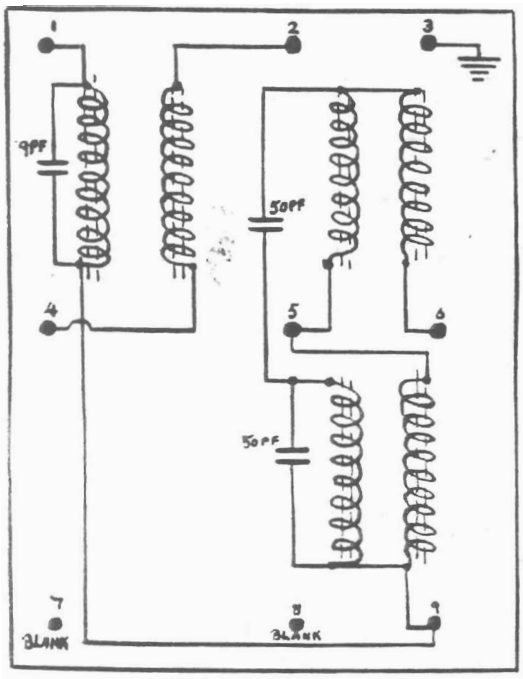
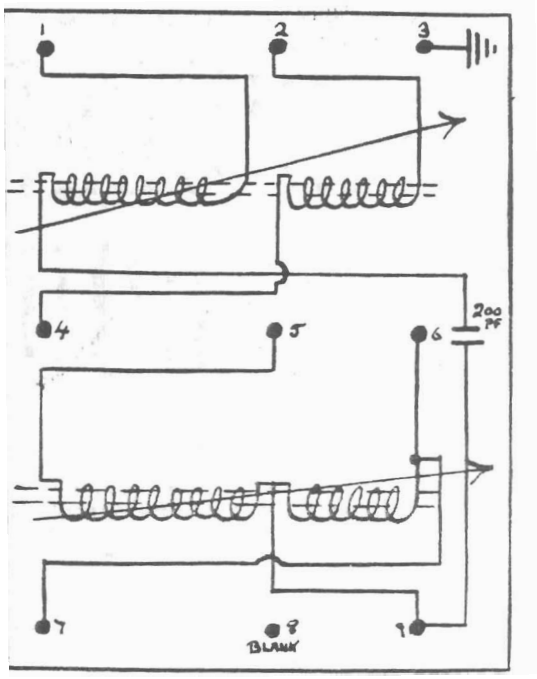
MIDGET COMMUNICATION RECEIVER M.C.R.1



RANGE 1.



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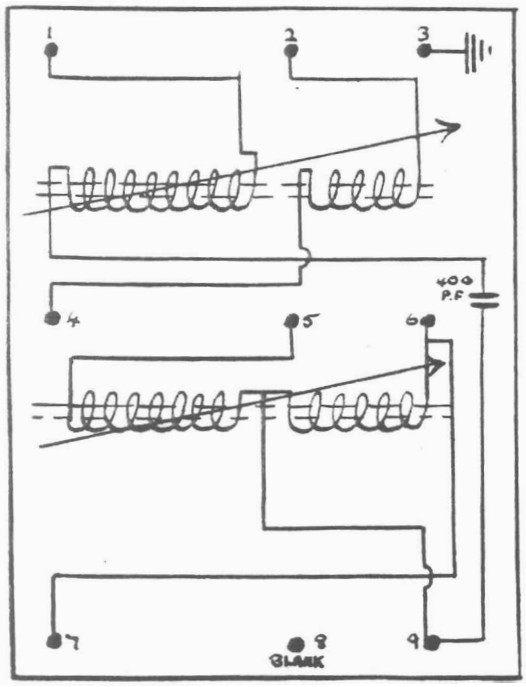
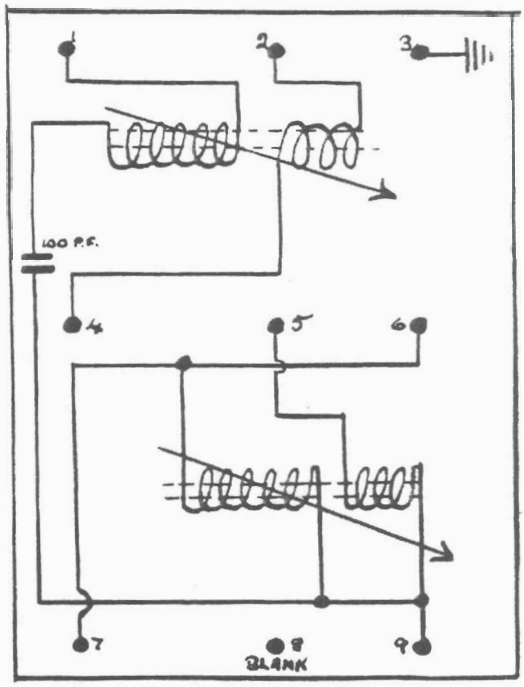
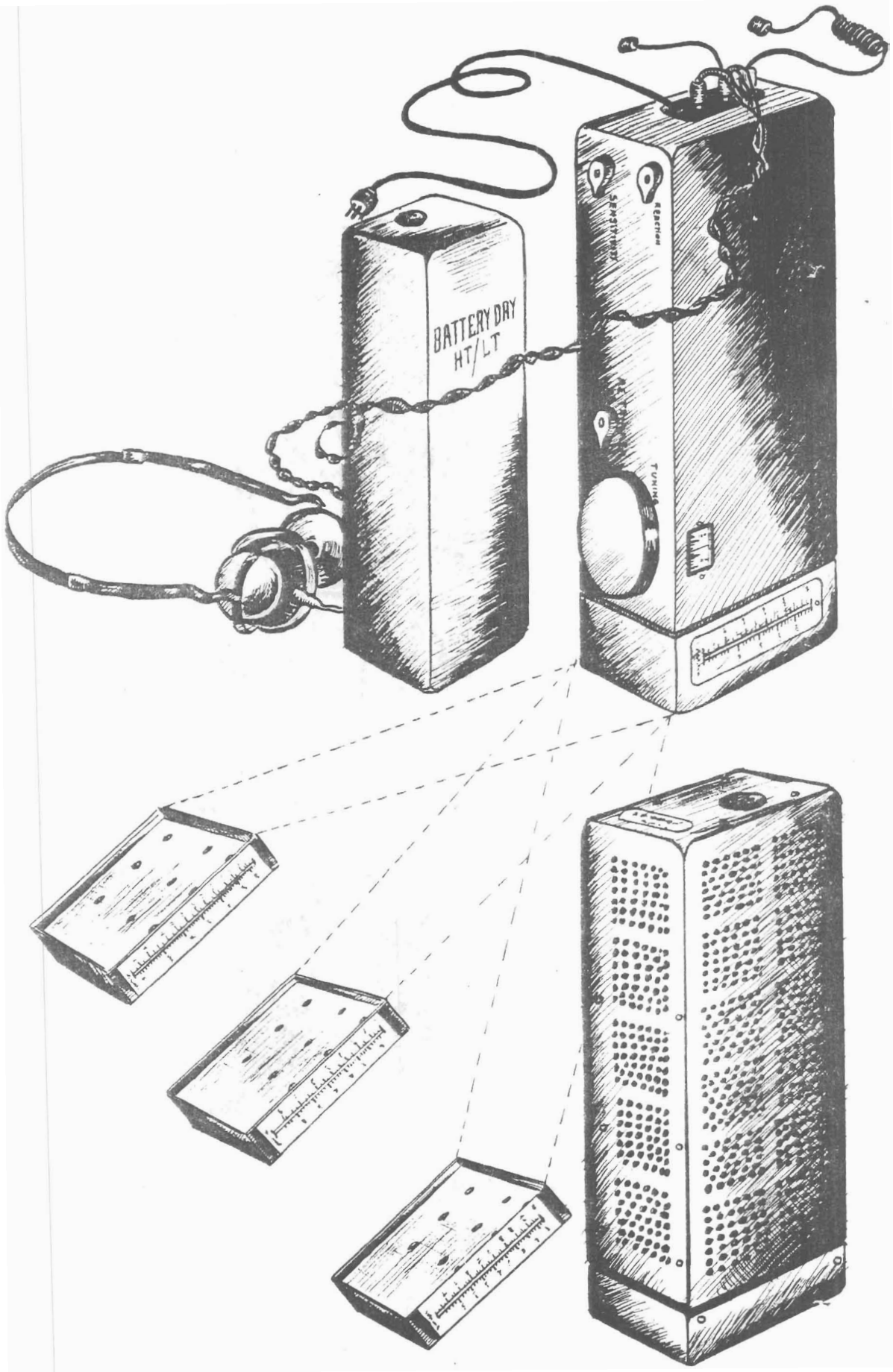


RANGE 3.

