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November, 1930.



MARCONIPHONE SERVICE MANUAL No. 1

for 2-Valve Models 220 (A.C. Mains) and 221 (Battery).

PART I.

GENERAL NOTES.

(Both Models).

AERIALS.

Instal a well-insulated single inverted L type aerial about 80 ft. long in one continuous length without joints, with at least two good quality insulators at either end and short well-insulated earth lead wherever possible. Use nothing but either copper or phosphor bronze wire—enamelled for preference. Any other material may give trouble due to rusting, lack of efficiency, or difficulty in handling.

ROOF AERIALS.

Aerials may be installed in rafters of houses, but should be as carefully insulated as if they were exterior and be at least 1 ft. from roof or walls. The Earth lead should be run in a downwards direction if possible.

NEITHER ROOF NOR OTHER INDOOR AERIALS ARE SO SATISFACTORY AS AN OUTSIDE AERIAL.

The wires composing roof aerials should be at least 18 in. apart and joined at one end.

EARTHS.

Earth wires should be as short and of as low resistance as possible. Extreme care must be taken if pipes of any kind are used. Avoid gas pipes at all costs. Not only are these dangerous, but the fact that they are frequently joined with non-conducting materials renders them still further unsatisfactory. A gas pipe earth does not comply with I.E.E. Regulations. Water pipes may be used. Wherever possible, choose a rising main pipe. Make all connections to metal pipe on to clean metal, binding joints with insulating tape to protect from corrosion. Use a strong Earth clip.

Bury earth pins or plates in moist ground. If ground tends to become dry, pin or plate should be surrounded by a small amount of coke or porous material, which can be moistened, preferably by means of a short length of pipe such as is used to carry away rain water.

A LOW-RESISTANCE EARTH ASSISTS BOTH SELECTIVITY AND SENSITIVITY. If doubt is entertained as to efficiency of earth, more than one earthing point may be employed with advantage; for instance, a water pipe and earth plate. Fit an adequate weather-proof lightning switch. If porcelain type of switch installed outside window, provide weather protecting cowl. When lightning is about, earth aerial in such a manner that no portion of it enters house. Satisfactory combined leading-in tubes and earthing switches are obtainable which, while operating outside, can be manipulated from inside. *They must, however, be of first-class quality.*

EARTHING SWITCH.

The earthing switch most recommended is a double pole double throw, so that both aerial and earth are disconnected from the receiver when not in use. This is particularly important on receivers working from the mains—any metal cover or part of a mains receiver requiring to be earthed in accordance with I.E.E. or other lighting regulations can be connected to the "earth" on the lighting circuit or to a separate earth connection other than that which earths the aerial outside the premises.

TUNING ARRANGEMENTS.

(Both Models.)

A variable coupled 2-valve circuit employing detector valve transformer coupled to output valve.

Grid leak rectification is employed. Two aerial tapplings are provided.

Aerial coupling coil is split into two sections which couple successively with medium and long-wave sections of grid or secondary coil. Wave-length switch (S.1) shorts out long-wave sections of secondary coil when in medium wave position (contacts K and L). In pick-up position introduces pick-up directly to grid of first valve (contacts M and N). When switch is in the gramophone pick-up position, increased bias is supplied to detector valve to enable it to function as an amplifier.

Reaction and selectivity controls of a unique nature are employed, damping coils consisting of a few turns of wire are wound over reaction coil and both sections of aerial coupling coil.

Variable resistances, V.R.2, V.R.1, are wired in series with each of damping circuits. By varying resistances, coupling effect between respective circuits is increased or diminished.

Two Aerial tapplings are provided (A.1, A.2).

For normal or short aerials and maximum sensitivity, use A.1.

For aerials over 80 ft. and maximum selectivity, use A.2.

APPROXIMATE TUNING TABLE

(Both Models).

This table is intended only as a guide to installing engineers, and should not be handed to customers as aerial conditions are likely to cause variations in it.

| Dial Reading | ... | ... | ... | ... | 10° | 20° | 30° | 40° | 50° | 60° | 70° | 80° | 90° |
|--|-----|-----|-----|-----|------|------|------|------|------|------|-----|-----|-----|
| Approx. Wave-length, Longwave band | ... | 690 | 800 | 950 | 1100 | 1275 | 1425 | 1600 | 1750 | 2000 | | | |
| Approx. Wave-length, Medium wave band... | | 210 | 260 | 300 | 360 | 400 | 460 | 500 | 560 | 600 | | | |

TUNING HINTS.

In certain cases, when instrument is installed, it may be found convenient to set the selectivity control as far in an anti-clockwise direction as possible—increasing selectivity after stations have been identified and logged by turning selectivity control in a clockwise direction.

IMPORTANT WARNINGS.

All electric values are ± 20 per cent. as measured with a first-class instrument. INDIFFERENT meters will give fictitious readings.

1. Before suspecting faults in receiver itself, check up aerial, earth, mains supply and loud speaker. Ascertain that voltage plug is correctly placed in the case of the 220 A.C. instrument.
2. Inspect aerial to see that it is not touching side of house or branch of tree, etc. Check joints and earth, lightning switch and all contacts. See that insulators are clean and undamaged. See that all strands of aerial wire are intact. Examine, and, if necessary, clean Earthing switch contacts. See that all contact terminals are tight.
3. Battery-operated receivers under test should be correctly connected to fully-charged batteries with valves in position.
4. In case of valve "burn-outs," exercise caution before replacing valves. Check filament voltages at holders before inserting new valves.
5. Always switch off receiver before making adjustments to interior.
6. Always have a spare set of valves handy.

HOW TO USE THE SERVICE TABLES.

1. When using service tables, receiver should be in condition for working, *i.e.*, with aerial and earth, loud speaker and fully-charged batteries connected, and main switch "on." This applies equally to mains operated receivers, except that mains take place of batteries.

2. Where resistance readings are given, an infinite resistance shown by actual test denotes a broken wire or burnt-out component. A very much lower resistance denotes a partial or complete short circuit of one component of circuit under test.

NOTE.—Very high value resistances may be approximately tested for continuity with pair of headphones and battery in series.

3. When testing condensers on Avometer, an infinite resistance reading should always be shown. Any reading less than infinity denotes a faulty condenser.

NOTE.—Always test condensers between each tag and EARTH where infinite resistance should also be shown. This applies also to transformers, chokes, etc.

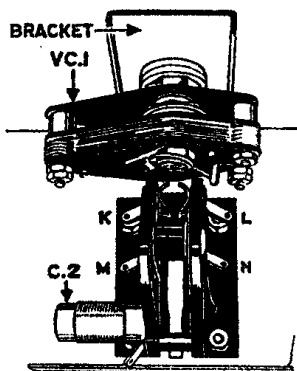
WHEN TESTS FROM TAGS TO CHASSIS, EARTH OR CASE ARE BEING PERFORMED, ALL TAGS OF COMPONENT UNDER TEST MUST BE DISCONNECTED FROM REST OF CIRCUIT.

4. All resistance readings are given for the actual component concerned as wired in circuit, except where otherwise stated.

