"TRADER" SERVICE SHEET

630

PHILCO B3 AND P322

THE Philco B3 is a 3-valve, 2-waveband battery-operated TRF receiver equipped with separate selectivity, gain and reaction controls. It also has a Droitwich filter.

Two versions of the P322 (Runs 1 and 2) employ chassis that are not very different from that in the B3, and the differences are described overleaf, but this *Service Sheet* was prepared from a B3.

Release dates and original prices: 1939 *(both models); B3, £6 17s. 6d.; P322, £5 10s., plus batteries in each case.*

CIRCUIT DESCRIPTION

Aerial input via selectivity control condenser **C12** and coupling coils **L2, L3** to single tuned circuit **L4, L6, C15** (MW), plus **L5** (LW) which precedes a variable-mu pentode valve **(V1, Mazda metallised VP21)** operating as RF amplifier. A Droitwich filter circuit **L1, C11** is connected across the aerial circuit via a plug and socket which permits it to be disconnected if not required.

Tuned-secondary RF transformer coupling by **L8, L10, L12, C19** (MW), plus **L9, L11** (LW), between **V1** and a second RF pentode **(V2, Mazda metallised SP21)** operating in this case as detector on grid leak system with **C4** and **R2.** Reaction is applied from anode coupling coil **L7** and controlled by variable condenser **C16. L7** is shunted by a damping resistance **R1.**

Resistance-capacity coupling by **R4, C8** and **R6,** via RF filter **C6, R5, C7,** between **V2** and pentode output valve **(V3, Mazda Pen23).**

Grid bias voltages are obtained automatically from drop along resistances **R8, R9, R10** which form a potential divider in the negative HT lead to chassis. Gain control is by a variable potentiometer **R7,** which is connected across **R9, R10** and varies GB applied to **V1.**

COMPONENTS AND VALUES

	RESISTANCES	Values (ohms)
R1	Reaction damping ...	99,000
R2	V2 CG resistance ...	2,000,000
R3	V2 SG HT feed	100,000
R4	V2 anode load	150,000
R5	RF stopper	51,000
R6	V3 CG resistance ...	1,000,000
R7	Variable gain control ...	100,000
R8	Automatic GB resistances	140
R9		140
R10		1,500

	CONDENSERS	Values (μF)
C1	V1 CG decoupling ...	0·05
C2	V1 SG decoupling ...	0·1
C3	HT circuit RF by-pass...	0·25
C4	V2 CG condenser ...	0·00003
C5	V2 SG decoupling ...	1·0
C6	RF by-pass condensers	0·00005
C7		0·00025
C8	V2 to V3 AF coupling ...	0·01
C9	Fixed tone corrector ...	0·003
C10*	Auto GB by-pass ...	35·0
C11‡	Droitwich filter tuning	—
C12†	Selectivity control ...	0·00025
C13‡	Aerial circ. LW trimmer	—
C14‡	Aerial circ. MW trimmer	—
C15†	Aerial circuit tuning ...	—
C16†	Reaction control ...	0·00025
C17‡	RF trans. LW trimmer...	—
C18‡	RF trans. MW trimmer...	—
C19†	RF trans. sec. tuning ...	—

* Electrolytic. † Variable. ‡ Pre-set.

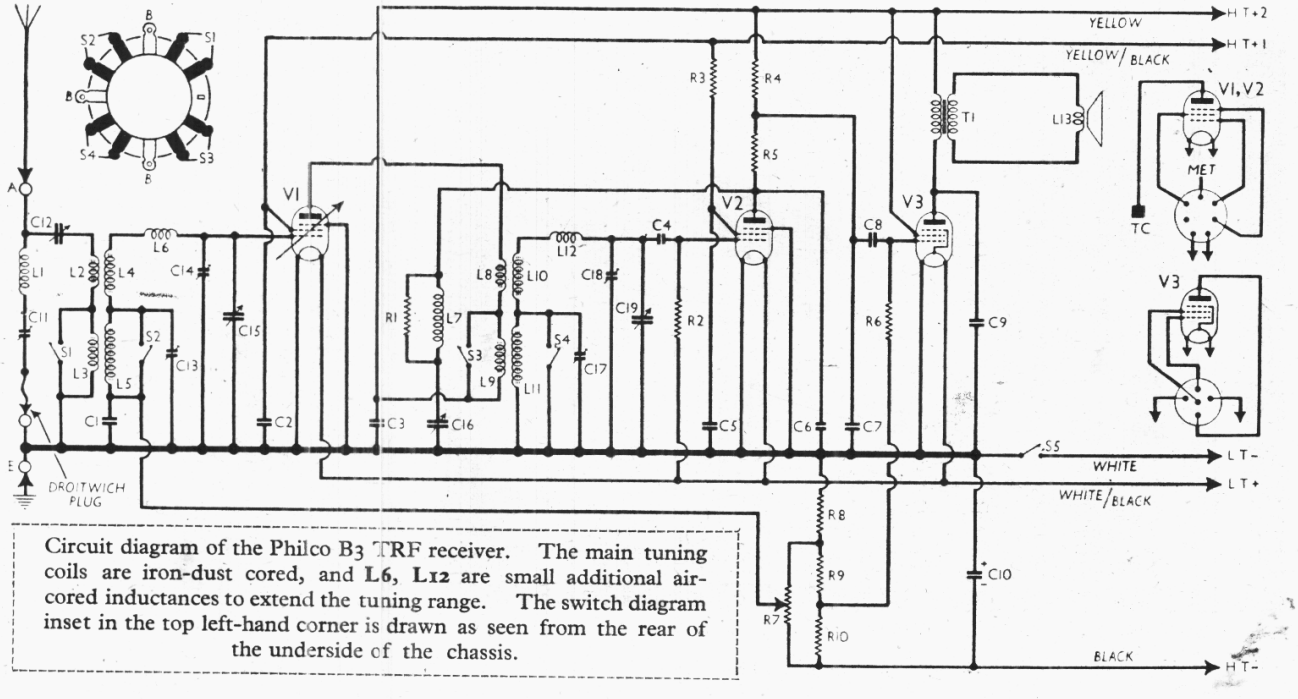
The Philco B3 receiver.

