PHILIPS 680A

Three-valve, plus rectifier, three waveband, push-button superhet for A.C. supplies.

Circuit.—Band pass input circuits on M. and L.W. couple the aerial to V1, a hexode-triode frequency-changer. I.F. transformers link up V2, the amplifier, and V3, a combined double-diode and output valve. A third winding on the output transformer provides negative feedback. The full-wave rectifier, V4, utilises a resistance, R1, instead of a smoothing choke.

Wavebands: 13.8–51, 175–585, 708–2,000 metres. Mechanical push-button tuning provides for three M.W. stations, three M. or L.W. as desired, and for wavechange switching.

Provision for P.U. and low-impedance extension speaker.

Mains consumption: 50 watts.

GANGING

I.F. CIRCUITS.—Tune to 180 metres, volume maximum. Inject 128 kc. and adjust I.F. trimmers.

R.F. AND OSCILLATOR CIRCUITS.—Tune to 180 metres. Fit Philips' trimming jig and turn back manual control so that condenser rests on jig.

Inject 1,600 kc. and trim Cs. 18, 10, 6, 10, 18 in that order.

I.F. FILTER.—Apply 128 kc. to aerial socket. Adjust C13 for minimum.

CALIBRATION.—Inject and tune to 530 m. Adjust pointer to 530 m. by screw provided in mechanism. Tune and adjust to 240 m., using adjustment screw near to the first one.

KEY ADJUSTMENT

The condenser has a lateral instead of rotary movement. It is pushed to required pre-set positions by a crank at the end of a rotary bar. The amount of travel for each station key is determined by a screw, set in the key, and bearing against a stop bar.

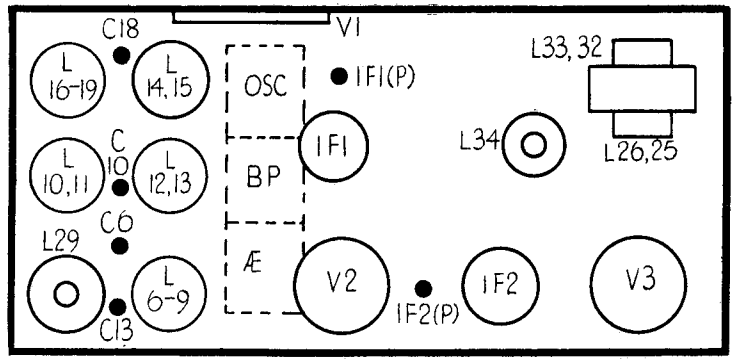
Wave switching is accomplished by rockers, which the keys tilt. On the three keys, which can be adjusted to either M. or L.W. stations, there are arms which normally operate the L.W. rocker. By releasing screws, these arms are allowed to fall and the keys then switch to M.W.

Adjustment of both station and waveband screws is made through holes below the keys. A tool is provided with the receiver.

