

BURNDEPT 218

TRANSPORTABLE BATTERY SUPERHET

BURNDEPT fit a 4-valve superhet chassis in their 218 battery operated transportable receiver. The valves include a variable-mu pentode H.F. amplifier, a heptode frequency changer, a pentode second detector and a pentode output valve. A Westector provides A.V.C.

Provision is made for using an external aerial and earth, a separate winding on the frame aerial being used for coupling.

CIRCUIT DESCRIPTION

Tuned frame aerial input (L2, L3, C14 with provision for external aerial-earth coupling by small winding L1) to variable-mu pentode signal frequency amplifier (V1, Mullard metallised VP2).

Tuned secondary transformer coupling by L4, L5, L6, L7 and C15 to heptode frequency changer (V2, Marconi metallised X21) operating with electron coupling. Oscillator grid coils L8, L9, tuned by C17; tracking by pre-set condensers C19 (L.W.) and C20 (M.W.); anode reaction coils L10, L11.

No valve amplification other than that afforded by the frequency changer is used in the intermediate frequency stage. A single tuned-primary tuned-secondary transformer, L12, L13, couples V2 to the second detector, an H.F. pentode (V3, Mullard metallised SP2) operating on grid leak system with C6 and R4.

Intermediate frequency 130 KC/S.

A half-wave metal rectifier (MR1, Westinghouse W6 Westector) is fed from the detector anode by condenser C10 and provides D.C. potential, developed across load resistance R8, which is fed back through decoupling circuits as G.B. to H.F. and F.C. valves, giving automatic volume control.

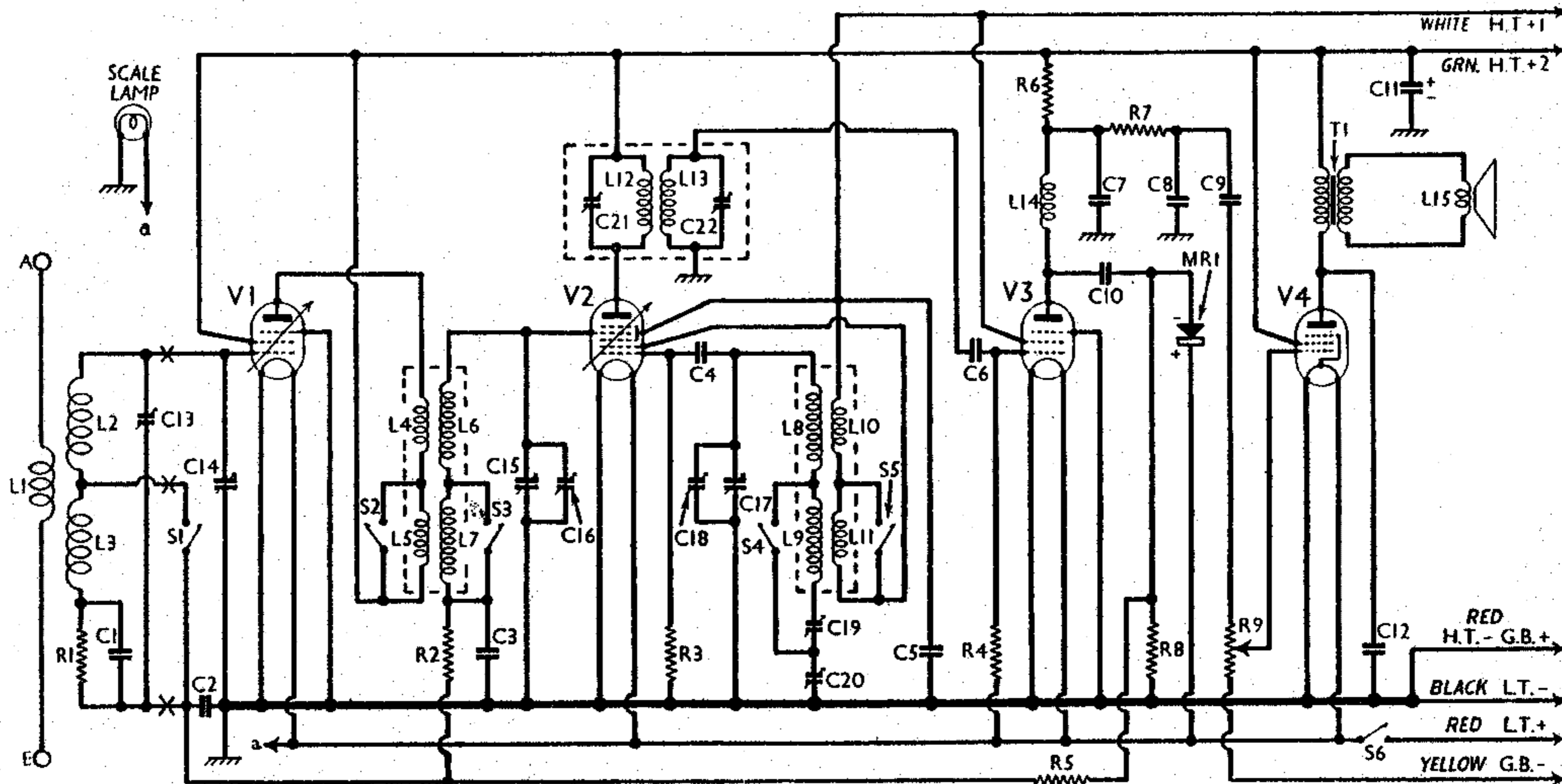
I.F. filtering in V3 anode circuit by choke L14, stopper resistance R7, and by-pass condensers C7, C8. Resistance-capacity coupling by R6, C9, and manual volume control R9, to output pentode (V4, Mullard PM22A). Tone correction in anode circuit by fixed condenser C12.

