

RADIOKES "SIMPLIFIED" SUPER-HET. SIX

GENERAL.

The Radiokes simplified Super-heterodyne, employing 6 Valves and Rectifier, will give splendid sensitivity, knife edge selectivity and splendid tone, the latter being under the control of the operator. The tubes employed, and the positions they occupy are:—

R.F. Amplifier and Int. Amplifier, Kenrad	235
1st and 2nd Detectors	224
Oscillator	227
Power Output	247
Rectifier	280

The Radiokes new and improved Kit comprises:—

- | | |
|--|---------------------------------------|
| 1 Aerial Coil. | 1 Padding Condenser. |
| 1 R.F. Transformer. | 1 Stromberg-Carlson Triple Gang Cond. |
| 2 Intermediate Frequency Transformers. | 3 Knobs, 6 Yds. Hook-up Wire. |
| 1 Oscillator Coil. | |

Both the aerial coil and the R.F. Trans. embody impedance-capacity coupling, which gives uniform high amplification over the whole wave-band.

The Intermediate Frequency Transformers are so designed that they give the maximum of selectivity obtainable, without sacrificing the finely balanced tonal qualities.

The Super-heterodyne principle makes it imperative that the utmost care should be taken in the construction, and for this reason the instructions given herein should be carefully followed. If this care is taken, even those who know very little about radio will be able to build this set, and thus enjoy, at greatly reduced price, all the advantages given by the most expensive modern factory-built Super-het.

In addition to the parts given on the lists herein, the constructor will require approximately:—

- 5 doz. $\frac{1}{8}$ in. Nuts and Screws.
- $\frac{1}{2}$ lb. Solder, with a rosin flux, and a good Soldering Iron.

It is important that all soldered joints should be good, as one "dry joint" will be very likely to cause serious trouble.

Sufficient Friction Wire for the joints is included with the Coil Kit.



Assemble Yourself

The **RADIOKES**
SIMPLIFIED
SUPERHETERODYNE 6

METROPOLITAN ELECTRIC COY. LTD.
TRACY HOUSE, CLEVELAND STREET, REDFERN

THE COMPLETED SET



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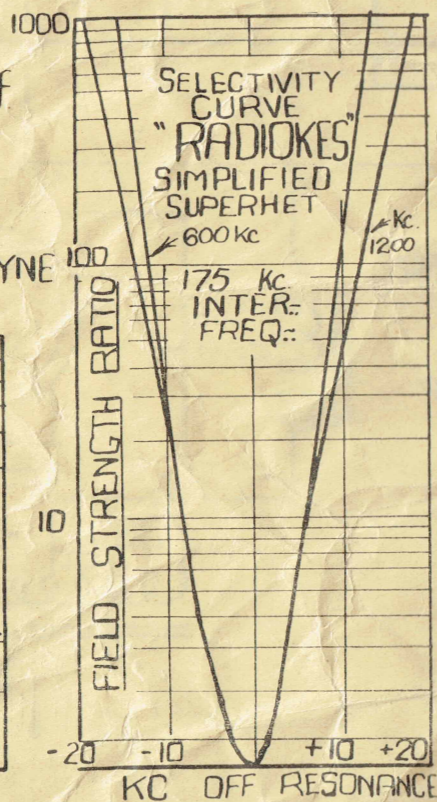
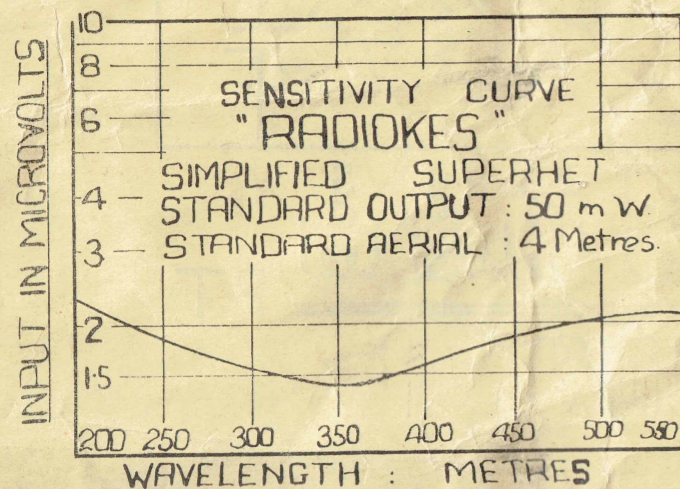
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It is important that all soldered joints should be good, as one "dry joint" will be very likely to cause serious trouble.

