

# 'TRADER' SERVICE SHEETS

## COSSOR 376B

### 5-VALVE BATTERY SUPERHET

A 5-VALVE superhet circuit is employed in the Cossor 376B battery-operated receiver, containing a heptode frequency changer, a variable-mu pentode I.F. amplifier, a double diode, a triode driver and a double-triode Class B output valve. Provision is made for an extension speaker and a gramophone pick-up.

#### CIRCUIT DESCRIPTION

Aerial input via series condenser **C1**, coupling condenser **C2** and coupling coils **L1**, **L2** to inductively coupled band-pass filter. Primary **L3**, **L4** tuned by **C22**; secondary **L5**, **L6** tuned by **C24**.

First valve (**V1**, Cossor metallised **210PG**) is a heptode operating as frequency changer with electron coupling. Oscillator grid coils **L7**, **L8** tuned by **C26**; anode reaction coils **L9**, **L10**; tracking by fixed condensers **C7** (L.W.) and **C8** (M.W.).

Second valve, a variable-mu H.F. pentode (**V2**, Cossor metallised **210VPT**) operates as intermediate frequency amplifier with tuned-primary tuned-secondary transformer couplings **L11**, **L12** and **L13**, **L14**.

Intermediate frequency **128 KC/S.**

Diode second detector forms part of separate special I.H.C. double diode valve (**V3**, Cossor **220DD**). Second diode,

coupled by condenser **C17**, provides D.C. potential which is developed across load resistance **R13** 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 potential divider **R11**, **R12**.

Audio-frequency output from signal diode is developed across manual volume control **R10** and passed via coupling condenser **C18** and I.F. stopper **R15** to triode driver valve (**V4**, Cossor **220PA**).

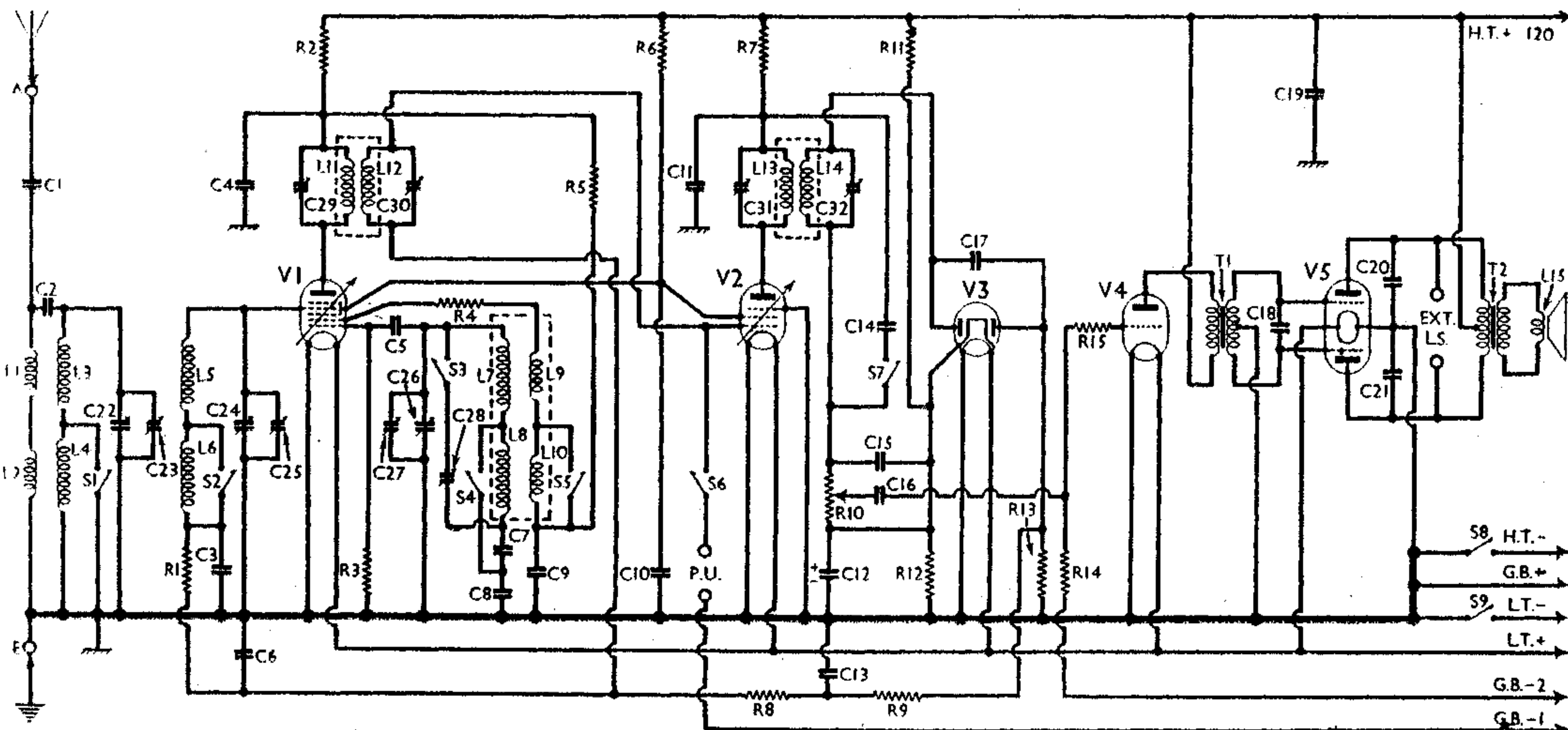
Transformer coupling by **T1** to positive drive Class B output valve (**V5**, Cossor **220B**). Tone correction by fixed condensers **C20**, **C21**. Coupling to internal speaker by special transformer **T2**. Provision at rear of chassis for connection of high impedance external speaker.

