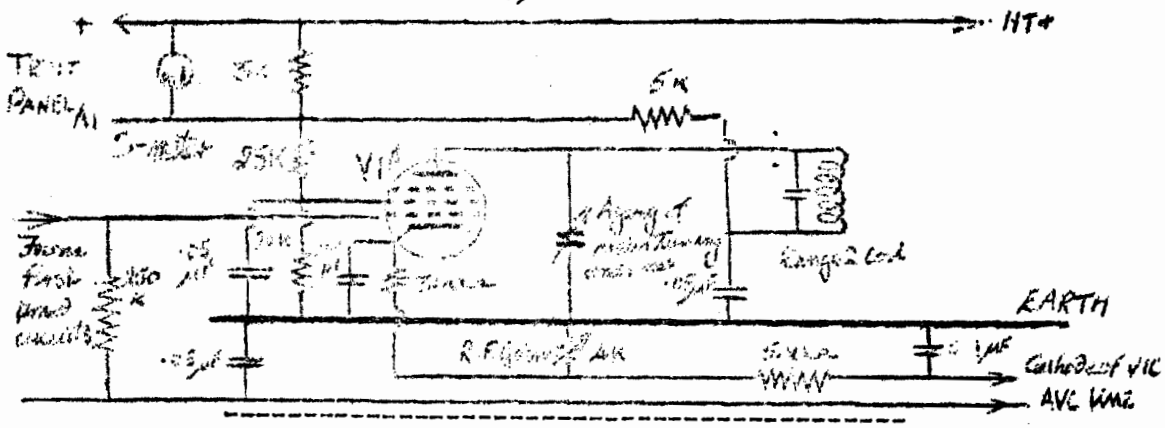
A SIMPLE S-METER FOR THE R107

by Andrew M. Pomfret, G3LZZ

It was desired at G3LZZ to employ some sort of metering device to compare the signal strengths of different stations. In order to do this, it is necessary to insert the meter in the circuit at a point where zero signal will register zero on the meter; it is no good having a meter in circuit which will measure say, 70 % FSD for zero signal and 80 % FSD for 5 and 9 plus 60 dB signal. The R107 has a series of points of the circuit brought out to a front panel for testing purposes, and it was decided to experiment with these first of all before investigating the possibilities of tapping the AVC line. After several experiments, a reasonably satisfactory system was employed, and has been in use ever since.

It was found that the best method was to meter between the HT tag and the one marked 1A. This gave a zero reading on exceptionally strong signals and a reading in excess of 5 MA under no signal conditions with the AVC on and the RF gain control at maximum. Methods of shunting the meter were tried until the no signal condition gave a reading of exactly 5mA. Subsequently a different method has been used. It was found that the last "notch" of the RF gain control could be used as a setting device without altering the RF gain appreciably. Thus under varying conditions of mains voltage or valve noise, it is possible to set the meter to read 5 MA on every occasion, enabling accurate and consisent readings to be taken. Naturally, it is not as sensitive as the more conventional arrangements, but functions quite well nevertheless.

Calibration of the instrument is rather difficult, but the individual should judge several signals by ear, and note their readings, so that fairly precise reports can be given. The circuit herewith may be self-explanatory to most, but a few words on the matter will not come amiss. The screen-grid of the first stage is connected to HT by a 25K and a 3K resistor in series, and to chassis by a 20K resistor across which is a 0.05uF decoupling condenser. From the junction of the 3K and 25K resistors a 5K resistor runs through the coil of the appropriate range to the anode. The meter, a 5mA 9-ohms type, is in effect connected across the common 3K dropping resistor, because this resistor junction is connected to the point 1A on the test panel. This virtual shorting of the resistor has hardly any effect on the screen for obvious reasons; even the anode circuit exhibits no outward sign of change. As far as the practical side of the installation goes, two leads were soldered onto the inside of the test panel, and brought out through the small hole in the top, left-hand corner of the receiver to the meter on the top. This is placed upside-down so that strong signals knock it over to the right. The writer has been an R.107 in which a 2" meter hole had been drilled (with much difficulty) through the front panel in the space normally occupied by the watch container. If such permanent methods are to be employed, however, it is best to employ some other form of S-meter arrangement involving the AVC line directly.



