"TRADER" SERVICE SHEET 1092

PHILCO B2602

The appearance of the Philco B2602 transportable which is provided with a carrying handle.

OPERATING from self-contained dry batteries or from A.C. or D.C. mains of 200-240 V (40-60 c/s in the case of A.C.) the Philco B2602 is a 4-valve (plus metal rectifier) 2-band portable superhet. No provision is made for external connections such as aerial, earth or speaker, but the chassis is isolated from the mains. The waveband ranges are 187-550 m and 1,000-2,142.8 m. A difference in the mains input wiring on earlier models is explained overleaf under "Modifications."

Release date and original price: December 1950; £12 15s 11d, without batteries. Purchase tax extra.

CIRCUIT DESCRIPTION

Tuned frame aerial input by **L2, C26** (M.W.) or **L2,** loading coil **L1** and **C26** (L.W.) to heptode valve **(V1, Brimar 1R5)** which operates as frequency changer with electron coupling.

Oscillator grid coils **L3** (M.W.) and **L4** (L.W.) are tuned by **C29.** Parallel trimming by **C27** (M.W.) and **C9, C27, C30** (L.W.); series tracking by **C10, C31** (M.W.) and **C10, C28, C31** (L.W.). Inductive reaction coupling from anode by **L5** (M.W.) and **L6** (L.W.). Oscillator stabilization by **R3. C5** neutralizes the inter-electrode capacitance between the oscillator and control grids.

Second valve **(V2, Brimar 1T4)** is a variable-mu R.F. pentode operating as intermediate frequency amplifier, with tuned transformer couplings **C3, L7, L8, C4** and **L9, L10, C32.**

Intermediate frequency 465 kc/s.

Diode signal detector is part of diode pentode valve **(V3, Brimar 1S5).** Audio frequency component in rectified output is developed across volume control **R8,** which acts as diode load, and is passed via **C15** to control grid of pentode section, which operates as A.F. amplifier.

D.C. potential developed across **R8,** is fed back as bias via step-down potential divider **R6, R7** to **V1** giving automatic gain control. The bias applied to **V2** is fixed and is derived from the filament chain.

Resistance-capacitance coupling by **R12, C17** and **R14** between **V3** pentode anode and pentode output valve **(V4, Brimar 3V4).** Tone correction in anode circuit by **C20.**

For battery operation, power supplies are carried by switches **S8(B)** and **S10(B),** which close in that position as indicated by the suffix **(B).** For mains operation, **S7(M), S9(M), S11(M)** and **S12(M)** close. **S13, S14** are the normal on/off switches. The safety link disconnects the mains from the chassis when the back of the carrying case is opened.

Mains H.T. current is supplied by metal rectifier **(MR1,** two **SenTerCel RM3** units in series). Smoothing by **R18, R19** and electrolytic capacitors **C21, C22** and **C23.** Filament current is taken from the H.T. circuit via ballast resistor **R17.**

(Continued col. 1 overleaf)

