'TRADER' SERVICE SHEET 234

PILOT B344

3-BAND BATTERY SUPERHET

OCTAL type glass valves are fitted in the Pilot B344 4-valve 3-band battery superhet, the valve sequence comprising a heptode frequency changer, a variable-mu pentode I.F. amplifier, a double-diode triode and a double pentode output valve in a Q.P.P. stage. The short-wave range covered is 16-52 metres and there is a jack for connecting a gramophone pick-up.

CIRCUIT DESCRIPTION

Aerial input (**A**) via coupling coils **L2** (S.W.), **L4** (M.W.) and **L6** (L.W.) to single tuned circuits **L3** (S.W.), **L5** (M.W.) and **L7** (L.W.) and **C23. D** connection is provided for use with a doublet aerial. I.F. rejection on M.W. by **L1, C19.**

First valve (**V1, Pilot 1C7G**) is a heptode operating as frequency changer with electron coupling. Oscillator grid coils **L8** (S.W.), **L10** (M.W.) and **L12** (L.W.) are tuned by **C24**; parallel trimming by **C27** (S.W.), **C28** (M.W.), and **C7, C29** (L.W.); series tracking by **C6** (S.W.), **C25** (M.W.) and **C26** (L.W.). Anode reaction coils **L9** (S.W.), **L11** (M.W.) and **L13** (L.W.).

Second valve (**V2, Pilot 1D5G**), a variable-mu R.F. pentode, operates as intermediate frequency amplifier with tuned-primary tuned-secondary transformer couplings **C30, L14, L15, C31,** and **C32, L16, L17, C33.**

Intermediate frequency 456 KC/S.

Diode second detector is part of double diode triode valve (**V3 Pilot 1H6G**). Audio frequency component in rectified output is developed across load resistance **R6** via pick-up jack and passed via coupling condenser **C12** and manual volume control **R7** to C.G. of triode section. Upon insertion of plug into the pick-up jack the signal diode circuit is broken, thus muting radio. Tone control in anode circuit by R.C. filter **C14, R10.**

Second diode of **V3,** fed from **L17** via coupling condenser **C13** provides D.C. potential which is developed across load resistance **R9** and fed back through decoupling circuits as G.B. to F.C. and I.F. valves, giving automatic volume control.

Transformer coupling by **T1** between **V3** triode and quiescent push-pull output stage which comprises a double pentode output valve (**V4, Pilot 1E7G**). Fixed tone correction in anode circuits by **C15, C16.** Provision for connection of low impedance external speaker across secondary of internal speaker input transformer **T2.**

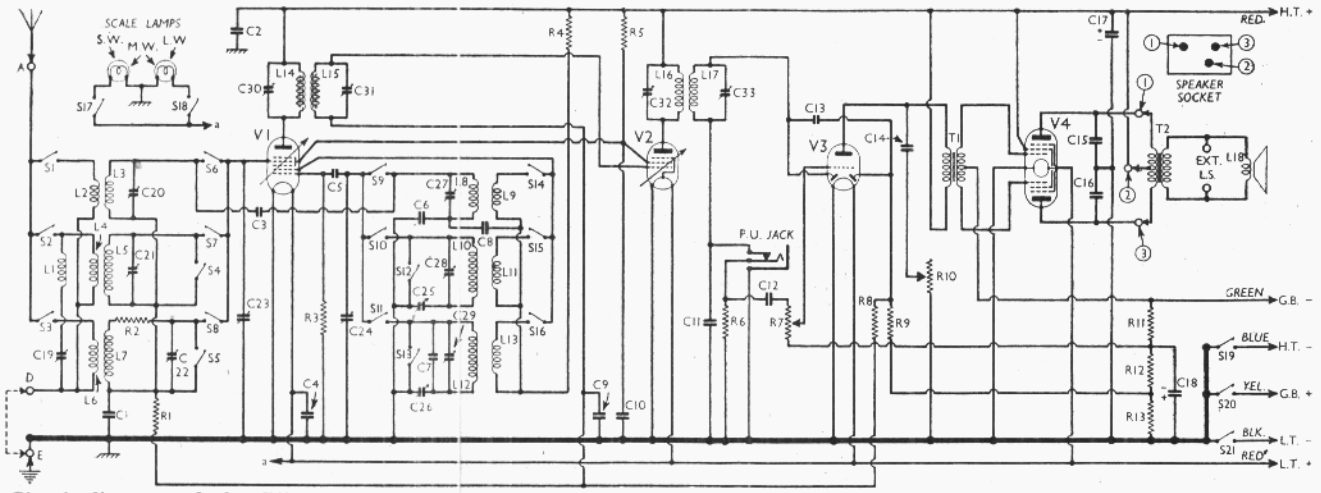
Grid vias potentials and A.V.C. delay voltage are obtained from a potentiometer **R11, R12, R13** connected across G.B. battery.

