# PHILCO

# Radio Service Bulletin No. 79

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## Model A.421

TYPE CIRCUIT : Four-valve Superheterodyne Receiver with highly selective iron dust core coils, full A.V.C. and high slope Pentode Output (3 watts) for operation on Long and Medium wavebands. Provision is made for connecting an external speaker of the Permanent Magnet Moving-Coil type having an impedance of 2-3 ohms.

MAINS SUPPLY : Alternating current mains of 200-229 volts or 230-250 volts, 50-100 cycles when the correct transformer tapping is employed. Two tappings are provided : green (labelled 220 v.) covering 200-229 volts and white/black (labelled 245 v.) covering 230-250 volts.

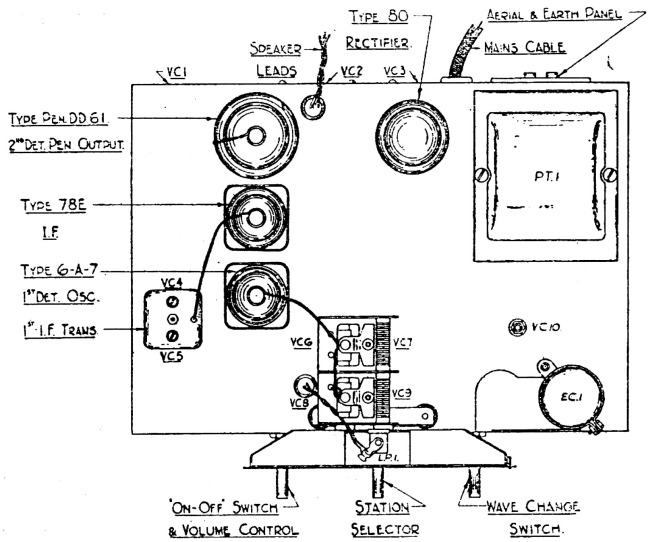
WAVEBANDS : COVERAGE : Two : (*a*) Long, 2,000-1,000 metres (150-300 Kc.) ; (*b*) Medium, 550-200 metres (545.4-1,500 Kc.).

TUNING DRIVE : Geared 6 : 1 ratio for smooth and accurate tuning.

LOUDSPEAKER : The 6 in. diameter fully energised moving-coil speaker used gives the highest efficiency audio output and greater bass response is obtained due to the large baffle.

INTERMEDIATE FREQUENCY : 451 Kc.

POWER CONSUMPTION : 40 watts approx.




TOP CHASSIS DIAGRAM.

## TABLE 1 — VOLTAGES.

Valve socket readings to chassis taken with an 065 or 077 Philco Set Tester on the 500, 250 and 10 volts ranges. Volume control at minimum, wavechange switch in M.W. position and no aerial connected. A.C. line 245 volts, 50 cycles. Speaker, Part No. 360-1127 (2,000 ohms field).

| POSITION | VALVE | ANODE | SCREEN | BIAS |
|---|---|---|---|---|
| 1st Detector and Oscillator, S.3 ... | 6A7 | Pin 3. 250 v.<br>Pin 5. 200 v.* | Pin 4. 100 v. | Pin 7. 6.5 v. |
| I.F. Amplifier, S.2... ... ... | 78E | Pin 3. 250 v. | Pin 4. 100 v. | Pin 5. 6.5 v. †<br>Pin 6. 6.5 v. |
| 2nd Detector, A.V.C. and Pentode Output, S.1 ... ... ... | PEN. D.D.61 | Pin 6. 245 v. | Pin 4. 250 v. | Pin 3. 5.5 v. |
| Full-wave Rectifier, S.4 ... ... | 80 | Pin 3. 350 v. A.C.<br>Pin 4. 350 v. A.C. | — | — |

* Oscillator Anode Volts. † Suppressor Grid Volts.
Total D.C. 360 volts measured between EC.1/1 and chassis.

*NOTE :* Above voltages are slightly increased when Speaker Part No. 360-1106 (1,140 ohms field) is used.

