'TRADER' SERVICE SHEETS RECEIVER SERIES (NUMBER SEVEN)

PHILIPS Model 634A

SUPERINDUCTANCE A.C. RECEIVER

MODEL 634A in the Philips 1933-4 range of receivers is an A.C. instrument employing two S.G. H.F. stages in a "straight" circuit, with four tuned coils of the well-known "superinductance" type. It is notable for its special automatic sensitivity control, automatic fading compensation, and resistance-capacity smoothing circuits.

CIRCUIT DESCRIPTION

Special choke-capacity filter **L1,C3** in aerial circuit. One aerial connection by way of fixed condenser **C16** to tapping on primary coil of capacity-coupled band-pass input filter. Primary **L4, L5, L6,** tuned by **C4**; secondary **L7, L8, L9** tuned by **C5**; coupling condensers **C20, C21.** First S.G. H.F. amplifier (**V1, Mullard metallised S4VB**) coupled to second H.F. amplifier (**V2, Mullard metallised S4VB**) by tuned-secondary H.F. transformer. Primary, **L10**; secondary, **L11, L17, L12,** tuned by **C6.** **V2** coupled to diode detector forming part of single diode tetrode (**V3, Mullard metallised SD4**) by similar tuned secondary transformer. Primary, **L13**; secondary, **L14, L15, L16** tuned by **C7.** Diode also provides rectified voltage which is fed back through decoupling resistance **R6** as G.B. to **V1** and **V2,** thus giving a degree of automatic fading compensation (otherwise A.V.C.).

Variable potentiometer **R4** is mechanically coupled to ganged condenser drive spindle and operates in such a manner that the gain of the H.F. stages is automatically reduced as the wavelength decreases. This ensures that the sensitivity of the receiver remains practically constant over both wavebands. Further control of sensitivity is provided by switch **S6,** which has the effect of increasing or decreasing the fixed G.B. applied to **V1** and **V2.**

Detector output passes through H.F. filter **L2, L3, C31,** to manual volume control **R5,** thence to control grid of **V3** *via* coupling condenser **C1.** Volume control operative on radio and gramophone. **V3** is R.C. coupled to directly-heated output pentode (**V4, Mullard PM24A**), which has a three-point tone control **C25, C26, C27, S5** in its grid circuit and the usual condenser **C28** in its plate circuit across the primary of the speaker input transformer **T1.** In some 634A receivers the tone control is connected in the anode circuit of **V4.**

H.T. current supplied by full-wave rectifier (**V5, Philips 1821**). Smoothing effected by two electrolytic condensers, **C39, C40** and resistance network.

DISMANTLING THE SET

Removing Chassis.—Remove 2 knobs (grub screws are fitted). Remove back of cabinet (six screws), with mains lead attached. Remove the 4 bolts and washers holding the chassis to the base of the cabinet. Rubber bushes are fitted on each side of the cabinet base, and tubular metal distance pieces pass through the base. After the bolts have been removed, and the speaker earth lead has been disconnected from the chassis, the latter can be withdrawn far enough for normal service work. If there is any difficulty in drawing the chassis out, the rubber bushes between the chassis and the cabinet have probably stuck, and should therefore first be freed.

To free the chassis entirely, release the paxolin strip carrying the mains plug which is fitted at the top of the cabinet (4 screws). Remove the under-chassis shield (4 screws, two at each side), and unsolder the two connections of the speaker lead from the tags of the extension speaker sockets.

NOTE.—Two of the three sockets are connected together.

The chassis can then be entirely withdrawn, and it is not essential that its own speaker be re-connected when testing, since it is of the P.M. type, and there is no field winding forming part of the circuit. However, it is a simple matter to extend the existing speaker leads if desired, and they can then be plugged into the extension speaker sockets.

The reason for disconnecting the speaker lead at the chassis end is that there is then no need to undo the four cleats holding it to the cabinet.

For certain operations it may be necessary to remove the two steel strips across the bottom of the chassis (4 screws each). *When replacing,* do not forget the three earthing tags which are clamped to the chassis by the strips.