COMPONENTS AND VALUES

	RESISTANCES	Values (ohms)
R1	V1 tetrode C.G. decoupling ..	100,000
R2	Aerial circuit L.W. stabiliser..	50
R3	V1 osc. C.G. resistance ..	50,000
R4	V1 osc. anode H.T. feed ..	3,000
R5	V1, V2 S.G.'s H.T. feed ..	22,000
R6	V3 signal diode load	500,000
R7	Manual volume control ..	1,000,000
R8	A.V.C. line decoupling ..	1,000,000
R9	V3 A.V.C. diode load ..	1,000,000
R10	Variable tone control ..	100,000
R11	G.B. potentiometer resistances	50,000
R12		10,000
R13		10,000

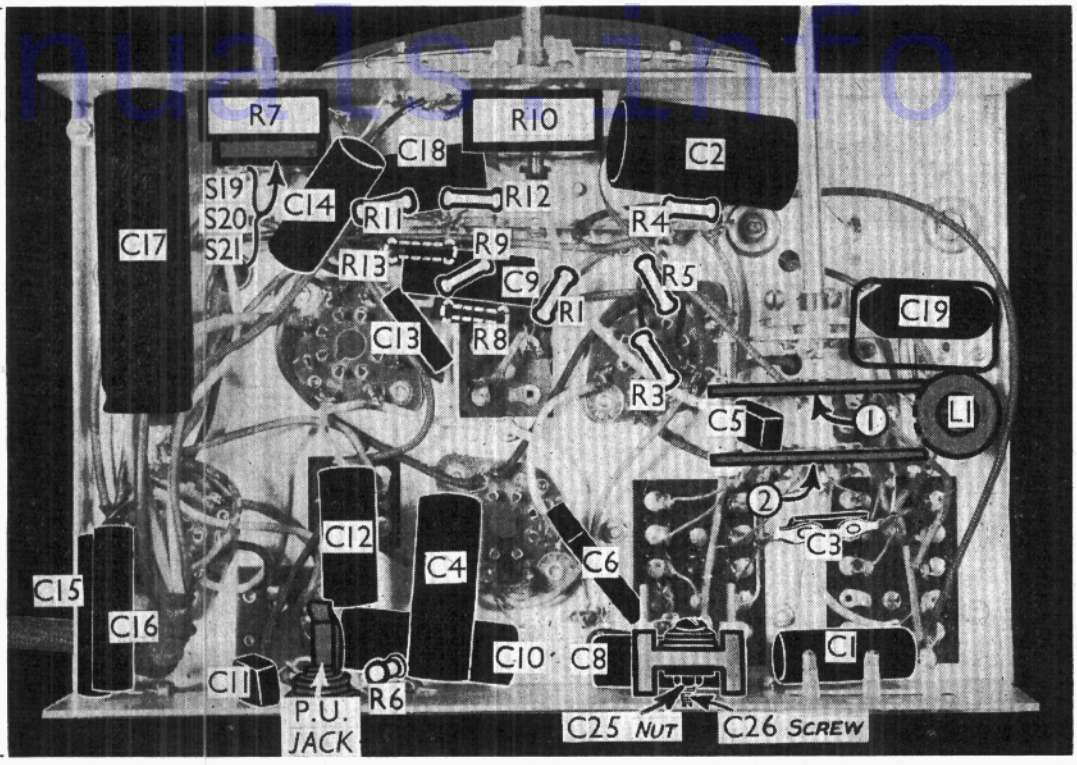
	CONDENSERS	Values (μF)
C1	V1 tetrode C.G. decoupling ..	0·05
C2	H.T. circuit R.F. by-pass ..	0·5
C3	S.W. neutralising condenser ..	Very low
C4	V1 filament R.F. by-pass ..	0·25
C5	V1 osc. C.G. condenser ..	0·00005
C6	Osc. circuit S.W. tracker ..	0·003
C7	Osc. circuit L.W. fixed trimmer	0·00001
C8	Osc. circuit S.W. reaction coupling	0·05
C9	V2 C.G. decoupling	0·05
C10	V1, V2 S.G.'s decoupling ..	0·25
C11	I.F. by-pass	0·0001
C12	A.F. coupling to V3 triode ..	0·01
C13	V3 A.V.C. diode coupling ..	0·00005
C14	Part of T.C. circuit	0·01
C15	Fixed tone correctors	0·002
C16		0·002
C17*	H.T. supply reservoir ..	8·0
C18*	V3 triode C.G. decoupling ..	10·0
C19‡	I.F. filter tuning, M.W. ..	0·0001
C20‡	Aerial circuit S.W. trimmer	—
C21‡	Aerial circuit M.W. trimmer	—
C22‡	Aerial cricuit L.W. trimmer ..	—
C23†	Aerial circuit tuning	—
C24†	Oscillator circuit tuning ..	—
C25‡	Oscillator circuit M.W. tracker	0·0005
C26‡	Oscillator circuit L.W. tracker	0·00016
C27‡	Oscillator circuit S.W. trimmer	—
C28‡	Oscillator circuit M.W. trimmer	—
C29‡	Oscillator circuit L.W. trimmer	—
C30‡	1st I.F. trans. pri. tuning ..	—
C31‡	1st I.F. trans. sec. tuning ..	—
C32‡	2nd I.F. trans. pri. tuning ..	—
C33‡	2nd I.F. trans. sec. tuning ..	—

