

PHILCO D531 A.C. FIVE WITH AUTO TUNING

CIRCUIT.—The aerial input to the signal grid of V1, a 6A7 frequency changer, is via a choke-coupled circuit to single-tuned circuits on the medium and long waves and by an H.F. transformer on the short waves.

The oscillator circuit will be recognised as a modified Hartley arrangement with single coils acting both as grid and regeneration windings.

An I.F. transformer, tuned to 475 kc., couples the frequency changer to the I.F. amplifier V2, an H.F. pentode type 78E. V2 is in turn coupled by another transformer to the demodulating diode of V3, a type 75 double-diode triode.

An H.F. filter circuit is interposed between the secondary of the transformer and the demodulating diode load, and the rectified potentials are led via an L.F. coupling condenser to the manual volume control, VR2, and thence to the grid of the triode section of the valve.

The other diode of V3 provides a D.C. potential, and is utilised for the automatic volume control of V1. Negative feedback potentials, derived from the secondary of the speaker transformer, are led to the cathode circuit of V3, and provide a tone-control arrangement controlled by VR1.

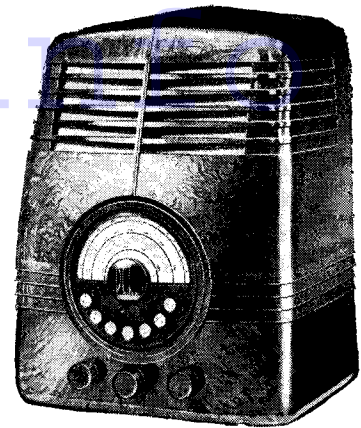
V3 is resistance-capacity coupled to the 42E output pentode. The pentode compensator condenser C10 can be directly connected between the anode and cathode of the valve or in series with a resistance, thereby giving fixed tone modifications.

A potentiometer connected between H.T. negative and chassis line provides bias for the grid and suppressor grid of V2, the grid of V4 and also a delay voltage for the A.V.C.

Mains equipment consists of a mains transformer, a full-wave rectifying valve V5, electrolytic smoothing condensers and a smoothing choke (the speaker field coil). Mains suppressor condensers are connected between the primary of the mains transformer and chassis.

Chassis Removal.—Remove the back of the cabinet (secured by wood screws) and the four spring-fixed control knobs. Remove the four chassis-securing bolts from the base.

The chassis may then be completely removed from the cabinet, and is fully accessible for all service requirements.



The Philco D531 is available in either moulded or wooden cabinets; the moulded version is shown above.

Special Notes.—The mains adjustment device at the rear of the chassis consists of two sockets, inscribed with voltage values, into one of which a threaded member is screwed.

A pair of sockets at the rear of the chassis enables a pick-up to be connected for gram, work, and extension speaker sockets are also provided. The extension speaker should have an impedance of some 2 or 3 ohms.

The single dial light is rated at 6.3 volts .35 amp., has a bayonet-type base and is a Philco No. 34-2141.

C18 and C19 are contained inside the coil can of IFT1, and R19, C20 and C21 are inside IFT2.

Alignment Notes

I.F. Circuits.—Connect an output meter across the primary of the speaker transformer and a service oscillator between the top grid cap of V1 and chassis, leaving the normal grid connection still made. Switch the receiver to medium waves, turn gang to maximum and the tone control to "high."

Tune the service oscillator to 475 kc. and adjust VC1, VC2, VC3 and VC4 in that order for maximum response, reduc-

