'TRADER' SERVICE SHEET

259

PILOT U385,

CU385, RGU385 AND RGAU385

IN the Pilot U385 receiver there is a 6-valve (plus rectifier) A.C. 3-band superhet chassis with a short-wave range of 16-53 metres and a cathode-ray type tuning indicator.

The chassis is for mains of 200-250 V, 40-60 C/S, and has a heptode frequency changer, a variable-mu pentode I.F. amplifier, a double diode A.V.C. rectifier, a double diode triode for detection and phase splitting, and two pentodes in a push-pull output stage.

An identical chassis is fitted in the CU385 console and a modified chassis in the RGU385 and RGAU385 radiogram, and automatic radiogram. This *Service Sheet* was prepared on a U385 table model, but the modifications in the RGU385 and RGAU385 are dealt with in "General Notes."

CIRCUIT DESCRIPTION

Aerial input via coupling coils **L2** (S.W.), **L3** (M.W.) and **L4** (L.W.) to single-tuned circuits **L5, C36** (S.W.), **L6, C36** (M.W.) and **L7, C36** (L.W.). 261 m. filter **L1, C32** across aerial circuit on L.W. only. On M.W. aerial circuit is shunted by **C1, C2** to remove a resonance that occurred in that band.

First valve (**V1, Brimar 6A8G**) is a heptode operating as frequency changer with electron coupling. Oscillator grid coils **L8** (S.W.), **L9** (M.W.) and **L10** (L.W.) are tuned by **C37**; parallel trimming by **C38** (S.W.), **C39** (M.W.) and **C6, C40** (L.W.); series tracking by **C7** (S.W.), **C41** (M.W.) and **C42** (L.W.). Anode reaction by coils **L11** (S.W.), **L12** (M.W.) and **L13** (L.W.).

Second valve (**V2, Brimar 6U7G**) is a variable-mu R.F. pentode operating as intermediate frequency amplifier with tuned-primary tuned-secondary transformer couplings **C43, L14, L15, C44** and **C45, L16, L17, C46.**

Intermediate frequency 456 KC/S.

Diode second detector is part of double diode triode valve (**V3, Brimar 6Q7G**), the two diodes being strapped together. Audio frequency component in rectified output is developed across load resistance **R9** and passed via coupling condenser **C14** and manual volume control **R7** to C.G. of triode section. I.F. filtering by **C16,** and cathode and anode by-pass condensers **C18, C19.** Provision for connection of gramophone pick-up by jack, between **C14** and cathode. Upon insertion of P.U. plug the feed from **R6** is broken, thus muting radio.

Triode section of **V3** operates as a phase-splitting valve. Resistance-capacity coupling between anode and cathode circuits respectively, by resistances **R13, R11,** condensers **C22, C23** and C.G. resistances **R20, R21,** via grid stoppers **R22, R23** to push-pull output stage, comprising two pentode valves (**V5, V6, Brimar 6F6G's**). Fixed tone correction in anode circuits by **C25, C26.** Variable tone control between anodes by **R26, C27.** Provision for connection of high impedance external speaker across leads to primary of internal speaker input transformer **T1.**

Operating potentials for cathode-ray tuning indicator (**T.I. Tungsram 6G5**) and automatic volume control, are obtained from a separate double diode valve with separate cathodes (**V4, Brimar 6H6G**). One diode, fed via **C13** and **C20** from **V2** anode, provides D.C. potential which is developed across load resistance **R15** and applied via decoupling circuit **R14, C21** to C.G. of **T.I.**

Second diode, fed directly via **C13,** provides D.C. potential which is developed across load resistance **R19** 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 **R27** in H.T. negative lead to chassis.