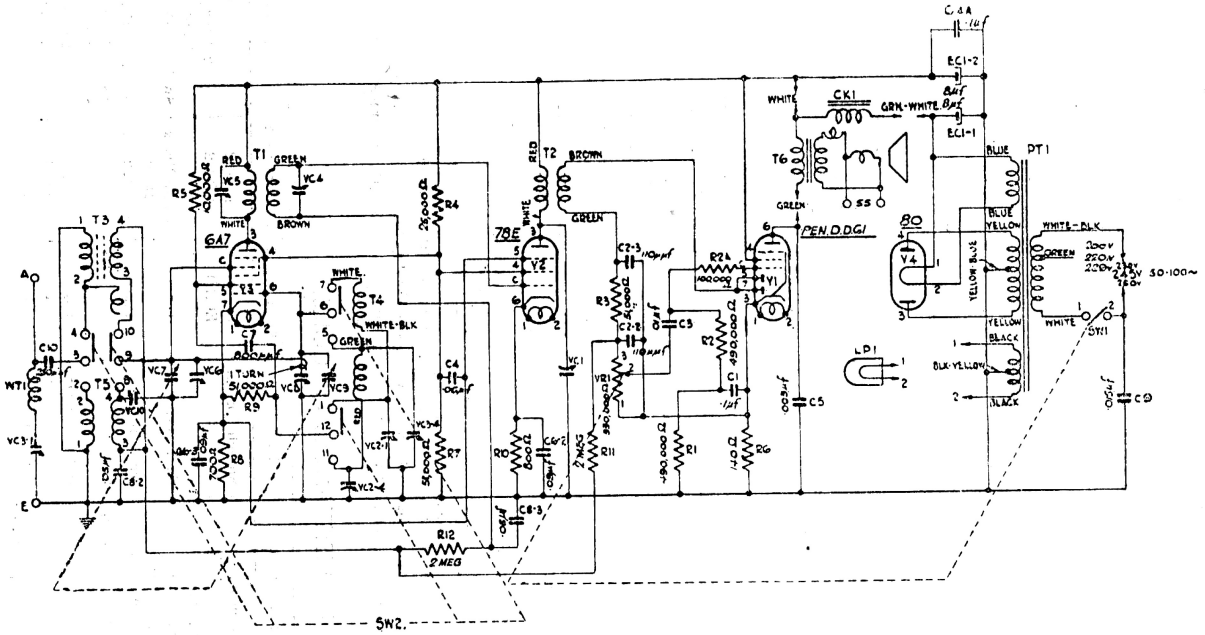
V.1, V.2, V.3 and LP.1 filaments, each 6.3 volts A.C. ; V.4 filament, 5 volts A.C., measured between Pins 1 and 2 on each socket.

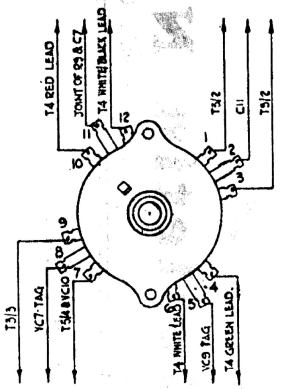
## TABLE 2—RESISTANCES OF COILS.

| REF. No. | TEST PROD. 1 | TEST PROD. 2 | RESISTANCE (OHMS) | REF. NO. | TEST PROD. 1 | TEST PROD .2 | RESISTANCE (OHMS) |
|---|---|---|---|---|---|---|---|
| WT.1 ... | TB.5 Socket "A" | VC.3/1 | 15 approx. | Speech Coil ... | Lead 1 | Lead 2 | 2** |
| | | | | CK.1 ... ... | EC.1/1 | EC.1/2 | 2,000 approx. or 1,140 approx. |
| T.3 Primary | TB.4 Tag | Chassis | Sw.2. M.W. 25 | | | | |
| T.3 Secondary | V.3 Cap | C.8/2 | Sw.2. M.W. 2.5 | PT.1 Primary | C.9/3 | White/Black (245 v.) | Sw.1. "ON." 20 approx. |
| T.5 Primary | TB.4 Tag | Chassis | Sw.2. L.W. 100 approx. | | | | |
| T.5 Secondary | V.3 Cap | C.8/2 | Sw.2. L.W. 35 approx. | PT.1 Primary | C.9/3 | Green (220 v.) | Sw.1. "ON." 20 approx. |
| T.1 Primary | V.3/3 | TB.2/2 | 8 | | | | Sw.1. "ON." 17.5 approx |
| T.1 Secondary | V.2 Cap | C.8/3 | 12 | | | | Sw.1. "OFF." Infinity |
| T.4 ... ... | V.3/6 | TB.3/1 | Sw.2. M.W. 2.5<br>Sw.2. L.W. 15 | H.T. Secondary | V.4/3 | Chassis | 240 approx. |
| | | | | H.T. Secondary | V.4/4 | Chassis | 240 approx. |
| T.2 Primary | V.2/3 | TB.2/2 | 30 | Rectifier L.T. Secondary | V.4/1 | V.4/2 | 0.1†† |
| T.2 Secondary | V.1/7 | C.2/3 | 75 approx. | | | | |
| T.6 Primary | V.1/6 | EC.1/2 | 240 approx. | Heater L.T. Secondary | V.1/1 | V.1/2 | 0.2†† |
| T.6 Secondary | Output Transformer | Output Transformer | 0.2** | | | | |