When replacing under-chassis shield, do not forget the strip of insulating material between one side of the shield and the strip holding fifteen resistances.

The chassis should be handled with great care when making repairs, and a method of support should be adopted which prevents damage to the coil cans. Also, the tuning dial, pointer and mechanism should be very carefully handled. Before removing the chassis, it is as well to turn the dial to the minimum position and note the reading on the main and micrometer dials. When the chassis is replaced, the same reading should be obtained. If not, the pointer may have to be adjusted by slightly bending its brass support.

Removing the Loud-speaker.—Disconnect the earth wire and unsolder the two leads to the output transformer. The nuts and lock-nuts fitted to the three clamps should be released, when the loud-speaker can be withdrawn. If it is necessary to fit a new cone and coil, a new service clamping ring can be used. This ring is obtainable from the Service Department, and is cut equidistant around its periphery; it can easily be adjusted with a pair of flat pliers.

(Continued overleaf)

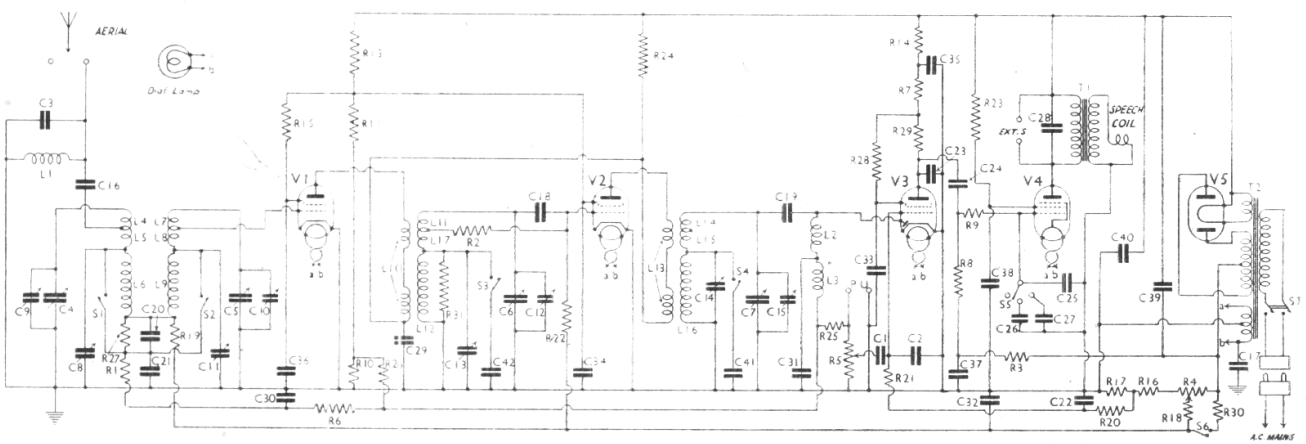


Fig. 1.—The circuit of the Philips 634A. Note that many of these models have the tone control circuit (S5, C26, C27) connected in the anode circuit of V4.

PHILIPS MODEL 634A (contd.)