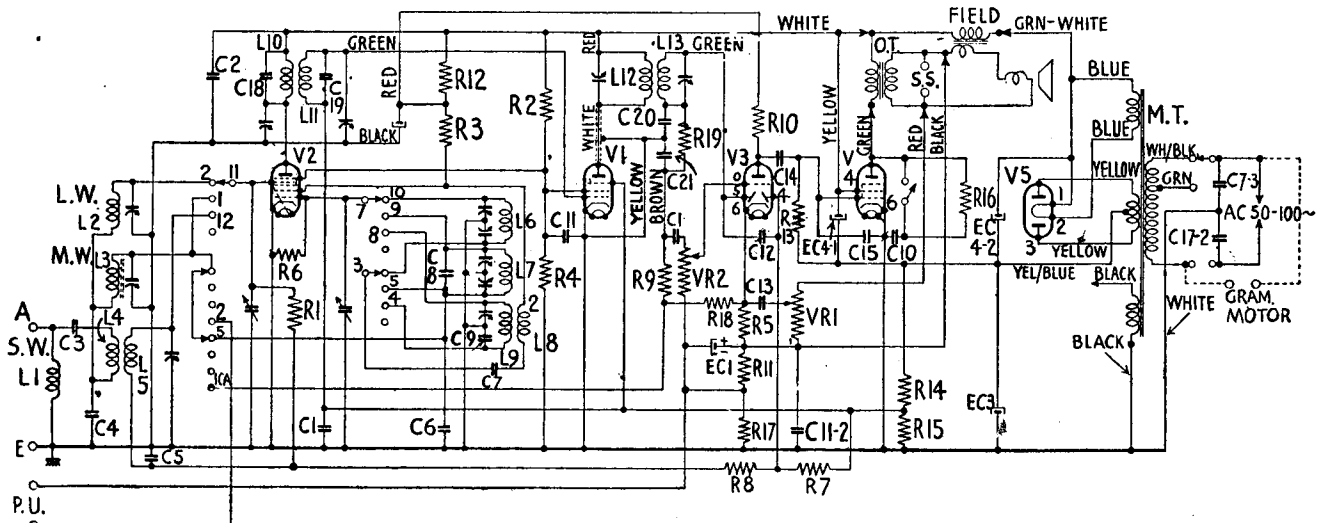
WINDINGS (D.C. Resistances)

L.	Ohms.	Range.	Where measured.
1	25	Any	Aerial socket and chassis.
2	45	L.W.	Top grid V1 and C4.
3	3.5	M.W.	Top grid V1 and C4.
4	Below .1	S.W.	C3 and C4.
5 .. ..	.1	S.W.	Top grid V1 and C4.
6	25	L.W.	Osc. grid and C7.
7	5	M.W.	Osc. grid and C7.
8 .. ..	.1	S.W.	Osc. grid and C7.
9 .. ..	.5	S.W.	Osc. anode and C7.
10	8	Any	Red and white wires.
11	12	Any	Green and brown wires.
12	12	Any	Red and white.
O.T. prim.	500	Any	White and green wires spkr. panel.
M.T. prim.	20	Any	Mains plug pins.
Total H.T. sec.	480	Any	Yellow leads to V5.
Field	1,140	Any	Green-white and white wires spkr. panel.

VALVE READINGS

No signal. Volume maximum. M.W. min cap. 230 volt. A.C. mains.

V.	Type.	Electrode.	Volts.
1	6A7	Anode ..	265
		Screen ..	90
		Osc. anode ..	200
2	78E	Anode ..	265
		Screen ..	90
3	75	Anode ..	150
4	42E	Anode ..	250
		Screen ..	265
5	80	Heaters	365



A modified Hartley arrangement is used in the circuit employed in the Philco D531, a three-band A.C. superhet with automatic tuning.

ing the input from the service oscillator as the circuits come into line.

Signal Circuits.—Check that the light slot and the pilot light are in line with the letter D in the word Daventry on the S.W. scale, and the dot at 214 metres under letters "OR" in the R. Normandie.

Open tuning condenser to fullest extent, insert a .006-in. feeler gauge under the heel of the moving vanes, close gang on gauge and check that the indicator reads on letter "E" in R. Normandie. Remove gauge.

Connect the service oscillator to the aerial and earth sockets via a standard dummy aerial. Only feed sufficient input to obtain reliable peaks in the output meter and progressively reduce the input as the circuits come into line to keep the A.V.C. inoperative.

Medium Waves.—Tune set and oscillator to 214 metres (1,400 kc.) and adjust T1

and then T2 for maximum; 214 metres is marked by a dot on the scale.

Tune set and oscillator to 500 metres (600 kc.) and adjust P1 (screw of double padding condenser) for maximum, simultaneously rocking the gang.

Long Waves.—With wave selection switch in the M.W. position, feed in and tune a 285.7 metres (1,050 kc.) signal—this corresponds to West Regional.

Keep the dial in this position, switch set to L.W. band and feed a 1,293 (232 kc.) signal—this corresponds to Luxembour—adjust T3 and then T4 for maximum response.