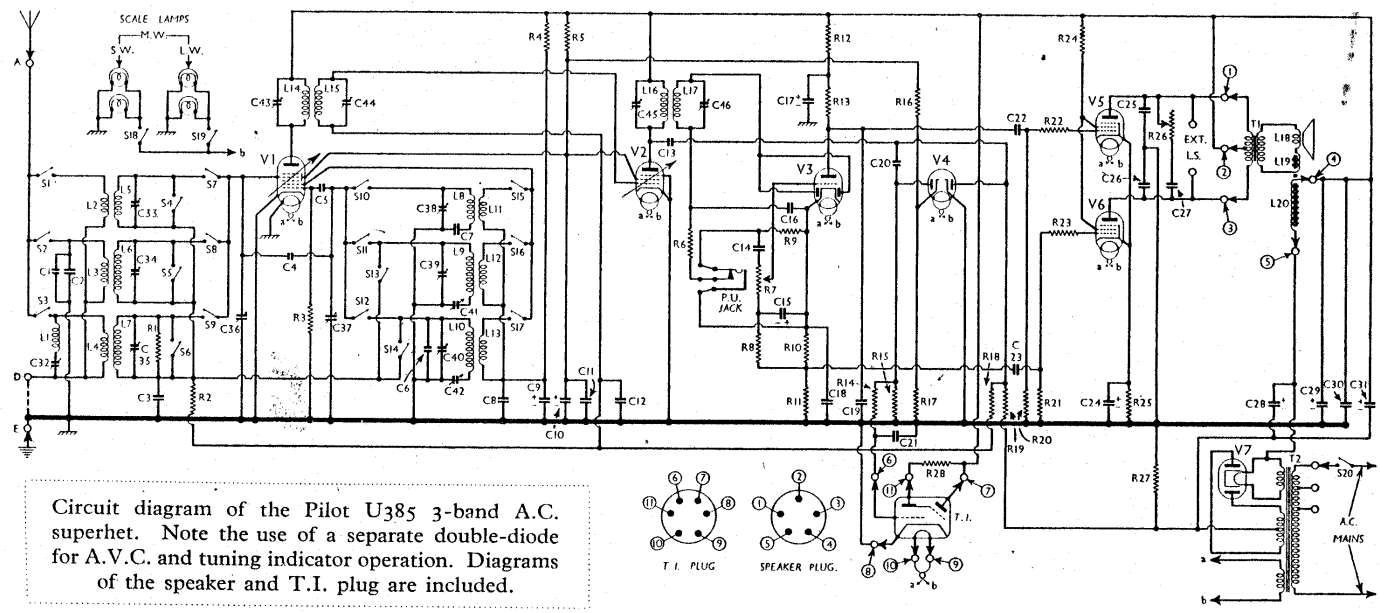
H.T. current is supplied by I.H.C. full-wave rectifying valve (**V7, Brimar 5Z4G**). Smoothing by speaker field **L20** and dry electrolytic condensers **C28, C29, C31.** H.T. circuit R.F. filtering by **C30.**

COMPONENTS AND VALUES

	RESISTANCES	Values (ohms)
R1	Aerial circuit L.W. damping	500,000
R2	V1 tetrode C.G. decoupling	100,000
R3	V1 osc. C.G. resistance	50,000
R4	V1 osc. anode H.T. feed	6,000
R5	V1, V2 S.G. H.T. feed and part V4 G.B. pot.	10,000
R6	I.F. stopper	30,000
R7	Manual volume control	750,000
R8	V3 triode C.G. decoupling	250,000
R9	V3 signal diode load	250,000
R10	V3 triode G.B. resistance	2,500
R11	V3 triode cathode load	100,000
R12	V3 triode anode decoupling	20,000