COMPONENTS AND VALUES

	Condensers	Value (μF)
C1	V3 L.F. coupling	·01
C2	V3 grid H.F. by-pass	·0002
C3	Part of aerial circuit filter	·0001
C4	Band-pass pri. tuning (ganged)	·00043
C5	Band-pass sec. tuning (ganged)	·00043
C6	1st H.F. trans. tuning (ganged)	·00043
C7	2nd H.F. trans. tuning (ganged)	·00043
C8	Band-pass pri. LW pre-set trimmer	·000027
C9	C4 pre-set trimmer	·000027
C10	C5 pre-set trimmer	·000027
C11	Band-pass sec. LW pre-set trimmer	·000027
C12	C6 pre-set trimmer	·000027
C13	1st H.F. sec. LW pre-set trimmer	·000027
C14	2nd H.F. sec. LW pre-set trimmer	·000027
C15	C7 pre-set trimmer	·000027
C16	Aerial coupling condenser	·000025
C17	By-pass for heater winding	·1
C18	V2 grid coupling	·000027
C19	V3 diode coupling	·000013
C20	Band-pass coupling condensers	·025
C21	Band-pass coupling condensers	·04
C22†	V3 grid decoupling	·25
C23	V3 anode H.F. by-pass	·00025
C24	V4 grid coupling	·002
C25	Tone control condensers	·0001
C26	Tone control condensers	·00032
C27	Tone control condensers	·00125
C28	V4 anode by-pass	·002
C29	V1 and V2 anodes decoupling	·1
C30†	A.V.C. circuit decoupling	·1
C31	Part of diode H.F. filter	·0001
C32†	V1 and V2 grids decoupling	·25
C33†	V3 S.G. by-pass	·5
C34†	V2 S.G. by-pass	·5
C35†	V3 anode decoupling	1·0
C36	V1 S.G. by-pass	·1
C37†	V4 grid decoupling	·1
C38†	V4 aux. grid decoupling	1·0
C39	H.T. smoothing electrolytics	16·0
C40	H.T. smoothing electrolytics	16·0
C41	By-pass for L16 when set is on M.W. band	·04
C42	By-pass for L12 when set is on M.W. band	·04

† In condenser block.

	Resistances	Value (ohms)
R1	Included in band-pass circuit	10,000
R2	Artificial damping applied to L11	1,600,000
R3	V4 grid decoupling	500,000
R4	Sensitivity control pot. and G.B. resist. (part)	550
R5	Manual volume control	500,000
R6	A.V.C. circuit decoupling	2,000,000
R7	Part of V3 anode resist.	64,000
R8	V4 grid resistance	1,000,000
R9	V4 grid H.F. stopper	*100,000
R10	V1 and V2 S.G.'s potentiometer	3,200
R11	V1 and V2 S.G.'s potentiometer	20,000
R13	V1 and V2 S.G.'s potentiometer	20,000
R14	V3 anode decoupling	25,000
R15	V1 S.G. decoupling	1,000
R16	Parts of main G.B. and smoothing resist.	250
R17	Parts of main G.B. and smoothing resist.	64
R18	V1 and V2 grids decoupling	2,500,000
R19	Part of band-pass circuit	4,000,000
R20	V3 grid decoupling	800,000
R21	V3 grid resistance	1,000,000
R22	V2 grid resistance	3,200,000
R23	V4 aux. grid decoupling	4,000
R24	V1 and V2 anodes decoupling	1,000
R25	Parts of A.V.C. circuit	50,000
R26	Parts of A.V.C. circuit	5,000,000
R27	Part of band-pass circuit	200,000
R28	V3 S.G. decoupling	400,000
R29	V3 anode resistance (part)	100,000
R30	Part of sensitivity control	2,000,000
R31	Artificial damping applied to L12	320,000

* 500,000 Ω in some cases.

	Components	Value (ohms)
L1	Part of aerial circuit filter	140
L2	Parts of diode H.F. filter	350-430
L3	Parts of diode H.F. filter	350-430
L4	Primary band-pass coil	1·0
L5	Primary band-pass coil	1·5
L6	Primary band-pass coil	28·5
L7	Secondary band-pass coil	1·0
L8	Secondary band-pass coil	1·5
L9	Secondary band-pass coil	28·5
L10	1st H.F. trans. pri.	75·0
L11	Part of 1st H.F. trans. sec.	1·0
L12	Part of 1st H.F. trans. sec.	28·5
L13	2nd H.F. trans. pri.	75·0

	Components (*contd.*)		Value (ohms)
L14	2nd H.F. trans. sec.		1·0
L15	2nd H.F. trans. sec.		1·6
L16	2nd H.F. trans. sec.		28·5
L17	Part of 1st H.F. trans sec.		1·6
T1	Speaker input trans.	Pri.	680-830
T1	Speaker input trans.	Sec.	0·2
T2	Mains trans.	Pri. (total)	73·0
T2	Mains trans.	Heater sec.	0·1
T2	Mains trans.	Rect. fil. sec.	0·2
T2	Mains trans.	H.T. sec.	550
S1-S4	Waveband ganged switches		—
S5	Tone control switch		—
S6	Sensitivity switch		—
S7	D.P. mains switch		—

