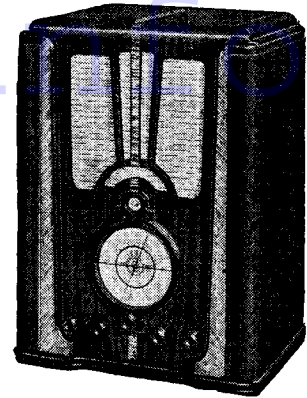


PILOT U106 SIX-BAND A.C. EIGHT



Typical of the American form of "big set," the Pilot U106 is an eight-valve plus rectifier superhet covering medium and long waves and four short bands including an ultra-short range.

The speaker may be removed if desired or, alternatively, the four leads to the speaker panel unsoldered. From top to

CIRCUIT.—The aerial input circuit provides connections for either a single wire or doublet aerial as desired. Coupling to V1, a 6U7G H.F. pentode operating as an amplifier, is effected by a set of transformer coils on all bands except Band 1. On Band 1 the aerial input is brought straight through to the grid of V2 via an ultra short wave inductance.

V1 is tuned anode coupled to V2, a 6L7G, acting as the mixer. A 6J7G (V3) is the separate oscillator and provides the beat frequency that, mixed with the incoming signal, gives a resultant signal of 456 kcs.

The converted signal passes via an I.F. transformer to the first I.F. amplifier V4, another H.F. pentode, via a further transformer to V5, a 6B8G double-diode H.F. pentode.

The pentode section of V5 operates as the second I.F. amplifier, while of the two diodes, one is used to operate the 6G5 visual tuning indicator and the other to provide the voltage for operating the A.V.C. network biasing the grids of V1, V2 and V4.

The output of the I.F. amplifier section of V5 passes via a further I.F. transformer to the strapped diodes of V6, a 6Q7G double diode triode. The coupling arrangements to the grid of the triode section of V6 include a manual volume control and a pick-up jack that quenches the radio section when operating on gramophone.

V6 is resistance capacity coupled to V7 and V8, two 6N6G output valves. A tone switch enables a further pair of L.F. coupling condensers to be brought into circuit or switched out as desired. It will be noticed that the 6N6G is a twin triode

valve enclosed in a single envelope with the cathode of the first triode internally connected to the control grid of the second triode. Bias for these valves is obtained from resistances connected between H.T. negative and the chassis earth line.

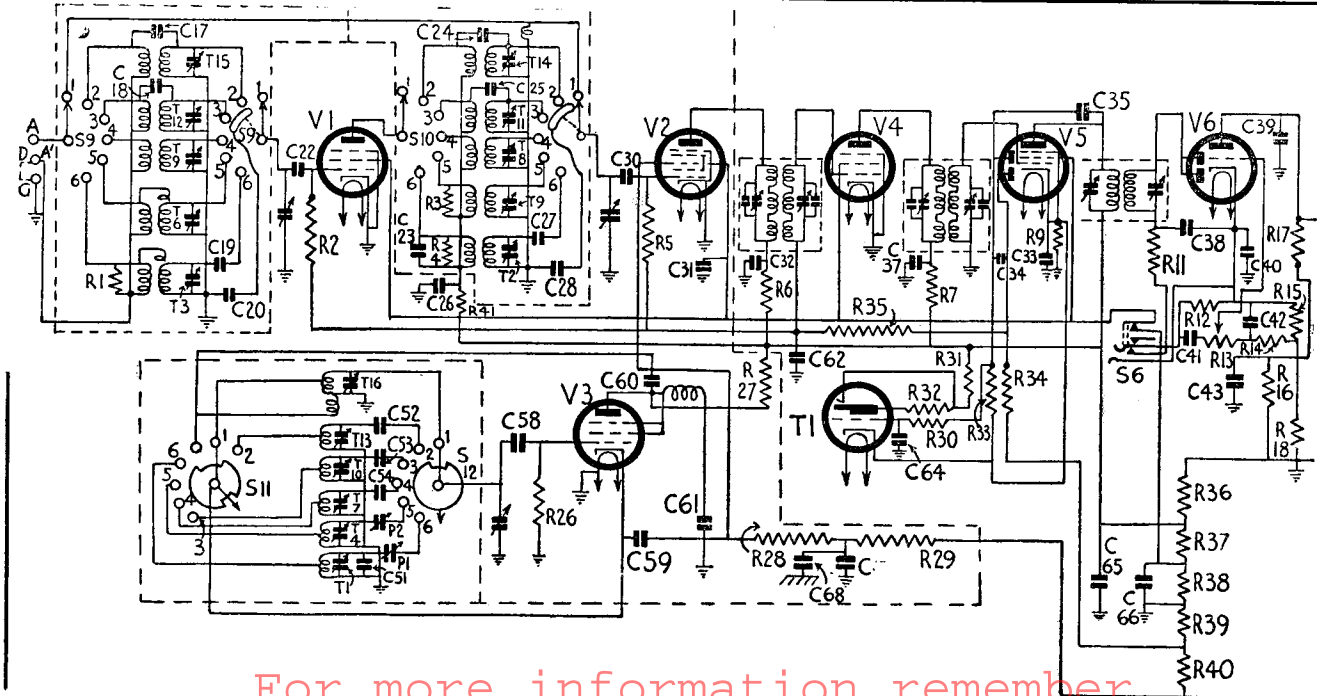
Mains equipment consists of a mains transformer, a 5U4G full wave rectifying valve, electrolytic smoothing condensers and a smoothing choke (the speaker field coil).