5. Having traced fault to one suspected component, disconnect all wires to this component and test again.

WARNING.—If it is necessary to disconnect any wire in order to test a component, **DO NOT FORGET TO RE-MAKE THE CONNECTION BEFORE PROCEEDING TO CARRY OUT THE NEXT MEASUREMENT.**

Fig. 1.



Tuning Condenser and Wave Change Switch for both models.

N.B.—Index letters on switch contacts tally with those on theoretical diagrams (Figs. 5 and 6).

PART II.

Special Information Model 220 (2-Valve Receiver for A.C. Mains).

(Wait for the Valves to Warm Up.)

Voltage Range.

- 100-110 volts A.C., 40-100 cycles.
- 200-250 volts A.C., 40-100 cycles.

See that the receiver has been adjusted for the voltage of the mains on which it is to be used, as declared by responsible official of Electricity Supply Company.

NOTE.—A formal letter requesting this information and statutory limits of voltage variation may be written to Supply Company, the official reply being carefully preserved.

SPECIAL NOTE.

Test mains with A.C. voltmeter and note that reading obtained tallies with the voltage for which receiver is adjusted and declared voltage.

Certain instruments may be found with voltage tappings marked :—

| | | | |
|-----|-----|-----|-----|
| 105 | 205 | 225 | 240 |
| | | or | |
| 100 | 200 | 216 | 236 |
| 110 | 215 | 235 | 250 |

the former markings having been altered to the latter in later models in order to be more explicit.

This model employs 2 indirectly heated valves (M.H.4 and M.L.4), heated by alternating current from a secondary of the mains transformer (T.2).

MAINS TRANSFORMER.

(T.2.)

This transformer has :—

| | | | |
|--|-----------------|-----------|--------------------------------|
| 1 primary winding tapped by voltage selector screw (mains wiring, orange) | between sockets | { 105—205 | D.C. Resistance about 40 Ohms. |
| | | { 105—225 | 50 " |
| | | { 105—240 | 58 " |
| Primary as measured across mains input plug voltage selector screw in 240 v. socket | | | 85 " |
| 1 secondary winding supplying M.H.4 and M.L.4 filaments (brown) | | | 1/2 Ohm. |
| 1 secondary winding supplying U.9 (U.10) filament (brown) | | | 1/2 " |
| 1 high voltage secondary winding centre tapped, the outers of which are connected to the anodes of the U.9 (U.10) rectifier valve (yellow wiring) | | | 1000 Ohms. |

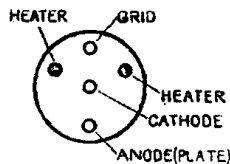
M.H.4 AND M.L.4 VALVES.

These valves have—

- (1) An anode (yellow wiring).
- (2) A grid (green wiring).
- (3) A cathode (which emits electrons).
- (4) and (5) A "heater" (brown wiring) filament which heats the cathode.

Cathode in most cases consists of an insulated tube coated with sensitive electron emitting material. Inside tube and insulated from it is inserted heater filament wire (brown leads). In this instrument cathodes are earthed.

The valve has therefore 5 pins at the base (see Fig. 2).

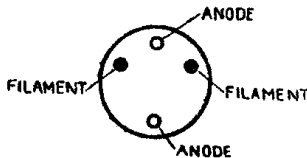


The base of a mains operated indirectly heated valve having a cathode which takes the place of the filament as far as the radio or amplifier wiring is concerned such as the M.H.4 or M.L.4.

Fig. 2.

Function of Valve.

U.9 (U.10) Full wave rectifier, supplies direct current H.T. and grid bias from the A.C. mains. (This valve is *not* indirectly heated.)



The base of a full wave rectifying valve.

Fig. 3.

M.H.4 Detector valve.

M.L.4 Low frequency amplifier valve.

IMPORTANT NOTE.

When replacing valves on this instrument, care should be taken to supply the latest type of replacement valve.

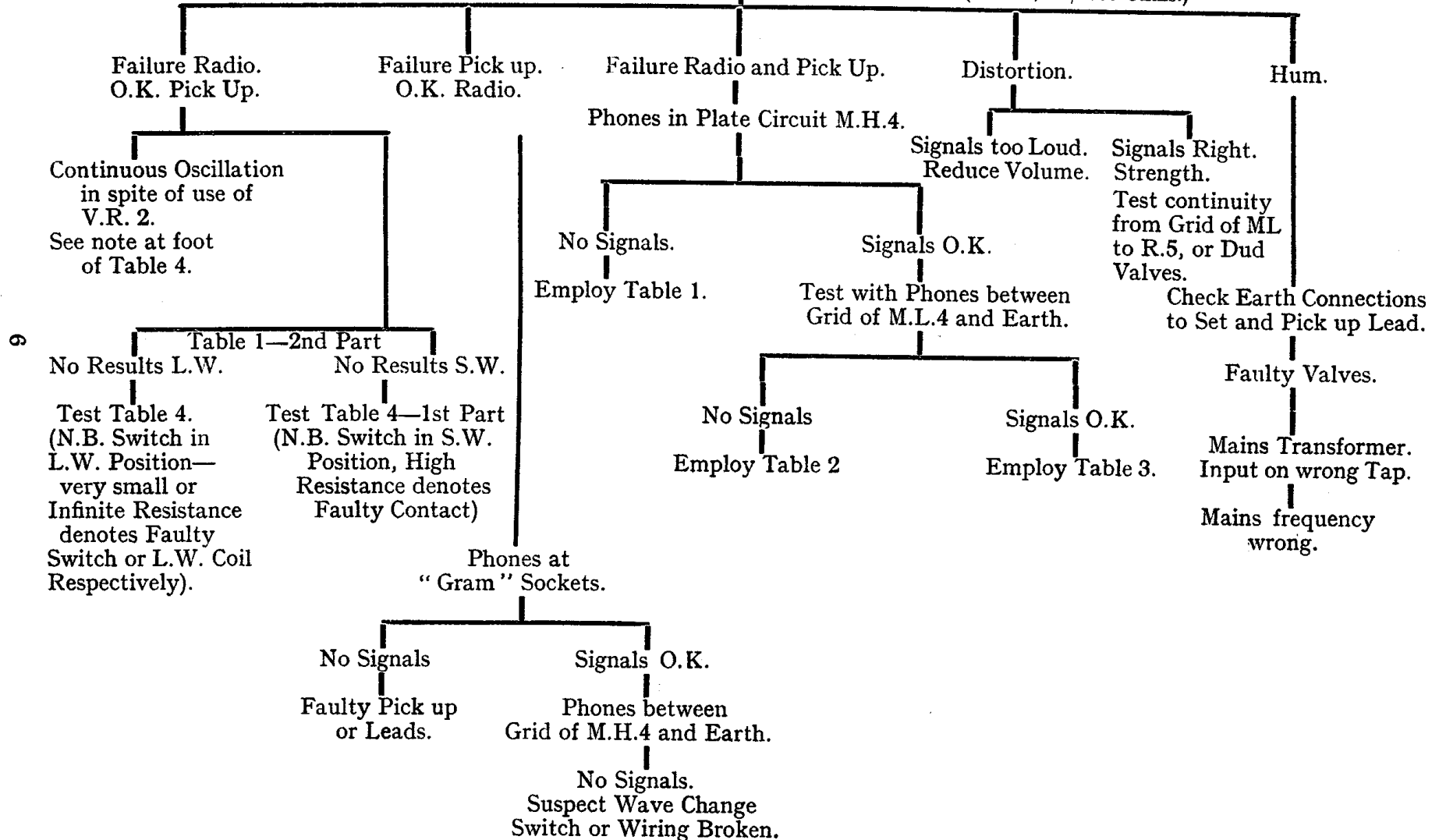
To remove chassis from cabinet, unscrew six securing screws under the base of cabinet, also wooden wedge in front of valve panel; take off hooks. Then chassis will slide out of cabinet. (N.B.—It may be necessary to remove two felt feet at the back to get at two of the screws.)

