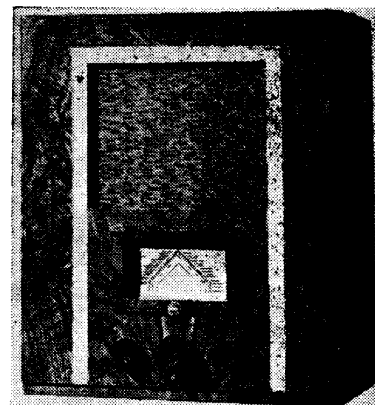


"TRADER" SERVICE SHEET

679

PHILIPS 821B

BATTERY RECEIVER



REVISED ISSUE OF

SERVICE SHEET No. 183

A SIMPLE 3-valve circuit using pentodes throughout is employed in the chassis of the Philips 821B battery operated 2-band TRF 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.

Release date and original price: August, 1936; £7 7s. without batteries.

CIRCUIT DESCRIPTION

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

Single tuned circuit L4, L5, C18 precedes variable-mu pentode RF amplifier (V1, Mullard metallised VP2). Gain control by variable potentiometer R2 which varies GB 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 RF 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 CG circuit. RF 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). GB is obtained from potential divider, R10, R11 which is connected in parallel with loading resistor R12 across GB battery. Fixed tone correction in anode circuit by C15. Provision for connection of high-impedance external speaker across primary of internal speaker transformer T1.

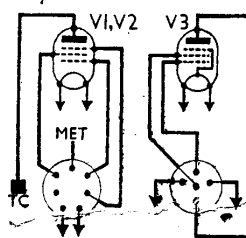
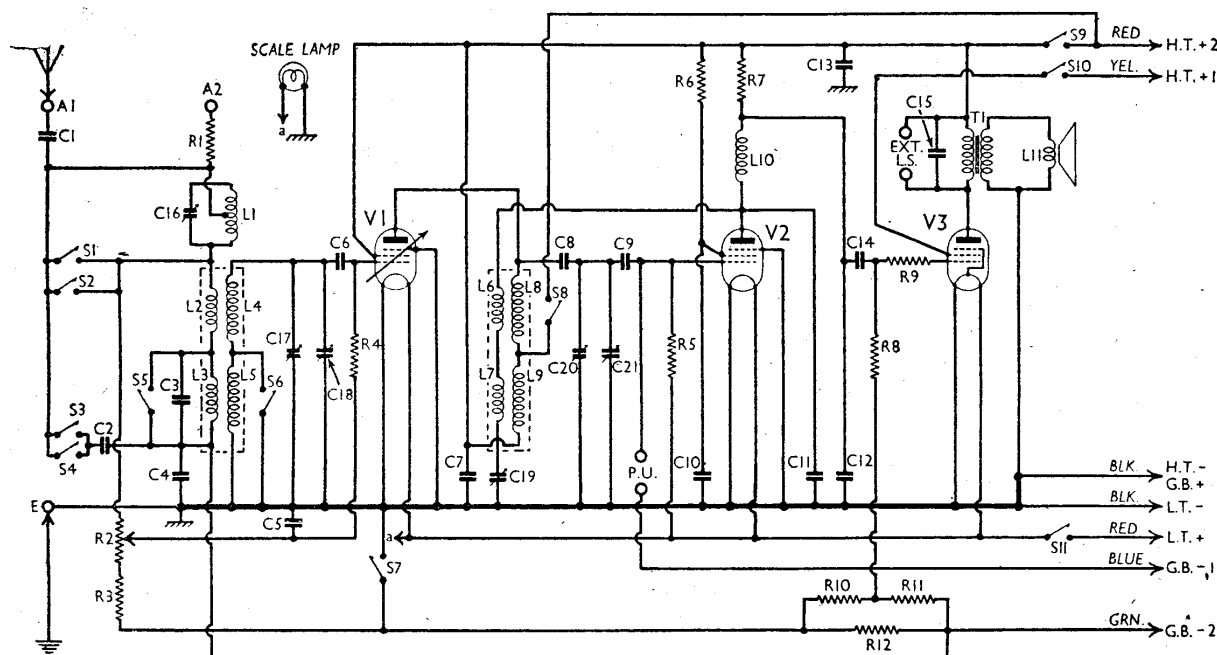
COMPONENTS AND VALUES