	OTHER COMPONENTS	Approx. Values (ohms)
L1	Droitwich filter coil ...	50·0
L2	Aerial coupling coils ...	1·5
L3		18·5
L4	Aerial tuning coils ...	1·5
L5		18·5
L6		1·0
L7	Reaction coil	15·0
L8	RF trans. primary coils ...	5·0
L9		20·0
L10	RF trans. secondary coils	1·5
L11		18·5
L12		1·0
L13	Speaker speech coil ...	2·0
T1	Speaker input trans. Pri.	850·0
	Sec.	0·2
S1–S4	Waveband switches ...	—
S5	LT circuit switch, ganged R7	—

VALVE ANALYSIS

Valve voltages and currents given in the table below are approximate values

Valve	Anode Voltage (V)	Anode Current (mA)	Screen Voltage (V)	Screen Current (mA)
V1 VP21	120	2·1	51·5	0·6
V2 SP21	16	0·4	35	0·2
V3 Pen 23	120	2·4	120	0·5



Circuit diagram of the Philco B3 TRF receiver. The main tuning coils are iron-dust cored, and **L6, L12** are small additional air-cored inductances to extend the tuning range. The switch diagram inset in the top left-hand corner is drawn as seen from the rear of the underside of the chassis.

only. They represent conditions to be expected in the average receiver when operating with a new 135 V HT battery, with the gain and reaction controls at minimum, the selectivity control turned fully clockwise, and the receiver switched to MW, but with no signal input.

Voltages were measured on the 50 V and 250 V ranges of a Philco set tester (models 065, 077 and J3), chassis being the negative connection.

DISMANTLING THE SET

Removing Chassis.—Remove the four control knobs (pull-off) from the front of the cabinet; remove the four self-tapping screws (with metal washers) holding the chassis to the bottom of the cabinet.

The chassis may now be withdrawn to the extent of the speaker leads, which is sufficient for normal purposes, but may be freed entirely if the leads are unsoldered from the tags on the speaker transformer.

When replacing, note that two rubber buffers are fitted between the front chassis member and a wooden block at the front of the cabinet.

Removing Speaker.—Unsolder from the transformer the two leads connecting it to chassis, and remove the four nuts (with lock-washers) holding the speaker to the sub-baffle.

When replacing, the transformer goes at the bottom. Only two tags are then visible for the speaker leads, and it is immaterial which way round they are connected.

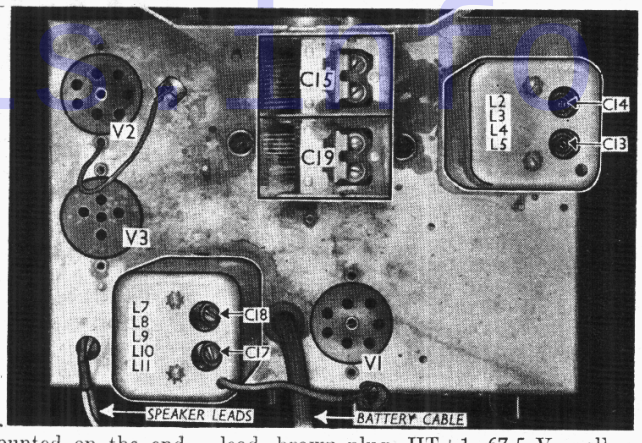
GENERAL NOTES

Switches.—S1-S4 are the waveband switches in a single rotary unit beneath the chassis. The unit is indicated in our under-chassis view, and shown in detail in the diagram, inset in the circuit diagram overleaf, where it is viewed from the rear of the underside of the chassis.

In the MW (control knob anti-clockwise) position, all the switches are closed, and in the other position (LW) they are all open.

S5 is the QMB LT circuit switch, ganged with the gain control **R7.**

Coils.—L1 is the Droitwich filter tuning coil, in an unscreened unit beneath the chassis. It is connected across the aerial circuit via its pre-set tuning condenser **C11** and a plug and socket device. When the filter is not required, the plug may be withdrawn. **C11** is mounted on the end of the coil former.