NOTE.—ALL READINGS GIVEN ARE SUBJECT TO A VARIATION OF ± 20 PER CENT.

MODEL 220—FAULT FINDING CHART.

Fault—Crackles, Noise or Dead Silence.

Examine Aerial, Earth, Mains and Loud Speaker (Test Continuity with Phones and Battery).
(H.P. 2,000/4000 Ohms.)



H.T. SUPPLY TABLE.

Rectifying Valve U.9 (U.10.) supplies high tension to anodes of M.H.4 and M.L.4.

| | | | | | | | | |
|---------------------------------|-----|-----|-----|-----|-----|-----|-----|-------------------|
| Filament volts | ... | ... | ... | ... | ... | ... | ... | 4 A.C. |
| Feed to anode | ... | ... | ... | ... | ... | ... | ... | 6 to 8 milliamps. |
| Feed to second anode (grid pin) | ... | ... | ... | ... | ... | ... | ... | 6 to 8 milliamps. |

If H.T. low measured between smoothing choke and earth, U.9 (U.10) may be low in emission.

N.B.—If this valve is low in emission, the high tension voltage on the anodes of the M.H.4 and M.L.4 valves will be low also. Replace U.9 (U.10) valve.

WAIT FOR VALVES TO WARM UP.

TEST AT THE VALVES WITH THE VALVES IN POSITION AND SET SWITCHED ON.

TABLE I.

M.H.4.

1. Filament voltage, 4 A.C.
2. Anode voltage, 140 (1,200 V.Avo. range).
3. Anode milliamps (switch in radio position), 3 to 5 (M/A).

No heater volts denotes break in heater circuit (brown).

Test continuity from each valve leg to mains transformer. (T.2.) (Brown.)

No anode volts denotes break in anode circuit (yellow).

Test resistance values of following components:—

| | | | | |
|-----------------------------|-----|-----|------|----------|
| Reaction coil and R.2 | ... | ... | ohms | 1,000 |
| Primary T.1 | ... | ... | „ | 1,800 |
| Resistance R.3 | ... | ... | „ | 25,000 |
| Condensers C.3, C.4 and C.5 | ... | ... | „ | infinity |

Also test each lead of each condenser to earth.

There should be NO continuity.

High anode feed (M/A) denotes break in grid circuit (green). Test for continuity and resistance of following components: R.1 (2 megohms).

High anode volts—probably valve low in emission. Try a new valve.

If filament volts and anode volts both O.K. and signals still not heard with phones in **series with the plate circuit**, suspect faulty grid coils or aerial coupling coil, or condensers C.2 and U.C.1.

Check resistance readings with Table IV.

TABLE II.

M.L.4.

If signals heard O.K. in plate circuit of M.H.4, and not between grid and earth of M.L.4, this denotes discontinuous secondary T.1 (resistance reading should be about 11,000 ohms) or break in the wiring of grid circuit of M.L.4 (green).

TABLE III.

M.L.4.

1. Filament volts, 4 A.C.
2. Plate volts, 200 D.C.
3. Anode milliamps about 15.

Failure to read filament volts denotes fault in filament circuit (brown). (See Table I).

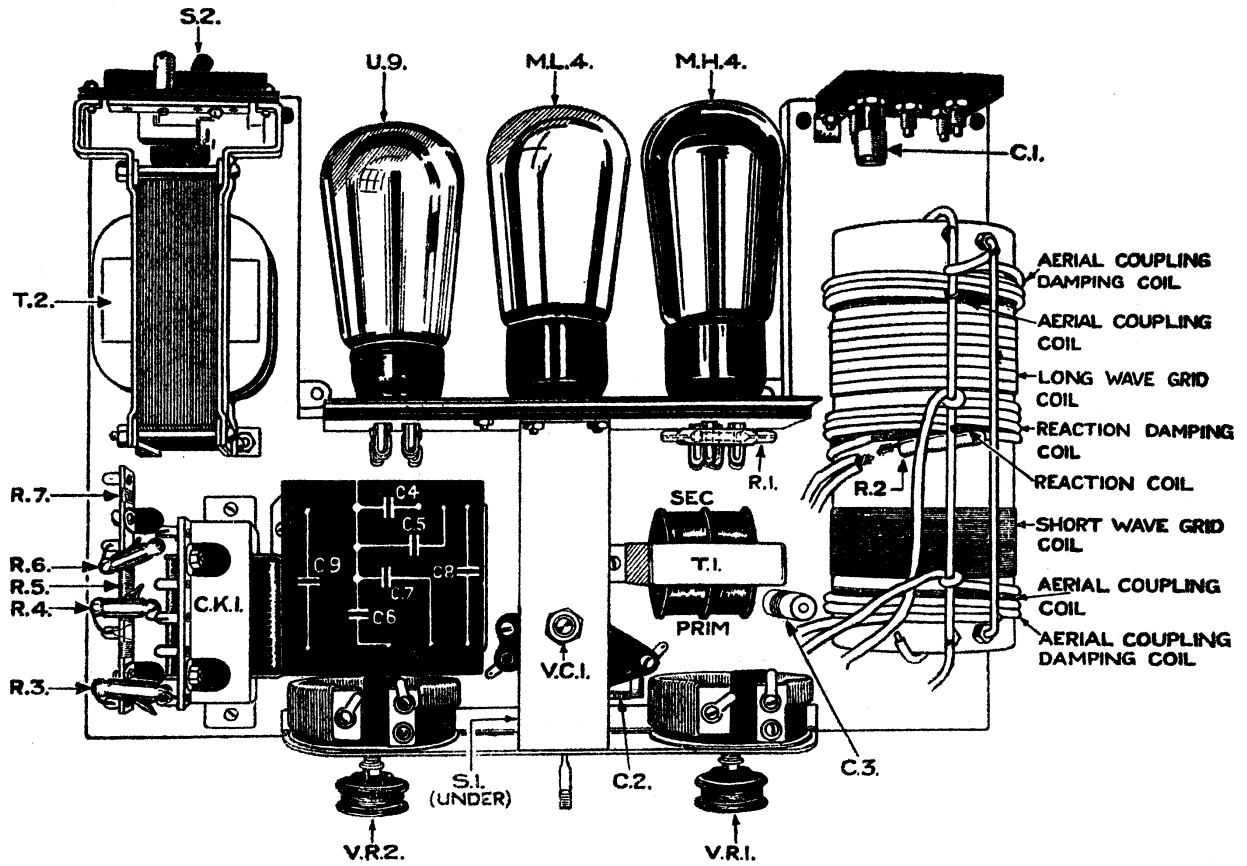
No or low plate volts denotes condenser C.6 broken down to earth or no continuity between plate of the valve and loud speaker output sockets.