Sufficient Fried Wire for the job is included with the Coil Kit.

PERFORMANCE of "RADIOKES" SIMPLIFIED SUPERHETERODYNE



ASSEMBLY AND WIRING INSTRUCTIONS—Continued.

Then wire the loud speaker socket as follows:—

To two adjacent pins bring leads from plate pin of 247 socket, and from B+. The most convenient point being centre tap of 280 fil. Res. Then join this pin to the next adjacent pin on the speaker socket, and finally take a lead from C.T. to the fourth pin. The last step in this stage is to wire in the bias resistor of the 247. This is simply done by mounting R_8 between the chassis and the second terminal of the Power Choke. All leads in this stage may be done in ~~Green~~ ^{Orange} Fried Wire.

STAGE (2)—ASSEMBLY OF OTHER COMPONENTS.

First mount the T.C.C. By-Pass Condensers: 2 mf.—mount on side of chassis, directly under 280 socket 6 only 0.5 mf.: mount these in blocks of 3 on opposite side of chassis. It will be found that the spacing is such that this can be done while still leaving the coil mounting holes clear. Secondly, mount Vol. Control and Tone Control Switch on front, followed by padding Condenser on back. Mount aerial and earth terminals (insulating aerial terminal). Mount R.F.C. near 2nd Detector socket. Mount Triple Gang. The balance of the components are put in during stage (3). Note that soldering iron is not used during stage (2).

STAGE (3)—COMPLETION OF WIRING.

Before starting on stage (3) it is important to note that the Radiohms and Pigtail Resistors and small Condensers **must** be mounted so that they are unable to move, i.e., to a convenient terminal on a component which is solidly mounted to the chassis. First wire in 247 bias and grid lead. This is done by mounting R_7 between join of R_8 and the Power Choke, and one terminal of the 2mf. T.C.C. Next insert the 0.5 meg. Durham leak between this terminal and the grid pin of the 247 socket. (See diagram of Circuits.) On this grid terminal also mount the common terminal of the Simplex Tone Control Condenser, and one side of a .01 mf. T.C.C. Connect up the three lugs of the Simplex Tone Control to three of the four points of the switch, leaving the other vacant. Next take a lead from R.F.C. to plate terminal of second detector socket, and from other side of R.F.C. to the 0.1 mf. T.C.C. wired in as above. Then connect all the $\frac{1}{2}$ mfd. T.C.C.'s to Chassis, wire in the coils as shown in diagram of Circuits, being careful to rigidly follow the colouring of the leads as shown. The two resistors marked R_5 may be supported by the $\frac{1}{2}$ mf. T.C.C., to which they are connected. Note that the Green leads from R.F. Coil, and the two Intermediate Frequency Coils goes straight to B+; it will be found that the top R_5 (in circuit diagram) will be a convenient spot to bring the B+ lead to from the power side of the chassis, with R_5 mounted on the plate de-coupling Condenser (0.5 mfd.). The Oscillator plate lead Green goes through R_4 to B+, and is de-coupled by the 0.5 mf. T.C.C. shown in Circuit diagram. This 0.5 mf. is a convenient mounting post for R_4 . The Orange lead from Oscillator Coil goes to cathode of 1st Detector Socket, and the Red to R_3 and .01 mf. T.C.C., the other ends of both of which are earthed to chassis. The Screen Grids are simply connected as shown in Diagram of circuits. Cathodes of R.F. Amplifier and I.F. Amplifier are joined, and go through R_2 to V.C., the other side of which goes to aerial terminal. Cathodes are de-coupled as shown by 0.5 mf. 2nd Detector Cathode goes to R_6 , and 0.5 mf., the other sides of which go to chassis.

Finally, 2nd Detector Screen Grid is taken to the other grids through R_9 and is by-passed to chassis through the remaining 0.5 mf., and 2nd Detector plate goes to B+ through the other $\frac{1}{2}$ meg. Durham leak. Black lead from Oscillator coil goes to grid pin of 227 socket through .00025 T.C.C. Fixed Cond. and Blue lead to padding

Condenser, the other side of which goes to chassis. The grid pin of the 227 is earthed through the 2.0 meg. Durham Leak. Use Blue Fried Wire in this stage. Having thus completed the wiring, go carefully through the circuit, stage by stage, paying strict attention to the diagram of Circuits in order to thoroughly check over the wiring. Care should be taken to connect the Loud Speaker leads to the plug in corresponding order to that in which the socket in the chassis is wired.