Chassis Removal.—Remove the back of the cabinet, the four spring fixed control knobs and the tuning knob (grub screw fixing). Remove the four chassis-securing bolts from the base of the cabinet. Unclip the visual tuning indicator and socket from its mounting.

The chassis may then be removed to the extent of the speaker cable and is sufficiently accessible for service.

RESISTANCES

R.	Purpose.	Ohms.	R.	Purpose.	Ohms.
1	L.W. aerial shunt	5,000	23	V8 grid leak	500,000
2	V1 A.V.C. feed	500,000	24	V7 and V8 anodes decoupling ..	3,000
3	M.W. H.F. primary shunt ..	4,000	26	Osc. grid leak	50,000
4	L.W. H.F. shunt	2,000	27	V3 anode feed	7,500
5	V2 A.V.C. feed	500,000	28	V2 grid leak	30,000
6	V2 anode decoupling	1,000	29	V2 grid leak	12,000
7	V4 anode decoupling	1,000	30	T.I. grid feed	1 meg.
9	V5 cathode bias	600	31	T.L. H.T. feed	20,000
11	H.F. stopper	50,000	32	T.I. anode feed	1 meg.
12	V6 demodulating diode load ..	250,000	33	V5 T.I. diode load	1 meg.
13	Volume control	750,000	34	V5 A.V.C. diode load	1 meg.
14	V6 bias decoupling	250,000	35	V4 A.V.C. decoupling	1 meg.
15	V6 cathode bias	2,500	36	H.T. line pot. network (part)	2,000
16	V6 anode decoupling	20,000	37	H.T. line pot. network (part)	4,200
17	V6 anode load	100,000	38	H.T. line pot. network (part)	4,000
18	V6 cathode load	100,000	39	A.V.C. delay volts pot. (part)	18
20	V7 grid leak	500,000	40	A.V.C. delay volts pot. (part)	28
21	Tone control	750,000	41	V1 anode decoupling	1,000



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bottom of the speaker panel, the black, yellow, green and red leads are connected in this order, whilst the remaining white lead is connected to the tag situated out of line with respect to the others.

The underside of the chassis is covered by a metal screening plate with slots which allow the trimmers to be adjusted. To remove this plate four bolts must be detached and two rivets removed.

Special Notes.—A jack at the rear of the chassis enables a pick-up to be connected and the insertion of the plug cuts off radio reception.

A similar jack, marked "headphone," enables a pair of high impedance headphones to be connected and insertion of the plug disconnects the speaker.

A pair of sockets at the rear of the chassis enable a permanent magnet speaker with an impedance of 10,000 ohms to be operated.

The separate oscillator valve, V3, operates in an electron coupled oscillator arrangement. On the ultra-short wave-band additional reaction is provided from

the anode of V3 to ensure stable oscillation.

The tuning pack, consisting of all coils and trimmers, is for completely screened by a metal box and for all practical purposes, inaccessible. The makers recommend that faulty tuning packs should be returned to the factory.

In our particular chassis two 100-ohm resistances (R42) connected in parallel were connected between the cathode of V7 and V8 and one side of the heater.

The combined waveband-indicating and dial-illumination lights are located in holders behind the wavelength dial. These have bayonet bases and are Ever Ready bulbs rated at 7.3 volts .25 amp.

Circuit Alignment Notes

I.F. Circuits.—Connect an output meter across the primary of the speaker transformer. Switch receiver to M.W. band,

(Continued on page 24)

Pilot U106 on Test

MODEL U106.—Standard model for A.C. mains operation, 200-250 volts, 50-60 cycles. Price, 25 gns.

