'TRADER' SERVICE SHEET

180

BURNDEPT 257

4-VALVE A.C. SUPERHET

THE Burndept 257 A.C. superhet has a 4-valve (plus rectifier) chassis which also uses a Westector for providing A.V.C. The receiver is suitable for mains of 200-260 V, 50-100 C/S, and has provision for a gramophone pick-up, an extension speaker and for using the mains as an aerial.

CIRCUIT DESCRIPTION

Aerial input via M.W. coupling coil **L1** and L.W. tap to inductively coupled band-pass filter. Primary coils **L2, L3** are tuned by **C26**; secondary coils **L8, L9** are tuned by **C29**; coupling coils **L4, L5, L6, L7.**

First valve (**V1, Mullard metallised FC4**) is an octode operating as electron coupled frequency changer. Oscillator grid coils **L10, L11** are tuned by **C32**; parallel trimming by **C31** (M.W.) and **C33** (L.W.); series tracking by **C34** (L.W.) and **C35** (M.W.); oscillator anode reaction coils **L12, L13.**

Second valve, a variable-mu H.F. pentode (**V2, Mullard metallised VP4B**), operates as intermediate frequency amplifier with tuned-primary tuned-secondary transformer couplings **C36, L14, L15, C37** and **C38, L16, L17, C39.**

Intermediate frequency 130 KC/S.

Triode second detector (**V3, Mullard metallised 354V**) operates on grid leak system with **C8** and **R8.** Provision for connection of gramophone pick-up in grid circuit by switch **S7**; **S6** breaks **V1** S.G. and osc. anode H.T. feed circuit and thus mutes radio on gramophone.

Metal rectifier (**MR1. Westinghouse Westector WMX12**), is fed from **V3** anode via condenser **C12** and provides D.C. potentials, developed across resistances **R12, R13,** which are fed back through decoupling circuits as G.B. to F.C. and I.F. valves, giving automatic volume control. Delay voltage is obtained from drop along **V4** cathode resistance **R17.**

I.F. filtering in **V3** anode circuit by **L18, C14, R14** and **C15.** Resistance capacity coupling by **R11, C16** and manual volume control **R15** between **V3** and pentode output valve (**V4, Mullard Pen A4**). Fixed tone correction in anode circuit by **C19**; variable tone control by R.C. filter **R18, C20.** Provision for connection of high-impedance external speaker by coupling condenser **C21.**

H.T. current is supplied by I.H.C. full-wave rectifying valve (**V5, Brimar R2**). Smoothing by speaker field coil **L21** and electrolytic condensers **C22, C23.** Mains aerial coupling by **C24.**

DISMANTLING THE SET

A detachable bottom is fitted to the cabinet and upon removal (four countersunk-head wood screws) gives access to most of the under-chassis components.

