INSTRUCTION BOOK FOR

EDDYSTONE

1934

KILODYNE KITS

PRICE: ONE SHILLING.

EDDYSTONE
1934 KILODYNE FOUR

BATTERY AND A.C. KITS.

Instructions and diagrams for the erection, operation and maintenance.

The 1934 Kilodyne Four differs from other all wave receivers inasmuch that it has been primarily designed as a short wave set, while adaption for the longer wavebands has been incorporated later and it is not a long wave set adapted afterwards so that short wave signals can be received. On the medium wavelengths, 250/500 metres, it is highly selective for its type and has excellent long range capabilities. We have regular reports concerning its reception of English and other European MEDIUM WAVE STATIONS from such distant parts as the West Coast of Africa and Northern India. It should be borne in mind, however, that on these wavelengths it is impossible without a plurality of tuned circuits to achieve hair-line selectivity on powerful local transmitters, and this is not claimed.

The circuit design is based on the 1933 Kilodyne which gave such great satisfaction and which has now been modified to include the latest developments. The design employs a screened grid high frequency stage and although an untuned aerial circuit is used, a great measure of amplification is obtained from this valve due to the efficiency of the coupling circuit following it. This coupling comprises a high frequency transformer with tuned secondary winding, which arrangement gives only light damping on the detector valve grid circuit, to the great advantage as far as selectivity is concerned. The reaction winding is fed from the detector plate by means of the Reinartz method to this transformer. The detector valve is of the metallised type and leaky grid detection is employed. The detector valve is coupled to the first L.F. valve by means of a resistance coupling stage, the valve of which is coupled by means of a Hypermite transformer to the final pentode output valve. There are only two high tension leads, the different voltages for the various stages being drop fed by means of resistances and decoupled, which results in more efficient working, greater simplicity and an even drain on the high tension battery. The grid bias battery is eliminated, automatic bias being derived from the high tension supply for this purpose.

CONSTRUCTIONAL DETAILS.

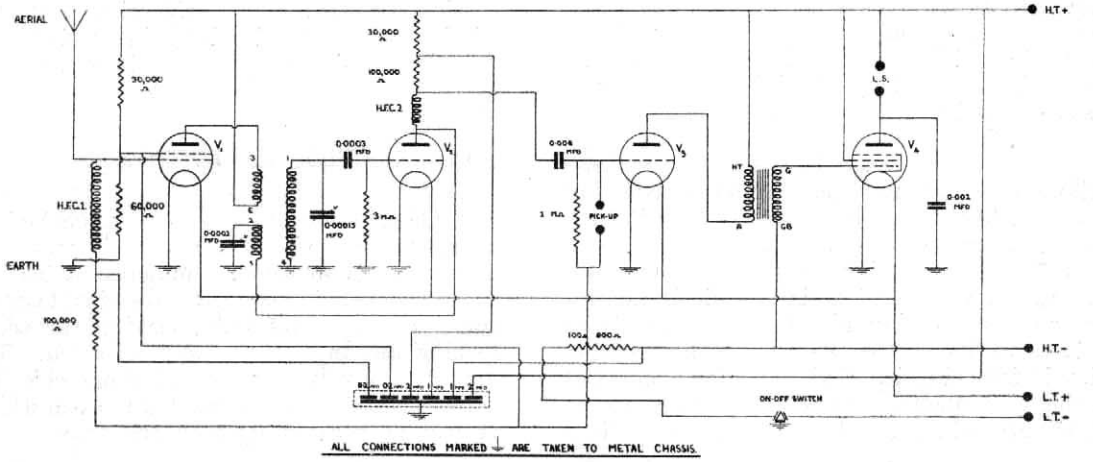
The components should be unpacked and checked over so that a general impression of the lay-out is obtained. Commence by inserting the six sockets in the terminal strips, fastening these with one nut only, leaving the second locking nut until the wiring is begun. Then mount the valveholders and 6-pin coil base using 6BA $\times \frac{1}{2}''$ round head screws and nuts. It will be noticed that on the screened grid

valveholder and the coil base, the fastening down screw is also used to make a connection to the chassis and the paint has been removed for this purpose. These screws can be left loose until the wiring is commenced. The remaining components on the chassis can now be mounted, two 4BA × $\frac{5}{8}$" screws being used for the transformer and two 4BA × $\frac{3}{8}$" screws for the condenser block. For mounting the H.F. chokes, use 6BA × $\frac{1}{2}$" screws and for the grid bias resistance a 4BA × $\frac{1}{2}$" screw is necessary. The small fixed condensers and wire end resistances should then be prepared to be put into place. $\frac{5}{8}$" × 6BA screws are threaded through the tags on the .0003 mfd. condenser and on one side only of the .006 and .002 mfd. condensers and should be locked tightly in place with 6BA nuts. These screws are then used as terminals to which to wire to, washers and terminal heads being provided to complete the assembly. The ·0003 mfd. grid condenser is mounted on to the chassis by using a 6BA × $1\frac{1}{4}$" screw threaded through a $\frac{5}{8}$" erinoid distance sleeve, utilising the hole in the condenser moulding itself. It will be noticed that one end of the 3 megohm grid leak is taken to the metal chassis by using this screw as a means of connection. When wiring, it will be necessary to make sure that the head of this screw is making good contact to the metal so that the grid leak is returned correctly to earth. The .006 mfd. condenser is fixed by placing one of the terminal tags over the bottom connection of H.F. choke 2, the other end being fitted with a terminal in the manner already mentioned. The .002 mfd. condenser has a terminal connection on one end, the tag on the other side being bent gently over at right angles and the hole in the tag slipped over one of the fastening screws of the final valveholder. It should also be carefully watched that the head of this screw makes actual contact with the metal of the chassis. The resistances are easily mounted into the circuit, the ends being cut to the length required and then made into small loops by means of a pair of pliers. The reaction condenser, switch, tuning drive and condenser need not be mounted until last, since it is more convenient to work without the panel in place in the early stages. The actual wiring can now begin and rubber covered wire is supplied for this purpose. This has to be cut into the lengths required and the ends bared and looped for easy connection. In stripping the rubber from the end of the wire, make sure that the copper wire itself is not cut.

With the help of the point to point connections and the wiring diagram, no difficulty should be experienced in carrying out the wiring correctly, the only point is that care should be taken to see that the wire is clean and that good tight connections are made in every case. Any one loose joint or connection may cause endless trouble in the performance of the receiver. A good supply of washers is provided and these should be utilised where one or more wires lead to the same fixing point. The set is arranged so that no soldering is necessary but, of course, to anyone experienced in soldering, all the joints could be made in this way and this arrangement is perhaps preferable since an excellent electrical contact is always assured with a well soldered joint.

