"TRADER" SERVICE SHEET

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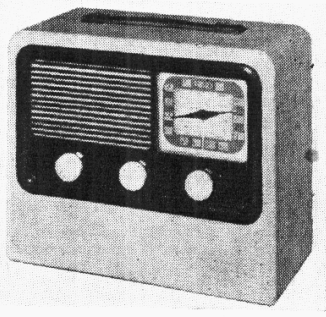
PHILCO BP425

ALL-DRY PORTABLE



AN all-dry portable, the Philco BP425 is a 4-valve, 2-band superhet in which provision is made for the connection of an external aerial.

The BP426, which is of identical appearance, uses 2 V valves, involving many modifications, and is not covered in this *Service Sheet.*

Release date and original price: November, 1945, £13 17*s* 6*d plus* £2 19*s* 8*d purchase tax, without batteries.*

CIRCUIT DESCRIPTION

Tuned frame aerial input **L1, C20** (M.W.), with the addition of loading coil **L2** on L.W., to heptode valve **(V1, Mullard metallized DK32)** operating as frequency changer with electron coupling. Provision for connection of an external aerial via series capacitor **C1** to a tapping on **L1.**

V1 oscillator grid coils **L3** (M.W.) and **L4** (L.W.) are tuned by **C21;** parallel trimming by **C22** (M.W.) and **C4, C23** (L.W.). Series tracking by **C24** (M.W.) and **C25** (L.W.). Reaction coupling from anode, via **C5,** is obtained from the common impedance of the trackers in grid and anode circuits.

Second valve **(V2, Mullard metallized DF33)** is a variable-mu R.F. pentode operating as intermediate frequency amplifier with tuned-primary, tuned-secondary transformer couplings **C2, L5, L6, C3** and **C8, C9, L7, L8, C10** in which the tuning capacitors are fixed and alignment adjustments are carried out by varying the positions of the iron-dust cores.

Intermediate frequency 465 kc/s.

Diode second detector is part of single diode triode valve **(V3, Mullard metallized DAC32).** Audio frequency component in rectified output is developed across manual volume control **R6,** which also acts as diode load resistor, and passed via A.F. coupling capacitor **C13** and C.G. resistor **R7** to control grid of triode section, which operates as A.F. amplifier. I.F. filtering by **C11, R5** and **C12** in diode circuit.

D.C. potential developed across **R6** is fed back, via a decoupling circuit **R4, C7,** as G.B. to I.F. valve, giving automatic volume control.

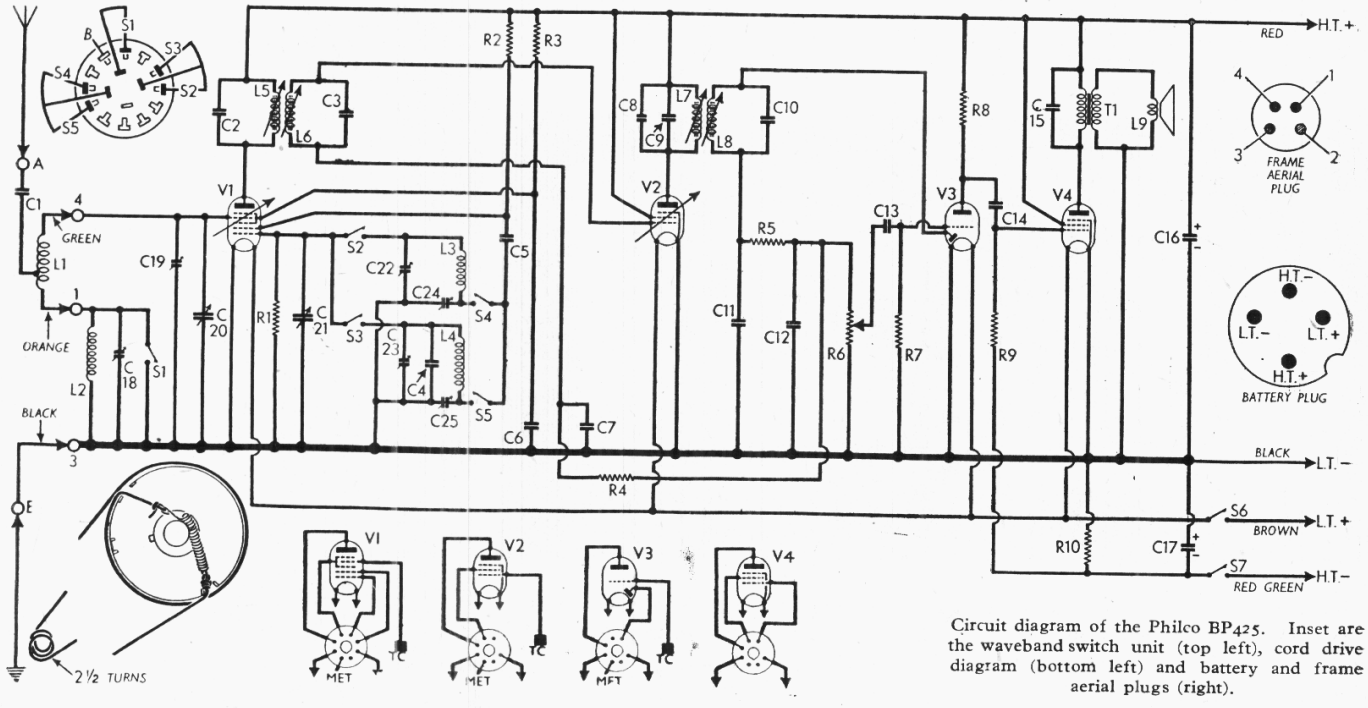
Resistance-capacitance coupling by **R8, C14** and **R9** between **V3** triode and pentode output valve **(V4, Mullard DL35).** Fixed tone correction by **C15** in anode circuit. G.B. potential for **V4** is obtained from the drop along **R10** in the H.T. negative lead to chassis.