Provision is made for connection of a gramophone pick-up in control grid circuit of I.F. amplifier **V2**, which is employed as L.F. amplifier. When the master switch control is set to "gram," switch **S6** is closed to connect pick-up, and G.B. is applied from G.B.—1 tapping. Switch **S7** is also closed to couple anode of **V2** to manual volume control **R10** by means of condenser **C14**, resistance **R7** then operating as anode load.

#### COMPONENTS AND VALUES

Resistances		Values (ohms)
R1	V1 tetrode C.G. decoupling	2,000,000
R2	V1 tetrode anode decoupling	10,000
R3	V1 oscillator C.G. resistance	250,000
R4	V1 osc. anode series resistance	5,000
R5	V1 osc. anode decoupling	10,000
R6	V1 and V2 S.G.'s H.T. feed	40,000
R7	V2 anode decoupling	30,000
R8	A.V.C. line decoupling	100,000
R9		250,000
R10	V3 signal diode load; manual V.C.	1,000,000
R11	A.V.C. delay voltage potential divider	1,000,000
R12		50,000
R13	V3 A.V.C. diode load	1,000,000
R14	V4 C.G. resistance	2,000,000
R15	V4 C.G. I.F. stopper	100,000

Condensers		Values (μF)
C1	Aerial series condenser	0.0005
C2	Capacitive aerial coupling	0.000025
C3	V1 tetrode C.G. decoupling	0.1
C4	V1 tetrode anode decoupling	0.1
C5	V1 osc. C.G. condenser	0.00025
C6	A.V.C. line decoupling	0.001
C7	Oscillator L.W. tracker	0.00123
C8	Oscillator M.W. tracker	0.00175
C9	V1 osc. anode decoupling	0.01
C10	V1 and V2 S.G.'s by-pass	0.1
C11	V2 anode decoupling	0.002
C12*	V3 cathode by-pass	25.0
C13	A.V.C. line decoupling	0.1
C14	L.F. coupling to R10 (gram.)	0.01
C15	I.F. by-pass	0.0001
C16	L.F. coupling to V4	0.01
C17	Coupling to V3 A.V.C. diode	0.0001
C18	T1 secondary shunt	0.0005
C19	H.T. reservoir	2.0
C20	Tone correctors	0.005
C21		0.005
C22†	Band-pass primary tuning	—
C23†	Band-pass primary trimmer	—
C24†	Band-pass secondary tuning	—
C25†	Band-pass secondary trimmer	—