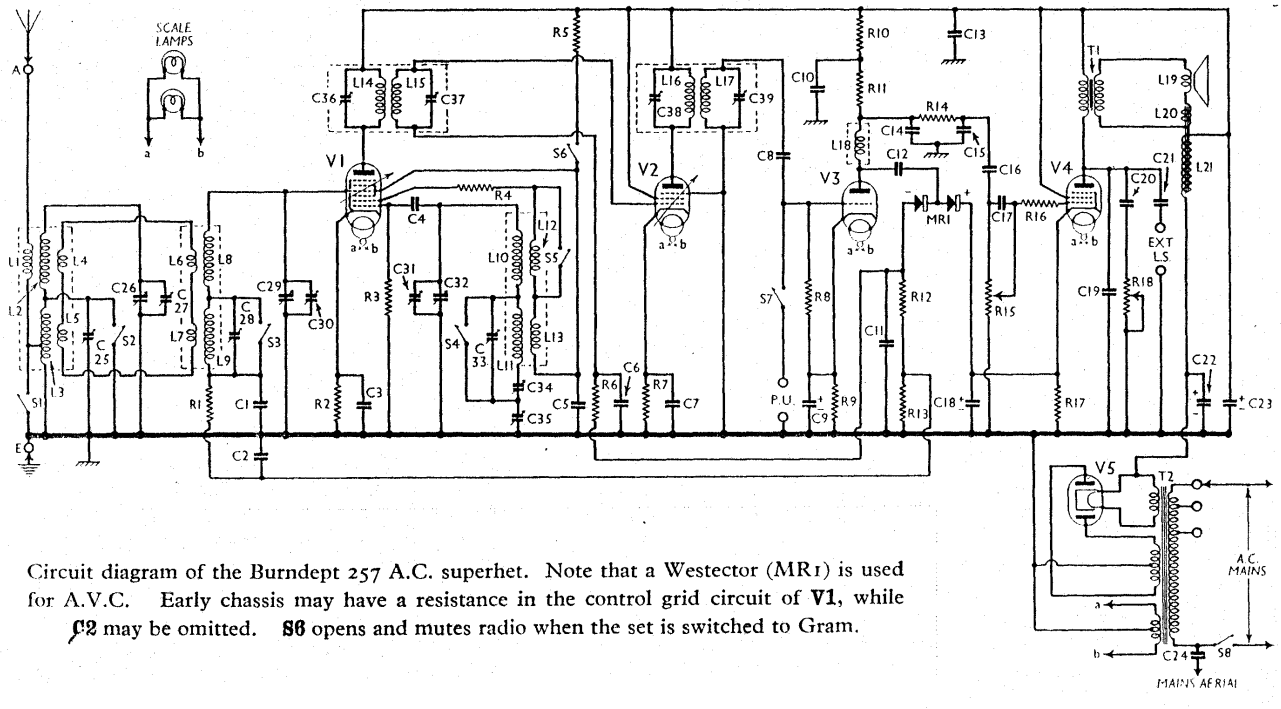
Removing Chassis.—If it should be necessary to remove the chassis from the cabinet, first remove the four control knobs (recessed grub screws) and the four bolts (with washers) holding the chassis to the bottom of the cabinet. The chassis can now be withdrawn to the extent of the speaker leads, which should be just sufficient for normal purposes. *When replacing*, note that there is no flat on the spindle of the combined wave-change and gramophone switch and see that the knob is so positioned that the blue dot is uppermost when the receiver is operating on the medium band.

To free the chassis entirely, unsolder the speaker leads and *when replacing*, connect them as follows:— F, red; 3, blue; 1 and F joined together, black.