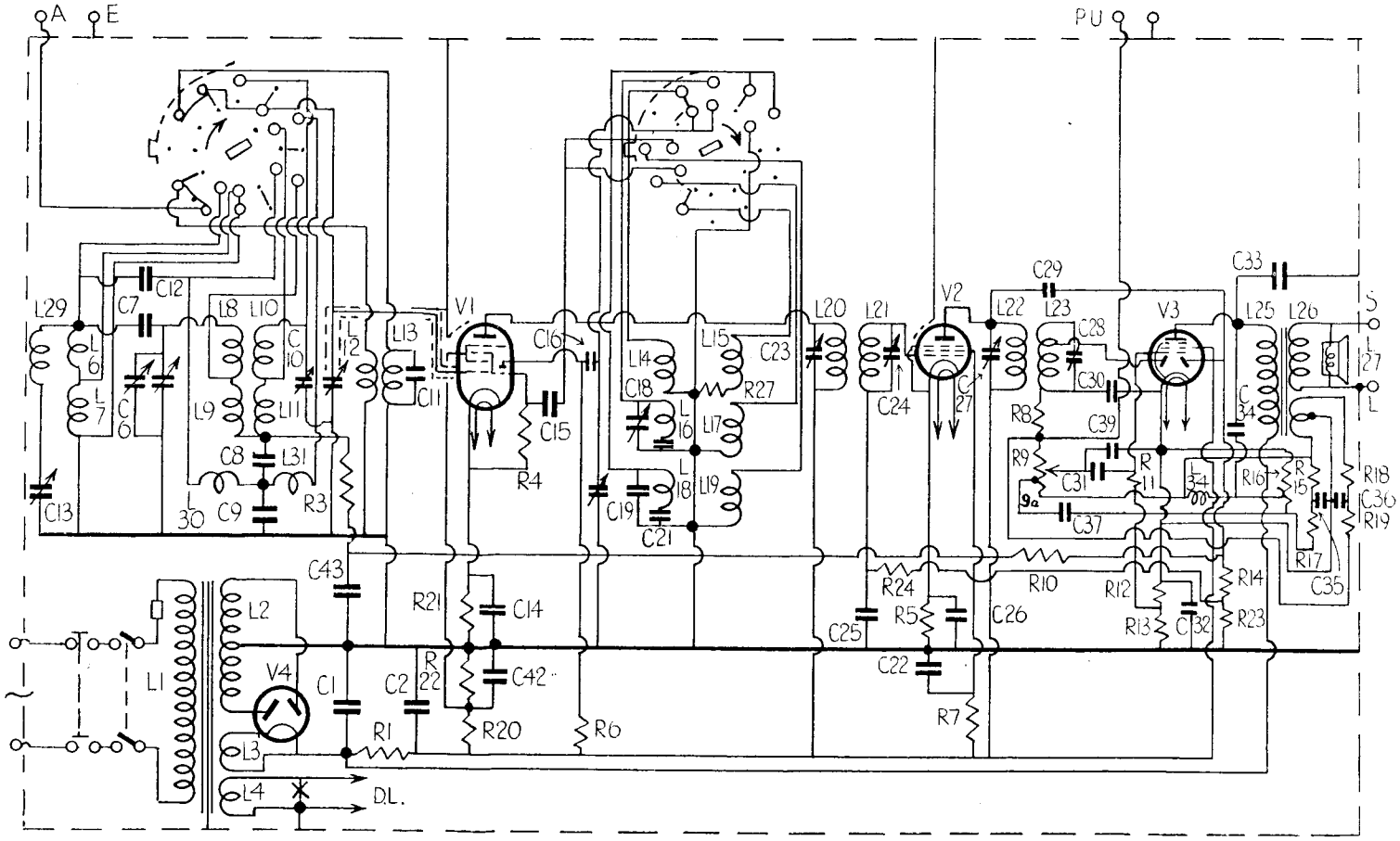
VALVE READINGS

V	Type	Electrode	Volts	Ma.
1	ECH3	Anode	255	1.2
		Screen	70	1.8
		Osc. anode	140	4.3
2	EF9	Anode	250	5
		Screen	90	1.5
3	EBL1	Anode	260	32
		Screen	240	5.2
4	AZ1	Cathode	300	—

Dial lamp—Type 8091, D–00.



The mains transformer and V4, the rectifier, are on a separate assembly to the right of the chassis and are not shown above.



RESISTANCES

R	Ohms.	R	Ohms.
1	1,800	14	.56 meg.
3	.1 meg.	15	1,500
4	47,000	16	50,000
5	330	17	12,000
6	27,000	18	10,000
7	.1 meg.	19	.82 meg.
8	47,000	20	47,000
9	.65 meg.	21	330
9A	.05 ,,	22	33,000
10	1.5 ,,	23	.56 meg.
11	1 ,,	24	1.8 ,,
12	150	27	15
13	390		

CONDENSERS

C	Mfds.	C	Mfds.
1	50	21	.000394
2	15	22	.047
Or 1+2	32+32	23	70–100 mmfds.
3	11–490 mmfds.	24	70–100 ,,
4	11–490 ,,	25	.047
5	11–490 ,,	26	.047
6	20 ,,	27	70–100 mmfds.
7	10 ,,	28	70–100 ,,
8	.012	29	8.2 ,,
9	.039	30	56 ,,
10	20 mmfds.	31	.0033
11	2.2 ,,	32	25
12	39 ,,	33	.001
13	70–100 ,,	34	.0047
14	.047	35	.033
15	47 mmfds.	36	.0056
16	.00047	37	.027
18	20 mmfds.	39	.0001
19	33 ,,	42	.0047
20	.00145	43	.047