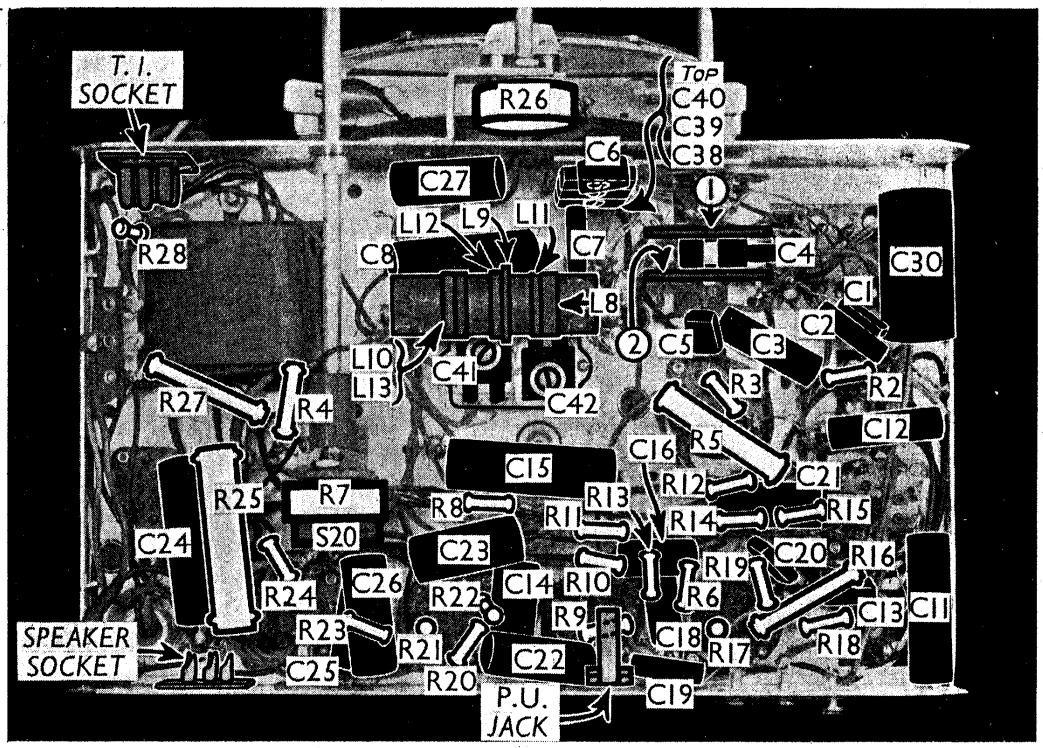
	RESISTANCES (*Continued*)	Values (ohms)
R13	V3 triode anode load	100,000
R14	T.I. feed decoupling	1,000,000
R15	V4 T.I. diode load resistance	1,000,000
R16	V4 G.B. potential divider (T.I. section)	15,000
R17		250
R18	A.V.C. line decoupling	2,000,000
R19	V4 A.V.C. diode load resistances	2,000,000
R20	V5 C.G. resistance	500,000
R21	V6 C.G. resistance	500,000
R22	V5 grid stopper	400
R23	V6 grid stopper	400
R24	V5, V6 S.G.'s H.T. feed	1,000
R25	V5, V6 G.B. resistance	200
R26	Variable tone control	100,000
R27	A.V.C. delay voltage resistance	23
R28	T.I. anode H.T. feed	1,000,000

	CONDENSERS	Values (μF)
C1	M.W. aerial circuit shunt	0·000C5
C2		0·0001
C3	V1 tetrode C.G. decoupling	0·02
C4	Small coupling	Very low
C5	V1 osc. C.G. condenser	0·00005
C6	Osc. circuit L.W. fixed trimmer	0·000025
C7	Osc. circuit S.W. fixed tracker	0·006
C8	V1 osc. anode R.F. by-pass	0·05
C9*	V1 osc. anode decoupling	4·0
C10*	V1, V2 S.G.'s decoupling	8·0
C11	V1, V2 S.G.'s R.F. by-pass	0·05



Circuit diagram of the Pilot U385 3-band A.C. superhet. Note the use of a separate double-diode for A.V.C. and tuning indicator operation. Diagrams of the speaker and T.I. plug are included.

Under-chassis view. Diagrams of the switch units are on page IV. Note the tuning indicator and speaker sockets. **C4** is a very small fixed condenser. **C38-C40** are beneath **C6**, in the order shown.



CONDENSERS (*Continued*)		Values (μF)
C12	V2 C.G. decoupling	0·02
C13	Coupling to V4 diodes ..	0·000025
C14	A.F. coupling to V3 triode ..	0·05
C15*	V3 triode C.G. decoupling ..	10·0
C16	I.F. by-pass	0·0001
C17*	V3 triode anode decoupling ..	4·0
C18	V3 cathode I.F. by-pass ..	0·0001
C19	V3 triode anode I.F. by-pass ..	0·0001
C20	Coupling to V4 T.I. diode ..	0·000025
C21	T.I. feed decoupling	0·05
C22	V3 triode anode to V5 A.F. coupling	0·02
C23	V3 triode cathode to V6 A.F. coupling	0·02
C24*	V5, V6 cathodes by-pass ..	10·0
C25, C26	Fixed tone correctors ..	0·005, 0·005
C27	Part of tone control circuit ..	0·02
C28*, C29*	H.T. smoothing ..	16·0, 8·0
C30	H.T. circuit R.F. by-pass ..	0·1
C31*	H.T. smoothing	8·0
C32‡	Aerial 261 m. filter tuning ..	0·00015
C33‡	Aerial circuit S.W. trimmer ..	—
C34‡	Aerial circuit M.W. trimmer ..	—
C35‡	Aerial circuit L.W. trimmer ..	—
C36†	Aerial circuit tuning	0·000425
C37†	Oscillator circuit tuning ..	0·000425
C38‡	Osc. circuit S.W. trimmer ..	—
C39‡	Osc. circuit M.W. trimmer ..	—
C40‡	Osc. circuit L.W. trimmer ..	—
C41‡	Osc. circuit M.W. tracker ..	0·0006
C42‡	Osc. circuit L.W. tracker ..	0·00015
C43‡	1st I.F. trans. pri. tuning ..	—
C44‡	1st I.F. trans. sec. tuning ..	—
C45‡	2nd I.F. trans. pri. tuning ..	—
C46‡	2nd I.F. trans. sec. tuning ..	—

