NUMBER SIXTY-TWO **'TRADER' SERVICE SHEETS**

PHILCO MODEL 1280 (& 280)

A.C./D.C. SUPERHET

THE Philco Model 1280 is a 4-valve A.C./D.C. table receiver, with a valve rectifier and a barretter lamp. A superheterodyne circuit, with heptode frequency changer, is used, and a shadow-meter tuning indicator is fitted.

Model 280 has an identical chassis, except that the tuning indicator is not included, its winding being replaced by a 10,000 O resistor.

There are two radiogram models, the 1280 radiogram for A.C./D.C. use, with a universal motor, and the 1280X, for A.C. only, which has the A.C./D.C. chassis, but an A.C. only motor.

The information below refers to the latest chassis of the 1280, and early models may differ in the tone control circuit.

CIRCUIT DESCRIPTION

Aerial input via blocking condenser **C1** direct to L.W. coupling coil **L3,** and by way of switch **S1** to M.W. coupling coil **L2.** I.F. filter **L1, C30** in aerial circuit. Mixed coupled band-pass input filter. Primary **L4, L5** tuned by **C33**; secondary **L7, L8** tuned by **C36**; coupling by **L6** (M.W.) and **C4.**

First valve (**V1, Philco 6A7**) is a heptode operating as frequency changer with electron coupling. Oscillator grid tuning coils **L9, L10** tuned by **C37**; anode reaction applied by fixed condenser **C9**; tracking by **C40** (L.W.) and **C8, C41** (M.W.). Sensitivity switch **S7,** when open, increases fixed G.B. resistance in **V1** cathode circuit.

Second valve, a variable-mu H.F. pentode (**V2, Philco 78E**) operates as intermediate frequency amplifier with tuned-primary tuned-secondary transformer couplings **L11, L12** and **L13, L14.**

Intermediate frequency 451 KC/S.

Moving-iron meter visual tuning indicator in anode feed circuit to **V2.**

Diode second detector forms part of double diode triode valve (**V3, Philco 75**) working with diode anodes strapped. D.C. potential in rectified output is developed across load resistance **R8** and fed back as G.B. to F.C. and I.F. valves, giving automatic volume control. Delay voltage is obtained from drop along **V3** auto. G.B. resistance **R11.**

Audio frequency component in rectified output is passed by way of coupling condenser **C15,** manual volume control **R9,** and coupling condenser **C18,** to grid of **V3** triode section which operates as L.F. amplifier. I.F. filtering by **R7, C13, C14** and **C22.** Bass compensation in volume control circuit by means of **R10** and **C16** working in conjunction with tapping on **R9.** Three point tone control by switch **S8** and fixed condensers **C12, C17.** Provision for connection of pick-up across volume control.

Resistance capacity coupling by **R13, C21** and **R15** to output pentode (**V4, Philco 18E**) working with fixed tone compensation by **C24.** Provision for low resistance external speaker across secondary of speaker input transformer **T1.**

When the receiver is used with A.C mains supplies, H.T. current is supplied by a special full-wave rectifying valve (**V5, Philco 25RE**) operating on the half wave system with its anodes and cathodes paralleled. With D.C. mains in use the valve behaves as an ordinary resistance of low value. Smoothing by L.F. choke **L17** and electrolytic condensers **C26, C27, C28.** Speaker field winding **L16** is connected in series with ballast resistance **R18** across main H.T. supply and forms part of potential divider supplying **V1** and **V2** S.G.'s.