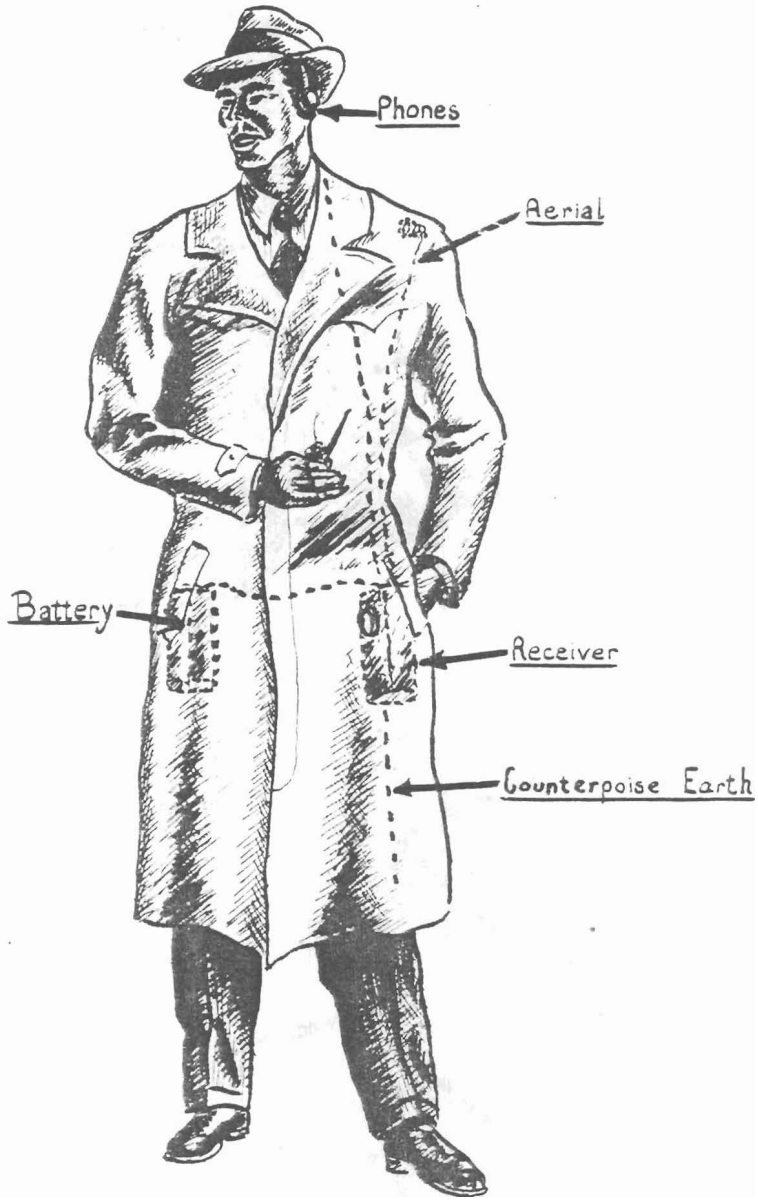


RANGE 4.

THEORY DIAGRAM OF COIL PACKS.



MCR1 RECEIVER AND ACCESSORIES.



SKETCH SHOWING RECEIVER IN WALKING POSITION.

GENERAL INSTRUCTIONS.

The Set will work with short aerial and no earth, as shown in the walking position, but, of course, for really good results and for receiving far distant stations, you should:-

1) Erect the aerial as high as possible, using the bakelite card as an insulator if necessary. The aerial, plugs into socket "A".
2) Use the 10ft. of wire provided to make an earth connection with the crocodile clip, or alternatively, use this as a counterpoise earth. Plug earth into socket "E".
3) Select a coil unit to cover the frequency of the station which you wish to receive, and push this on to the end of the receiver.
4) Plug the telephone leads into the sockets marked "PH".
5) When ready to receive, plug the power lead into the battery, or mains unit, which ever you are using.

TUNING IN THE STATIONS.

1) Turn the Sensitivity control fully clockwise.
2) Adjust the tuning control until any station somewhere near the frequency required is tuned in.
3) Adjust the aerial trimmer for the loudest reception.
4) Adjust the reaction control to the position either just before or just after the point of oscillation, according to whether R.T. or C.W. signals are to be received.
5) Refer to the calibration scale on the coil unit, and move the tuning control to the setting given for the desired frequency. If the station is not heard at once, switch to and fro around the setting given.
6) If necessary re-adjust sensitivity to get comfortable volume.

IMPORTANT POINTS.

a) Always remove the plug from the battery or power pack when the receiver is not being used. If you don't do this, you will expend your battery or waste power.
b) Always leave one coil pack on the receiver, in order to protect the pin contacts.
c) When changing coil units, care should be taken to keep the units straight, and in line with the receiver, in order to avoid bending and straining the pins.
d) It is desirable, although not essential, that the battery should be discontinued when changing coil units.
e) About 30 hours operation can be expected from the battery.
f) If the reaction control has to be turned almost clockwise before the set oscillates, as indicated by the "plop and hiss", it is an indication that the battery is becoming run down.

NOTES ON THE POWER PACK.

This power pack may be used, when correctly adjusted, on either A/C or D/C mains, at any voltage between 97 and 140 or 190 and 250.

Proceed as follows:-

Ascertain the type of current, A/C or D/C, and the voltage by reference to an electric house meter.

For D/C mains, use the Selector Screw in one of the top row of sockets, marked "Input Volts D/C", and for A/C mains screw the socket in the appropriate

socket of the bottom row, marked "Input Volts A/C", taking care to screw the socket right home.

Plug in the power lead to a suitable mains outlet.

If you have any doubt as to whether the mains are A/C or D/C, proceed as follows:-

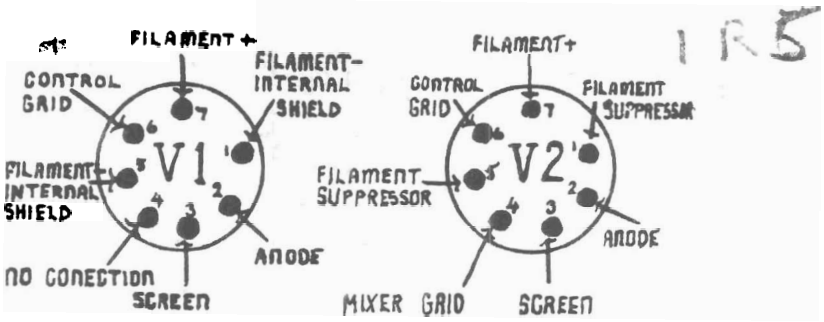
a) Set the voltage selector screw into the D/C range at the correct voltage.
b) If the receiver fails to operate, reverse the mains plug in its socket. If now the receiver gives results, then the mains are D/C.
c) If stations can be received faintly in either position of the mains plug, then the mains are A/C. In this case - switch off the power - remove the socket selector screw, and plug it into the input volts A/C range, and again reverse the mains plug.
d) If when on A/C troublesome mains hum is heard, some improvement may be effected by reversing the mains plug.

