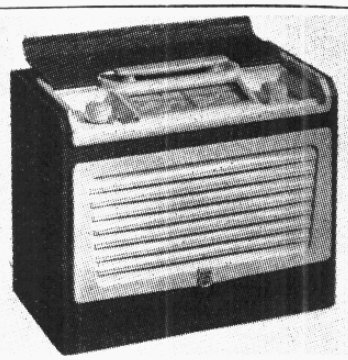
"TRADER" SERVICE SHEET

1104

PHILIPS 523UB



INCORPORATING a battery "revitalising" circuit, which enables the life of the H.T. battery to be increased, the Philips 523UB is a 5-valve (plus metal rectifier) 2-band portable superhet, designed to operate from self-contained batteries or from A.C. or D.C. mains of 200-250V. A set of safety contacts isolates the chassis when the back is opened.

Release date and original price: June, 1953. £17 9s. 9d. Purchase tax and batteries extra.

CIRCUIT DESCRIPTION

Tuned frame aerial input by **L1,** loading coil **L3** and **C33** (M.W.) or **L1, L2,** loading coils **L3, L4** and **C33** (L.W.). Provision is made for the connection of an external aerial and earth, aerial coupling on L.W. being via **C1** and **S2,** and on M.W. via **C1, S3,** and the capacitance of a metal foil strip on frame aerial **L1.**

First valve **(V1, Mullard DK91)** is a variable-mu R.F. pentode operating as R.F. amplifier. I.F. filtering by **L5, C8.** Aperiodic resistance-capacitance coupling by **R4, C9, R6** to second valve **(V2, Mullard DK92),** a heptode operating as frequency changer with electron coupling.

Third valve **(V3, Mullard DF91)** is a variable-mu R.F. pentode, operating as intermediate frequency amplifier with tuned transformer couplings **C10, L10, L11, C11** and **C21, L12, L13, C22.** **Intermediate frequency 470 kc/s.**

Diode signal detector is part of diode pentode valve **(V4, Mullard DAF91).**

Resistance-capacitance coupling by **R18, C26** and **R21** between **V4** pentode anode and output pentode **(V5, Mullard DL94).** Tone correction in anode circuit by **C28.** Extra bias is obtained for **V5** on mains by the insertion of **R12** in the filament circuit.

For battery operation power supplies are carried by switches **S13(B), S15(B)** and **S17(B),** which close in that position, as indicated by the suffix **(B).** For mains operation **S14(M), S16(M)** and **S18(M)** close.

S19, S20 are the battery charge switches. When the receiver is operating from mains, with the battery charge switch control in the mains position, **S19** is closed and **S20** open, and H.T. and filament current is supplied in the normal way through **R27.** When the control is switched to battery charge however, **S19** opens and **S20** closes to trickle-charge the H.T. battery through **R33.**

H.T. current is supplied by half-wave metal rectifier **(MR1, SenTerCel RM2)** consisting of two units joined in series for 250V mains coverage. Smoothing by **R27,** voltage adjustment resistors **R28, R29, R30, R31, R32** and electrolytic capacitors **C29, C30.** Filament is taken from the H.T. circuit, the filaments being connected in series and fed via **R25, R26.** The latter is pre-set in the factory to give a filament current of 46.4 mA when the receiver is operated from 241 V A.C. mains, the voltage adjustment being set to 245 V.

The filaments remain series-connected for battery operation. Bias is obtained from the filament voltage drop. **R5, R8, R22, R23** and **R24** are filament shunts to by-pass H.T. current.

