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"TRADER" SERVICE SHEET

1412

PHILIPS G91T

"Philette" Portable

EMPLOYING six p-n-p transistors, a press-button waveband switch and a printed circuit, the Philips L3G91T "Philette" is a 2-band portable receiver housed in a plastics case. The wavebands covered are 188-555m (M.W.) and 1,177-2,000m (L.W.). The receiver is fitted with a ferrite rod aerial and a co-axial socket is provided to enable it to be operated with a car aerial.

Release date and original price: May, 1959, £14 6s 2d. Purchase tax extra.

CIRCUIT DESCRIPTION

M.W. and L.W. aerial coils **L2, L3** and their associated low impedance coupling coils **L4, L5** are mounted on a ferrite rod to form an internal aerial. For L.W. reception, the switched coils **L3** and **L5** are connected in series with M.W. coils **L2** and **L4**, and the tuning circuit is then shunted by **C5**. On both bands tuning is by variable capacitor **C3**, with parallel trimming by **C4**. Provision is made for the connection of a car aerial via **C1, C2** and aerial loading coil **L1**.

TR1 is employed as self-oscillating frequency changer, the local oscillator circuit being formed by **L6, L7** and **L8**. **L7** and **L8** comprise the oscillator coil, **L8** providing a low impedance coupling for **TR1** emitter. Oscillator tuning by variable capacitor **C10** and trimmer capacitor **C9** on M.W., and additionally by **C8** on L.W. Tracking by the shaped vanes of **C10**.

TR2 and **TR3** operate as a two-stage earthed-emitter I.F. amplifier with transformer couplings **L9, L10; L11, L12;** and **L13, L14**. Positive feedback due to the inherent internal coupling in **TR2** and **TR3** is neutralized by **C13, R8** and **C17, R12**. Base bias for **TR2** and **TR3** is provided by the potential dividers **R5, R6, R13** and **R9, R10**. Collector currents are stabilized by emitter resistors **R7, R11**.

Intermediate frequency 470 kc/s

The audio frequency component in the rectified output of germanium diode detector **X1** is developed across load resistor **R13** and volume control **R14**, and is passed via **R15, R16** and electrolytic coupling capacitor **C22** to the base of driver stage **TR4**.

Under weak signal conditions the detector efficiency is improved by the forward bias applied to it from the potential divider **R5, R6**. As the signal strength rises the positive-going D.C. potential developed across **R13, R14** is fed back as bias to the base of **TR2**, giving automatic gain control.

The amplified output of **TR4** is coupled to the output stage comprising the common-emitter transistors **TR5, TR6** in a single-ended class B push-pull circuit. **TR5** and **TR6** are biased from the potential divider **R21-R24**. Coupling to high impedance speaker **L15** via electrolytic capacitor **C25**. Tone compensation by negative feedback between **L15** and the emitter of **TR4** via **R25, R26** and **R20**.

CIRCUIT ALIGNMENT

Equipment Required.—A signal generator modulated 30 per cent at 400c/s; an output meter with a 30Ω resistor for use as a dummy load; a 0.05μF capacitor and a 2.2MΩ resistor connected in parallel; a non-metallic slotted trimming tool, which can easily be made by cutting a slot in an insulated No. 10 knitting needle.

With the tuning gang at maximum capacitance, check that the cursor coincides with the right-hand end of the horizontal line between the M.W. and L.W. tuning scale apertures.

Adjust the signal generator attenuator to maintain a 50mW reading on the output meter at all times during the alignment procedure.

1.—Disconnect the speaker and connect the 30Ω dummy load resistor in its place; connect the output meter in parallel with the load resistor. Connect the signal generator, via the 0.05μF capacitor connected in parallel with the 2.2MΩ resistor, to the base of **TR1**.