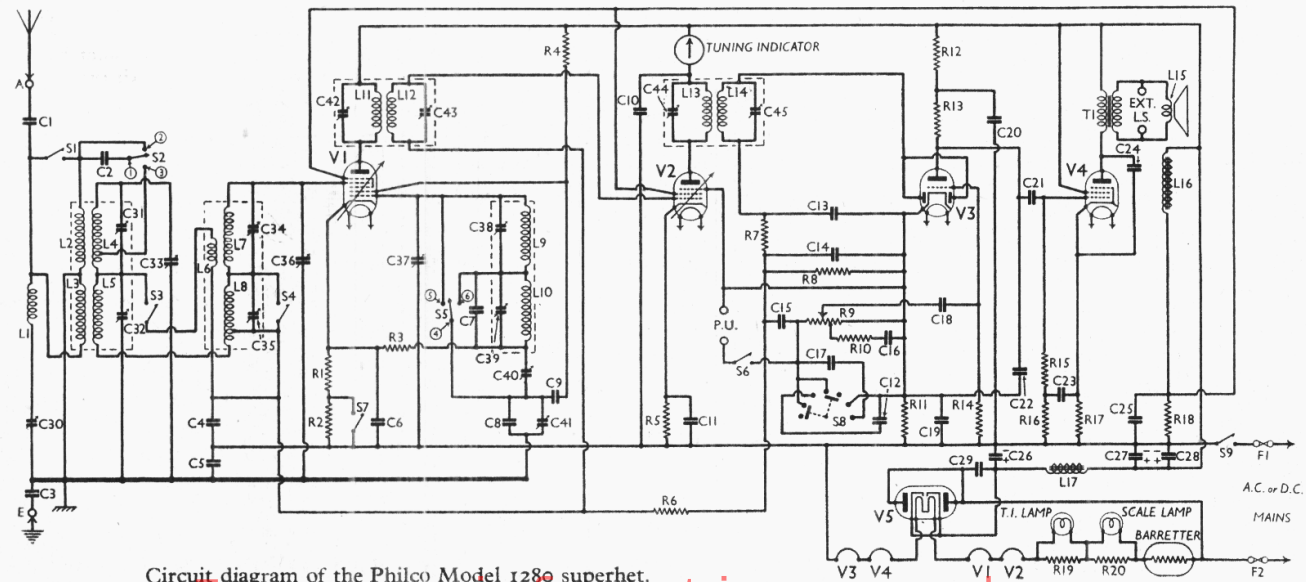
Heaters of all valves are connected in series, together with scale and tuning indicator lamp ballast resistances **R20 R19,** and barretter across mains supply.

COMPONENTS AND VALUES

	Resistances	Values (ohms)
R1	V1 fixed G.B. resistance	250
R2	V1 fixed G.B. resistance	1,500
R3	V1 osc. grid resistance	51,000
R4	V1 osc. anode resistance	10,000
R5	V2 fixed G.B. resistance	500
R6*	A.V.C. circuit decoupling	2,000,000
R7	I.F. stopper	51,000
R8	V3 diodes load	330,000
R9	Manual volume control	1,000,000
R10	Part of bass comp. circuit	25,000
R11	V3 auto. G.B. resistance	5,000
R12	V3 anode decoupling	70,000
R13	V3 anode load	250,000
R14*	V3 grid resistance	1,500,000
R15	V4 grid resistance	490,000
R16	V4 grid decoupling	51,000
R17	V4 auto. G.B. resistance	400
R18	Speaker field ballast	1,800
R19	T.I. lamp ballast	25
R20	Scale lamp ballast	25

* May be two resistances in series.

	Condensers	Values (μF)
C1	Aerial series condenser	0·001
C2	Aerial coupling condenser (M.W.)	0·00005
C3	Earth blocking condenser	0·1
C4	Band-pass coupling condenser	0·05
C5†	Chassis isolating condenser	0·5
C6	V1 cathode by-pass	0·05
C7	Osc. L.W. trimmer, fixed	0·00005
C8	Osc. M.W. tracker, fixed	0·00025
C9	V1 osc. reaction condenser	0·0008
C10	V2 anode decoupling	0·05
C11	V2 cathode by-pass	0·05
C12	Part of tone control circuit	0·003
C13	I.F. by-passes	0·00011
C14	I.F. by-passes	0·00011
C15	L.F. coupling to vol. control	0·03
C16	Part of bass comp. circuit	0·01
C17	Part of tone control circuit	0·006
C18	L.F. coupling to V3 triode	0·01
C19	V3 cathode by-pass	0·1
C20†	V3 anode decoupling	0·5