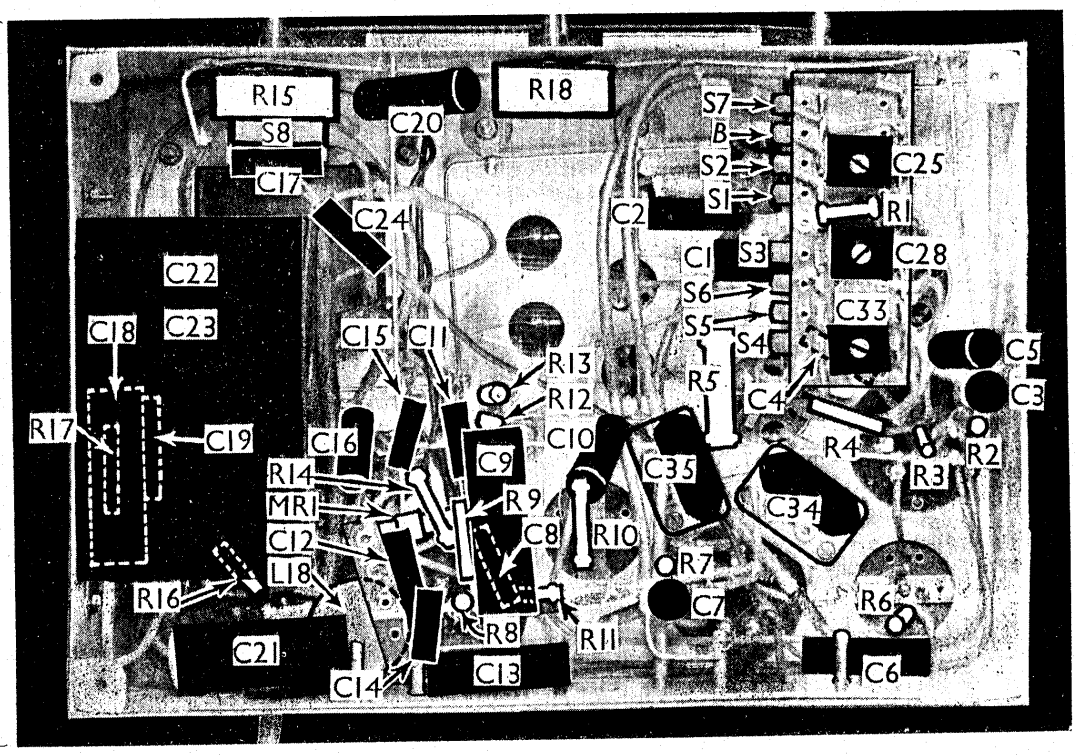
Removing Speaker.—To remove the speaker from the cabinet, remove the nuts and lock washers from the four bolts with ornamental heads holding it to th front of the cabinet. *When replacing*, see that the transformer is pointing to the top right-hand corner of the cabinet (viewed from the back).

COMPONENTS AND VALUES

	RESISTANCES	Values (ohms)
R1	V1 pentode C.G. decoupling	500,000
R2	V1 fixed G.B. resistance	200
R3	V1 osc. C.G. resistance	50,000
R4	V1 osc. anode stabiliser	200
R5	V1 S.G.'s and osc. A decoupling	30,000
R6	V2 C.G. decoupling	500,000
R7	V2 fixed G.B. resistance	150
R8	V3 grid leak	500,000
R9	V3 G.B. resistance	1,000
R10	V3 anode decoupling	20,000
R11	V3 anode load	25,000
R12	MR1 load resistances	500,000
R13	MR1 load resistances	500,000
R14	I.F. stopper	20,000
R15	Manual volume control	500,000
R16	V4 C.G. I.F. stopper	100,000
R17	V4 G.B. resistance	150
R18	Variable tone control	250,000



Circuit diagram of the Burndept 257 A.C. superhet. Note that a Westector (MR1) is used for A.V.C. Early chassis may have a resistance in the control grid circuit of **V1**, while **C2** may be omitted. **S6** opens and mutes radio when the set is switched to Gram.



Under-chassis view. Note that thesecondswitch from the top of the switch unit is blank. **C34** and **C35** are adjustable through holes in the chassis deck. **C18, C19** and **R17** are beneath the **C22, C23** electrolytic condenser block. **MR1** is the Westector, while **L18** is a screened I.F. choke.

