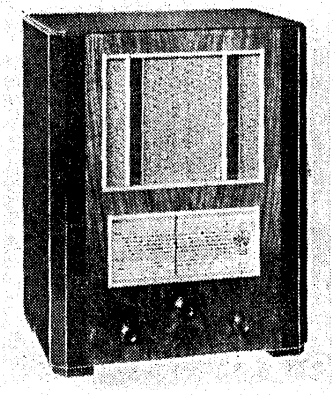
'TRADER' SERVICE SHEET

329

PILOT B43

3-BAND BATTERY SUPERHET



COVERING a short-wave range of 16.5-52 m, the Pilot B43 is a 4-valve battery 3-band superhet with a triode-pentode frequency changer, a variable-mu pentode IF amplifier, a double-diode triode and a pentode output valve. A feature is that three of the valves are fitted with the new Mazda octal base, while another point is that provision is made for an extension speaker, a combined switch-plug allowing the internal speaker to be cut out.

CIRCUIT DESCRIPTION

Aerial input via coupling coils **L1** (SW), **L2** (MW) and **L3** (LW) to single-tuned circuits **L4, C17** (SW), **L5, C17** (MW) and **L6, C17** (LW) which precede first valve (**V1, Mazda metallised TP23**), a triode pentode operating as frequency changer with internal coupling. Triode oscillator anode coils **L10** (SW), **L11** (**MW**) and **L12** (LW) are tuned by **C23**; parallel trimming by **C20** (SW), **C21** (MW) and **C22** (**LW**); series tracking by **C3** (SW), **C18** (MW) and **C19** (LW). Reaction by grid coils **L7** (SW), **L8** (MW) and **L9** (LW).

Second valve (**V2, Mazda metallised VP22**) is a variable-mu RF pentode operating as intermediate frequency amplifier with tuned-primary tuned-secondary transformer couplings **C24, L13, L14, C25** and **C26, L15, L16, C27; L13, L14** being iron-cored.

Intermediate frequency 451 KC/S.

Diode second detector is part of double diode triode valve (**V3, Mazda metallised L22DD**). Audio frequency component in rectified output is developed across load resistances **R6, R7** and passed via AF coupling condenser **C8** and manual volume control **R8** to CG of triode section, which operates as AF amplifier.

Second diode of **V3,** fed from **V2** anode via **C6,** provides DC potential which is developed across load resistance **R13** and fed back through decoupling circuit as GB to FC and IF valves, giving automatic volume control.

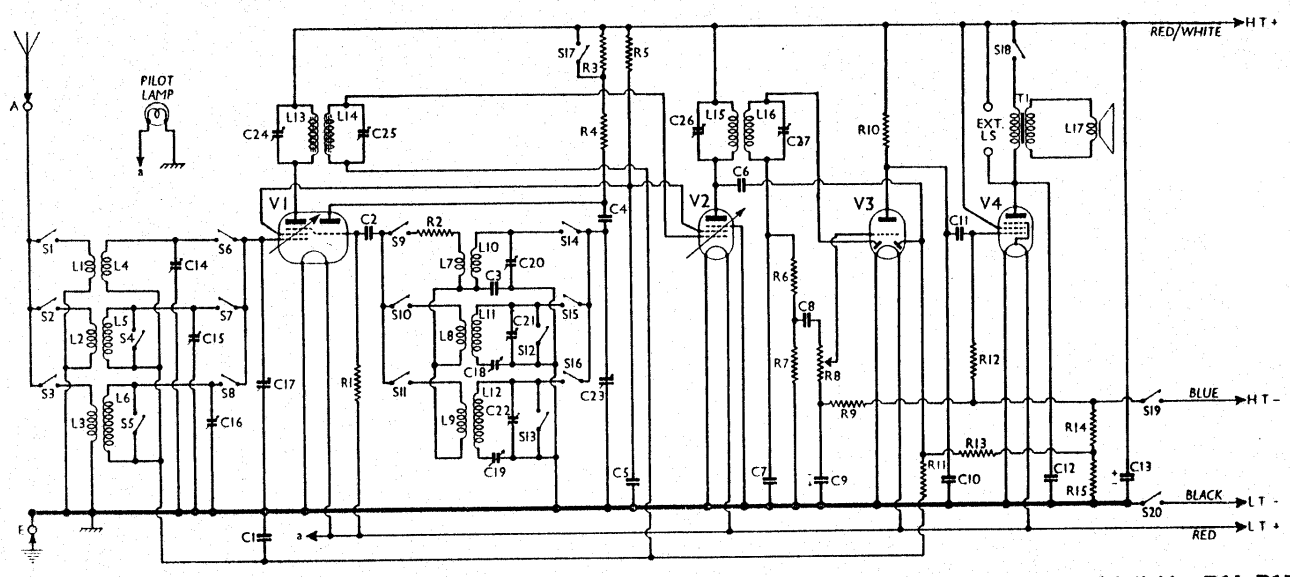
Resistance-capacity coupling by **R10, C11** and **R12** between **V3** triode and pentode output valve (**V4, Mazda Pen24**). Provision for connection of high impedance external speaker between **V4** anode and HT positive line. Switch **S18** between primary of internal speaker input transformer **T1** and HT positive line permits the internal speaker to be muted. Fixed tone correction by **C12** in anode circuit.