CONVERSION TABLE.

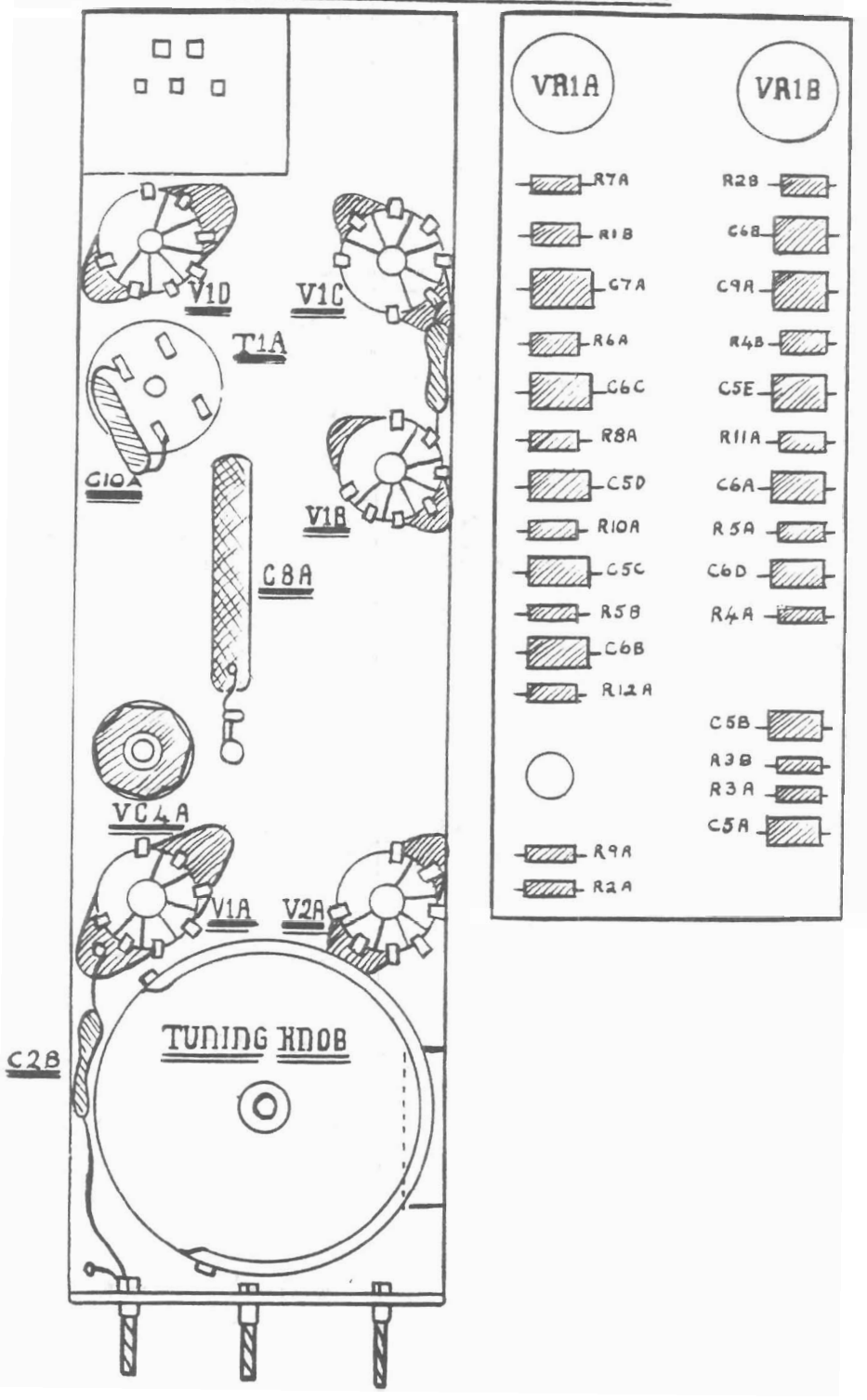
RANGE 1.		RANGE 2.		RANGE 3.		RANGE 4.	
KC/S.	METRES	MC/S.	METRES	MC/S.	METRES	MC/S.	METRES
100	3000	2.5	120	4.5	67	8.0	38
150	2000	2.6	115	4.6	65	8.5	35
200	1500	2.7	111	4.7	64	9.0	33
250	1200	2.8	107	4.8	63	9.5	31
300	1000	2.9	103	4.9	61	10.0	30
350	856	3.0	100	5.0	60	10.5	29
400	750	3.1	97	5.1	59	11.0	27
450	666	3.2	94	5.2	58	11.5	26
500	600	3.3	91	5.3	57	12.0	25
550	545	3.4	88	5.4	56	12.5	24
600	500	3.5	86	5.5	55	13.0	23
650	462	3.6	83	5.6	54	13.5	22
700	429	3.7	81	5.7	53	14.0	21
750	400	3.8	79	5.8	52	15.0	20
800	375	3.9	77	5.9	51		
850	353	4.0	75	6.0	50		
900	333	4.1	73	6.2	48		
950	316	4.2	71	6.4	47		
1000	300	4.3	70	6.6	45		
1100	273	4.4	68	6.8	44		
1200	250	4.5	67	7.0	43		
1300	231	4.6	65	7.2	42		
1400	214	4.7	64	7.4	41		
1500	200	4.8	63	7.6	39		
1600	188	4.9	61	8.0	38		
		5.0	60				

RECEIVING THE POPULAR STATIONS.

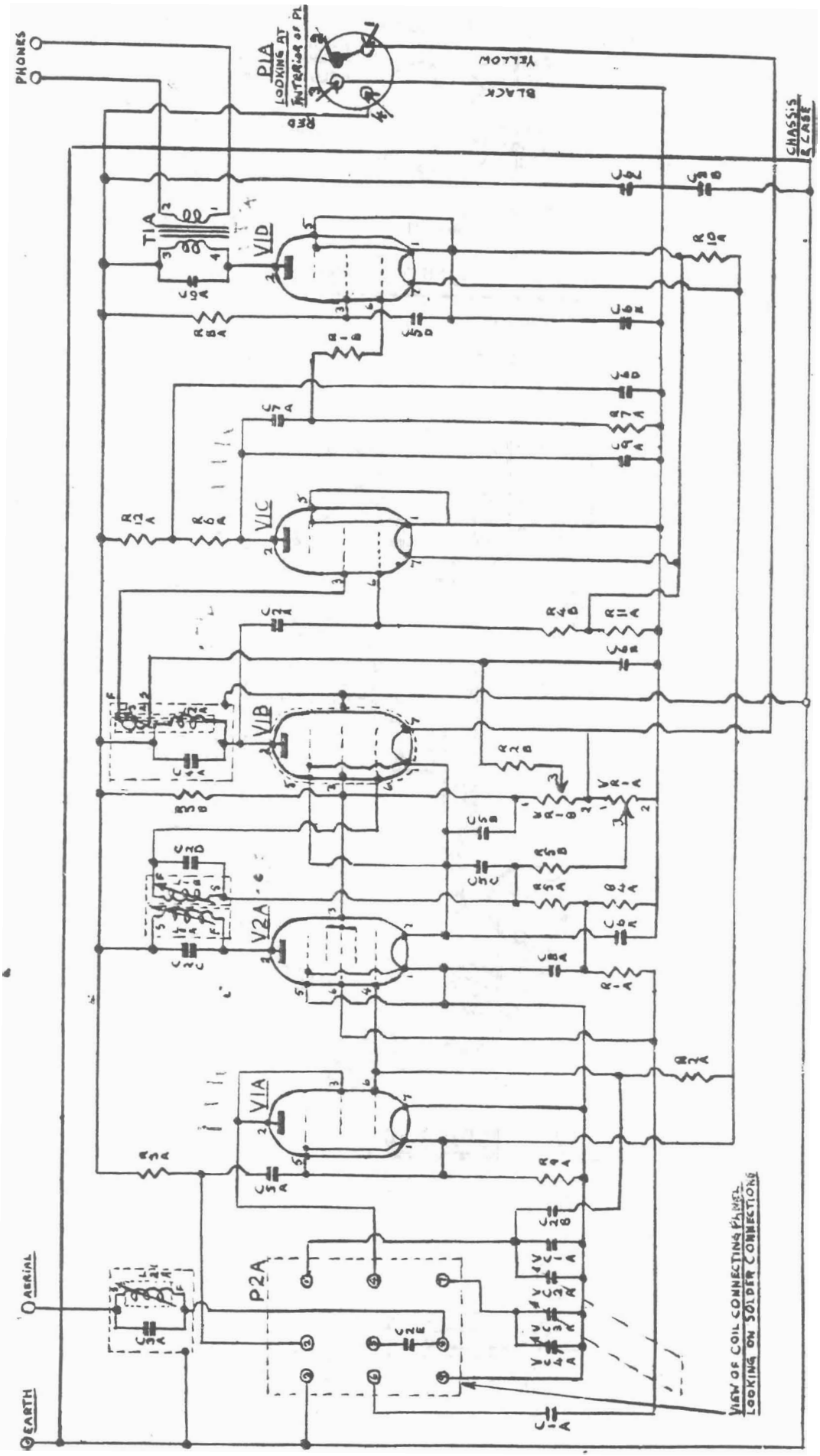
STATION	METRES	COIL PACK	ROUGH POSITION
Light Programme	1500	1	Approximate setting 20
Third Programme	514	1	Approximate setting 85
North Regional	449	1	Approximate setting 98
Scottish Regional	391	1	Approximate setting 105
Welsh Regional	373	1	Approximate setting 110
Home Service	342	1	Approximate setting 120
West Regional	307	1	Approximate setting 127
Midland Regional	296	1	Approximate setting 129
Light Programme	261	1	Approximate setting 135