Tune set and oscillator to 1,875 metres

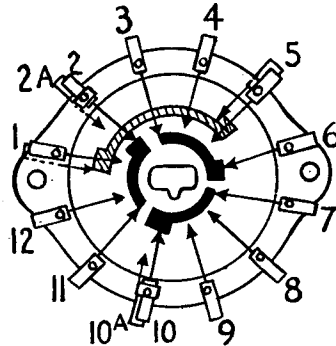
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CONDENSERS

C.	Purpose.	Mfds.
1	Bias decoupling01
2	H.T. line by-pass25
3	Aerial coupling006
4	Aerial padder .. .. .	.00225
5	A.V.C. decoupling S.W. ..	.04
6	M.W. osc. anode shunt .. .	.00025
7	Osc. anode coupling .. .	.0008
8	M.W. osc. fixed trimmer ..	.000012
9	S.W. osc. fixed padder .. .	.0025
10	Pentode compensator .. .	.01
11-1	V1 and V2 screens decoupling	.05
12	A.V.C. diode coupling .. .	.00011
13	Feed back coupling .. .	.25
14	L.F. coupling .. .. .	.01
15	V4 grid shunt .. .. .	.00025
16	L.F. coupling .. .. .	.1
17	Mains suppressors .. .	.015+.015
18	I.F.T.1 prim. fixed trimmer	.000115
19	I.F.T.1 sec. fixed trimmer ..	.00005
20	H.F. by-pass .. .. .	.00011
21	H.F. by-pass .. .. .	.00011
11-2	Feed-back .. .. .	.05
EC1	Bias decoupling .. .. .	.65
EC2	V3 anode decoupling .. .	.16
EC3	Bias pot. shunt .. .. .	.35
EC4	H.T. smoothing	8+8

RESISTANCES

R.	Purpose.	Ohms.
1	V1 A.V.C. feed	1.5 meg.
2	V1 and V2 screens pot. (part)	51,000
3	Osc. anode load	25,000
4	V1 and V2 screens pot. (part)	150,000
5	V3 cathode bias	120
6	Osc. grid leak	70,000
7	A.V.C. diode load	1 meg.
8	A.V.C. decoupling	1 meg.
9	Demodulating diode load (part)	240,000
10	V3 anode load	250,000
11	V3 cathode network (part)..	4,000
12	V3 anode decoupling .. .	6,000
13	V4 grid resistance	1 meg.
14	Bias pot. (part)	200
15	Bias pot. (part)	65
16	Tone modifier	15,000
17	V3 cathode network (part)..	20,000
18	Demodulating diode load (part)	40,000
19	H.F. stopper	51,000
VR1	Tone control	1,000
VR2	Volume control	500,000



Philco D531 on Test

MODEL D531.—A.C. mains, 200-250 volts, 50-100 cycles. Price 11 gns. D531B, in bakelite, 9½ gns.

DESCRIPTION.—Four-valve, pi u s rectifier, three-band table superhet with automatic tuning.

FEATURES.—Full-vision scale calibrated in station names and metres with S.W. scale in megacycles. Telephone-type dial with seven press-turn buttons giving nine stations. "Bumper" at end of travel to prevent distortion of gang when using press-turn buttons. Slow-motion manual tuning provided by separate knob concentric with tone control. Other controls for combined volume and master switch, wave selection and combined tone control and tone switch. Sockets for pick-up and low-impedance extension L.S.

LOADING.—60 watts.

Sensitivity and Selectivity
SHORT WAVES (16.6-50 metres).—Representative gain and selectivity, handling quite easy and no noticeable drift.

MEDIUM WAVES (200-550 metres).—Good gain and selectivity with small local station spread. Gain well maintained over band.

LONG WAVES (1,100-1,900 metres).—Similar performance to medium waves with all main stations easily received clear of interference.

Acoustic Output
Ample volume for an ordinary room with well-balanced tone. Very little colouration on speech and general reproduction. **Press-button Operation**

