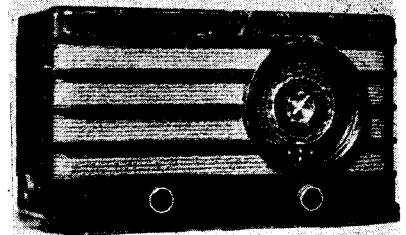


PHILIPS 470A THREE-BAND FOUR



A simple but efficient three-valve plus rectifier three-band A.C. model, the 470A lists at 8 gns.

CIRCUIT.—Aerial input to the octode frequency changer is by an inductively coupled circuit on the short waves and by a band-pass arrangement on the medium and long waves. An I.F. trap is included.

Signal grid to oscillator grid coupling is afforded by C42. On the medium and long waves C29 is short circuited and the padding condensers serve as the oscillator grid condenser.

The coupling to the pentode I.F. valve is an I.F. transformer tuned to 128 kc. Both V1 and V2 are A.V.C. controlled.

A further transformer provides the coupling between V2 and the demodulating diode of V3, a double diode output pentode. The secondary of the transformer is tapped and connected to the diode.

Connection to the combined manual volume control and demodulating diode load R10 is made via an H.F. filter circuit, and the rectified potentials obtained fed to the grid of the pentode section of V3 via an L.F. coupling condenser and grid stopper resistance.

The other diode of V3, fed by a small coupling condenser from the anode of the I.F. amplifying valve, provides a D.C. potential to operate the A.V.C. circuit.

A variable top-cut tone control circuit, R17, C35 and R18, provides tone control, and a pentode compensator C30 effects a fixed-tone modification.

Mains equipment consists of a mains transformer, a full-wave rectifying valve V4, electrolytic smoothing condensers, a smoothing resistance for H.T. supply to V1 and V2 and the screen of V3.

Chassis Removal.—Take off back of cabinet and the mains safety device. Remove the two grub-screw fixed control knobs from the front and the two knobs from the sides. The knobs on the sides are removed by loosening the grub screws securing the extension shafts inside the cabinet.

Unsolder the lead to the tag of the earthing screen below the chassis. The six securing screws should then be removed from around the edges of the wood block holding the complete chassis and speaker assembly.

The whole of the chassis and speaker assembly can then be removed and is fully accessible for service.

Special Notes.—The mains adjustment consists of a black disc on which six voltages are engraved. To alter the voltage, pull the disc until it is free to rotate, and then turn it until the required voltage is visible through an aperture in the back of the cabinet, or, alternatively, at the top position of travel.

The mains input leads are led through a safety device so that the receiver is switched off when the back is removed.

The single dial light, mounted in a screw-in holder secured by a milled nut to the top of the scale, is a Philips type 8042-37.