No provision for connection of gramophone pick-up or external speaker.

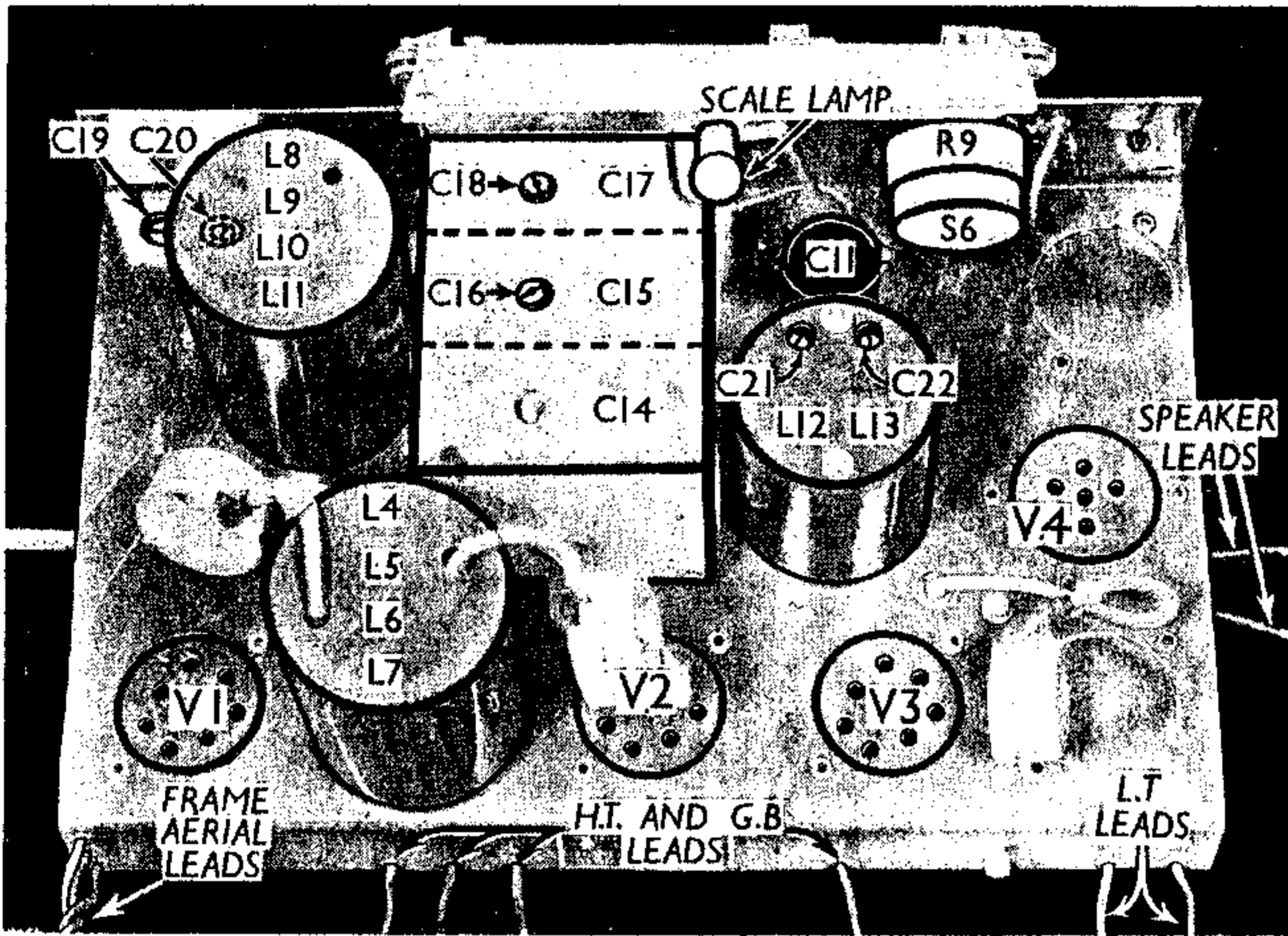
COMPONENTS AND VALUES

Resistances		Values (ohms)
R1	V1 C.G. decoupling	1,000
R2	V2 tetrode C.G. decoupling ..	250,000
R3	V2 oscillator C.G. resistance ..	100,000
R4	V3 grid leak	1,000,000
R5	A.V.C. line decoupling	1,000,000
R6	V3 anode load	100,000
R7	I.F. stopper	15,000
R8	Westector load resistance	1,000,000
R9	Manual volume control	500,000

Condensers		Values (μF)
C1	V1 C.G. decoupling	0.01
C2	A.V.C. line decoupling	0.1
C3	V2 tetrode C.G. decoupling ..	0.1
C4	V2 oscillator C.G. condenser ..	0.001
C5	V2 S.G.'s and oscillator anode decoupling	0.1
C6	V3 C.G. condenser	0.0001
C7	} I.F. by-passes	0.0002
C8		0.0001
C9	L.F. coupling to V4	0.01
C10	Coupling to Westector (MR1) ..	0.0005
C11*	H.T. reservoir	8.0
C12	Tone corrector	0.002
C13†	Frame aerial trimmer	---
C14†	Frame aerial tuning	---
C15†	H.F. transformer tuning	---
C16†	H.F. transformer trimmer	---



Circuit diagram of the Burndept 218 transportable battery superhet. The crosses on the diagram towards the left indicate the points where the frame aerial circuit connects to the chassis wiring.



Plan view of the chassis. The oscillator M.W. tracker, C20, is hidden behind the L8-L11 coil unit. The trimmer of C14 is in the frame aerial. C11 is the H.T. reservoir condenser.

Condensers (contd.)		Values (μF)
C17†	Oscillator tuning	—
C18†	Oscillator trimmer	—
C19†	Oscillator L.W. tracker ..	0.0015
C20†	Oscillator M.W. tracker ..	0.002
C21†	I.F. trans. pri. tuning ..	—
C22†	I.F. trans. sec. tuning ..	—

* Electrolytic † Variable ‡ Pre-set.

Other Components		Approx. Values (ohms)
L1	External aerial-earth coupling	0.4