DESCRIPTION.—Eight-valve, plus rectifier, table-type superhet, covering six bands.

FEATURES.—Airplane full-vision scale, section illuminated according to waveband, calibrated in metres and station names. Controls for combined brilliance and tuning, wave selection and bass tone switch. Jacks at rear of chassis for pick-up and high impedance headphones. Sockets for 10,000 ohms extension speaker. Visual tuning indicator.

LOADING.—140 watts.

Sensitivity and Selectivity.

ULTRA SHORT WAVES (4.5-15 metres).—Television sound received with reasonable strength at about 15 miles. No undue drift, although retuning was occasionally necessary.

SHORT WAVES (12-30, 26-70 and 65-195 metres).—Excellent gain and selectivity on all three bands. Nicely controlled A.V.C. Drift almost completely absent and handling very easy.

MEDIUM WAVES (190-550 metres).—Excellent gain and selectivity, with a good background. Gain well maintained over band. Local stations spread on adjacent channels only.

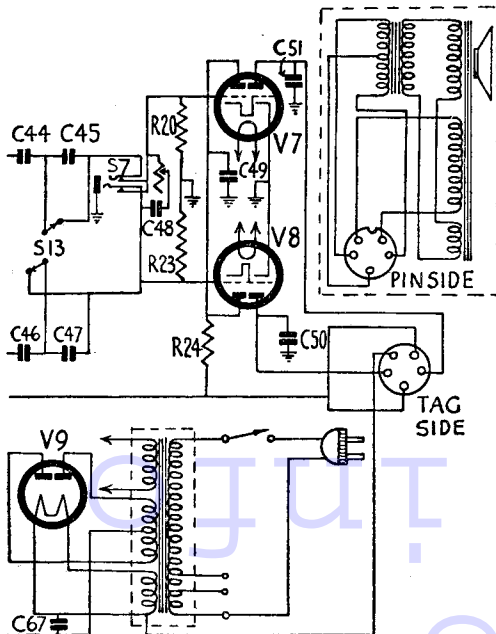
LONG WAVES (750-2,200 metres).—Excellent gain and selectivity, with good background. All main stations easily received without interference. Very slight side splash on Deutschlandsender.

Acoustic Output

Ample volume for a very large room. Tone controls are very nicely graded and the general tone tends to be on the deep side and very full, but at the same time has quite good attack.