2.—Switch the receiver to M.W. Turn the tuning gang to minimum and the volume

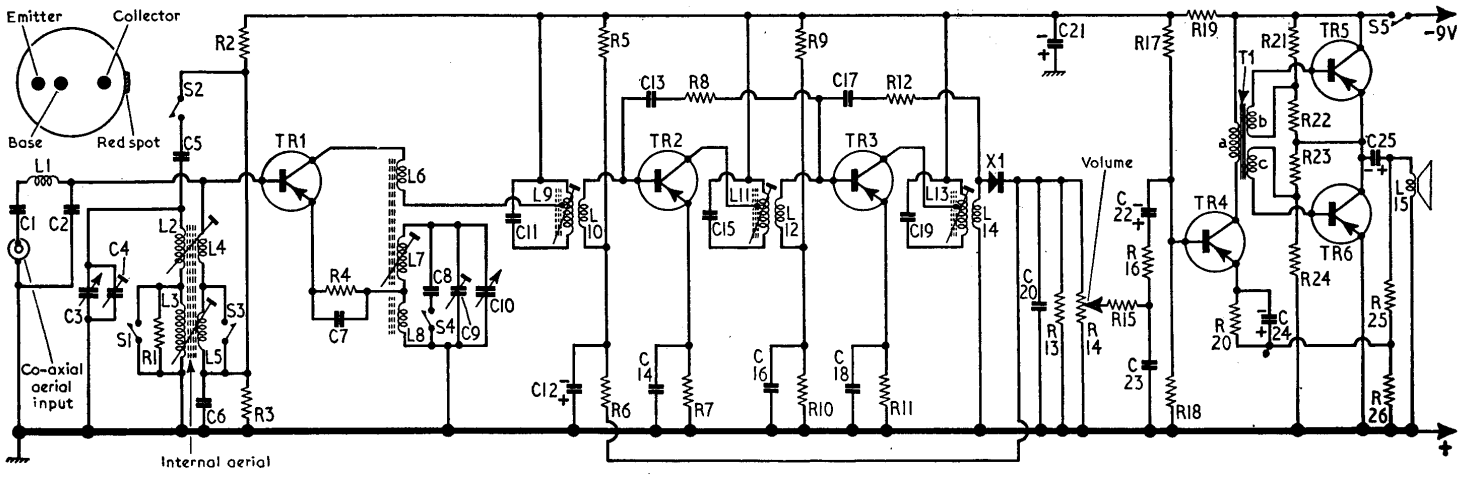
(Continued overleaf, col. 1)

Coils*		
L1	—	A1
L2	1·6	A1
L3	3·8	C1
L4	—	A1
L5	—	C1
L6	—	B1
L7	—	B1
L8	—	B1
L9	5·6 (total)	B1
L10	—	B1
L11	5·5 (total)	B1
L12	—	B1
L13	5·3 (total)	B2
L14	—	B2
L15	24.0	C2
Resistors		
R1	270kΩ	B1
R2	39kΩ	B1
R3	10kΩ	B1
R4	3·9kΩ	B2
R5	68kΩ	B2
R6	12kΩ	B2
R7	680Ω	B1
R8	1·2kΩ	B2
R9	22kΩ	C1
R10	4·7kΩ	C1
R11	1kΩ	B2
R12	3·3kΩ	B2
R13	18kΩ	C1
R14	50kΩ	C1
R15	1kΩ	C1
R16	1·5kΩ	C1
R17	47kΩ	C1
R18	12kΩ	C2
R19	680Ω	C2
R20	470Ω	C2
R21	2·7kΩ[1]	C2
R22	100Ω[1]	C2
R23	2·7kΩ[1]	B2
R24	100Ω[1]	B2
R25	2·2kΩ	C2
R26	15Ω	C1
Capacitors		
C1	0·01μF	A2
C2	18pF[1]	A2
C3	196·1pF	A1
C4	30pF	A1
C5	68pF[2]	B1
C6	0·01μF	B1
C7	6,800pF	B2
C8	250pF[2]	A2
C9	30pF	A1
C10	110pF	A1
C11	91pF	B1
C12	10μF	B2
C13	56pF[1]	B1
C14	0·082μF	B1
C15	91pF	B1
C16	0·047μF	C1
C17	18pF[1]	B2
C18	0·082μF	B2
C19	91pF	B2
C20	0·01μF	B2
C21	100μF	B1
C22	1μF	C2
C23	0·047μF	C1
C24	100μF	C2
C25	100μF	C2
Miscellaneous*		
T1 a	240·0	C2
T1 b	45·0	C2
T1 c	45·0	C2
S1-S4	—	B1
S5	—	—

