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PHILIPS

SERVICE MANUAL

BATTERY RECEIVER

3 VALVES

Type 822 B

GENERAL REMARKS.

This receiver is a straight three-valve instrument for use with batteries. An eliminator can be used if desired.

Four control knobs are provided. The top centre is for tuning, the bottom centre comprises both the on/off switch and wave band switch. In the left-hand position the receiver is switched off; in the middle position the medium-wave band is obtained, and in the right-hand position it is adjusted for the long-wave band. The left-hand knob controls the volume, and the right-hand knob controls the sensitivity and selectivity.

Description of Circuits.

The control grid of the valve V1 (VP2) is connected to the centre aerial socket via the series condenser C1—which has R1 in parallel—to the H.F. transformer, the primary and secondary of which are coupled by the condenser C2. The secondary winding of the H.F. transformer is tuned by C12 and its associated trimmer. This tuned circuit is connected to V1 via the condenser C3. Control over the volume is effected by the potentiometer P1, which is connected at its ends to the grid bias voltage via the

primary winding of the aerial H.F. transformer to the negative end and the positive side via R3. The slider of the potentiometer is taken to the control grid of the valve V1 via the resistance R2.

The anode of the first valve is coupled by the coil to the valve V2 (SP2), and this coil is tuned by the condenser C13 and its associated trimmer. This tuned circuit is connected to the control grid of V2 via the condenser C4 and grid leak R4. Selectivity and sensitivity is controlled by the circuit comprising the inductance and variable condenser C14 in the anode circuit of the detector V2. From the anode of the latter valve a resistance capacity circuit is connected forming the L.F. coupling to the output valve V3 (PM22A). The anode of this valve is connected to a permanent magnet moving coil loudspeaker via the output transformer T1.

A filter circuit is incorporated immediately after the anode of V2 comprising the air core coil CK1 together with the condensers C6, C8. The decoupling condensers C2, C5, C7 and C11 are connected in one box. Note that the switch not only short-circuits or places into circuit the long-wave sections of the coils, but also breaks the anode filament and grid bias batteries in the "off" position.

Trimming the tuned circuits.

The apparatus required for this adjustment is as follows:

1. A Service Oscillator similar to Philips Type 4028C.
2. An output indicator.
3. A small insulated screwdriver.

The method of balancing is as follows:

It will not be necessary to remove the chassis from the cabinet, as the trimmers are situated on top of the variable condensers.

1. Connect the Service Oscillator to aerial socket No. A2 via artificial aerial.
2. Connect output meter across loudspeaker.
3. Switch to medium-wave band.
4. Apply a signal of 250 metres.
5. Trim with the trimmers C12 and C13 until the output meter shows a maximum deflection.
6. Retrim with sensitivity control at best position. If signals are too strong reduce the strength of the oscillator.
7. Seal trimmers with sealing wax.
8. If the calibration is inaccurate readjust pointer for satisfactory calibration and re-check on 250 metres.
9. This trimming adjustment will hold good for the long-wave band.

How to trace Faults.

1. The following data is as completed as possible, but as there may be compound faults it cannot be complete.
2. Always carry out test measurements so as to find the fault.

The method of procedure should be as follows:

- I. Check all anode and grid battery voltages together with the voltage across the filament sockets of the valve-holders with the switch placed at "ON."
- II. Equip the receiver with a known good set of valves (or a set of valves from a receiver that functions satisfactorily) and, if necessary, try another loudspeaker.

III. If V3 has abnormal current and voltages.

- A.
 1. Switch open-circuited.
 2. Primary T1 open-circuited.
 3. C10, C11 short-circuited.
 4. Screened anode lead V1, V2 earthing to screening.
 5. Filament switch open-circuited or high resistance.
 6. GB—4.5 V. open-circuited.
 7. R7, R8 open-circuited.
 8. C9 short-circuited.
 9. Bad contact in valve holder.

B. If V3 has normal voltages and currents.

1. Primary T1 short-circuited.
2. C11, C10, C9 open-circuited.
3. R8 or R7 short-circuited.
4. Bad contact in valve holder.
5. Fault in loudspeaker or loudspeaker transformer.

C. If V2 has abnormal voltages and currents.

1. R6 open-circuited.
2. CK1 open-circuited.
3. Anode lead shorting to earthed screening.
4. C8 short-circuited.
5. R5 open-circuited.
6. C7 short-circuited.
7. Bad contact in valve holder.
8. R4 open-circuited.
9. C4 short-circuited.
10. C14 short-circuited.

D. If V2 has normal voltages and currents.

1. C6, C7, C8, C11 open-circuited.
2. Earthing of screen disconnected.
3. C14 open-circuited or condenser pigtail broken.
4. S7, S8 open-circuited.

