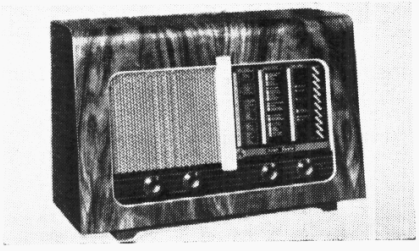
"TRADER" SERVICE SHEET

986

PILOT JACK (A.C. Model)



DESIGNED to operate from A.C. mains only of 200-250 V, 40-100 c/s, the A.C. Pilot Jack (T42) is a 4-valve (plus rectifier) 3-band superhet. Waveband ranges are 13-50 m, 180-550 m and 1,000-2,000 m.

A double-wound mains transformer is used for heater current supplies, but the H.T. circuit and chassis are "live" to the mains. The A.C./D.C. models are covered in Service Sheet 985.

Release date and original price: October, 1949, £16 17s, plus purchase tax.

CIRCUIT DESCRIPTION

Aerial input on S.W. by coupling coil **L1** to single-tuned circuit **L4, C36,** which precedes heptode valve **(V1, Brimar 6BE6)** operating as frequency changer with electron coupling. On M.W. and L.W., input is from tuned frame aerials **L5, C36** (M.W.) and **L6, C36** (L.W.), although provision is made for the connection of an external aerial via frame aerial coupling coils **L2** (M.W.) and **L3** (L.W.).

Oscillator grid coils **L7, L8** (S.W.), **L9, L10** (M.W.) and **L11, L12** (L.W.) are tuned by **C37.** Parallel trimming by **C38** (S.W.), **C39** (M.W.) and **C8, C40** (L.W.). Series tracking by **C9** (S.W.), **C10** (M.W.) and **C11** (L.W.). Inductive reaction coupling from cathode by coils **L8** (S.W.), **L10** (M.W.) and **L12** (L.W.).

Second valve **(V2, Brimar 9D6** or in suitably wired models **6BA6)** is a variable-mu R.F. pentode operating as intermediate frequency amplifier with tuned transformer couplings **C4, L13, L14, C5** and **C14, L15, L16, C15.**

Intermediate frequency 470 kc/s.

Diode signal detector is part of double diode triode valve **(V3, Brimar 6Q7GT).** A.F. component in rectified output is developed across load resistor **R7** and passed via **C20** and volume control **R9** to grid of triode section. I.F. filtering by **C16, R8, C19** and **C23.**

Second diode of **V3,** fed from **V2** anode via **C18,** provides D.C. potential, giving A.G.C.

Resistance-capacitance coupling by **R13, C25** and **R16** between **V3** triode and beam tetrode output valve **(V4, Brimar 6V6GT), C25** being shunted by **C26** on M.W. and L.W. bands. Tone correction by negative feedback on M.W. and L.W. between **V4** and **V3** anodes via **S17** and **R15,** and variable tone control in **V3** anode circuit by **C24** and tone control **R14.**