The receiver is now ready to be lined up and tested.

TESTING AND ADJUSTING THE COMPLETELY WIRED CHASSIS.

Having carefully checked over the wiring, the final step is to adjust the various trimmers and padding Condenser. Before outlining a method of doing this, the following will be a great help should a voltmeter be available:—Max. B+ volt. to Chassis: 240 to 250 volt. Between I.F.C. and Chassis: 50 to 60 (neg.). This is the drop through the Penthode Bias Resistor and the Power Choke. Plate Volts. on 235's and 1st Det.: 240 to 250. Screen Volts. on 235's and 1st Det.: 90 to 100. Max. Bias Volt. on 235's: 15 to 20. Min. Bias Voltage on 235's: 3. (It will be noted that the maximum is not sufficient to entirely suppress plate current in the Variable Mu tubes, but the aerial is directly earthed when the Bias is at max. value, and thus complete attenuation of signals is possible.) Oscillator plate volts: 40 to 50. 2nd Detector is leak-fed, and hence voltages may not be read. It will be found advisable to use a metallic bottom plate for the chassis, since the great sensitivity of the receiver will cause pick-up on the lead from the aerial terminal to the aerial coil can, if this is not screened as suggested above. Now set the receiver up, attaching speaker, and about 10 to 15 feet of aerial and an earth; switch on power and allow tubes to warm up. Put Vol. Control to max. and tone control to the vacant stud on the 4-point switch. (Should the set howl when it has warmed up, it is a sure sign that one of the T.C.C. de-couplers has been omitted, most likely that one de-coupling the plates.) Tune in a low-wave length station (e.g., 2UW). Adjust trimmers on Variable Condenser until maximum signal is obtained. (Note that when the adjustment is nearly complete, the local station will be too strong, so that it is advisable to change to an interstater for the final adjustments.) Having thus adjusted the circuits at the low wave lengths, we must finally adjust the padding Condenser, to ensure that the tracking is in order. (Note that the padding Condenser is untouched up till now.) Tune in a fairly high wave-length station (such as 2FC). Do not touch triple gangs trimmers. "Rock" the triple gang, i.e., tune from one side of the station to the other, and at the same time screw the padding Condenser. It will be found that (excluding the very improbable case in which the padder is found dead right) on screwing padder out, and rocking, signals decrease in strength, and on screwing in and rocking, signals increase in strength, or vice versa, depending on whether the padder was too big or too small to start with. The receiver is now lined up, and on returning to low-wave length stations it will be found that they still are received at full strength. The Superheterodyne is now complete, and the tone control may be tried out and stations sought for. It will be found that the tone control on the first position has the effect of practically eliminating the background noise in the reception. The other positions result in increased mellowness of tone. The operator will have a choice of about 30 different stations, all of which will give good entertainment consistently, and up to a dozen others will be heard if conditions are favourable. For the more technically minded, we append the sensitivity and selectivity curves of the receiver. It will be seen that the sensitivity is well under 1 microvolt per metre, while 15Kc separation is possible under any conditions of station strength, even when the local is giving a strength 1,000 times as great as the distant station whose programme is desired.

Assembly and Wiring Instructions

Having collected all parts required, together with material, such as nuts, screws, solder, flux, and a good iron, the assembling and wiring of the receiver may be gone on with.

This may best be done in 3 stages, viz.:—

- (1) Assembly and wiring of Power Pack, and output stage.
- (2) Assembly of other components.
- (3) Wiring of other components.

STAGE (1)

Mount the components on the chassis in the following order:—

- (1) All Valve Sockets (sub-panel).
- (2) Power Transformer (P.T.).
- (3) Electrolytic Condensers (I.F.C. and O.F.C.).

IMPORTANT NOTE.—I.F.C. is insulated from the chassis, washers are provided with the Polymets for this purpose, and one of the holes has a larger clearance than the other.

- (4) Power Choke (Pwr. Chke.). Wire up all filaments with Black fried wire; 280 Rectifier to "C" winding (5v.); 247 Penthode to "B" winding (2.5v. 3a.). All others in parallel with "A" winding (2.5v. 8a.).

Next, complete the wiring of the Power Circuit as follows:—

Wire in 280 Plates to outers of 350/350 winding on P.T. Then wire from C.T. of 350/350 to the **case terminal** of I.F.C. and also from C.T. to Pwr. Chke.