Having proceeded thus far, the panel can now be put into place and the switch, reaction condenser, tuning drive and escutcheon

THE 1934 KILODYNE FOUR.



mounted. The variable tuning condenser is locked to the bent metal bracket at the back of the drive and the spindle pushed into the centre bush where it is finally fastened by the side set screw. Before setting this screw, the pointer on the drive should be turned to 100° and the vanes of the tuning condenser placed right in. The final wires to the tuning and reaction condensers and the leads from the switch can then be made. The leads are already soldered to the switch.

All that remains to be done to complete the assembly is to connect the battery leads as shown in the blue print. The blue lead is L.T. negative—this is provided with a small tag at the end for fastening to the switch. The red lead is H.T. positive, the whitish-grey lead, L.T. positive and the black lead, H.T. negative.

The set is now ready to test, but before doing so, it is advisable to thoroughly check over with reference to the point to point connections to make sure that everything is in its correct place. We draw attention to the following points, which should be most carefully observed :—

Leads Nos. 3 and 4—
Connections from the earth terminal to one end of the 60,000 ohm resistance are made to the chassis by means of one of the screws which holds the terminal block. This screw should make good contact and the paint must be removed from the chassis to ensure this.

Lead No. 38—
The third lead from the switch is taken to a screw and terminal head bolted to the chassis and making good connection to it.

Lead No. 51—
This lead is dotted because it runs entirely on the top side of the chassis. It joins the moving vanes terminal of the tuning condenser to the metal chassis. Connection to the metal chassis is made by utilising fixing screw E of the grid bias potentiometer.

All leads which go to connections marked E should make good electrical connection to the metal chassis as before mentioned.

The Erie resistors are coloured and the different values can be differentiated from the following colour markings :—

	Body.	*Tip.*	*Dot.*
30,000 ohms	Orange	Black	Orange
40,000 ohms	Yellow	Black	Orange
50,000 ohms	Green	Black	Orange
60,000 ohms	Blue	Black	Orange
100,000 ohms	Brown	Black	Yellow
1 megohm	Brown	Black	Green
3 megohm	Orange	Black	Green

VALVES.

V1 is the screened grid high frequency valve and the correct one to use is either the Mazda SG215 or Mullard PM12. V2 is the detector valve, which is a Mazda HL210 metallised, and the choice of this valve is particularly stressed since valves of other characteristics or not metallised may be very detrimental to the performance of the receiver. V3 is a Mazda HL210 clear and V4 a Mullard PM22. The use of this last valve is also important and it should not be substituted, otherwise the automatic grid bias arrangements will be upset.

BATTERIES.

A 2 volt accumulator is necessary for the filament supply and at least 135 volts high tension is recommended. This may be increased up to 170 volts without any harm to the receiver. Slightly increased power is obtained when a higher H.T. voltage is used but the current consumption of the set will be increased considerably.

LOUD SPEAKER.

If the ordinary type of cone speaker is used, one with a resistance of approximately 2,000 ohms is most suitable. In the case of a moving coil loud speaker, this should have an input transformer of high ratio incorporated in order to match the high impedance of the pentode valve used. The Eddystone Permanent Magnet Moving Coil Loud Speaker, matched for use with this set, employs a transformer with a ratio of 70-1.

NOTE. If it is desired to place the chassis in a cabinet, care should be taken so that no metal screening plate is placed under the chassis since this is quite unnecessary for screening purposes and may be responsible for shorting out some of the connections.

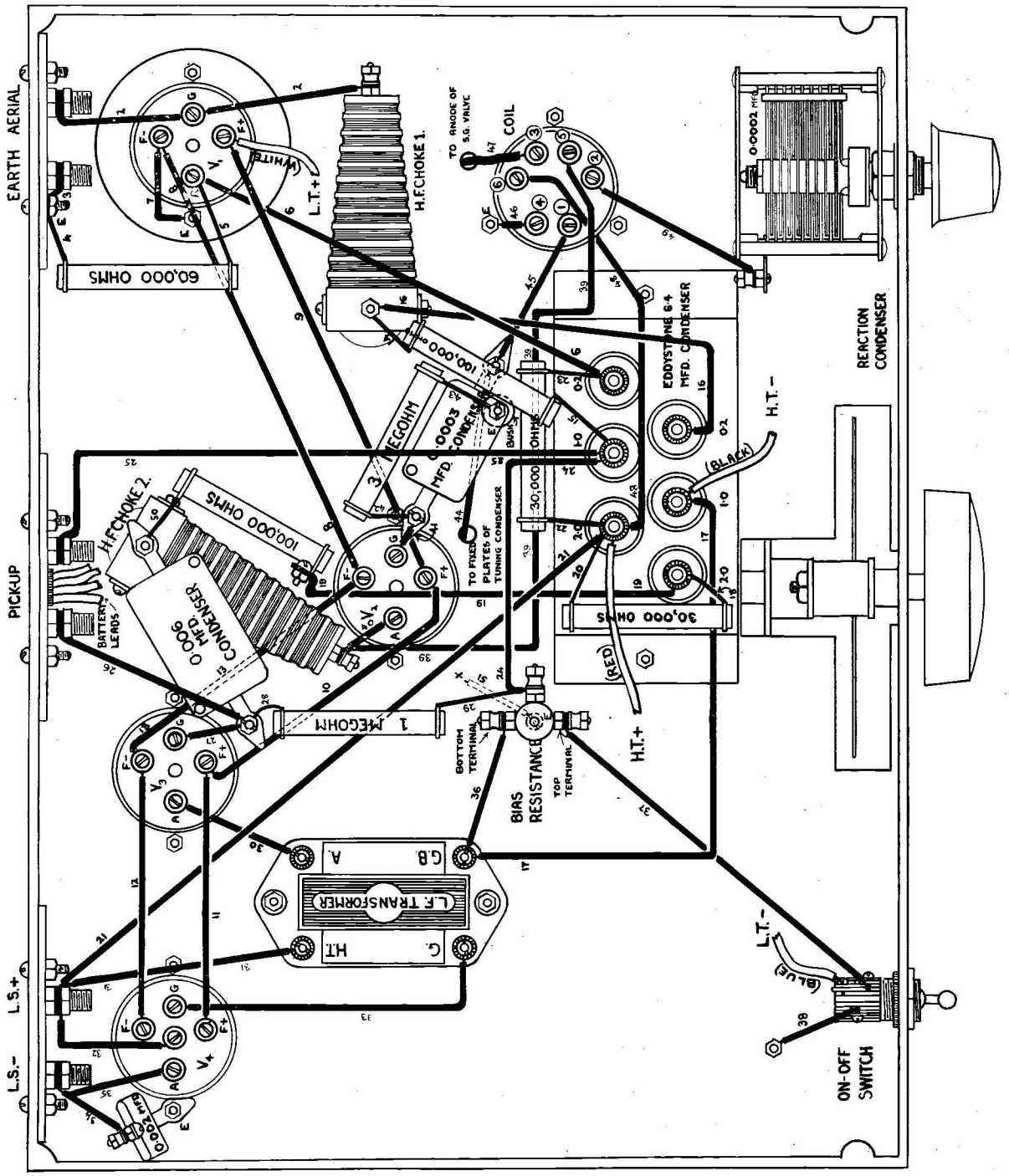
CONNECTING UP.