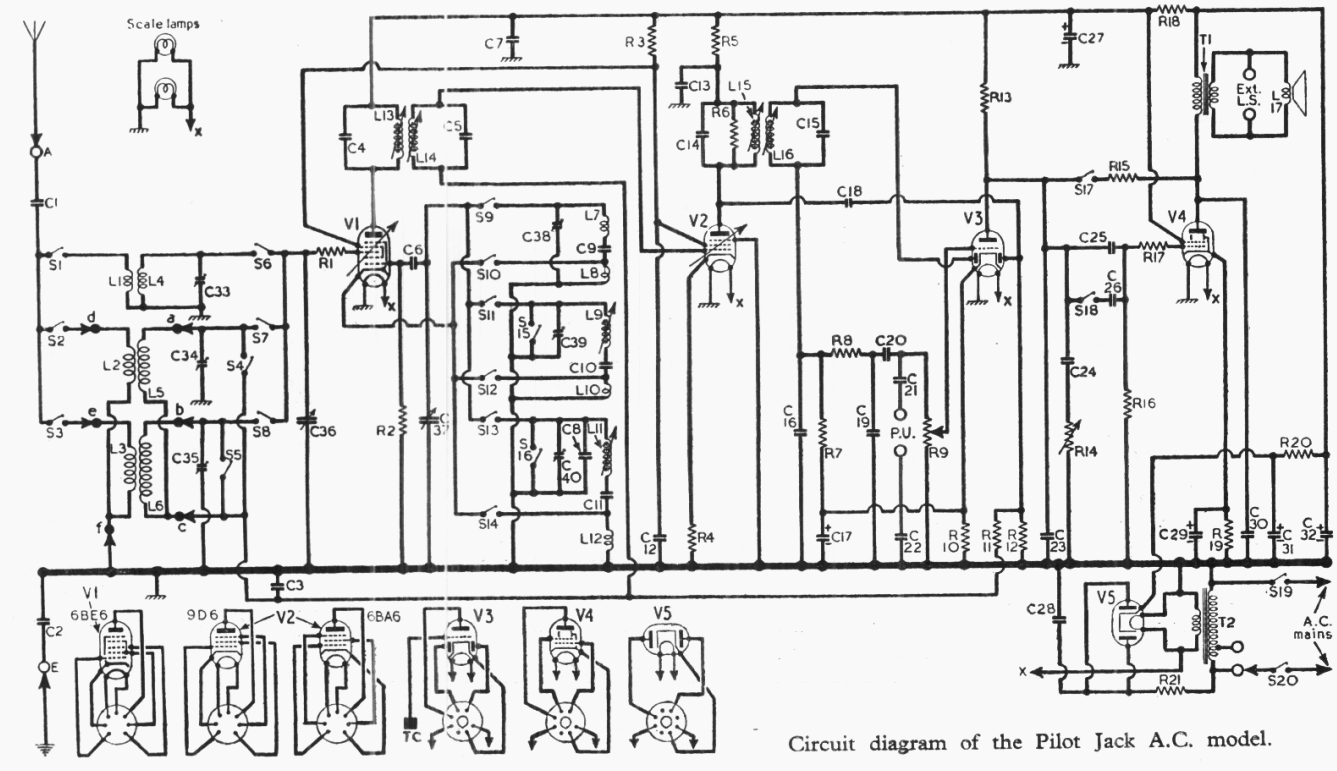
H.T. current is supplied by I.H.C. rectifying valve **(V5, Brimar 6X5GT)** operating with its anodes strapped to form a half wave rectifier. **T2** is a heater transformer only.

COMPONENTS AND VALUES

	RESISTORS	Values	Locations
R1	V1 C.G. stopper ...	33Ω	G3
R2	V1 osc. C.G.	22kΩ	H4
R3	S.G. H.T. feed ...	10kΩ	G4
R4	V2 G.B. ...	180Ω	G4
R5	V2 H.T. decoup. ...	2·2kΩ	F4
R6	L15 shunt	470kΩ	G4
R7	Diode load	270kΩ	F4
R8	I.F. stopper ...	47kΩ	F4
R9	Volume control ...	1MΩ	E3
R10	V3 G.B.	4.7kΩ	F3
R11	A.G.C. decoup. ...	1MΩ	F4
R12	A.G.C. diode load	1MΩ	F4
R13	V3 anode load ...	270kΩ	F4
R14	Tone control ...	1MΩ	E3
R15	Tone corrector ...	1·5MΩ	F3
R16	V4 C.G.	470kΩ	F3
R17	Grid stopper ...	4·7kΩ	F3
R18	H.T. smoothing ...	2·2kΩ	F3
R19	V4 G.B. ...	270Ω	F3
R20	H.T. smoothing ...	680Ω	E4
R21	Surge limiter ...	100Ω	E4

	CAPACITORS	Values	Locations
C1	Aerial series ...	500pF	H3
C2	Chassis isolator ...	0·002μF	H3
C3	A.G.C. decoupler ...	0·1μF	G4
C4	1st I.F. trans.	100pF	B2
C5	tuning	100pF	B2
C6	V1 osc. C.G.	100pF	H4
C7	H.T. by-pass ...	0·1μF	G4
C8	L.W. osc. trimmer	150pF	H4
C9	S.W. osc. tracker...	0·006μF	H4
C10	M.W. osc. tracker	530pF	H4
C11	L.W. osc. tracker	225pF	H4
C12	S.G. decoup. ...	0·1μF	G4
C13	V2 anode decoup.	0·1μF	G4
C14	2nd I.F. trans.	100pF	C2
C15	tuning	180pF	C2
C16	I.F. by-pass ...	100pF	F4
C17*	V3 cath. by-pass ...	25μF	F4
C18	A.G.C. coupling ...	20pF	F4
C19	I.F. by-pass ...	100pF	F4
C20	A.F.coupling ...	0·005μF	F4
C21	P.U. isolators ...	0·02μF	F4
C22		0·02μF	F4
C23	I.F. by-pass ...	500pF	F3
C24	Part tone control	0·01μF	F3
C25	A.F. coupling ...	0·001μF	F3
C26	Tone corrector ...	0·01μF	G3
C27*	H.T. smoothing ...	8μF	G3
C28	Mains R.F. filter	0·05μF	E4
C29*	V4 cath. by-pass ...	25μF	E3
C30	Tone corrector ...	0·002μF	G3
C31*	H.T. smoothing	32μF	D1
C32*		32μF	D1
C33‡	S.W. aerial trim ...	50pF	H3
C34‡	M.W. aerial trim ...	50pF	H3
C35‡	L.W. aerial trim ...	50pF	H3
C36†	Aerial tuning ...	§528pF	B1
C37†	Oscillator tuning ...	§528pF	B2
C38‡	S.W. osc. trimmer	50pF	H4
C39‡	M.W. osc. trimmer	50pF	H4
C40‡	L.W. osc. trimmer	50pF	H4

