'TRADER' SERVICE SHEET

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PHILIPS 821B

3-VALVE BATTERY RECEIVER

A SIMPLE 3-valve circuit using pentodes throughout is employed in the chassis of the Philips 821B battery operated receiver. It has two aerial sockets and provision for using both an extension speaker and a gramophone pick-up. On the long waves a Droitwich rejector can be brought into circuit by means of an extra position on the wave-change switch.

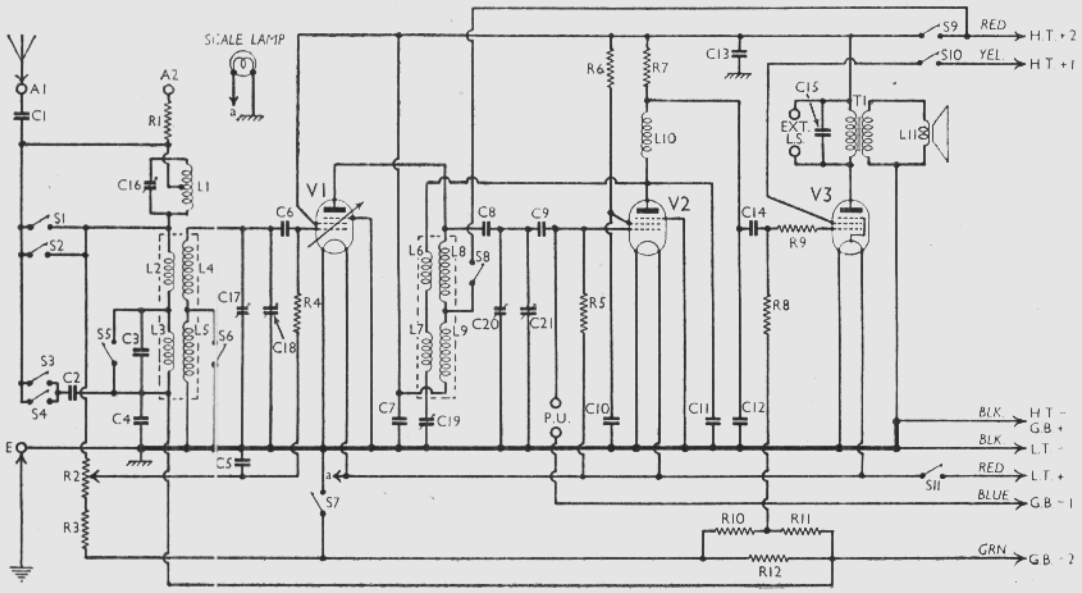
CIRCUIT DESCRIPTION

Two alternative aerial input connections to coupling coils **L2, L3** (M.W. and L.W.), and coupling condenser **C2** (L.W.). **A1**, via series condenser **C1,** is for distant reception, and **A2**, via fixed resistance **R1,** is for local station reception. Droitwich rejector **L1, C16** is short-circuited by switches **S1, S2** on M.W. and normal L.W., but a third movement of the wave-change switch control opens the switches and connects the rejector in circuit.

Single tuned circuit **L4, L5, C18** precedes variable-mu pentode radio-frequency amplifier (**V1, Mullard metallised VP2**). Gain control by variable potentiometer **R2** which varies G.B. applied and also reduces input to the valve by shunting the aerial-earth circuit with condenser **C5.**

Tuned-anode coupling by **L8, L9, C21** between **V1** and R.F. pentode detector valve (**V2, Mullard metallised SP2**) which operates on grid leak system with **C9** and **R5.** Reaction is applied from anode by coils **L6, L7** and controlled by variable condenser **C19.** Provision for connection of gramophone pick-up in **V2** C.G. circuit. H.F. filtering in anode circuit by choke **L10** and by-pass condensers **C11, C12.**

Resistance-capacity coupling by **R7, C14** and **R8** between **V2** and pentode output valve (**V3, Mullard PM22D**). G.B. is obtained from potential divider **R10, R11** which is connected in parallel with loading resistance **R12** across G.B. battery. Fixed tone correction in anode circuit by **C15.** Provision for connection of high-impedance external speaker across primary of internal speaker transformer **T1.**



Circuit diagram of the Philips 821B. Note the alternative aerial sockets. The Droitwich rejector is switched in circuit in the fourth position of the wavechange switch.

DISMANTLING THE SET

Removing Chassis.—If it is desired to remove the chassis from the cabinet, first remove the four control knobs (recessed grub screws, two in the knob of the wave-change switch) and then the four bolts (with washers, rubber washers and distance pieces) holding the chassis to the bottom of the cabinet. The chassis can now be withdrawn.

To free the chassis entirely, unsolder the speaker leads, and *when replacing* connect the green lead to the left-hand tag on the transformer terminal strip and the yellow lead to the right-hand. Grey lead goes to the tag on the transformer frame.

Removing Speaker.—To remove the speaker from the cabinet, slacken the three clamps (nuts and lock nuts). *When replacing,* see that the transformer terminal strip is at the bottom.

