TRADER' SERVICE SHEET

219

BURNDEPT 267

4-BAND A.C. SUPERHET

TWO short-wave bands of 13·5-51 metres (referred to below as S.W.1) and 50-180 metres (S.W.2) are covered by the Burndept 267 receiver, in addition to the usual medium and long waves. The chassis is a 4-valve (plus rectifier) A.C. superhet type suitable for mains of 200-260 V, 50-100 C/S, and has provision for both a gramophone pick-up and an extension speaker.

CIRCUIT DESCRIPTION

Aerial input via coupling coils **L1** (S.W.1), **L3** (S.W.2), **L5** (M.W.) and **L7** (L.W.) to single-tuned circuits **L2, C26** (S.W.1), **L4, C26** (S.W.2), **L6, C26** (M.W.) and **L8, C26** (L.W.).

First valve (**V1, Mazda metallised AC/TH1**) is a triode-hexode operating as a frequency changer with internal coupling. Oscillator anode coils **L10** (S.W.1), **L12** (S.W.2), **L14** (M.W.) and **L16** (L.W.) are tuned by **C34**; parallel trimming by **C30** (S.W.1), **C31** (S.W.2), **C32** (M.W.) and **C7, C33** (L.W.); series tracking by **C6** (S.W.1), **C27** (S.W.2), **C28** (M.W.) and **C29** (L.W.); oscillator grid reaction coils **L9** (S.W.1), **L11** (S.W.2), **L13** (M.W.) and **L15** (L.W.).

Single variable-mu pentode intermediate frequency amplifier (**V2, Mullard metallised VP4B**) operates with tuned-primary tuned-secondary transformer couplings **C35, L17, L18, C36** and **C37, L19, L20, C38.**

Intermediate frequency 473 KC/S.

Diode second detector is part of separate double diode valve (**V3, Mullard metallised 2D4A**). Audio-frequency component in rectified output is developed across load resistance **R13** and passed via I.F. stopper **R12,** coupling condenser **C14** and manual volume control **R15** to C.G. of pentode output valve (**V4, Mullard Pen A4**). Fixed tone correction in anode circuit by **C16.** Provision for connection of high impedance external speaker across primary of **T1.**

Second diode of **V3,** fed from **V2** anode via **C13,** provides D.C. potential which is developed across load resistance **R14** and 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 **R16, R17.**

H.T. current is provided by full-wave I.H.C. rectifying valve (**V5, Brimar R2** or **R3**). Smoothing by speaker field coil **L23** and dry electrolytic condensers **C18, C19.** R.F. filtering by by-pass condensers **C17, C20.**