CONDENSERS		Values (μF)
C1	V1 pentode C.G. decoupling	0·1
C2	V1 A.V.C. line decoupling	0·01
C3	V1 cathode by-pass	0·1
C4	V1 osc. C.G. condenser	0·001
C5	V1 S.G.'s and osc. A decoupling	0·1
C6	V2 C.G. decoupling	0·1
C7	V2 cathode by-pass	0·1
C8	V3 C.G. condenser	0·0001
C9*	V3 cathode by-pass	25·0
C10	V3 anode decoupling	0·1
C11	I.F. by-pass	0·01
C12	MR1 coupling	0·0005
C13	H.T. supply H.F. by-pass	0·1
C14	I.F. by-passes	0·0005
C15	I.F. by-passes	0·0005
C16	V3 to V4 L.F. coupling	0·01
C17	V4 C.G. I.F. by-pass	0·0001
C18*	V4 cathode by-pass	50·0
C19	Fixed tone corrector	0·002
C20	Part of T.C. filter	0·1
C21	Ext. speaker coupling	0·5
C22*	H.T. smoothing	8·0
C23*	H.T. smoothing	16·0
C24	Mains aerial coupling	0·0001
C25‡	Band-pass pri. L.W. trimmer	—
C26‡	Band-pass pri. tuning	—
C27‡	Band-pass pri. M.W. trimmer	—
C28‡	Band-pass sec. L.W. trimmer	—
C29‡	Band-pass sec. tuning	—
C30‡	Band-pass sec. M.W. trimmer	—
C31‡	Oscillator M.W. trimmer	—
C32‡	Oscillator tuning	—
C33‡	Oscillator L.W. trimmer	—
C34‡	Oscillator L.W. tracker	—
C35‡	Oscillator M.W. tracker	—
C36‡	1st I.F. trans. pri. tuning	—
C37‡	1st I.F. trans. sec. tuning	—
C38‡	2nd I.F. trans. pri. tuning	—
C39‡	2nd I.F. trans. sec. tuning	—

* Electrolytic. † Variable. ‡ Pre-set.

OTHER COMPONENTS		Approx. Values (ohms)
L1	Aerial M.W. coupling coil	4·9
L2, L3	Band-pass primary coils	5·5, 9·0
L4, L5	Band-pass coupling coils	0·4
L6, L7	Band-pass coupling coils	0·4
L8, L9	Band-pass secondary coils	5·0, 9·0

OTHER COMPONENTS (*Continued*)			Approx. Values (ohms)
L10	Oscillator tuning coils		4·5
L11	Oscillator tuning coils		5·7
L12	Oscillator reaction coils		4·3
L13	Oscillator reaction coils		1·2
L14	1st I.F. trans.	Pri.	30·0
L15	1st I.F. trans.	Sec.	30·0
L16	2nd I.F. trans.	Pri.	30·0
L17	2nd I.F. trans.	Sec.	30·0
L18	V3 anode I.F. choke		200·0
L19	Speaker speech coil		2·7
L20	Hum neutralising coil		0·1
L21	Speaker field coil		2,000·0
T1	Speaker input trans.	Pri.	600·0
		Sec.	0·45
T2	Mains trans.	Pri. total	25·0
		Heater sec.	0·03
		Rect. heat. sec.	0·05
		H.T. sec. total	130·0
S1 S5	Waveband switches		—
S6, S7	Gram. switches		—
S8	Mains switch, ganged R15		—

VALVE ANALYSIS

Valve voltages and currents given in the table below are those measured in our receiver when it was operating on mains of 220 V, using the 230 V tapping on the mains transformer. The receiver was tuned to the lowest wavelength on the medium band and the volume control was at maximum, but there was no signal input.

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

Valve	Anode Voltage (V)	Anode Current (mA)	Screen Voltage (V)	Screen Current (mA)
V1 FC4*	205	1·3	85	4·5
V2 VP4B	265	14·0	265	5·0
V3 354V	80	4·3	—	—
V4 Pen.A4	240	34·0	265	4·2
V5 R2	370†	—	—	—

* Oscillator anode (G2) 85 V, 1·9 mA.
† Each anode, A.C.

GENERAL NOTES

Switches.— **S1-S7** are the waveband and gramophone switches, ganged in a single unit beneath the chassis. Note that one of the switches in the unit, marked "B," is blank. The table below gives the switch positions for the various control settings, starting with the control fully anti-clockwise. O indicates open, and C, closed.

Switch	L.W.	M.W.	Gram
S1	O	C	O
S2	O	C	O
S3	O	C	O
S4	O	C	O
S5	O	C	O
S6	C	C	O
S7	O	O	C

S8 is the O.M.B. mains switch, ganged with the volume control **R15**.