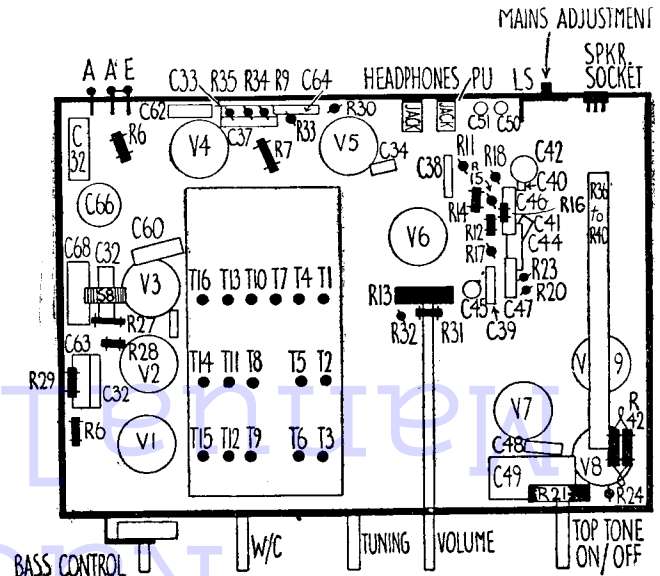
CONDENSERS

C.	Purpose.	Mfds.	C.	Purpose.	Mfds.
17	B2 additional aerial coupling	.00001	43	V6 anode decoupling ..	4
18	B3 additional aerial coupling	.000025	44	LF coupling .. .. .	.02
19	B6 aerial fixed padder	.01	45	Tone control .. .. .	.001
20	S9 shorting condenser	.01	46	LF coupling .. .. .	.02
22	V1 grid isolator	.00025	47	Tone control .. .. .	.001
23	LW HF primary fixed trimmer	.00015	48	Tone control .. .. .	.005
24	V1 additional anode coupling B2	.00001	49	V7 and V8 anodes decoupling	.25
25	V1 additional anode coupling B3	.000025	50	Output anodes shunt ..	.002
26	V1 anode decoupling	.02	51	Output anodes shunt ..	.002
27	B6 anode padder	.01	52	B2 fixed padder .. .. .	.00325
28	S10 shorting condenser	.01	53	B5 fixed padder .. .. .	.00267
30	V1 anode decoupling	.00025	54	B4 fixed padder .. .. .	.0013
31	V2 screen decoupling ..	.02	58	Oscillator grid .. .. .	.0001
32	V2 anode decoupling ..	.02	59	V2 injector grid coupling	.00005
33	V5 cathode shunt	.1	60	B1 extra reaction coupling	.02
34	V5 A.V.C. diode coupling	.000025	61	V3 anode decoupling ..	4
35	V5 T1 diode coupling	.000025	62	V4 A.V.C. decoupling ..	.02
37	V4 anode decoupling	.02	63	V2 grid decoupling .. ..	.1
38	HF bypass	.0001	64	T.T. grid decoupling ..	.02
39	V6 anode shunt	.0001	65	HT smoothing	8
40	HF bypass	.0001	66	V1, V2, V4 and V5 screens	8
41	LF coupling	.05	67	decoupling	20
42	V6 cathode bias decoupling	.10	68	HF smoothing	10
				Extra to C63	10



The circuit (left), is basically orthodox, but includes a number of refinements such as the separate oscillator V3 and separate diodes for demodulation, A.V.C. and visual tuner.

Right is the underchassis layout diagram. The drawing of the top is given on page 24.



Pilot U106 Six-Band

(Continued from page 23)

turn gang to maximum and tone controls to "high" position.

Connect a service oscillator via a .1 mfd. condenser to the top grid cap of V5 and chassis. Tune oscillator to 456 kc. and adjust the trimmers of I.F.T.3 for maximum response. Only feed sufficient input from the service oscillator to obtain definite peaks in the output meter, so as to prevent operation of the A.V.C.

Connect the service oscillator to the top grid cap of V4, adjust the trimmers of I.F.T.2, then connect the oscillator to the top grid cap of V2 and adjust the trimmers of I.F.T.1 for maximum.

Signal Circuits.—Connect the service oscillator to the A and E terminals of the receiver, only feeding sufficient input to obtain reliable peaks. Make sure that the metal connecting bar is between the E. and A2 terminals.

Long Waves.—Tune set and oscillator to 800 metres (375 kc.) and adjust T1, T2 and then T3 for maximum.

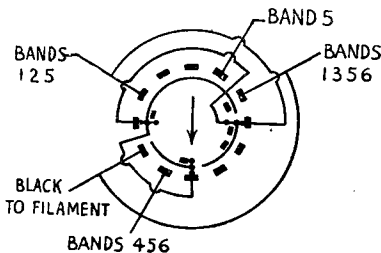
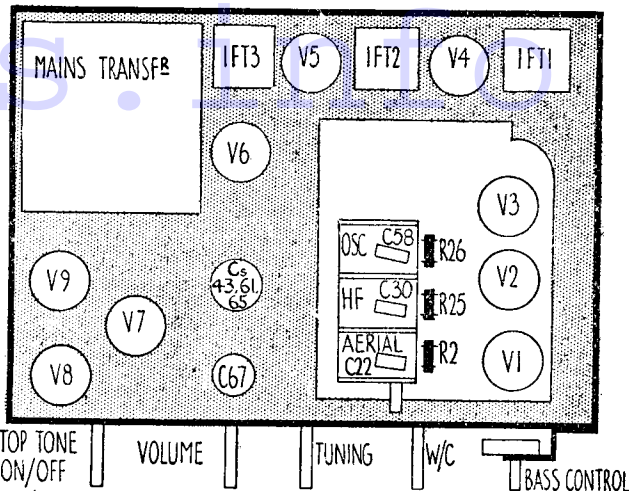
Tune oscillator to 2,000 metres (150 kc.), tune in on receiver, then adjust P1 for maximum, simultaneously rocking the gang.

Re-check at 800 metres.

Medium Waves.—Tune set and oscillator to 200 metres (1,500 kc.) and adjust T4, T5 and then T6 for maximum.

Tune oscillator to 500 metres (600 kc.), tune in on receiver, then adjust P2 for

This diagram (right) enables all parts on the top of the U106 chassis to be identified. Below, is the bank on the front of the band switch which controls the dial lights. Wave switch diagrams are not given because of the inaccessibility of the tuning pack.



maximum, simultaneously rocking the gang.

Re-check at 200 metres.

Short Waves.—Band 4. Tune set and oscillator to 70 metres (4.3 mc.) and adjust T7, T8 and T9 for maximum response, simultaneously rocking the gang.