High anode volts—probably valve old and low in emission. Try a new valve.

High anode feed (M/A) denotes break in grid circuit. Test for continuity and resistance of following components:—

| | | | | |
|----------------|-----|-----|------|---------|
| T.1, secondary | ... | ... | ohms | 11,000 |
| Resistance R.6 | ... | ... | „ | 100,000 |
| Resistance R.5 | ... | ... | „ | 700 |

DIAGRAPH (Model 220), Fig. 4.



DIAGRAPH (Model 220), Fig. 5.

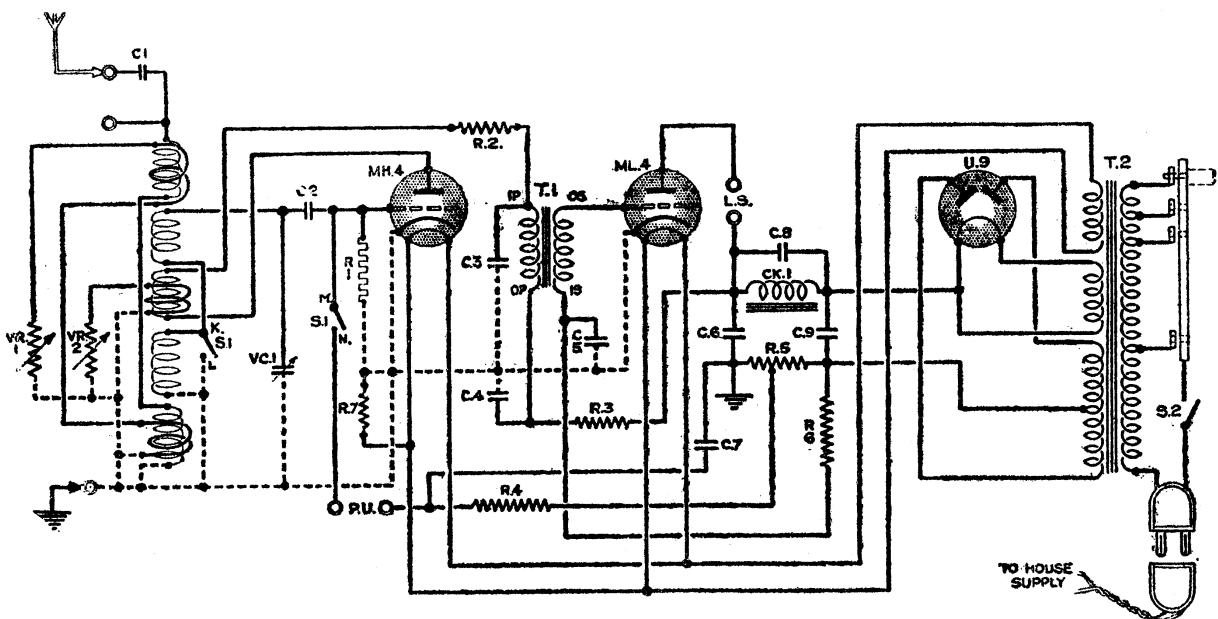


TABLE IV.

TABLE OF RESISTANCE VALUES.

| | | | | | | | | | | | Ohms. (approx.) |
|--|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----------------|
| Resistance between aerial socket (A.1) and earth socket should be | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | 20 |
| „ „ coil side of C.2 and earth (switch in long-wave position) should be | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | 11 |
| „ „ „ „ (switch in short-wave position) should be | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | about 2 |
| „ „ plate M.H.4 and transformer T.1 (i.e., reaction coil and R.2) should be... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | 1,011 |
| „ of V.R.1 and V.R.2 should be (one side disconnected from circuit) | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | 6 |
| „ of R.1 should be | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | 2 meg. |
| „ of R.2 | „ | ... | ... | ... | ... | ... | ... | ... | ... | ... | 1,000 |
| „ of R.3 | „ | ... | ... | ... | ... | ... | ... | ... | ... | ... | 25,000 |
| „ of R.4 | „ | ... | ... | ... | ... | ... | ... | ... | ... | ... | 100,000 |
| „ of R.5 | „ | ... | ... | ... | ... | ... | ... | ... | ... | ... | 700 |
| „ of R.6 | „ | ... | ... | ... | ... | ... | ... | ... | ... | ... | 100,000 |
| „ of R.7 | „ | ... | ... | ... | ... | ... | ... | ... | ... | ... | 9 |
| „ of T.1 primary should be | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | 1,800 |
| „ of T.1 secondary | „ | ... | ... | ... | ... | ... | ... | ... | ... | ... | 11,000 |
| „ across all condensers should be infinite as measured on an Avometer ; <u>one side of the condenser having been disconnected from rest of circuit.</u> | | | | | | | | | | | |
| Resistance CK1 should be | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | 700 |

All other values given are resistance as measured when wired in circuit.

TABLE OF CONDENSER VALUES.

| | | | | | | | | | |
|-----|----------------|-----|-----|-----|-----|-----|-----|-----|--------------|
| C.1 | ... | ... | ... | ... | ... | ... | ... | ... | 0.0001 mfd. |
| C.2 | ... | ... | ... | ... | ... | ... | ... | ... | 0.00025 mfd. |
| C.3 | ... | ... | ... | ... | ... | ... | ... | ... | 0.0003 mfd. |
| C.4 | } in one block | ... | ... | ... | ... | ... | ... | ... | 1 mfd. |
| C.5 | | ... | ... | ... | ... | ... | ... | ... | 0.1 mfd. |
| C.6 | | ... | ... | ... | ... | ... | ... | ... | 2 mfd. |
| C.7 | | ... | ... | ... | ... | ... | ... | ... | 0.1 mfd. |
| C.8 | | ... | ... | ... | ... | ... | ... | ... | 0.02 mfd. |
| C.9 | | ... | ... | ... | ... | ... | ... | ... | 3 mfd. |

NOTE.—Uncontrollable reaction is due to movable arm of V.R.2 making poor contact with resistance winding. This may be rectified by removing knob and small spring washer when arm and spindle may be withdrawn complete, having first removed the condenser block.

N.B.—Before removing condenser block, note positions of the various wires. Having removed rotary arm of V.R.2, bend it forward slightly so that it presses more firmly on resistance winding and apply small quantity of high grade vaseline to the spindle before re-assembling.