** Resistance of T.6 Secondary alone and Speech Coil alone (taken when disconnected).
†† Resistance of L.T. windings taken with all valves removed.

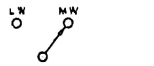
*NOTE :* Reference numbers for valves should be read in conjunction with the socket numbers *e.g.*, V.1-S.1.



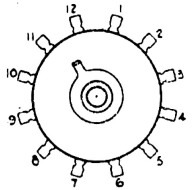




WIRING & FRONT VIEW OF ALTERNATIVE SW.2

CHASSIS BEING UPSIDE DOWN.




S.W.2 SHOWN IN M.W. POSITION

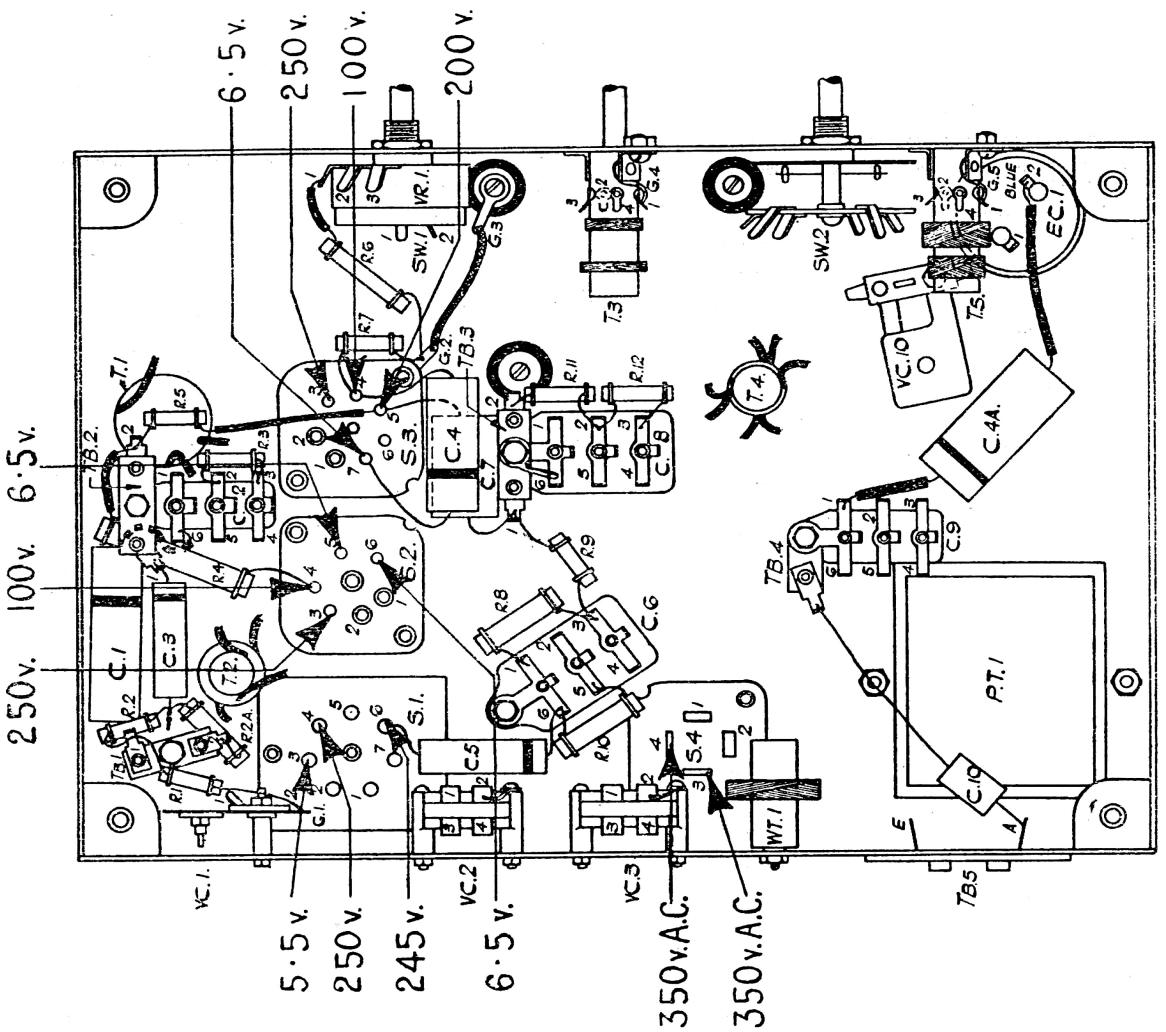



FRONT VIEW OF S.W.2

CHASSIS BEING UPSIDE DOWN

NOTE:- WHEN MAINS TRANSFORMER PT.No. 32-7823 IS USED, IT IS NECESSARY TO EARTH ONE SIDE OF THE HEATER WINDING (FROM V2/2 TO CG/1) AS THERE IS NO CENTRE TAP ON THIS TRANSFORMER.

# SCHEMATIC DIAGRAM—MODEL A.421.




UNDER CHASSIS DIAGRAM—MODEL A.421.

## ALIGNMENT PROCEDURE

Before leaving the Factory all Philco Receivers are accurately aligned, but if misalignment is suspected through damage, no alteration must be made without instruction in the correct adjustment of the trimming and padding condensers. It should only be carried out with the aid of an accurately calibrated Signal Generator and for this purpose the PHILCO ALL-PURPOSE SET TESTER MODEL 077 is recommended.

Connect the Output Meter across the Primary of the Output Transformer, i.e., green and white leads. With gang condenser fully closed check that pointer reads on index line. Set wave-change switch to M.W. position (clockwise rotation), turn gang open to fullest extent and volume control fully clockwise.