* Electrolytic. ‖† Variable. ‡ Pre-set. § "Swing" value, min. to max.



Circuit diagram of the Pilot Jack A.C. model.

OTHER COMPONENTS		Approx. Values (ohms)	Location
L1	Aerial coupling coils	0·4	H3
L2		0·1	A2
L3		6·0	A2
L4	Aerial tuning coils	Very low	H3
L5		1·0	A2
L6		24·0	A2
L7	S.W. osc. tuning	Very low	H4
L8	S.W. reaction coil	Very low	H4
L9	M.W. osc. tuning	2·5	H4
L10	M.W. reaction coil	0·2	H4
L11	L.W. osc. tuning	12·0	H4
L12	L.W. reaction coil	0·6	H4
L13	1st I.F. trans. Pri.	7·0	B2
L14	1st I.F. trans. Sec.	7·0	B2
L15	2nd I.F. trans Pri.	7·0	C2
L16	2nd I.F. trans Sec.	7·0	C2
L17	Speech coil	2·8	—
T1	Primary	0·5	—
	Secondary	430·0	—
T2	Primary, total	160·0	D2
	Secondary	0·3	D2
S1-S16	Waveband switches	—	H3
S17, S18	Tone switches	—	H3
S19, S20	Mains sw., g'd R9	—	E3

VALVE ANALYSIS

Voltages and currents given in the table below are those measured in our receiver when it was operating from A.C. mains of 230 V. The volume control was turned to maximum and the set tuned to the high wavelength end of M.W., but there was no signal input.

Voltage measurements were made with an Avo Electronic Testmeter which introduces no appreciable voltage drop, and allowance must be made for the current drawn by other meters. Chassis was the negative connection.

Valve	Anode V	Anode mA	Screen V	Screen mA	Cath. V
V1 6BE6	186	3.4	100	7·2	—
V2 9D6	176	4·0	100	1·0	1·0
V3 6Q7GT	112	0·3	—	—	1·8
V4 6V6GT	213	27·0	186	2·5	8·4
V5 6X5GT	228†	—	—	—	265·0

† A.C. reading.

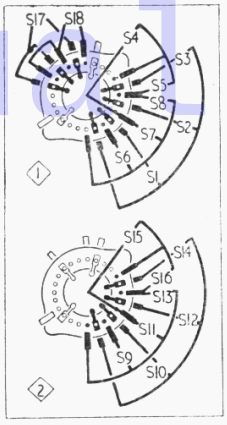
DISMANTLING THE SET

Removing Chassis.—Pull off four control knobs (with felt washers) from front of set;

Remove the three 2BA bolts with washers securing the chassis to the cabinet;

Withdraw the chassis to the extent of the speaker leads and unsolder them from the tags on the output transformer.

When replacing, the short chassis fixing screw goes to the left-hand front corner of cabinet base, viewed from rear. Connect the speaker leads to the output transformer as follows, numbering the tags from top to bottom: 1, black; 2, blue; 3, red; 4, green.



Left: Diagrams of the waveband switch units. Below them is the switch table.

Switch	S.W.	M.W.	L.W.
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
S14	—	—	C
S15	C	—	—
S16	C	C	—
S17	—	C	C
S18	—	C	C

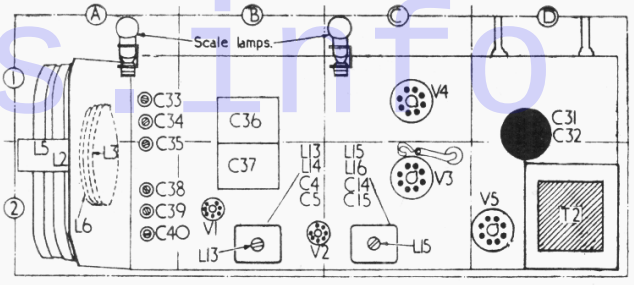
GENERAL NOTES

Switches.—**S1-S18** are the waveband switches, ganged in two rotary units beneath the chassis. These are indicated in our under-chassis drawing, and shown in detail in the diagrams inset beside the plan illustration of the chassis.

