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PHILIPS L2G48T "New Yorker"

Transistored Portable Radio Receiver

A FINE tuning control designated Station Focus is a distinguishing feature on this Philips radio receiver, Model L2G48T. The receiver employs seven transistors and four diodes, and has waveband ranges of 1,175-2,000m (l.w.), 186-560m (m.w.) and 25-50m (s.w.).

Reception is via an internal ferrite rod aerial, with the addition of a telescopic aerial for improved sensitivity on short wavebands. A socket is provided, for the connection of a car type aerial.

Audio output at a moderate listening level is approximately 200mW. This is handled by a 5in by 3in elliptical loudspeaker of 8 ohms impedance. An earphone socket is provided and the internal loudspeaker is muted on the insertion of the earphone plug.

Power is provided by four 1·5V batteries (U11 or similar type). They are housed in a separate compartment which can be removed from the base of the case, by compressing the spring-clip situated below the car aerial socket.

TRANSISTOR ANALYSIS

Transistor voltages given in the table below were taken from data supplied by the manufacturer. They are all negative with respect to the positive line, and were measured under no signal conditions on a 100kΩ per volt voltmeter. Total current consumption under no signal conditions, with a supply voltage of 6·1V, is given as 14mA± 3·0mA.

Transistor Table

Transistor		Emitter (V)	Base (V)	Collector (V)
TR1	AF115	1·1	1·2	5·7
TR2	AF117	0·52	0·65	5·7
TR3	AF117	0·95	1·1	5·7
TR4	AC127	3·0	2·8	0·16
TR5*	OC81	0	0·16	3·2
TR6*	OC81	3·3	3·5	6·2
TR7	AC127	3·3	3·2	0

Alternative transistor types:* **TR5 *and* **TR6** *AC128.*

CIRCUIT DESCRIPTION

When the l.w. button is depressed, a signal (induced in the ferrite rod aerial), corresponding to the resonant frequency of the parallel tuned circuit **L2, L1, C3, C5** and **C6**, will develop a relatively large e.m.f. across **L2**—e.g. from the junction of **L1** and **L2**, and chassis. This signal is then coupled via blocking capacitor **C7** into **TR1** base. Switches **S2, S3, S5** and **S6** are closed at *l*, when working on l.w.

Depressing the m.w. button closes the aforementioned switches at *m*. **S3** and **S6** now produce a series circuit comprised of **L3, C5** and **C6. L3** and **L4** form a mutual inductive coupling and the reflected impedance of the tuned circuit in **L4**, is relatively large at resonance. A correspondingly large e.m.f. at the tuned signal frequency will be developed across **L4**. This signal, as before is then fed via **C7** into **TR1** base.

For short wave working, although the circuit constants are changed, the circuit is basically similar to that for m.w. Depressing the s.w. button, **S5** and **S6** close at *s*, the

(*Continued overleaf, col.* 1)

Resistors

R1	22kΩ	B2
R2	6·8kΩ	B2
R3	1kΩ	B2
R4	56Ω	B2
R5	180kΩ	B2
R6	33kΩ	B2
R7	47kΩ	A1
R8	82kΩ	A2
R9	470Ω	A2
R10	3·9kΩ	A2
R11	15kΩ	A2
R12	12kΩ	A2
R13	1kΩ	A2
R14	47kΩ	C1
R15	10kΩ	A2
R16	10kΩ	A2
R17	120Ω	A2
R18	680Ω	A2
R19	4·7Ω	A2
R20	330Ω	A2
R21	470Ω	A2
R22	470Ω	B2
R23	2·2Ω	B2
R24	2·2Ω	B2
R25	3·3kΩ	C2

