NUMBER 122 'TRADER' SERVICE SHEETS

BURNDEPT 201, 225, 226 AND 231

A 4-VALVE (plus rectifier) A.C. superhet chassis is fitted in the Burndept 201 receiver, the valve arrangement comprising an octode frequency changer, a variable-mu pentode I.F. amplifier, a double diode and a pentode output valve.

The chassis is suitable for A.C. mains of 195-260 V, 40-100 c.p.s., and has provision for a gramophone pick-up, an extension speaker and for using the mains as an aerial. Features are a meter type visual tuning indicator and two separate speakers.

A similar chassis is fitted in the 225 radio-gramophone, and in the 226 and 231 table models, but the last two have only a single speaker.

CIRCUIT DESCRIPTION

Aerial input by way of **S1** (L.W.) and **S2** (M.W.) to tappings on primary of inductively coupled band-pass filter. Primary **L1, L2,** tuned by **C26**; secondary **L7, L8,** tuned by **C28**; coupling coils **L3, L4, L5, L6.**

First valve (**V1, Mullard metallised FC4**) is an octode operating as frequency changer with electron coupling. Oscillator grid coils **L9, L10,** tuned by **C30**; anode reaction coils **L11, L12**; tracking by pre-set condenser **C32** (L.W.) and fixed condensers **C6, C7** (M.W.).

Second valve (**V2, Mullard metallised VP4A**) is a variable-mu H.F. pentode operating as intermediate frequency amplifier with tuned-primary, tuned-secondary transformer couplings **L13, L14** and **L15, L16.**

Intermediate frequency 130 KC/S.

Visual tuning indicator of moving iron type in common anode feed circuit to **V1** and **V2.**

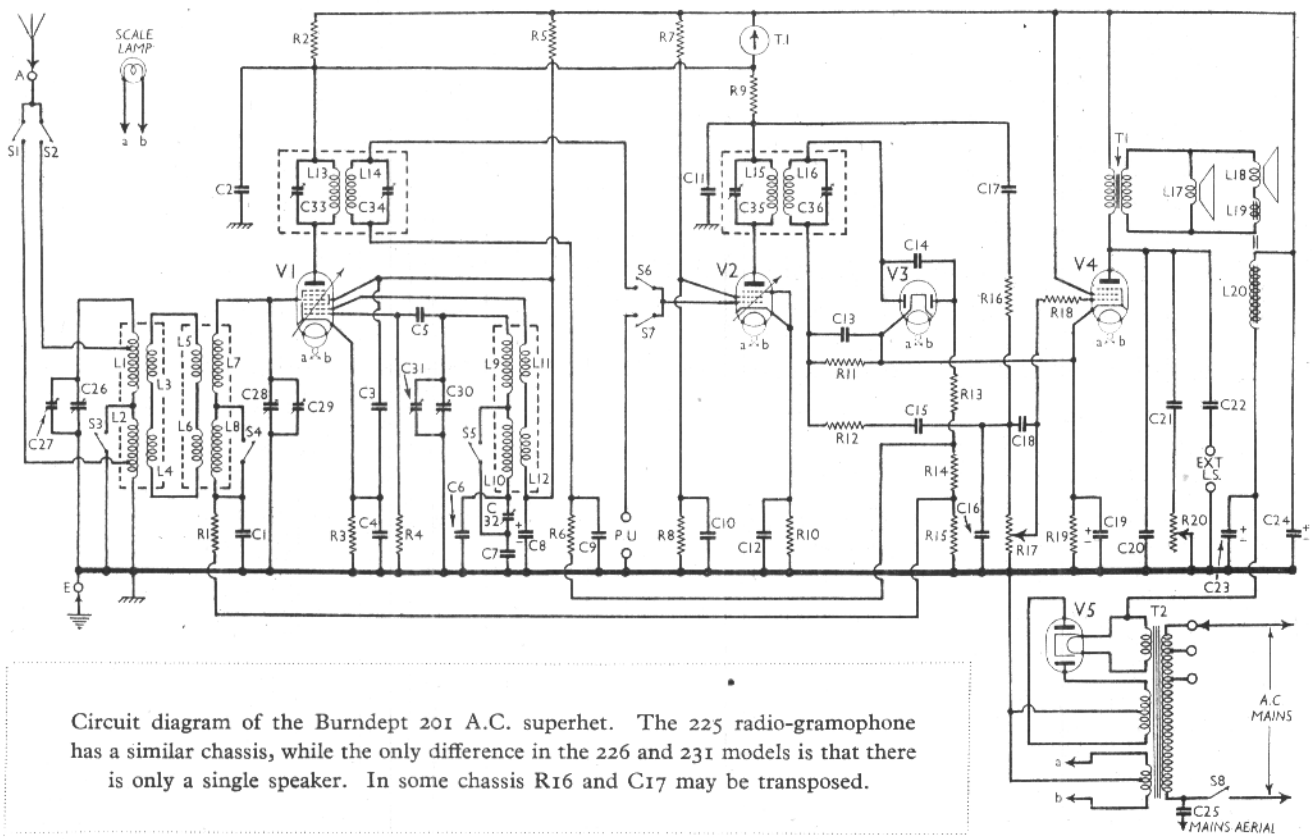
There is provision for insertion of pick-up in grid circuit of **V2** by means of switch **S7. S6** disconnects the radio input on Gram. **V2** acts as L.F. amplifier on Gram., with anode load **R9,** and coupling condenser **C17.**