CURRENT NEWS BY A.M.P.

The first event I have the pleasure in recording is the wedding of Alan Davies, G3INW of Eccleshill to his charming bride Audrey at the Friends' Meeting House, Rawdon, on a fine Saturday morning towards the end of the Summer holidays. The members of the club participated in a most generous gift on the part of Mr. Barowitz in the form of a plush rug. The Best Man was Denis Binns, G3MGI, and his mother the registrar. Also present from the radio world were Duncan, G3KLZ, Peter G3LZW, and myself. Other guests included Mr. and Mrs. Neville H. Newhouse. After the reception, the couple left for their honeymoon in Scotland before going to Swansea where they had made their home in a caravan. Alan has asked me to say that he is now officially GW3INW, but will not be active except perhaps from the University station. He hopes to be on the air for the annual MCC, and meanwhile passes his 73 to all.

Shortly after his departure, a most interesting lecture was held at the Bradford Club, given by Peter, G3LZW. Although one of our own circle of friends, there was a rather poor attendance from B.G.S. members, at which both he and I were disappointed, and which was entirely uncalled for. However, this did not detract from the enjoyment of his excellent talk, coloured by the display of gear and the demonstrations of hi-fi which he performed. We had one lady visitor in the person of Mrs. Davies, Alan's mother, accompanied by his father, Fred, G3KSS.

Parents' Day was not a complete failure. I was only on the scene for three-quarters of an hour, but during that time several people had a word over the air with Peter with whom we were in duplex QSO. Later he came over in person to help clear up. In fact, nowadays we see him most weekends, as he does not find it much bother to drive over from Manchester in his little Austin.

Duncan has once again gone down to Evesham in connection with his work, but returns at odd weekends. At G3KLZ/A he has a marvellous set-up for Top Band, with a long wire 90 ft. above the ground, and access to AR88, 888A, and BC348 receivers. Although I heard him on one evening I could not raise him, even though I had just worked a couple of stations near London!

In the B.G.S. club there is a different receiver and a much better Top Band transmitter to be found. Some dipoles for 20, 15 and 10 metres have been constructed, but still have to be erected. There is much enthusiasmshown by the younger members. Some kind of radio-telescope project, similar to that of G3MMB, Stowe School, has been suggested by M. J. Walker. The club room is much clearer now that much old and useless junk has been salvaged. B. Fleming has sent off for his licence, and W. D. Kaye is trying once more to pass the G.P.O. Morse Test.

David, G3KEP, has recently sustained a change of QTH and is now residing in a newly-built bungalow in Eldwick. He has facilities for erecting a 256 ft. long-wire, and his QAH has increased. He should now be in an even better position for working DX, and for the 70 cm. transmissions of G3KEP/T.

There have recently been several new local licences issued, and they include: G3MZO, G3MZG, G3NAH, G3NAK, G3NBI, and G3NBS.

Recently, I made the acquaintance of two local amateurs, only one of whom is ever on the air nowadays. After working G2BXS one lunchtime from G3MHB, I invited myself round to Bert's that evening. He knows only a very few locals as he is not very active now, but one of his best friends is Denis, G3BOR, who lives up the next road to me. Bert suggested that I look him up, but before I did so, Denis called to see me next Sunday lunchtime when I was on Top Band to say that not only was he aware of my existence, but he had heard my 'FUNDAMENTAL — 2IF' signal on his broadcast receiver. I fixed up for him to come the next Sunday evening, and he told me about himself, while I told him of all the B.G.S. activities (or nearly all! - Ed.). He plans to get back on the air sometime, and while he was here, I worked G3JEQ on CW to interest him in 160 metres. On Sunday, October 26th, David, G3KEP, David G3MAW, John and I went to the Harrogate Audio Fair. The queue of cars was quite half a mile long and the Grang Hotel packed with people. Many of the small demonstration rooms proved inadequate, but 'Little David' was quite content collecting free literature from the stands. We were not, of course, the only amateurs there. We met Don Skirrow, G3GFD, of Bradford Moor, and also we surprisingly came across Duncan, G3KLZ, Denis, G3MGI, and Peter, G3MGA in a small party. We were going to stop at Harry Ramsdens on the way back, but when we saw the queue, we kept on!