E. V1 has abnormal voltages and currents.

1. S5, S6 open-circuited.
2. C4 short-circuited.
3. C13 or trimmer short-circuited.
4. Anode lead shorting to earthed screening.
5. Earthed screening shorting to H.T. end of trimmer or variable condenser.
6. R2, P1 short-circuited or open-circuited.
7. G.B.—9 open-circuited.
8. S1, S2 open-circuited.
9. C5, C2 short-circuited.
10. Bad contact in valve holder.
11. Defect in wave change switch.

F. V1 has normal voltages and currents.

1. C3 open-circuited.
2. S3, S4 open-circuited.
3. Fault in wave change switch.
4. C12 or trimmer short-circuited.
5. Aerial socket disconnected.
6. S1, S2 short-circuited.

REMOVING AND CHANGING OF PARTS.

Removing the chassis:

The method of removing the chassis should be done in the following way:

1. Release the back and remove the valves.
2. Remove the four knobs on the front of the cabinet by taking out the grub screws.
3. Remove the four screws and washers, etc., on the underside of the cabinet.
4. Disconnect the loudspeaker leads.

Important points to be noted when repairing.

1. Do not make any alteration to the wiring or screening plates.
2. Always replace earth connections to their original points.
3. Replace all spring washers, etc., in their original places.
4. All moving parts may be greased with a little vaseline.

Condenser Drive and Variable Condenser.

These parts should be removed together. After unsoldering the leads remove the securing screws when the complete assembly can be removed.

Refer to notes on trimming after the condenser assembly has been replaced.

LIST OF SPARE PARTS, ETC.

When ordering any of these items, please state :

1. Code number.
2. Type and serial number of receiver.
3. Description.

| Fig. | Item. | Description of Parts. | Code No. |
|---------------------|-------|--|----------|
| | | Variable condenser assembly | 822.001 |
| | | Re-action condenser assembly | 822.002 |
| | | Main spindle for re-action condenser | 822.043 |
| | | Pigtail for re-action condenser | 822.044 |
| | | Tags for re-action condenser | 822.045 |
| | | Aerial coil assembly | 822.009 |
| | | Inter-valve coil assembly... .. | 822.010 |
| | | Filter coil C.K.1 | 822.011 |
| | | Drive assembly | 822.020 |
| | | Switch and screen assembly | 822.021 |
| | | Spindle for switch | 822.040 |
| | | Index assembly for switch | 822.041 |
| | | Bank assembly for switch | 822.042 |
| | | Valve holder, 7-pin | 822.022 |
| | | Valve holder, 5-pin | 822.023 |
| | | Aerial and earth socket panel | 822.024 |
| | | Anode cap and mantle lead | 822.025 |
| | | Anode cap and braided lead | 822.026 |
| | | Station scale | 822.027 |
| | | Four-way tag panel | 822.028 |
| | | Pilot lampholder | 822.029 |
| | | H.T. battery lead | 822.030 |
| | | L.T. accumulator lead | 832.031 |
| | | Screen lead... .. | 822.032 |
| | | Rubber insulating bush | 822.033 |
| | | Wander plug, H.T. red (plus) | 822.034 |
| | | Wander plug, H.T. black (minus) | 822.035 |
| | | Wander plug, No. 1, grid minus, yellow | 822.036 |
| | | Wander plug, No. 2, grid minus, blue | 822.037 |
| | | Wander plug, aerial | 822.038 |
| | | Wander plug, earth | 822.039 |
| LOUDSPEAKER. | | | |
| | | Loudspeaker, complete | 822.046 |
| | | Bag for speaker | 822.047 |
| | | Output transformer | 822.048 |
| | | Wood screws for baffle | 822.204 |
| | | Silk piece | 822.049 |
| SMALL PARTS. | | | |
| | | Cleat | 822.101 |
| | | Distance-piece ($\frac{1}{16}$ "), $\frac{3}{16}$ " \times $\frac{3}{16}$ " | 822.102 |
| | | Distance-piece ($\frac{1}{16}$ "), $\frac{1}{16}$ " \times $\frac{3}{16}$ " | 822.103 |
| | | Grommet (large) | 822.104 |
| | | Grommet (small) | 822.105 |
| | | 6 BA Tag, tinned | 822.106 |
| | | Accumulator tags | 822.107 |

LIST OF SPARE PARTS, ETC.—continued.