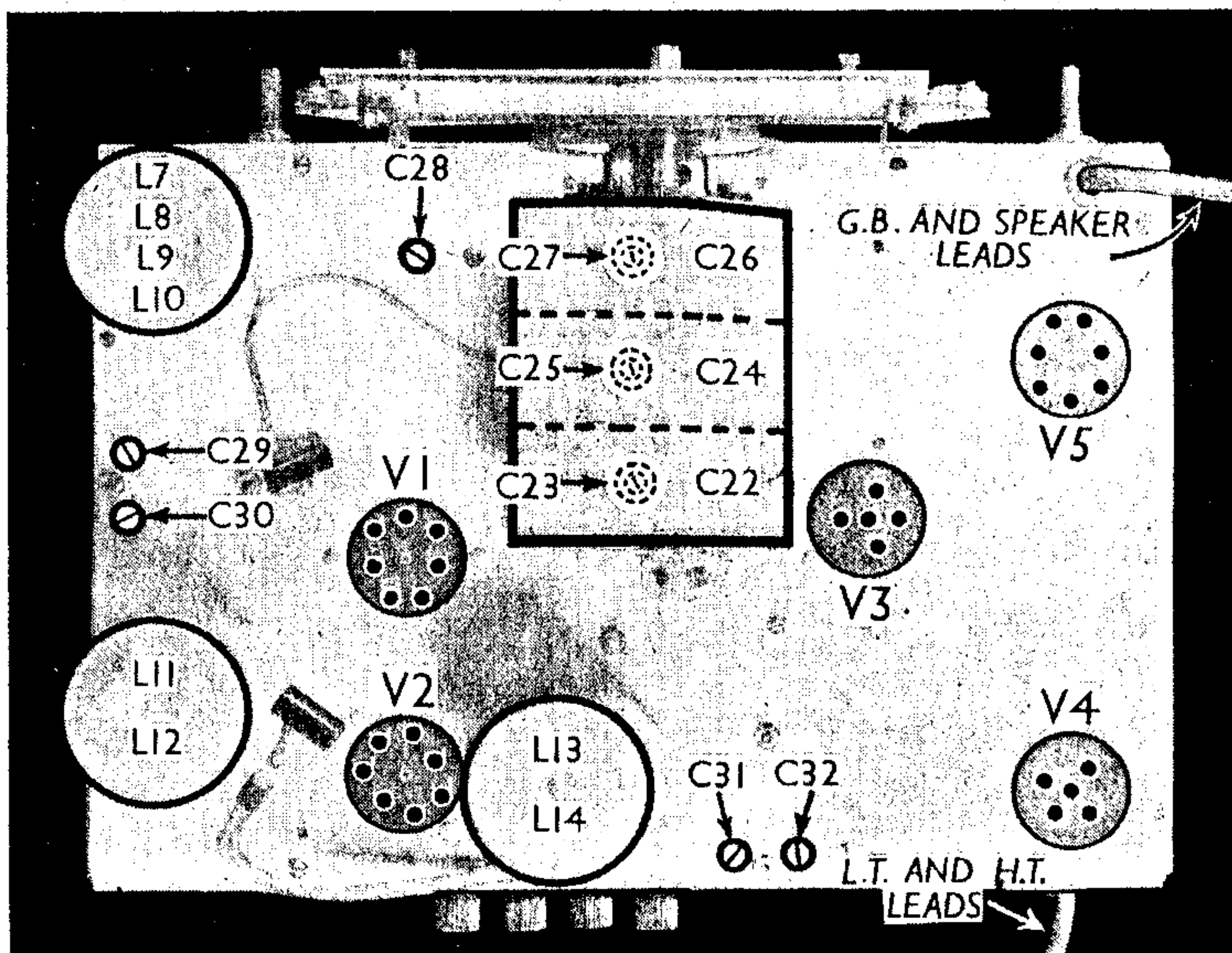


Circuit diagram of the Cossor 376B battery superhet. Separate L.T. and H.T. switches are used, and pick-up switching is incorporated.

Condensers (contd.)		Values ( $\mu F$ )
C26†	Oscillator tuning	—
C27†	Oscillator main trimmer	—
C28†	Oscillator L.W. trimmer	0.00003
C29†	1st I.F. trans. pri. tuning	0.00007
C30†	1st I.F. trans. sec. tuning	0.00007
C31†	2nd I.F. trans. pri. tuning	0.00007
C32†	2nd I.F. trans. sec. tuning	0.00007

\* Electrolytic † Variable ‡ Pre-set

Other Components		Approx. Values (ohms)
L1	Aerial coupling coils	6.0
L2		6.0
L3		3.3
L4		12.8
L5	Band-pass secondary coils	3.3
L6		12.5
L7	Oscillator tuning coils	4.3
L8		8.5
L9	Oscillator reaction coils	1.4
L10		2.5
L11	1st I.F. trans. { Pri. Sec. }	90.0
L12		90.0
L13	2nd I.F. trans. { Pri. Sec. }	90.0
L14		90.0
L15	Speaker speech coil	2.0
T1	Driver trans. { Pri. Sec. total }	450.0
T2	Speaker input trans. { Pri. total Sec. }	100.0
Sr-S5	Waveband switches	750.0
S6-S7	Radio-gram change-over switches	0.2
S8	H.T. circuit switch	—
S9	L.T. switch	—



Plan view of the chassis. Note the I.F. trimmers C29-C32, and the oscillator L.W. trimmer, C28.