That's all for this issue, but please let me know of any gossip suitable for inclusion in these pages before next time. Until then, 73 es gud DX...

Andrew M. Pomfret, G3LZZ

AN AMATEUR TELEVISION CONVERTER
from notes by G3KOK, British Amateur TV Club

The little converter to be described is taken from the quarterly journal of the B.A.T.C., cq-TV, and consists of an oscillator in the 400 Mc/s region link coupled to a trough line mixer employing a silicon diode. The IF chosen may be any BBC channel, but slightly better results will be obtained if the converter can feed directly into the receiver IF chain, assuming the latter to work on the standard 38 Mc/s or so. Lower IF's may cause trouble.

The chassis consists of a square tangular box (A) containing a 'U'-shaped trough (B), so forming three equal troughs. These are for the oscillator, IF and mixer respectively. Thin sheet brass is ideal for the construction - 22 s.w.g. or thinner is ample - but copper, aluminium or tin may be used. The inside of the troughs should be well-polished. The outer box should be cut out and drilled, and then bent up. The corners should be soldered or brazed for added strength and electrical efficiency. The IF trough is similarly bent, and attached to the main box for fixing in the socket for the EF91, or 6AK5 IF valve. The oscillator employs either a 12AT7 (ECC81) B9A, or preferably a 6J6 (ECC91) B9G valve. Eddystone miniature tuning condensers are specified, but cheaper Phillips concentric, or Mullard types may be used. Do not depart from the sizes of line shown, or the tuning may be a long way out. In particular, take care that all connections to the lines have as little inductance as possible. This applies particularly to the connection from the mixer line to the tuning condenser.