The valves having been placed in their proper positions and lead No. 47 having been connected to the top terminal of the screened grid valve, the external connections can be

1934 KILODYNE FOUR

BATTERY MODEL

WIRING PLAN



made. The aerial and earth and loud speaker are connected to the respective terminals on the back. The two low tension spades go to the accumulator and the two high tension leads to H.T.— and H.T.+ of the high tension supply. It should be carefully noted that the low tension connections are made the right way round, since although the set will work if they are wrongly made, the results will be poor. If the high tension connections are made the wrong way round the set will not work at all. The set is now ready for switching on and its first trial can commence.

OPERATING THE SET.

Insert a suitable coil and then starting with both tuning condenser dial and the reaction condenser at minimum, switch the receiver on. Increase the reaction control slowly by means of the vernier knob until at a certain point the set will begin to oscillate; this will be noticeable immediately since a low rushing sound will be heard. Throughout the whole tuning operations, this reaction control should be so adjusted that the set is always only just in this oscillating condition. The reaction control should never be turned any more than is necessary for the first reaction sound to be heard. Now commence turning the tuning dial slowly, increasing the reaction control gently if necessary to keep the set in the oscillating condition. Probably the first signals to be heard will be C.W. morse transmissions, a series of dots and dashes of a high pitched musical note. With the set in the slightly oscillating condition referred to, telephony signals will also be first heard as a high pitched whistle similar to a continuous C.W. morse signal with the difference, however, that as the tuning is varied, the note will appear to consist of a double peak signal with a silent point in the centre. To receive the telephony signal clearly, leave the set tuned to the silent point, slack off the reaction control very slightly until the set is just out of oscillation, retune a trifle if necessary, and the speech or music should be quite clearly heard. It simplifies the operation of the receiver when searching for stations, to keep it in the oscillating condition, but it should be borne in mind that clear telephony can never be received with the receiver oscillating.

POINT TO POINT CONNECTIONS.

1—Aerial Socket to G terminal of valveholder V1.
2—G Terminal of V1 to one end of H.F. Choke 1.
3 Earth Socket to fixing screw E on paxolin strip.
4—Wire End of 60,000 ohm Resistance to fixing screw E.
5 -Other end of 60,000 ohm Resistance to A terminal of V1.
6—A Terminal of V1 to 0.2 mfd. terminal on condenser block.
7—F — Terminal of V1 to screw E which is the fixing screw of valveholder V1.
8—F — Terminal of V1 to F — terminal of valveholder V1.
9—F + Terminal of V1 to F + terminal of valveholder V2.
10—F + Terminal of V2 to F + terminal of valveholder V3.
11—F + Terminal of V3 to F + terminal of valveholder V4.
12—F — Terminal of V4 to F — terminal of V3.
13 -F - Terminal of V3 to F — terminal of V2.
14 -Wire end of 100,000 ohm Resistance to H.F. Choke 1.
15 Other end of this resistance to 1.0 mfd. terminal on condenser block.
16—End of H.F. Choke 1 to second 0.2 mfd. terminal on condenser block.
17—1.0 mfd. condenser terminal to G.B. terminal of L.F. transformer.
18—One end of 30,000 ohm resistance to first 2.0 mfd. condenser terminal.
19—2.0 mfd. Condenser Terminal to Screw and Nut on the wire end of 100,000 ohm resistance near H.F.C.2.
20—Wire End of 30,000 ohm Resistance to Second 2.0 mfd. Condenser Terminal.
21 -2.0 mfd. Condenser Terminal to L.S. + Socket.
22—Wire End of Second 30,000 ohm Resistance to 2.0 mfd. Condenser Terminal.
23—Other End of this Resistance to 0.2 mfd. Condenser Terminal.
24—1.0 mfd. Condenser Terminal to Centre Terminal of Bias Resistance.
25—1.0 mfd. Condenser Terminal to One Pickup Socket.
26—Other Pickup Socket to Terminal on .006 mfd. Coupling Condenser.
27—.006 mfd. Condenser to G Terminal of V3.
28—1 megohm Grid Leak to .006 mfd. Condenser.
29—Other End of 1 megohm Grid Leak to Centre Terminal of Bias Resistance.
30—A Terminal of V3 to A Terminal of L.F. Transformer.
31—H.T. Terminal of L.F. Transformer to L.S. + Socket.
32—L.S. + Socket to Centre Terminal of V4.
33—G Terminal of V4 to G Terminal of L.F. Transformer.
34—L.S. — Socket to Terminal on .002 mfd. Condenser, the other end of the latter being fixed to Screw E.
35—L.S. — Socket to A Terminal of V4.
36—G.B. Terminal of L.F. Transformer to Bottom Terminal of Bias Resistance.
37—Top Terminal of Bias Resistance to On-Off Switch.
38—On-Off Switch to Earth Point E.
39—No. 5 Terminal on Coil Base to H.F. Choke 2.
40—H.F. Choke 2 to A Terminal of V2.
41 -G Terminal of V2 to Terminal on .0003 mfd. Grid Condenser.
42—One End of 3 megohm Grid Leak to Terminal on .0003 mfd. Condenser.
43—Other End of 3 megohm Grid Leak to Fixing Screw E which passes through the bush which fixes the grid condenser to the chassis.
44—Other Side of Grid Condenser to Fixed Plates of Tuning Condenser through hole in chassis.
45—Grid Condenser to No. 1 Terminal of Coil Base.
46—No. 4 Terminal of Coil Base to Earth Point E.