**DISMANTLING THE SET**

A detachable bottom is fitted to the cabinet and upon removal (four bolts

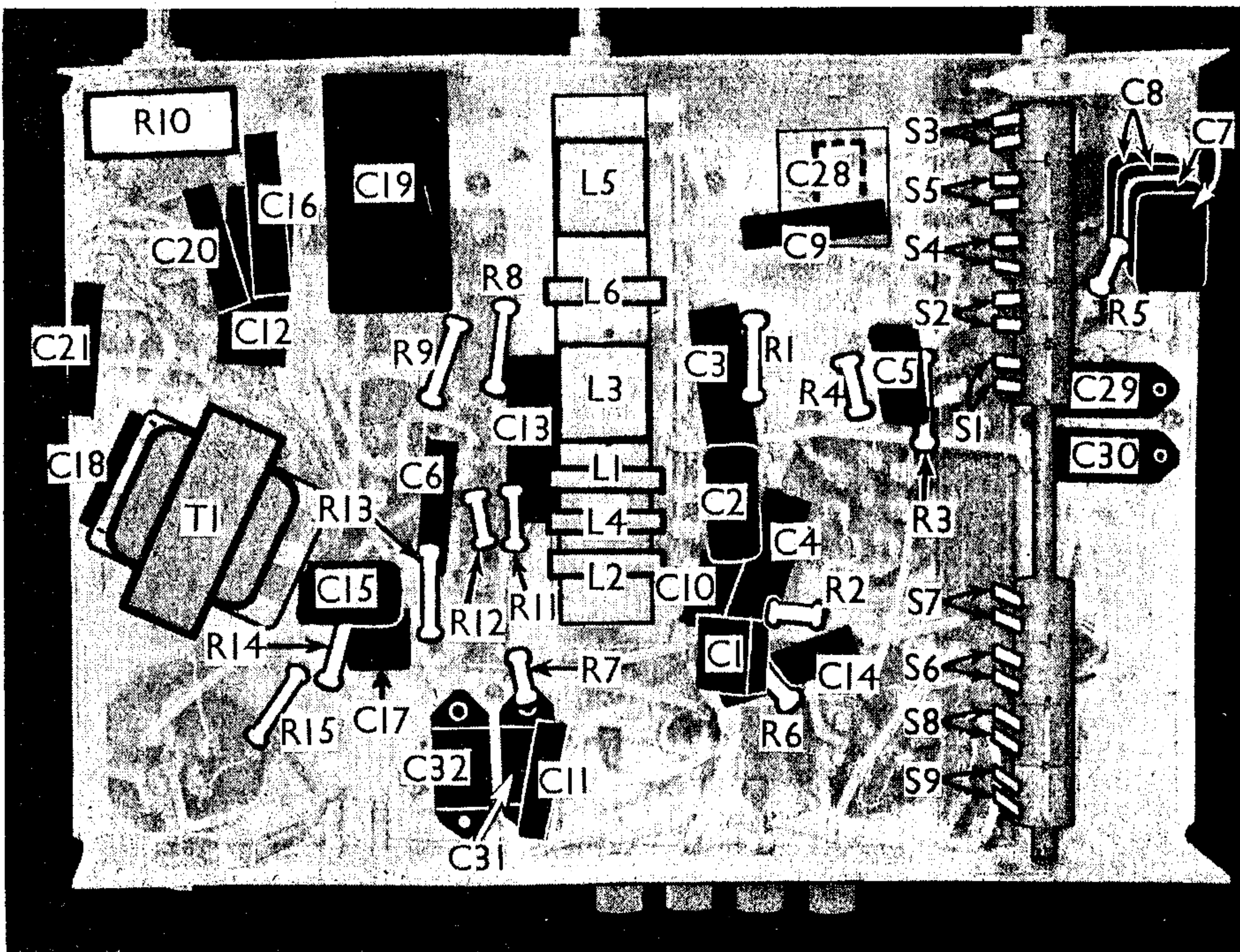
with washers) gives access to most of the under-chassis components.

**Removing Chassis.**—To remove the chassis, remove the back (four screws and washers) and disconnect and remove the batteries. Now disconnect the leads to the

speaker (screw terminals), when the chassis can be withdrawn.

When replacing, connect the speaker leads as follow, number the terminals from left to right:—1, white; 2, black;

(Continued overleaf)



Under-chassis view. The switch unit contains the wave-band, pick-up and battery switches, all of which are clearly indicated. C7 and C8 each consist of two fixed mica condensers in parallel.

**COSSOR 376B (Continued)**

3, brown; 4, green. Note that the two small control knobs are marked with their purpose, so that they must be replaced on the correct spindles.