* Electrolytic. † Variable. ‡ Pre-set.

OTHER COMPONENTS		Approx. Values (ohms)
L1	L.W. aerial 261 m. filter coil	1·8
L2	Aerial S.W. coupling coil ..	1·2
L3	Aerial M.W. coupling coil ..	23·0
L4	Aerial L.W. coupling coil ..	80·0
L5	Aerial S.W. tuning coil ..	0·05
L6	Aerial M.W. tuning coil ..	3·25
L7	Aerial L.W. tuning coil ..	20·0
L8	Oscillator S.W. tuning coil ..	0·1
L9	Oscillator M.W. tuning coil ..	6·6
L10	Oscillator L.W. tuning coil ..	15·0
L11	Oscillator S.W. reaction ..	0·2
L12	Oscillator M.W. reaction ..	2·2
L13	Oscillator L.W. reaction ..	5·5
L14	1st I.F. trans. Pri. ..	7·25
L15	1st I.F. trans. Sec. ..	7·25
L16	2nd I.F. trans. Pri. ..	11·0
L17	2nd I.F. trans. Sec. ..	11·0
L18	Speaker speech coil	1·7
L19	Hum neutralising coil.. ..	0·1
L20	Speaker field coil	800·0
T1	Speaker input trans. Pri., total ..	700·0
	Speaker input trans. Sec. ..	0·3
T2	Mains trans. Pri., total ..	14·0
	Mains trans. Heater sec. ..	0·1
	Mains trans. Rect. heat. sec.	0·1
	Mains trans. H.T.sec., total	220·0
S1-S17	Waveband switches	—
S18, S19	Scale lamp switches	—
S20	Mains switch, ganged R7 ..	—

DISMANTLING THE SET

Removing Chassis.—To remove the chassis from the cabinet, remove the three small control knobs (pull off), the large tuning knob (recessed grub screw) and the felt washers on the spindles. Now remove the four screws (with washers and spring washers) holding the chassis to the bottom of the chassis, and the socket from the tuning indicator.

By tilting the back upwards the chassis can now be withdrawn to the extent of the speaker leads, which should be sufficient for normal purposes. *When replacing*, do not forget the felt washers on the spindles of the controls.

To free the chassis entirely, unplug the speaker leads from the socket at the rear of the chassis.

Removing Speaker.—If it is desired to remove the speaker from the cabinet, slacken the four clamps holding it to the sub-baffle and *when replacing*, see that the transformer is on the right.

VALVE ANALYSIS

Valve voltages and currents given in the table below are those measured in our receiver when it was operating on mains of 227 V, using the 225 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 400 V scale of a model 7 Universal Avometer, chassis being negative.

Valve	Anode Voltage (V)	Anode Current (mA)	Screen Voltage (V)	Screen Current (mA)
V1 6A8G*..	253	4·1	107	3·8
V2 6U7G	253	12·0	107	2·5
V3 6Q7G ..	132	0·7	—	—
V4 6H6G	—	—	—	—
V5 6F6G ..	240	35·0	240	5·9
V6 6F6G ..	240	30·0	240	5·1
V7 5Z4G ..	335‡	—	—	—

*Oscillator anode (G2) 212 V, 7·2 mA.
‡Each anode, A.C.

GENERAL NOTES

Switches.—**S1-S17** are the waveband switches and **S18, S19** the scale lamp switches, in two rotary units beneath the chassis. They are indicated in our under-chassis view, and shown in detail in the diagrams on page IV, where they are seen looking from the front of the underside of the chassis.