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

Scale Lamps.—These are two small lamps, with large, clear spherical bulbs and M.E.S. bases, rated at 6.5 V, 0.3 A.

External Speaker.—Two sockets are provided at the rear of the chassis for the connection of a low impedance (about 3·4 Ω) external speaker.



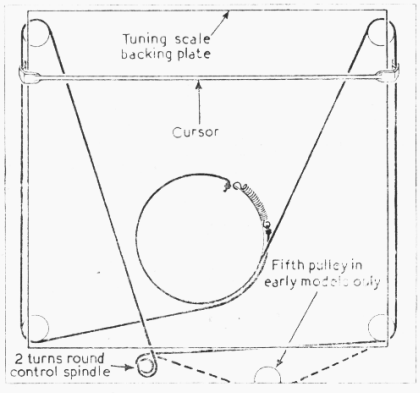
Plan view of the chassis. The frame aerial windings are on a panel on the left.

Drive Cord Replacement.—50 inches of fine gauge nylon braided glass yarn is required for a new tuning drive cord, which should be run as shown in the sketch below, where the system is viewed from the front, as though seen through the scale assembly upon the back of which it is mounted, with the gang at maximum capacitance. The cursor can be slipped on afterwards.

CIRCUIT ALIGNMENT

All the adjustments may be made with the chassis in the cabinet, the cores of **L14, L16** being made accessible by removing the cabinet base cover, secured by six round-head screws. Before aligning the I.F. stages, the cores should be freed by melting the wax seals.

I.F. Stages.—Switch set to L.W., turn gang and volume control to maximum. Connect signal generator output, via a 0.1 μF capacitor in each lead, to control grid (pin 7) of **V1** and chassis, feed in a 470 kc/s (638.3 m) signal and adjust the cores of **L16** (location reference F4), **L15** (C2), **L14** (G4) and **L13** (B2) for maximum output, reducing the input as the circuits come into line. Re-seal cores.



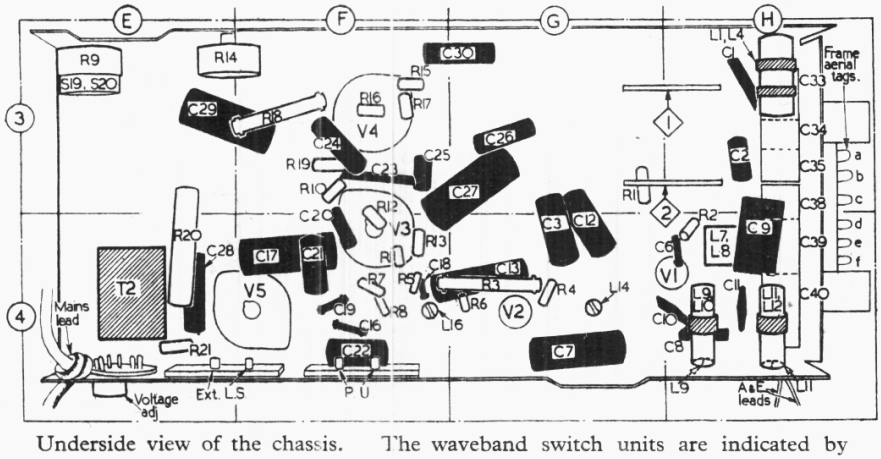
The tuning drive, as seen from the front.

R.F. and Oscillator Stages.—Check that with the gang at maximum capacitance the cursor coincides with the highest wavelength ends of the tuning scale. The position of the cursor may be adjusted by sliding it up or down the drive cord. Transfer the signal generator leads, via a dummy aerial, to **A** and **E** sockets.

S.W.—Switch set to S.W., tune to 13.4 m on scale, feed in a 13.4 m (23 Mc/s) signal and adjust **C38** (A2) and **C33** (A1) for maximum output. Repeat these adjustments.

M.W.—Switch set to M.W., tune to 200 m on scale, feed in a 200 m (1,500 kc/s) signal and adjust **C39** (A2) and **C34** (A1) for maximum output. Tune to 500 m on scale, feed in a 500 m (600 kc/s) signal and adjust the core of **L9** (H4) for maximum output. Repeat these adjustments.

L.W.—Switch set to L.W., tune to 1,000 m on scale, feed in a 1,000 m (300 kc/s) signal and adjust **C40** (A2) and **C35** (A2) for maximum output. Tune to 2,000 m on scale, feed in a 2,000 m (150 kc/s) signal and adjust the core of **L11** (H4) for maximum output. Repeat these adjustments.



Underside view of the chassis. The waveband switch units are indicated by **1** and **2** in diamonds.

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