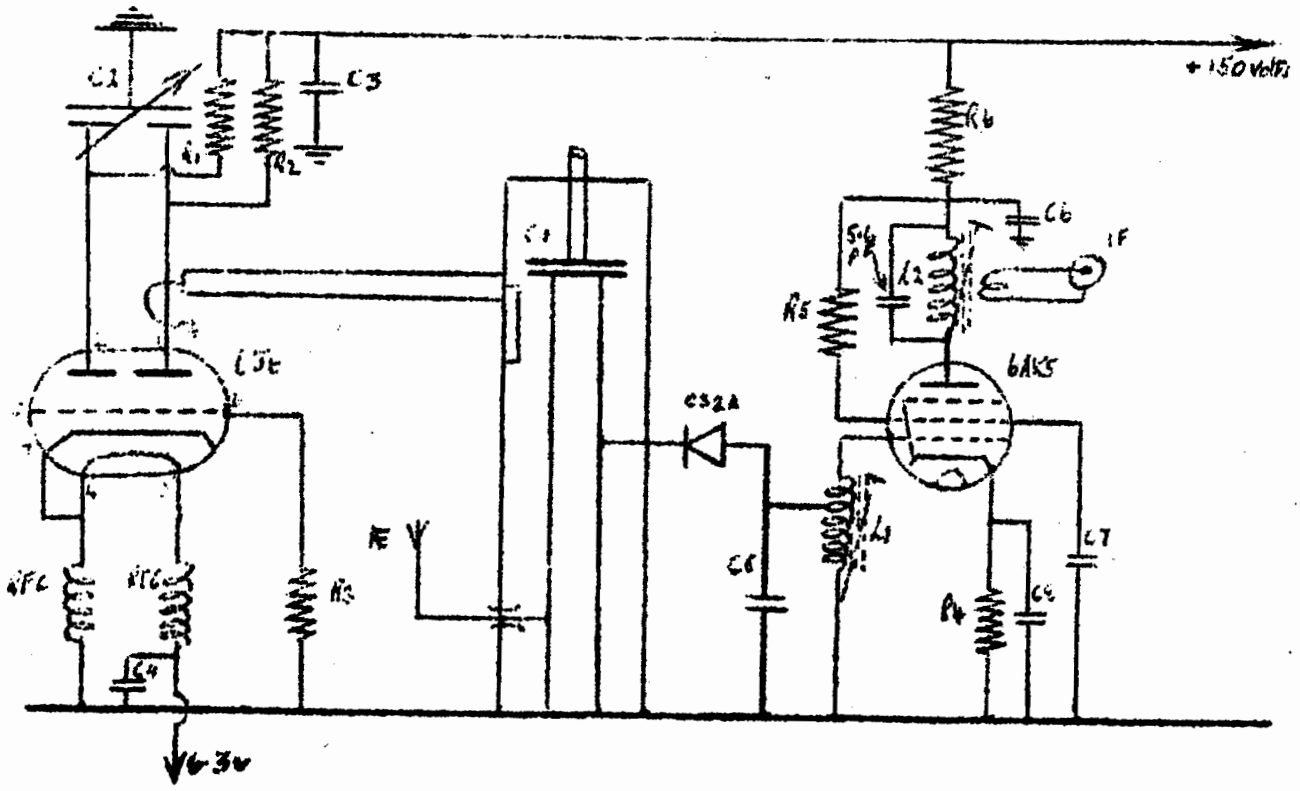
The IF stage can now be assembled and wired. The crystal is held against the mixer line by the spring of its connection to the coil. This connection is best made by using an octal top-cap connector. Under no circumstances attempt to solder directly onto the crystal. A 2.2 pF condenser is also soldered from this connection to chassis.