The table (page IV) gives the switch positions for the three control settings, starting from fully anti-clockwise. A dash indicates open, and **C**, closed.

S20 is the Q.M.B. mains switch, ganged with the

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PILOT U385—*Continued*

manual volume control, **R7**. There is also a pick-up jack switch at the rear of the chassis, which is shown in the circuit in diagrammatic form. When a pick-up is inserted the bottom of **R6** is disconnected from **C14**, thus muting radio.

Coils.—**L1** is mounted on a bracket attached to the gang condenser, with **C32**. **L2-L7**; **L14, L15** and **L16, L17** are in three screened units on the chassis deck. The first of these also contains **R1** and the trimmers **C33-C35**, which are numbered in our plan chassis view from top to bottom. The other two units contain their associated trimmers. The oscillator unit, **L8-L13** is unscreened, and is on a tubular former beneath the chassis.

Scale Lamps.—These are four miniature bayonet cap types, rated at 7·3 V, 0·25 A. They are switched in or out of circuit by **S18** and **S19** in the main switch assembly.

External Speaker.—Two sockets are provided at the rear of the chassis for a high impedance (10,000 O) external speaker.

Condensers C9, C10, C17, C29.—These are four dry electrolytics in a single tubular metal cased unit on the chassis deck. The case forms the common negative connection. Four leads emerge from the unit beneath the chassis, two black, one red and one green. The red lead is the positive of **C29** (8μF) and the green the positive of **C10** (8μF). The black lead to **R4** and **C8** is the positive of **C9** (4μF) and the black lead to **R12** and **R13** is the positive of **C17** (4μF).

Condensers C28, C31.—These are two dry electrolytics in a further tubular metal case on the chassis deck, the case being isolated in this instance. Of the three leads emerging from the bottom of the unit, the black one is the common negative. The green lead is the positive of **C31** (8μF) and the red the positive of **C28** (16 μF).

Condenser C4.—This is a very small fixed condenser, formed of two tags riveted to a fibre strip, and connected across two tags on one of the switch units.

Trackers C41, C42.—These form a dual unit, beneath the chassis, roughly in its centre.

Speaker Connections.—A 5-pin plug and socket is used for connecting the speaker to the chassis. The plugs and sockets are indicated by numbered arrows and circles in the circuit diagram, at the bottom of which a diagram of the plug, looking from the free ends of the pins, is given.

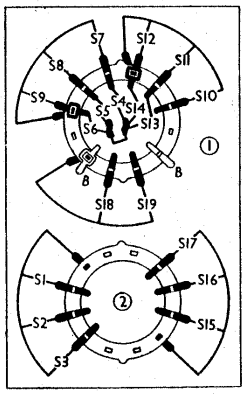
T.I. Connections.—The tuning indicator fits into an American 6-pin socket, the connections of its base being given in the diagram on this page. The socket is connected via six coloured leads to a special 6-pin plug which fits into the corresponding socket at the front of the chassis. The corresponding plugs and sockets are indicated by arrows and circles numbered from 6 to 11 on the circuit diagram, and at the bottom of this is a diagram of the plug, looking from the free ends of the pins, and numbered to correspond.

Valve Bases.—Octal bases are used on the valves in this set, and a diagram showing the pins numbered in the usual way, looking at the underside of the base, is given on this page, together with a table of the electrode connections. B indicates a blank pin, and a dash, no pin.

Chassis Divergencies.—Ours was an early chassis. In later models **R1** may be 1,000,000 O, and the trimmers shown by us returned to **C3** may actually go to chassis.

TABLE AND DIAGRAMS OF SWITCH UNITS

Switch	L.W.	M.W.	S.W.
S1	—	—	C
S2	—	C	—
S3	C	—	—
S4	C	C	—
S5	C	—	C
S6	—	C	—
S7	—	—	C
S8	—	C	—
S9	C	—	—
S10	—	—	C
S11	—	C	—
S12	C	—	—
S13	—	—	C
S14	—	C	C
S15	—	—	C
S16	—	C	—
S17	C	—	—
S18	—	C	C
S19	C	C	—



Switch diagrams, looking from the front of the underside of the chassis.

Radiogram Models.—These have a similar chassis, but the pick-up jack is replaced by a single-pole changeover switch, fitted on the motor board.