Mount Centre Tapped Filament Resistors as shown in Circuit diagram. Wire from Centre Tap of 280 fil. Resistor to centre poles of both F.C. and O.F.C. These points are common, and are the B+ point (Max. high tension voltage) of the receiver. Wire now from B+ point to auxiliary grid pin on 247 socket. **DO NOT** connect centre tap of 5v. "B" winding to centre tap of 280 fil. resistor.

ASSEMBLY AND WIRING INSTRUCTIONS—Continued.

Then wire the loud speaker socket as follows:—

To two adjacent pins bring leads from plate pin of 247 socket, and from B+. The most convenient point being centre tap of 280 fil. Res. Then join this pin to the next adjacent pin on the speaker socket, and finally take a lead from C.T. to the fourth pin. The last step in this stage is to wire in the bias resistor of the 247. This is simply done by mounting R_8 between the chassis and the second terminal of the Power Choke. All leads in this stage may be done in ~~Green~~ ^{Orange} Fried Wire.

STAGE (2)—ASSEMBLY OF OTHER COMPONENTS.

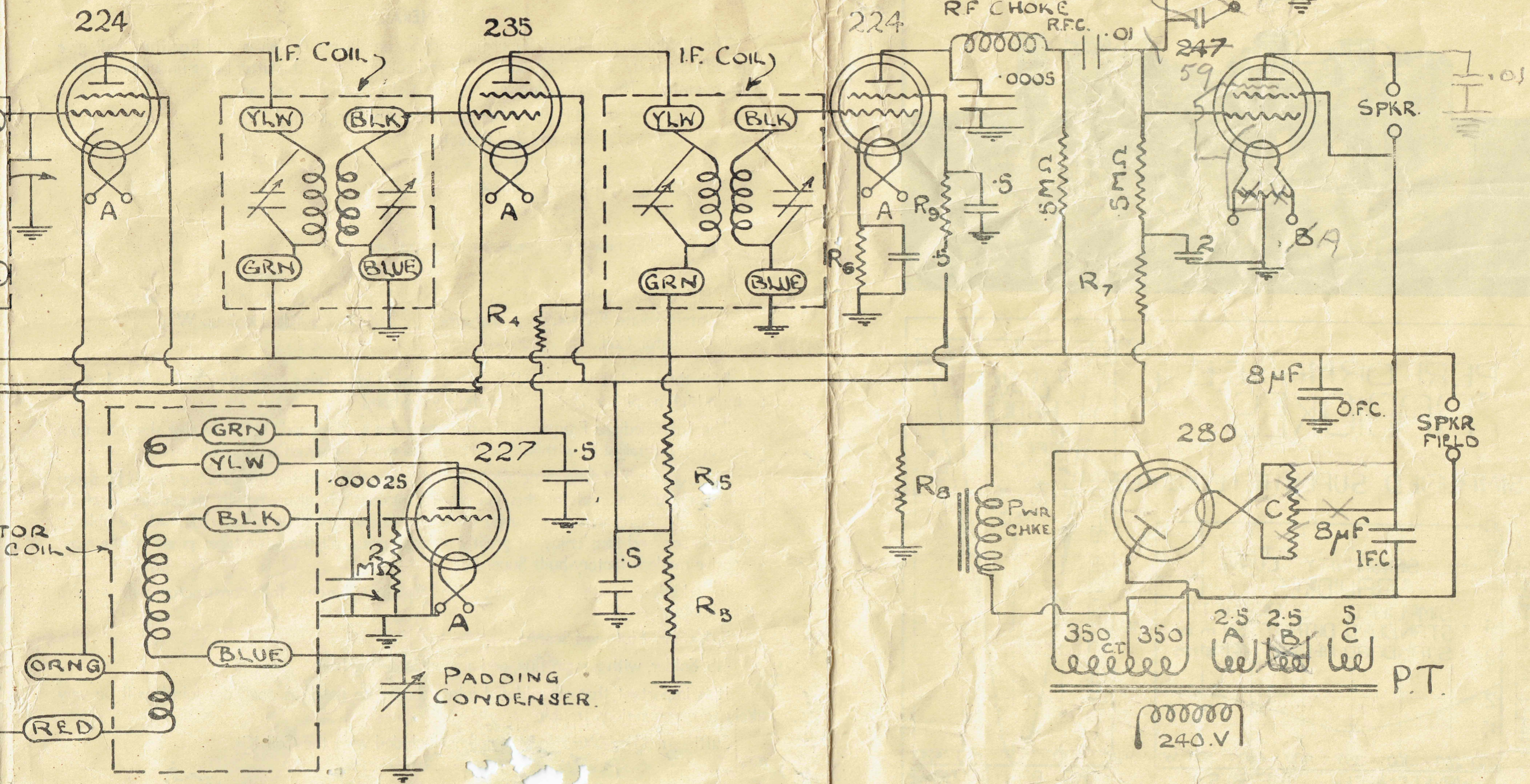
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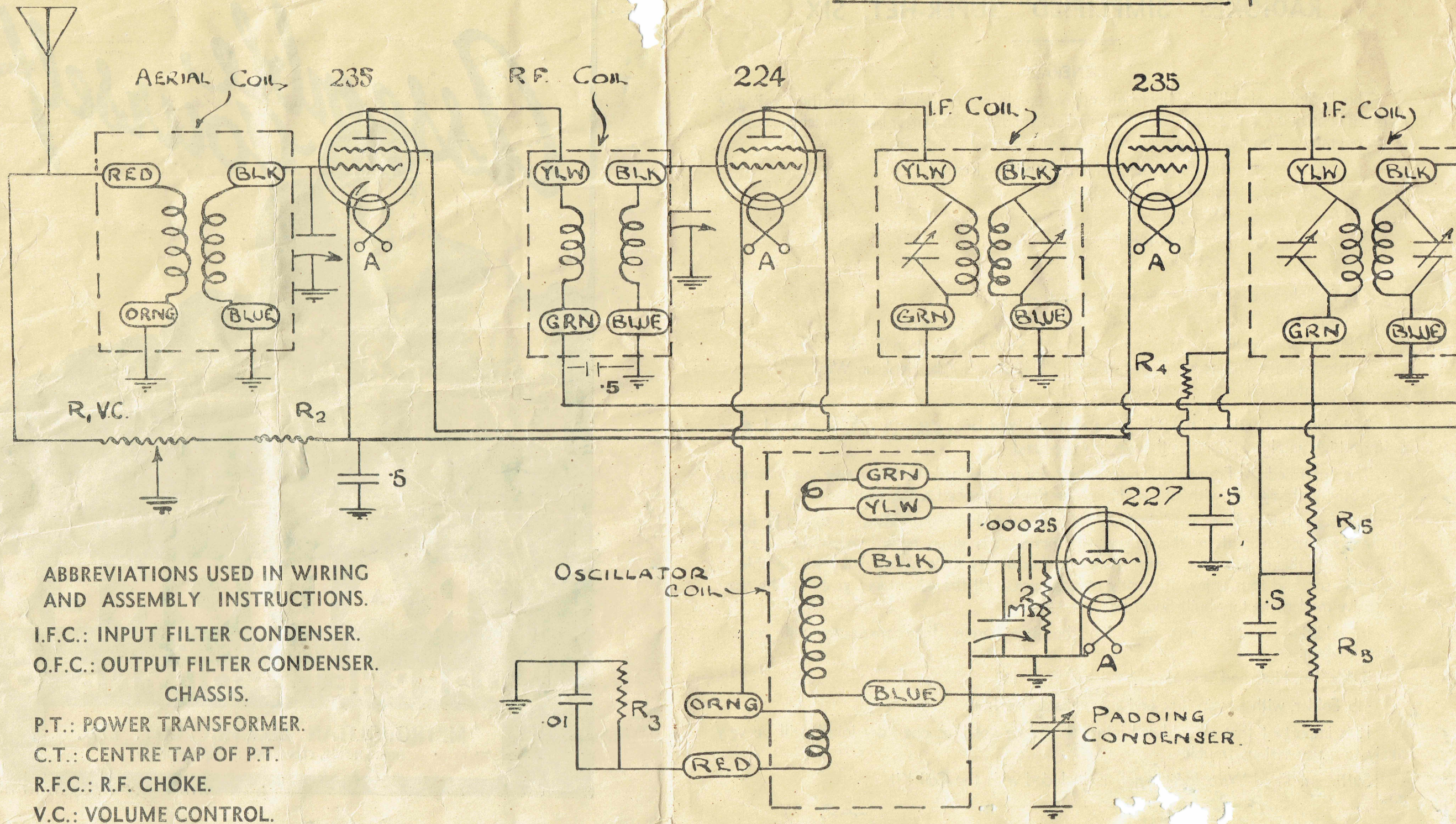
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CIRCUIT DIAGRAM.