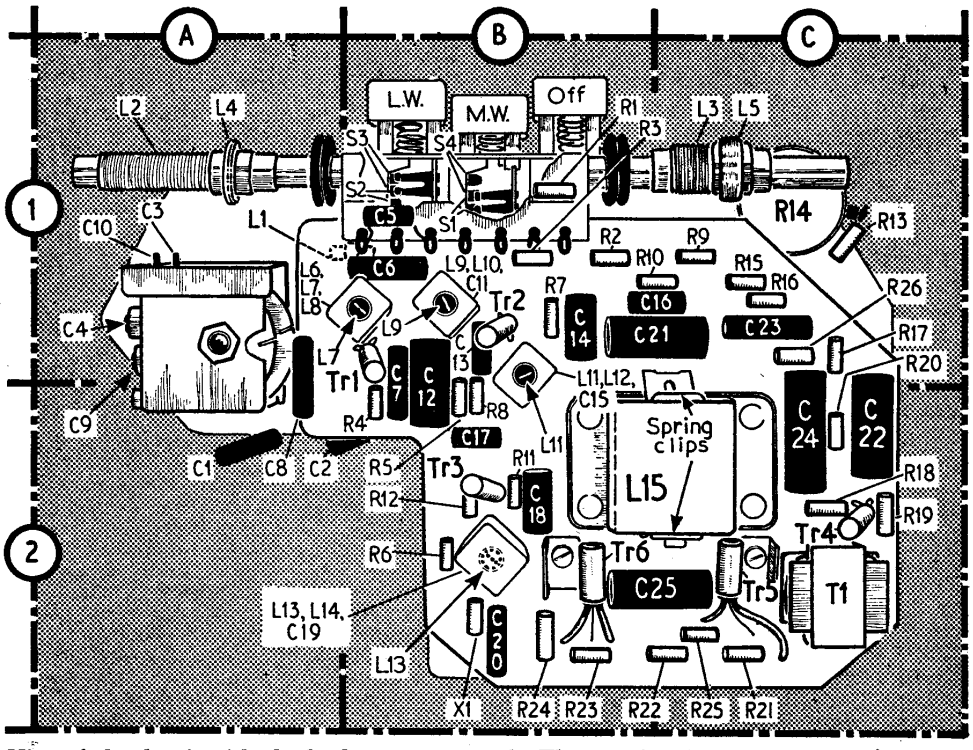
**Approximate D.C. resistance in ohms.*

[1] *5 per cent tolerance.*

[2] *1 per cent tolerance.*



Circuit diagram of the Philips G91T, or more fully L3G91T. The co-axial aerial socket permits the use of a car aerial.



View of the chassis with the back cover removed. The aerial rod is cut away to show the switch. **L1** *is hidden by the printed circuit panel.*

Circuit Alignment—*continued*

control to maximum. Feed in a modulated 470kc/s signal and adjust the cores of **L11** (B1), **L13** (B2), **L9** (B1), and then **L11** and **L9** again, in that order, for maximum output. To adjust **L13** the screening cover must first be removed (pull off), but it should be replaced immediately after **L13** has been adjusted.

3.—Turn the tuning gang to maximum capacitance. Feed in a modulated 537kc/s signal and adjust the core of **L7** (B1) for maximum output.

4.—Turn the tuning gang to minimum capacitance. Feed in a modulated 1,610kc/s signal and adjust **C9** (A1) for maximum output.

5.—Repeat operations 3 and 4.

6.—Feed in a modulated 640kc/s signal and tune it in on the receiver, then without disturbing the setting of the tuning gang, disconnect the signal generator from **TR1** and loosely couple its output to the aerial circuit. This can be done conveniently by clipping the signal generator output lead onto the insulated covering of the connecting leads between **L2** and **L3** (B1). Still feeding in a modulated 640kc/s signal, slide the former of **L2, L4** (A1) along the ferrite rod for maximum output.

7.—Feed in a 1,425kc/s signal, tune it in on the receiver, and then adjust **C4** (A1) for maximum output.

8.—Switch the receiver to L.W. Transfer the signal generator to the base of **TR1** via the 0.05μF capacitor connected in parallel with the 2.2MΩ resistor. Feed in a modulated 180kc/s signal and tune it in on the receiver. Without disturbing the setting of the tuning gang, transfer the signal generator to the aerial circuit as described in operation 6. Still feeding in a 180kc/s signal, slide the former of **L3, L5** (C1) along the ferrite rod for maximum output.

9.—Switch receiver to M.W. and repeat operations 6 and 7. Seal the formers of **L2, L4** and **L3, L5** to the ferrite rod with wax to prevent them from moving.

GENERAL NOTES

Switches.—S1-S5 are the waveband and battery on/off switches ganged in a slide-type unit and actuated by press-buttons. The unit is shown in our rear view illustration of the chassis in location reference B1, where the switch contacts associated with **S1-S4** are also shown. The battery switch contacts **S5** are shown in the sketch of a section of the reverse side of the chassis in column 1. **S1** and **S3** close on M.W., **S2** and **S4** close on L.W.

Battery.—The battery recommended by the manufacturers is an Ever Ready PP9 or a Vidor T6009, rated at 9V.