COMPONENTS AND VALUES

	CONDENSERS	Values (μF)
C1	Aerial series condenser	0·002
C2	Aerial L.W. coupling	0·00008
C3	L3 trimmer	0·00008
C4	G.B. circuit by-pass	0·1
C5	V1 C.G. decoupling	0·1
C6	V1 C.G. condenser	0·0001
C7	V1 anode decoupling	0·1
C8	Blocking condenser	0·05
C9	V2 grid condenser	0·000016
C10	V2 S.G. by-pass	0·5
C11, C12	V2 anode H.F. by-passes	0·0001, 0·001
C13	H.T. supply reservoir	2·0
C14	V2 to V3 L.F. coupling	0·0032
C15	Tone corrector	0·0016
C16‡	Droitwich rejector tuning	0·00016
C17‡	Aerial circuit trimmer	0·000027
C18†	Aerial circuit tuning	0·00045
C19†	Reaction control	0·0002
C20‡	V1 anode circuit trimmer	0·000027
C21†	V1 anode circuit tuning	0·00045

† Variable. ‡ Pre-set.

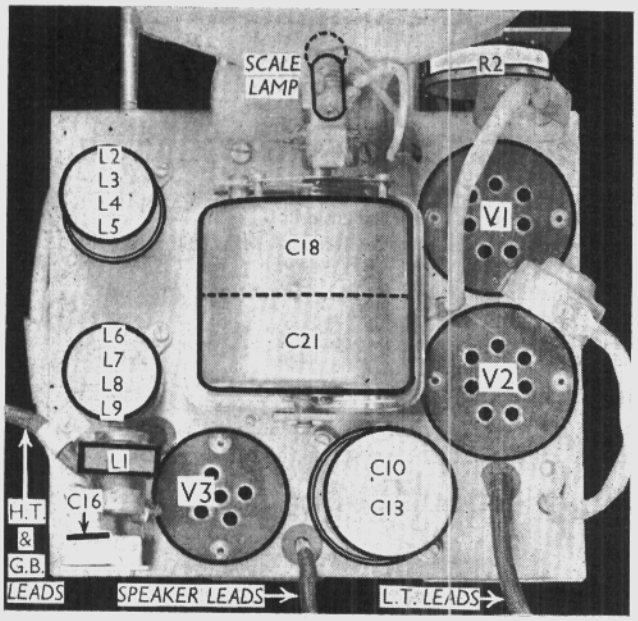
	RESISTANCES	Values (ohms)
R1	Aerial series resistance	250,000
R2	V1 gain control	10,000
R3	Gain control fixed min.	500
R4	V1 C.G. resistance	2,000,000
R5	V2 grid leak	2,000,000
R6	V2 S.G. H.T. feed	250,000
R7	V2 anode load	100,000
R8	V3 C.G. resistance	2,000,000
R9	V3 C.G. H.F. stopper	200,000
R10	V3 G.B. potential divider	25,000
R11		64,000
R12	G.B. battery load	1,600

	OTHER COMPONENTS	Approx. Values (ohms)
L1	Droitwich rejector coil	34·0
L2, L3	Aerial coupling coils	25.0, 58·0
L4, L5	Aerial circuit tuning coils	2·5, 43·0
L6, L7	Reaction coils	1·0, 7·5
L8, L9	V1 anode circuit tuning coils	2·5, 43·0
L10	V2 anode H.F. choke	375·0
L11	Speaker speech coil	2·0
T1	Speaker input trans. Pri. / Sec.	630·0 / 0·2
S1-S6	Waveband switches	—
S8		
S7	G B. circuit switch	—
S9,S10	H.T. circuit switches	—
S11	L.T. circuit switch	—

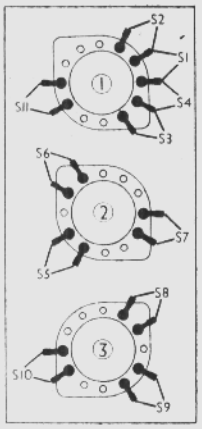
VALVE ANALYSIS

Valve voltages and currents given in the table (p.III) are those measured in our receiver when it was operating from a battery reading 138 V on the H.T. section, on load. The volume control was at maximum but the reaction control was at minimum, and there was no signal input.

Voltages were measured on the 1,200 V scale of an Avometer, chassis being negative.



Plan view of the chassis. **L1** and **C16** form the Droitwich rejector.



Switch diagrams, looking in the directions of the arrows in the under - chassis view.

Valve	Anode Voltage (V)	Anode Current (mA)	Screen Voltage (V)	Screen Current (mA)
V1 VP2 ..	138	2·0	138	0·6
V2 SP2 ..	40	0·8	50	0·3
V3 PM22D*	135	5·0	125	0·7

* Valve in our receiver marked " B ".

GENERAL NOTES

Switches.—**S1-S11** are the wavechange, Droitwich rejector and battery switches, ganged in three rotary units which are indicated in our under-chassis view. The arrows show the directions in which the units are viewed in the diagrams on this page.

The table below gives the switch positions for the four control settings, starting from the fully anti-clockwise position.