| Fig. | Item. | Description of Parts. | Code No. |
|-------------------------|---|-----------------------|----------|
| SCREWS AND NUTS. | | | |
| | 6 BA × $\frac{1}{4}$ " rd. hd. screws, D.N.P. | ... .. | 822.200 |
| | 6 BA × $\frac{3}{8}$ " rd. hd. screws, D.N.P. | ... .. | 822.201 |
| | 6 BA × $\frac{1}{2}$ " rd. hd. screws, D.N.P. | ... .. | 822.202 |
| | 4 BA × $\frac{3}{4}$ " rd. hd. screws, D.N.P. | ... .. | 822.203 |
| | 6 BA std. full nuts | ... .. | 822.210 |
| | 4 BA std. full nuts | ... .. | 822.211 |
| | 4 BA std. hex. lock nuts | ... .. | 822.212 |
| | 6 BA shakeproof washers (int. teeth) | ... .. | 822.213 |
| | 4 BA shakeproof washers (int. teeth) | ... .. | 822.214 |
| | Washers, P.11238 (for wave change switch) | ... .. | 822.215 |
| | Rivets, oval hd. semi tub., No. 12 × $\frac{11}{16}$" | ... .. | 822.218 |
| | Rivets, oval hd. semi tub., No. 12 × $\frac{11}{16}$" | ... .. | 822.219 |
| | Rivets, oval hd. semi tub., No. 12 × $\frac{1}{8}$" | ... .. | 822.220 |
| CABINET. | | | |
| | Silk piece | ... .. | 822.052 |
| | Cabinet complete | ... .. | 822.050 |
| | Back | ... .. | 822.051 |
| | Valve indicator label | ... .. | 822.053 |
| | Milled thumb screws | ... .. | 822.108 |
| | Inserts for thumb screws | ... .. | 822.109 |
| | Clips for back | ... .. | 822.110 |
| | Glass for escutcheon | ... .. | 822.055 |
| | Spring for securing glass | ... .. | 822.111 |
| | No. 4 × $\frac{1}{4}$ " rd. hd. steel wood screws | ... .. | 822.205 |
| | Washer for same | ... .. | 822.206 |
| | Knob for wave change switch | ... .. | 822.056 |
| | Knob tuning | ... .. | 822.057 |
| | Escutcheon | ... .. | 822.054 |
| | No. 4 × $\frac{1}{4}$ " rd. hd. steel wood screws, F.B. | ... .. | 822.207 |
| | 4 BA × $\frac{1}{16}$ " steel grub screws | ... .. | 822.208 |
| | Felt protectors | ... .. | 822.112 |
| | Felt protector pads | ... .. | 822.113 |
| | 2 BA × $\frac{5}{8}$ " rd. hd. steel screws, cadmium plated | ... .. | 822.209 |
| | Washers for chassis | ... .. | 822.216 |
| | Washers 2 BA | ... .. | 822.217 |

CURRENTS AND VOLTAGES.

H.T. Battery = 135 V. L.T. Battery 2.0 V.

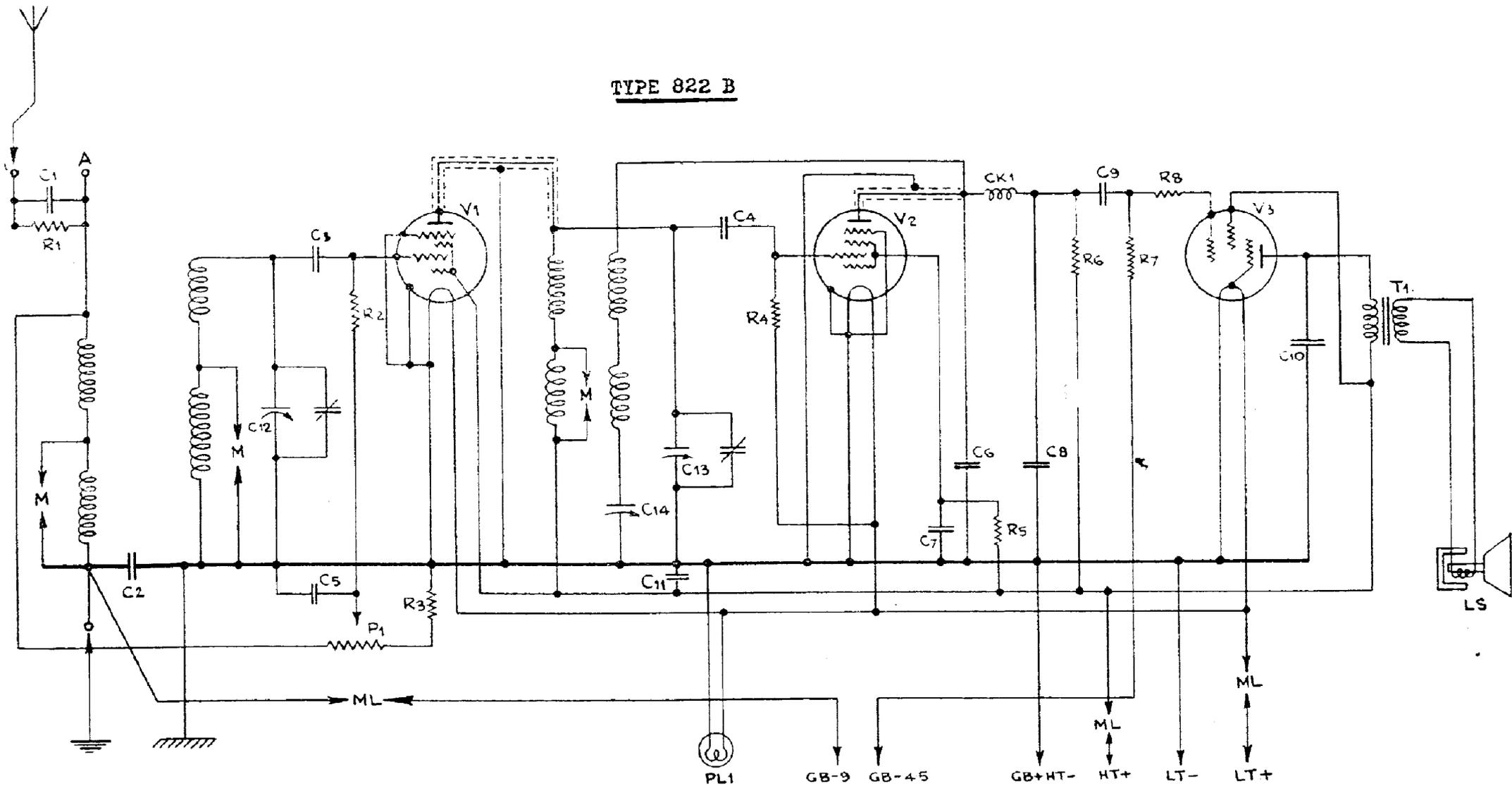
Approximate values.