L2	} Frame aerial	0.9
L3		5.5
L4	} H.F. transformer primary	4.2
L5		4.0
L6	} H.F. transformer secondary	5.0
L7		9.0
L8	} Oscillator tuning coils ..	4.5
L9		6.5
L10	} Oscillator anode coils ..	1.0
L11		4.0
L12	} I.F. transformer { Pri. ..	27.0
L13		Sec. .. 27.0
L14	V3 anode I.F. choke	170.0
L15	Speaker speech coil	2.5
T1	Speaker input trans. { Pri. ..	700.0
	{ Sec. ..	0.1
MR1	A.V.C. Westector	—
S1-S5	Waveband switches	—
S6	L.T. switch, ganged R9 ..	—

DISMANTLING THE SET

Removing Chassis.—To remove the chassis from the cabinet, remove the two control knobs on the front of the set

(recessed grub screws) and the switch knob (recessed grub screw) and es-cutcheon (three countersunk-head wood screws) on the right-hand side of the cabinet. Disconnect the frame aerial and the speaker and remove the two round-head screws (with washers) holding the chassis to the shelf, the heads of which are under the shelf. Take out the VP2 and PM22A, thus making it possible to remove the nuts and washers from the two screws holding the front of the chassis to the cabinet. The chassis can now be withdrawn.

When replacing, note that the leads to the frame go straight across to the

nearest tag and that the speaker leads should go to the tags marked 1 and 3.

Removing Speaker.—The speaker can be removed from the cabinet by removing the nuts and washers from the four bolts holding it to the sub-baffle.

Removing Frame Aerial.—If it is necessary to remove the frame aerial, this can be done by removing the four countersunk-head wood screws holding it in the cabinet lid, two being at the top and two at the bottom. The screws concerned are the smaller ones, that is those nearer the centre.