* Electrolytic. † Variable. ‡ Pre-set.



Circuit diagram of the Pilot B344 battery superhet. The numbers in circles show the connections of the speaker connector, an underneath view of the socket being inset at the top right-hand corner.

Under - chassis view. The switch units are indicated, and are shown in detail on page VIII. **C19** is adjusted through a hole in the chassis deck. **C25** and **C26** are adjusted from the rear of the chassis by a nut and screw respectively. **C3** is a very small capacity.



OTHER COMPONENTS			Approx. Values (ohms)
L1	Aerial circuit M.W. I.F. filter coil		11·0
L2	Aerial circuit S.W. coupling		1·2
L3	Aerial S.W. tuning coil		0·5
L4	Aerial circuit M.W. coupling		21·0
L5	Aerial M.W. tuning coil		3·0
L6	Aerial circuit L.W. coupling		130·0
L7	Aerial L.W. tuning coil		19·0
L8	Osc. circuit S.W. tuning coil		0·1
L9	Osc. anode S.W. reaction		0·8
L10	Osc. circuit M.W. tuning coil		6·0
L11	Osc. anode M.W. reaction		2·0
L12	Osc. circuit L.W. tuning coil		11·0
L13	Osc. anode L.W. reaction		4·25
L14	1st I.F. trans.	Pri.	7·0
L15		Sec.	7·0
L16	2nd I.F. trans.	Pri.	13·5
L17		Sec.	13·5
L18	Speaker speech coil		3·4
T1	Intervalve trans.	Pri.	2,000·0
		Sec. total	6,000·0
T2	Speaker input trans.	Pri. total	800·0
		Sec.	0·25
S1-S16	Waveband switches		—
S17,18	Scale lamp switches		—
S19	H.T. circuit switch		—
S20	G.B. circuit switch		—
S21	L.T. circuit switch		—

DISMANTLING THE SET

Removing Chassis.—To remove the chassis from the cabinet, remove the three small control knobs (pull off) and the large tuning knob (recessed grub screw). Now remove the four bolts (with washers and spring washers) holding the chassis to the bottom of the cabinet, when by tilting the back upwards slightly it can be withdrawn to the extent of the speaker leads, which should be sufficient for normal purposes.

To free the chassis entirely, unplug the speaker connector from the socket on the chassis.

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

If the leads have been disconnected from the speaker, connect them as follows, numbering the tags from bottom to top :—3, blue ; 4, red ; 5, blue.