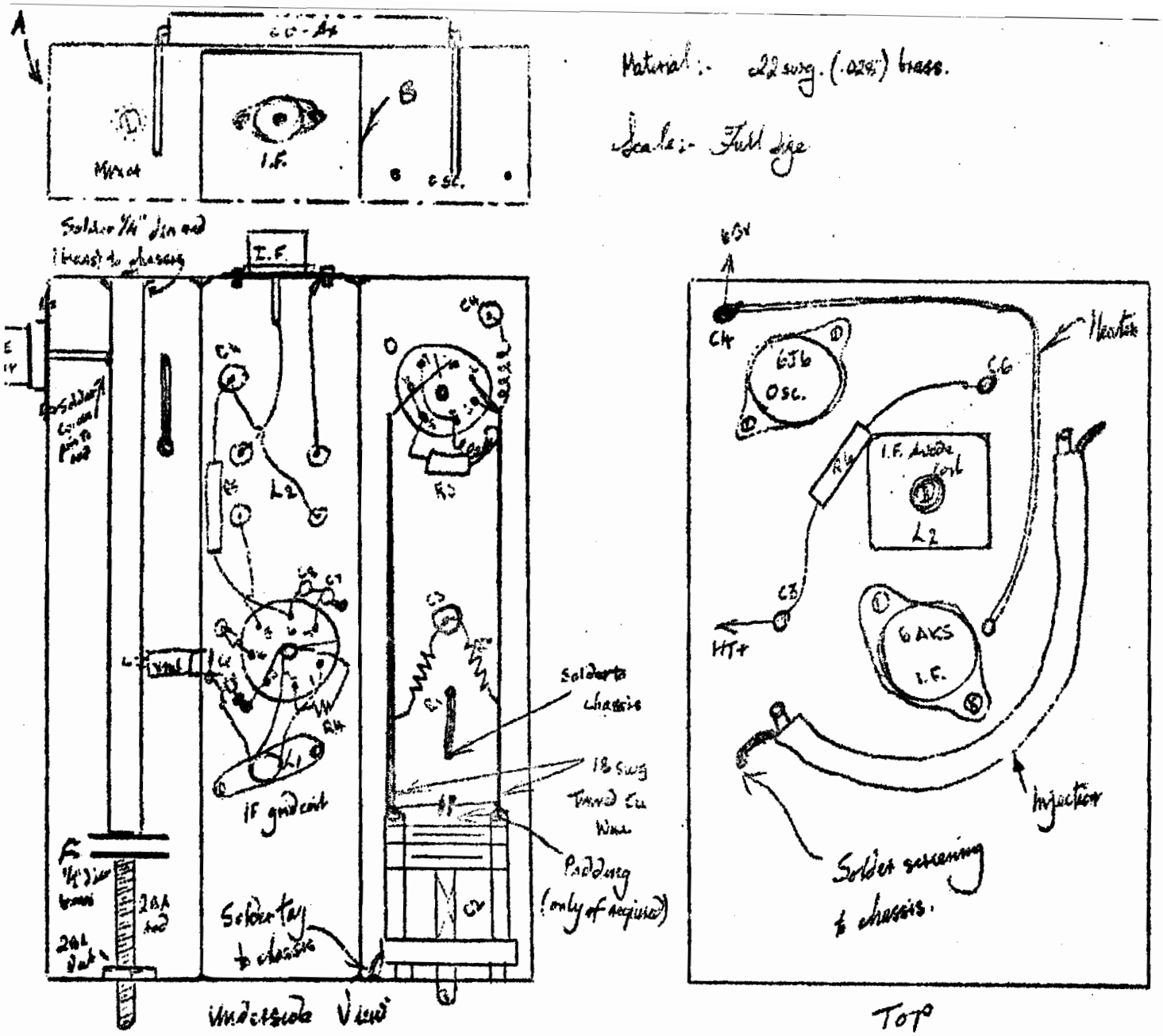
Having finished the converter, it should now be aligned. An IF signal generator is required for this, and, on request, builders of this converter may carry out this procedure at G3KEP at whose QTH a signal source is available.

Now the injection to the mixer is set to the right point. The bottom end of the IF grid coil is detached from earth and taken via a 1mA fsd meter to chassis. With the oscillator at its correct frequency some crystal current should be registered. With the mixer tuning at mid-scale, adjust the injection by bending the coupling loops nearer or or further from the oscillator and mixer lines until about 200 uA is indicated. This should not vary by much as the oscillator and mixer tuning is varied, unless the mixer is tuned near to the oscillator frequency. Now the aerial can be attached - the tap is for a 75 ohm input or less - and the unit should work right away. Tune the oscillator until a signal is found(as shown the tuning range is about 40Mc/s; this may be reduced by removing more plates from the tuning condensers and adding fixed C instead) and then peak the signal with the mixer tuning. The oscillator tuning will be extremely sharp, the mixer pretty flat. Provided the dimensions given overleaf are strictly adhered to, there should be no difficulty in finding a signal if one is there and if the aerial and feeder are bringing it in.

C1 ½" brass discs adjusted by means of 2 BA brass rod.
C2 Eddystone type 551 split-stator cut down to 2 fixed and 3 moving plates; approx 10pF max. Add fixed C if reqd. to bring oscillator to correct range.
C3, C4, C6 1000pF ceramic feedthrough.
C5 See text.
C7, C8 1000 pF disc ceramic.
R1, R2, R5 1K ½W Erie type 9.
R3 5.6 K ½W.
R4 180 ohms ½W.
R6 2.2 K ½W.
RFC's 12 turns ⅛" i.d. closewound, 22swg

L1 9 turns centre-tapped 28swg closewound. 0.3" dia.
L2 10 turns 28swg 0.3" dia. Link 1½ turns 22 swg over HT end.





