'TRADER' SERVICE SHEETS *RECEIVER SERIES (NUMBER TWENTY-SIX)*

PHILIPS MODEL 588A

A.C. SUPERHET

MODEL 588A is a Philips 1934-5 A.C. receiver, and is the first superheterodyne to be produced by this company. It employs a 5-valve (plus rectifier) circuit. Notable features are the octode frequency-changer, the diode second detector giving also A.V.C., the pentode L.F. amplifier, and the directly-heated filament output pentode.

CIRCUIT DESCRIPTION

Aerial input by way of I.F. rejector circuit **L1, C22** and series condenser **C1** to capacity-coupled band-pass filter. Primary **L2, L3** tuned by **C23**; secondary **L4, L5** tuned by **C25**; coupling condensers **C2, C3.** First valve (**V1, Mullard metallised FC4**) is an octode functioning as frequency-changer with electron coupling. Oscillator grid tuning coils **L6, L7** tuned by **C27**; anode reaction coils **L8, L9**; tracking by fixed condensers **C5** and **C6.**

One variable-mu pentode intermediate frequency amplifier (**V2, Mullard metallised VP4A**) with tuned-primary tuned-secondary transformer couplings **L10, L11** and **L12, L13. I.F. 115 KC/S.**

Half-wave diode second detector forming part of double-diode (**V3, Mullard metallised 2D4**), with one anode unconnected. Steady voltage developed across **R7** and **R8** is fed back by way of decoupling circuit **R6, C8** as G.B. to frequency-changer and I.F. valves, thus providing automatic volume control.

L.F. component is tapped off by manual volume control **R8** and passed on by way of coupling condenser **C13** to H.F. pentode L.F. amplifier (**V4, Mullard metallised SP4**). Provision for connection of gramophone pick-up across volume control. **C10** by-passes signals from **V2** when pick-up plugs are inserted.

Resistance-capacity coupling to directly-heated filament output pentode (**V5, Mullard PM24M**). Variable tone control by means of condensers **C16** and **C17** and variable resistance **R14** in anode circuit.

H.T. current supplied by full-wave rectifying valve (**V6, Philips 1821**). Smoothing by L.F. choke **L15** and large electrolytic condensers **C18, C19.**

DISMANTLING THE SET

Removing Chassis.—Remove back of cabinet (hinged clips). Remove control knobs (grub screws fitting into slots in spindles). Unsolder speaker earth lead from tag on speaker. Free the speaker lead from the clips on inside of cabinet. Remove four screws from underside of cabinet holding chassis in position. Chassis may now be withdrawn sufficiently for most requirements. To remove it entirely, unsolder speaker lead from the two tags on the speaker input transformer.

When replacing chassis, do not forget the steel washers, rubber bushes and metal distance pieces. Also, under one of the chassis holding screws there is a spring contact strip, making contact between the chassis and the metallised paper which forms a lining to part of the cabinet for screening purposes.