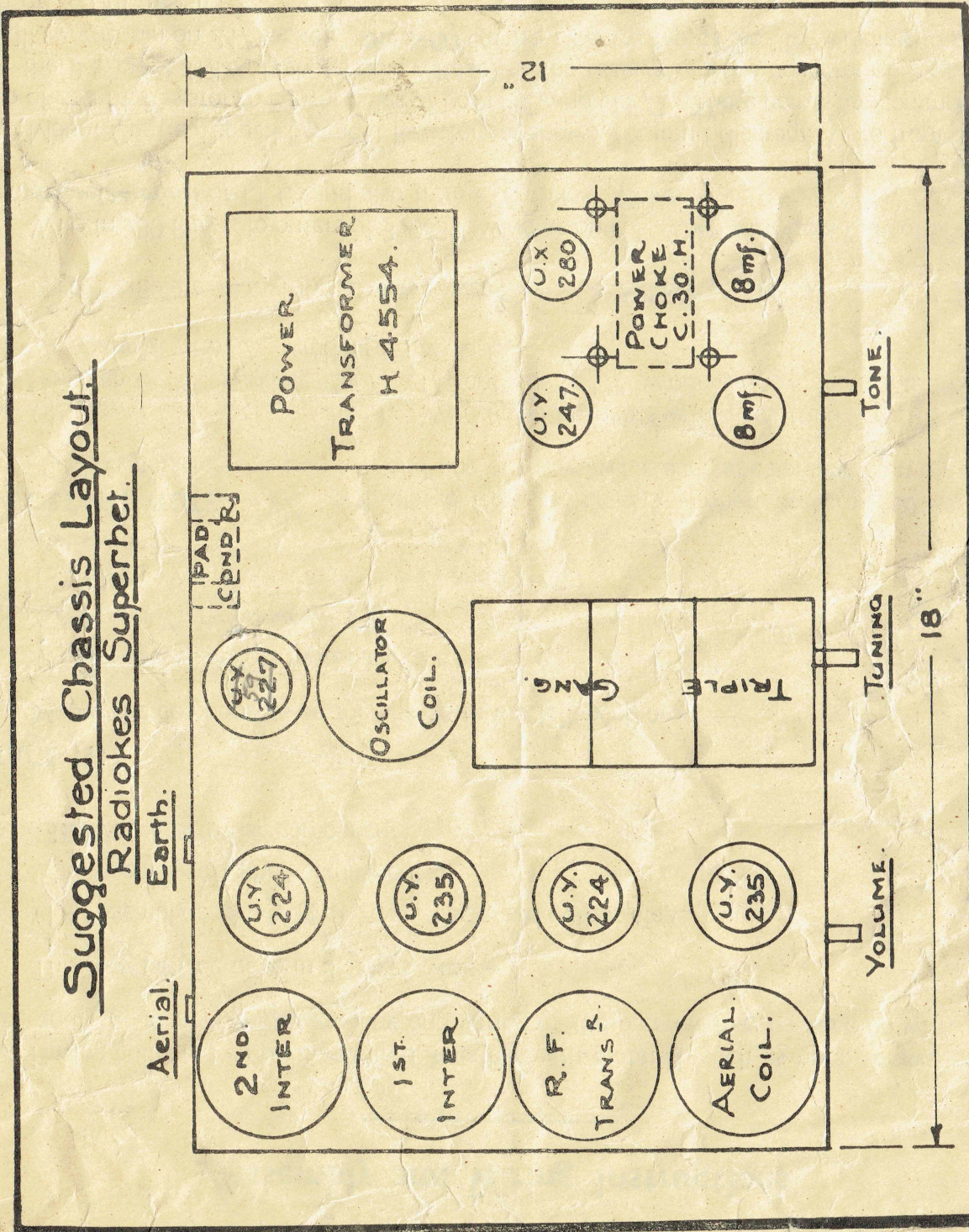
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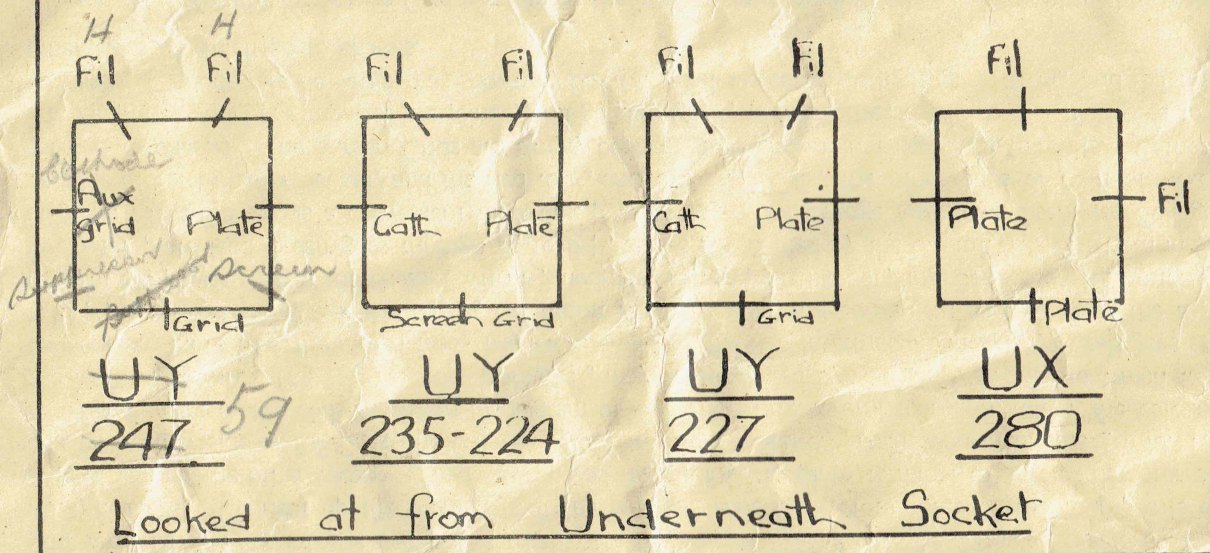
- ABBREVIATIONS USED IN WIRING AND ASSEMBLY INSTRUCTIONS.
- I.F.C.: INPUT FILTER CONDENSER.
 - O.F.C.: OUTPUT FILTER CONDENSER.
 - CHASSIS.
 - P.T.: POWER TRANSFORMER.
 - C.T.: CENTRE TAP OF P.T.
 - R.F.C.: R.F. CHOKE.
 - V.C.: VOLUME CONTROL.

