January, 1937

Broadcaster Service Man's Manual

(FFNGIN

650 ALL-WAVE PILOT SUPERHET

CIRCUIT.—A five-valve plus rectifier superhet for operation on A.C. mains and working on the usual medium and long wavelengths and two short bands.

An inductively coupled aerial transformer precedes V1, an H.F. pentode, which is coupled through a further transformer to V2, the frequency changer Top capacity coupling is employed on the first

short wave band.

An I.F. transformer tuned to 456 kc. is used to couple the signal to V3, an H.F. pentode, and through a second H.F. pentode to V4, a double diode triode. Both these transformers have a third winding interposed between the main winds and taking the form of a simple tuned circuit,

the effect being to increase the selectivity.

The cathode ray tuning indicator is operated from this stage by the rectified signal from V4.

The volume control, R11, also operates at this stage by regulating the input to the grid. The pick-up, when connected, breaks the coupling between the diode and the

grid and is coupled via C29 to the grid.

The diodes of V5 are strapped and used for both demodulation and to provide A.V.C. bias, which is fed to V1 and V2 in the orthodox manner. V3 is not con-

trolled by A.V.C.
L.F. signals from V4 are resistance and capacity coupled to the output pentode V5, and then to the moving-coil speaker through a matching transformer. V5 is tone-controlled by C36 and R18.

Mains equipment consists of transformer, full-wave rectifier, electrolytic condensers and the speaker field.

Special Notes.-The six dial lights are of the miniature bayonet-cap type, and replacements should be obtained from the manufacturers. The holders are secured to



An electronic tuning indicator is incorporated in this five-valve plus rectifier all-wave American-type superhet marketed by Pilot Radio Ltd.

VALVE READINGS Volume maximum. 200 volts A.C.

v.	Type.		Electrode.	Volts.	Ma.
	All Pilot.				
1	6D6 (6)		Anode	250	6.25
			Screen	95	1.
2	6A7 (7)		Anode	250	3.5
			Screen	65	2.9
			Osc.anode	145	2.8
3	6D6 (6)		Anode	225	5.9
•	(-,		Screen	95	1.1
4	75 (6)		Anode	50	.3
4 5	42 (6)		Anode	230	37
-	\-//•	٠.	Screen	250	6,5
6	80 (4)		Filament	340	

the dial assembly by spring clips and are easily removed.

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The external speaker is connected on the primary of the output transformer and should have its own matching transformer.

Removing Chassis .- Remove four knobs from the front of the cabinet, the tuning knob being secured by a grub screw and the others by spring clips, unplug the speaker from its socket on the back of the chassis and then remove four bolts from underneath the cabinet.

The chassis may then be partly with-drawn and the tuning indicator plug removed from the front of the chassis. The chassis will then be entirely free.

ALIGNMENT NOTES

I.F. Circuits.—Switch the receiver to the medium wave band and fully mesh the condenser plates. Connect an output meter, to read 1.5 volts, across the external speaker terminals. Inject a signal of 456 kc. and about

.5 volt via a dummy aerial to the grid of V3, and adjust T1, T2, T3 for maximum.

Transfer the oscillator to the grid of V2, and trim T5, T4 and T6 for maximum.

Medium Waves.—Tune the receiver to

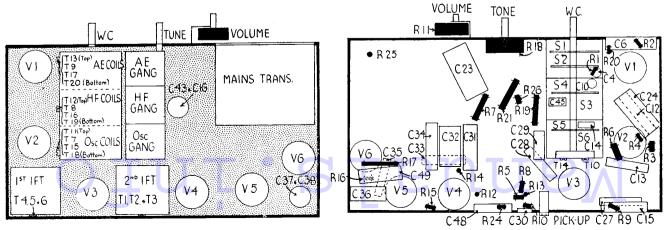
200 metres and inject a signal of this wavelength to the aerial and earth terminals. Adjust T7, T8 and T9 for maximum reading on the output meter.
Inject and tune in a signal of 500 metres

and, while rocking the gang condenser, adjust T10 for maximum.

Carefully repeat the above adjustments until no further improvement is possible.