DISMANTLING THE SET

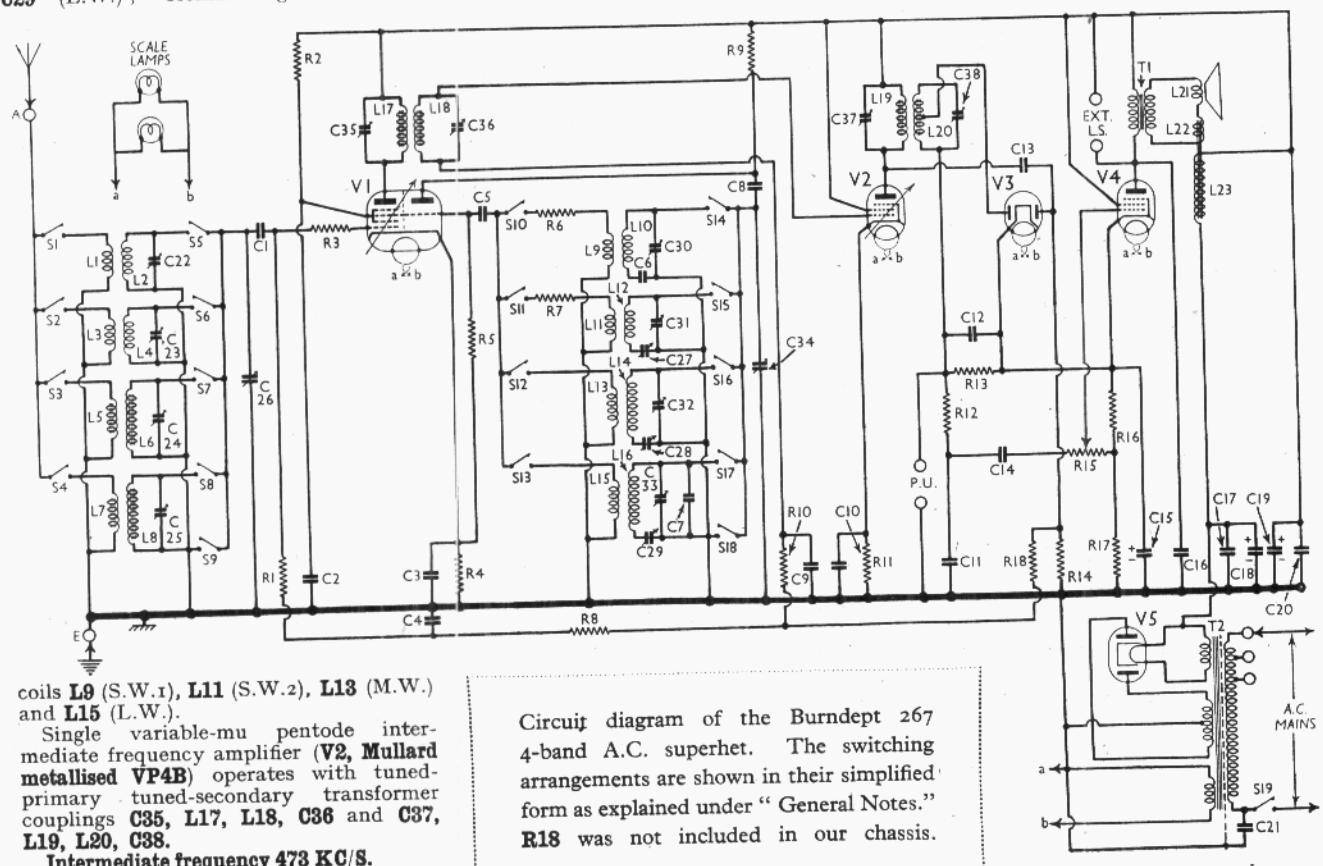
A detachable bottom is fitted to the cabinet and upon removal (four counter-sunk-head wood screws) gives access to most of the under-chassis components.

Removing Chassis.—If it is necessary to remove the chassis from the cabinet, remove the three control knobs (recessed grub screws) and the four bolts (with washers) holding the chassis to the bottom of the cabinet. Now unsolder the speaker leads, when the chassis is free.