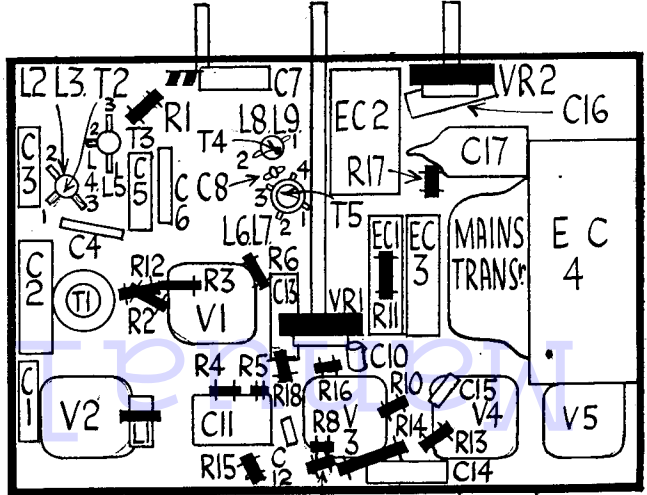
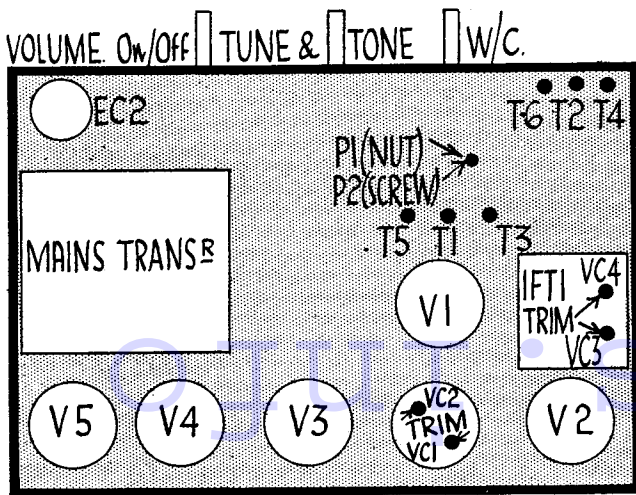
The settings were found to be accurate. The handling was, perhaps, a little stiff, but there was no trace of slip on releasing pressure from the buttons. Ample latitude in adjustment for selection between adjacent buttons.

Left, the arrangement of the switch of the Philco D531. Below are the diagrams showing the chassis layout, the upper and under views being on the left and right respectively.

QUICK TESTS

Quick tests are available on the leads to the speaker panel. Voltages measured between these and the chassis should be —

- Green lead, 250 volts, smoothed H.T.
- White lead, 265 volts, smoothed H.T.
- Green-white lead, 365 volts (between lead and R18+R14).



MAINS ADJUSTMENT

R7

black from a grommet in the chassis to the second tag, and the earthing lead from the chassis and the lead to the external earth socket to the third tag.

Special Notes.—A pair of sockets on the side of the cabinet enables an external aerial and earth system to be connected for use in screened localities.

C14, the pentode compensator condenser, is connected on the primary of the speaker transformer.

The single pilot light is mounted in a screw-in holder. It is rated at 2 volts .1 amp., and has an M.E.S. base.

A pair of sockets on the side of the cabinet enables an extension speaker to be connected or headphones to be used. The speaker should be of the low impedance (2 to 4 ohms) type.

The chassis is in the form of two sections, held together by the speaker baffle structure. One carries the "radio" components and the other the output part.

A screen is fitted underneath the chassis to insure against feed-back effects.

The cabinet is fitted with a turntable for easy use of the directional properties of the frame.

Circuit Alignment Notes

Connect an output meter across the primary of the output transformer in

usual manner. Turn volume control to maximum and adjust the reaction control so that the receiver is nearly but not quite oscillating.

Tune the receiver to 214 metres (1,400 kc.) and bring a service oscillator tuned to the same frequency near to the receiver. Only feed sufficient input from the oscillator to obtain reliable peaks in the output meter.

Adjust T1 and then T2 maximum with the reaction control set so that the receiver is not quite in the oscillating condition. The lowest input possible from the service oscillator should be used for optimum results.

There are no separate adjustments for the long-wave band.

WINDINGS (D.C. Resistances)				
L.	Ohms.	Range.	Where measured.	
1.. ..	1.5	M.W.	Tags or top grid V1 and chassis.	
2.. ..	21	L.W.	Tags or top grip V1 and chassis.	
3.. ..	2.3	M.W.	Anode V1 and V3.	
4.. ..	21	L.W.	Anode V1 and V3.	
5.. ..	4	M.W.	Anode V2 and reaction condenser.	
6.. ..	13.5	L.W.	Anode V2 and reaction condenser.	
I.T. ..	2900+ 1300	Any	Tags.	

McMichael Bijou on Test

MODEL 387.—"Bijou." For B battery operation, requiring a Drydex type H.1146 90-volt H.T. J.T.MV5 and an Oldham type J.T.MV5 2-volt accumulator. PRICE.—8 gns.

DESCRIPTION.—Four-valve straight portable with reaction.

FEATURES.—Receiver and frame aerials in leatherette-covered case with carrying bar. Turntable on base. Unique slow and fast tuning control constituted by a metal bar in front of speaker grille. Edgewise tuning scales on each side of speaker grille calibrated in metres and station names. Other controls for combined reaction and volume and combined wave selection and master switch. Sockets on side of cabinet for low impedance speaker and external aerial and earth.

LOADING.—H.T., 6.4 ma.; L.T., .7 amp.