Switch	Off	M.W.	L.W.	L.W. with Droitwich rejector
S1	O	C	O	O
S2	O	O	C	O
S3	O	O	C	O
S4	C	O	O	C
S5	O	C	O	O
S6	O	C	O	O
S7	O	C	C	C
S8	O	C	O	O
S9	O	C	C	C
S10	O	C	C	C
S11	O	C	C	C

Coils.—**L1** is the unscreened coil, while **L2-L5** and **L6-L9** are in two screened units, all on the chassis deck. **L10** is an H.F. choke, beneath the chassis.

Scale Lamp.—This is a Philips 2 V, 0·1A M.E.S. type.

External Speaker.—Two sockets are provided at the rear of the chassis for a high resistance external speaker.

Condensers C10, C13.—These are two paper types in a tubular screened unit on the chassis deck, with connecting tags beneath. The two tags close together belong to **C10** (0·5 μF) and the pair with the large separation belong to **C13** (2·0 μF).

Condenser C1.—This is made up of two 0·001μF condensers in parallel.

Batteries.—A 2 V L.T. cell and a combined 135 V H.T. and 9 V G.B. battery are recommended.

Battery Leads and Voltages.—L.T. cable: Black lead, L.T. negative; Red lead, L.T. positive 2 V. H.T. and G.B. cable: Black lead, H.T. negative and G.B. positive; Red lead, H.T. positive 2, 135 V; Yellow lead, H.T. positive 1, 135 V if **V3** is marked A, 120 V or nearest if **V3** is marked B; Blue lead, G.B. negative 1, —1·5 V; Green lead, G.B. negative 2, —9 V.

CIRCUIT ALIGNMENT

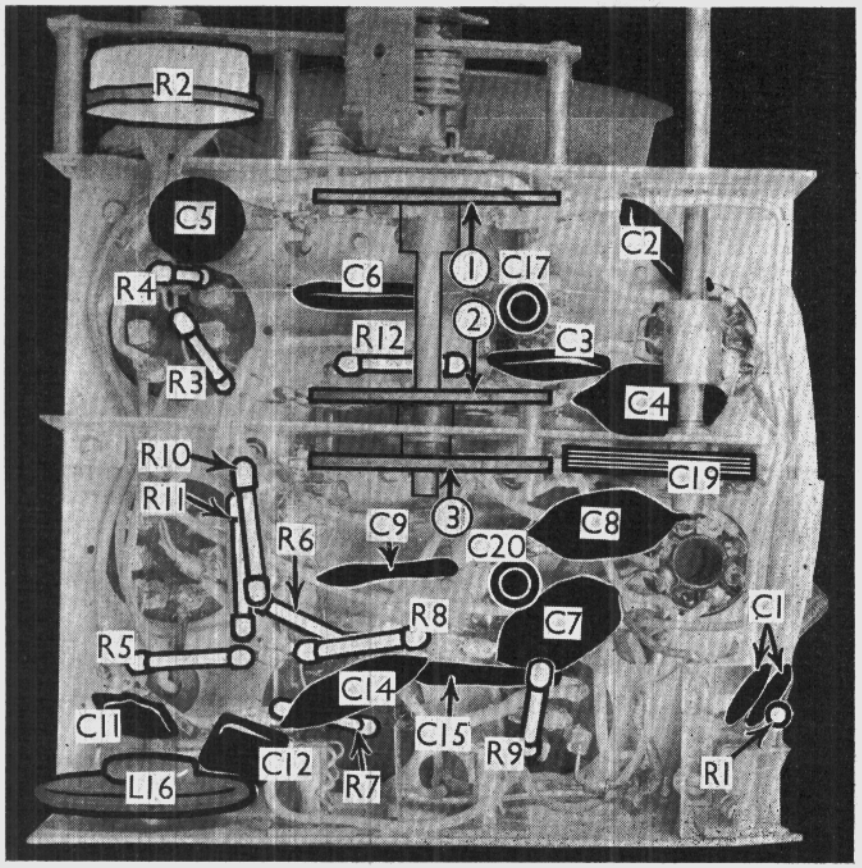
An auxiliary dial will be necessary for trimming the set accurately, since the tuning scale is not attached to the chassis. Connect up the set with the recommended battery voltages (see General Notes), connect an oscillator to the **A1** aerial socket, and switch set to M.W.

Turn condenser drive until the 150 deg. mark on the scale is coincident with 225 m. Adjust the gain control **R2** until **V1** has 1·5 V bias, using a high resistance voltmeter for measurement. Turn reaction condenser **C19** to about 10 deg. from minimum.

C20 should be approximately flush with the insulating rod, and **C17** about 9 m.m. below. Now adjust the two condensers for maximum output at 225 m. Increase reaction until receiver is on the verge of oscillation, then re-adjust **C17** and **C20**.

Check up to see that the receiver will tune to 200 m. and that calibration lies between the limits marked on the driving disc at 225, 300, 500, 1,000 and 1,500 m.

Droitwich Rejector.—Turn gain control to maximum. Switch receiver to L.W., feed in a 1,500 m. signal, tune to it very accurately. Then adjust **C16** carefully for *minimum* output.



Under-chassis view. The switch units are indicated by arrows and numbers in circles.