CONDENSERS		Values (μF)
C1	Aerial series condenser ...	0.002*
C2	Aerial LW shunt condenser ...	0.00008
C3	GB circuit by-pass ...	0.00008
C4	V1 CG decoupling ...	0.1
C5	V1 CG decoupling ...	0.1
C6	V1 CG decoupling ...	0.0001
C7	V1 anode decoupling ...	0.1
C8	Blocking condenser ...	0.05
C9	V2 grid condenser ...	0.000016
C10	V2 SG decoupling ...	0.5
C11	RF by-pass condensers ...	0.0001
C12	HT circuit reservoir ...	0.001
C13	V2 to V3 AF coupling ...	2.0
C14	Tone corrector ...	0.0032
C15	Droitwich rejector tuning ...	0.00016
C16†	Aerial MW trimmer ...	0.000027
C17†	Aerial circuit tuning ...	0.00045
C18†	Reaction control ...	0.0002
C19†	V1 anode MW trimmer ...	0.00027
C20†	V1 anode circuit tuning ...	0.00045

* Made up of two 0.001 μF condensers in parallel.
† Variable. ‡ Pre-set.

RESISTORS		Values (ohms)
R1	Aerial series resistor ...	250,000
R2	1 gain control ...	10,000
R3	V1 fixed GB resistor ...	500
R4	V1 CG resistor ...	2,000,000
R5	V2 grid leak ...	2,000,000
R6	V2 SG HT feed ...	250,000
R7	V2 anode load ...	100,000
R8	V3 CG resistor ...	2,000,000
R9	V3 grid stopper ...	200,000
R10	V3 GB potential divider {	25,000
R11		64,000
R12	GB battery load ...	1,600

OTHER COMPONENTS		Approx. Values (ohms)
L1	Droitwich rejector coil ...	34.0
L2	Aerial coupling coils ...	25.0
L3		58.0
L4	Aerial circuit tuning coils ...	2.5
L5		43.0
L6	Reaction coils ...	1.0
L7		7.5
L8	V1 anode circuit tuning coils ...	2.5
L9		43.0
L10	V2 anode RF choke ...	375.0
L11	Speaker speech coil ...	2.0
T1	Speaker input { Pri. ...	630.0
	trans. { Sec. ...	0.2
S1-S6	Waveband switches ...	—
S7		—
S8	GB circuit switch ...	—
S9, S10	HT circuit switches ...	—
S11	LT circuit switch ...	—



Circuit diagram of the Philips 821B. R12 shunts the GB section of the HT battery via S7. The Droitwich rejector L1, C16 is in circuit only in the fourth switch position.

GENERAL NOTES

Switches.—S1-S11 are the wave-change, Droitwich retractor 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. A dash indicates open, and C, closed.

Switch	Off	MW	LW normal	LW with retractor
S1	—	C	—	—
S2	—	—	—	—
S3	—	—	—	—
S4	C	—	—	C
S5	—	—	—	—
S6	—	—	—	—
S7	—	—	—	—
S8	—	—	—	—
S9	—	—	—	—
S10	—	—	—	—
S11	—	C	C	C

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

Scale Lamp.—This is a Philips 2 V, 0.1 A MES type.

External Speaker.—Two sockets are provided at the rear of the chassis for a high-impedance (24,000 Ω) 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 μ F) and the pair with the large separation belong to C13 (2.0 μ F).

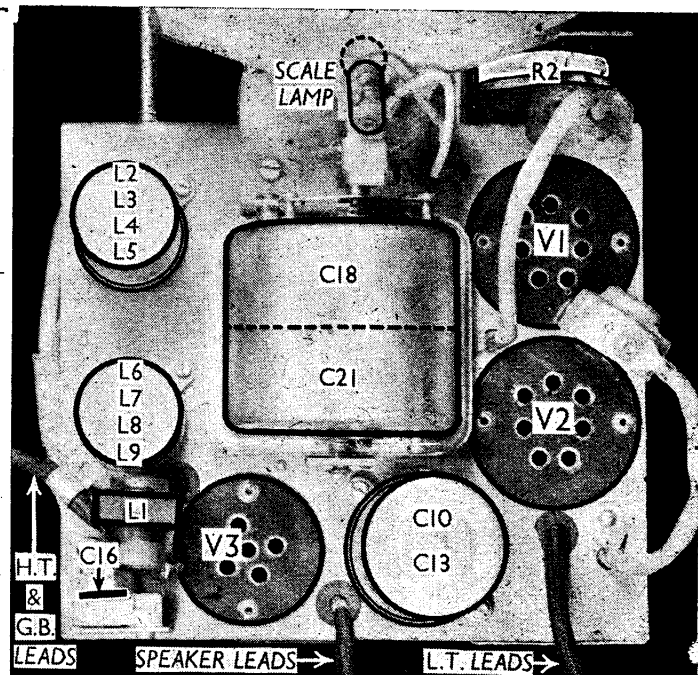
Condenser C1.—This is made up of two 0.001 μ F condensers in parallel.