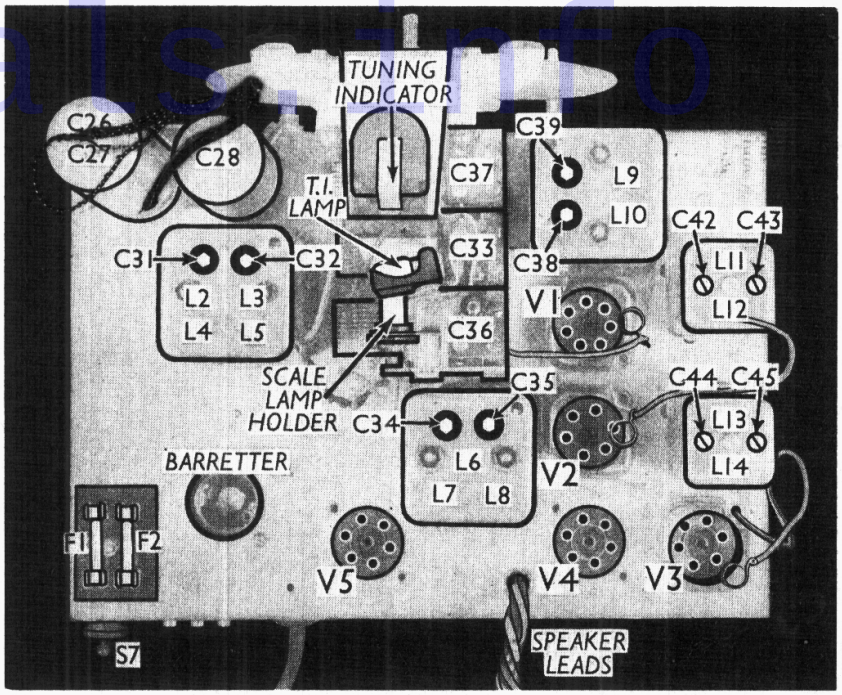


Circuit diagram of the Philco Model 1280 superhet.

	Condensers (contd.)	Values (μF)
C21	L.F. coupling to V4	0·01
C22	V3 anode I.F. by-pass	0·00011
C23	V4 grid decoupling	0·05
C24	Tone compensator	0·003
C25†	V1 and V2 S.G.'s by-pass	0·25
C26*	H.T. smoothing	8·0
C27*		8·0
C28*		12·0
C29	Rectifier anode-cathode by-pass	0·05
C30‡	Aerial I.F. filter tuning	0·000035
C31‡	Band-pass pri. M.W. trimmer	—
C32‡	Band-pass pri. L.W. trimmer	—
C33	Band-pass primary tuning	—
C34‡	Band-pass sec. M.W. trimmer	—
C35‡	Band-pass sec. L.W. trimmer	—
C36	Band-pass secondary tuning	—
C37	Oscillator tuning	—
C38‡	Osc. M.W. trimmer	—
C39‡	Osc. L.W. trimmer	—
C40‡	Osc. L.W. tracker	—
C41‡	Osc. M.W. tracker	—
C42‡	1st I.F. trans. pri. tuning	—
C43‡	1st I.F. trans. sec. tuning	—
C44‡	2nd I.F. trans. pri. tuning	—
C45‡	2nd I.F. trans. sec. tuning	—

* Electrolytic. ‡ Pre-set. † In block.

	Other Components	Values (ohms)
L1	Aerial I.F. filter coil	15·5
L2	Aerial coupling coils	26·0
L3		125·0
L4	Band-pass primary coils	3·3
L5		17·0
L6	Band-pass M.W. coupling coil	Very low
L7	Band-pass secondary coils	3·0
L8		15·0
L9	Osc. grid tuning coils	2·6
L10		20·0
L11	1st I.F. trans. Pri.	7·0
L12	1st I.F. trans. Sec.	11·0
L13	2nd I.F. trans. Pri.	7·0
L14	2nd I.F. trans. Sec.	11·0
L15	Speaker speech coil	2·0
L16	Speaker field winding	3,300·0
L17	H.T. smoothing choke	285·0
T1	Speaker input trans. Pri.	500·0
	Speaker input trans. Sec.	0·4
S1-S5	Waveband switches	—
S6	Gram. pick-up switch	—
S7	Sensitivity switch	—
S8	Tone control switch unit	—
S9	Mains switch, ganged R9	—
F1	Mains circuit fuses	—
F2		—



Plan view of the chassis. The tuning indicator and lamp are only fitted on Model 1280. The barretter lamp is an Osram 301 screw-in type.