Suggested Chassis Layout.

Radiokes Superhet.



KEY to "MARQUIS" VALVE SOCKETS



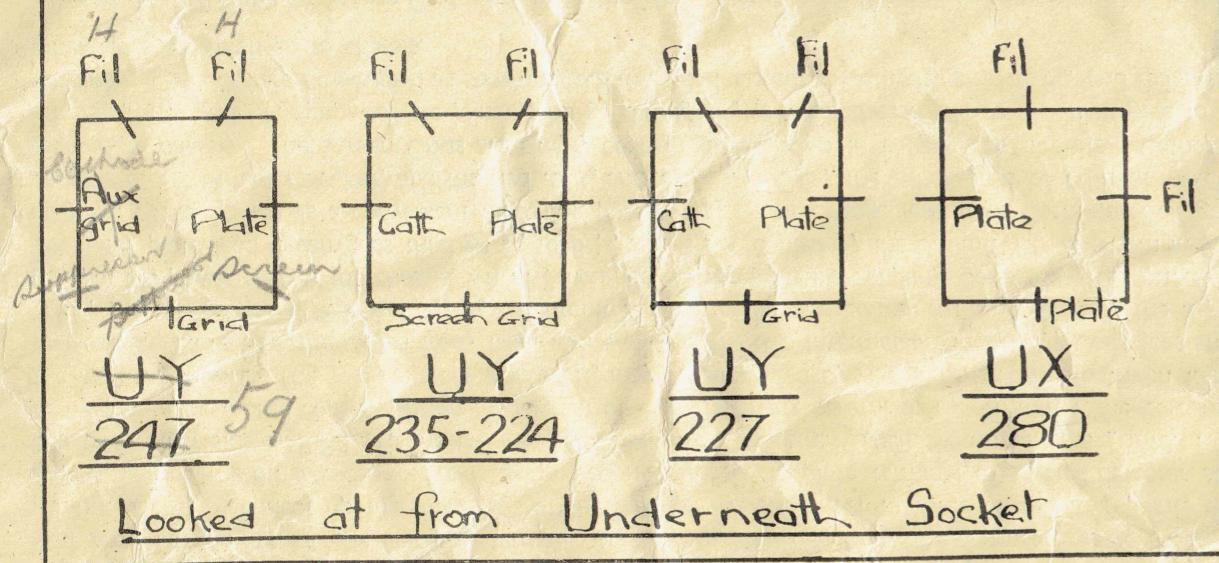
LIST OF PARTS REQUIRED FOR RADIOKES SUPERHETERODYNE.