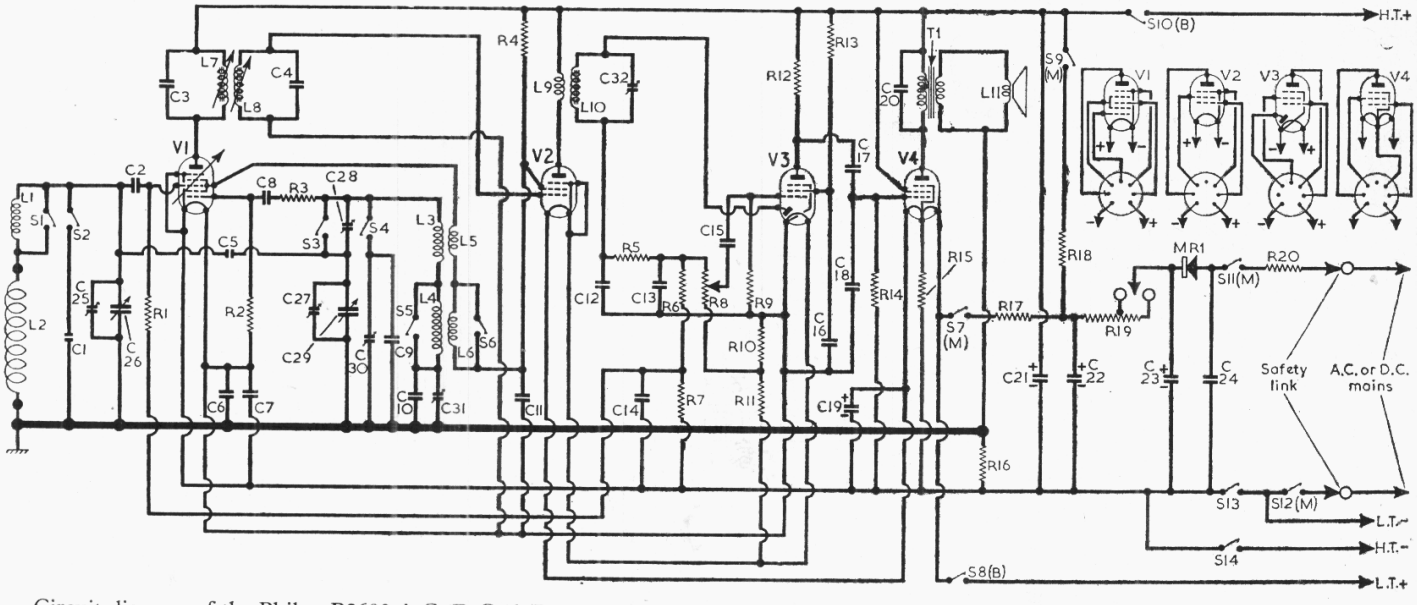
COMPONENTS AND VALUES

	RESISTORS	Values	Locations
R1	V1 C.G.	1MΩ	E3
R2	V1 osc. C.G. ...	100kΩ	F4
R3	Osc. stabilizer ...	1·2kΩ	F3
R4	H.T. decoupling ...	15kΩ	E4
R5	I.F. stopper ...	47kΩ	C2
R6	A.G.C. potential divider ...	2·2MΩ	D4
R7		3·3MΩ	F3
R8	Volume control ...	1MΩ	D3
R9	V3 C.G.	6·8MΩ	D4
R10	V3 diode delay bias	470Ω	D3
R11		270Ω	D3
R12	V3 anode load ...	470kΩ	D4
R13	V3 S.G. feed ...	4·7MΩ	D4
R14	V4 C.G.	2·2MΩ	D3
R15	Filament shunt ...	680Ω	D3
R16	Chassis isolator ...	150kΩ	F3
R17	L.T. ballast ...	2kΩ	B2
R18	H.T. smoothing ...	1·5kΩ	B2
R19	Ballast resistor ...	*2,140Ω	B2
R20	Surge limiter ...	100Ω	E4

* Tapped at 1,750Ω + 390Ω from C22.

	CAPACITORS	Values	Locations
C1	L.W. aerial trim ...	80pF	F3
C2	V1 C.G.	100pF	F3
C3	1st I.F. trans. tuning ...	100pF	A2
C4		100pF	A2
C5	Osc. neutralizer ...	1·5pF	A2
C6	Filament by-passes	0·1μF	F4
C7		0·25μF	E3
C8	V1 osc. C.G. ...	100pF	F3
C9	L.W. osc. trim. ...	100pF	G4
C10	M.W. osc. tracker...	520pF	G4
C11	H.T. decoupling ...	0·1μF	E4
C12	I.F. by-passes ...	100pF	C2
C13		100pF	C2
C14	A.G.C. decoupling	0·05μF	F3
C15	A.F. coupling ...	0·002μF	D3
C16	V3 S.G. decoupling	0·05μF	D4
C17	A.F. coupling ...	0·005μF	D4
C18	I.F. by-pass ...	220pF	D3
C19*	Filament by-pass...	30μF	E3
C20	Tone corrector ...	0·005μF	D4
C21*	H.T. smoothing ...	40μF	C1
C22*		30μF	C1
C23*		20μF	C1
C24	Mains R.F. by-pass	0·05μF	E3
C25‡	M.W. aerial trim....	—	A2
C26†	Aerial tuning ...	—	A2
C27‡	M.W. osc. trim. ...	—	A1
C28‡	L.W. osc. tracker...	—	A1
C29†	Oscillator tuning ...	—	A1
C30‡	L.W. osc. trim. ...	—	G4
C31‡	M.W. osc. tracker...	—	G4
C32‡	I.F. trimmer ...	—	C2

* Electrolytic. † Variable. ‡ Pre-set



Circuit diagram of the Philco B2602 A.C./D.C./A.D. portable. No provision is made for the connection of an external aerial and earth.