DISMANTLING THE SET

Removing Chassis.—Remove the four control knobs (pull off), taking care not to lose the springs. *When replacing*, note that the large knob should be placed on the spindle of the tuning condenser.

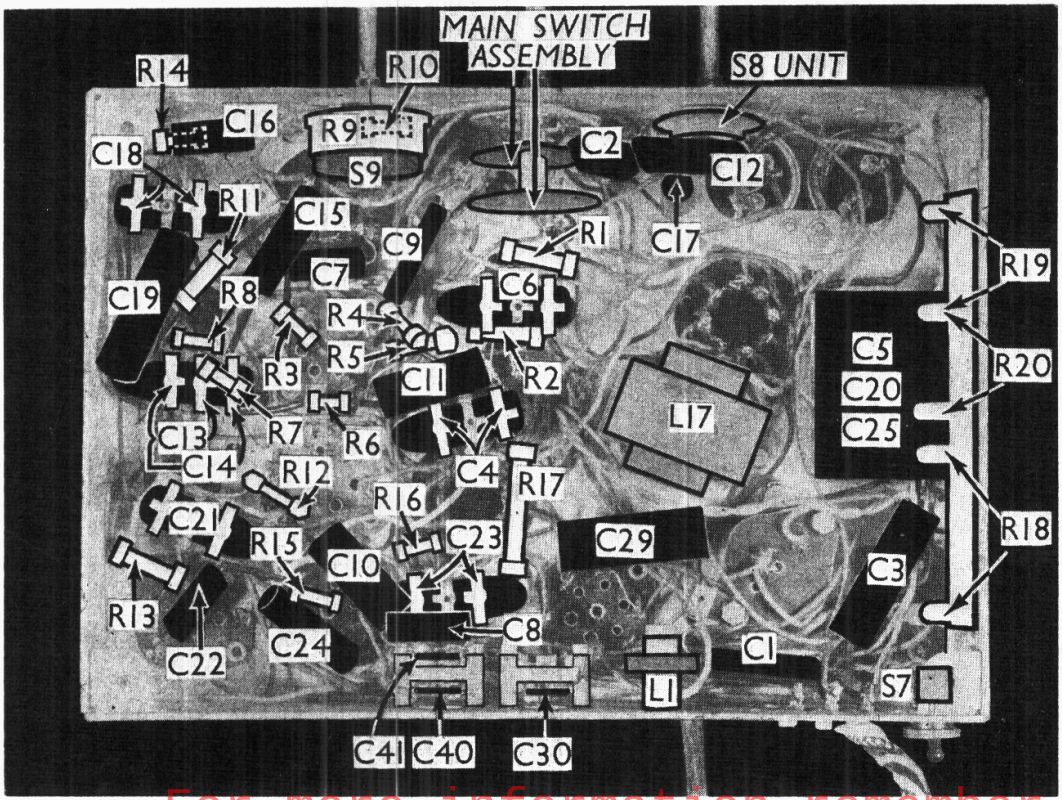
Remove the four bolts holding the chassis, the heads of which are underneath the cabinet.

Chassis can now be withdrawn to the extent of the speaker leads, which is sufficient to allow normal repairs to be effected. *When replacing*, do not forget to insert the four rubber washers between the chassis and cabinet bottom.

If it should be necessary to withdraw the chassis entirely, unsolder the five leads to the speaker terminal panel. *When replacing*, connect as follows, numbering the tags from top to bottom. On the left of speaker terminal panel: 1, white; 2, green; 3, green-white. On the right of panel: 1, red; 2, black.

Removing Speaker.—The speaker is held to the cabinet by four bolts with ornamental heads, and can be removed when these are withdrawn. *When replacing*, see that the transformer is towards the right of the cabinet.