- | | |
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| 1 only Radiokes Superhet. Coil Kit, comprising:— | 2 only 25,000 ohm 10M/A A25A Radiohm, R ₄ , R ₆ . |
| 1 only Standard Aerial Coil. | 2 " 50,000 " 10M/A A50A " R ₅ . |
| 1 " Standard R.F. Transformer. | 2 " 100,000 " 5M/A A100D " R ₇ , R ₉ . |
| 1 " Oscillator Coil. | 1 " 250 " 100M/A Pigtail Resistor, R ₈ . |
| 2 " Intermediate Trans. | 2 " 50 " Centre Tapped Fil. Res. |
| 1 " Radiokes Padding Condenser. | 1 " H4554 Power Transformer. |
| 1 " Stromberg Carlson Triple Gang. | 1 " C30H.S. Power Choke. |
| 1 " 10,000 ohm Volume Control (VC10), R ₁ . | 1 " Honeycomb R.F. Choke Type R.F.H.C. |
| 1 " 125 " 50M/A Pigtail Resistor, R ₂ . | 1 " Radiokes Full Vision Dial Complete. |
| 1 " 10,000 " 10M/A A10A Radiohm, R ₃ . | |

OTHER PARTS.

- | | |
|--------------------------------------|--|
| 2 only 8 mfd. Polymet Condensers. | 1 only Simplex Tone Control Cond. Ass. |
| 2 " 235 Ken-Rads. | 1 only 4-point switch. |
| 2 " 224 " " | 1 " 7 pin socket |
| 1 " 247 59 " " | 5 " 6 only U.Y. Sockets |
| 1 " 227 " " | 2 " U.X. " } Marquis. |
| 1 " 280 " " | 1 " Loud Speaker Plug |
| 1 only 2.0 mfd. T.C.C. By-pass Cond. | |
| 6 " 0.5 mfd. T.C.C. By-pass Cond. | 1 only Amplion Loud Speaker, Type K.75, 7,500 ohm field. |
| 2 " 0.01 mfd. T.C.C. Fixed Cond. | |
| 1 " 0.0005 mfd. T.C.C. Fixed Cond. | 5 only Valve Screening Cans, 2in. dia. x 4 1/4 in. high |
| 1 " 0.00025 mfd. T.C.C. Fixed Cond. | 1 only Pressed Metal M.S. Udyllite finished Chassis. |
| 2 " 0.5 megohm Durham Leaks. | |
| 1 " 2.0 megohm Durham Leak. | |

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| 1 " Standard R.F. Transformer. | 2 " 100,000 " 5M/A A100D " R ₇ , R ₉ . |
| 1 " Oscillator Coil. | 1 " 250 " 100M/A Pigtail Resistor, R ₈ . |
| 2 " Intermediate Trans. | 2 " 50 " Centre Tapped Fil. Res. |
| 1 " Radiokes Padding Condenser. | 1 " H4554 Power Transformer. |
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| 2 " 224 | 1 " 7 pin socket |
| 1 " 247 59 | 5-6 only U.Y. Sockets |
| 1 " 227 | 2 " U.X. " } Marquis. |
| 1 " 280 | 1 " Loud Speaker Plug |
| 1 only 2.0 mfd. T.C.C. By-pass Cond. | 1 only Amplion Loud Speaker, Type K.75, 7,500 ohm field. |
| 6 " 0.5 mfd. T.C.C. By-pass Cond. | |
| 2 " 0.01 mfd. T.C.C. Fixed Cond. | |
| 1 " 0.0005 mfd. T.C.C. Fixed Cond. | |
| 1 " 0.00025 mfd. T.C.C. Fixed Cond. | 4-5 only Valve Screening Cans, 2in. dia. x 4¼in. high |
| 2 " 0.5 megohm Durham Leaks. | 1 only Pressed Metal M.S. Udyllite finished Chassis. |
| 1 " 2.0 megohm Durham Leak. | |

ASSEMBLY TO END OF 2nd STAGE

Filament Wiring Omitted for Clearness