Transistors.—In the event of replacement of either **TR5** or **TR6** being necessary, *both* transistors must be replaced with a matched pair.

Drive Cord Replacement.—About 25in of nylon-braided glass yarn is required for a new drive cord. As shown in the sketch of the tuning drive system (column 1), two metal collars are pinched on the cord to form a loop at each end, and the overall length when made up should be 610mm (24.2in).

Modifications.—The following variations in component values may be found.

R1, 220kΩ or 270kΩ; **R12,** 3.3kΩ; **C17,** 22pF; **C20,** 0.01μF. In later receivers the battery switch **S5** is connected in the positive battery lead.

DISMANTLING

Removing Chassis.—Unscrew two screws from the rear of the receiver, then remove the rear section of the case, which is held by a hidden press-stud, by pulling its lower edge away from the body of the case;

unsolder two leads from the external aerial socket;

remove control knobs (pull off), springs and tuning scale;

remove the three brass fixing pillars (unscrew). The bottom pillar carries the press-stud.

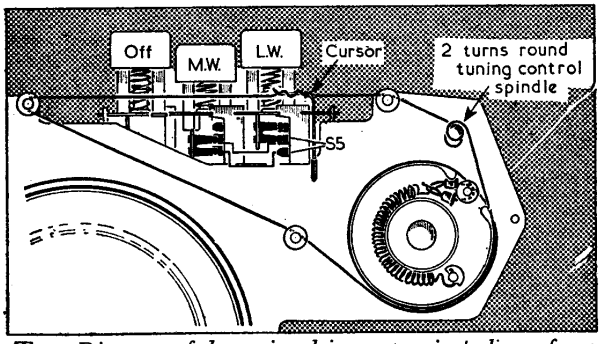
The central section of the case and the chassis may then be separated from the front section of the case.

The printed circuit panel is mounted on the rear of the speaker unit, whose magnet passes through it. Two spring clips, one on each side of the magnet, clamp the panel to the speaker chassis, being sprung between the panel and the arch of the magnet. It is important to replace the insulated washer between the speaker and the printed circuit panel when re-assembling.

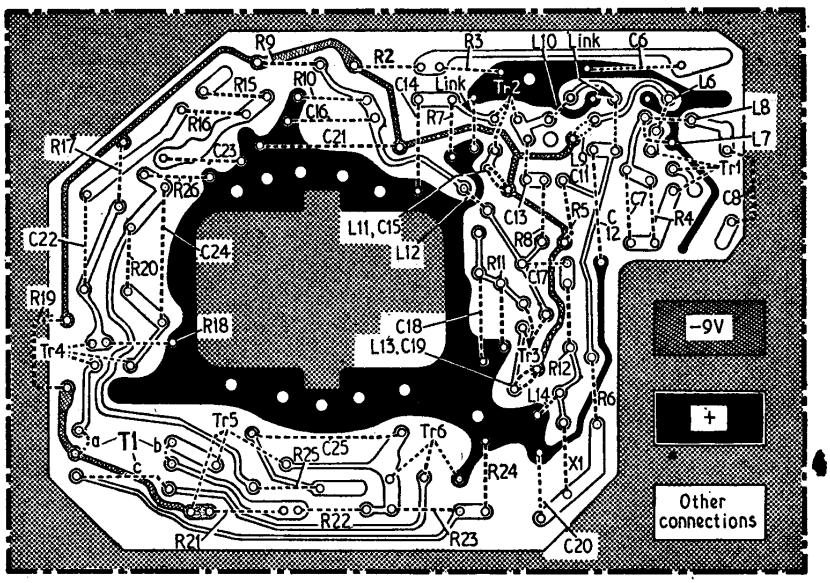
TRANSISTOR ANALYSIS

Transistor voltages and currents given in the table below are those derived from the manufacturers' information. Voltages were measured with a 20,000Ω/V meter, chassis being the positive connection in every case. The receiver was switched to M.W., but there was no signal input. The total battery current was 6-9mA.

Transistor	Emitter (V)	Base (V)	Collector (V)	Collector (mA)
TR1 OC44	1·6	1·3	7·0	0·4
TR2 OC45	0·56	0·66	7·0	0·8
TR3 OC45	0·9	1·0	7·42	0·95
TR4 OC78D	1·13	1·12	8·42	2·2
TR5 OC78	4·5	4·66	9·0	0·8
TR6 OC78	—	0·16	4·5	0·8



Top: *Diagram of the tuning drive system including a front view of the switches.*



Right: *View of the front side of the printed circuit panel, showing component connections.*

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