When operating a pick-up with this model, it is important that the pick-up lead is screened and earthed.

MARCONIPHONE MODEL 220. SPARE PART LIST.

A.C. MAINS.

The following list comprises the mains spare parts available for the Model 220. When ordering quote Q. 220 and the Index No. and full description.

IMPORTANT NOTE.—Each Catalogue No. refers to one item only or one assembly only, such as one screw, nut and washer.

| Index No. | Part Name. | Quantity Required. |
|---|---|-----------------------|
| CABINET. | | |
| Q. 220/ 1 | Cabinet complete | |
| „ 2 | Back panel | |
| „ 3 | Back panel securing screws | 2 |
| „ 4 | Screw cups | 2 |
| „ 5 | Perforated metal panel | 6 |
| „ 6 | Securing screw | |
| „ 7 | Button for steadying valve deck inside cabinet | |
| „ 8 | Button securing screw and washer... .. | |
| „ 9 | Dial escutcheon | |
| „ 10 | Switch escutcheon | |
| „ 11 | Brackets for holding back panel | |
| „ 12 | Felt foot | 4 |
| „ 13 | Securing screws for felt foot | 4 |
| „ 14 | Chassis to cabinet securing screw, nut, washer and shake-proof washer | 2 |
| CHASSIS. | | |
| „ 20 | Metal base | |
| „ 21 | Front metal panel | |
| „ 22 | Front metal panel securing screw, long | 2 |
| „ 22A | Front metal panel securing screw, centre... .. | 1 |
| „ 23 | Metal condenser bridge | |
| „ 24 | Metal condenser bridge, securing screw (short), nut and Grover washer (front) | 2 |
| „ 25 | Metal condenser bridge, securing screw (long), nut and Grover washer (back) | 4 |
| „ 26 | Tuning coil, complete with R. 2 | |
| „ 27 | Tuning coil distance piece | 2 |
| „ 28 | Tuning coil securing screw, nut, washer and Grover washer | 2 |
| „ 29 | Earthing tag | |
| FRONT PANEL ELECTRICAL ASSEMBLY. | | |
| „ 30 | Range switch and condenser, C. 2, .00025 mfd. | |
| „ 31 | Screw, nut and washer | 4 |
| „ 32 | Earthing Tag | |
| „ 33 | Damping rheostats, V.R. 1, or V.R. 2, complete, less knob | |
| „ 34 | Damping rheostat knob | |
| „ 35 | Grub screw for knob... .. | |
| „ 36 | Resistance element | |
| „ 37 | Moulded former | |

| Index No. | Part Name. | Quantity Required. |
|---|--|--------------------|
| FRONT PANEL ELECTRICAL ASSEMBLY—continued. | | |
| Q .220/ 38 | Large card washer | |
| „ 39 | Contact arm and spindle | |
| „ 40 | Lock collar on spindle | |
| „ 41 | Rheostat fixing nut | |
| VARIABLE CONDENSER ASSEMBLY. | | |
| „ 43 | Variable condenser, V.C. 1, .0005 mfd. | |
| „ 44 | Moulded condenser dial (less scale and screw) | |
| „ 45 | Special locking screw | |
| „ 46 | Scale only | |
| „ 47 | Screw, nut and washer for securing scale to dial | 2 |
| „ 48 | Condenser fixing nut | |
| „ 49 | Washer under condenser bridge | |
| „ 60 | Valve deck assembly, complete with R.1 | |
| „ 64 | Valve deck securing screw, nut and washer | 6 |
| „ 50 | Intervalve L.F. Transformer (T.1) | |
| „ 51 | Transformer securing screw, nut and Grover washer | 2 |
| FIXED CONDENSERS. | | |
| „ 55 | C. 1, .0001 mfd. | |
| „ 56 | C. 2, .00025 mfd. | |
| „ 53 | C. 3, .0003 mfd. | |
| „ 54 | Screw and washer for securing C. 3 | |
| „ 57 | C. 4, C. 5, C. 6, C. 7, C. 8, C. 9 in block | |
| „ 58 | Securing screw, nut and Grover washer for block | 4 |
| RESISTANCES. | | |
| „ 61 | R. 1, 2 megohms | |
| „ 65 | R. 3, 25,000 ohms | |
| „ 66 | R. 4, 100,000 ohms | |
| „ 67 | R. 6, 100,000 ohms | |
| „ 68 | R. 2, Spaghetti type on tuning coil | |
| „ 69 | Wirewound grid bias strip with R. 5 and R. 7 | |
| „ 69A | Securing screw, nut and washers for R. 5 and R. 7. | 2 |
| „ 70 | Aerial-earth gram. block, complete with condenser, Cl. .0001 mfd. | |
| „ 71 | Socket and nut | |
| „ 73 | Block securing screw, nut and washer | 2 |
| „ 74 | Mains, switch and loudspeaker block, complete | |
| „ 84 | Block securing screw, nut and washer | 2 |
| „ 82 | Mains, input plug, complete | |
| „ 81 | Card packing washer for item 82 | |
| „ 83 | Securing screw and nut | 2 |

| Index No. | Part Name. | Quantity Required. |
|-------------------------------|---|--------------------|
| MAINS SUPPLY ASSEMBLY. | | |
| Q. 220/ 150 | Mains, transformer, T.2, complete with voltage plug and screw strip ... | |
| „ 151 | Voltage selector plug ... | |
| „ 152 | Tag strip ... | |
| „ 153 | Plate with busbar ... | |
| „ 154 | Strip securing screw ... | 2 |
| „ 155 | Transformer securing screw, nut and Grover washer ... | 4 |
| „ 156 | Smoothing choke (C.K. 1) with tag strip ... | |
| „ 157 | Soldering lug strip only ... | |
| „ 158 | Securing screw and nut for strip ... | 2 |
| „ 159 | Securing screw, nut and Grover washer for choke ... | 2 |
| „ 160 | Mains lead complete with socket and bayonet adaptor ... | |
| „ 161 | 12 ft. length of maroon flex ... | |
| „ 162 | Mains socket (for flex) ... | |
| „ 163 | Standard bayonet adaptor ... | |
| „ 164 | Plugs for aerial, earth and L.S. ... | |
| COLOURED SLEEVING. | | |
| „ 101 | Black ... | |
| „ 102 | Yellow ... | |
| „ 103 | Red ... | |
| „ 104 | Blue ... | |
| „ 105 | Green ... | |
| „ 106 | Brown ... | |
| „ 107 | Yellow, black tracer ... | |
| „ 108 | Orange ... | |
| „ 109 | Purple ... | |
| „ 110 | Pink ... | |
| „ 111 | Yellow, red tracer ... | |
| „ 112 | White ... | |
| VALVES. | | |
| | Marconi MHL4 5-pin ... | |
| | Marconi ML4 5-pin ... | |
| | Marconi U10 ... | |

PART III.

Special Information—Model 221 (Battery).

(For 2 Volt Valves.)

L.T. Accumulator.—Test with voltmeter with accumulator connected to receiver and receiver switched on ; the reading must not be lower than 1.9 volts.