VALVE ANALYSIS

It is essential to observe on which part of the scale the variable condenser is placed before making measurements on the valves. As resistance **R4** is mechanically coupled to the spindle of the variable condenser, it will be seen that this variation will cause a variation of voltages and currents in the valves. Similarly, the sensitivity switch should be placed as stated below in order to ensure accurate readings.

NOTE.—Voltage readings in the tables below should be measured with a high resistance voltmeter, from the anode or screen of each valve to the *cathode*.

Table I.

Tuning scale at **minimum**, sensitivity switch out (max. sens.)

Valve		Anode Volts	Anode Curr. (mA)	Screen Volts	Screen Curr. (mA)
V1.	S4VB	230	0·8	110-120	0·2
V2.	S4VB	230	1·6	110-120	0·4
V3.	SD4	70	0·6	—	—
V4.	PM24A	218	17·5	208	5·5
V5.	1821	250*	—	—	—

* Each anode.

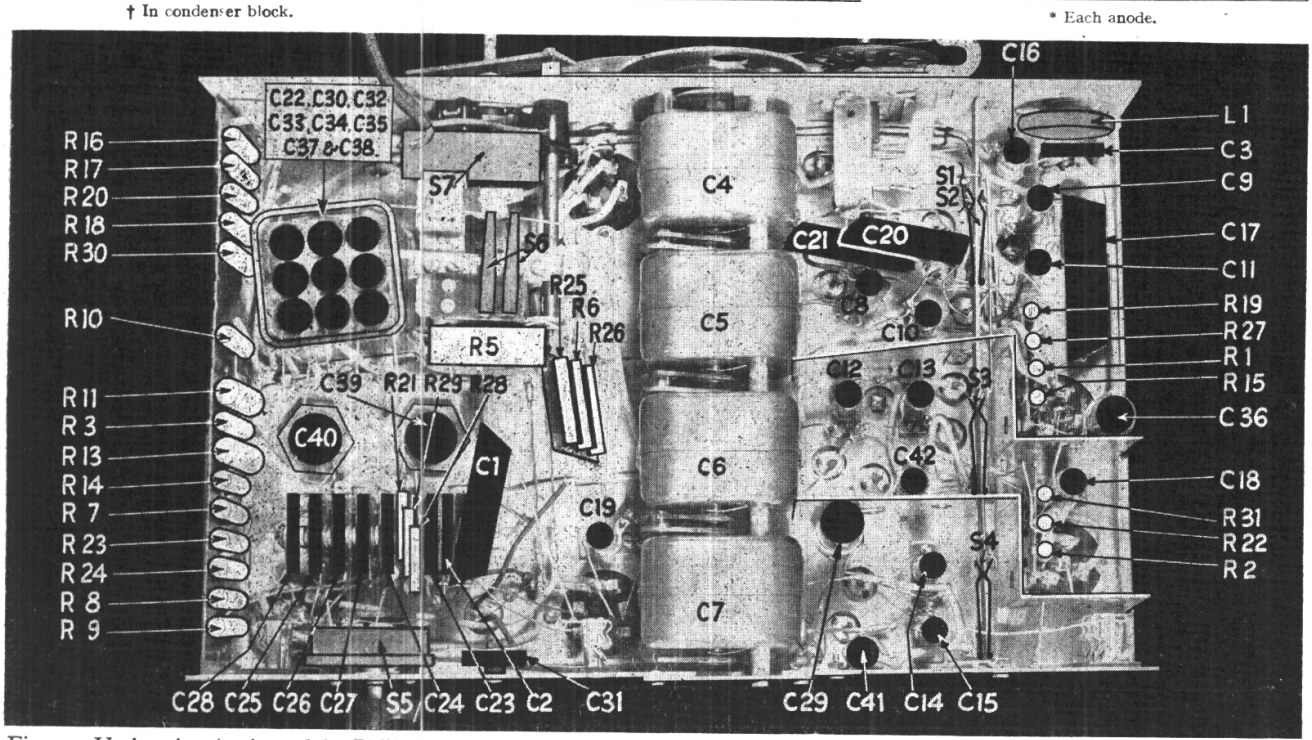


Fig. 3.—Under-chassis view of the Philips 634A. The screen and its supporting bars have been removed. The connections of the block condenser are shown in a separate diagram.