OTHER COMPONENTS		Approx. Values (ohms)	Locations
L1	L.W. loading coil ...	14·0	A2
L2	Frame aerial ...	1·0	—
L3	Oscillator tuning coils	2·0	G3
L4		6·5	G3
L5	Oscillator reaction coils	2·3	G3
L6		4·0	G3
L7	1st I.F. trans. Pri.	12·0	A2
L8	1st I.F. trans. Sec.	12·0	A2
L9	2nd I.F. trans. Pri.	32·0	C2
L10	2nd I.F. trans. Sec.	6·0	C2
L11	Speech coil ...	2·5	B1
T1	O.P. trans. Pri. ... Sec. ...	570·0 —	B1
S1-S6	Waveband switches	—	F3
S7(M)-S12(M)	Mains/battery switches	—	F4
S13, S14	Power sw., g'd R8	—	D3

Circuit Description—*continued*

The filaments are connected in series for both mains and battery operation, bias being obtained from points of appropriate potential in the filament chain. **R15** by-passes the H.T. current from **V4** past the filaments.

The H.T. negative circuit on both mains and battery operation is not taken to chassis in the normal way but is "anchored" to it by **R16**. As the chassis has no direct connection to the mains input circuit, an earth may be directly connected to the chassis when it is being serviced on the bench. **R20** protects **MR1** from current surges, and **C24** operates as a mains R.F. by-pass.

DISMANTLING THE SET

Removing Chassis.—Remove volume control knob and concentric tuning and waveband control knobs (pull-off);

hinge open back of carrying case and unsolder frame aerial leads from tags;

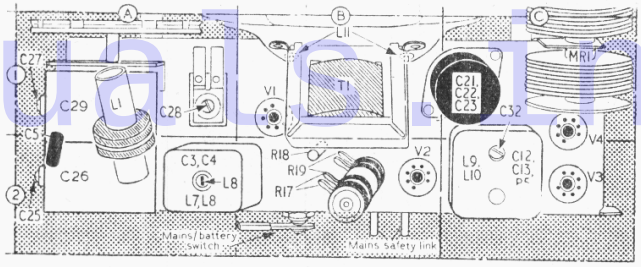
remove two wood screws at ends of rear chassis member and withdraw chassis.

To operate the receiver the mains link should be unclipped from the back cover and taped or tied in place over the mains link plug on the rear chassis member.

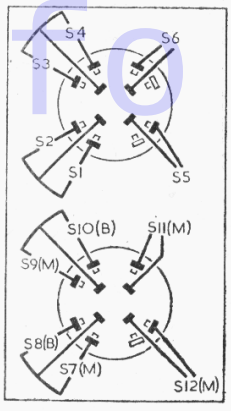
GENERAL NOTES

Switches.—**S1-S6** are the waveband switches, ganged in a single rotary unit beneath the chassis. The unit is indicated in our underside view of the receiver, and shown in detail in the upper diagram inset beside the plan view, where it is drawn as seen from the rear of the chassis. **S1, S3, S5** and **S6** close on M.W. (control knob anti-clockwise); **S2** and **S4** close on L.W.

S7(M), S8(B)-S11(M) are the mains/battery change-over switches, ganged in a second single rotary unit beneath the chassis as indicated in the underside view of the receiver. It is shown in detail in the lower diagram inset beside the plan view, where it is drawn as seen from the front of the chassis. The **(M)** switches close for mains operation (control lever clockwise), and the **(B)** for battery.



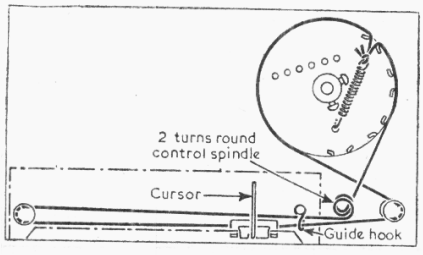
Above: Plan view of chassis. *Right:* Waveband and mains/battery switches as seen in underside view of chassis.



S13, S14 are the Q.M.B. mains switches, ganged with the volume control **R8**.

Safety Link.—This isolates the chassis from the mains when the back is open, and consists of a two-pin plug on the rear chassis member which presses against two shrouded spring contacts on the back cover of the carrying case.

Drive Cord Replacement.—About 30in of nylon-braided glass yarn is required for a new drive cord, which should be run as shown in the accompanying sketch, where the system is drawn as seen from the front with the gang at maximum capacitance. The cursor can be slipped on afterwards and should be adjusted to coincide with the indentation at the right-hand end of the scale backing plate (viewed from front of chassis) when the gang is at maximum.



Sketch of the tuning drive system, drawn as seen from front with gang at maximum.

MODIFICATIONS

In earlier models a different ballast resistor was fitted, having a further 40 Ω isolated section at its top end. In these models, **R20** was connected in series with this extra resistor between the anode of MR1 and **S11(M)**. However, in order to avoid troubles due to leakage between sections of the ballast resistor the top 40 Ω section was omitted in later models (including ours) and **R20** was connected between **S11(M)** and the left-hand side safety link pin (viewed from rear of chassis).