THE KILODYNE FOUR.—continued.

POINT TO POINT CONNECTIONS—continued

47—Flexible Lead from No. 3 Terminal of Coil Base, through hole in chassis, to the Anode Terminal of S.G. Valve.
48—No. 6 Terminal of Coil Base to 2.0 mfd. Condenser Terminal.
49—No. 2 Terminal of Coil Base to Reaction Condenser.
50—Wire End of Second 100,000 ohm Resistance to H.F. Choke 2.
51—Fixing Screw of Grid Bias Resistance to moving Plates of Tuning Condenser.

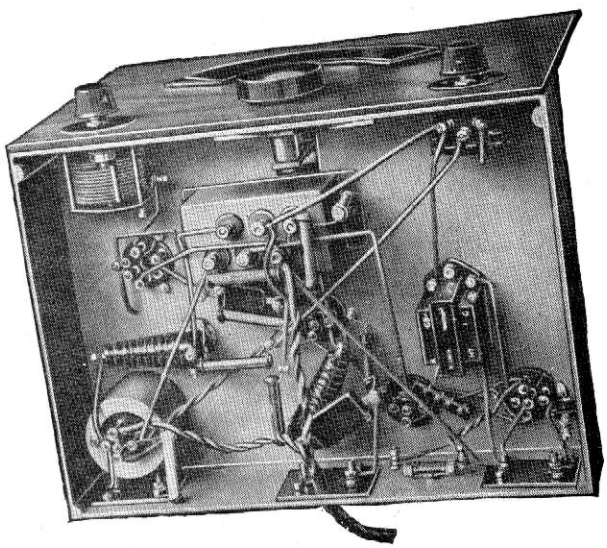
LIST OF PARTS.

Die-cast Aluminium Chassis, drilled all necessary holes, finished inside and out battleship grey celluloid varnish, complete with three terminal panels ..	22/6
Panel drilled and gapped for escutcheon ..	2/9
1 Eddystone Scientific S.W. Condenser, 150 m.mfd.	7/6
1 Eddystone S.M. Reaction Condenser, with Dial .0002 mfd.	6/-
2 Eddystone Scientific H.F. Chokes ..	4/6 each
1 Eddystone Open Vision Disc Drive 22-1	10/6
1 Eddystone 6-pin S.W. Coil, type 6LB, 12/26 metres	4/6
1 Eddystone 6-pin S.W. Coil, type 6Y, 22/47 metres	4/6
1 Eddystone 6-pin S.W. Coil, type 6R, 41/94 metres	5/-
1 Eddystone 6-pin Coil, type 6G, 250/500 metres	5/6
1 Eddystone 6-pin Coil Base, type 963 ..	2/-
1 Eddystone Condenser Block	11/6
3 Eddystone 4-pin Valveholders, type 955	1/- each
1 Eddystone 5-pin Valveholder, type 956	1/2
1 Eddystone 1,000 ohm Tapped Bias Resistor	2/9
1 3-way Switch with leads already soldered	2/-
1 R.I. Hypermite Transformer	12/6
1 each Erie Resistors 60,000 ohm, 1 meg., 3 meg.	1/- each
2 each Erie Resistors 30,000, 100,000 ohm.	1/- each
1 T.C.C. Condenser, .0003 mfd.	8d.
1 T.C.C. Condenser, .002 mfd.	1/-
1 T.C.C. Condenser, .006 mfd.	1/6
6 Plugs and Sockets @ 3d. per pair ..	1/6
1 Set 4 way Heavy Duty Battery Leads ..	2/9
Screws, Nuts, Washers, Wire and Bush, etc.	1/5

1934 ALL ELECTRIC KILODYNE
FOR A.C. MAINS

CONSTRUCTIONAL DETAILS.

The all electric Kilodyne is very similar to the battery model except that provision has been made for fitting A.C. valves with the extra centre terminal and a tapped volume control supplying 15 volts negative bias to the output valve and variable bias from 0—15 volts to the vari-mu S.G. valve. There are also two extra resistances and a Humdinger for controlling hum. The general mounting of the parts and wiring details are almost identical with those described for the battery model and these should be carefully read. There is slight variation in wiring up the heater leads between the valves, these together with leads to the Humdinger should be twisted together, which reduces radiation and prevents hum. The same care should be taken to see that all connections which are made to earth points E, down to fixing screws, make good electrical contact to the chassis. In this respect also, the fastening screw of the Humdinger must make good contact with the chassis, otherwise this component will be ineffective.



UNDER CHASSIS VIEW (A.C. MODEL). The wiring and assembly presents no difficulty even to the inexperienced beginner.

Two points which may be specially mentioned are : first, the mounting of one of the 40,000 ohm resistances, which is placed vertically at the side of the condenser block, so that in the wiring plan, only the top round end view is shown. Secondly, lead No. 59 cannot be properly shown on the wiring plan since it is made on top of the chassis, but it consists of a lead from the moving vane terminal of the variable condenser, fastened down to the chassis and making good electrical contact with it, a special fastening screw is provided on the chassis for this purpose.

The set of 4-way leads are connected as shown in the point to point wiring details, the blue and red heater leads being twisted together.

VALVES.

V1.—Osram VMS4.
V2.—Mazda AC/HL Metallised.
V3.—Mazda AC/HL Clear.
V4.—Mullard PM24M.

CONNECTING UP.

When the set is completely wired, connections thoroughly checked over and the valves correctly inserted in their proper holders, the necessary connections for aerial, earth, and loud speaker can be made and the set connected to the mains supply unit. The leads are provided with suitable plugs, the two marked 4v. A.C. are plugged into the corresponding sockets on the unit and it is immaterial which way round they are placed. H.T. — and H.T. + plugs are then also plugged into the unit. In addition to the earth connection to the set itself, an additional earth connection may be taken to the power supply unit which earths the outside case of this component.

OPERATING DETAILS.

The set is switched on by means of the switch fitted in the leads of the power supply unit and it will take a short time for the heaters of the A.C. valves to warm up to the proper working temperature before the set will work. At this point, the small screw controlling the Humdinger should be adjusted to the position where hum is at a minimum. This control, when set, does not need readjustment. For general tuning and station finding, the set is worked in exactly the same way as already described in the case of the battery model.