Diode second detector forms part of double diode (**V3, Mullard metallised 2D4A**). Second diode provides steady potential, developed across **R13, R14** and **R15,** which is fed back as G.B. to **V1** and **V2,** giving automatic volume control. Delay voltage is obtained from voltage drop along **R19,** which also acts as **V4** bias resistance.

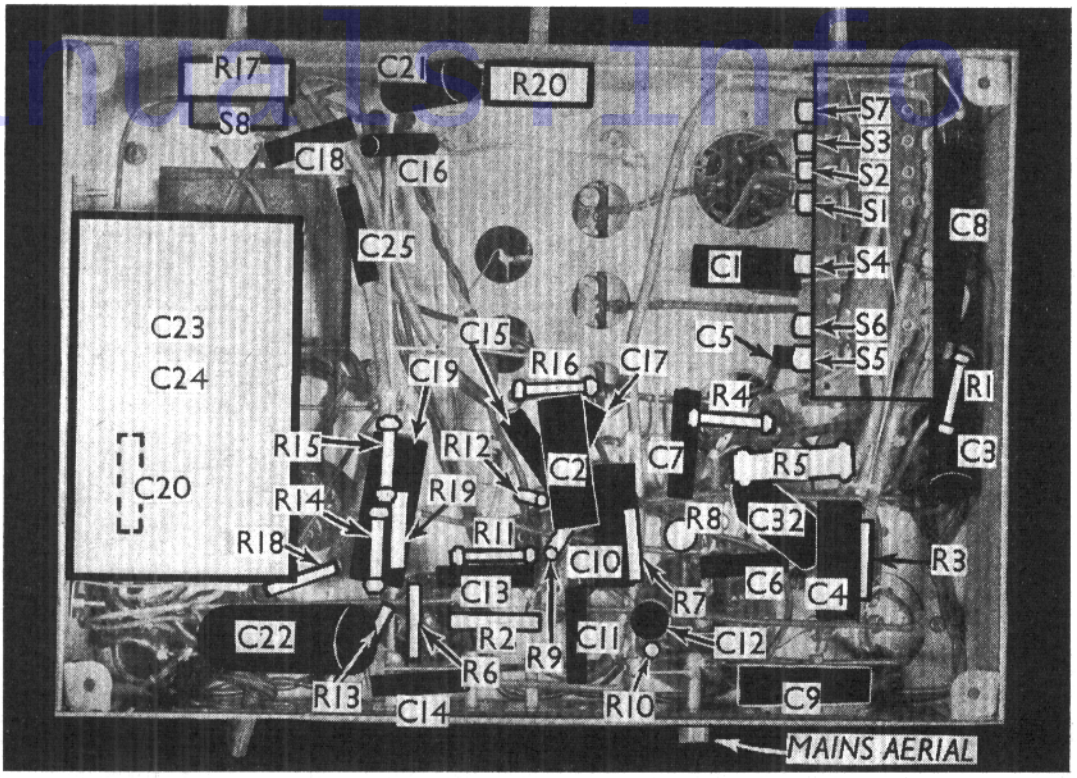
Audio frequency output from rectifier diode is developed across **R11** and passed by way of I.F. stopper **R12,** and coupling condenser **C15** to manual volume control **R17,** thence via grid stopper **R18** to control grid of output pentode (**V4, Mullard Pen4VB**). Fixed tone compensation by **C20,** and variable tone control by **C21** and **R20.** Provision for connection of high resistance external speaker, through coupling and isolating condenser **C22.**

H.T. current supplied by I.H.C. full-wave rectifying valve (**V5, Micromesh R2** or **R3**). Smoothing by speaker field **L20** and dry electrolytic condensers **C23, C24.**

In models CN201 and CN225, the energised speaker **L18, L19, L20** is supplemented by a P.M. type, **L17,** in parallel with **L18, L19.** In models CN226 and CN231, only the energised speaker is fitted.