| | V1 (VP2) | V2 (SP2) | V3 (PM22A) | |
|----------|----------|----------|------------|-------|
| V_a | 135 | 45 | 135 | Volts |
| $V_{g'}$ | 135 | 50 | 135 | Volts |
| $-V_g$ | -9 | --- | -4.5 | Volts |
| i.a. | 1.6 | 0.8 | 7.5 | mA |
| i.s. | 0.5 | 0.4 | 2.5 | mA |

Measured with voltmeter having 1,000 Ohms per volt.

Grid voltage measured across battery.

TYPE 822 B



RESISTANCES.

| Designation. | Resistances. | Code No. |
|--------------|--------------|----------|
| R1 | 10000 Ohm | 822.017 |
| R2 | 2 M. Ohm | 822.012 |
| R3 | 500 Ohm | 822.016 |
| R4 | 2 M. Ohm | 822.012 |
| R5 | 0.25 M. Ohm | 822.014 |
| R6 | 0.1 M. Ohm | 822.015 |
| R7 | 2 M. Ohm | 822.012 |
| R8 | 0.2 M. Ohm | 822.013 |
| P1 | 10000 Ohm | 822.017 |

CONDENSERS.

| Designation. | Condensers. | Code No. |
|--------------|-----------------------|----------|
| C1 | 10 $\mu\mu\text{F}$ | 822.007 |
| C2 | 0.1 μF | * |
| C3 | 100 $\mu\mu\text{F}$ | 822.006 |
| C4 | 10 $\mu\mu\text{F}$ | 822.007 |
| C5 | 0.1 μF | * |
| C6 | 100 $\mu\mu\text{F}$ | 822.006 |
| C7 | 0.1 μF | * |
| C8 | 1000 $\mu\mu\text{F}$ | 822.003 |
| C9 | 2000 $\mu\mu\text{F}$ | 822.004 |
| C10 | 5000 $\mu\mu\text{F}$ | 822.005 |
| C11 | 2 μF | * |
| C12 | 444 $\mu\mu\text{F}$ | 822.001 |
| C13 | 444 $\mu\mu\text{F}$ | |
| C14 | 350 $\mu\mu\text{F}$ | |
| | * Condenser Box | 822.008 |

COILS.

| Designation. | Resistance in Ohms. | Component Part. |
|--------------|---------------------|----------------------|
| S1 | 0.2 | Aerial Coil. |
| S2 | 42.0 | |
| S3 | 3.5 | |
| S4 | 11.5 | |
| S5 | 3.5 | |
| S6 | 11.5 | Anode Coil. |
| S7 | 1.5 | |
| S8 | 6.5 | |
| S9 | 800 | Speaker Transformer. |
| S10 | .8 | |
| S11 | 2.1 | |
| CK1 | 100.0 | H. F. anode choke. |

The above are average figures.