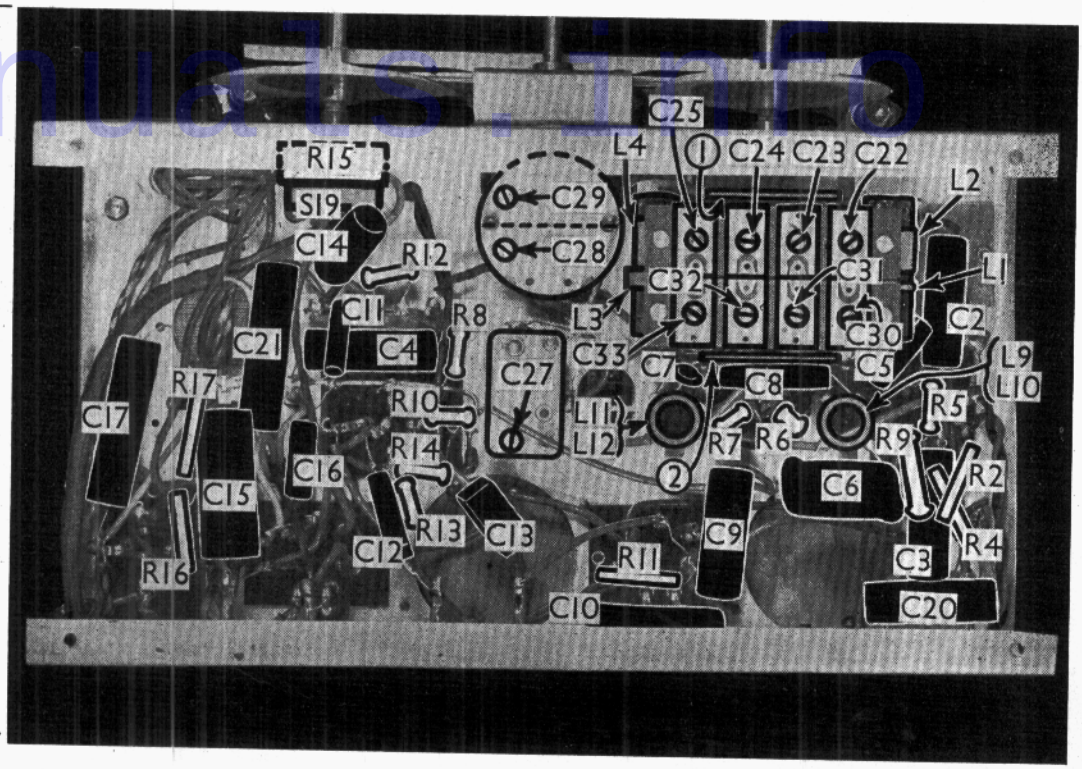
When replacing the chassis, connect the speaker leads as follows:—F, red; 3, blue; 1 and F joined together, black. The green lead goes to the earthing tag.

Removing Speaker.—To remove the speaker from the cabinet, unsolder the leads and remove the nuts (with lock washers) from the four screws holding it to the sub-baffle.

When replacing, see that the transformer is on the right and do not forget to fix the earthing tag on the bottom right-hand screw. Connect the leads from the chassis as above and take the red lead from the electrolytic block to tags F and 1 (which are joined together), the yellow lead to the other F tag, and the black lead to the earthing tag on one of the speaker fixing screws.



Circuit diagram of the Burndept 267 4-band A.C. superhet. The switching arrangements are shown in their simplified form as explained under "General Notes." **R18** was not included in our chassis.



Under-chassis view. Note the neat arrangement of the various trimmers. The coils for the S.W.1 and S.W.2 bands are on tubular formers. The two switch units are indicated by numbers in circles and arrows.

COMPONENTS AND VALUES

	RESISTANCES	Values (ohms)
R1	V1 hexode C.G. decoupling	500,000
R2	V1 S.G. H.T. feed	20,000
R3	V1 hexode C.G. resistance	50
R4	V1 fixed G.B. resistance	200
R5	V1 osc. C.G. resistance	50,000
R6	Osc. circuit S.W.1 stabiliser	50
R7	Osc. circuit S.W.2 stabiliser	500
R8	V1 A.V.C. line decoupling	500,000
R9	V1 osc. anode decoupling	30,000
R10	V2 C.G. decoupling	500,000
R11	V2 fixed G.B. resistance	200
R12	I.F. filter resistance	10,000
R13	V3 signal diode load	500,000
R14	V3 A.V.C. diode load	1,000,000
R15	Manual volume control	500,000
R16	V3, V4 G.B. pot., A.V.C. delay	150
R17		100
R18*	V1, V2, A.V.C. line decoupling	500 000

* Not in our chassis.