Long Waves.—Tune the receiver to 750 metres and inject a signal of this frequency

(Continued on next page.)



The orderly construction of the chassis of the Pilot set is shown by these layout diagrams. Resistors are indicated in solid black to speed reference.

PILOT 650 SUPERHET

(Continued from previous page.) to the aerial and earth terminals. Adjust T11, T12 and T13 for maximum.

Inject and tune in a signal of 2,000 metres and, while rocking the gang condenser, adjust T14 for maximum output.

Repeat the above until the best results are obtained.

Short Wave 2.- Set the pointer to the 49 metre index mark, inject a signal of

R. Purpose. Ohms. 1 V1 A.V.C. decoupling 100,000 2 V1 cathode bias 400 3 V2 cathode bias 400 4 V2 osc. grid leak 50,000 5 Diode load (part) 100,000 6 V2 screen decoupling 30,000 7 V2 screen and osc. anode deceupling 10,000 8 V2 A.V.C. decoupling 1 meg. 9 V3 cathode bias 600 10 Diode load (part) 200,000 11 Volume control 1 meg. 12 Diode load (part) 200,000 13 V4 cathode bias 40,000 15 V4 anode decoupling 100,000 16 V5 grid leak 500,000 17 V5 cathode bias 100,000 18 Tone control 100,000 19 V1 and V3 screen decoupling potr. 40,000 20 V2 land V3 screen decoupling potr. 40,000 21 V2 scrcen and osc. anode		RESISTANCES	
2 V1 cathode bias 400	R.	Purpose.	Ohms.
2 Vi cathode bias 400	1	V1 A,V,C, decoupling	100,000
4	2	V1 cathode bias	
4	3	V2 cathode bias	400
6 V2 screen decoupling	4	V2 osc. grid leak	50,000
coupling. 1 meg. 600 10 Diode load (part) 50,000 1 meg. 12 Diode load (part) 200,000 13 V4 cathode bias 40,000 14 V4 anode load 250,000 15 V4 anode decoupling 100,000 15 V4 anode decoupling 100,000 16 V5 grid leak 500,000 17 V5 cathode bias 410 100,000 18 Tone control 100,000 19 V1 and V3 screen decoupling 20 V2 screen and osc. anode decoupling 20 V2 long-wave modifier 22 V2 long-wave modifier 23 Long-wave aerial coil modifier 25 Long-wave aerial coil modifier 25 Tuning indicator grid 1 meg. 1 meg. 26 V3 anode decoupling 4,000 1 meg. 26 V3 anode decoupling 4,000 1 meg. 27 28 28 29 29 29 29 29 29	5		100,000
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9 V3 cathode bias 50,000 11 Volume control 1 meg. 12 Diode load (part) 200,000 13 V4 cathode bias 40,000 14 V4 anode load . 250,000 15 V4 anode decoupling 100,000 16 V5 grid leak 500,000 17 V5 cathode bias 410 18 Tone control 100,000 19 V1 and V3 screen decoupling potr. 20 V1 and V3 screen decoupling potr. 21 V2 screen and osc. anode decoupling. 22 V2 long-wave modifier 25 Long-wave aerial coil modifier 40,000 24 Tuning indicator grid 1 meg. 25 Tuning indicator feed 1 meg. 26 V3 anode decoupling . 4,000	٥		1
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23 Long-wave aerial coil modifier 50,000 24 Tuning indicator grid 1 meg. 25 Tuning indicator feed 1 meg. 26 V3 anode decoupling 4,000	22		250
24 Tuning indicator grid 1 meg. 25 Tuning indicator feed 1 meg. 26 V3 anode decoupling 4,000			50,000
26 V3 anode decoupling 4,000			
			1 meg.
Field coil 1,400	26		4,000
		Field coil	1,400

this frequency and trim T15, T16 and T17 tor maximum.

Short Wave 1 .- Tune to 16.6 metres and inject a signal of 16.6 metres to the aerial and earth terminals. Trim T18, T19 and T20 for maximum, rocking the gang condensers while adjusting T19.