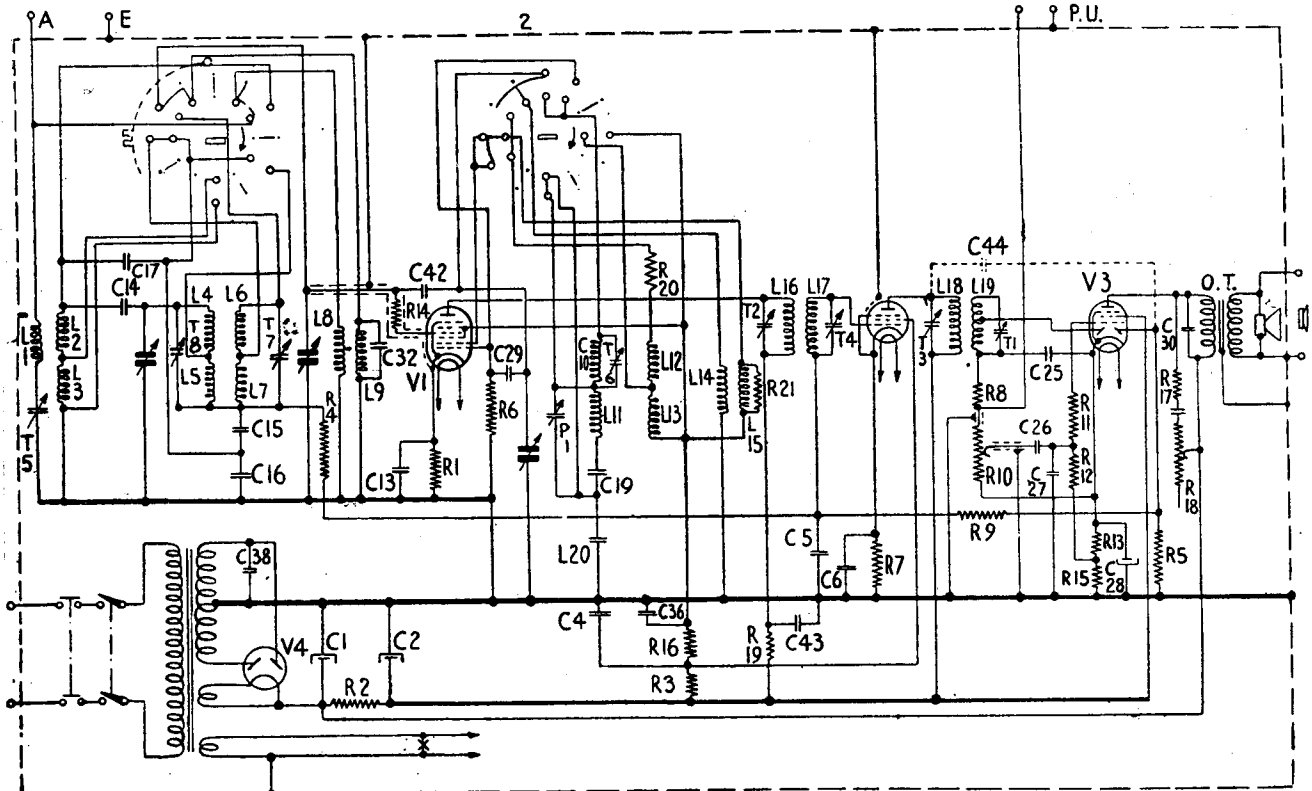
Sockets at the rear near the mains adjustment device are for operating a 5-7-ohms extension speaker.

Similar pair of sockets are for connecting a pick-up. The pick-up should have a

VALVE READINGS

No signal. Volume maximum. M.W. min. cap.

V.	Type.	Electrode.	Volts.	Ma.
1	(Mullard) FC4 (7 met.)	Anode ..	230	1.5
		Screen ..	78	3
		Osc.anode ..	90	1.7
2	VP4B ..	Anode ..	225	5.1
		Screen ..	155	2.5
3	Pen.4DD ..	Anode ..	250	34
		Screen ..	230	5
4	(Philips) 1821 (4)	Heater ..	270	—



Band-pass pre-selection, tone control, P.U. and E.S. sockets are included in the 470A. The switch diagrams correspond to the actual appearance of the switch banks.

high output to obtain satisfactory results, as only the pentode output valve is used.

It will be seen from the circuit that the wavechange switches are drawn to conform with the actual appearance of each switch, and the diagrams may be taken to correspond with our usual drawings of switch contacts.

C38 is not included when the mains transformer has separate coils. Sometimes different positions of R17 and C35

will be found but it is an easy matter to identify these components as they are connected to the tone control resistance R18. R17 is inside an insulating sleeve.

Alignment Notes

I.F. Circuits.—Earth the receiver, turn volume to maximum and tune to lower end of L.W. range (about 700 metres). Connect an output meter across primary of speaker transformer or extension speaker sockets.