	CONDENSERS	Values (μF)
C1	V1 hexode C.G. condenser	0·0001
C2	V1 S.G. decoupling	0·1
C3	V1 cathode by-pass	0·1
C4	V1 hexode C.G. decoupling	0·1
C5	V1 osc. C.G. condenser	0·0002
C6	Osc. S.W.1 fixed tracker	0·005
C7	Osc. L.W. fixed trimmer	0·00004
C8	V1 osc. anode coupling	0·0002
C9	V2 C.G. decoupling	0·1
C10	V2 cathode by-pass	0·1
C11	I.F. by-passes	0·0005
C12		0·0001
C13	V3 A.V.C. diode feed	0·0001
C14	A.F. coupling to V4	0·05
C15*	V4 cathode by-pass	25·0
C16	V4 anode tone corrector	0·005
C17	V5 cathode R.F. by-pass	0·01
C18*	H.T. smoothing	8·0
C19*		16·0
C20	H.T. line R.F. by-pass	0·1
C21	Mains R.F. by-pass	0·01
C22‡	Aerial circuit S.W.1 trimmer	—
C23‡	Aerial circuit S.W.2 trimmer	—
C24‡	Aerial circuit M.W. trimmer	—
C25‡	Aerial circuit L.W. trimmer	—
C26†	Aerial circuit tuning condenser	—
C27‡	Osc. circuit S.W.2 tracker	—

	CONDENSERS (Continued)	Values (μF)
C28‡	Osc. circuit M.W. tracker	—
C29‡	Osc. circuit L.W. tracker	—
C30‡	Osc. circuit S.W.1 trimmer	—
C31‡	Osc. circuit S.W.2 trimmer	—
C32‡	Osc. circuit M.W. trimmer	—
C33‡	Osc. circuit L.W. trimmer	—
C34†	Osc. circuit tuning condenser	—
C35‡	1st I.F. trans. pri. tuning	—
C36‡	1st I.F. trans. sec. tuning	—
C37‡	2nd I.F. trans. pri. tuning	—
C38‡	2nd I.F. trans. sec. tuning	—

* Electrolytic. † Variable. ‡ Pre-set.

	OTHER COMPONENTS	Approx. Values (ohms)
L1	Aerial S.W.1 coupling coil	0·65
L2	Aerial SW.1 tuning coil	0·05
L3	Aerial S.W.2 coupling coil	0·45
L4	Aerial S.W.2 tuning coil	0·4
L5	Aerial M.W. coupling coil	1·1
L6	Aerial M.W. tuning coil	2·1
L7	Aerial L.W. coupling coil	100·0
L8	Aerial L.W. tuning coil	9·0
L9	Osc. S.W. 1 grid coil	0·5
L10	Osc. anode S.W.1 tuning coil	Very low
L11	Osc. S.W.2 grid coil	40·0
L12	Osc. anode S.W.2 tuning coil	0·3
L13	Osc. M.W. grid coil	65·0
L14	Osc. anode M.W. tuning coil	4·0
L15	Osc. L.W. grid coil	1·5
L16	Osc. anode L.W. tuning coil	4·6
L17	1st I.F. trans. Pri.	5·0
L18	Sec.	5·0
L19	2nd I.F. trans. Pri.	5·0
L20	Sec. total	5·0
L21	Speaker speech coil	1·9
L22	Hum neutralising coil	0·1
L23	Speaker field coil	2,000·0
T1	Speaker input trans. Pri.	460·0
	Sec.	0·3
T2	Mains trans. Pri. total	22·5
	Heater sec.	0·1
	Rect. heat. sec.	0·1
	H.T. sec. total	350·0
S1-S18	Waveband switches	—
S19	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 235 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 AC/TH1*	220	3·0	100	6·0
V2 VP4B	220	10·6	220	3·9
V3 2D4A	—	—	—	—
V4 PenA4	205	33·0	220	5·2
V5 R2	315†	—	—	—

* Oscillator anode, 80 V, 3·9 mA.
† Each anode, A.C.

GENERAL NOTES

Switches.—The wavechange and gramophone switches **S1-S18** are in two ganged rotary units beneath the chassis, indicated in our under-chassis view, and shown in detail in the diagrams on page IV. It will be noted on examining the actual units that each has a large plate on the rotor which shorts together all the switches, except the two in use in each unit. In the radio positions the shorted switches are also earthed. On gram. the tuned input circuit and the tuned oscillator anode circuit are earthed for radio muting purposes.