6 V1 10 V2 113 V2 114 V2 115 V2 116 V2 20 Shock 22 Shock 22 V1 24 V1 25 Nee 27 V3 28 V3 28 V3 28 L.F. 30 H.I. 31 V4 33 L.F. 36 Toi 38 H.I. 38 H.I. 38 V2 30 H.I. 31 V4 32 V5 34 V5 36 H.I. 38 H.I. 38 H.I. 38 H.I.	Purpose. A.V.C. decouplin cathode bias shu screen decouplin osc. grid screen and osc. a outpling, screen and osc. a coupling rt-wave padding rt-wave padding anode decouplin screen decouplin screen decouplin screen decouplin cathode bias shu	g nt g nt conde do node do	e- e-	Mfd05 .1 .05 .1 .05 .2 .00005 .2 .00137 .00287 .25 .1
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20 Shoc 22 Shoc 22 Shoc 22 Shoc 22 V1 25 Net 22 V3 28 V3 29 L.F. 33 L.F. 31 V4 32 V5 36 For 36 H.M. 34 V5 36 H.M. 34 V2 V2	oupling, screen and osc. a coupling rt-wave padding rt-wave padding anode deroupling screen decouplin	node d	e-	2 .00137 .00287 .25
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33 L.F 34 V5 35 Per 36 Tor 37 H.7 38 H.7 43 V2	cathode bias shu	nt		10
34 V5 35 Per 36 Tor 37 H.7 38 H.7 43 V2	anode decoupling	z		.1
34 V5 35 Per 36 Tor 37 H.7 38 H.7 43 V2	coupling			.01
36 Tor 37 H.1 38 H.1 43 V2	cathode bias shu	nt		10
36 Tor 37 H.1 38 H.1 43 V2	itode compensati	ng		.005
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44 9 7	screen and osc. a oupling	node d	е-	2
	V.H.F. coupling			.00001
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	ins suppressor ins suppressor ning indicator de ternal speaker co		1	

McMICHAEL 366 R.G. ALIGNMENT

(Continued from page 43.)

Connect a modulated oscillator to the grid cap of V1 and an output meter across the external speaker terminals. speaker plug should be pushed in just far enough to make contact, while leaving the internal speaker in circuit—about 1-in. is far enough. Connect a .1 mfd. condenser across the oscillator section of the gang

condenser to stop the valve oscillating.

Inject a signal of 128.5 kc. and trim T1,
T2, T3 and T4 for maximum reading on the output meter.

Medium Waves.—Inject a signal of 214 metres to the aerial and earth terminals and tune it in. Trim T5 for maximum reading on the output meter. A weak reading on the output meter. A weak signal should be used and the peak nearest minimum capacity selected. Then adjust T6 and T7 for maximum.

Long Waves.—Inject and tune in a signal of 1,000 metres and adjust T8 for

maximum on the output meter.

Calibration.—With the gang condenser vanes fully meshed the pointer should be resting over a black mark at the top end of the tuning scale and filling in the two lines forming the outer scale.

If this is not so, then the screw in the centre of the pivot must be slackened and the pointer moved to the correct position.

QUICK TESTS

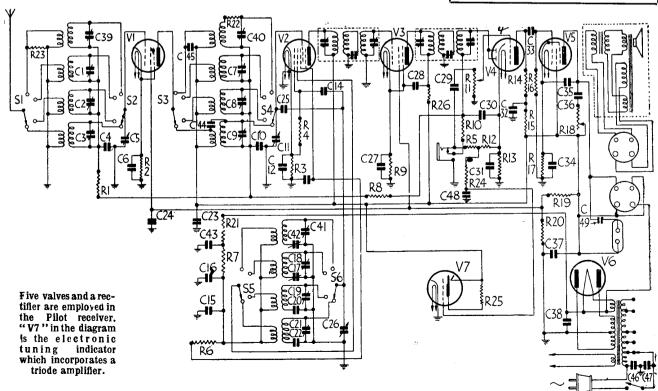
Quick tests are available on this receiver on the terminal panel at the rear of the chassis shelf. Volts measured between this and the chassis should be:

Red, 220v., smoothed H.T.

Green, speech coil.

Blue, speech coil.

Black, 385v., unsmoothed H.T.



For more information remember www.savoy-hill.co.uk