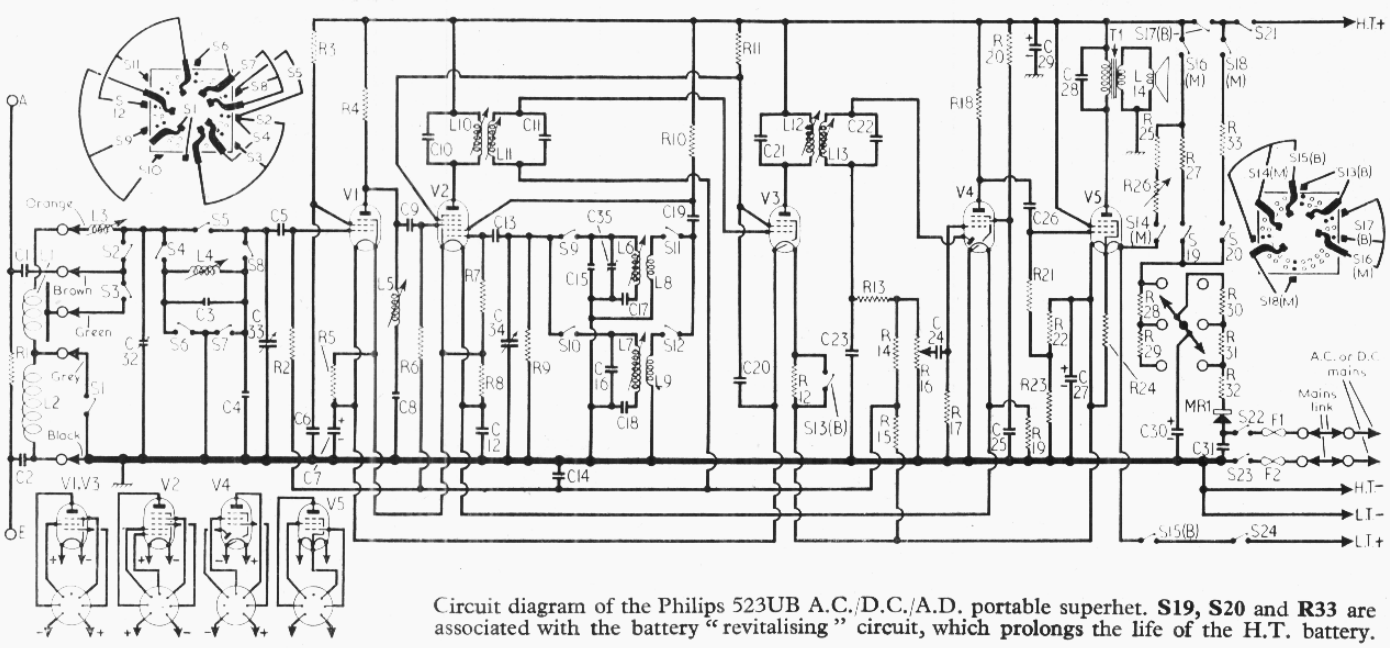
COMPONENTS & VALUES

	CAPACITORS	Values	Locations
C1	Aerial and earth isolators	150pF	—
C2		0·0047μF	—
C3	L.W. aerial trim.	10pF	G3
C4		97pF	G3
C5	V1 C.G.	100pF	G4
C6	V1 S.G. decoup.	0·047μF	G4
C7*	Filament by-pass	100μF	E3
C8	I.F. filter tune	18pF	G4
C9	R.F. coupling	100pF	G4
C10	1st I.F. trans. tun.	110pF	A2
C11		110pF	A2
C12	Filament by-pass	0·1μF	E4
C13	V2 osc. C.G.	100pF	G4
C14	A.G.C. decoupling	0·047μF	F3
C15	M.W. osc. trim.	12pF	F3
C16	L.W. osc. trim.	148pF	F3
C17	M.W. osc. tracker	530pF	F3
C18	L.W. osc. tracker	195pF	G3
C19	Osc. reaction coup.	470pF	G4
C20	V3 S.G. decoupling	0·047μF	F4
C21	2nd I.F. trans. tun.	115pF	B2
C22		115pF	B2
C23	I.F. by-pass	100pF	E4
C24	A.F. coupling	0·0022μF	D4
C25	V4 S.G. decoup.	0·047pF	E3
C26	A.F. coupling	0·0022μF	E4
C27*	Filament by-pass	250μF	C1
C28	Tone corrector	0·0022μF	B1
C29*	H.T. smoothing	100μF	C1
C30*		50μF	B1
C31	Mains R.F. by-pass	0·01μF	D3
C32‡	M.W. aerial trim.	30pF	G3
C33†	Aerial tuning	500pF	A1
C34†	Oscillator tuning	500pF	A1
C35‡	M.W. osc. trim.	30pF	G3

* Electrolytic. † Variable. ‡ Pre-set.