Capacitors

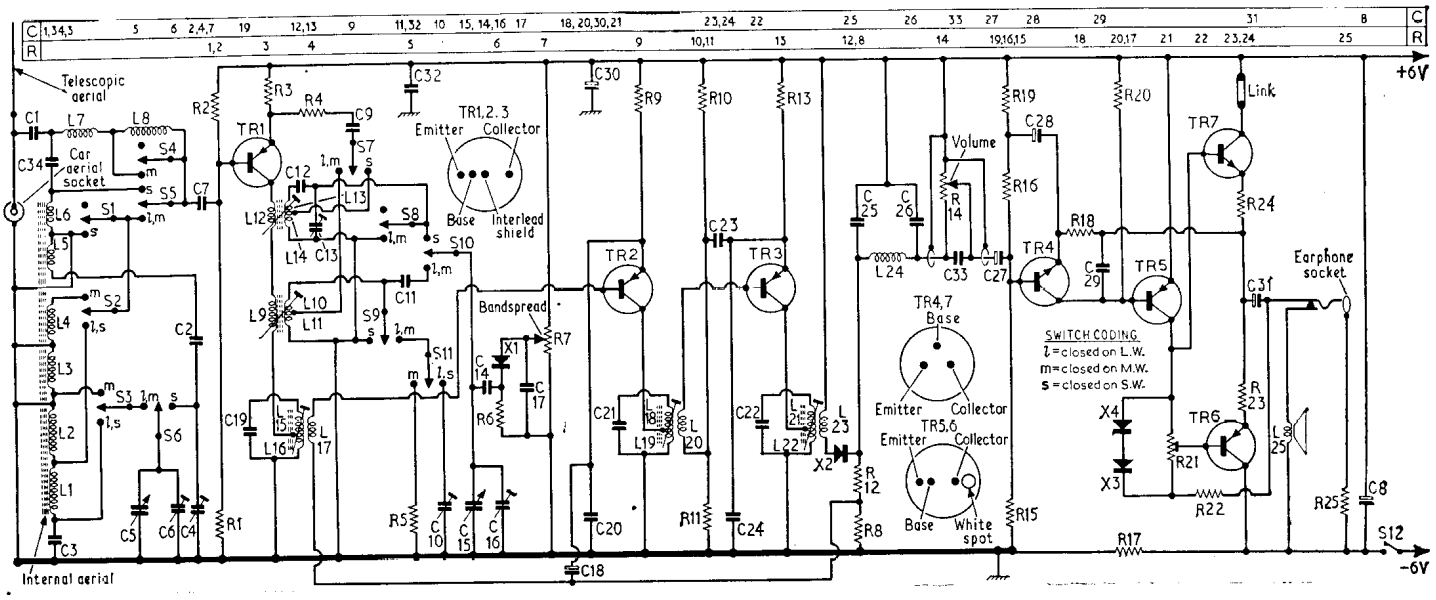
C1	0·01μF	
C2	220pF	B2
C3	68pF	B2
C4	25pF	B2
C5	—	A2
C6	15pF	B2
C7	0·01μF	B2
C8	200μF	A2
C9	0·022μF	B2
C10	300pF	B2
C11	220pF	B2
C12	180pF	B2
C13	25pF	B2
C14	3·3pF	B2
C15	—	B2
C16	25pF	B2
C17	0·01μF	B2
C18	40μF	A2
C19	150pF	A2
C20	0·047μF	A2
C21	150pF	A2
C22	150pF	A2
C23	0·01μF	A2
C24	0·047μF	A2
C25	0·022μF	A2
C26	0·022μF	A2
C27	6·4μF	A2
C28	64μF	A2
C29	0·01μF	A2
C30	100μF	B2
C31	200μF	B2
C32	0·047μF	A2
C33	0·022μF	C1
C34	4pF	B2