COMPONENTS AND VALUES

	RESISTORS	Values (ohms)
R1	V1 osc. C.G. resistor ...	220,000
R2	V1 osc. anode H.T. feed ...	10,000
R3	V1 S.G. H.T. feed ...	68,000
R4	A.V.C. line decoupling ...	2,200,000
R5	I.F. stopper	47,000
R6	Manual volume control ...	500,000
R7	V3 triode C.G. resistor ...	2,200,000
R8	V3 triode anode load ...	1,200,000
R9	V4 C.G. resistor	2,200,000
R10	V4 G.B. resistor	820

	CAPACITORS	Values (μF)
C1	Aerial series	0·0001
C2	1st I.F. transformer tuning capacitors	0·0001
C3		0·0001
C4	Osc. L.W. fixed trimmer ...	0·0001
C5	V1 osc. anode coupling ...	0·002
C6	V1 S.G. decoupling ...	0·01
C7	A.V.C. line decoupling ...	0·1
C8	2nd I.F. transformer tuning capacitors	0·00001
C9		0·0001
C10		0·0001
C11	I.F. by-pass capacitors ...	0·0001
C12		0·0001
C13	A.F. coupling to V3 C.G. ...	0·005
C14	A.F. coupling to V4 C.G. ...	0·01
C15	Fixed tone corrector ...	0·01
C16*	H.T. reservoir capacitor ...	2·0
C17*	V4 G.B. by-pass	50·0
C18‡	Aerial L.W. trimmer ...	0·00004
C19‡	Aerial M.W. trimmer ...	0·00004
C20†	Frame aerial tuning ...	0·000532
C21†	Oscillator circuit tuning ...	0·000532
C22‡	Osc. circ. M.W. trimmer ...	0·00004
C23‡	Osc. circ. L.W. trimmer ...	0·00004
C24‡	Osc. circ. M.W. tracker ...	0·00073
C25‡	Osc. circ. L.W. tracker ...	0·00033

* Electrolytic. † Variable. ‡ Pre-set.



Circuit diagram of the Philco BP425. Inset are the waveband switch unit (top left), cord drive diagram (bottom left) and battery and frame aerial plugs (right).

	OTHER COMPONENTS		Approx. Values (ohms)
L1	Frame aerial winding	...	2·5
L2	Aerial L.W. "loading" coil		27·0
L3	Osc. M.W. tuning coil	...	2·0
L4	Osc. L.W. tuning coil	...	14·0
L5	1st I.F. trans. Pri.	...	8·0
L6	1st I.F. trans. Sec.	...	8·0
L7	2nd I.F. trans. Pri.	...	7·0
L8	2nd I.F. trans. Sec.	...	7·0
L9	Speaker speech coil	...	2·5
T1	Output trans. Pri. ...	...	400·0
	Output trans. Sec. ...	...	0·25
S1-S5	Waveband switches	...	—
S6	L.T. circuit switch Ganged		—
S7	H.T. circuit switch Ganged		—
	R6		—

VALVE ANALYSIS

Valve voltages and currents given in the table below are those measured in our receiver when it was operating with a new battery. The receiver was tuned to the lowest wavelength on the M.W. band, and the volume control was at maximum, but there was no signal input.