VALVE BASES VIEWED FROM UNDERNEATH.



COMPONENTS ABOVE CHASSIS AND ON TAG BOARD.



THEORETICAL DIAGRAM OF THE RECEIVER.

CONDENSERS.

C1A	100PF
VC1A	Variable Trimmer
C2A	50PF
C2B	50PF
C2C	50PF
C2D	50PF
C2E	500PF
C3A	300PF
CHA	60PF
VC4A	Variable RE Trimmer
C5A	.05 uf 250v
C5B	.05 uf 250v
C5C	.05 uf 250v
C5D	.05 uf 250v
C5E	.05 uf 250v
C6A	.1 uf 150v
C6B	.1 uf 250v
C6C	.1 uf 150v
C6D	.1 uf 250v
C7Av	.001 uf
C8A	.01 uf 250v
C8B	.01 uf 550 v non Inductive
C9A	.003 uf mica
C10A	.005 uf mica
VC2A) VC3A)	Ganged Tuning Condenser

RESISTORS.

R1A	470,000ohms
VR1A	250,000ohms Pot.Sen
VR1B	250,000ohms Pot.React.
R1B	470,000ohms
R2A	100,000ohms
R2B	100,000ohms
R3A	18,000ohms
R3B	18,000ohms
R4A	3.3M ohms
R4B	3.3M ohms
R5A	1.2M ohms
R5B	1.2M ohms
R6A	220,000ohms
R7A	2.2M ohms
R8A	270,000ohms
R9A	470ohms
R10A	330ohms
R11A	220ohms
R12A	68,000ohms

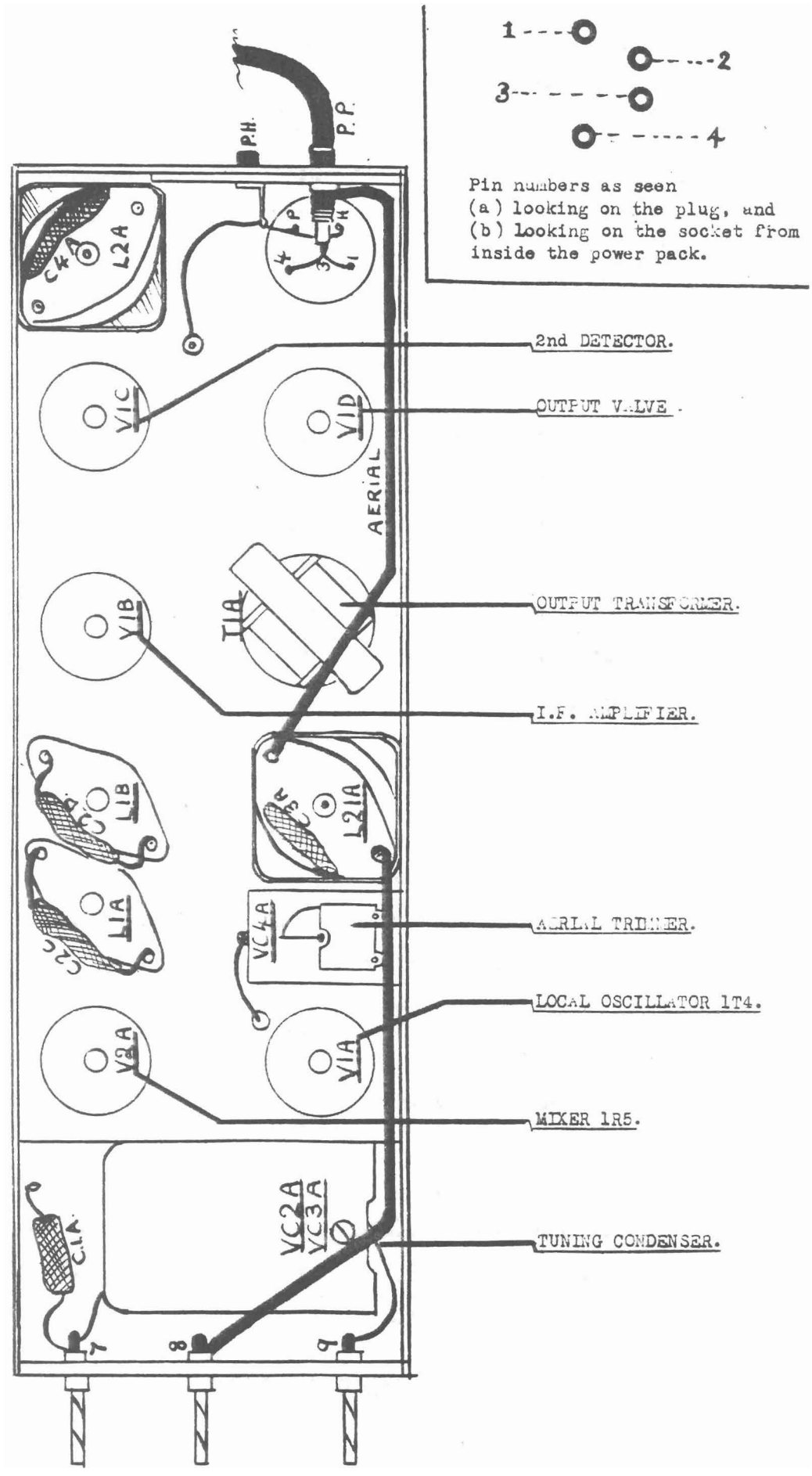
RF

L21A	Aerial Coil(Iron core)
L1A) L1B)	IF Transformer 1730 Kc/s.
L2A	IF .Coil
L3A	" " Reaction
T1A	Output Trans.Phones
P1A	Power Input Plug(4pin)

VALVES.

V1A	1T4	Local oscillator	1.4
V2A	1R5	Mixer	1.4
V1B	1T4	IF Amp	1.4
V1C	2nd Det. & L.F. Amplifier		
V1D	Output Pentode		

VALUES OF COMPONENTS.