VALVE ANALYSIS

Valve voltages and currents given in the table below are those measured in

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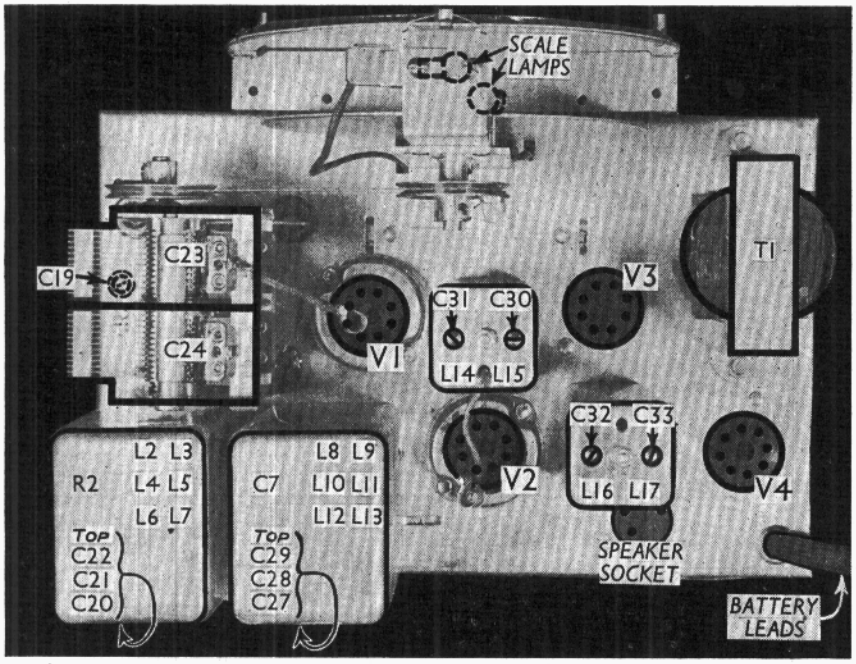


Plan view of the chassis. The trimmers in the large coil units are numbered from top to bottom.

PILOT B344—*Continued*

our receiver when it was operating with an H.T. battery reading 135 V on load, and a 10·5 V G.B. battery. 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 1C7G*	135	1·1	68	1·5
V2 1D5G	135	3·5	68	1·4
V3 1H6G	132	0·6	—	—
V4 1E7G	133†	0·4†	135	0·3

* Oscillator anode (G2) 120 V, 4·4 mA.
† Each anode.

GENERAL NOTES

Switches.—**S1-S18** are the waveband and scale lamp switches, in two ganged rotary units beneath the chassis. The units are indicated in our under-chassis view, and shown in detail in the diagrams on the right. Note the extra switches in the second unit formed by the metal plates fixed to the rotor.

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

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

S19-S21 are the Q.M.B. battery circuit switches, in a single unit, ganged with the volume control, **R7.** These have one common contact, connecting to chassis, on the right of the unit, looking from the rear of the underside of the chassis. The three contacts on the left belong to **S21** (top), **S19** (centre) and **S20** (bottom).

The pick-up switching is performed by a jack at the rear of the chassis, shown diagrammatically in our circuit diagram.

Coils.—**L1** is beneath the chassis, while **L2-L7, L8-L13** and the I.F. transformers **L14, L15** and **L16, L17** are in four screened units on the chassis deck. The trimmers of the **L2-L7** and **L8-L13** units are reached through holes in the backs of the cans, and are indicated in order from top to bottom in our plan chassis view. The first unit also contains **R2** and the second, **C7.**

Scale Lamps.—These are two Ever Ready miniature bayonet cap types (centre contact) rated at 2·0 V, 0·06 A.

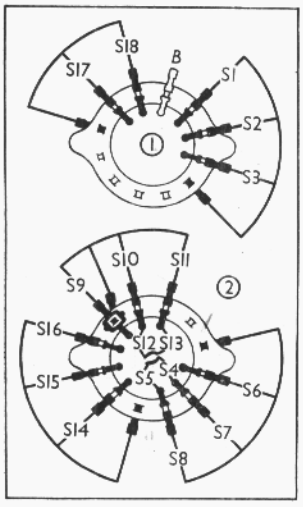
External Speaker.—Although no direct provision is made for an external speaker, a low impedance (3-4 O) type could be connected to the two tags on the internal speaker input transformer to which the speech coil is joined.