H.T. Battery.—Test when connected to the receiver with receiver switched on ; reading should not be less than 90 volts and, for best results, be between 110 and 120 volts.

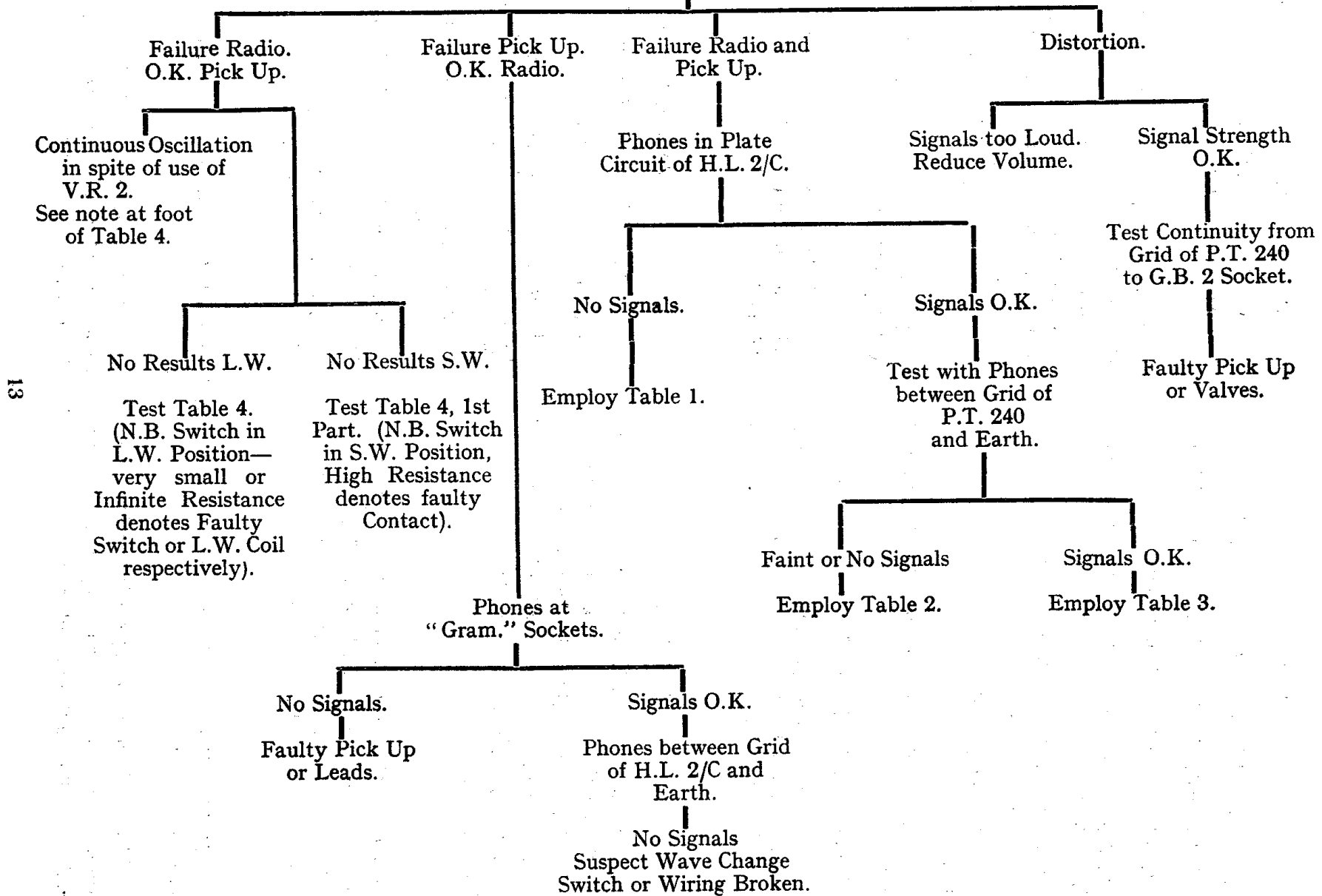
Special Grid Bias Battery.—Battery should read $4\frac{1}{2}$ volts between “ filament ” and anode “ pins ” and $1\frac{1}{2}$ volts between filament and grid pins of battery.

Loud-speaker is connected between H.T. + (Red) and plate (Yellow) of pentode valve.

Model 221—Fault-Finding Chart.

Fault—Crackles, Noise or Dead Silence.

Examine Aerial, Earth, Check all Battery Voltages and Loud-speaker (Test Continuity with Phones and Battery)
(H.R. 2,000/4,000 ohms.)



All readings given are subject to a variation of ± 20 .

TABLE I.

HL 2/C (HL 210) (Detector Valve).

Test at valve-holder with valve in position.

1. Filament voltage should be 2V.

2. Anode to earth voltage should be 30-40 (1,200 v. range).

3. Anode milliamps should be 1 to 2 (switch in radio position).

No filament volts denotes break in filament circuit.

Test continuity from each valve leg to L.T. accumulator.

No anode volts denotes break in anode circuit.

Test resistance values of following components :

| | | | | |
|------------------|-----|-----|------|-------|
| Reaction coil R2 | ... | ... | ohms | 18 |
| Primary T.1 | ... | ... | „ | 1,000 |

TABLE II.

If signals heard O.K. in the plate circuit of HL2/C (HL210) and not between grid and earth of PT240, the fault will lie in the secondary circuit of T.1 (green). Test at the valve holder for grid bias voltage, *i.e.*, between grid and earth. Reading should be 6 volts.

No grid volts denotes break in secondary T.1 (resistance reading should be about 11,000 ohms) or break in the wiring between the grid and the plate socket of grid bias battery.

NOTE.—Uncontrollable reaction is due to movable arm of VR2 making poor contact with resistance winding. See Part II, page 4.

N.B.—When removing condenser block note positions of various wires. Having removed rotary arm of VR2, bend it forward slightly so that it presses more strongly on resistance winding. If necessary apply a small quantity of high grade vaseline to the spindle before re-assembling.

Resistance R.3 ohms. 50,000

Condensers C3, C4 and C5 infinity

Also test each lug to earth.

If filament volts and anode volts both O.K. and signals still not heard with phones in series with the plate circuit (yellow) test grid and circuit (green) and bias of detector valve HL2/C (HL210) and earth with wave change switch in pick-up position (trigger down), pick terminals short-circuited ; reading should be $1\frac{1}{2}$ volts.

No reading or very small reading denotes (provided grid bias battery O.K.), faulty condenser C2.

If grid bias volts O.K. suspect secondary tuning coil or aerial coupling coil test between the points AA and BB.

TABLE III,

PT240 (Pentode Output Valve).

First test valve readings.