Batteries.—A 2 V LT cell and a combined 135 V HT and 9 V GB battery are recommended.

Battery Leads and Voltages.—LT cable: Black lead, LT negative; Red

Plan view of the chassis. All the outgoing leads are indicated. C16 is adjusted from the rear.

lead, LT positive 2 V. HT and GB cable: Black lead, HT negative and GB positive; Red lead, HT positive 2, 135 V; Yellow lead, HT positive 1, 135 V if V3 is marked A, 120 V or nearest if V3 is marked B; Blue lead, GB negative 1, -1.5 V; Green lead, GB negative 2, -9 V.



VALVE ANALYSIS

Valve voltages and currents given in the table below are those measured in our receiver when it was operating from a battery reading 138 V on the HT 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.

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."

DISMANTLING THE SET

Removing Chassis.—Remove the four control knobs (recessed grub screws, with two screws in the waveband control knob); remove four bolts (with metal washers, rubber washers and distance pieces) holding the chassis to the bottom of the cabinet, when the chassis may be withdrawn to the extent of the speaker leads.

To free chassis entirely, unsolder from the speaker the leads connecting it to chassis. When replacing, connect the green lead to the left-hand tag on the transformer connecting strip, the yellow lead to the right-hand tag, and the grey lead to the tag on the transformer frame.

Removing Speaker.—Slacken the three clamps (nuts and lock-nuts) and lift out speaker. When replacing, the transformer connecting strip should be at the bottom, and if the leads have been unsoldered they should be connected as described previously.

CIRCUIT ALIGNMENT

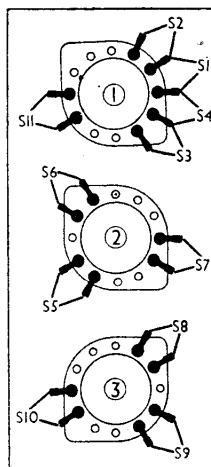
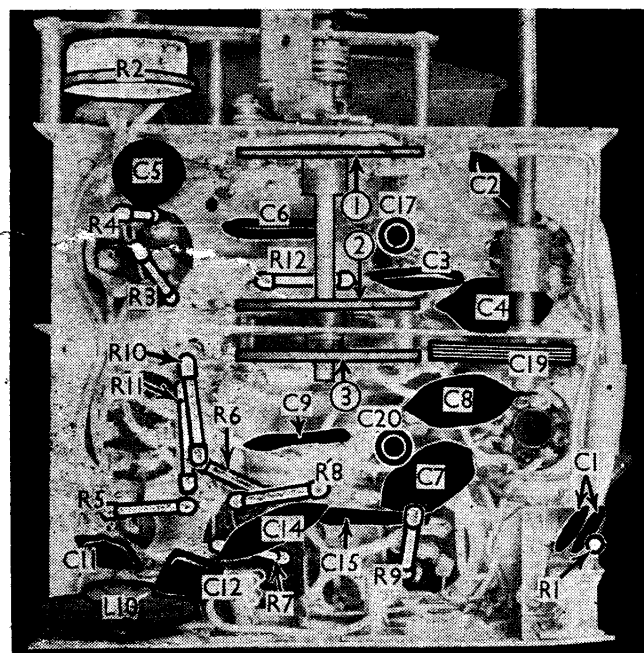
An auxiliary dial will be necessary for trimming the set accurately, since the tuning scale is not attached to the chassis. Connect up the set with the recommended battery voltages (see General Notes), connect signal generator to the A1 socket.

MW.—Switch set to MW, and 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 mm below. Now feed in a 225 m (1,333 kc/s) signal, and adjust the two condensers for maximum output at 225 m. Increase reaction until receiver is on the verge of oscillation, then readjust 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 Retractor.—Switch set to LW with retractor (fully clockwise switch position), and turn the gain control to maximum. Feed in a 1,500 m (200 kc/s) signal, tune it in accurately, and then adjust C16 for minimum output.



Under-chassis view (left); arrows indicate the directions in which the switch diagrams (above) are viewed.