CIRCUIT ALIGNMENT

I.F. Stages.—Switch set to M.W., and turn gang to maximum. Connect signal generator to control grid (top cap) of **V2** through a 0·1 μF condenser, and to chassis. Feed in a 456 KC/S signal, and adjust **C45** and **C46** for maximum output. Transfer signal generator to top cap of **V1**, and similarly adjust **C43** and **C44**. Repeat the adjustment of all trimmers with the signal generator connected to **V1** top cap.

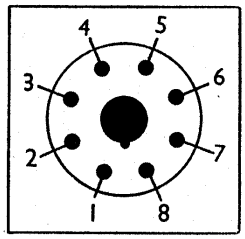
R.F. and Oscillator Stages.—Connect signal generator to **A** and **E** through a 0·0002 μF condenser. Switch set to M.W., and tune to 200 m. on scale. Feed in a 200 m. signal, and adjust **C39**, then **C34**, for maximum output. Feed in a 500 m. signal, tune it in on receiver, then adjust **C41** for maximum output, rocking the gang for optimum results. Repeat the 200 m. adjustments.

Switch set to S.W., tune to 16·6 m. on scale, feed in a 16·6 m. (18 MC/S) signal and adjust **C38** and **C33** for maximum output. Fixed tracking is used on this band, so there is no adjustment at the top of the band.

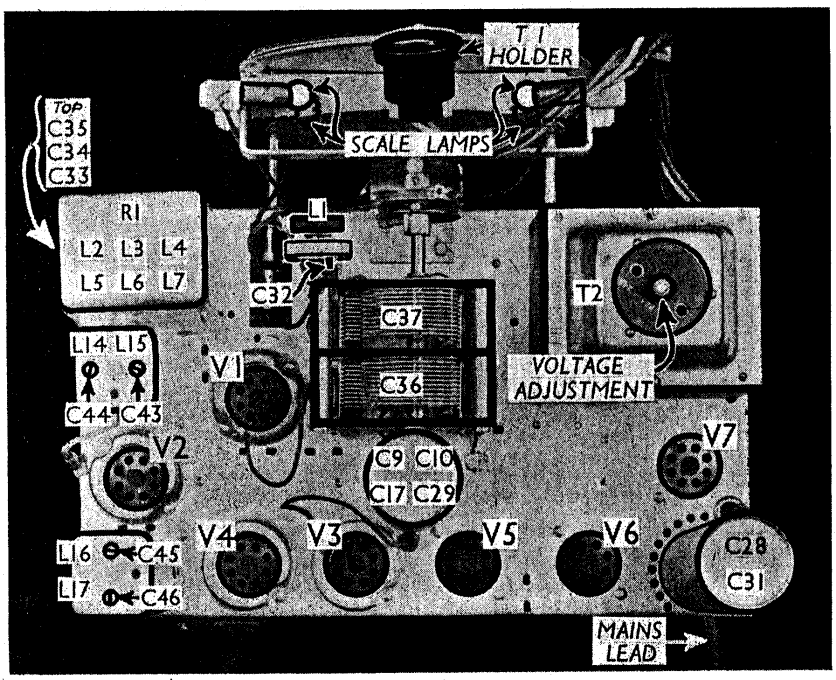
Switch set to L.W., tune to 800 m. on scale, feed in an 800 m. signal, and adjust **C40** and **C35** for maximum output. Feed in a 2,000 m. signal, tune it in, and adjust **C42** for maximum output, rocking the gang for optimum results. Repeat the 800 m. adjustments.

261 m. Filter.—This is used to eliminate a whistle on Luxembourg, due to London National, which is sometimes encountered. It is best to adjust **C32** when listening to the actual whistle, if this is present.

VALVE	PIN 1	2	3	4	5	6	7	8	TOP CAP
6A8G	B	H	A	G_3, G_5	G1	G2	H	C	G4
6U7G	B	H	A	G2	G3	—	H	C	G1
6H6G	B	H	D_2	C2	D1	—	H	C1	—
6Q7G	B	H	A	D1	D2	—	H	C	G
6F6G	B	H	A	G2	G1	—	H	C	—
5Z4G	B	H	—	A1	—	A2	—	H, C	—



The octal valve base, looking from the free ends of the pins. Base connections are in the table on the left.



Plan view of the chassis. The **L2-L7** coil unit also contains **R1** and the trimmers **C35, C34** and **C33**, reached through holes in the side of the can.

Base connections of the tuning indicator, looking from the free ends of the pins.