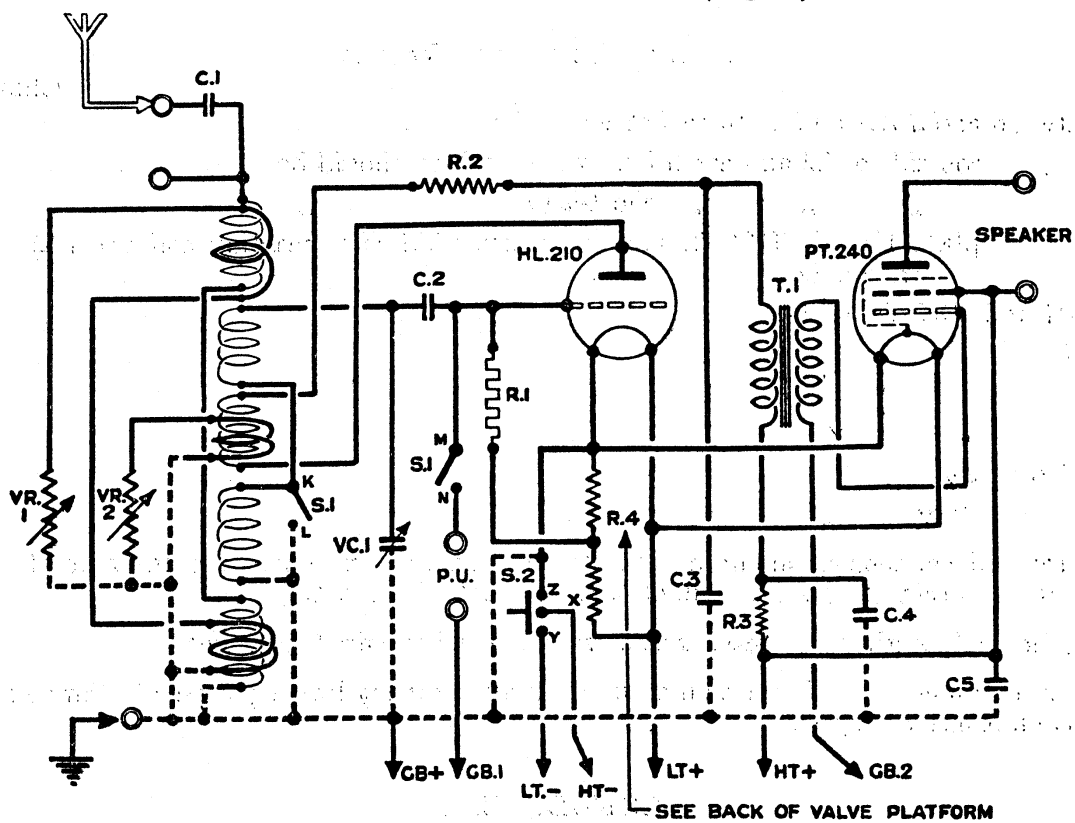
Filament volts should be 2 volts. Second grid (*i.e.*, centre pin) volts should be 120. Plate volts (with loud-speaker sockets shorted) should be 120.

Failure to read filament volts denotes fault in filament circuit. (See Table I.)

No volts on the centre pin denotes faulty condenser C5.

No plate volts denotes no continuity between plate of the valve and loud-speaker output sockets.

THEORETICAL DIAGRAM (Fig. 6).



H.L. 210 is superseded by H.L. 2/C.

DIAGRAPH (Fig. 7).

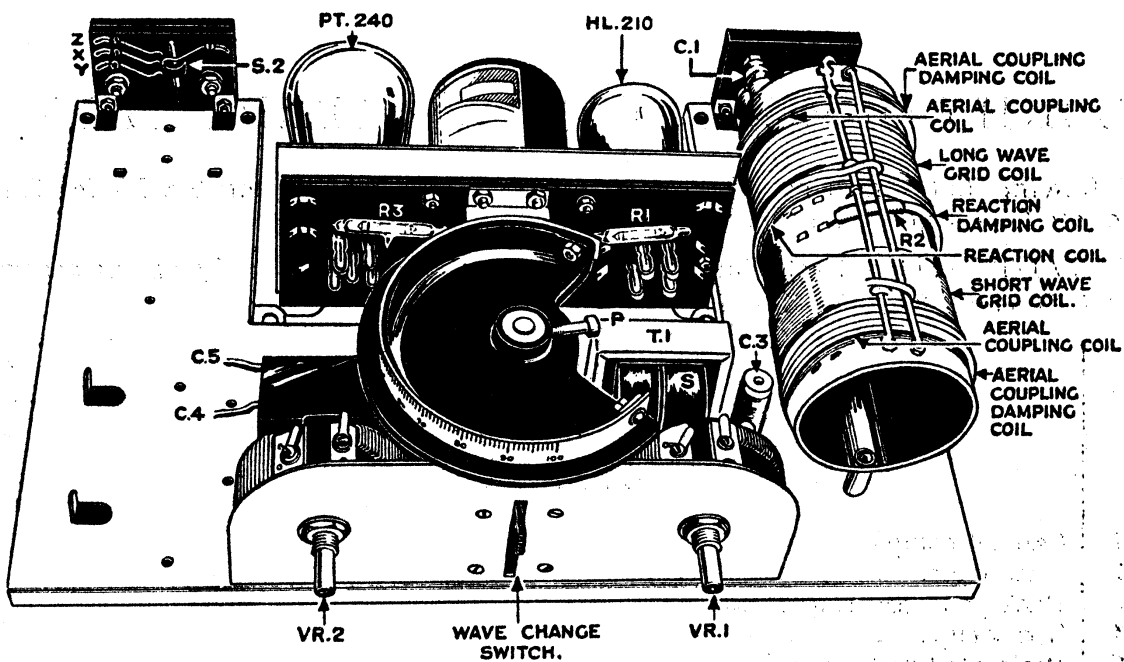


TABLE IV.

TABLE OF RESISTANCE VALUES.

| | | | | | | | | | | Ohms. (approx.) |
|--|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----------------|
| Resistance between aerial A.1 and earth socket should be | ... | ... | ... | ... | ... | ... | ... | ... | ... | 20 |
| " " coil side of C2 and earth long-wave position should be | ... | ... | ... | ... | ... | ... | ... | ... | ... | 11 |
| " " " " " short-wave " " " | ... | ... | ... | ... | ... | ... | ... | ... | ... | 2 |
| " " plate HL2/C (HL210) and transformer T.1 (i.e., reaction coil and R2) should be | ... | ... | ... | ... | ... | ... | ... | ... | ... | 1,018 |
| " VR1 and VR2 should be | ... | ... | ... | ... | ... | ... | ... | ... | ... | 6 |
| " R1 | ... | ... | ... | ... | ... | ... | ... | ... | ... | 2 meg. |
| " R2 | ... | ... | ... | ... | ... | ... | ... | ... | ... | 1,000 |
| " R3 | ... | ... | ... | ... | ... | ... | ... | ... | ... | 50,000 |
| " T.1 primary | ... | ... | ... | ... | ... | ... | ... | ... | ... | 1,000 |
| " T.1 secondary | ... | ... | ... | ... | ... | ... | ... | ... | ... | 10,000 |
| " across all condensers should be infinite, measured on an avometer; one side of the condenser having been disconnected from rest of circuit. | | | | | | | | | | |

All other values given are resistance as measured when wired in circuit.