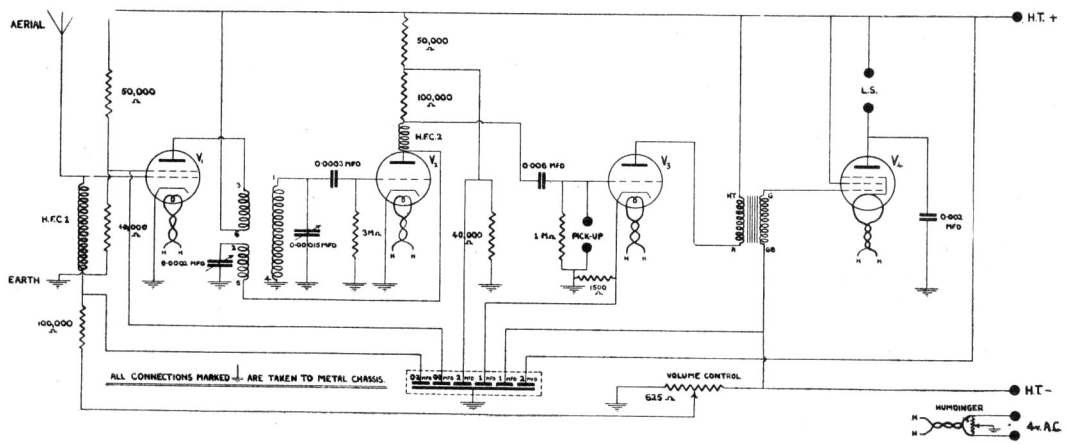
GRAMOPHONE PICKUP.

It is quite a simple matter to use a gramophone pickup with the Kilodyne receiver. All that is necessary is to plug the two leads from the pickup into the two terminals provided on the receiver. In the case, however, where a volume control is not already incorporated with the pickup, a 250,000 ohm volume control should also be connected across the pickup terminals of the receiver, otherwise distortion, due to valve overloading, may occur. If, when using a pickup, tone is on the high side, this can be made more mellow by connecting a .006 mfd. condenser across the pickup terminals. When a gramophone pickup is in use the reaction condenser in the set should be set at zero position with the vanes fully out. It should also be carefully noticed that leads from the pickup to the set are not run parallel to the loud speaker leads, and moreover, the length of wire in use should be kept as short as possible.

POINT TO POINT CONNECTIONS.

1—Heater Terminal H of Valveholder V1, to H Terminal of Valveholder V2.
2—H Terminal of V2 to H Terminal of Valveholder V3.
3—H Terminal of V3 to H Terminal of Valveholder V4.
4—H Terminal of V4 to H Terminal of V3.
5—H Terminal of V3 to H Terminal of V2.
6—H Terminal of V2 to H Terminal of V1.
7—H Terminal of V4 to One Terminal of Humdinger.
8—Other Terminal of Humdinger to H Terminal of V4.
9—G Terminal of V1 to Aerial Socket.
10—G Terminal of V1 to H.F. Choke 1.

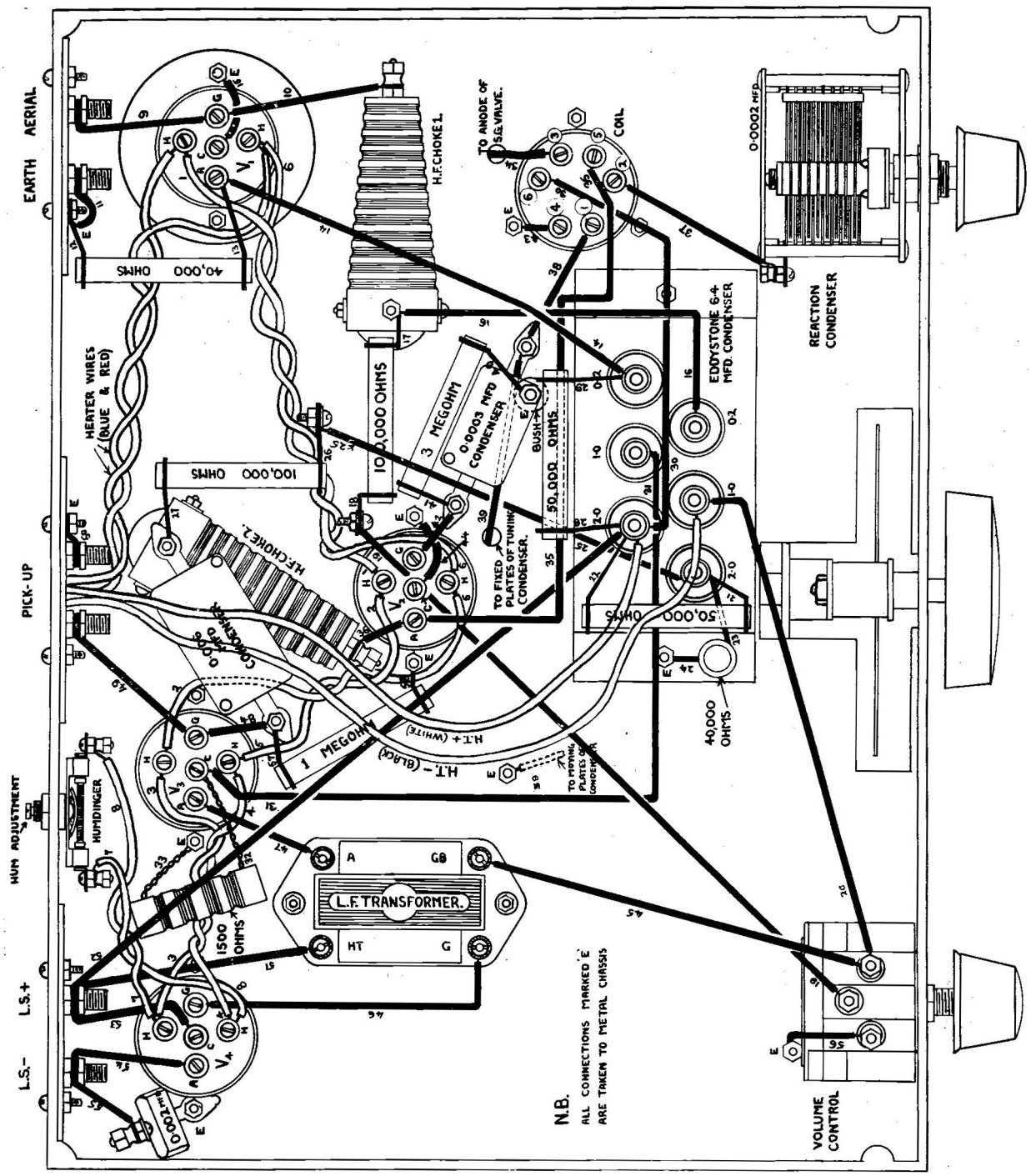
THE 1934 A.C. ELECTRIC KILODYNE



1934 ALL ELECTRIC KILODYNE

FOR A.C. MAINS.