The makers' diagram shows the two contacts which are marked blank (B) in our diagrams connected to chassis.

Continued overleaf

BURNDEPT 267—*Continued*

This modification would add two switches which would earth the aerial coupling and oscillator grid circuits on gram.

In our circuit and switch diagrams we have omitted the switches formed by the centre plates for the sake of clarity. If they were included the total number of wavechange and gramophone switches would rise from eighteen to thirty-six.

The table below gives the switch positions for the five control settings, starting from fully anti-clockwise. O indicates open, and **C** closed.

S19 is the Q.M.B. mains switch, ganged with the volume control, **R15.**

Coils.—**L1, L2**; **L3, L4**; **L9, L10** and **L11, L12** are on four tubular unscreened units beneath the chassis. **L5-L8, L13-L16,** and the I.F. transformers **L17, L18** and **L19, L20** are in four screened units on the chassis deck. **L5-L8** and the I.F. transformers are iron dust-cored.

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

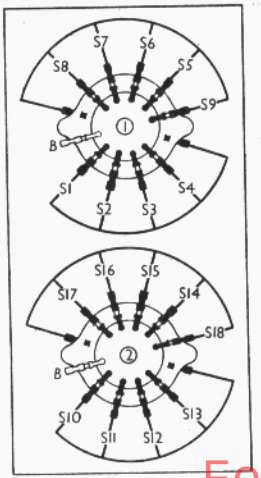
External Speaker.—Two sockets are provided at the rear of the chassis for a high impedance external speaker.

Condensers C18, C19.—These are two dry electrolytics in a single carton, mounted in a clip fitted to the inside of the cabinet. The black lead to the earthing tag on the speaker chassis is the common negative. The yellow lead to the bottom field tag on **T1** is the positive of **C18** (8μF), while the red lead (to tag 1) is the positive of **C19** (16 μF).

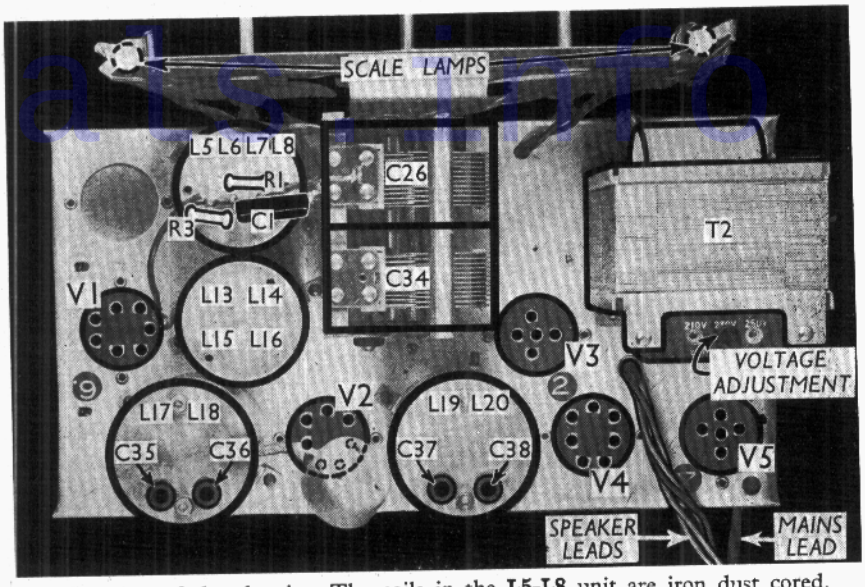
Resistance R18.—This is shown in the makers' diagram, and in our circuit diagram, but was omitted from our chassis.