SHOWING LAYOUT OF TOP CHASSIS.

NOTES ON THE RECEIVER.

V1A and V2A together act as the frequency changer, V1A being the local oscillator, V2A being the mixer, this is the most important difference to normal receiver practice, as usually these two valves are contained in one envelope. R3A is the oscillator anode feed resistor which also acts as a H.F. choke with C5A acting as its by-pass condenser. C2B is the oscillator auto-bias condenser, and R2A the auto-bias leak. The grids of V1A and V2A are strapped together and mixing takes place within V2D the I.F. frequency being developed across the transformer L1A and L1B and impressed upon the grid of V1B the I.F. amplifier. L2A is tuned to the I.F. frequency and has L3A a reaction winding. By moving VR1B in a clockwise direction an increasing voltage is placed on the screen of V1C the second detector causing it eventually to break into oscillation which will beat with and permit the reception of C.W. transmission. The I.F. frequency is 1750 KC/S.

V1C is the second detector R6A being the anode load R12A and C6D for de-coupling. The rectified signal is passed via coupling condenser C7A and grid stopper R1B to the output valve V1D. T1A is the output transformer designed to match the impedance of V1D to that of the headphones.

Volume Control (Sensitivity) is effected by VR1A which varies the bias applied to the I.F. amplifier V1D.

NOTES ON THE POWER PACK.

The Power Pack does not follow the normal trend for A.C./D.C. working employed for most domestic universal receivers. The difference being that while a resistive arrangement is used for breaking down the mains voltage for D.C., an auto-transformer is used for A.C.

To enable this to be carried out, and to give a large number of voltage tappings without a cumbersome multi-change switch, the whole of the switching is done by the screwing in of a plug.

For D.C. one contact only is made, e.g. S5, S6, S7 or S8, but for A.C., two contacts are made, S4 and S4A, or S3 and S3A, or S2 and S2A, or S1 and S1A.

With D.C., of course, current will pass one way only through the rectifier, so the correct position of the mains lead, to ensure correct polarity must be maintained.

The effect of the metal rectifier when working on D.C. is simply that of protecting the electrolytics, e.g. if there were no rectifier, then the electrolytics would be destroyed, should the mains plug be accidentally reversed.

The electrolytics C2 and C3 are 200 volt working, and it will be seen then that if the set were plugged into 250 volt D.C. mains with the receiver not connected, the electrolytics might be destroyed through the excess voltage being applied; therefore, to prevent this, R5/P is fitted. This and the lower half of the auto-transformer act as a bleeder to keep the H.T. voltage always below the working voltage of the electrolytics, irrespective of whether the receiver is plugged in.

C4/P is the filament voltage smoothing condenser. This is brought into circuit by the receiver plug, pins 1 and 2 being short-circuited.

C1/B is a mains filter condenser. This helps to prevent interference from noisy mains.

R1/P, R2/P, R3/P and R4/P are of critical value, their function being to enable the set to work off various mains voltages.

R6/P reduces the H.T. voltage to 7.5 for working the filaments of the valves.

WARNING. Don't forget when working off A.C. that the plug must be screwed

right home, as only when it is in this position will it short circuit the "A" switches, which, in turn, short-circuit R5/P. This resistor must be short-circuited for proper working on A.C.

FAULT FINDING ON THE MCR1.

In common with all other receivers, the most delicate parts of this set are its valves. Care must be taken not to drop the receiver, as this will probably fracture the filaments. Also, should it be necessary to remove the valves from their sockets, then the greatest care should be taken to see that they are not rocked, as this bends the pins and often cracks the glass. All that is required to remove these valves, is one straight upward pull.

If your require to test the filaments of the valves, the best way is, not to remove the valves, but to test across pin 1 and 3, of the mains plug. This should give a closed circuit reading. Of course, if you get an open circuit reading here, then don't presume that all the valve filaments are burned out. The best plan then is to take off the outer casing of the receiver and test for filament continuity across the contacts 1 and 7 of the valve base, thus avoiding taking the valve out.

Should it be found that the filament reading is in order, e.g. that the filaments are O.K. and yet the set will not play, then ascertain first of all if the trouble is in the power supply or the receiver. If you have both battery and power pack, and the set will not work from either, but according to the best of your knowledge, both battery and power pack are O.K., then it can fairly safely be presumed that the fault is in the receiver.

The best method of fault finding then is to voltage trace around the valve sockets; there should, of course, be H.T. voltage on all anodes and screens (don't forget your meter loads the circuit).

If all these appear in order, then, with a signal generator try to get an I.F. signal through from anode V2A. If you can, then the trouble is either in the coil pack (possibly imperfect connections) or the 1T4 valve is not oscillating, or the components associated with the oscillator circuit are at fault, or either V1A or V2A are at fault, or the components associated with V2A are at fault.

If you can't get an I.F. signal through, then work gradually towards the output stage, changing down to an L.F. signal after the second detector.

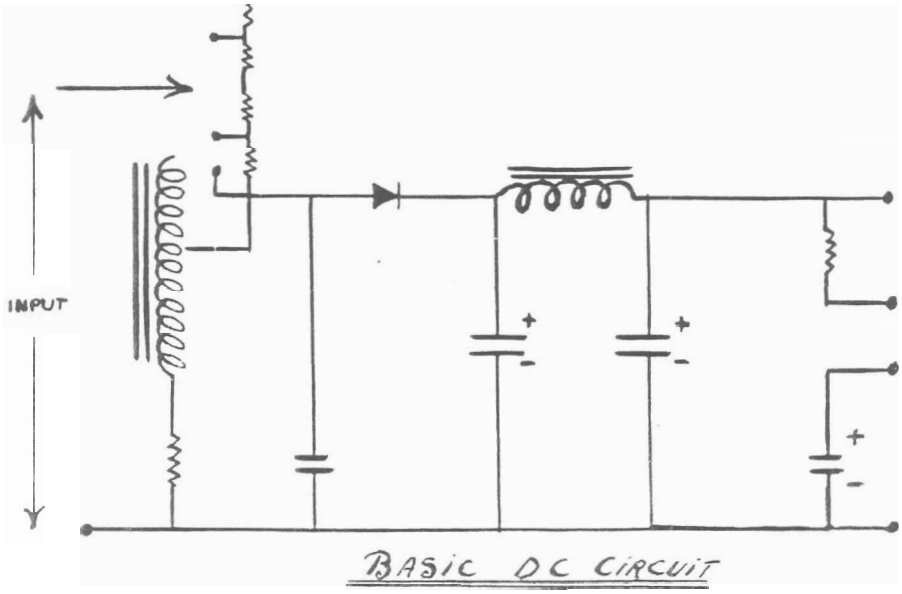
The fault will always be just behind the first point where you start to get signals, e.g. if you get a signal at the grid of the output valve, but not at the grid of the second detector, then the fault must lie in the second detector or its associated resistors or condenser.

FAULT FINDING ON THE POWER PACK.