Potentials for **V3** triode and **V4** GB, and AVC delay, are obtained from drop along resistances **R14, R15** in negative lead to chassis, that at their junction also providing fixed GB for **V1** and **V2.**

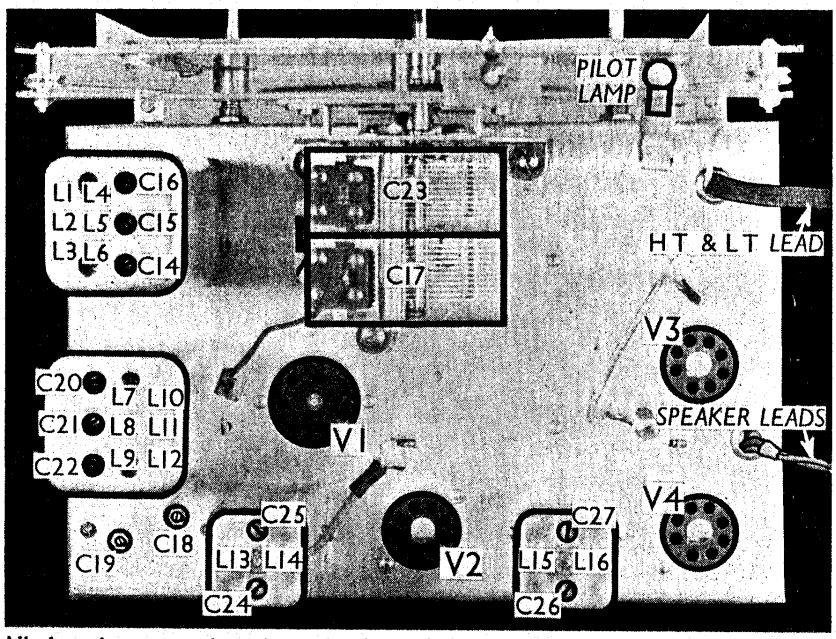
COMPONENTS AND VALUES

	RESISTANCES	Values (ohms)
R1	V1 osc. CG resistance ..	50,000
R2	Osc. reaction SW stabiliser ..	30
R3	V1 osc. anode MW and LW HT feed	20,000
R4	V1 osc. anode SW HT feed ..	6,000
R5	V1, V2 SG's HT feed	30,000
R6	V3 signal diode load resistances	50,000
R7		500,000
R8	Manual volume control ..	750,000
R9	V3 triode CG decoupling ..	50,000
R10	V3 triode anode load	100,000
R11	AVC line decoupling	1,000,000
R12	V4 CG resistance	500,000
R13	V3 AVC diode load	1,000,000
R14	V1, V2, V3 and V4 auto GB, and AVC delay voltage resistances	190
R15		140

	CONDENSERS	Values (μF)
C1	AVC line decoupling	0·05
C2	V1 osc. CG condenser ..	0·0004
C3	Osc. circuit SW tracker ..	0·006
C4	V1 osc. anode coupling ..	0·00015
C5	V1, V2 SG's decoupling ..	0·1
C6	Coupling to V3 AVC diode ..	0·00015
C7	IF by-pass	0·00015
C8	AF coupling to V3 triode ..	0·01
C9*	V3 CG decoupling	10·0
C10	V3 triode anode IF by-pass ..	0·0004
C11	V3 triode to V4 IF coupling	0·01
C12	Fixed tone corrector	0·002
C13*	HT circuit reservoir	8·0
C14‡	Aerial circuit SW trimmer ..	—



Note the automatic bias arrangements in this circuit diagram of the Pilot B43 3-band battery superhet, the potential divider **R14, R15** in the HT negative lead providing grid bias for all four valves and also delay voltage for the AVC system.