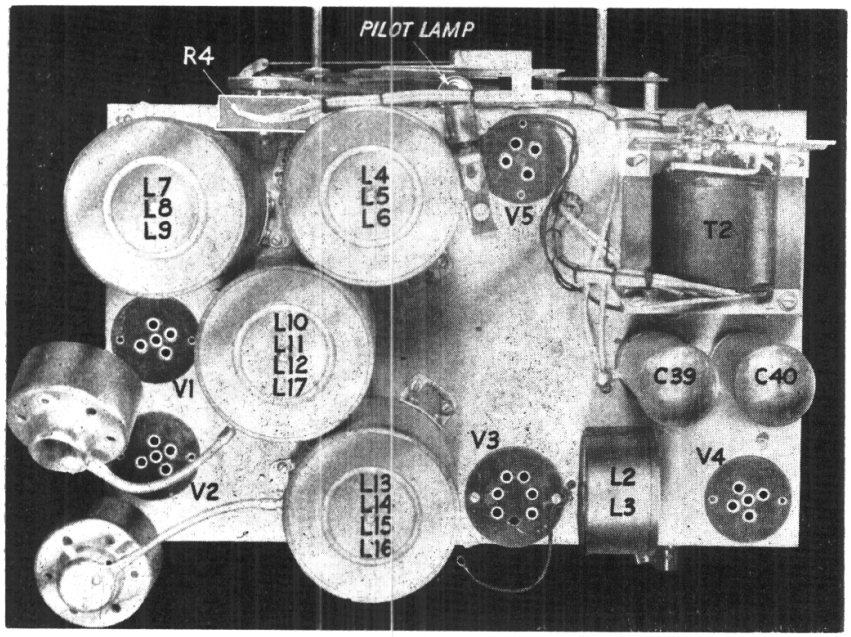


Fig. 2.—Plan view of the chassis of Philips Model 634A. The valves have been removed. Note the pilot lamp in its removable holder. R4 forms a sensitivity control, and is ganged with the condenser drive by means of a phosphor-bronze belt.

Table 2.

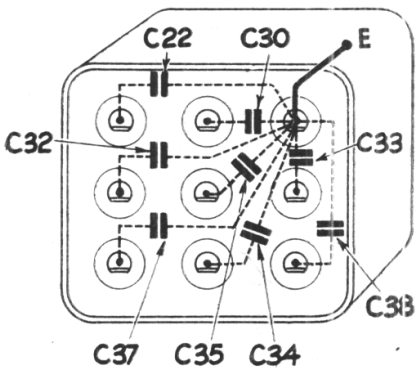
Tuning scale at **maximum**, sensitivity switch out (max. sens.)

Valve		Anode Volts	Anode Curr. (mA)	Screen Volts	Screen Curr. (mA)
V1.	S4VB	215	2·5	95	0·8
V2.	S4VB	215	5·5	95	1·2
V3.	SD4	70	0·5	—	—
V4.	PM24A	210	15·0	205	4·5
V5.	1821	250*	—	—	—

* Each anode.

GENERAL NOTES

Condenser Block.—This can be seen clearly in the under-chassis view, and the internal wiring is shown diagrammatically in the additional sketch. To



A sketch showing the internal connections of the condenser block, containing eight condensers. It is seen in the same position as in Fig. 3, the top right-hand tag being earthed to the can and chassis.

remove, unsolder the leads and mark each one for easy identification. Release the screws holding the two special clamps and the block can then be withdrawn. When fitting a new block care should be taken to ensure that all leads are reconnected correctly.