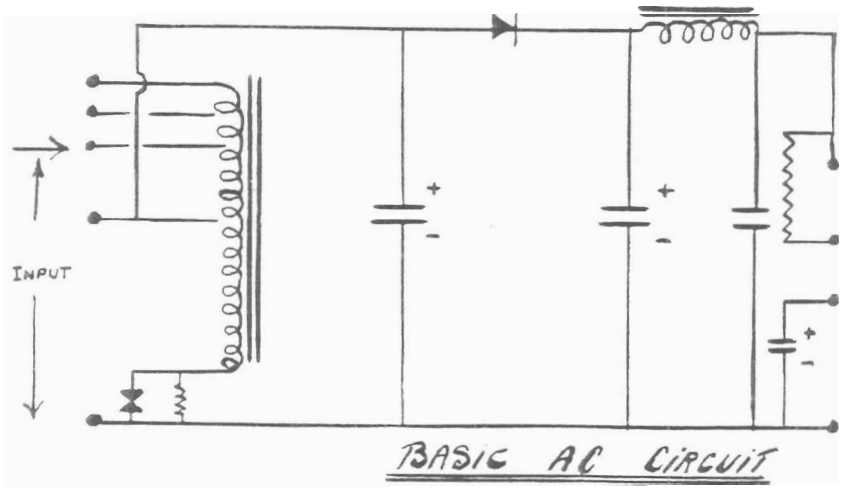
GENERAL. Absence of H.T. and L.T. volts will usually mean that either C2/P or C3/P have developed an internal short, a fault which is not uncommon with electrolytic condensers, especially if a voltage in excess of their rated voltage has been accidentally been applied, and this can happen quite easily with multi-voltage sets, e.g. if the plug were set at 107 volts and the set accidentally connected to, say 250 volts, then, in all probability the high voltage would burn out the electrolytics. It might, at the same time, burn out the valves.

Bear in mind when testing voltages of the power pack, that the filament voltage will not be exactly 7.5, unless your meter is exactly the same resistance as the 5 valves in series; therefore, don't be alarmed if your voltage reads high.

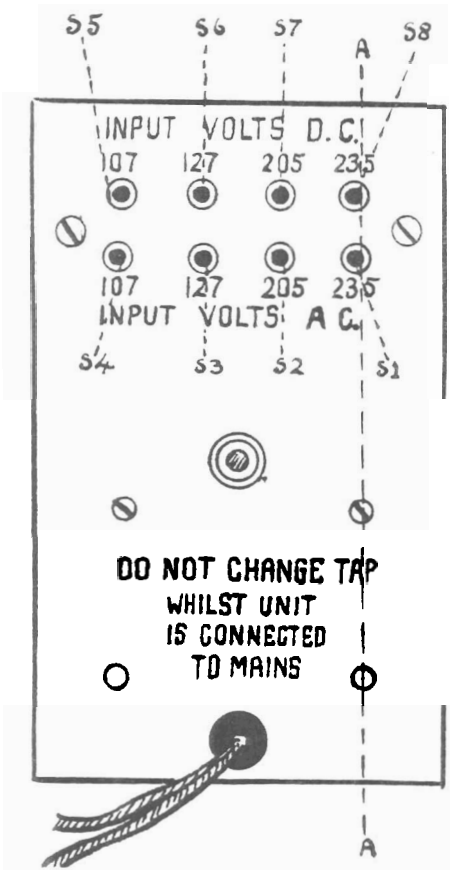
Don't forget that C4/P may develop a short-circuit with or without a good reason, but you can readily check this by testing between pins 1 and 2 of the power pack output socket. This, while not showing infinity, should show a high resistance (don't forget to maintain polarity) in fact, you should be able to see the charging of this condenser from your own meter battery. (If hum develops in the set, then test this condenser's capacity by watching it charge through your own meter). If no charging takes place, then this condenser has developed an open circuit and this will cause hum. If the set hums on A.C. an improvement can usually be effected by reversing the mains plug.