Circuit diagram of the Burndept 201 A.C. superhet. The 225 radio-gramophone has a similar chassis, while the only difference in the 226 and 231 models is that there is only a single speaker. In some chassis R16 and C17 may be transposed.



Under-chassis view. The switches S1-S7 are clearly marked. C20 is beneath the electrolytic block C23 and C24. C32, the L.W. oscillator padder, is adjusted through a hole in the chassis deck.

COMPONENTS AND VALUES

	Resistances	Values (ohms)
R1	V1 pentode C.G. decoupling	100,000
R2	V1 pentode anode and V2 anode H.T. feed	5,000
R3	V1 fixed G.B. resistance	250
R4	V1 oscillator grid resistance	50,000
R5	V1 S.G.'s and oscillator anode H.T. feed	30,000
R6	V2 C.G. decoupling	250,000
R7	V2 S.G. potential divider	25,000
R8	V2 S.G. potential divider	20,000
R9	V2 anode load (for gram.)	10,000
R10	V2 fixed G.B. resistance	200
R11	V3 signal diode load	1,000,000
R12	I.F. stopper	100,000
R13	V3 A.V.C. diode load	500,000
R14	V3 A.V.C. diode load	500,000
R15	V3 A.V.C. diode load	250,000
R16	Limiting resistance	250,000
R17	Manual volume control	500,000
R18	V4 C.G. I.F. stopper	100,000
R19	V4 G.B. and V3 delay voltage resistance	150
R20	Variable tone control	250,000

	Condensers	Values (μF)
C1	V1 C.G. decoupling	0·1
C2	V1 pentode anode and V2 anode decoupling	0·1
C3	V1 S.G.'s by-pass	0·1
C4	V1 cathode by-pass	0·1
C5	V1 oscillator C.G. condenser	0·001
C6	Osc. M.W. trackers, fixed	0·0005
C7	Osc. M.W. trackers, fixed	0·01
C8*	V1 S.G.'s and oscillator anode decoupling	8·0
C9	V2 C.G. decoupling	0·1
C10	V2 S.G. by-pass	0·1
C11	V2 anode by-pass	0·002

	Condensers—(con't.)	Values (μF)
C12	V2 cathode by-pass	0·1
C13	I.F. by-pass	0·0001
C14	Coupling to V3 A.V.C. diode	0·0001
C15	L.F. coupling to V4	0·01
C16	I.F. by-pass	0·0001
C17	L.F. coupling (gram.)	0·01
C18	Vol. control shunt	0·0001
C19*	V3 cathode by-pass	50·0
C20	Tone corrector	0·002
C21	Tone control condenser	0·1
C22	Ext. L.S. coupling	0·5
C23*	H.T. smoothing	8·0
C24*	H.T. smoothing	16·0
C25	Mains aerial coupling	0·0001
C26†	Band-pass primary tuning	—
C27‡	Band-pass primary trimmer	—
C28†	Band-pass secondary tuning	—
C29‡	Band-pass secondary trimmer	—
C30†	Oscillator tuning	—
C31‡	Oscillator trimmer	—
C32‡	Oscillator L.W. tracker	—
C33‡	1st I.F. trans. pri. tuning	—
C34‡	1st I.F. trans. sec. tuning	—
C35‡	2nd I.F. trans. pri. tuning	—
C36‡	2nd I.F. trans. sec. tuning	—

* Electrolytic. †Variable. ‡Pre-set.