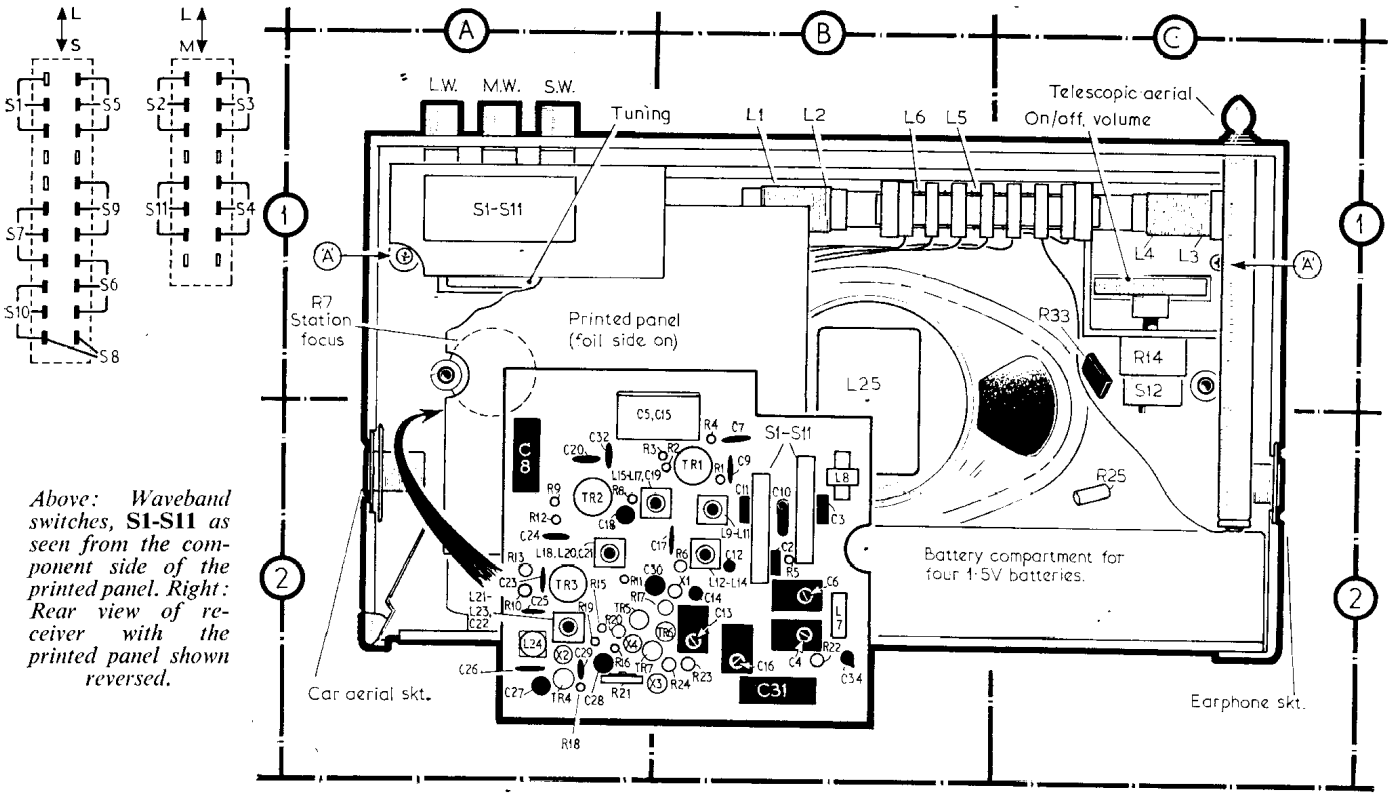
Coils and Transformers

L1	—	B1
L2	—	B1
L3	—	C1
L4	—	C1
L5	—	B1
L6	—	B1
L7	—	B2
L8	—	B2
L9	—	B2
L10	—	B2
L11	—	B2
L12	—	B2
L13	—	B2
L14	—	B2
L15	—	A2
L16	—	A2
L17	—	A2
L18	—	A2
L19	—	A2
L20	—	A2
L21	—	A2
L22	—	A2
L23	—	A2
L24	—	A2
L25	8Ω	B1

Miscellaneous

X1	OA79	B2
X2	OA70	A2
X3	AA129	B2
X4	AA129	A2
S1—S11	—	A1
S12	—	C1





Above: Waveband switches, **S1-S11** *as seen from the component side of the printed panel. Right: Rear view of receiver with the printed panel shown reversed.*

Circuit Description—*continued*

tuned circuit becomes **L5, C2, C4, C5** and **C6,** with **L6** as the inductive coupling.

The oscillator tuned circuits associated with the mixer/oscillator **TR1** are conventional apart from the Station Focus control. Resistor **R6** ensures that the diode **XI** operates at all times in its non-linear mode by limiting the maximum forward current that flows through it to approximately 600μA. Resistor **R7** enables this current to be varied from max. to zero. When operated in this manner, the capacitance of a germanium diode (C_D) can be varied. By placing this variable capacitance diode in parallel with the oscillator tuning capacitor **C15** a degree of fine tuning is achieved. (C_D max. occuring at max. current and C_D min. at min. current.)

When switched to l.w. this effect is minimal, but as the frequency of the oscillator is increased, the affective C_D is increased proportionately. In this way Bandspread is obtained when switched to m.w. and s.w.

The signal component centred on 470kc/s at the collector of **TR1** is selected by the i.f. transformer **L15, L16** and **L17** and fed into the base of **TR2** for amplification by **TR2.** Further amplification is provided by **TR3,** the signal finally being demodulated by **X2.** The d.c. component (its magnitude dependent upon signal strength) available at the cathode of **X2** is used for a.g.c. and controls the bias on **TR2.**

A Pi filter **C25, L24** and **C26,** filters the residual i.f. from the audio-component that is developed across the diode load **R14. R14** is also the volume control and the a.f. available is fed via blocking capacitor **C27** to the base of the pre-driver transistor **TR4.**

This a.f. amplifier and output stage, employing complementary symmetry is of standard form and feeds energy at a.f. via **C31** to the loudspeaker **L25.**

CIRCUIT ALIGNMENT

Equipment Required.—An a.m. signal generator covering the range 100kc/s—12Mc/s; an audio output meter with an impedance to match 8Ω. Alternatively an a.c. voltmeter and an 8·2Ω 1W resistor; a 0·47μF isolating capacitor; a suitable non-ferrous trimming tool and an r.f. coupling loop.