WIRING PLAN



POINT TO POINT CONNECTIONS– continued.

11—Earth Socket to Earthed Point E (i.e., to Screw fastening Paxolin Terminal Strip to the Chassis).
12—One End of 40,000 ohm Resistance to same Earthed Point E.
13– Other End of this Resistance to A Terminal of V1.
14—A Terminal of V1 to 0.2 mfd. Terminal on Condenser Block.
15– Cathode Terminal C of V1 to Earthed Screw E, which is a fixing screw of the Valveholder V1.
16– H.F. Choke 1 to 0.2 mfd. Condenser Terminal.
17—One End of 100,000 ohm Resistance to H.F. Choke 1.
18—Other End of this Resistance to Screw and Nut.
19—Above Screw and Nut to Centre Terminal of Volume Control.
20—Right-hand Terminal of Volume Control to 1.0 mfd. Condenser Terminal.
21—One End of 50,000 ohm Resistance to 2.0 mfd. Condenser Terminal.
22—Other End of this Resistance to other 2.0 mfd. Condenser Terminal.
23—Top of 40,000 ohm Resistance to 2.0 mfd. Condenser Terminal.
24—Bottom of 40,000 ohm Resistance to Screw E which fastens Condenser Block to Chassis.
25—2.0 mfd. Condenser Terminal to Screw and Nut.
26—One End of 100,000 ohm Resistance to same Screw and Nut.
27—Other End of this Resistance to H.F. Choke 2.
28—50,000 ohm Resistance to 2.0 mfd. Condenser Terminal.
29—Other End of 50,000 ohm Resistance to 0.2 mfd. Condenser Terminal.
30– 2.0 mfd. Condenser Terminal to No. 6 Terminal of Coil Base.
31– 1.0 mfd. Condenser Terminal to C Terminal of V3.
32—One End of 1,500 ohm Bias Resistance to C Terminal of V3.
33—Other End of Bias Resistance to Earthed Screw E Fixing Valveholder V3 to Chassis.
34—Flexible Lead from No. 3 Terminal of Coil Base, through Hole provided in Chassis, to Anode of S.G. Valve.
35—No. 5 Terminal of Coil Base to A Terminal of V2.
36—A Terminal of V2 to H.F. Choke 2.
37 –No. 2 Terminal of Coil Base to Reaction Condenser.
38—No. 1 Terminal of Coil Base to .0003 mfd. grid Condenser.
39—.0003 mfd. Condenser to Fixed Plates of Tuning Condenser, through Hole in Chassis.
40—One End of 3 megohm Grid Leak to Earthed Screw E which supports .0003 mfd. Condenser on Insulated Bush as shown in diagram.
41– Other End of Grid Leak to .0003 mfd. Condenser.
42 –.0003 mfd. Condenser to G Terminal of V2.
43—No. 4 Terminal of Coil Base to Fixing Screw E.
44—C Terminal of V2 to Fixing Screw E.
45—Right-hand Terminal of Volume Control to G.B. Terminal on L.F. Transformer.
46—G Terminal of Transformer to G Terminal of V4.
47—A Terminal of L.F. Transformer to A Terminal of V3.
48—G Terminal of V3 to One End of .006 mfd. Condenser, the other end of this Condenser going to H.F. Choke 2.
49– G Terminal of V3 to One Pickup Socket.
50—Other Pickup Socket to Fixing Screw E.
51—H.T. Terminal of L.F. Transformer to L.S. + Socket.
52—L.S. + Socket to 2.0 mfd. Condenser Terminal.
53—L.S. + Socket to C Terminal of V4.
54—A Terminal of V4 to L.S. — Socket.
55—L.S. — Socket to .002 mfd. Condenser. The other end of this Condenser is Fixed under Screw E.
56—Left-hand Terminal of Volume Control to Earthed Point E.
57 –1 megohm Grid Leak to .006 mfd. Condenser.
58—Other End of this Grid Leak to Fixing Screw E.
59—Moving Plates of Tuning Condenser to Earthed Screw E. This connection is made above the chassis.

POWER SUPPLY LEADS.
H.T. —. Black Lead to 1.0 mfd. Condenser Terminal.
H.T. + Whitish-Grey Lead to 2.0 mfd. Condenser Terminal.
Heater Wires. Blue Lead to one H Terminal of V1.
Red Lead to other H Terminal of V1.

SERVICING RECEIVER.

NOISES, CRACKLING, ETC.

First disconnect the aerial and earth leads from the receiver, *turning reaction control to minimum*, and if the trouble disappears, the fault can be looked for outside the set. It may be that the noise is electrical interference coming from some external source such as a motor, electric fan, electric sign, or it may be bad atmospherical static. In the former case, it is sometimes possible to effect a remedy by tracing the source of the trouble and then getting permission to add apparatus to reduce it.

Severe noises can be caused by the aerial and earth system itself. Check this over for loose joints, frayed or broken strands of wire, shake all wires to make sure that there is no intermittent break in the conductor. All contacts should be clean and well made and no intermittent contacts with buildings or trees should occur. It is worth remembering that when listening on the short waves, the ignition system of passing cars can often be picked up strongly. Check the earth lead and see that this is not responsible for noise. It is advisable to use insulated wire for this and see that a really good short earth return is obtained.

If the noises persist when the aerial and earth are removed, the trouble lies in the instrument, batteries, or associated wiring. See that the terminals on the accumulators and the connectors are clean and free from corrosion—dirt here is a prevalent cause of

trouble. Similarly, the H.T. connections. The H.T. battery or unit may be noisy, this can be checked by putting a pair of 'phones across sections of 20v. of it when, if in good silent working order, after the initial click at contact, nothing more will be heard. Do not hold the telephone tags when making this test and test the battery in sections.

Shake every flexible lead to ensure no intermittent connection exists. Examine points where spade terminals, plugs, etc., join leads. Check 'phone or loud speaker cords. All the external causes of noise having been eliminated, we come to the receiver itself. Occasionally a valve may be noisy in operation, this can best be checked by substitution. Clean all coil and valve pins and with the aid of a knife blade, open out all pin leaves so that they make more positive contact with their sockets. Care should be taken not to damage any wire in the pins when opening these out.