VALVE ANALYSIS

Voltages and currents for the various valves in the receiver given in the table below are those measured in our set when it was operating from a new H.T. battery reading 126 V. The volume control was at maximum, and the set was tuned to the lowest wavelength on the medium band. There was no signal input, the frame connections being shorted together.

Voltages were measured on the 1,200 V scale of an Avometer, with chassis as negative.

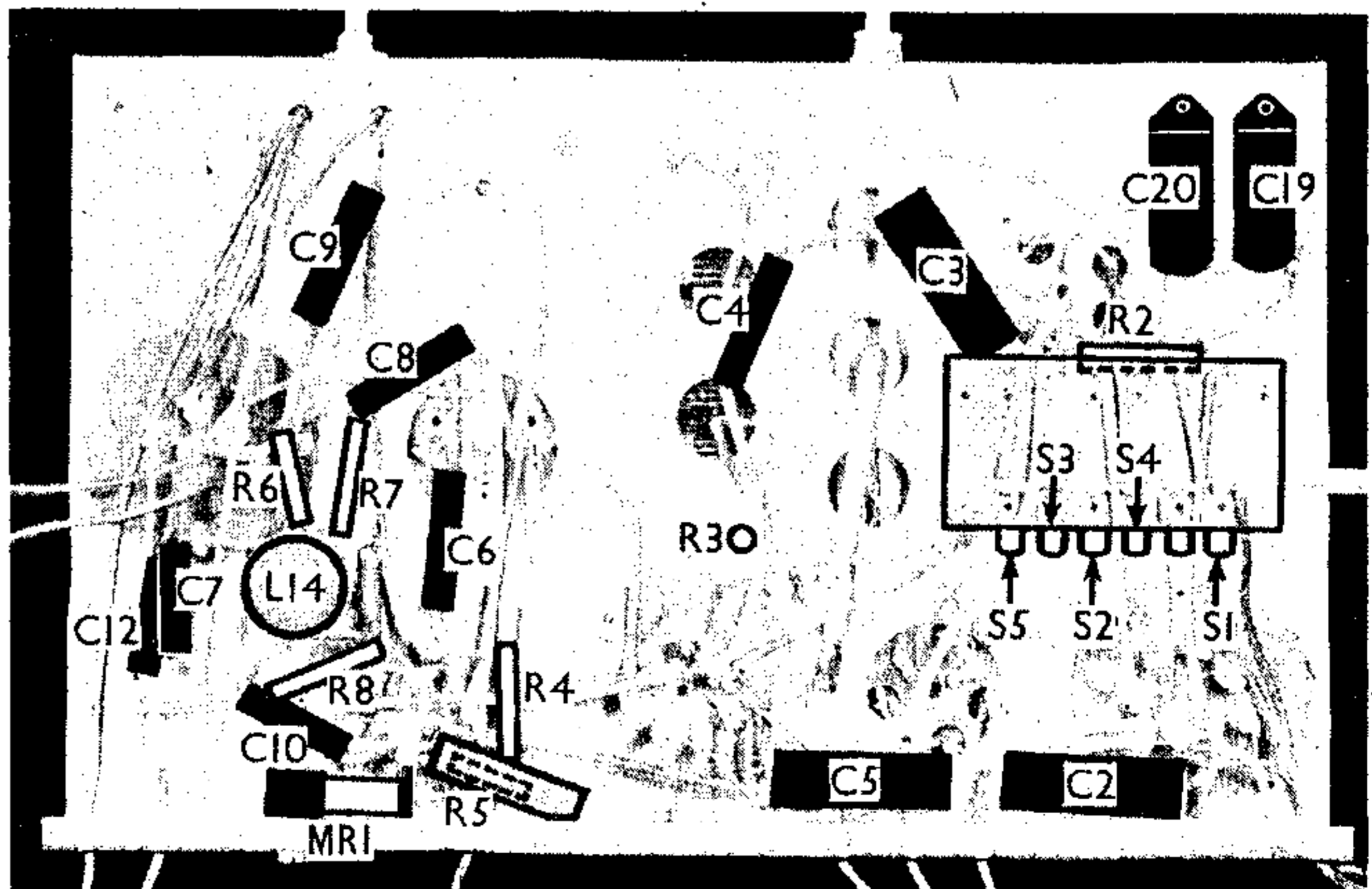
Valve	Anode Volts	Anode Current (mA)	Screen Volts	Screen Current (mA)
V1 VP2 ..	120	2.3	120	0.6
V2 X21* ..	120	0.5	60	1.4
V3 SP2 ..	38	0.7	60	0.2
V4 PM22A	118	3.5	120	0.8

* Osc. anode (G2) 60 V, 1.5 mA.