(*Continued overleaf*)



Under-chassis view. The main switch assembly is shown in detail overleaf, while the S8 unit is described in General Notes. C13 and C14 each have one common contact.

PHILCO 1280 (*Contd.*)

VALVE ANALYSIS

Valve voltages and currents given in the table below were measured with the receiver operating on 235 V A.C. mains, with no signal input and with the volume and sensitivity controls at maximum. Voltages were measured on the 1,200 V scale of an Avometer, negative being the cathode of the valve concerned.

Valve	Anode Volts	Anode Current (mA)	Screen Volts	Screen Current (mA)
V1 6A7* ..	195	2·5	65	2·0
V2 78E ..	155	3·8	65	1·0
V3 75 ..	80	0·3	—	—
V4 18E ..	175	22·0	190	5·1
V5 25RE† ..	—	—	—	—

* Osc. anode (G2) 165 V, 2mA.
† Cathode to negative line, 215 V.

GENERAL NOTES

Switches.—The wave-band and radiogram switches are in two rotary ganged units, indicated in the under-chassis view, and shown separately in diagrammatic form. Each switch comprises two or three fixed contact fingers, which, in the "closed" positions, are shorted by flat contacts mounted on the rotary portion of the switch units. Switches **S1-S6** are included in these units. It will be noted that **S2** and **S5** each have three fixed contacts, numbered on the circuit diagram and on the switch diagram. The table below gives the switch positions for the various settings, O indicating open, and C, closed.

Position	S1	S2	S3	S4	S5	S6
M.W.	C	1, 3 C	C	C	4, 6 C	O
L.W.	O	1, 2 C	O	O	O	O
Gram.	O	O	O	O	4, 5 C	C

S7 is the "local-distant" sensitivity switch, of the Q.M.B. single pole shorting type, mounted at the rear of the chassis. It is closed in the most sensitive position (knob pushed down).

S8 is a special unit forming the three-position tone control. It has seven fixed contacts, and two rotary bridging pieces. It is indicated in the circuit diagram, the fixed contacts being shown as they would appear *looking from the spindle end of the unit.* In the first position, contacts 1, 2 and 4, 5 (from the left) are bridged. In the second position, 2, 3 and 5, 6 are bridged, and in the third, 3, 4 and 6, 7 are bridged.

S9 is the Q.M.B. mains switch, ganged with the volume control.

Coils.—All the coils (except **L1,** seen in the under-chassis view) are in five screened units. The three large ones are for the signal-frequency and oscillator coils, while the two small ones house the I.F. transformers and their trimmers. Two trimmers are also included in each of the large units.

The screens are fitted to the chassis in each case by four special spring clip devices, which appear to be easy to insert, but more difficult to remove. With care, it is possible to squeeze them with pliers and thus free them from the holes in the chassis, but in practice it is not easy. The coil units are held into the cans by nuts and screws, and it is necessary to remove the nuts to withdraw the screens if the coil unit is not to be removed as well.

Pilot Lamps.—The scale lamp is a special small bayonet type, with centre contact, rated at 6.3 V. The tuning indicator lamp (Model 1280 only) is of the same type. The Philco part number is 34-2068.

Fuses F1, F2.—These are inside a small screening box on the chassis deck, held on by one nut. It has been removed in our plan chassis view. The fuses are standard 1¼ ins. 1A types. (Philco part number 380-5003.)

Valve Connections.—American 6- and 7-pin valves are used, and diagrams are given in column 3, looking at the undersides of the bases, the pins being numbered. The connections are as follow:

V1 (6A7 heptode): 1, heater; 2, heater; 3, anode; 4, screen grids; 5, osc. anode; 6, osc. grid; 7, cathode; top cap, cont. grid.

V2 (78E H.F. pentode): 1, heater; 2, heater; 3, anode; 4, screen grid; 5, supp. grid; 6, cathode; top cap, cont. grid.

V3 (75 double diode triode): 1, heater; 2, heater; 3, anode; 4, diode 1; 5, diode 2; 6, cathode; top cap, cont. grid.