Make sure that no loose connections or broken joints exist in the receiver wiring. Loose metal parts, such as screws, nuts or terminals even if not connected will cause noise. Any components which have their earth returns made by being bolted or fastened to the metal cabinet should always be well tightened up and care taken to see that the two bearing surfaces are clean.

The component parts of the set now come under examination, and in order to locate which part of the receiver is causing the noise, remove the valves one at a time, commencing at the H.F. or detector end. If the noise ceases when the H.F. valve is pulled out, the trouble obviously lies in the parts associated with it; if the noise persists, obviously the trouble is in the detector or L.F. stages. Having located the portion of the circuit which is noisy, it remains to test the components likely to be at fault. A simple method is to use a pair of headphones in series with a small dry battery—a flashlamp battery is suitable, one tag of the 'phones and one lead from the battery forming the two testing ends.

All components which have continuity to a direct current, such as transformers, H.F. chokes, coils, resistances, grid leaks, should show that continuity is intact by a distinct click when test connections are made. If no click is heard, they have broken down completely; if crackling is heard, the part is faulty and should be replaced. This click at contact will, of course, vary according to the resistance of the circuit and will be very much smaller in the case of a grid leak than a transformer winding. Fixed condensers can be tested with the same arrangement. In the case of small value condensers, no noise will be noticed at contact but if they have short circuited or broken down in insulation, a definite click or crackling noise will be heard. By-pass condensers of larger capacity will show the same symptoms if faulty and though a click will appear at first contact, once they are charged to the same potential as the battery, no further click should be heard, if the testing ends are taken off and then applied again. If the 'phone tags only are applied to the condenser some time after, and the insulation of the condenser is perfect, the noise of the condenser discharging itself should be heard.

Test variable condensers to make sure vanes are not touching at any one point, this may account for the set not oscillating with a certain condenser setting. Clean out dust from between condenser vanes with a pipe cleaner.

NO SIGNALS.

Check over all leads and connections, making sure that there are no breaks or loose joints and in the case of the battery model, make sure that the batteries are in order. In the case of the all electric set, ascertain that the mains supply plug is alive and also that the flex lead is intact. The cause of the trouble may be due to a faulty valve or valves and, of course, any broken down component would be responsible for the set not working. The most likely cause of the trouble as far as components are concerned, would be the high frequency choke or the transformer, and these should be tested first In the case of the A.C. set, the volume control potentiometer, which is also responsible for the grid bias adjustments to the two last valves as well as the variable bias on the screened grid valve, should also be tested for continuity. Check over the loud speaker leads and the loud speaker itself.

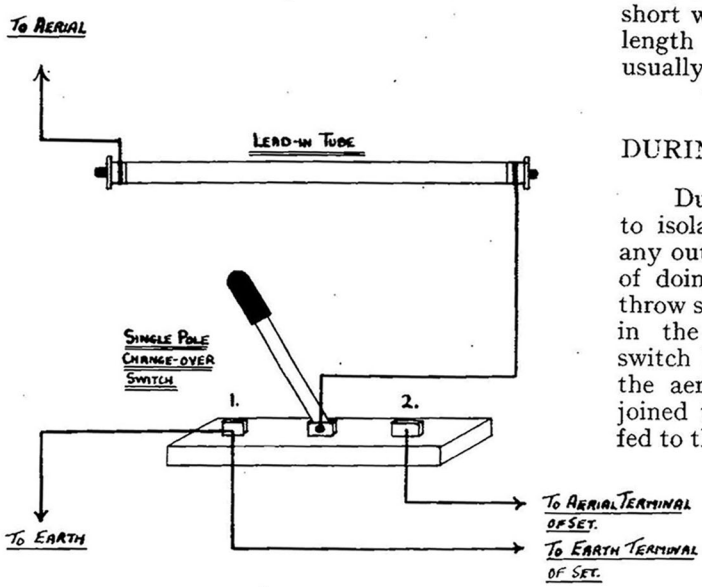
If the emission of any one of the valves falls below normal, the performance of the whole set will be affected and this should be checked by substitution or having the valves tested. In the case of the battery receiver, check the L.T. and H.T. batteries, or source of H.T. supply, as these may be down in voltage, or in the case of the all electric set, the rectifying valve may be losing its emission and the incoming line voltage should be checked.

THE AERIAL AND EARTH.

Results can be obtained from the Kilodyne Four receiver on any form of aerial and earth arrangement, nevertheless it is always well worth while to erect this in as efficient a manner as possible to suit local circumstances. It can be readily appreciated that quite a small increase of signal voltage obtained from the aerial can result in a large increase in final output volume, due to the very great amplification factor of the valve stages in the receiver. The qualifications of a good aerial are firstly, that it shall be in as open a position as possible, that is, not badly screened by nearby objects, such as trees or buildings. Secondly, that it shall be as high as convenient, at least 30 ft.; and thirdly, it should be well insulated and in one piece without any frayed strands, right to the lead-in. The down wire from the horizontal position should always be well away from buildings and never carried down a wall. Inside the house, the lead to the set should be direct and short.

For the outside wire, a single strand of 14g. enamelled copper is highly satisfactory, while the lead inside the house to the set should be insulated flex.

The most usual type of aerial is the inverted L type shown in sketch A. Another equally good alternative for some installations is also the T aerial shown in sketch B. In this case, the lead in top should be taken from the centre and soldered. For short wave reception, a vertical type of aerial consisting of a single wire suspended in as vertical a position as possible gives very good results; this, however, is only recommended when it can be suspended from a good height and is not very closely screened.



DIRECTION OF AERIAL.

In theory, best results are obtained from a given station when the aerial is pointing in the direction of that station. In practice, it is seldom that a very pronounced difference is found.

LENGTH OF AERIAL.

An all round standard to work to for good medium wave and short wave reception is about 60 ft. of wire from the free end of the aerial to the set.

On the medium waves, 100 ft. of wire will give rather more sensitivity and volume from very distant stations, but the selectivity of the set will be reduced. To obtain maximum selectivity, a length of wire down to as low as 20 ft. can be employed. If atmospherics cause considerable interference, a shorter aerial is to be preferred to a longer one. For short wave reception, the aerial can be of any length between 20 ft. and 60 ft., there is usually a loss of volume below 40 ft.

DURING STORMS.