SWITCH TABLE AND DIAGRAM

Switch	Gram. (G)	S.W.1 (1)	S.W.2 (2)	M.W. (3)	L.W. (4)
S1	O	**C**	O	O	O
S2	O	O	**C**	O	O
S3	O	O	O	**C**	O
S4	O	O	O	O	**C**
S5	O	**C**	O	O	O
S6	O	O	**C**	O	O
S7	O	O	O	**C**	O
S8	O	O	O	O	**C**
S9	**C**	O	O	O	O
S10	O	**C**	O	O	O
S11	O	O	**C**	O	O
S12	O	O	O	**C**	O
S13	O	O	O	O	**C**
S14	O	**C**	O	O	O
S15	O	O	**C**	O	O
S16	O	O	O	**C**	O
S17	O	O	O	O	**C**
S18	**C**	O	O	O	O



Switch diagrams, looking from the rear of the underside of the chassis. The switches formed by the centre contact plates have been omitted.



Plan view of the chassis. The coils in the **L5-L8** unit are iron dust cored.

CIRCUIT ALIGNMENT

For alignment the volume control should be at maximum. With the gang fully meshed the pointer should coincide with the two ends of the wavelength scales.

I.F. Stages.—Remove the grid connector from the top of **V1,** and connect signal generator to top cap of the valve and chassis, with a 0·25 MO resistance shunted across these two points. Short **C34.**

Feed in a 473 KC/S (634·2 m.) signal, and adjust **C38, C37, C36** and **C35** in that order for maximum output. Repeat with low signal input, and check by swinging generator from 468 to 478 KC/S, noting that resonance occurs exactly at 473 KC/S.

Remove short from **C34** and replace normal top cap of **V1.**

R.F. and Oscillator Stages.—Connect signal generator to **A** and **E** sockets.

Switch set to L.W., tune to 750 m. on scale, feed in a 750 m. signal, and adjust **C33,** then **C25** for maximum output. Feed in a 2,000 m. signal, tune it in on receiver, and adjust **C29** for maximum output, rocking the gang slightly for optimum results. Re-trim **C33** and **C25** and re-track **C29** until no further improvement results.

On the M.W. (3) band and S.W.2 (2) band a similar procedure is adopted. On M.W., adjust **C32** and **C24** at 200 m., and **C28** at 550 m. On S.W.2, adjust **C31** and **C23** at 50 m., and **C27** at 170 m.

On the S.W.1 (1) band, there is no variable tracker, so **C30** and **C32** are adjusted at 13·5 m. Trimming is very critical on this band, and care must be taken to see that the pressure of the trimming tool is not affecting the process. If a dummy aerial is used with the signal generator, it should be replaced by a 40 $\mu\mu$F fixed condenser on the S.W.1 band.

MAINTENANCE PROBLEMS

Doubler Condensers Breakdown

A 4-VALVE A.C. McMichael set was found to have no more than 40 V H.T. to earth, at all points in the chassis.

A Westinghouse rectifier is incorporated in this receiver but on examination and testing with a reliable ohmmeter, was found to be quite O.K., so an H.T. short was suspected, but the resistance from the H.T. supply line to earth was quite normal.

I next turned my attention to the two voltage-doubling condensers, and found on replacing either of them that the voltage immediately increased to about 180 V, while replacing both of them caused the H.T. supply line to be at 320 V positive to earth.—G. R. W.

Trouble with O/C Grid Leak

YET another McMichael of exactly the same type, lacked punch, while the reproduction was distinctly distorted. A new output pentode slightly improved performance, but still failed to make the sets performance really normal.

It was determined to remove the chassis from the cabinet, but immediately the earth wire was removed, volume fell by at least 80 per cent., while the reproduction suggested that one, or both of the L.F. valves was hopelessly over-biassed. Gradually however, the tone improved till after about thirty seconds, when reproduction was comparable with what it was formerly.

After some investigation however, it was found that the grid leak of the R.C. coupled output pentode valve had become o/c. Replacement of this grid leak, and the supplying of a new pentode brought the performance in every way up to standard.—G. R. WILDING, LIVERPOOL.