Connect a volume oscillator between the
(Continued on page 43)

CONDENSERS

C.	Purpose.	Mfds.
1	H.T. smoothing	.32
2	H.T. smoothing	.32
4	V2 screen decoupling	.05
5	V2 A.V.C. decoupling	.05
6	V2 cathode bias shunt	.05
13	V1 cathode bias shunt	.05
14	Aerial coupling	.000016
15	Bottom band pass coupling	.016
16	Bottom band pass coupling	.025
17	Aerial coupling	.00004
19	L.W. osc. fixed padder	.0007
20	M.W. osc. fixed padder	.000149
25	H.F. bypass	.00008
26	L.F. coupling	.01
27	V3 grid shunt	.00008
28	V3 cathode bias shunt	.25
29	Osc. grid	.00005
30	Pentode compensator	.002
32	S.W. aerial fixed trimmer	.000016
35	Tone control	.05
36	V1 screen osc. anode decoupling	.1
38	Rectifier H.F. bypass	.02
42	Neutralising coupling	.000002
43	V1 anode decoupling	.05
44	A.V.C. diode coupling	.000004

RESISTANCES

R.	Purpose.	Ohms.
1	V1 cathode bias	250
2	H.T. smoothing	2,000
3	V3 screen decoupling	8,000
4	V1 A.V.C. feed	100,000
5	A.V.C. diode load	500,000
6	Osc. grid leak	50,000
7	V2 cathode bias	250
8	H.F. stopper	50,000
9	V2 A.V.C. decoupling	2 meg.
10	Volume control	500,000
11	V3 grid stopper	10,000
12	V3 grid leak	1 meg.
13	V3 cathode bias (part)	160
14	V1 grid stopper	50
15	V3 cathode bias (part)	400
16	V1 screen and osc. anode decoupling	12,500
17	Tone modifier circuit	100
18	Tone control	50,000
19	V1 anode decoupling	8,000
20	Regeneration modifier	500
21	Regeneration modifier	20,000

Philips 470A on Test

MODEL 470A.—For A.C. mains, 100-260 volts, 50-100 cycles. Price 8 gns.

DESCRIPTION.—Three-valve, plus rectifier, three-waveband table model.

FEATURES.—Full-vision circular scale, calibrated in metres and station names. Nearly 360 degrees of pointer rotation. Speaker at side of chassis. Controls for tone, combined volume and master switch, tuning and wave selection. Wave selection control operates indicator on scale. Sockets for pickup and low impedance extension speaker.

LOADING.—50 watts.

Sensitivity and Selectivity

SHORT WAVES (16.7-51 metres).—Excellent gain and selectivity with very easy handling and good background.

MEDIUM WAVES (198-585 metres).—Well maintained gain, excellent selectivity and local stations spread on adjacent channels only. Clean background.

LONG WAVES (720-1,950 metres).—Similar performance to medium waves with only slight side splash interference on Deutschlandsender.

Acoustic Output

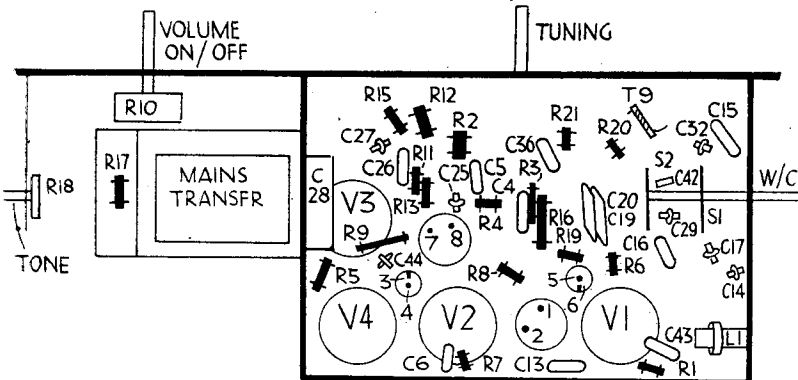
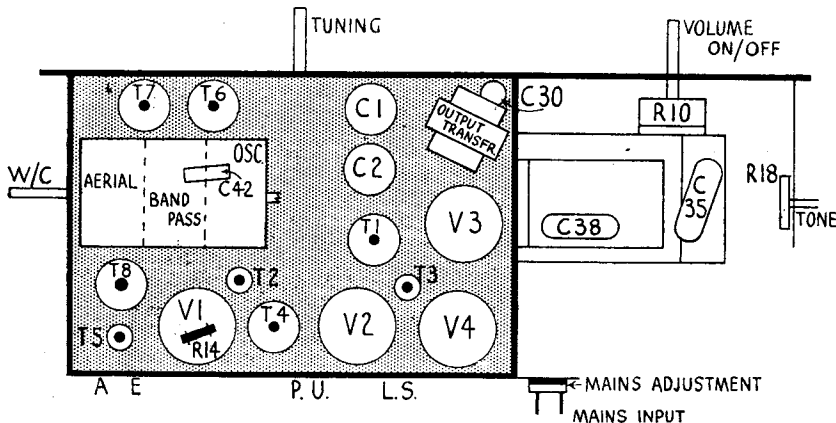
Very good well-balanced tone with excellent low-note radiation and crisp, clean attack. Speech practically without colouration and a general pleasing balance on orchestral music. Ample volume for an ordinary room.