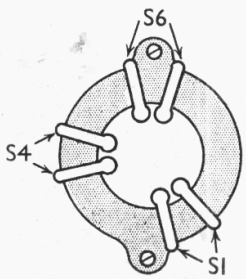
V4 (18E output pentode): 1, heater; 2, heater; 3, anode; 4, aux. grid; 5, cont. grid; 6, cathode.

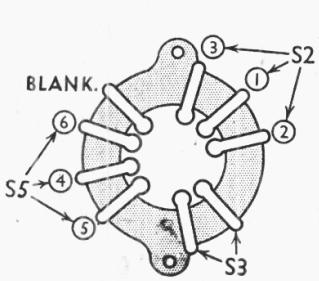
V5 (25RE rectifier): 1, heater; 2, heater; 3, anode 1; 4, cathode 1; 5, cathode 2; 6, anode 2.

Tuning Indicator.—This has a resistance of about 4,000 O. In the Model 280, it is replaced by a 10,000 O resistance (not shown in our chassis views).

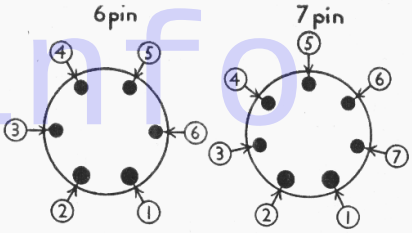
Condensers C5, C20, C25.—These are in a single metal-cased block, seen in the under-chassis view. The brown lead is common. The second connection of **C5** is the metal case, of **C20** the red lead, and of **C25** the white lead.

Resistances R6, R14.—These may each consist of two resistances in series.





The two sections of the main switch assembly. That on the left is the front one looking from the back of the chassis. S2 and S5 have contacts numbered as in the circuit diagram.



6 and 7 pin American valve bases.

Condensers C26, C27.—These are two 8 μF electrolytics in a single tubular case, insulated from chassis. The tag on the case is the common negative, while the two on the moulded base are the positives. The red and black leads connect to the positive of **C27.**

Condenser C28.—This consists of two electrolytics (8+4μF) in a single tubular case connected to chassis. The black coded tag is the common negative, and the red and green ones are the positives, which are joined together.

Pick-up.—In series with one of the pick-up leads and **S6** there may be a 0.01 μF condenser. It as not included in our chassis, however.

External Speaker.—Sockets are provided at the rear of the chassis for this. A low resistance type (2O) should be used.

Tone Control Circuit.—This appears to have been slightly modified in recent chassis. Our circuit diagram and chassis pictures show the connections and components as found in our chassis. **C12** may not occur in early models.

Moulded Condensers.—Note that the condensers in moulded black cases are provided with three tags. In most cases the condenser unit is between the two outer tags, the central one being used merely as a bearer tag. In the case of **C13** and **C14,** however, these are both in a single unit, with one common tag.

CIRCUIT ALIGNMENT

Connect an output meter across the primary of the output transformer. Set the wavechange switch to M.W., and rotate gang condenser to 1,500 KC/S position.

The I.F. trimmers should first be adjusted. Feed in a 460 or 451 KC/S signal (if the latter figure is stamped on the back of the chassis) to the grid top cap of **V1.** Adjust signal generator attenuator to give a half-scale reading on output meter. Adjust **C42, C43, C44** and **C45** for maximum output, reducing input as required. Transfer generator lead to aerial socket, and adjust **C30** (I.F. filter) for *minimum* reading.

Feed in a 1,400 KC/S signal and set tuning dial to 1,400 KC/S. Unscrew **C38** fully, and then screw up until the first position of maximum output is reached. Now adjust **C31** and **C34** for maximum output.

Feed in and tune in a 600 KC/S signal, rock the gang condenser and at the same time adjust **C41** (slotted screw).

Switch to L.W., and feed in and tune a 290 KC/S signal. Adjust **C32, C35, C39.** Feed in and tune a 160 KC/S signal, rock the gang condenser, at the same time adjusting **C40** (hexagonal nut) for maximum output. Re-check at 290 and 160 KC/S, checking calibration at 160KC/S.