WINDINGS

L	Ohms.	L	Ohms.
2	300	19	9.5
3	less than .5	20	115
4	,, .5	21	115
6	26	22	115
7	90	23	90
8	4.5	24	35
9	48	25	700
10	4.4	26	1
11	45	27	2.5
12	2	29	110
13	less than .5	30	.7
14	,, .5	31	.7
15	1	32	180
16	8	33	180
17	2.5	34	800
18	32		

PHILIPS 680A
MULLARD MAS94

Three-valve, plus rectifier, three waveband superhet for operation on AC mains of 100-250 volts, 50-100 cycles. Fitted with push-buttons for stations and wavechanging and with sockets for pick-up and extension speaker. Marketed by Phillips Lamps, Ltd., and Mullard Wireless Service Co., Ltd., Century House, Shaftesbury Avenue, London, WC2.

ON medium and long waves a bandpass circuit is employed in which the aerial signals are coupled by L6, L7 and C7 to the primary coils L8 (MW) and L9 (LW). These are tuned by VC1 section of the ganged condenser.

Secondaries of the bandpass unit are L10, L11 tuned by VC2, and the signals are fed direct to the grid of the frequency changer V1.

Bandpass coupling is effected by L30, L31, C8 and C9, and an intermediate-frequency rejector circuit comprises L29 and C13.

On short waves the aerial input is fed to the coupling coil L12 and thence to the tuning coil L13.

V1 is cathode biased by R21 decoupled by C14 and has automatic volume control applied to the grid circuit on MW and LW only. R3 and C43 are the AVC decoupling components.

The oscillator triode section of V1 employs grid leak R4 and condenser C15 with feed-back coils L15, L17, L19. The tuned anode coils L14, L16 and L18 are fed from the anode circuit *via* C16 and are tuned by VC3.

IF signals are transferred by transformer L20 and L21 to the grid of the pentode V2 which is AVC controlled. Standing bias is provided by the cathode resistance R5, decoupled by C26.

A second IF transformer, L22, L23 passes the signal on to the signal diode of the double diode output pentode V3. IF filtering is by R8 and C30, and the volume control R9 is the load resistance.

Audio frequency signals are fed *via* C31 to the grid of the pentode section of V3. HF filtering is effected by C39.

The AVC diode of V3 is fed from the anode of V2 *via* C29, the load resistances being R14 and R23. Full control volts are applied to V1, and the smaller voltage to V2 from the junction of R14 and R23.

Delay voltage is obtained from the maximum bias across the cathode resistances R12, R13, while the junction of these two resistances provides bias for the pentode section of V3.

Pickup sockets are provided across the top end of the volume control R9 and chassis.

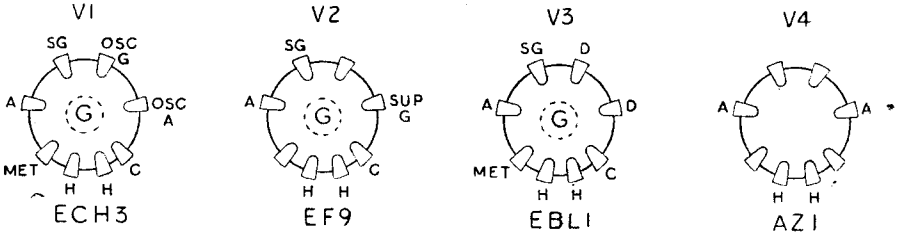
The output transformer L25, L26 couples V3 to the permanent-magnet moving-coil loudspeaker in which L27 is the speech coil. Sockets are provided for an extra low-impedance speaker having a DC resistance of approximately 2.5 ohms.