Sensitivity and Selectivity

MEDIUM WAVES (200-550 metres).—Very well maintained gain and sensitivity with ample volume on the main stations even in daylight. Adequate selectivity and easy handling, with complete freedom from reaction overlap.

LONG WAVES (1,000-1,900 metres).—Similar performance to medium waves with good volume from all the usual stations and excellent selectivity with the directional properties of the frame aerial.

Accustic Output

Very well balanced tone for a small portable, with no undue cutting of the top notes, and pleasing reproduction on speech and music.

Philco D531

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(160 kc.) and adjust P2 (the nut of the double padding condenser) for maximum, simultaneously rocking the gang. 1,875 metres is marked by a dot on the scale.

Repeat both operations until no further improvement results.

Short Waves.—Tune set and oscillator to 18 mc., screw T5 right up and then unscrew until the second peak is heard. Then adjust T6 for maximum sensitivity.

On some receivers pulling will be experienced when T6 is adjusted. By shunting a .00035-mfd. condenser (variable) across the oscillator section of the gang and tuning it so that the second harmonic instead of the fundamental beats with the incoming signal, this pull can be minimised.

Therefore, connect the variable condenser between the tag of T5 and chassis and tune it (about half open) for signal at 18 mc. Then trim T6 for maximum, disconnect the shunt condenser, screw T5 right up and then unscrew until the second peak is heard.

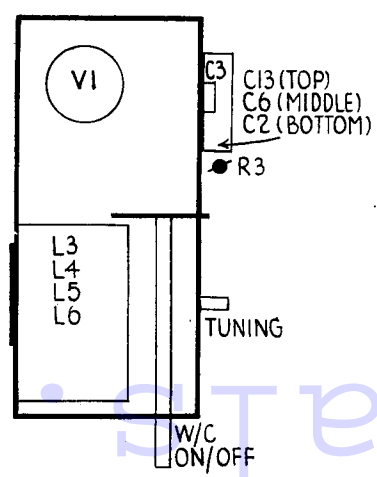
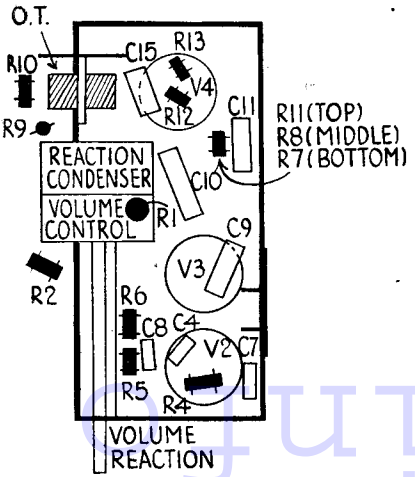
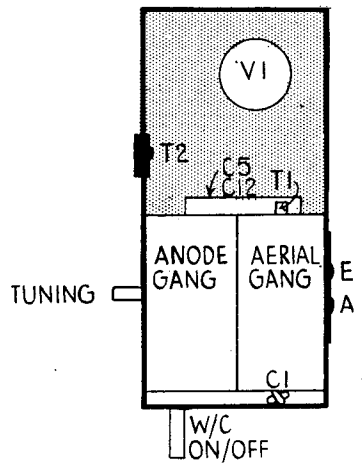
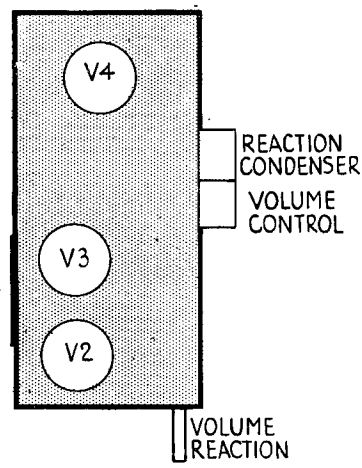
Check that the 18-mc. image is obtained at approximately 17.1 mc.

Automatic Buttons

Press the button and rotate the dial (either way) until the button engages with the slot behind the dial. Then rotate the special tool one turn counter-clockwise—sufficient to loosen the button—but not beyond this.

Still keeping the button depressed, take out the tool and insert the blade into the centre of the button. Turn the screw until the desired station is again tuned in.

Then, keeping the blade of the tool depressed in and held steady with one hand, tighten the button by clockwise rotation with finger and thumb of the other hand. To complete operations insert the appropriate name tag.



There are two sections to the Bijou chassis, one for the radio side and one for the output. Here the top "deck" views are shown tinted with the corresponding underside layouts below.