During electrical storms, it is advisable to isolate the receiver and connect to earth any outside aerial. A simple and safe method of doing this is to use a single pole double throw switch connected in the system as shown in the diagram on page 12. When the switch blade is thrown over to contact No. 1, the aerial is disconnected from the set and joined to earth, while in position No. 2, it is fed to the receiver in the usual way. The earth terminal on the set can be earthed through the switch contact or direct, whichever is the most convenient. It is advisable that the switch be fitted outside the

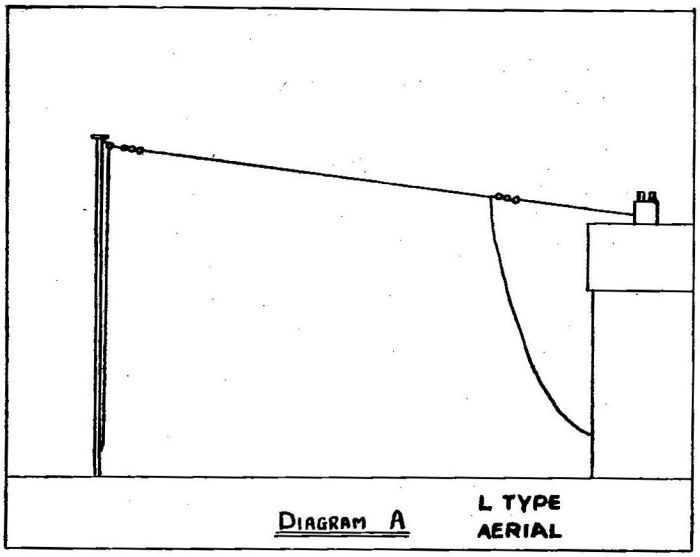


DIAGRAM A L TYPE AERIAL

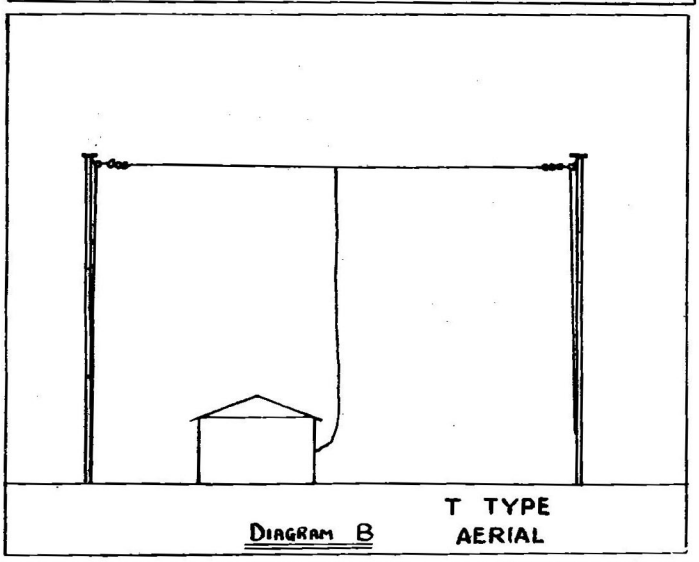


DIAGRAM B T TYPE AERIAL

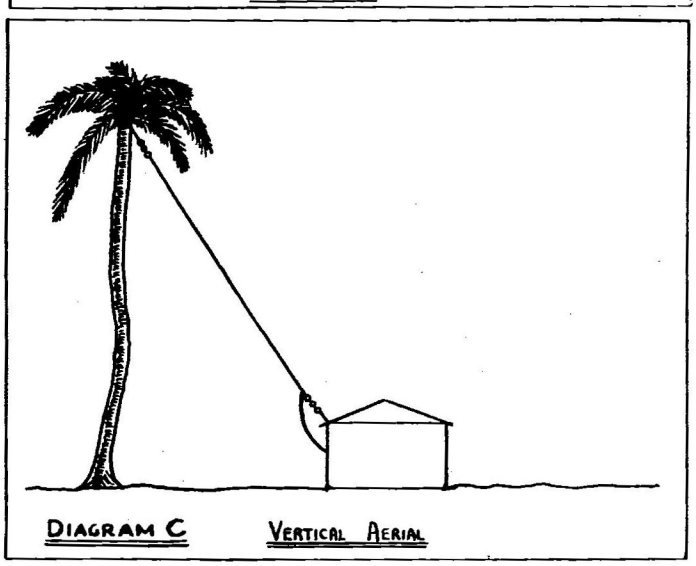


DIAGRAM C VERTICAL AERIAL

house at the position where the lead to the set comes in. A properly earthed aerial and earth system is actually a safeguard during a storm.

GENERAL REMARKS.

If the aerial is sloping, the highest end should be the one which is away from the receiver. The down lead should be taken from the horizontal position immediately in front of the insulator and not from a short distance along the wire. The best method of obtaining a down lead is to continue the main aerial by securely twisting it at the insulator and so avoiding the necessity of making a soldered joint.

THE EARTH.

The earth lead should consist of insulated wire from the set to the point where the connection to earth is made. Do not use bare wire, as it may result in partial earthing to walls or pipes and so cause noises in the receiver or unstable reception and control. The earth connection should be well made to a copper earth tube or similar object buried in damp ground. It is important that the length of the earth connection is kept as short as possible. The earth lead may sometimes be omitted for short wave reception without loss of signal strength, but on the medium wavebands, if this is done, a distinct loss of volume will be found with increased selectivity and much sharper tuning. A good earth is always desirable.

NOTES ON AERIAL ERECTION.

See that the aerial does not sway unduly, on the other hand, it is not necessary to have it ultra taut.

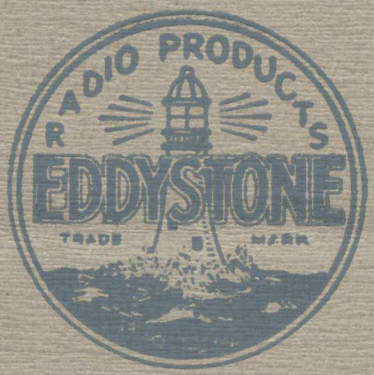
Arrange so that it can be let down at least from one end for an occasional inspection.

When pulleys are used for hoisting and letting down, see that they are of the type in which the rope or wire cannot slip out of the pulley groove and jam.

Stranded steel wire covered, such as Electron aerial wire or Superaerial, makes good hoisting and supporting wire for the aerial proper.

Well galvanized stranded iron wire is good for guying poles and masts.

Do not fasten the aerial direct to a tree which can sway in a wind—the aerial will break unless left very loose, which is inadvisable. In this case a pulley and balance weight should be used.



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