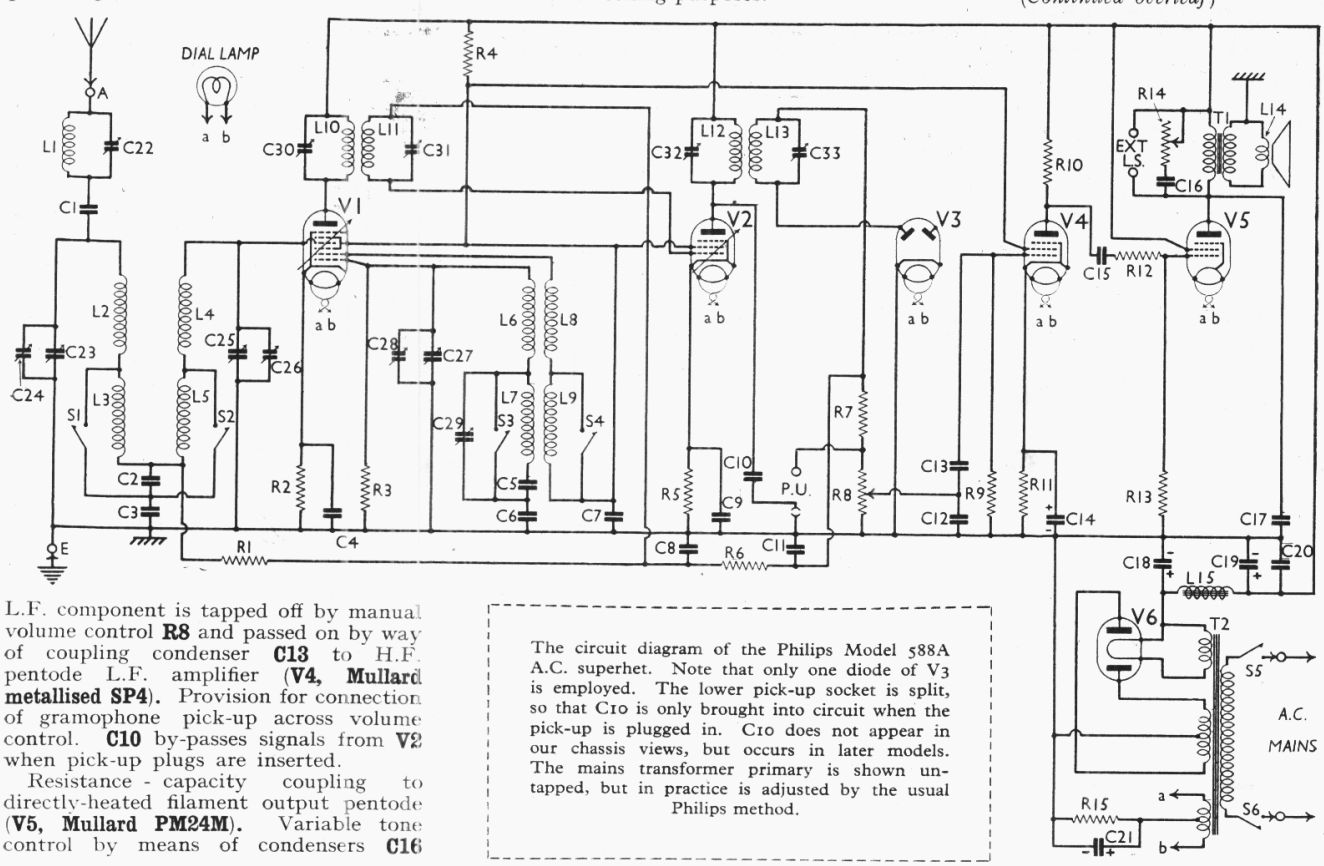
Removing Speaker.—This is held in position on the sub-baffle by three metal clips, with bolts and nuts. *When replacing,* the transformer should be to the right of the speaker chassis.

COMPONENTS AND VALUES

	Resistances	Values (ohms)
R1	V1 cont. grid decoupling ..	10,000
R2	V1 fixed G.B. resistance ..	200
R3	V1 osc. grid resistance ..	50,000
R4*	H.T. feed to V1, V2 and V4 S.G.'s..	32,000
R5	V2 fixed G.B. resistance ..	640
R6	A.V.C. circuit decoupling ..	1,000,000
R7	H.F. stopper	50,000
R8	Volume control and diode load	500,000
R9	V4 grid resistance	1,000,000
R10	V4 anode resistance	320,000
R11	V4 G.B. resistance	6,400
R12	V5 grid H.F. stopper	640,000
R13	V5 grid resistance	500,000
R14	Tone control, variable ..	50,000†
R15	V5 G.B. resistance	800

* This may comprise two 64,000 Ω resistances in parallel.
† Or 64,000, or 80,000 Ω.

(*Continued overleaf*)



The circuit diagram of the Philips Model 588A A.C. superhet. Note that only one diode of V3 is employed. The lower pick-up socket is split, so that C10 is only brought into circuit when the pick-up is plugged in. C10 does not appear in our chassis views, but occurs in later models. The mains transformer primary is shown untapped, but in practice is adjusted by the usual Philips method.

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PHILIPS 588a A.C. SUPERHET (continued.)

	Condensers.	Values (μF)
C1	Aerial series condenser	0·000025
C2, C3	Band-pass coupling condensers	0·025 each
C4	V1 cathode by-pass	0·05
C5	L.W. tracker (osc.)	0·00093
C6	M.W. tracker (osc.)	0·00181
C7*	V1, V2 and V4 S.G.'s by-pass	1·0
C8	A.V.C. circuit decoupling	0·1
C9	V2 cathode by-pass	0·1
C10	Radio by-pass on gram.	0·01
C11	Diode reservoir	0·0001
C12	V4 grid H.F. by-pass	0·0002
C13	L.F. coupling to V4	0·01
C14	V4 cathode by-pass, electrolytic	25·0
C15	L.F. coupling to V5	0·01
C16, C17	Tone control condensers	0·032 each
C18	H.T. smoothing, electrolytics	0·002
C19	H.T. smoothing, electrolytics	32·0
C20*	H.T. smoothing	32·0
C21	V5 G.B. resistor by-pass	0·5
C22	I.F. rejector tuning, pre-set	25·0
C23	Band-pass primary tuning	0·000145
C24	Band-pass pri., trimmer, pre-set	0·00043
C25	Band-pass secondary tuning	0·000055
C26	Band-pass sec. trimmer, pre-set	0·00043
C27	Oscillator tuning	0·000055
C28	Oscillator trimmer, pre-set	0·00043
C29	Oscillator L.W. trimmer, pre-set	0·000055
C30	1st I.F. trans. pri. tuning, pre-set	0·000145
C31	1st I.F. trans. sec. tuning, pre-set	0·000145
C32	2nd I.F. trans. pri. tuning, pre-set	0·000145
C33	2nd I.F. trans. sec. tuning, pre-set	0·000145