Band 3. Tune set and oscillator to 27 metres (11.1 mc.) and adjust T10, T11, and then T12 for maximum response, simultaneously rocking the gang.

Band 2. Tune set and oscillator to 13 metres (23,077 kc.) and adjust T13, T14 and then T15 for maximum response, simultaneously rocking the gang.

Band 1. Tune set and oscillator to 5 metres (60 mc.) and adjust T16 for maximum.

Replacement Condensers.

Exact replacement condensers for the U106 available from A. H. Hunt, Ltd., Garratt Lane, Wandsworth, London, S.W.18, are: For either C42 or C58, unit number 2985, price 1s 4d.; for C67, 3s 4d., 7s. 6d.; for the block containing C43, C61 and C66, unit 4112 8s.; and for C66, 2632, 2s. 6d.

move, by means of a pin, the name-tag of the button and inset the prongs of the special tool provided into the two holes in the centre of the button. Press the button and rotate the dial (both ways) until the button engages with the slot behind dial, then rotate the special tool one turn counter-clockwise sufficient to loosen button, but not beyond this.

Still keeping button depressed, take out the tool and insert the blade into the centre of the button. Turn this screw, which will rotate the dial, until the desired station is again tuned in. Then, keeping the blade of the tool pressed in and held steady with one hand, tighten the button by clockwise rotation with finger and thumb of other hand. Then insert the appropriate name-tag.

Pye 802 A.C. Five

(Continued from page 27.)

if necessary to prevent the valve oscillating.

Tune service oscillator to 465 kc. and adjust the outer coils only of the I.F. transformers with an insulated spacer tool until a maximum peak is obtained in the output meter. After adjustment re-seal the coils with ordinary coil dope and if possible leave for approximately two hours to dry before carrying out any signal trimmer adjustments.

Signal Circuits.—Connect the service oscillator to the A. and E. sockets via a dummy aerial, only feeding sufficient input to obtain reliable peaks in the output meter so as to keep the A.V.C. inoperative.

Short Waves.—Tune set and oscillator to 15 metres (20 mc.) and adjust T1 for maximum.

Inject a 50 metres (6 mc.) signal and tune in on receiver. The oscillator circuit must be adjusted to make the calibration correct in moving the lead to the oscillator section of the gang in relation to the short wave winding on the oscillator coil.

Similarly the aerial circuit must then be adjusted for optimum signal strength by moving the black lead to the S.W. aerial coil in relation to this winding. (Note that the gang must be retuned each time a lead is moved.) If much adjustment is required repeat the trimming adjustment at 15 metres.

Medium Waves.—Tune set and oscillator to 210 metres (1,425 kc.) and adjust T2 and then T3 for maximum.

The medium wave calibration is fixed, but check at 500 metres (600 kc.), and if necessary compensate with T2 afterwards retrimming T3 on a 210 metres signal.

Long Waves.—Tune set and oscillator to 1,800 metres and adjust P1 for maximum, simultaneously rocking the gang.

Replacement Condensers

Exact replacement condensers for the Pye 802 are made by A. H. Hunt, Ltd. These are: For the block containing C34 and C35, unit 3990, price 9s. 3d.; for C18, 4049, 1s. 9d.; C33, 2935, 1s. 9d.; and for C27, 4015, 1s. 6d.

VALVE READINGS

Screen and anode voltages measured to cathode.

V.	Type.	Electrode.	Volts.
1	6U7G	Anode	216
		Heaters	6.3
		Screen	94
2	6L7G	Anode	228
		Heaters	6.3
		Screen	94
3	6J7G	Anode	170
		Heaters	6.3
4	6U7G	Anode	224
		Heaters	6.3
		Screen	94
5	6A8G	Anode	222
		Cathode	3.7
		Heaters	6.3
		Screen	94
6	6Q7G	Anode	180
		Cathode	43
		Heaters	6.3
7	6N6G	Anode	350
& 8		Heaters	6.3
		Driver anode ..	305
9	SU46	Unsmoothed D.C.	420

Philco D521 Empire Automatic

(Continued from page 33.)

receiver (corresponding to dot under letter "t" in word "Budapest") and adjust P2 for maximum, simultaneously rocking the gang.

Repeat until no further improvement results.

Automatic Buttons.—The receiver is sent out adjusted to receive a selected number of stations. If a station not mentioned on the button name tags is desired, then the button nearest the slot (at the back of the dial) when the station is tuned in should be used.

With the desired station tuned in, re-