All the trimmers and trackers are shown in this plan view and are reached through holes in the coil cans or the chassis deck.

	CONDENSERS (*Continued*)	Values (μF)
C15‡	Aerial circuit MW trimmer ..	—
C16‡	Aerial circuit LW trimmer ..	—
C17†	Aerial circuit tuning	—
C18‡	Osc. circuit MW tracker ..	0·0006
C19‡	Osc. circuit LW tracker ..	0·0002
C20‡	Osc. circuit SW trimmer ..	—
C21‡	Osc. circuit MW trimmer ..	—
C22‡	Osc. circuit LW trimmer ..	—
C23†	Oscillator circuit tuning ..	—
C24‡	1st IF trans. pri. tuning ..	—
C25‡	1st IF trans. sec. tuning ..	—
C26‡	2nd IF trans. pri. tuning ..	—
C27‡	2nd IF trans. sec. tuning ..	—

* Electrolytic. † Variable. ‡ Pre-set.

	OTHER COMPONENTS		Approx. Values (ohms)
L1	Aerial SW coupling coil ..		0·5
L2	Aerial MW coupling coil ..		18·0
L3	Aerial LW coupling coil ..		100·0
L4	Aerial SW tuning coil ..		0·05
L5	Aerial MW tuning coil ..		2·0
L6	Aerial LW tuning coil ..		20·0
L7	Oscillator SW reaction ..		0·2
L8	Oscillator MW reaction ..		1·2
L9	Oscillator LW reaction ..		3·6
L10	Osc. circuit SW tuning coil ..		0·05
L11	Osc. circuit MW tuning coil ..		3·0
L12	Osc. circuit LW tuning coil ..		16·0
L13	1st IF trans.	Pri.	4·0
L14		Sec.	4·0
L15	2nd IF trans.	Pri.	12·0
L16		Sec.	12·0
L17	Speaker speech coil		1·6
T1	Speaker input trans.	Pri. ..	530·0
		Sec. ..	0·15
S1-S17	Waveband switches		—
S18	Speaker switch		—
S19	HT circuit switch (ganged R8)		—
S20	LT circuit switch (ganged R8)		—

DISMANTLING THE SET

Removing Chassis.—If it is desired to remove the chassis from the cabinet, remove the knobs (pull off) and felt washers from the two outer control spindles and the knob (recessed grub screw) and felt washer from the spindle of the tuning drive, then remove the four bolts (with washers and spring washers) holding the chassis to the bottom of the cabinet, when the chassis can be withdrawn to the extent of the speaker leads, which is sufficient for normal purposes.

To free the chassis entirely, unsolder the speaker leads and, *when replacing*, connect them as follows, numbering the tags from left to right:—1, 3 and 5, blank; 2, blue; 4, red.

Removing Speaker.—To remove the speaker from the cabinet, unsolder the leads and slacken the four clamps holding the speaker to the sub-baffle. *When replacing*, see that the transformer is on the right and connect the leads as above.

VALVE ANALYSIS

Valve voltages and currents given in the table below are those measured in our receiver when it was operating with a new HT battery reading 122 V on load. 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.

If, as in our case, **V1** should become unstable when its anode current is being measured, it can be stabilised by connecting a non-inductive condenser of about 0·1μF from grid (top cap) to chassis.