The makers recommend that this modification be carried out in all receivers of the earlier pattern, the orange lead from **MR1** anode and **R20** being disconnected from the tags of the top (40 Ω) section and wired as shown in our circuit diagram overleaf.

VALVE ANALYSIS

Valve voltages and currents given in the table below are those measured on our receiver when it was operating from 230 V A.C. mains, with the voltage adjustment set to the 220-240 V tapping. The receiver was switched to M.W. and the gang turned to maximum, but there was no signal input.

Voltages were measured with an Avo Electronic TestMeter, and as this instrument has a high internal resistance, allowance should be made for the current drawn by other types of meter. The common negative of **C21, C22** and **C23** was the negative connection in every case. The voltage measured across **C23** was 250 V, and across **C22** was 110 V.

Valve	Anode		Screen	
	V	mA	V	mA
V1 1R5 ...	90	1·1	58	1·4
V2 1T4 ...	90	1·6	58	0·6
V3 1S5 ...	46	0·09	21	0·03
V4 3V4 ...	88	6·0	90	1·2

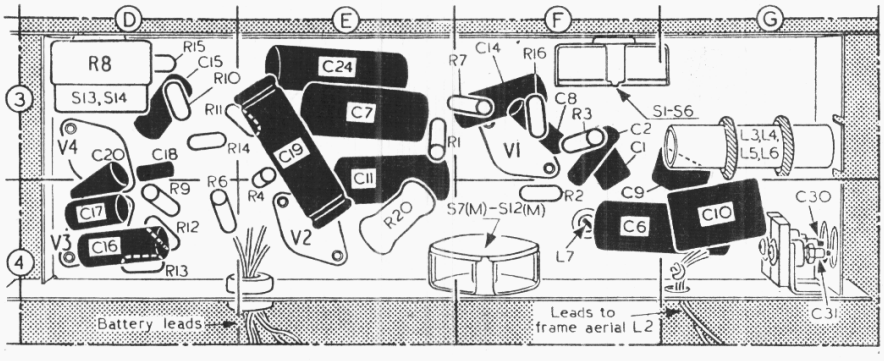
CIRCUIT ALIGNMENT

I.F. Stages.—Remove chassis from carrying case and connect a 10 kΩ resistor in place of the frame aerial. Switch receiver to M.W. and turn gang to maximum. Connect output of signal generator, via an 0.05 μF capacitor in the live lead, to control grid (pin 6) of **V1** and chassis. Feed in a 465 kc/s (645.16 m) signal and adjust **C32** (location reference C2) and the cores of **L8** (A2) and **L7** (F4) for maximum output. Two peaks will be found when adjusting the cores of **L7** and **L8**, the correct one being that obtained with the cores farthest out of the coil formers. Repeat these adjustments until no further improvement results.

R.F. and Oscillator Stages.—Disconnect 10 kΩ resistor from frame aerial leads, reconnect frame aerial and place receiver and batteries in their normal positions relative to the frame aerial. Connect the signal generator leads to a 6in diameter loop, consisting of six to eight turns of wire, placed near to the frame aerial. As the tuning scale is part of the carrying case, reference must be made during alignment to the five indentations on the scale backing plate. The one at the extreme right-hand end of the plate indicates the highest wavelength end of the tuning scale, and the cursor should coincide with this mark when the gang is at maximum. The remaining four indentations indicate the trimming and tracking positions as follows, reading from left to right: 1, M.W. trim; 2, L.W. trim; 3, L.W. track; 4, M.W. track.

M.W.—Switch receiver to M.W., tune to tracking point, feed in a 550 kc/s (545.4 m) signal and adjust **C31** (G4) for maximum. Tune receiver to trimming point, feed in a 1,500 kc/s (200 m) signal and adjust **C27** (A1) and **C25** (A2) for maximum output. Repeat these adjustments, rocking the gang for optimum results when readjusting **C31**.

L.W.—Switch receiver to L.W. and tune to tracking point. Feed in a 150 kc/s (2,000 m) signal and adjust **C28** (A1) for maximum output while rocking the gang for optimum results. Tune to trimming point, feed in a 290 kc/s (1,035 m) signal and adjust **C30** (G4) for maximum output. Repeat these adjustments.



Underside view of chassis. The frame aerial **L2** is fixed to the back cover of the carrying case.

Printed in England by Cornwall Press Ltd., Paris Garden, London, S.E.1.