Plan view of the chassis. The four trimmers are contained in their respective coil units, and their adjustments are indicated here.

The remaining coils, with the exception of **L6** and **L12,** are in two screened units on the chassis deck with their associated trimmer condensers. The tuning coils **L4, L5** and **L10, L11** have iron-dust cores. **L6** and **L12** are additional MW air-cored inductances mounted in separate unscreened units beneath the chassis.

External Speaker.—No provision is made for the connection of an external speaker, but one could be connected to the speaker input transformer **T1.** If it were connected to the two primary tags, it should have a high impedance (15,000-20,000 Ω); a low impedance (about 4 Ω) type could be connected across the secondary winding at the speech coil tags.

Batteries.—No specific types are stipulated, but the makers mention as representative types suitable for this receiver the Exide OCG3 2V accumulator and the Exide H1051 (120 V) or H1131 (135 V) HT battery. GB is automatic.

Battery Leads and Voltages.—White lead, spade tag, LT negative; white/black lead, spade tag, LT positive 2 V. Black lead and plug, HT negative; yellow/black lead, brown plug, HT+1, 67.5 V; yellow lead and plug, 135 V (or 120 V).

Chassis Divergencies.—R8 and **R9** were both 140 Ω resistance in our chassis, but they are quoted in the makers' information as 120 Ω. The makers also mention several possible small alterations, in values, seldom exceeding 10 per cent., and type, that may be found in some chassis, but they are many in number and the differences are not important in view of the tolerance limits of standard component values, so that they are not enumerated here.

MODEL P322

There are two versions of the P322 Run 1 and Run 2.

Run 2 chassis is similar electrically to the B3, although there are differences in some components, which have different part numbers but similar values. The scale assembly is different, and so are the control knobs.

Run 1 chassis has several differences, the chief of which are the omission of the selectivity control condenser **C12** and the reaction damping resistance **R1.** The remaining differences are similar to those in Run 2.

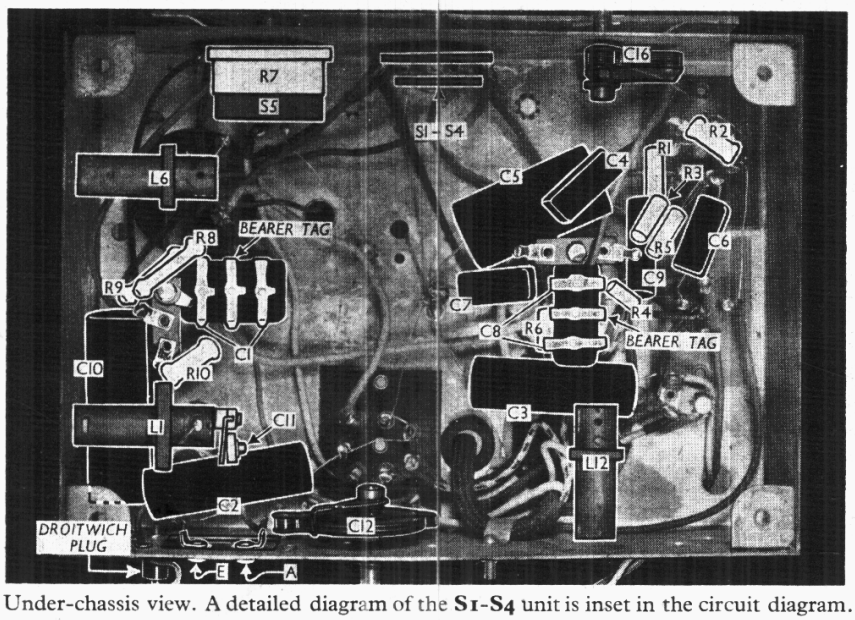
CIRCUIT ALIGNMENT

With the gang at minimum, the lower pointer should register with the index arrow at the bottom of the scale. Connect signal generator leads to A and E sockets, via a suitable dummy aerial, and withdraw the Droitwich plug.

MW.—Switch set to MW (anti-clockwise), turn volume and selectivity controls to maximum (clockwise), and the reaction control to minimum (anti-clockwise). Tune to 214 m on scale, feed in a 214 m (1,400 kc/s) signal, and adjust **C14** and **C18** for maximum output. Repeat these adjustments until no improvement can be obtained.

Now readjust **C18,** at the same time advancing **C16** until the set is on the verge of oscillation. The setting of **C18** will then be very critical. Check calibration and sensitivity at 500 m (600 kc/s).

LW.—Switch set to LW, and turn **C16** to minimum. Tune to 1,250 m on scale, feed in a 1,250 m (240 kc/s) signal, and adjust **C13** and **C17** for maximum output. Repeat these adjustments. Now advance **C16** and readjust **C17** in turn until the set is on the verge of oscillation. Check at 1,875 m (160 kc/s).



Under-chassis view. A detailed diagram of the **S1-S4** unit is inset in the circuit diagram.

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