	RESISTORS	Values	Locations
R1	Anti static shunt	1MΩ	—
R2	V1 C.G.	820kΩ	G4
R3	V1 S.G. feed	68kΩ	G4
R4	V1 anode load	18kΩ	G4
R5	Fil. H.T. by-pass	560Ω	G4
R6	V2 C.G.	820kΩ	G4
R7	V2 osc. C.G.	27kΩ	G4
R8	Fil. H.T. by-pass	330Ω	G4
R9	Oscillator shunt	33kΩ	G4
R10	Osc. anode feed	33kΩ	G4
R11	S.G. H.T. feed	39kΩ	F4
R12	V5 G.B.	18Ω	C2
R13	I.F. stopper	47kΩ	E4
R14	A.G.C. decoupling	5·6MΩ	E4
R15	G.B. feed	8·2MΩ	F4
R16	Volume control	1MΩ	D4
R17	V4 C.G.	10MΩ	E4
R18	V4 anode load	1MΩ	E3
R19	Fil. H.T. by-pass	220Ω	E4
R20	V4 S.G. feed	4·7MΩ	E3
R21	V5 C.G.	1MΩ	D4
R22	Filament H.T. by-pass	620Ω	D4
R23		250Ω	D4
R24		380Ω	E4
R25	Filament ballast	1·5kΩ	B2
R26		550Ω	B2
R27	H.T. smoothing	*1,432Ω	B2
R28	Voltage adjustment	263Ω	C2
R29		160Ω	C2
R30		68Ω	C1
R31		33Ω	C1
R32		175Ω	C2
R33	Battery recharge	†23·5kΩ	D3

* Two resistors, 1,645Ω and 10kΩ, in parallel.
‡ Two 47kΩ resistors in parallel.



Circuit diagram of the Philips 523UB A.C./D.C./A.D. portable superhet. **S19, S20** and **R33** are associated with the battery "revitalising" circuit, which prolongs the life of the H.T. battery.

OTHER COMPONENTS		Approx. Values (ohms)	Locations
L1	M.W. frame aerial	1·0	—
L2	L.W. frame aerial...	1·0	—
L3	M.W. loading coil...	3·0	A1
L4	L.W. loading coil...	34·0	A1
L5	I.F. filter	28·0	A2
L6	Oscillator tun. coils	10·0	A1
L7	Oscillator tun. coils	20·0	A1
L8	Oscillator reaction coils	9·0	A1
L9	Oscillator reaction coils	15·0	A1
L10	1st I.F. trans. Pri.	7·5	A2
L11	1st I.F. trans. Sec.	7·5	A2
L12	2nd I.F. trans. Pri.	12·0	B2
L13	2nd I.F. trans. Sec.	12·0	B2
L14	Speech coil ...	3·0	—
T1	O.P. trans. Pri.	580·0	B2
T1	O.P. trans. Sec.	—	G4
S1-S12	Waveband switches	—	C2
S13(B) to S18(M)	Mains/battery switches	—	D3
S19, S20	Batt. recharge sw.	—	D3
S21-4	On/off switch	—	C1
F1, F2	160mA fuses ...	—	

VALVE ANALYSIS

Valve voltages and currents given in the table below are derived from the manufacturers' information and are the average of readings taken on a number of receivers, which were operated from 241 V A.C. mains, the voltage adjustments being set to the 245 V tappings.

Voltages were measured with a valve voltmeter, and as this type of instrument has a high internal resistance, allowance should be made for the current drawn by other types of meter. Chassis was the negative connection in each case. Total input current on mains was 135 mA.

Valve		Anode V	Anode mA	Screen V	Screen mA
V1	DF91 ...	61	1·5	43	0·7
V2	DK92 ...	88	0·7	56	1·65
		Oscillator *	0·15		
V3	DF91 ...	88	1·5	56	0·6
V4	DAF91 ...	20	0·07	18	0·2
V5	DL94 ...	82	5·9	88	1·5

*No reading quoted.