	Other Components	Approx. Values (ohms)
L1	Band-pass primary coils	4·9
L2	Band-pass primary coils	9·5
L3		
L4	Band-pass coupling coils (in parallel)	0·2
L5	Band-pass coupling coils (in parallel)	0·2
L6		
L7	Band-pass secondary coils	4·9
L8	Band-pass secondary coils	9·5
L9	Oscillator grid tuning coils	4·1
L10	Oscillator grid tuning coils	5·75

	Other Components—(con't.)	Approx. Values (ohms)
L11	Oscillator anode reaction coils	0·8
L12	Oscillator anode reaction coils	1·9
L13	1st I.F. trans. Pri.	26·0
L14	1st I.F. trans. Sec.	26·0
L15	2nd I.F. trans. Pri.	26·0
L16	2nd I.F. trans. Sec.	26·0
L17	P.M. speaker speech coil	2·6
L18	Energised speaker speech coil	2·6
L19	Hum neutralising coil	0·1
L20	Speaker field coil	2,000·0
T1	Speaker input trans. Pri.	750·0
	Speaker input trans. Sec.	0·4
T2	Mains trans. Pri. total	21·5
	Mains trans. Heater sec.	0·03
	Mains trans. Rect. heat. sec.	0·05
	Mains trans. H.T. sec. total	400·0
S1-S5	Waveband switches	—
S6	Radio muting switch (gram.)	—
S7	Gram. pick-up switch	—
S8	Mains switch, ganged R17	—
T.I.	Tuning indicator	2,000·0

DISMANTLING THE SET

Removing Chassis.—To remove the chassis from the cabinet, first remove the back (eight round-head wood screws and washers) and the four control knobs (recessed grub screws). Now remove the two bolts (with two washers and a rubber washer each) holding the front of the chassis to the bottom of the cabinet and the two bolts (with nuts, lock washers and washers) holding the back of the chassis. The chassis can now be withdrawn to the extent of the speaker leads, which is just sufficient for normal purposes.

(*Continued overleaf*)

BURNDEPT 201, 225, 226, and 231 (Continued)

When replacing, do not forget to replace the rubber washers and washers between the front of the chassis and the cabinet bottom and note that the control knob which is not marked with a white dot goes on the spindle of the tuning dial.

To free the chassis entirely, unsolder the leads to the energised speaker. *When replacing*, connect the leads as follow :— F and 3 joined together, black ; 1, blue ; F, red.

Removing Speakers.—To remove the speakers from the cabinet, first disconnect the leads. Each speaker is held to its sub-baffle by four bolts and can be removed by taking off the nuts and lock washers from these. *When replacing the energised speaker*, note that the leads from the permanent-magnet speaker are connected to the outer of the three tags on the strip carrying the connections from the speech coil. *When replacing either speaker*, make sure that they are connected exactly as before, otherwise they will be out of phase. If in doubt, try both possible ways of connection and adopt that which gives the better results.

VALVE ANALYSIS

Valve voltages and currents given in the table below are those measured in our receiver when it was operating on mains of 225 V, using the 230 V tapping on the mains transformer. The volume control was at maximum and the receiver was tuned to the lowest wavelength on the medium band, but there was no signal input.

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 FC4*	280	0·3‡	80	5·1
V2 VP4A	220	4·9	95	2·1
V3 2D4A	—	—	—	—
V4 Pen4VB	255	42·0	290	5·3
V5 R3	380†	—	—	—

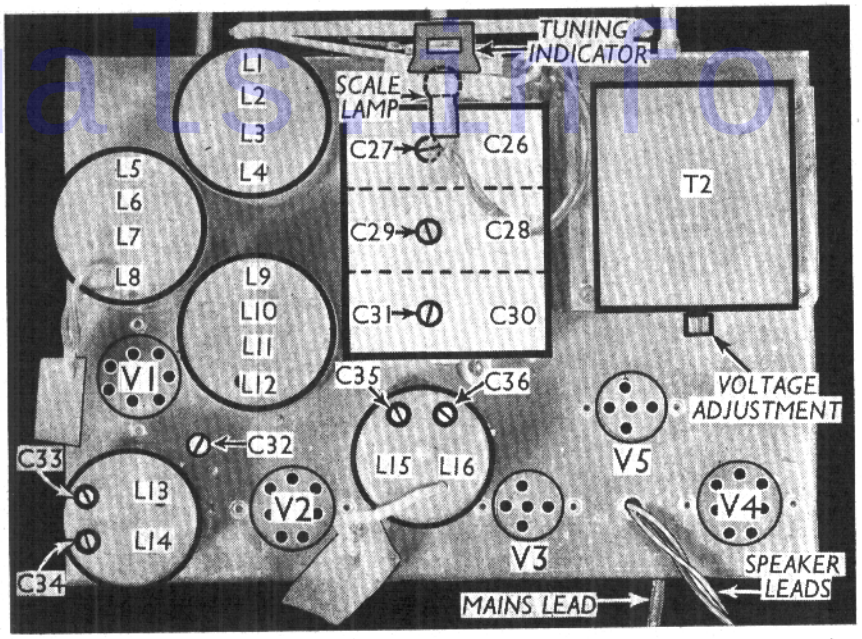
* Osc. anode (G2) 80 V, 2·2 mA.
† Each anode, A.C.
‡ 2·4 mA at top of tuning scale.