Voltages were measured on the 400v scale of a Model 7 Avometer, chassis being the negative connection.

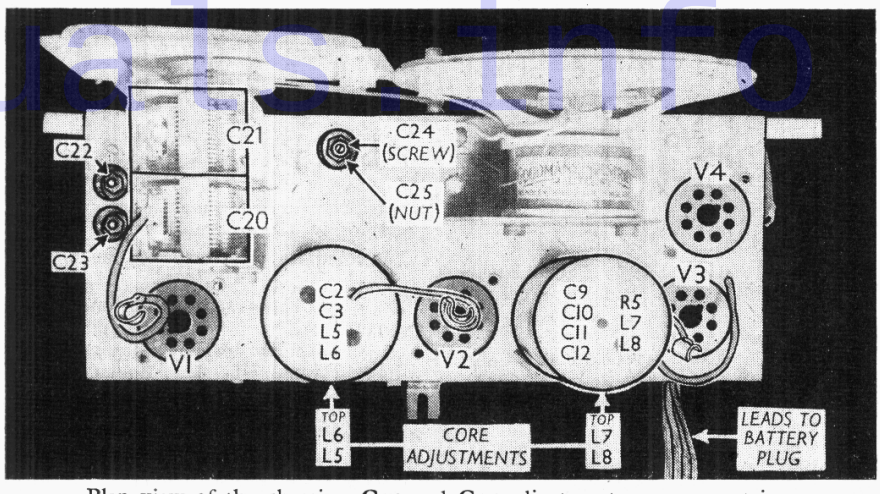
Valve	Anode Voltage (V)	Anode Current (mA)	Screen Voltage (V)	Screen Current (mA)
V1 DK32	80	0·38	31	0·62
	Oscillator			
	65	0·5		
V2 DF33	80	1·2	80	0·3
V3 DAC32	10	0·02	—	—
V4 DL35	78	5·2	80	0·55

GENERAL NOTES

Switches.—**S1**—**S5** are the waveband switches, ganged in a simple rotary unit beneath the chassis. The unit is indicated in our under-chassis view, and shown in detail in the diagram inset in the top left-hand corner of the circuit diagram overleaf. On M.W. (knob anti-clockwise) **S1, S2** and **S4** close; on L.W., **S3** and **S5** close.

S6 and **S7** are the Q.M.B. battery switches ganged with the manual volume control **R6.**

Coils.—The frame aerial **L1** is attached to the back cover and connected by means of a plug whose pins are identified in a diagram inset in the circuit overleaf, where they are viewed from their free ends. **L2 and L3, L4** are beneath the chassis, and the I.F. transformers **L5, L6** and **L7, L8** are in two screened units on the chassis deck. A copper screening band is clipped round the second can to screen the core adjustment of **L.7.**



Plan view of the chassis. **C24** and **C25** adjustments are concentric.

Battery.—A combined H.T. and L.T. all-dry type is required, with a 4-pin connecting socket. A diagram of the plug attached to the set, viewed from the free ends of the pins, is inset in the circuit diagram overleaf, where the pins are identified. The H.T. voltage is 90 V, and the L.T. voltage 1.5 V. Grid bias is automatic. Suitable batteries are Ever Ready All-dry No. 3, Drydex H1157, G.E.C. BB395, Siemens 1438 and Sterling 2242.

Alternative Valves.—The following valves are direct alternatives to the types used in our sample: **V1,** 1A7G or GT; **V2,** 1N5G or GT; **V3,** 1H5G or GT; **V4,** 1C5G or GT.

Divergencies.—In some chassis, the I.F. transformers may be fitted with pre-set capacitors instead of adjustable iron-dust cores, when the coil windings will be 12Ω each. In chassis Nos. AC 1,001 to AC 4901 **R8** will be 220,000Ω (in our sample it was 1,200,000Ω), and A.V.C. will be applied to **V1,** via a 1,000,000Ω resistor and 0.01μF capacitor to the bottom of **L2.** A 0.1μF capacitor is then inserted in the lead from **S1** to chassis. **C8** may be omitted in some chassis.