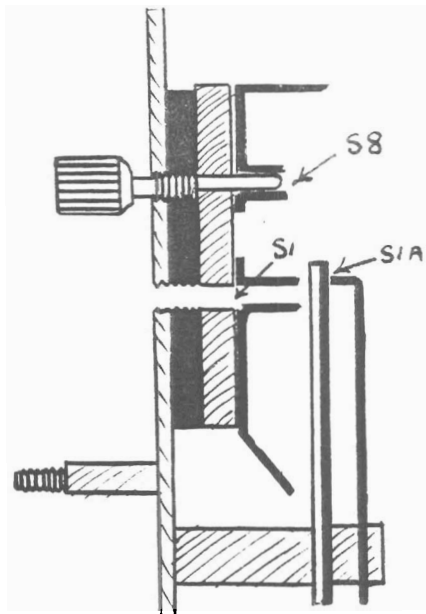


BASIC DC CIRCUIT

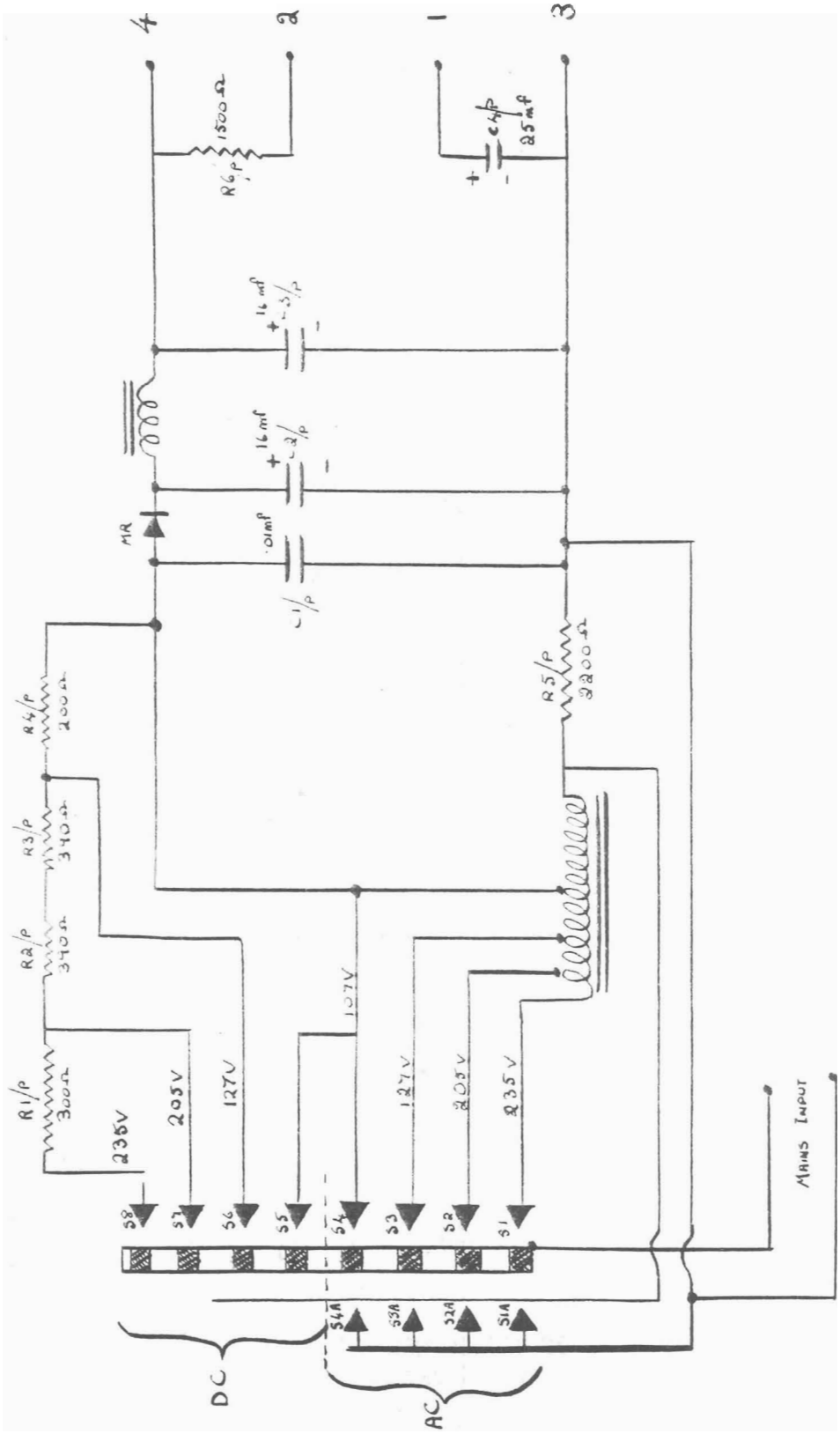


BASIC AC CIRCUIT

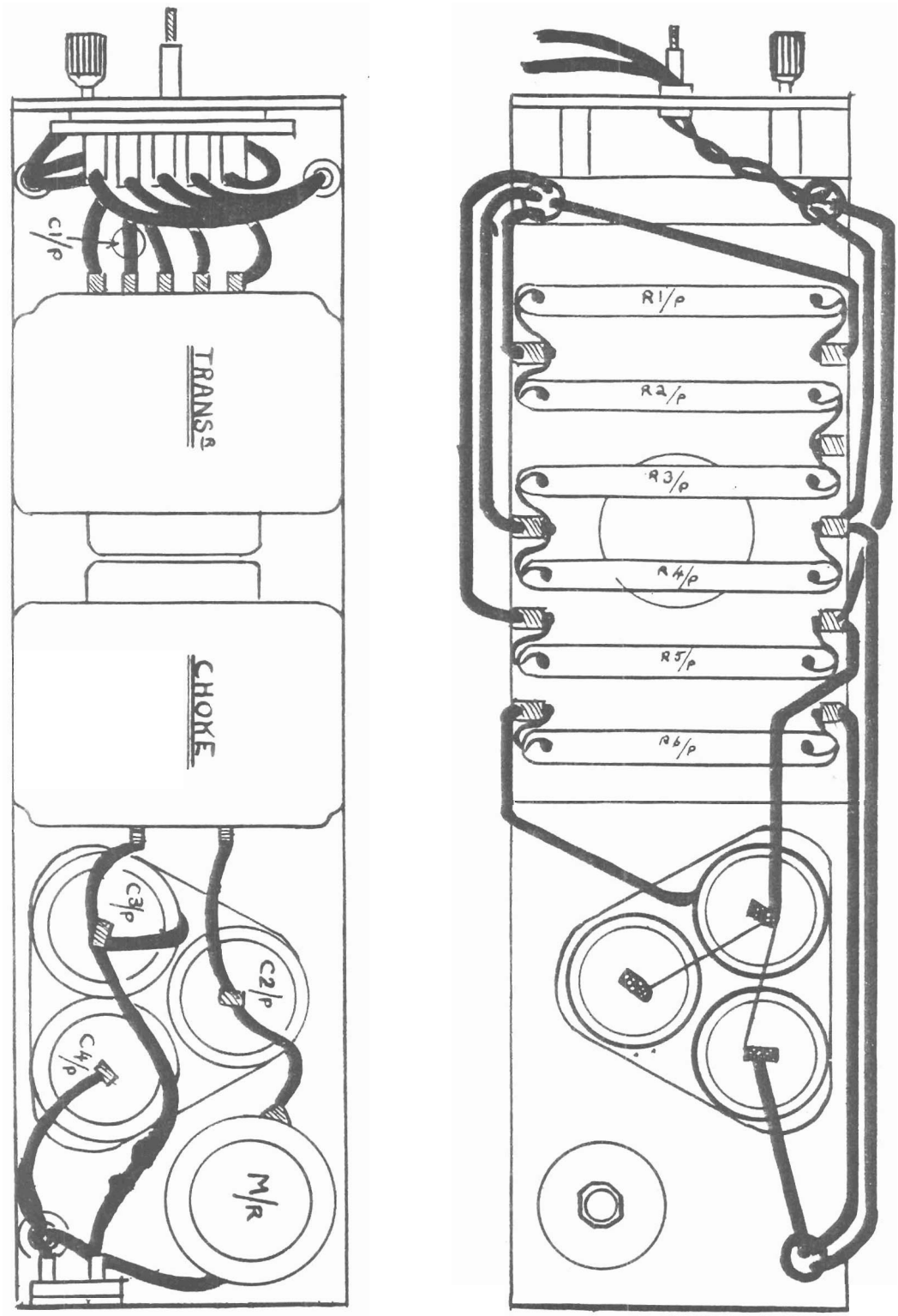




SHOWING HOW PLUG AFFECTS SWITCHING.
SECTION THROUGH "A" "A"



POWER PACK THEORETICAL DIAGRAM.



COMPONENT LAYOUT OF POWER PACK.

SUPPLEMENT TO THE MCR1 BOOKLET.

REPLACING THE DRY BATTERY.

At the time of publishing this booklet, a fair quantity of the correct size and type of batteries are available. It is believed, however, that there may be a shortage; therefore, some notes and sketches showing how ordinary batteries can be used, may be helpful.

For the L.T. section use 5 large capacity cell U2 or similar connected in series, and for the H.T. any 90V standard battery will do.

Connections to these batteries can be made by wires, Wander and Banana plugs, or alternatively, the socket can be removed from an old battery and wires taken from this to the new batteries, as in Fig. 1. This will facilitate simple switching on and off, by removing the plug.

For outdoor use a suitable box can be made to hold the batteries, and the socket can be permanently fitted on the top of the box, and, to this a shoulder strap can be fitted to facilitate carrying (see Fig. 2.).

NOTES WHEN USING THE SET OUT OF DOORS.

The set will slip into the pocket of most raincoats, the battery into the other.

The aerial should be placed on the shoulder, between jacket and raincoat, and a length of wire to act as a counterpoise earth should hang down.

Tuning in to alternative stations, and adjustment of "reaction" and sensitivity can be made without removing the set from the pocket. Of course, should you require to go to another wave band, then, it will be necessary to remove the set and change the coil pack.

It is important to realise that, owing to the fact that only a short aerial and imperfect earth can be used, reception of far distance stations is not usually possible in the walking position.

NOTES WHEN USING THE SET IN A CAR.

As cars are now made almost entirely from sheet steel, they present a perfect screening box against radio waves, therefore, the aerial of any radio must be external to the car. So if you wish to use the Pocket Radio in a car, you must hang the aerial out of one of the windows, or, better still, attach it to a standard type of car aerial.

If you intend fitting a car aerial, don't forget that the aerial must be insulated from the car. Very many of the car aerials available to-day are not fitted with insulators, and the uninitiated user often does not at first realise that these insulating bushes are necessary.

It is essential, however, that the aerial system should be entirely insulated from the car framework. The earth, on the other hand, should be connected to this car framework, although results are often quite good with the wire lying along the bottom, or with no earth wire at all. A lot depends upon the district and the direction in which you are travelling.

When using the set in the car, batteries must be used unless you provide a rotary convertor or a vibratory pack to energise the MCR1 power pack.

There are several rotary convertors about to-day quite cheap, which would run off the 6-volt or 12-volt car battery, and these rotary convertors give out D/C. This D/C can be used to energise the power pack, and this in turn would work the receiver. The block diagram - Fig 3 - shows the arrangement.

Notes on the M.R.C.1. and Power Pack.

The circuit of the M.R.C.1. is drawn with a short wave coil assembly plugged-in. The circuit of the coils ranges 2,3, and 4, are the same except for the size of the padding condenser, see diagram. Range 1, Aerial circuit is different, see diagram in bottom left hand corner. You will notice that there is no tuning in the signal frequency but a filter designed to pass signal of frequencies below the highest in the broadcast bands, and to suppress signals above this value. In addition this avoids the difficulties of ganging.

The M.R.C.1. works from 90 volts H.T. The current with sensitivity and reaction control at minimum is 5 MA. Full sensitivity and Set in oscillation 7.2 MA. Filament current 50 MA at 7.5 volts.

As the M.R.C.1. is built to work from an AC/DC Power Pack, the circuit must not come in direct contact with Earth. This is avoided by earthing the circuit through a .1 mfd condenser to the case, and the case of Chassis goes direct to earth.