T.M.C.

THE SAD TALE OF MY UNCLE MARMADUKE

by D. G. [illegible]

[illegible] recent [illegible] of my uncle Marmaduke. This is a true story which happened during the [illegible] World War.

At the time, my uncle was serving as a diver in the Firth of Forth. In those days, anti-submarine defence was primative, and consisted of listening posts. These were microphones on the river bed connecte to loudspeakers on the shore. The microphones picked up the sound of the engine of any submarine, or were supposed to.

One day, one of these microphones was giving trouble, and my uncle was sent down to put it right. Unfortunately, the man listening at the top was new on the job and when he heard my uncle mending the thing, he thought he was a submarine. He raised the alarm and there was such confusion that nobody bothered to check. He called up a destroyer, and this dropped a depth-charge on my poor uncle.

This story is perfectly true. If you look at the War Memorial, you will find the inscription T.M.C.Ronnard, a memorial to my poor gallant uncle Marmaduke.

THE CALCULATION OF PI-NETWORK COMPONENTS

There seems to be great demand for the formulae for the calculation of the component values for the pi-network type of tank circuit.

We have, therefore, set out below, the formulae required for these calculations.

Step 1) $R1 = \frac{500\ E}{I\ (mA)}$ ohms; R2 = Impedance of aerial

Step 2) $\frac{R1}{R2}$ ratio must not exceed 100; Assume loaded Q of coil = 12

Step 3) For any frequency, first determine reactance of C1, C2, and L

$$Xc1 = \frac{R1}{Q}\left(1 + \sqrt{\frac{R2}{R1}}\right) \text{ ohms}$$

Step 4) $$Xc2 = Xc1 \times \sqrt{\frac{R2}{R1}} \text{ ohms}$$

Step 5) $$X_L = \frac{R1}{Q}\left(1 + \sqrt{\frac{R2}{R1}}\right)^2 \text{ ohms}$$

Step 6) check for accuracy since $X_L = Xc1 + Xc2$

Step 7) Select frequency of operation (in Mc/s)

Step 8) $$C1 = \frac{10^6}{2\ pi \times f \times Xc1} \text{ uuF}$$

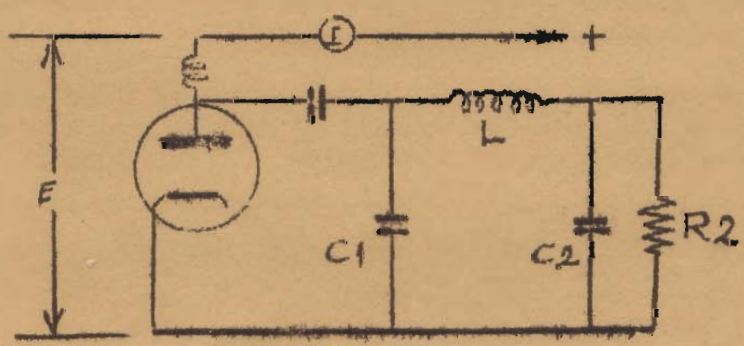
Step 9) $$L = \frac{X_L}{2\ pi \times f} \text{ uH}$$

Step 10) $$C2 = \frac{10^6}{2\ pi \times f \times Xc2} \text{ uuF}$$

Step 11) The number of turns to give the desired value of L may now be obtained from :-

$$N = Lx\left[1 + \sqrt{1 + \left(\frac{9}{a \times L \times x^2}\right)}\right]$$

Where, L = uH
N = number of turns
d. = diameter in in.
a = radius in in.
n = number of turns per inch
$x = \frac{20}{n\ d^2}$



LOW POWER TRANSMITTER FOR TEN METRES

by David Noble, G3MAW and David M. Pratt, G3KEP

(This article is reproduced by courtesy Messrs. Short Wave Magazine, Ltd.)