GENERAL NOTES

Switches.—S1-S12 are the waveband switches, ganged in a single unit beneath the chassis. Its position is indicated in our under-chassis illustration, and a detailed drawing of the unit is inset in the top left-hand corner of the circuit diagram overleaf. The associated switch table in column 2 gives the switch positions for the two control settings, starting from the fully anti-clockwise position of the control lever. A dash indicates open, and **C** closed.

S13(M)—S17(B), S18(M) are the mains/battery change-over switches, ganged in a second lever-operated unit, mounted on a bracket at the rear of the chassis. This is indicated in our plan view of the chassis, and shown in detail at the right of the circuit diagram. The unit is spring-loaded and in its normal position (lever fully anti-clockwise when viewed from rear) the receiver is switched to mains operation, and all the switches with the suffix **(M)** close. When the lever is turned fully clockwise, the **(B)** switches close for battery operation.

To hold the unit in this position, the mains plug is inserted in the "Mains Plug Receptacle" which we indicate in the plan view of the chassis, when the pins lock the switch in position. By this device the mains cannot be connected to the receiver while it is switched for battery operation. The receptacle will accept a standard 5A 2-pin plug.

S19, S20 are the battery charge switches comprising a Q.M.B. unit mounted on the volume control spindle, and operated by a control lever concentric with the volume control knob. In order to prolong the life of the H.T. battery the charge circuit is brought into operation by switching the receiver to mains operation and turning the charge control lever to "Batt. Charge" (fully clockwise). The receiver can then be switched on, and the H.T. battery trickle-charged.

In order to operate the receiver normally from mains, the recharge switch should be set to "Mains." When the receiver is operated from batteries, it does not matter in which position the control is set.

S21-S24 are the Q.M.B. "on/off" switches, ganged with the volume control **R16.**

Frame Aerials.—The M.W. (outer) frame winding **L1** and the L.W. (inner) winding **L2** are mounted on the back cover of the carrying case, together with **C1, C2** and the **A** and **E** sockets. A piece of copper foil secured beneath the lower half of **L1** provides a small coupling capacitance by which to inject a signal from an external aerial for M.W. operation. On L.W. the external aerial socket is coupled to the junction of **L3** and **L4.**

Connections from the chassis to the back cover are made by five coloured leads to sockets bearing similarly coloured paint spots. Reading from top to bottom, the frame sockets are: 1, orange; 2, grey; 3, black; 4, green; 5, brown.

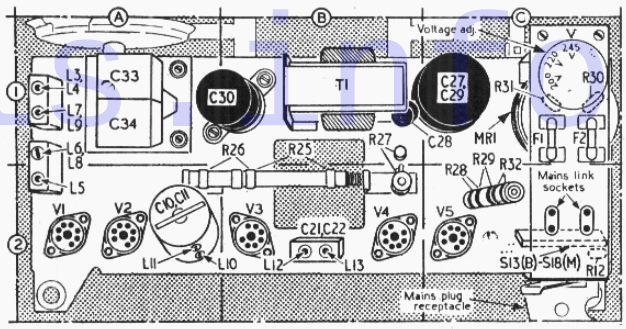
Batteries.—The L.T. batteries recommended are two Ever Ready All Dry 28's rated at 4.5 V each, or the equivalents in other makes, making 9 V. The H.T. batteries recommended are two Ever Ready B104's rated at 45 V each, or the equivalents in other makes, making 90 V. G.B. is automatic. All the batteries fit into the base of the carrying case, H.T. batteries at the bottom, and L.T. batteries on top, where they are secured by the metal battery clip and thumbscrew.

Voltage Adjustment.—Three positions of voltage adjustment are provided on a special rotary plug, the voltage setting being that adjacent to the "V" embossed in the top of the mounting panel.

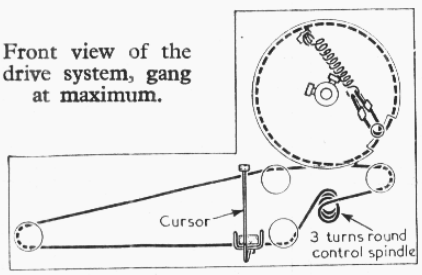
Drive Cord Replacement.—About 3 feet of cord is required, and it should be made up with a loop at each end to measure 32in overall, using special metal collars to clamp the ends. Run on as shown in the sketch (col. 2), starting anti-clockwise round the drum.