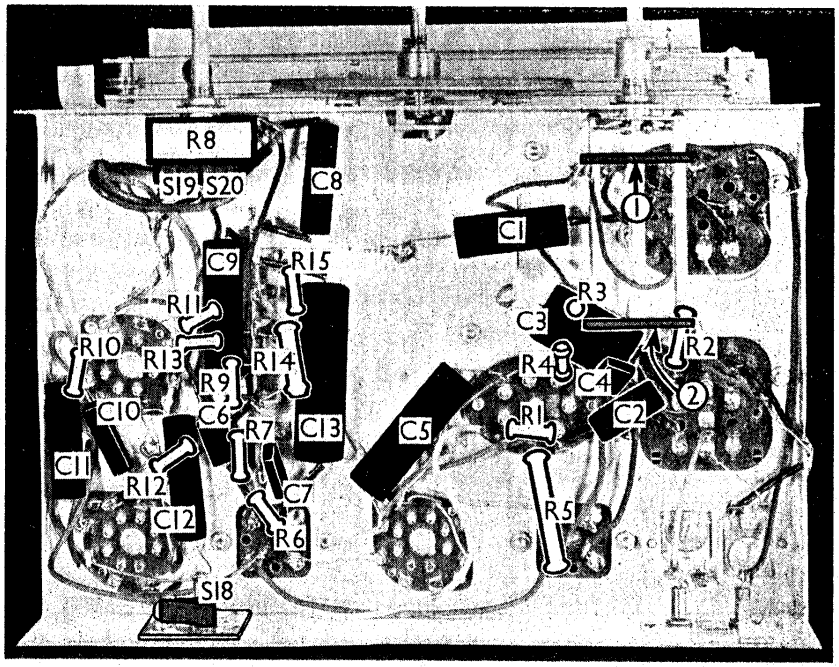
Valve	Anode Voltage (V)	Anode Current (mA)	Screen Voltage (V)	Screen Current (mA)
V1 TP23	117	0·6	62	1·2
	Oscillator			
	62	1·8		
V2 VP22	117	1·2	62	0·6
V3 L22DD	70	0·3	—	—
V4 Pen24	114	4·7	117	0·9

GENERAL NOTES

Switches.—**S1-S17** are the waveband switches, in two rotary units beneath the chassis. These are indicated in our under-chassis view, and shown in detail in the diagrams on page IV. 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*.

S18 is the internal speaker switch,

Continued overleaf



A double-pole battery switch is ganged with the volume control and is shown in this under-chassis view. Diagrams of the wave-change switch units appear overleaf.

PILOT B43—*Continued*

associated with the external speaker sockets. When the special plug is inserted and rotated anti-clockwise, **S18** opens and mutes the internal speaker.

S19 and **S20** are the HT and LT circuit switches, ganged with the manual volume control **R8**. The blue and the black braided leads go to **S19**, and the black rubber and tinned copper leads go to **S20**.

Coils.—**L1-L6**; **L7-L12** and the IF transformers **L13, L14** and **L15, L16,** are in four screened units on the chassis deck. These units contain also the associated trimmers.

Trackers.—The variable trackers **C18, C19** are adjusted through holes in the chassis deck.

Pilot Lamp.—This is an Ever Ready type, fitted with a miniature bayonet cap, and rated at 2 V, 0·06 A. Its bulb is coloured red.

External Speaker.—Special sockets are provided at the rear of the chassis for a high impedance (16,000 O) external speaker. A 2-pin plug is provided and the rotation of this permits both internal and external, or only the external speaker, to be in circuit, **S18** opening in the latter case.

Valve Bases.—**V2, V3** and **V4** have Mazda octal bases, whereas **V1** has the ordinary British 7-pin base. The octal base connections, looking at the underside of the base, and numbering the pins anti-clockwise from the key (when the key is at the bottom of the central spigot) are as follows :—

V2.—1, filament ; 2, no pin ; 3, anode ; 4, G2 ; 5, G3 ; 6, metallising ; 7, no pin ; 8, filament ; top cap, G1.

V3.—1, filament ; 2, blank ; 3, anode ; 4, blank ; 5, D1 ; 6, metallising ; 7, D2 ; 8, filament ; top cap, G1.

V4.—1, filament ; 2, no pin ; 3, anode ; 4, G2 ; 5, G1 ; 6, blank ; 7, no pin ; 8, filament.

Batteries.—LT, 2V 45 AH accumulator cell. HT, 120 V dry HT battery. GB is automatic.

Battery Leads and Voltages.—Black lead, spade tag, LT negative ; red lead, spade tag, LT positive 2 V ; blue lead, black plug, HT negative ; red/white lead, red plug, HT positive 120 V.

CIRCUIT ALIGNMENT

IF Stages.—Switch set to MW and turn gang to maximum. Connect signal generator to control grid (top cap) of **V2,** via a 0·1μF condenser, and chassis. Feed in a 451 KC/S signal, and adjust **C26** and **C27** for maximum output. Transfer signal generator to control grid (top cap) of **V1,** and adjust **C24** and **C25** for maximum output. Check the adjustments of **C26** and **C27.**

RF and Oscillator Stages.—With gang at maximum, pointer should register with " set line " at the top right hand corner of the scale. Connect signal generator to **A** socket (via a 0·0002μF condenser) and to **E** socket.