It is surprising what little power is required for working on the DX bands assuming that a reasonable aerial is available. A low-power transmitter was constructed and is described in the article. The unit was initially designed for use on the 10 metre band; but with suitable changes to the coils and the selection of an appropriate crystal, it may be used on any on the high-frequency bands.

The transmitter comprises a Pierce crystal oscillator on 9.33 Mc/s., output of which is taken at 28 Mc/s., and amplified by a tuned buffer amplifier which drives the QV04-7 PA. Any miniature high gain RF pentodes may be employed in the oscillator and buffer stages. EF80's were used in the proto-types, but others such as EF91, 6AK5, &c. will be suitable. The PA could also use a 5763 or any other modern type, although the circuit is designed for the valve specified.

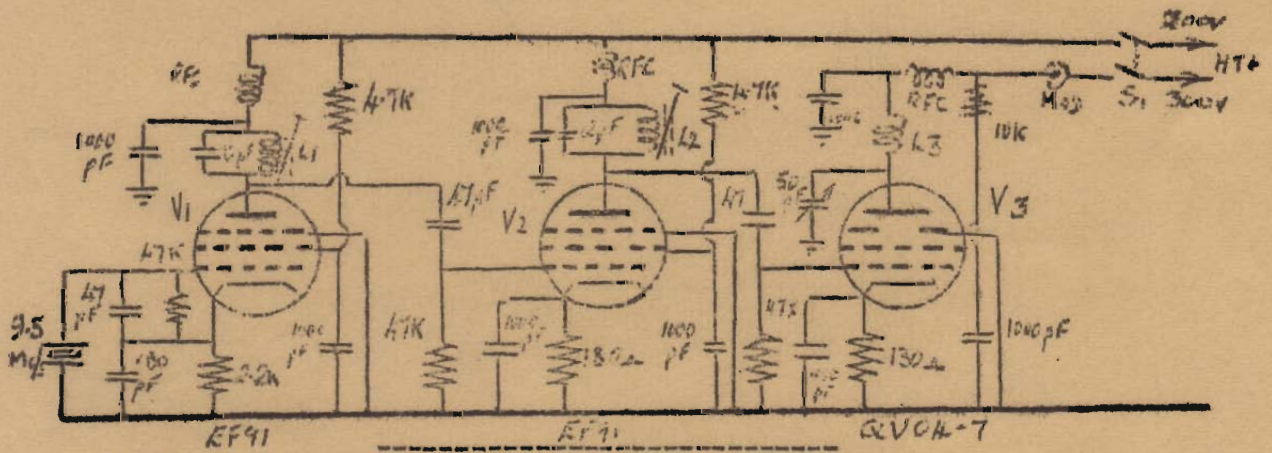
The oscillator and buffer stages may be aligned by inserting a meter in the grid circuit of the following stage, and peaking the coils L1 & L2 for maximum.

PA tuning is best carried out by means of a field strength meter. This may simply consist of a crystal diode connected across a 500uA meter with a short piece of wire fastened to one of the connections for RF pick-up. If the meter is not sensitive enough, the other terminal should be earthed — the little finger of your left hand should suffice !

The transmitter is run from the modulator and power supply of the writers' top band rig. But any power supply capable of supplying about 300 volts at 60 mA will suffice.

Originally, the transmitter was used for lowepower experiments on ten metres to test the capabilities of low-power on this band for local working. However, during good conditions it has been found possible to work American stations using this simple rig and an indoor dipole.

L1,L2,,,,,,,,,12¾ turns, 26 g. close wound on 5/16" former with iron core
L3,,,,,,,,,,,,7 turns, 16 g. self-supporting 7/16" inside diameter with 1 turn link in 'cold' end.



A PRIZE FOR W.A.B.C.

Starting on the 1st January, 1959, the first member of B.G.S. to receive the Short Wave Magazine certificate for working 60 British counties will also receive a very big box of miscellaneous components via G3KEP.

Material for the next "Ham" should reach the Editor by the last day of term