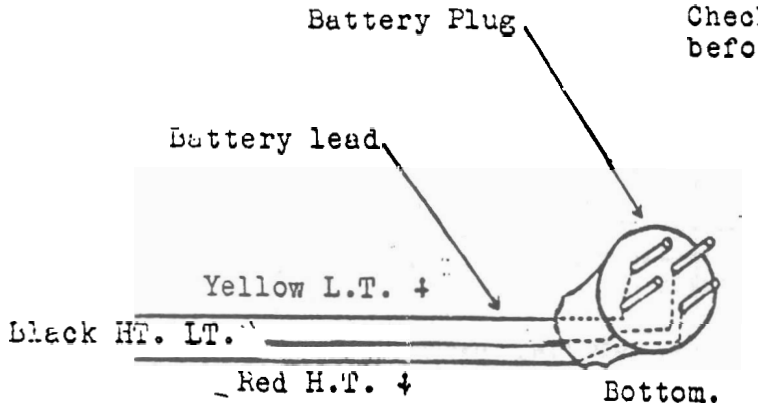
If you construct your own power pack with amplifier, the bias to the amplifier valve 1A5 should be 4.5 volts. It is easier to use a 4.5 volt battery than tap into the filament circuit. The positive of this battery is connected to the filament of the 1A5 valve. You will only require one extra lead to couple the power pack to the set, as the return comes with the battery leads.

As the output from the set is to suit 120 ohms Headphones, the best way to couple the amplifier to the set, is through the .1 mfd condenser shown in dotted lines at the headphone output valve. There will now be 2 condensers in the grid circuit of the 1A5 Valve. One in the set and the other in the amplifier. This is to prevent you receiving a shock from the power supply. The coupling lead between set and amplifier, if it is screened, should be covered for the same reason.

The case of either power pack is not coupled to the circuit at any point, so it is important to watch the insulation between the parts and wiring to the case.

A kit of parts can be supplied including metal case 9" x 4½" x 3½" drilled to take valveholder, speaker and controls. Price £5. 19. 6.

BATTERY CONNECTIONS FOR M.R.C.1.



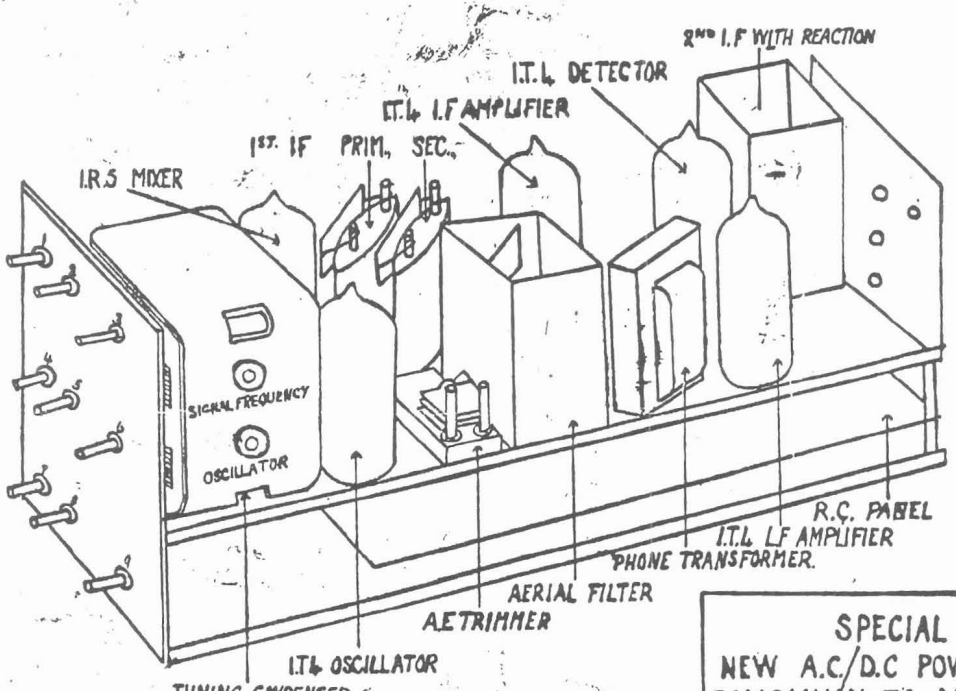
Check leads before using.

Colour of leads
RED LEAD H.T. +
BLACK LEAD HT-LT-
YELLOW LEAD L.T.

Looking at the pins with the two pins furthest apart at the bottom.

WARNING: Ever Ready A.D.24 Battery will blow the valves if plugged in without altering the battery connections. Any other battery with the same fittings should be examined to see if suitable before plugging in.

M.C.R.I.



SPECIAL
NEW A.C./D.C POWER PACK
COMPANION TO M.C.R.1
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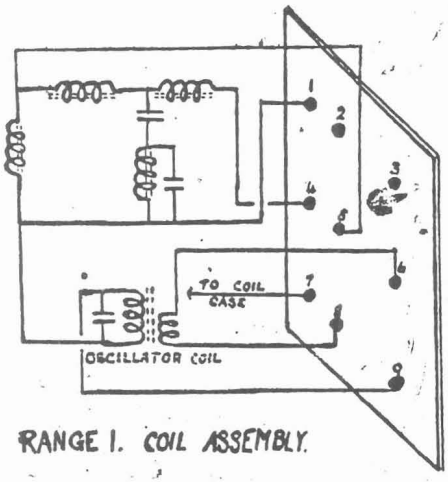
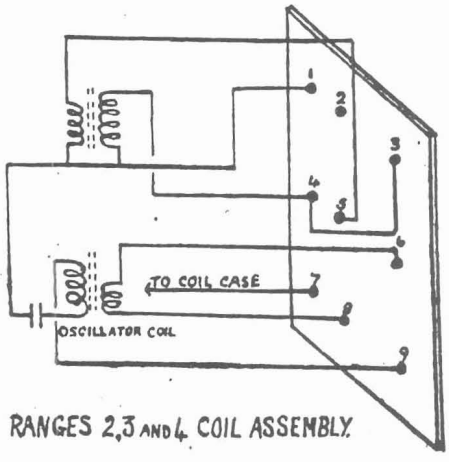


RANGE 1. COIL ASSEMBLY.



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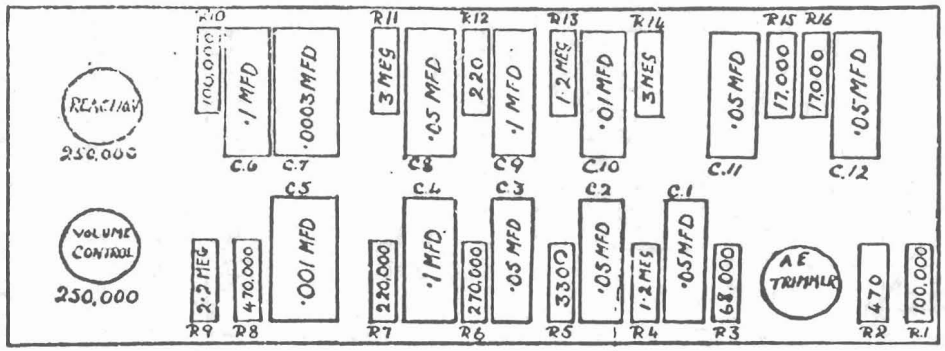
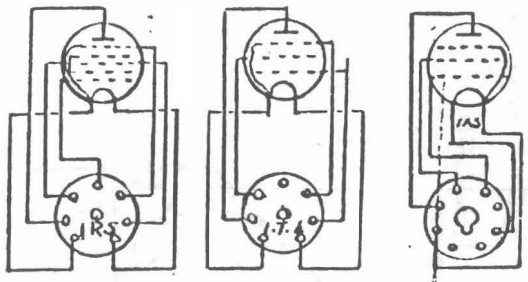


RESISTANCE AND CONDENSER PANEL OF M.R.C.1



BASE CONNECTIONS OF VALVES

250-107 VOLT A.C/D.C. POWER UNIT MADE AS COMPANION UNIT TO M.R.C.1.

TESTED POWER UNIT TO OPERATE L.S. SIZE 9"x4¼"x3¼" WITH 2½" BUILT IN L.S.