Coils.—**L1-L5, L6-L9** and **L10-L13** are in three screened units on the chassis deck. The I.F. transformers **L14, L15** and **L16, L17** are in two further screened units, with their associated trimmers. **L18** is a screened I.F. choke.

External Speaker.—Two sockets are provided at the rear of the chassis for a high resistance external speaker.

Scale Lamps.—These are two M.E.S. types, rated at 6 V, 0·3 A.

Condensers C22, C23.—These are two dry electrolytics in a single unit beneath the chassis, with a common negative (black) lead. The yellow lead is the positive of **C22** (8 μF) and the red the positive of **C23** (16μF).

Chassis Divergencies.—In early chassis, **C2** may be omitted, while an extra 500 Ω resistance may be included between the C.G. of **V1** and the top of **L8** and **C29**.

Westector MR1.—This is a WMX12 unit, having three connections. Note that the polarity of the two outer tags

Continued overleaf

BURNDEPT 257—*Continued*

must be observed should replacement become necessary. The ends of the unit are coloured red and black respectively.

Trackers C34, C35.—These are adjustable through holes in the chassis deck.

Trimmers C25, C28 and **C33.**—These are mounted beneath the chassis on the switch unit. They can be reached by removing the detachable bottom of the cabinet, and for reganging purposes there is therefore no necessity to remove the chassis from the cabinet.

CIRCUIT ALIGNMENT

I.F. Stages.—Short-circuit the oscillator grid coils in the receiver by means of a connecting link between the oscillator grid (pin 2) of **V1** and the chassis.

Inject a 130 KC/S signal into the control grid of **V1** (top cap), across a 0·25 MO resistance, which should be connected between the grid and chassis.

A useful accessory for facilitating this operation is a standard grid cap with two leads soldered to it, one to the outer shield and one to the contact cap, the 0.25 MO resistance being connected across the two, and the ends of the two leads having crocodile clips attached.

The input should be kept very low indeed, or trouble will be experienced with the detector overloading, causing incorrect alignment and distortion.

If the minimum output of the signal generator is suspected of being too large and liable to cause trouble, the E lead of the signal generator and the grid cap should be taken to the bottom of the grid coil instead of to the chassis. This will retain full A.V.C. on **V1** and **V2** and prevent the detector from being overloaded. The trimming of the I.F. transformers will not appear to be so sharp, however.

If a very small signal is available, the A.V.C. may be cut out by connecting the negative end of the Westector to chassis. This will make the trimming appear sharper than before.

Now adjust **C39, C38, C37** and **C36** in turn for maximum output. Afterwards, re-check them all again to make sure that previous adjustments were correct.

Remove the 0·25 MO resistance and replace the normal grid cap on the FC4. Remove the short-circuit from the oscillator grid coils.

H.F. and Oscillator Stages.—Inject a 210 m. signal between A and E sockets, with a dummy aerial in the lead from the signal generator. Again the output should be kept very low, and great care should be taken to see that the detector is not overloaded.