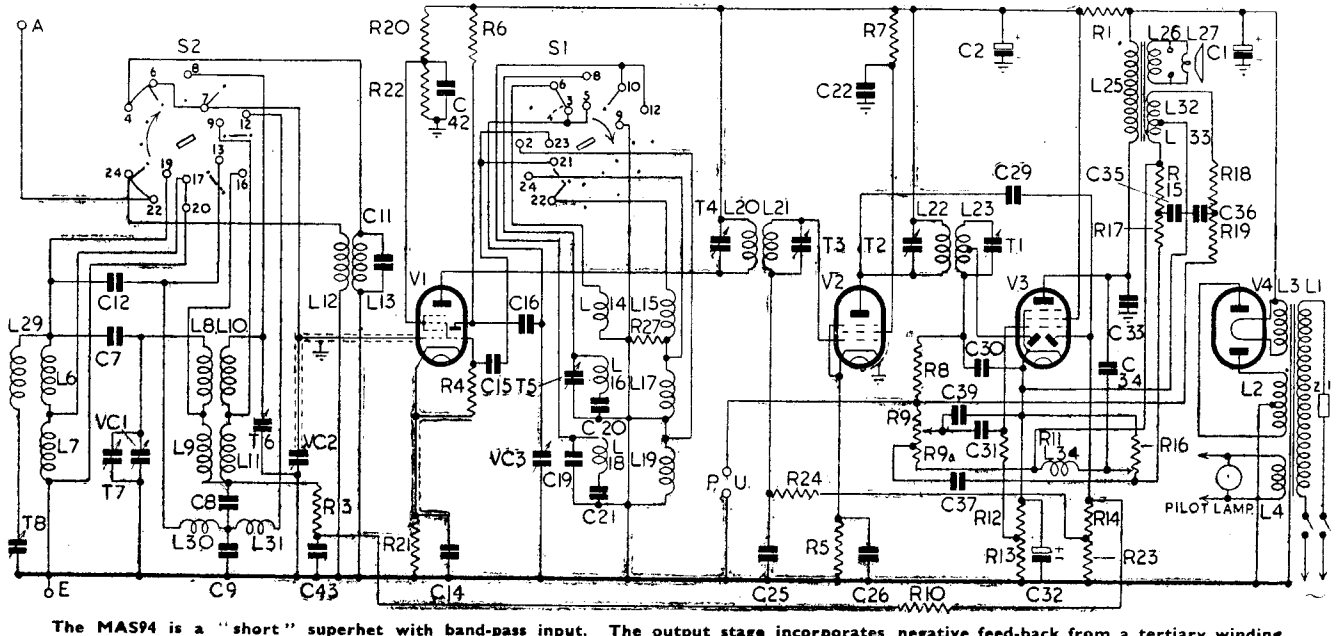
A tertiary winding on the output transformer, comprising L32 and L33, provides positive and

Continued overleaf

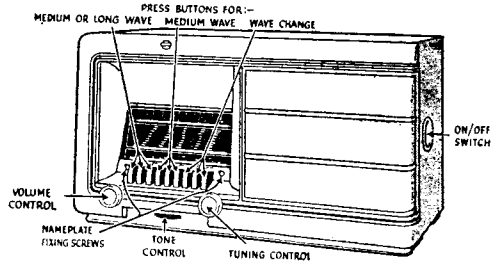
VALVE READINGS

V	*Type*	*Electrode*	*Volts*	*Mas.*
1	ECH3	Anode	255	1.2
		Osc.-anode	140	4.3
		Screen	70	1.8
		Cathode	2	—
2	EF9	Anode	250	5
		Screen	240	1.5
		Cathode	2.2	—
3	EBL1	Anode	260	3.2
		Screen	240	5.2
		Cathode	19	—
4	AZ1	Filament	300	DC





The MAS94 is a "short" superhet with band-pass input. The output stage incorporates negative feed-back from a tertiary winding on the speaker transformer. The push-button tuning is purely mechanical.



This cabinet houses the Mullard version. There are three buttons for wavechanging, three for medium wave pre-selected stations, and three which can be set for either medium or long-wave programmes. The manual tuning knob is depressed for operation. A lever type of tone control is fitted.