Trimmer C19.—This is adjustable through a hole in the chassis deck beneath the gang condenser.

Trackers C25, C23.—These are in a dual unit, and are adjusted by a nut and screw, reached through a hole at the rear of the chassis. The nut adjusts **C25,** and the screw **C26.**

Condenser C3.—This is a small condenser formed by the capacity between two tags rivetted on a strip of insulating material.

Chassis Divergencies.—**C7** in our chassis was 0·00001 μF, not 0·000015 μF as indicated by the makers. **R2** was 100 O in early chassis. In the makers' diagram, the positions of **C14** and **R10** are transposed, and **R2** is shown connected between the top of **C22** and **S8,** not between the top of **L7** and **C22,** as in our chassis.



Switch diagrams, looking from the rear of the underside of the chassis. **S4, S5** and **S12, S13** are formed by metal plates on the rotor of the second unit.

Valve Bases.—Octal bases are used on the valves in this set. A diagram showing the pins numbered in the usual way, looking at the underside of the base, is given on this page. The electrode connections to the various pins are given in the table on the right. B indicates a blank pin, or no pin.

Batteries.—Recommended types are: L.T., 2 V 45 AH accumulator cell; H.T., 135 V dry H.T. battery; G.B., 10·5 V unit tapped at 4·5, 9 and 10·5 V negative. If maximum power is not required, a 90 V H.T. battery may be used.

Battery Leads and Voltages.—Black lead, spade tag, L.T. negative; red lead, spade tag, L.T. positive 2 V; blue lead and plug, H.T. negative; red/white lead, red plug, H.T. positive, +135 V (or +90 V with smaller battery); yellow lead and plug, G.B. positive; green lead and plug, G.B. negative, —10·5 V or —9 V for 135 V H.T., —4·5 V for 90 V H.T.

Aerial Connections.—For an ordinary aerial, use terminal **A,** with **D** and **E** joined together by the metal link, and earthed. For a doublet (dipole) aerial, use terminals **A** and **D,** with the link between **D** and **E** removed.

CIRCUIT ALIGNMENT

I.F. Stages.—Switch set to M.W., and turn gang to maximum. Connect signal generator to chassis and top cap of **V2,** via a 0·1 μF condenser. Feed in a 456 KC/S signal, and adjust **C32** and **C33** for maximum output. Transfer signal generator lead from top cap of **V2** to top cap of **V1,** via the fixed condenser, then adjust **C30** and **C31** for maximum output.

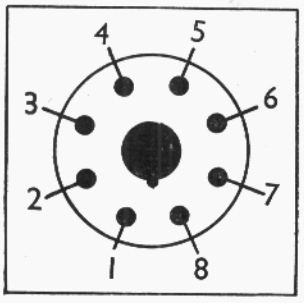
R.F. and Oscillator Stages.—Connect generator to **A** and **E** sockets via a 0·0002 μF condenser. Switch set to M.W. and tune to 200 m. on scale. Feed in a 200 m. (1,500 KC/S) signal, and adjust **C28** then **C21,** for maximum output. Feed in a 500 m. (600 KC/S) signal, tune it in, and adjust **C25** (nut) for maximum output, rocking the gang for optimum results. Repeat the adjustment at 200 m. and 500 m.

Switch set to L.W. and adjust **C29** and **C22** at 800 m. (375 KC/S), and **C26** (screw) at 2,000 m. (150 KC/S), in the same way as the M.W. band was aligned.

Switch set to S.W., and tune to 16·6 m on scale (a thin line above the 17 m. calibration is provided on the scale for this purpose). Feed in a 16·6 m (18 MC/s) signal, and adjust **C27,** then **C20,** for maximum output, rocking the gang very slightly for optimum results. Fixed tracking is used on this band.

I.F. Filter.—Feed in a 456 KC/S signal, switch set to M.W., turn gang to maximum, and adjust **C19** for *minimum* output.

VALVE DIAGRAM AND TABLE



Pin	1C7	1D5	1H6	1E7
1	B	B	B	B
2	F	F	F	F
3	A	A	A	A[1]
4	G3, G5	G2	D1	G1[1]
5	G1	B	D2	G1[2]
6	G2	B	G	A[2]
7	F	F	F	F
8	B	B	B	G2
Cap	G4	G1	—	—

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