Switches	M.W.	L.W.
S1 ...	C	—
S2 ...	—	C
S3 ...	C	C
S4 ...	—	—
S5 ...	C	—
S6 ...	C	—
S7 ...	—	C
S8 ...	—	C
S9 ...	C	C
S10 ...	—	C
S11 ...	C	—
S12 ...	—	C

Waveband switch table. The diagram is overleaf.



Plan view of the chassis.



Front view of the drive system, gang at maximum.

CIRCUIT ALIGNMENT

I.F. Stages.—Remove chassis from cabinet and stand it on its metal rectifier end. Switch receiver to M.W. and turn gang to minimum capacitance. Connect signal generator output, via an 0.047 μF capacitor in the "live" lead, to control grid (pin 6) of **V2** and chassis. Feed in a 470 kc/s (638.3 m) signal and adjust the cores of **L13, L12** (location reference B2) and **L11, L10** (A2) for maximum output. Repeat these adjustments.

I.F. Filter.—Transfer "live" signal generator lead, and 0.047 μF capacitor, to control grid (pin 6) of **V1.** Feeding in a 470 kc/s signal, adjust the core of **L5** (A2) for minimum output.

Oscillator Stage.—Check that with the gang at maximum capacitance the cursor coincides with the "m" at the high wavelength end of the L.W. tuning scale. With the signal generator "live" lead connected to **V1** control grid, carry out the following adjustments.

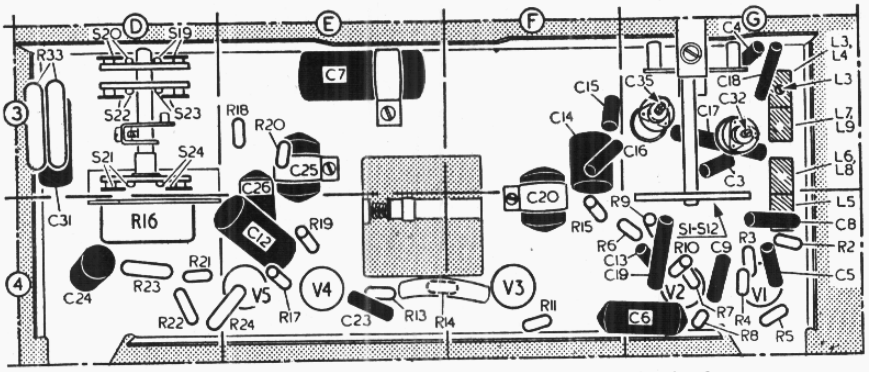
M.W.—Switch receiver to M.W. and turn gang to maximum capacitance. Feed in a 540 kc/s (555.5 m) signal and adjust the core of **L6** (A1) for maximum output. Turn gang to minimum capacitance, feed in a 1,585 kc/s (189.3 m) signal and adjust **C35** (G3) for maximum output. Repeat these adjustments.

L.W.—Switch receiver to L.W. and turn gang to maximum capacitance. Feed in a 140 kc/s (2,143 m) signal and adjust the core of **L7** (A1) for maximum output.

R.F. Stage.—Connect the frame aerials and place the back cover 3½in from the rear of the chassis, with the batteries arranged in their normal positions relative to the frame aerials. Transfer signal generator leads to a loop of wire taped in position on the back cover (a fairly large generator output will be needed).

M.W.—Switch receiver to M.W., feed in a 600 kc/s (500 m) signal, tune in receiver and adjust the core of **L3** (G3) for maximum output. Feed in a 1,500 kc/s (200 m) signal, tune in receiver and adjust **C32** (G3) for maximum output. Repeat these adjustments.

L.W.—Switch receiver to L.W., feed in a 150 kc/s (2,000 m) signal and adjust the core of **L4** (A1) for maximum output.



Underside view of the chassis. **R14** is hidden in a plastic sleeve.

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