Drive Cord Replacement.—A sketch inset in the circuit diagram shows the drive cord system as seen from the front of the set when the gang is at maximum. The two ends of the cord are tied to the two ends of the spring. The drum may be reached upon removing the scale: first remove the four press-studs holding the transparent cover, then pull off the pointer, when the scale may be freed by removing the two remaining press-studs. The cord goes round the control spindle 2½ times. The overall length of cord required is 17 ins.

DISMANTLING THE SET

Removing Chassis.—Remove the three control knobs (recessed grub screws);
remove the cheese-head screw (with specially shaped nut) securing the rear edge of the chassis to the supporting shelf;
remove the two round-head woodscrews securing the left and right front edges of the chassis to the front of the cabinet;
slide out chassis until the metal projections on the front edge foul the wooden blocks at the rear of the case, then gently tilt the rear edge of the chassis downward until the top of the scale assembly clears the left hand back retaining bracket, and lift out the chassis.

When replacing, ensure that the speaker sub-baffle is in position on the chassis before inserting in the carrying case.

CIRCUIT ALIGNMENT

The chassis must be removed from the carrying case in order to carry out most of the alignment adjustments, but it must be replaced before finally adjusting the R.F. trimmers, and therefore the following procedure must be adopted.

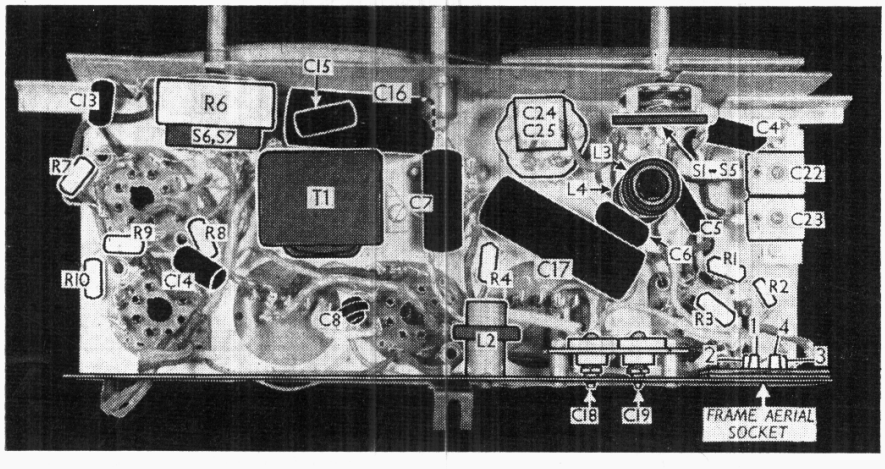
I.F. Stages.—Unplug frame aerial, switch set to M.W., and turn volume control to maximum. Remove existing top cap connector of **V1,** connect signal generator via a 0.1μF. series capacitor and 47,000 ohm parallel resistor to top cap and chassis; short circuit **C21,** and remove the detachable copper screen over the upper core adjustment on the second I.F. transformer **L7, L8.** Feed in a 465 kc/s (645.16m) signal, and adjust the cores of **L7, L8** for maximum output; replace the copper screen, and adjust the cores **L5, L6** for maximum output. Replace original top cap connector of **V1,** remove short-circuit from **C21,** and reconnect frame aerial.

R.F. and Oscillator Stages.—With the gang at maximum, the pointer should be vertical.

M.W.—Connect signal generator to **A** and **E** sockets via dummy aerial. Switch set to M.W., tune to 500m on scale, feed in a 500m (600 kc/s) signal and adjust **C24** for maximum output. Tune to 214m (spot on scale), feed in a 214m (1,400 kc/s) signal and adjust **C22,** then **C19,** for maximum output. Repeat the 500m and 214m adjustments until there is no further improvement.

L.W.—Switch set to L.W., tune to 1,875m (spot on scale), feed in an 1,875m (160 kc/s) signal and adjust **C25** for maximum output. Tune to 1,034m on scale, feed in a 1,034m (290 kc/s) signal and adjust **C23,** then **C18** for maximum output. Repeat the 1,875m and 1,034m adjustments until there is no further improvement.

Replace chassis, battery and frame aerial in the carrying case and reconnect signal generator to **A** and **E** sockets. Switch set to M.W., tune to the 214m spot on scale, feed in a 214m signal and readjust **C19** for maximum output. Switch set to L.W., tune to 1,034m on scale, feed in a 1,034m signal and readjust **C18** for maximum output.



Under-chassis view. A detailed diagram of the **S1-S5** switch unit is inset in the top left-hand corner of the circuit diagram overleaf. The frame aerial socket is indicated.

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