* In metal "can."

	Other Components		Values (ohms)
L1	Aerial I.F. rejector coil		127·0
L2, L3	Band-pass primary coils		3·9 + 36·8
L4, L5	Band-pass secondary coils		3·9 + 36·8
L6, L7	Oscillator grid coils		9·75 + 27·4
L8, L9	Oscillator anode coils		4·1 + 10·7
L10, L11	1st I.F. transformer	Pri. / Sec.	135·0 / 135·0
L12, L13	2nd I.F. transformer	Pri. / Sec.	135·0 / 135·0
L14	Speaker speech coil		4·35/5·3
L15	H.T. smoothing choke		410/500
T1	Speaker input trans.	Pri. / Sec.	480/590 / 0·66/0·78
T2	Mains trans.	Pri. total	73·0
		Heater sec.	0·1
		Rect. fil. sec.	0·2
		H.T. sec.	500·0
S1-S4	Waveband switches		—
S5-S6	Mains switches		—

VALVE ANALYSIS

Valve	Anode Volts	Anode Current (mA)	Screen Volts	Screen Current (mA)
V1FC4*	240/250	0·35/0·9	60/75	2·7/3·2
V2 VP4A	240/250	1·1/1·5	60/75	0·4/0·65
V3 2D4	—	—	—	—
V4 SP4	155/165†	0·3/0·35	60/75	0·1/0·14
V5 PM24M	200/220	20/24	220/230	3·5/5·0
V6 1821	225‡	—	—	—

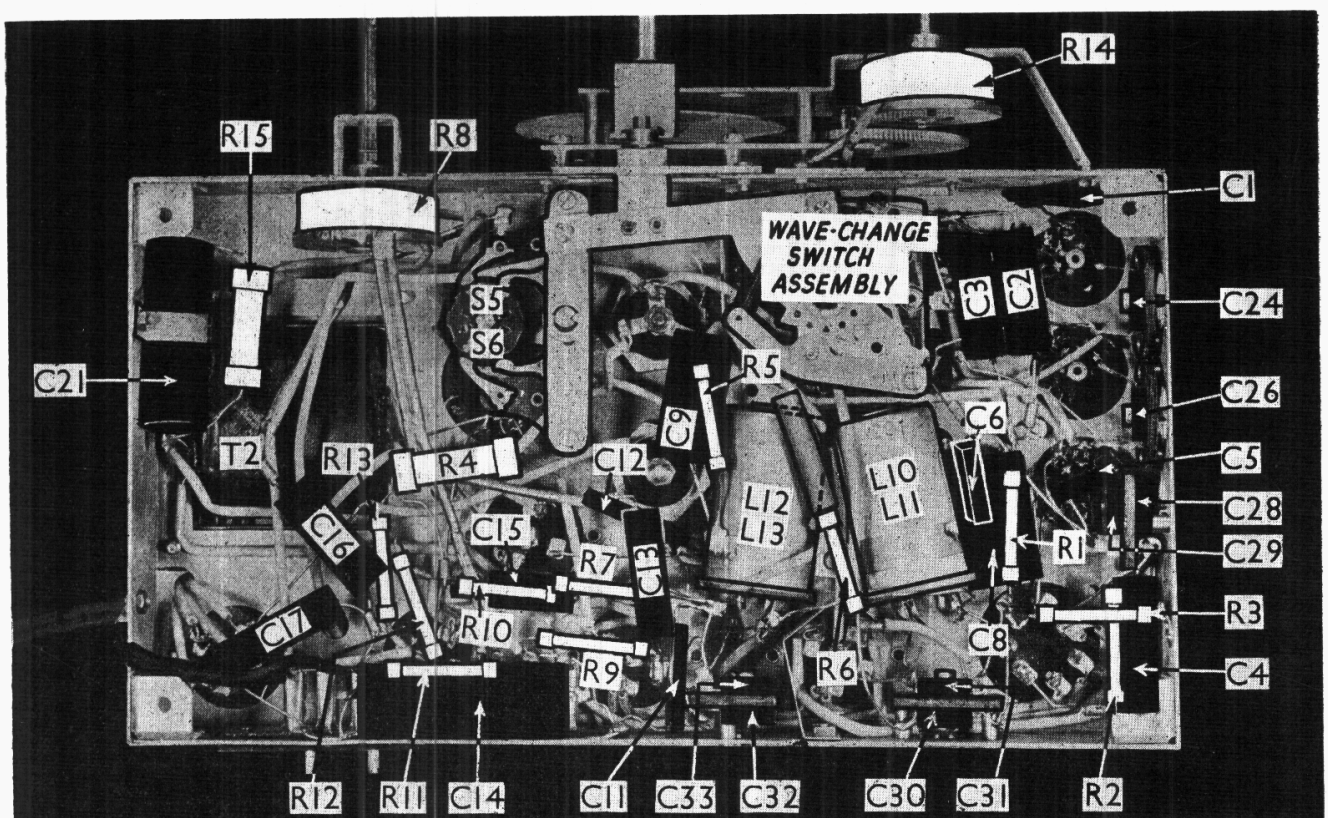
* Osc. anode (G2), 60/75 V 1·2/1·6 mA. † This voltage may be considerably lower with certain meters, owing to the high anode resistance. ‡ Each anode, A.C.