During alignment the volume control should be set to maximum, and the input signal adjusted to maintain an output of 50mW (0·75V a.c. if using voltmeter and resistor). All the adjustments that follow are for maximum output.

1.—Switch on signal generator and allow to warm up for 15 minutes. Connect the audio output meter in place of the loudspeaker. Rotate Station Focus control fully anti-clockwise, and set the compression trimmers to mid-position.
2.—Switch receiver to m.w., set tuning gang to minimum, calibration dot at the left hand end of scale. Connect the output of the signal generator via the 0·47μF capacitor to the junction of **C7** and **S5** and feed in a 470kc/s modulated signal. Adjust **L21.**
3.—Feed in a 472kc/s signal. Adjust **L18.**
4.—Feed in a 468kc/s signal. Adjust **L15.**
5.—Set tuning gang to maximum, calibration dot at right hand end of scale. Feed in a 535kc/s signal. Adjust **L9.**
6.—Set tuning gang to minimum. Feed in a 1,610kc/s signal. Adjust **C16.**
7.—Repeat operations 5 and 6 until no further improvement is obtained.
8.—Switch receiver to l.w. and set tuning gang to maximum. Feed in a 148kc/s signal. Adjust **C10.** (*Wind wire on or off as required.*)
9.—Switch receiver to s.w. Maintain tuning gang at maximum, and feed in a 6Mc/s. signal. Adjust **L12.**
10.—Set tuning gang to minimum. Feed in a 12Mc/s signal. Adjust **C13.** (The first peak adjusting from minimum capacity).
11.—Repeat 9 and 10 until no further improvement is obtained.
12.—Switch receiver to m.w. Transfer signal generator output to coupling loop, and remove the 0·47μF capacitor. Loosely couple the loop to ferrite rod aerial. Tune receiver to 500m. Feed in a 600kc/s signal. Adjust **L3** and **L4.** (slide along ferrite rod).
13.—Tune receiver to 200m. Feed in a 1,500kc/s signal. Adjust **C6.**
14.—Repeat operations 12 and 13 for maximum output with minimum tracking error.
15.—Switch receiver to l.w. and tune to 1,400m. Feed in a 214kc/s signal. Adjust **L1** and **L2** on ferrite rod.
16.—Switch receiver to s.w. Tune receiver to approximately 27m. Feed in an 11Mc/s signal. Rock the tuning gang to avoid pulling and adjust **C4.**

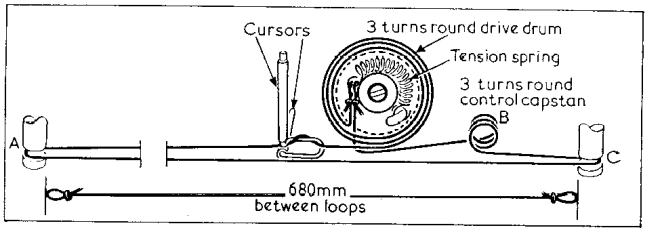
GENERAL NOTES

Dismantling.—Remove the battery compartment and place the receiver face downwards on a non-scratch surface. Remove the two retaining screws, lift off the rear portion of the case, and remove the handle and studs. Loosen the screw at the bottom of the telescopic aerial and withdraw the aerial. The case rear can now be completely removed. Reassemble in the reverse order.

To remove the chassis, undo the two screws "A" on illustration. Lift out aerial and earphone sockets, withdraw chassis and unsolder leads from R7. Reassemble in reverse order.

Adjustment of R21.—Open circuit the link in the collector of **TR7.** Insert a 0-10mA milliammeter. Under no signal conditions adjust **R21** so as to obtain a collector current of 3 ± 0·1mA.

Drive Cord Replacement.—With the receiver viewed from the top, set the gang fully clockwise (gang at maximum) and insert the spring in position in the drive drum (see illustration). Loop the new drive cord onto the free end of the spring. Stretch the cord to spindle B and wind on three turns in an anticlockwise direction, starting at the bottom of the spindle. Pass the cord round spindle C in an anti-clockwise direction and hold it under tension. Loop the free end of the cord onto the spring and wind it three turns clockwise round the drum, winding towards the top of the drum. Pass the large free loop of cord which remains over spindle A, ensuring that the cord does not become crossed over. Attach the cursor to the lower run of cord and align it with the right-hand scale marker, after the casefront moulding has been replaced.



Drive cord assembly with gang at maximum.

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