INTERMEDIATE FREQUENCY : The I.F. trimmers (VC.'s 1, 4 and 5) must first be carefully adjusted by feeding in a 451 Kc. signal from the Signal Generator through a Standard Dummy to the grid cap of the 6A7 valve (with grid lead connected) and the Signal Generator earthed to the receiver chassis. Adjust the Signal Generator Attenuator to give a half-scale reading on the Output Meter. The I.F. trimmers must then be adjusted for maximum output.

*NOTE :* It is necessary to carry out this operation several times, taking particular care with VC.1 ; unless this is done, the I.F. will peak at the wrong place.

WAVE-TRAP : Transfer Signal Generator lead via the Standard Dummy to the Aerial socket. Feed in a 451 Kc. signal and adjust VC.3 (screw) for *minimum* output.

MEDIUM WAVES : Set pointer at 1,400 Kc. (214 metres on scale). Feed in a signal of 1,400 Kc. and trim VC.'s 8 and 6 in that order for maximum output.

Set pointer at 600 Kc. (500 metres on scale) and feed in a signal of 600 Kc. Rock gang and pad VC.2 (screw) for maximum output. Readjust trimming at 1,400 Kc. and padding at 600 Kc. until no further improvement results.

LONG WAVES : Turn wave-change switch to L.W. position (counter-clockwise rotation). Set pointer at 240 Kc. (1,250 metres on scale). Feed in a signal of 240 Kc. and trim VC.3 (nut) and VC.10 in that order for maximum output.

Set pointer at 160 Kc. (1,875 metres on scale) and feed in a signal of 160 Kc. Rock gang and pad VC.2 (nut) for maximum output Readjust trimming at 240 Kc. and padding at 160 Kc. until no further gain can be obtained.