The voltage and current readings listed in the preceding table are those given by the makers for an average chassis working with no aerial or earth connected. All voltages were measured with a high resistance voltmeter with the chassis as negative, and the anode and screen currents were taken, where necessary, with a milliammeter inserted in the low H.F. potential ends of the circuits to avoid instability.

GENERAL NOTES

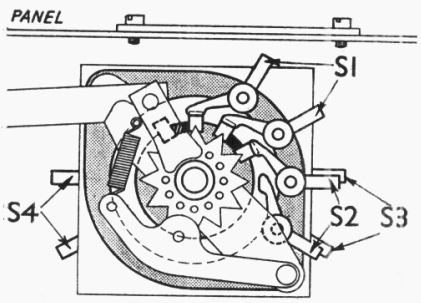
Switches.—There are four waveband switches, **S1-S4** and a two-pole mains switch, **S5, S6.** The switching mechanism is more complicated than usual, but an examination shows that it is very well constructed, and should not give trouble in use. The switch lever on the collar which fits over the tuning spindle works on a grooved wheel. This fits on an extension of the sliding mechanism. The collar and lever and the grooved wheel are loose, and care should be taken not to lose them.

The switches **S1-S4** and **S5, S6** are in separate units, but are ganged by a lever. **S5** and **S6** are shown in our under-chassis view, and are both *closed* when the set is switched on. The switches **S1-S4** are shown in a separate sketch, and are all *closed* on the M.W. band and *open* on the L.W. band. Actually, the switches are in two banks, screened from each other, with **S1** and **S2** above, and **S3** and **S4** below. The tags have been slightly staggered in our sketch for clarity.



The under-chassis view. The wavechange switch assembly is shown in a separate sketch. R4 may comprise two resistances in parallel. S5 and S6 form the double-pole mains switch, ganged with the wavechange switches.

Each fixed contact comprises two spring "fingers" between which the moving contacts slide when the switch is operated.



Sketch showing the wave-change switch assembly. S3 is below S2.

Coils.—The band-pass and oscillator coils are in three small screened units seen in the plan chassis view. If coil trouble occurs, the unit concerned will have to be replaced, since the screens are not removable. The units are held in position by a rectangular metal plate, which slides over the cylindrical cans. This plate is held by four screws tapped into the chassis, one of which is also provided with a nut and earthing tag. Do not forget this when replacing.

The I.F. transformers, **L10, L11** and **L12, L13,** are underneath the chassis, and are in similar screened units. These are held in position by metal bands, screwed to the chassis.

Condenser C10.—This is shown in our circuit diagram, but not in our under-chassis view, since it did not appear in our chassis. Later models will contain it, however. By means of a split pick-up socket, this condenser is only brought into circuit when the pick-up is plugged in. It by-passes any radio signals, and prevents break-through on pick-up.

Dial Lamp.—This is a 6 V 3 W car type, with a single contact S.B.C. base.

Resistance R4.—In our chassis this is a 32,000 O 2 W type, but in others it may be two 64,000 O, 1 W types in parallel.