RESISTORS

R	*Ohms*	*R*	*Ohms*
1	1,800	14	560,000
3	100,000	15	1,500
4	47,000	16	50,000
5	330	17	12,000
6	27,000	18	10,000
7	100,000	19	820,000
8	47,000	20	47,000
9	650,000	21	330
9a	50,000	22	33,000
10	1.5 meg.	23	560,000
11	1 meg.	24	1.8 meg.
12	150	27	15
13	390		

CONDENSERS

C	*Mfds.*	*C*	*Mfds.*
1	50	25	.047
2	15	26	.047
7	.00001	29	8.2 mmfds.
8	.012	30	56 mmfds.
9	.039	31	.0033
11	2.2 mmfds.	32	25
12	39 mmfds.	33	.001
14	.047	34	.0047
15	47 mmfds.	35	.033
16	.00047	36	.0056
19	33 mmfds.	37	.027
20	.00145	39	.0001
21	394 mmfds.	42	.047
22	.047	43	.047

WINDINGS

L	*Ohms.*	*L*	*Ohms.*
2	300	19	9.5
3	under .5	20	115
4	under .5	21	115
6	26	22	115
7	90	23	90
8	4.5	24	35
9	48	25	700
10	4.4	26	1
11	45	27	2.5
12	2	29	110
13	under .5	30	.7
14	under .5	31	.7
15	1	32	180
16	8	33	180
17	2.5	34	800
18	32		

PHILIPS 680A—*Continued*

negative voltages which are transferred to the grid circuit of V3 *via* frequency modifying components R15, R17, R18, R19, C35, C36. This arrangement provides negative feedback when the volume control is towards its minimum. When the control is advanced the feedback is positive, so that maximum gain is obtained for the reception of weak stations.

A permanent degree of tone correction is effected by C33 in the anode circuit of V3, and a variable tone control comprises R16, which is fed from the anode *via* C34.

The HT supply is obtained from the mains transformer and full-wave rectifier V4, with resistance smoothing by R1, C1 and C2.

GANGING

IF Circuits. Switch receiver to MW and tune to 180 m. Adjust volume control for maximum. Inject a 128 KC signal to the top grid of V1 and connect an 80 mmfd. condenser across T2.

Adjust T1 for maximum output.

Transfer the 80 mmfd. condenser from across T2 to across lower half of L23.

Adjust T2 for maximum output.

Disconnect 80 mmfd. condenser from across L23 and connect it across T4. Adjust T3 for maximum output.

Transfer condenser from T4 to T3, adjust T4 for maximum output.

Lock all the trimmers with "philitine" wax and remove the 80 mmfd. condenser.

HF Circuits. Switch receiver to MW. Adjust volume control to maximum and tune receiver to 180 m.

The manufacturers recommend the use of a special trimming jig which should be fitted to the ganged condenser, and when this is fitted the tuning control should be turned back so that the moving vanes rest against the jig.

Inject a 1600 KC signal into the aerial and earth sockets, and adjust T5, T6, T7, T6, T5 in that order for maximum output.

There are no LW adjustments to be made.

IF Filter Circuit. Inject a 128 KC signal into the aerial and earth sockets, and adjust T8 for *minimum* output.

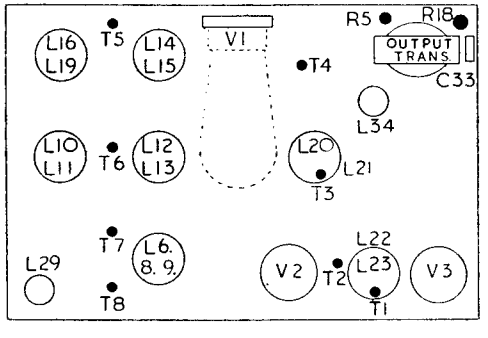
KEY ADJUSTMENT

The condenser has a lateral instead of rotary movement. It is pushed to required pre-set positions by a crank at the end of a rotary bar. The amount of travel is determined by a screw, set in each key and bearing against a stop bar.

Wave switching is accomplished by rockers, which the keys tilt. On the three keys which can be adjusted to either M or LW stations, there are arms which normally operate the LW rocker. By releasing screws, these arms can be made to fall, and the keys then switch to MW.

Adjustment of both station and waveband screws is made through holes below the keys. A tool is provided with the receiver.

(Right)—Layout diagram identifying parts on top of the Philips-Mullard chassis. It is characterised by the unusual location of V1 and the absence of the gang condenser which is mounted underneath. Trimmers are accessible, but chassis must first be removed from the cabinet.



The diagram below shows how the parts are disposed under the chassis. The rectifier and mains transformer are on a small separate chassis. Note the switch banks with contacts numbered as in the circuit diagram.