Electrolytic Condensers.—These are secured to the top of the chassis. It is necessary to unsolder the leads and unscrew the securing nuts in order to remove the complete condensers.

Note that **C39** has its can insulated from the chassis, connection to it being made *via* a tag, which can be seen in Fig. 2. Make certain that this tag is well clear of the chassis, and that the wires leading to it are properly insulated.

Mica Condenser Assembly.—Condensers **C1, C2, C23, C24, C27, C26, C25, C28,** together with resistances **R28, R29** and **R21,** are mounted in one complete assembly immediately behind the tone filter switch. If it is required to replace one of these components, it is essential to unscrew the chassis bracket, unsolder the leads, and withdraw the two screws at each end. The complete assembly can then be taken out for repair.

Resistances.—These are assembled and wired in groups on paxolin strips, and are easily replaced. Care should be taken to ensure that they are not overheated during soldering.

H.F. Choke.—The high frequency choke **L2, L3,** is mounted on the top of the chassis. In order to remove this component, the leads connected inside the chassis should be unsoldered and carefully marked with their respective positions. The two screws which hold the screened can to the chassis can then be released, and the component withdrawn.

Volume Control and Mains Switch.—These are secured to the chassis by two long rods. To remove, first of all unsolder all the connections and mark each one for easy identification. Remove the paxolin strip by taking out the screws, and remove the threaded distance pieces.

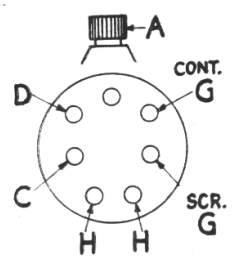
The resistance portion of the control can be released by taking away the two nuts at the opposite end, and also releasing the hexagonal nut, and releasing the pin which secures the spring. The switch portion of the assembly is secured to the two rods by two screws, and when these are released the assembly can be removed, leaving the on-off switch which is secured to the two rods close to the front of the chassis.

Tone Control Circuit.—In many 634A receivers the tone control is wired in the anode circuit of **V4,** and not in the grid circuit, as in our sample. This difference is slight, as it amounts only to the transference of **S5, C26** and **C27** to the anode circuit, **C25** being omitted and **C28** retained. The values of the condensers used, however, are somewhat higher, and are as follow:—C26, 0·01 μF; C27, 0·032 μF.

H.T. Fuse.—In some receivers a fuse is fitted between the filament of the rectifying valve and electrolytic condenser **C39.** This is mounted on the mains transformer voltage adjustment plate. New fuses can be obtained from the Philips Service Department.

Pre-set Condensers.—These are all accurately adjusted and sealed at the works, and should on no account be touched by the serviceman unless complete information is available. In the unlikely event of a fault occurring in either the ganged condenser or one of the coils the best plan in most cases will be to return the receiver concerned to the Philips Service Department.

Dial Lamp. This is of the single-pole S.B.C. type with a 6 V. 3 W filament, and is held in a special clip, which, in turn, is attached to a brass block on the chassis by means of a single screw. Removal is best accomplished after the rectifier valve **V5** has been withdrawn from its holder.



The connections of the SD4 single diode-tetrode, V3, looking at the underside of the valve base, or the underside of the valve-holder.

Valve Anode Screens.—The copper screens shielding the anodes of **V1** and **V2** are not easily removed from the screened anode leads. They are attached to the shanks of the anode terminals of the valves by means of internal clips operated by small push-buttons.

Aerial Sockets.—Two aerial sockets are provided, one marked A2 being used in normal conditions, while the other, A1, is intended for use only in "swamp" areas near powerful transmitters. No connection inside the chassis is made to A1, the capacity between the two sockets being sufficient to give the necessary coupling.

External Speaker Sockets.—There are three external speaker sockets at the rear of the chassis, the two upper ones being connected together and to the anode of **V4,** while the other one is wired to the main H.T. + line.