Condenser readings are infinite as measured on an ordinary Battery type of Ohm meter such as the Avometer. Do not use a Megger.

CONDENSERS.

| | | | | | | | | | | |
|----------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-------------|
| C.1 | ... | ... | ... | ... | ... | ... | ... | ... | ... | ·0001 mfd. |
| C.2 | ... | ... | ... | ... | ... | ... | ... | ... | ... | ·00025 mfd. |
| C.3 | ... | ... | ... | ... | ... | ... | ... | ... | ... | ·0005 mfd. |
| C.4 } in Block | ... | ... | ... | ... | ... | ... | ... | ... | ... | ·1 mfd. |
| C.5 } | ... | ... | ... | ... | ... | ... | ... | ... | ... | 2 mfd. |

MARCONIPHONE MODEL 221. SPARE PART LIST.

The following list comprises the mains spare parts available for the Model 221. When ordering quote Q. 221 and the Index No. and full description.

IMPORTANT NOTE.—Each Catalogue No. refers to one item only or one assembly only, such as one screw, nut and washer.

| Index No. | Part Name. | Quantity Required. |
|-----------------|---------------------------|--------------------|
| CABINET. | | |
| Q. 221/ 1 | Cabinet complete | ... |
| " 2 | Back panel | ... |
| " 3 | Back panel securing screw | 2 |
| " 4 | Screw cups | 2 |
| " 5 | Perforated metal panel | ... |

| Index No. | Part Name. | Quantity Required. |
|---|--|--------------------|
| CABINET—continued. | | |
| Q221/ 6 | Securing screws | 6 |
| " 7 | Button for steadying valve deck inside cabinet | |
| " 8 | Button securing screw and washer... .. | |
| " 9 | Dial escutcheon | |
| " 10 | Switch escutcheon | |
| " 11 | Brackets for holding back panel | 2 |
| " 12 | Felt foot | 4 |
| " 13 | Felt foot, securing screw | 4 |
| " 14 | Chassis to cabinet securing screw, nut, washer, and shake-proof washer | 2 |
| CHASSIS. | | |
| " 20 | Metal base | |
| " 21 | Front metal panel | |
| " 22 | Front metal panel securing screw, long | 2 |
| " 22A | Front metal panel securing screw (centre) | 1 |
| " 23 | Metal condenser bridge | |
| " 24 | Metal condenser bridge securing screw (front), with nut and Grover washer | 2 |
| " 25 | Metal condenser bridge securing screw (back), with nut and Grover washer | 2 |
| " 26 | Tuning coil, complete with R. 2 | |
| " 27 | Tuning coil distance pieces | 2 |
| " 28 | Tuning coil securing screw, nut, washer and Grover washer | 2 |
| " 29 | Earthing tag | |
| FRONT PANEL ELECTRICAL ASSEMBLY. | | |
| " 30 | Range switch and condenser C2/·00025 mfd. | |
| " 31 | Screw, nut and washer, for above | 4 |
| " 32 | Earthing tag | |
| " 33 | Damping rheostats V.R. 1 or V.R. 2, complete, less knob | |
| " 34 | Damping rheostat knob | |
| " 35 | Grub screw for knob... .. | |
| " 36 | Resistance element | |
| " 37 | Moulded former | |
| " 38 | Large card washer | |
| " 39 | Contact arm and spindle | |
| " 40 | Lock collar on spindle | |
| " 41 | Rheostat fixing nut | |
| VARIABLE CONDENSER ASSEMBLY. | | |
| " 43 | Variable condenser, V.C. 1, ·0005 mfd. | |
| " 44 | Moulded condenser dial (less scale and screw) | |
| " 45 | Special locking screw | |
| " 46 | Scale only | |
| " 47 | Screw, nut and washer for securing scale to dial | 2 |
| " 48 | Condenser fixing nut | |
| " 49 | Washer under condenser bridge | |
| " 50 | Intervalve L.F. transformer (T. 1)... .. | |
| " 51 | Transformer securing screw, nut and Grover washer | 2 |

| Index No. | Part Name. | Quantity Required. |
|-------------------------------|--|--------------------|
| FIXED CONDENSERS. | | |
| Q221/ 52 | Condenser block containing C. 4, C. 5 | |
| " 57 | Condenser block securing screw, nut and Grover washer | 2 |
| " 53 | Fixed tubular condenser (C. 3), .0005 mfd. | |
| " 54 | Screw and Grover washer for above | |
| " 55 | Fixed tubular condenser C. 1, .0001 mfd. | |
| " 56 | Fixed tubular condenser on Range switch C. 2, .00025 mfd. | |
| " 60 | Valve deck assembly complete with R. 1, R. 3, R. 4 | |
| " 61 | Vacuum type grid leak, 2 meg., R. 1 | |
| " 62 | Vacuum type, 50,000 ohms, R. 3 | |
| " 63 | Wire wound centre tapping resistance R. 4 | |
| " 64 | Valve deck securing screw and nut | 6 |
| " 70 | Aerial-earth gram. block, complete with condenser, Cl. = .0001 mfd. | |
| " 73 | Block securing screw, nut and washer | 2 |
| " 71 | Socket and nut | |
| " 74 | Main switch block complete | |
| " 75 | Backplate to switch block, only | |
| " 76 | Mounted switch lever | |
| " 77 | Contact spring | 4 |
| " 80 | Screws for holding contact springs... .. | 4 |
| " 78 | Switch mounting | |
| " 79 | Pin of switch lever | |
| " 71 | Socket nut | |
| " 81 | Soldering tag | |
| " 82 | Battery leads clamping block, state top or bottom | |
| " 83 | " " " securing screws | 2 |
| " 84 | Block-to-chassis securing screw, nut, and washer | 2 |
| BATTERY LEADS, &c. | | |
| " 90 | L.T. battery leads (complete) | |
| " 91 | H.T. battery leads | |
| " 92 | Identification tabs, L.T. + | |
| " 93 | Identification tabs, black, L.T. - | |
| " 94 | Identification tabs, black, H.T. + | |
| " 95 | Identification tabs, red, H.T. - | |
| " 96 | Battery tags for L.T. leads | |
| " 97 | Battery plugs for H.T. leads | |
| " 98 | Coloured plug for aerial, purple | |
| " 99 | Coloured plug for earth, black | |
| " 100 | Coloured plug for L.S., pink | |
| COLOURED SLEEVING. | | |
| " 101 | Black | |
| " 102 | Yellow... .. | |
| " 103 | Red | |
| " 104 | Blue | |
| " 105 | Green | |
| " 106 | Brown | |
| " 107 | Yellow, black tracer | |
| " 108 | Orange | |
| " 109 | Purple | |
| " 110 | Pink | |
| " 111 | Yellow, red tracer | |
| " 112 | White | |
| BATTERIES. | | |
| | Special Grid Battery | |
| | 120 Volt large capacity H.T. Battery | |
| VALVES. | | |
| | Marconi HL 2/C | |
| | Marconi PT 240 5-pin | |