Check Calibration.

# PARTS AND PRICE LIST—MODEL A.421.

| Ref. No. | Description | Part No. | List Price £ s. d. |
|---|---|---|---|
| T.1 VC.4 VC.5 | 1st I.F. Transformer and Trimmers Assembly. | 320-1047 | 9 0 |
| T.2 | 2nd I.F. Transformer ... ... ... | 32-2130 | 2 3 |
| T.3 | M.W. Aerial Transformer ... ... | 320-1044 | 4 0 |
| T.4 | Oscillator Coil ... ... ... ... | 32-2094 | 3 6 |
| T.5 | L.W. Aerial Transformer ... ... | 320-1045 | 4 0 |
| T.6 | Output Transformer, Part No. 320-7036 | Complete | |
| | Speech Coil and Cone, Part No. 360-3022 | Speaker | |
| CK.1 | Field Coil, 2,000 ohms ... ... ... | 360-1127† | 1 7 6 |
| T.6 or | Output Transformer, Part No. 320-7036 | Complete | |
| | Speech Coil and Cone, Part No. 360-4008 | Speaker | |
| CK.1 | Field Coil, 1,140 ohms ... ... ... | 360-1106† | 1 5 0 |
| WT.1 | I.F. Trap Coil Assembly ... ... ... | 380-5291 or 380-5138 | 2 0<br>2 0 |
| VC.1 | Single Padder, 5-50 mmfd. ... ... | 310-6011 | 9 |
| or | Single Padder, 15-80 mmfd. ... ... | 310-6013 | 1 0 |
| or | Single Padder, 10-60 mmfd. ... ... | 310-6037 | 1 0 |
| VC.2 | Double Padder, 230 + 375 mmfd. ... | 310-6028 | 2 0 |
| VC.3 | Double Padder, 100 + 100 mmfd. ... | 310-6027 | 1 6 |
| VC.6 VC.7 VC.8 VC.9 | Two-gang Condenser and Trimmers Assembly. | 31-1566 | 15 6 |
| VC.10 | Single Padder, 5-50 mmfd. ... ... | 310-6011 | 9 |
| or | Single Padder, 15-80 mmfd. ... ... | 310-6013 | 1 0 |
| or | Single Padder, 10-60 mmfd. ... ... | 310-6037 | 1 0 |
| EC.1 | Electrolytic Condenser, 8 + 8 mfd. ... | 30-2079 | 7 6 |
| C.1 | Tubular Condenser, .1 mfd. ... ... | 30-4122 | 1 0 |
| C.2 | Moulded Condenser, 110 + 110 mmfd. ... | 8035-DU | 1 9 |
| C.3 | Tubular Condenser, .01 mfd. ... ... | 30-4124 | 9 |
| C.4 | Tubular Condenser, .05 mfd. ... ... | 30-4020 | 9 |
| C.4A | Tubular Condenser, .1 mfd. ... ... | 30-4170 | 1 0 |
| C.5 | Tubular Condenser, .003 mfd. ... ... | 30-4042 | 9 |
| C.6 | Moulded Condenser, .09 + .09 mfd. ... | 4989-DG | 2 0 |
| C.7 | Mica Condenser, 800 mmfd. ... ... | 300-1005 | 1 0 |
| C.8 | Moulded Condenser, .05 + .05 mfd. ... | 3615-DG | 1 9 |
| C.9 | Moulded Condenser, .015 mfd. ... ... | 3793-SG | 1 6 |
| C.10 | Mica Condenser, 250 mmfd. ... ... | 300-1014 or 300-1041 or 30-1032 | 1 0<br>1 0<br>1 0 |
| R.1 | ½ watt Carbon Resistor, 490,000 ohms ... | 6097 | 9 |
| R.2 | ½ watt Carbon Resistor, 490,000 ohms ... | 6097 | 9 |
| R2A | ½ watt Carbon Resistor, 100,000 ohms ... | 33-1047 | 9 |
| R.3 | ½ watt Carbon Resistor, 51,000 ohms ... | 6098 | 9 |
| or | ½ watt Insulated Resistor, 51,000 ohms ... | 330-2015 | 9 |
| R.4 | 1 watt Carbon Resistor, 25,000 ohms ... | 3656 | 9 |
| R.5 | ½ watt Carbon Resistor, 10,000 ohms ... | 33-1,000 | 9 |