Condensers C7, C20.—These are contained in a single can mounted on top of the chassis. The connections are made to three tags projecting downwards through the chassis. Of these, one of the outer ones is the common earth connection. The tag connected to **R4** and the S.G.'s of **V1, V2** and **V4** is the other terminal of **C7.** while that connected to the other end of **R4, C19** and the screening grid of **V5** is the other terminal of **C20.**

Valves V1 and V3.—Connections for **V1** are given in Service Sheet No. 14, p. 79, 1st col. **V3** (2D4) has a 5-pin base with a top cap. The latter (one of the diodes) is not connected. The heater and cathode connections are normal. The "grid" pin (metallising) is connected to cathode and the "anode" pin connects to the diode used.

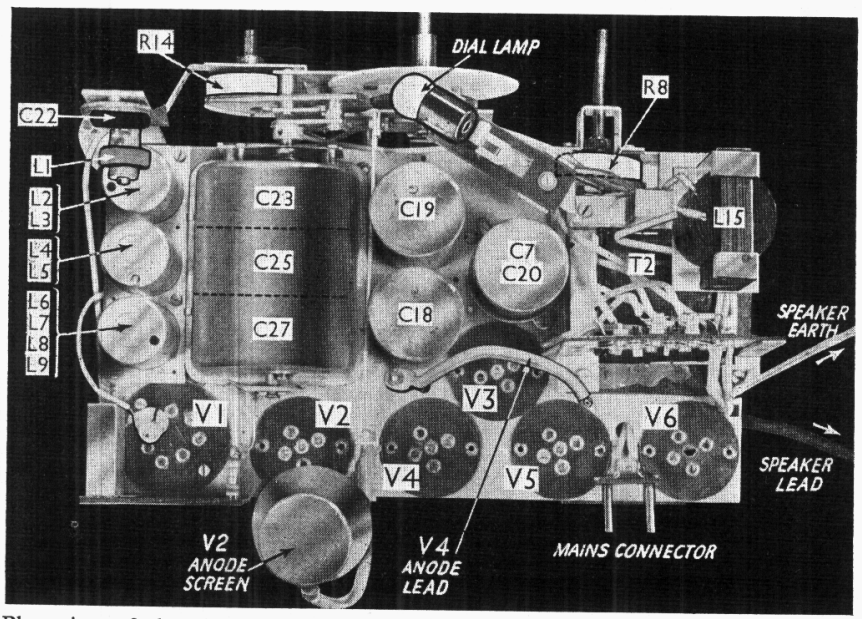
CIRCUIT ALIGNMENT

The following instructions are issued by the manufacturers.

To gang the I.F. circuits, feed a signal of 115 KC/S via a ·0002 μF condenser to top cap of **V1.** Set receiver volume control at maximum. Any adjustment of output must be done with the oscillator attenuator. Short **R3** to stop **V1** oscillating. Earth the chassis and turn tuning condenser to minimum, and switch to L.W. Shunt **L10** and **L13** with resistances of 10,000 O and trim with **C31** and **C32** for maximum deflection on output meter. Disconnect resistances from **L10** and **L13** and transfer to **L11, L12** and trim with **C30** and **C33** for maximum output. **C30** and **C31,** and **C32** and **C33** are fitted on common insulated plates. **C30** and **C32** should be adjusted with a spanner and **C31** and **C33** with a screwdriver.

To trim the H.F. and oscillator sections, switch receiver to M.W. band and connect a 10,000 O resistance across **L10** and remove the short circuit from **R3.** Adjust **C28** until the vanes have an opening of 1 m.m. Feed a signal of 225 m. to grid of **V1,** and adjust main tuning condenser for maximum output at one of the two positions obtainable. Trim oscillator circuit with **C28** for maximum output. Do not alter main tuning condenser. Now feed the 225 m. signal into aerial socket. Trim with **C24** and **C26** for maximum output. Short circuit **R3.** Switch receiver to L.W. band and feed a signal of 900 m. to aerial socket. Since the I.F. circuits cannot pass this frequency, because the oscillator is now out of action, a separate receiver must now be employed. Connect a 25 $\mu\mu$F condenser between anode of **V1** and aerial socket of another receiver which has been tuned accurately to 900 m. Connect output meter to this receiver. Tune receiver being ganged to 900 m. Remove short circuit from **R3** and reconnect output meter to receiver being ganged. Trim **C29** for maximum output.

Now feed a 350 m. signal to the aerial socket, tune the receiver and if necessary readjust the *dial* to the correct reading.



Plan view of the chassis. L1 and C22 form the I.F. filter. C18 and C19 are electrolytics, while C7 and C20 are paper condensers in a single cylindrical can. L15 is the smoothing choke.

'TRADER' SERVICE SHEETS

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