MW.—Switch set to MW, tune to 200 m on scale, feed in a 200 m (1,500 KC/S) signal, and adjust **C21,** then **C15,** for maximum output. Feed in a 500 m (600 KC/S) signal, tune it in, and adjust **C18** for maximum output, while rocking the gang for optimum results. Now check the 200 m adjustments again.

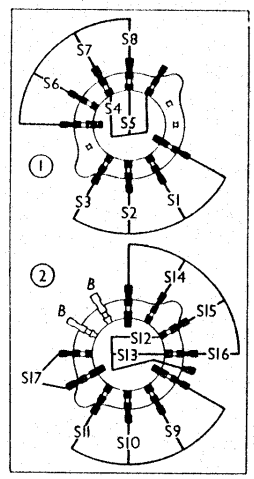
LW.—Switch set to LW, and follow the same procedure, adjusting **C22** and **C16** at 800 m (375 KC/S) and **C19** at 2,000 m (150 KC/S).

SW.—Switch set to SW, feed in a 17 m (17·65 MC/S) signal, tune to 17 m on scale, and adjust **C20** and **C14** for maximum output, rocking the gang very slightly, if necessary, for optimum results. No variable tracker is fitted on this band.

TABLE AND DIAGRAMS OF THE SWITCH UNITS

Switch	LW	MW	SW
S1	..	..	C
S2	..	C	..
S3	C	..	..
S4	..	..	C
S5	..	C	C
S6	..	..	C
S7	..	C	..
S8	C	..	..
S9	..	..	C
S10	..	C	..
S11	C	..	..
S12	..	..	C
S13	..	C	C
S14	..	..	C
S15	..	C	..
S16	C	..	..
S17	..	..	C

Diagrams of the switch units, drawn as seen from the direction of the arrows in the under-chassis view on the preceding page. A table of the switch positions is on the left.



MAINTENANCE PROBLEMS

T.I. Electrolytic Causes Instability

OSCILLATION similar to AF " motor-boating " whenever a carrier wave was tuned in was given by an H.M.V. 442. The stronger the carrier wave, the worse the " motor-boating " became.

The electrolytic and other decoupling condensers were checked and found to be O.K. and different valves effected no improvement. The 25 μF electrolytic condenser in parallel with the " fluid light " tuning indicator was then disconnected to be tested, and the set immediately stopped working altogether. A meter revealed a complete lack of HT on the anode of the IF valve, and a further test showed the indicator meter winding to be completely open-circuit.

Apparently the condenser had developed a leak of sufficiently low resistance to allow HT current to pass, but high enough to cause instability, since the resistance would be common to both IF and frequency-changer circuits.—L. S. NORRIS, FARNHAM.

Internal Short In Barretter

A DECCA AC/DC set was moved by road to a new address, and when it was connected up and switched on, it played for a minute or two, then a flash was noticed at the back of the set—and silence.

The owner examined it and found the rectifier filament burnt out, but could find no apparent cause. He purchased a replacement and put in, the same trouble occurring after a few seconds playing. He therefore brought the set along to me, with yet another new rectifier.

I examined the valves for inter-electrode shorts, without finding any, and the filter condensers were O.K.

As a voltage-dropper in the LT circuit a barretter was employed in series with the rectifier and valve filaments. As is usual, the resistance wire of this was in fine coils, arranged perpendicularly in parallel, being anchored at each end, and to the glass central support, by glass arms.

One of the top arms had broken clean off (probably in transit), leaving the spiral winding free at the top, and standing up, swaying like a spring. The slightest vibration from the set was sufficient to make the loose spiral intermittently short across to the remaining rigid spirals.—G. A. LANGLEY, CAPEL, SURREY.

Faulty Valve Connection

AFTER six months' use a Cossor 376B gave indifferent results—sudden occurrence of distortion, sometimes with a loss of signal strength. Since it was a superhet with AVC and Class B, milli-ammeter tests were difficult, but with no input the meter reading was normal and steady, in all anode circuits. The valves were tested and found O.K.

Driver and output transformers appeared normal, whether the set was " playing-up " or not, but a chance movement of the driver valve caused a temporary cure ; the trouble recurring when the valve was again wiggled about. The holder was cleaned and all joints re-soldered (though they appeared to be O.K.). Still no cure.

A new driver valve was then tried and cured the trouble, although the old one read O.K. on test. All the lead-out wires from the valve were unsoldered and the *grid* showed a dirty, dry joint. Re-soldering the joint effected a cure.—G. C. OXLEY, TIBSHELF.