| R.6 | ½ watt Wirewound Resistor, 140 ohms ... | 330-3003 | 9 |
| R.7 | ½ watt Carbon Resistor, 51,000 ohms ... | 4518 | 9 |
| or | ½ watt Carbon Resistor, 51,000 ohms ... | 6098 | 9 |
| or | ½ watt Insulated Resistor, 51,000 ohms ... | 330-2015 | 9 |
| R.8 | ½ watt Carbon Resistor, 700 ohms ... | 330-1008 | 9 |
| R.9 | ½ watt Carbon Resistor, 51,000 ohms ... | 6098 | 9 |
| or | ½ watt Insulated Resistor, 51,000 ohms ... | 330-2015 | 9 |
| R.10 | ½ watt Carbon Resistor, 800 ohms ... | 330-1009 | 9 |
| R.11 | ½ watt Carbon Resistor, 2 megohms ... | 33-1025 | 9 |
| R.12 | ½ watt Carbon Resistor, 2 megohms ... | 33-1025 | 9 |
| VR.1 | Volume Control, 330,000 ohms ... ... | 330-5004 | 5 0 |
| Sw.1 | On-Off Switch ... ... ... ... | | |
| Sw.2 | Wave-change Switch ... ... ... | 42-1164 or 420-1013 | 3 0<br>3 0 |
| PT.1 | Mains Transformer, 200-250 volts, 50-100 cycles. | 320-7029 or 32-7823 | 1 2 6<br>1 2 6 |
| S.1 | 7-prong Valve Holder (English type) ... | 270-6007 | 9 |
| S.2 | 6-prong Valve Holder ... ... ... | 27-6036 | 9 |
| S.3 | 7-prong Valve Holder ... ... ... | 27-6037 | 9 |
| S.4 | 4-prong Valve Holder ... ... ... | 27-6034 | 9 |
| | Valve Shield ... ... ... ... | 28-2726 | 8 |
| | Grid Clip ... ... ... ... ... | 28-2214 | — |
| | Rubber Bush ... ... ... ... | 4126 | 6 |
| | Dial Scale Holder and Spring Assembly... | 380-5508 or 389-5013 | —<br>— |
| | Dial Scale ... ... ... ... ... | 270-5107 | 2 3 |
| | Pointer and Hub Assembly ... ... | 380-5125 | 9 |
| | Dial Screen... ... ... ... ... | 270-5105 | 2 0 |
| | Mains Cable ... ... ... ... | LO-1009 | 1 9 |
| | Speaker Cable ... ... ... ... | LO-1004 | 1 0 |
| | Rubber Buffers ... ... ... ... | 270-7451 or 3914 | —<br>— |
| | Chassis Mounting Cup ... ... ... | 280-6040 | — |
| | Chassis Mounting Washer ... ... | 29-2089 | — |
| | Chassis Mounting Bolt ... ... ... | W.1345 | — |
| | Red Wander Plug ... ... ... | 380-5087 | 9 |
| | Black Wander Plug ... ... ... | 380-5015 | 9 |
| L.P.1 | Pilot Bulb ... ... ... ... ... | 34-2141 | 1 4 |
| | Tuning Knob and Spring Assembly ... | 270-4054 | 9 |
| | Volume Knob and Spring Assembly ... | 270-4055 | 9 |
| | Wave-change Knob and Spring Assembly | 270-4056 | 9 |
| | Knob Spring ... ... ... ... | 280-5262 | — |
| V.1 | Type PEN. DD. 61 Double Diode Pentode Valve. | 340-2000 | — |
| V.2 | Type 78E. Variable-mu H.F. Pentode Valve. | 8315-E | — |
| V.3 | Type 6A7 Variable-mu Heptode Valve... | 34-2002 | — |
| V.4 | Type 80 Full Wave Rectifier Valve ... | 3149 | — |

† When ordering speaker parts, the letter which will be found in the part number of the speaker must also be given.

*ABOVE PRICES DO NOT APPLY IN EIRE.*