**Removing Speaker.**—To remove the speaker, disconnect the leads and take out the six countersunk-head wood screws holding the sub-baffle to the cabinet. The speaker is rivetted to the sub-baffle and if it is taken off, they must be replaced with screws and nuts. When replacing, see that the transformer is at the top and if the baffle is taken off, see that it is replaced so that the cut-away portion goes to the bottom left-hand corner.

**Removing Speaker Grille.**—If necessary, the speaker grille can be removed by removing four screws (with washers). These are accessible through holes in the sub-baffle, which need not be removed.

**VALVE ANALYSIS**

Readings of valve voltages and currents given in the table below were taken with the receiver operating from new batteries, the H.T. reading 128 V and the G.B. reading 4.6 V. The volume control was at maximum and the receiver was tuned to the lowest wavelength on the medium waveband, 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 210PG*	103	0.3	51	1.2
V2 210VPT	55	1.8	51	0.5
V3 220DD	—	—	—	—
V4 220PA	122	2.7	—	—
V5 220B	122†	1.0 †	—	—

\* Osc. anode (G2) 73 V, 1.4 mA.  
† Each anode.

**GENERAL NOTES**

**Switches.**—All the switches are ganged in a single unit beneath the chassis, stretching from front to back. S1-S5 are the waveband switches, S6, S7 the gramophone pick-up switches, and S8, S9 the battery switches. They are clearly marked in the under-chassis view. The table below gives the switch positions for the various control settings, O indicating open, and C, closed. All switches are open in the "off" setting.

Switch	M.W.	L.W.	Gram.
S1	C	O	O
S2	C	O	C
S3	O	C	O
S4	C	O	O
S5	C	O	O
S6	O	O	C
S7	O	O	C
S8	C	C	C
S9	C	C	C

**Coils.**—The signal frequency coils are in a tubular unscreened unit beneath the chassis, the individual coils being indicated in the under-chassis view. The oscillator and I.F. coils are in three

screened units on the chassis deck. The I.F. trimmers are not included in the coil units.

**External Speaker.**—There is provision for this at the rear of the chassis. It should be of the high resistance type, and a Cossor Model 595 is recommended.

**Batteries.**—The recommended batteries are: L.T., 2 V 70 AH, Cossor Type E370. G.B., 9 V, Cossor Type 933. H.T., 120 V, Cossor Type 2120 (double capacity).

**H.T. and G.B. Leads and Voltages.**—Grey lead, black plug, H.T.—; Green lead, black plug, H.T.+120 V. Red lead, black plug, G.B.+; Yellow lead, black plug, G.B.—1, —1.5 V; Blue lead, black plug, G.B.—2, —4.5 V.

**Trimmers C29-C32.**—These are the I.F. trimmers, arranged in two pairs, and adjustable through holes in the chassis deck.

**Trimmer C28.**—This is the oscillator L.W. trimmer, also adjustable through a hole in the chassis deck.

**Condensers C7, C8.**—These each comprise two fixed condensers in parallel, and the four condensers are bolted up together.

**CIRCUIT ALIGNMENT**

Do not attempt re-alignment unless a modulated signal generator is available, and then not until all other possible sources of faults have been investigated. Disconnect the A.V.C. diode by unsoldering the leads from C17, R9 and R13 where they connect to the "anode" socket of the V3 valveholder. Remove the wax or paper sealing discs from all

trimmers. Disconnect the aerial. Connect a low range output meter (0.5 V A.C.) across the secondary of T2, and advance the volume control to maximum.

**Aligning I.F. Circuits.**—Adjust the signal generator to 128 KC/S and connect the output lead through a 0.1 μF condenser to V2 control grid, the earth lead going to chassis. Keep the signal generator output low, and adjust C31 and C32 for maximum output. Transfer the generator output connection to V1 modulator control grid, and adjust C29 and C30 for maximum output. Leave the generator connected to V1, and check each trimmer setting, starting with C32 and working back to C29.

**Aligning H.F. and Osc. Circuits.**—Connect the signal generator to the aerial terminal through a dummy aerial or 0.0002 μF condenser. Adjust the output to 1,400 KC/S (214.3 m.). Turn the wavechange switch to the M.W. position. Adjust the receiver gang condenser to 214 m., i.e., with the pointer at the eleventh dot from the bottom of the scale. (Previously ascertain that at the minimum stop the pointer is exactly in the middle of the 200 m. mark.) Use a very small generator output and adjust C27 for maximum output. Then adjust C25 and C23.

Switch the set to L.W., and adjust generator to 160 KC/S (1,875 m.). Turn the gang condenser so that the pointer indicates 1,875 m. (roughly the twelfth dot from the upper end of the scale). Adjust C28 for maximum output.

Finally re-solder the connections previously removed from V3 valveholder, and re-seal all trimmers.