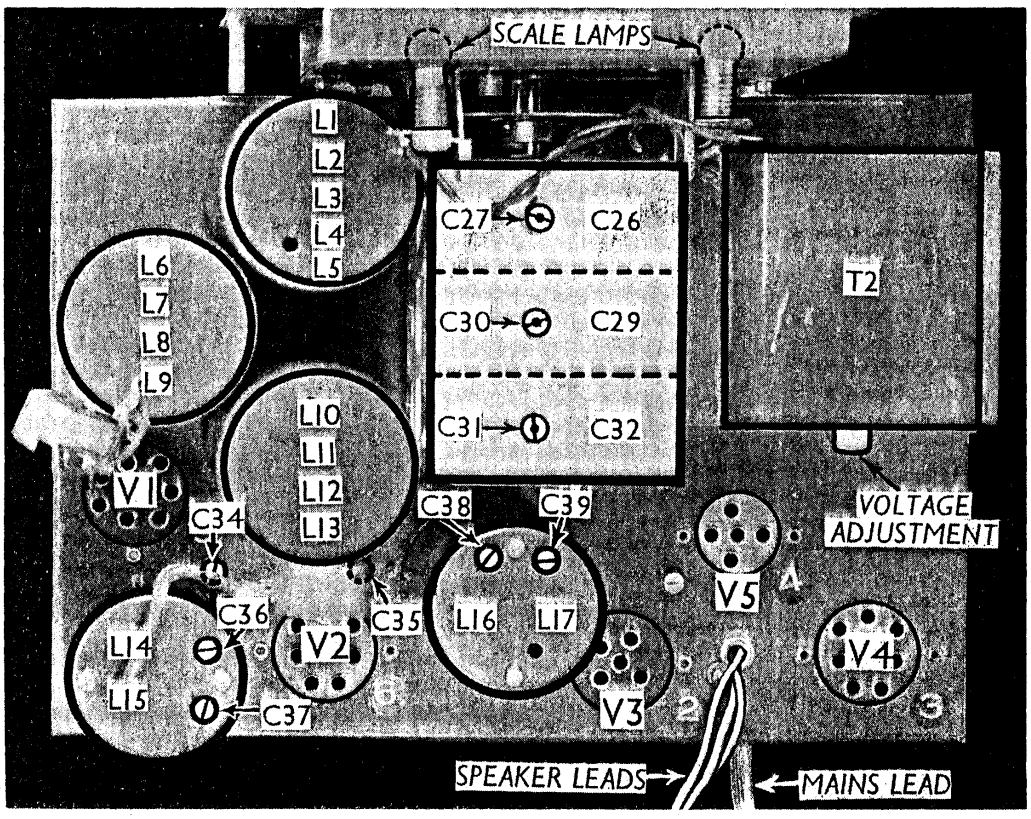
The set should then be switched to the M.W. band. Make sure that the pointer of the set lies parallel with the bottom of the scale at both ends of the travel of the gang, and then set it to 210 m. on the scale. Now adjust the oscillator trimmer, **C31** for maximum output. Then adjust the two remaining trimmers on the gang, **C30** and **C27,** for maximum output.

Feed in a 500 m. signal, and tune this in by turning the ordinary tuning control of the set until the signal is received at its loudest irrespective of the calibration. When this has been done, adjust the M.W. tracker **C35**. Tracking should be accomplished by slightly turning the tracking condenser screw and then adjusting the main tuning control and noting whether the output of the set is greater or less than before. If it is less, the tracking adjustment should be turned in the opposite direction and the main tuning control re-adjusted again to give maximum output. If it is more, then the tracking adjustment should continue to be turned in the same direction and the main tuning control re-adjusted again to give maximum output. This procedure should be continued until the optimum point (greatest output) is reached.

The signal generator should then be re-set to 210 m. and it should be noted whether the tracking operation has shifted the calibration at this end of the scale. If so, then the receiver should be set to 210 m. on the scale, and the oscillator and band-pass trimmers re-adjusted to give maximum output. Then the tracking at 500 m. should be re-adjusted agai and so on until neither operation has an effect on the other.

Switch the set to L.W. and adjust the signal generator to give a 1,000 m. signal. Set the pointer to 1,000 m. on the scale of the receiver and adjust the L.W. trimmers **C33, C28** and **C25** for maximum output.

Inject a 2,000 m. signal, tune this signal in on the receiver with the main tuning control and adjust the L.W. tracker **C34,** rocking the gang slightly to obtain the optimum output. Note whether this has upset the 1,000 m. calibration, and if so, re-adjust this, and so on in a similar manner to that in which the M.W. band was adjusted.



Plan view of the chassis. The trackers **C34** and **C35** are adjustable through holes in the chassis deck. All the tuning coils and I.F. transformers are in the five screened units shown.

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