GENERAL NOTES

Switches.—The spindle of the wave-change switch unit projects from the right of the chassis. It contains S1 to S5, and all the switches are closed on

(Continued overleaf)



Under-chassis view. R5 is inside a length of sleeving. L14 is an I.F. choke. Note that one set of contacts in the switch unit is not used.

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the M.W. band and *open* on the L.W. band. Note that one set of contacts, between **S1** and **S4**, is not used, the switch being shorted out by the wire from **C20** to the **V1** holder, and earthed.

S6 is the Q.M.B. L.T. switch, ganged with the volume control **R9**.

Coils.—Apart from the frame aerial and external aerial coupling coils (**L1-L3**), all the coils are in three screened units on the chassis deck. The units are **L4-L7**, the H.F. transformer; **L8-L11**, the oscillator unit; and **L12, L13**, the I.F. transformer, with its trimmers **C21, C22**. **L14** is an I.F. choke, mounted beneath the chassis.

Scale Lamp.—This is a 2 V Competa M.E.S. pattern, of the low consumption type.

External Speaker.—There is no provision for an external speaker, though a high resistance type could be connected across the primary of the internal speaker transformer **T1**.

Trimmer C13.—This is inside the frame aerial, and is adjustable through a hole in the back of cabinet door. The main condenser, **C14**, is not fitted with a trimmer.

Condenser C1, Resistance R1.—These two components are in parallel, and are mounted inside the frame aerial just above the panel carrying the connecting tags.

Batteries.—The batteries supplied are: L.T., Exide celluloid 2 V 25 AH cell, RSZ4; H.T. and G.B., Burndipt 120 V battery, tapped in 1.5 V steps from negative to +9 V.

Battery Plugs and Voltages.—Yellow plug, G.B. negative, insert in H.T.—socket. Red plug, G.B. positive, insert in +4.5 V socket. White plug, H.T. +1, insert in +60 V socket. Green plug, H.T. +2, insert in +120 V socket.

Resistance R5.—This is covered by a piece of black sleeving.

Metal Rectifier MR1.—This is a Westinghouse type W6. Should a new one be necessary, note the polarity when replacing.

CIRCUIT ALIGNMENT

Remove chassis from cabinet, connect up batteries and speaker, and connect output meter across the primary of **T1**. Leave frame aerial disconnected, but connect a 0.25 MO resistance across the two outer frame aerial leads on the chassis.

Connect a 0.25 MO resistance from the grid (top cap) of **V2** to chassis, leaving normal cap disconnected. Connect the signal generator across this latter resistance and see that the set is switched to L.W. and tuned to bottom of L.W. scale. Switch the set on, turn volume control to maximum, and switch on signal generator, adjusting this to 130 KC/S, and keeping the input to the set low.

Adjust **C21** and **C22** for maximum output.

Remove the 0.25 MO resistance from the top cap of **V2**, and replace the normal connection. Turn gang condenser to absolute minimum, and adjust pointer to coincide with the black spot at the lower end of the M.W. scale. Set receiver to 200 m. and switch to M.W. Apply a 200 m. signal across the resistance connected across the frame aerial leads, again keeping the input low to avoid A.V.C. action.

Now adjust **C18** and then **C16** for maximum output. As the set comes more in line the input must be reduced. Inject a 500 m. signal, and tune receiver to 500 m. on scale. Adjust **C20** for maximum output. Swing the gang condenser slightly for optimum reading whilst making this adjustment. If after this the circuit is out of alignment at 200 m., re-trim **C16** and **C18** at 200 m. and re-

adjust **C20** at 500 m. Continue until the set is in gang at both ends of the scale.

Switch receiver to L.W., tune to 2,000 m. and tune generator also to 2,000 m. Adjust **C19** for maximum, swinging gang condenser for maximum output, irrespective of scale reading. The optimum point should, however, be close to 2,000 m. on the scale.

Now remove the 0.25 MO resistance, put chassis back in cabinet, and re-connect all leads. Leave output meter connected, but close back of cabinet as much as possible. Connect signal generator to a coil of 20-60 turns, and place close to back of frame aerial. Switch to M.W. and tune receiver to 200 m., setting signal generator to 200 m. Switch on, and adjust **C13** through hole in back of cabinet door to give maximum output. The set should then be correctly aligned.