GENERAL NOTES

Switches.—S1-S5 are the waveband switches, **S6** the radio muting switch (gram.) and **S7** the gramophone pick-up switch. These are all ganged in a single unit beneath the chassis, seen in our under-chassis view. The table below gives the switch positions for the various control settings, O indicating open, and C closed.

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

S8 is the Q.M.B. mains switch, ganged with the volume control **R17.**



Plan view of the chassis. C32 is the oscillator L.W. trimmer. A moving iron tuning indicator is fitted.

Coils.—L1-L12 are in three screened units, while the I.F. transformers, **L13, L14,** and **L15, L16** are in two further screened units. All are mounted on the chassis deck.

Scale Lamp.—This is an Osram M.E.S. type, rated at 6.5 V, 0.3 A.

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

Tuning Indicator.—This is mounted above the tuning scale in an exposed position, and as it is rather fragile, care should be taken, when working on the underside of the chassis, to see that the indicator is not resting on the bench.

Condensers C23, C24.—These are two dry electrolytics in a single unit beneath the chassis. The black lead is the common negative, the yellow the positive of **C23** (8μF) and the red the positive of **C24** (16 μF).

Condenser C20.—This is beneath the **C23, C24** unit, and is shown dotted in our under-chassis view.

Tracker C32.—The L.W. oscillator tracker is adjusted through a hole in the chassis deck between the **V1** and **V2** valve-holders.

Components C17, R16.—These may be transposed in some chassis.

CHASSIS DIVERGENCIES

Models CN201, 225, 226 and 231 at present have similar chassis, but as explained at the end of the circuit description, Models CN201 and 225 have an additional P.M. speaker.

Earlier versions of these four chassis differed in a number of points, the most important circuit modification being the feeding of the pick-up directly across the volume control, instead of using **V2** for amplification as at present. Further, there were minor differences in component values (**C23** and **C24** were 6 μF each in early table models), while **C7** was omitted in a few very early models, and the I.F. was 117.5 KC/S.

The layout of the underside of the chassis was different, a condenser and resistance strip stretching from the front to the rear of the chassis.

Where an early model is received for service, reference should be made to Service Sheet No. 40 dealing with the then current Model CN226.

CIRCUIT ALIGNMENT

I.F. Stages.—Set receiver tuning pointer to bottom of L.W. scale. Connect oscillator grid of **V1** (Pin 2) to chassis. Connect a 250,000 O resistance between pentode control grid (top cap) of **V1** and chassis, and leave the existing top cap lead disconnected. Inject a 130 KC/S signal between top cap and chassis. Fit a 10,000 O resistance with crocodile clips on short leads at the ends, and use it as a shunt across the primary of an I.F. transformer when the secondary is being adjusted, and vice-versa.

Working on this principle, and with an output meter (say a 0-100 V A.C. voltmeter) plugged into the external speaker sockets, adjust **C36, C35, C34** and **C33** in turn for maximum output, in that order. Keep the input low to avoid A.V.C. influence.

H.F. and Oscillator Stages.—Turn tuning knob until gang condenser is fully in mesh. Scale pointer should now cover the spot at the top end of the scale, about ½ in. to the right of the 2,000 m. mark.

Now adjust tuning knob so that pointer indicates 200 m., inject a 200 m. signal at the A. and E. sockets, and adjust **C31** for maximum output.

Inject a 220 m. signal, set tuning pointer to 220 m., and adjust **C27** and **C29** for maximum output, rocking the tuning knob slightly to obtain the optimum point.

Switch receiver to L.W., set pointer to 2,000 m., inject a 2,000 m. signal, and adjust **C32** for maximum, slightly rocking the tuning knob meanwhile.