Replacement Condensers

EXACT replacement condensers available from A. H. Hunt, Ltd., are: For either C1 or 2, unit list number 2989, 7s. 6d., and for C28, unit 2918, 1s. 9d.

WINDINGS (D.C. Resistances)

L.	Ohms.	Range	Where measured.
1 ..	126	Any	Across tags.
2 ..	29	M.W.	C14 and chassis.
3 ..	143	L.W.	C14 and chassis.
4 ..	26	M.W.	Aerial gang and C15.
5 ..	50	L.W.	Aerial gang and C15.
6 ..	26	M.W.	Bandpass gang and C15.
7 ..	45	L.W.	Bandpass gang and C15.
8 ..	2	S.W.	Aerial socket and chassis.
9 ..	.1	S.W.	Bandpass gang and chassis.
10 ..	11	M.W.	Osc. gang and C19 + C20.
11 ..	42	L.W.	Osc. gang and C19.
12 ..	4	M.W.	R20 and C36.
13 ..	11	L.W.	R20 and C36.
14 ..	.3	S.W.	C29 and chassis.
15 ..	1.5	S.W.	Osc. anode and C36.
16 ..	130	Any	Points 5 and 6.
17 ..	130	Any	Points 1 and 2.
18 ..	130	Any	Points 3 and 4.
19 ..	130	Any	Points 7 and 8.
O.T. prim.	700	Any	Tags.
M.T. prim.	(200)	Any	
Total H.T. sec.	55	Any	Mains plugs.
	420	Any	Anode pins V4.



Construction is a little unusual, as these layout diagrams of the chassis indicate. The top view is "tinted." Trimmers are readily accessible from above.

Cossor 396 Three-band Six

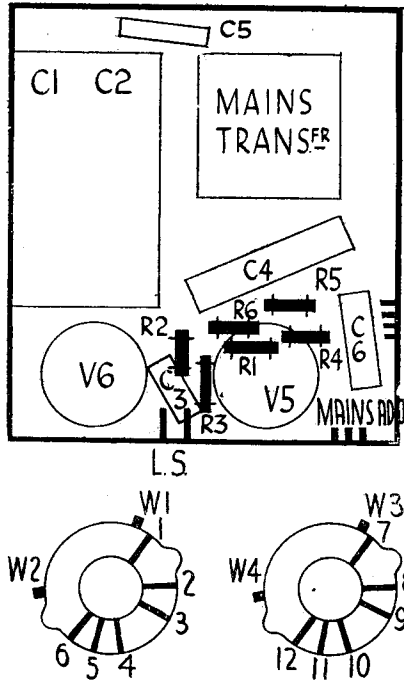
(Continued from page 31)

turn. The bulbs are rated at 6.5 volts .3 amp., and have M.E.S. bases.

C14, C15, C16 and C19 are contained inside the corresponding I.F. transformer can.

Alignment Notes

It should not be found necessary to adjust the I.F. transformers except when one is replaced, as there are no trimmers to drift.



Connect an output meter across the primary of the speaker transformer. Switch receiver to M.W. band, turn gang to maximum capacity, volume to maximum and tone to "high" position. Connect a service oscillator to the top grid cap of V1 and chassis.

Tune the service oscillator to 465 kc., and adjust first the iron cores of I.F.T.2 and then I.F.T.1 for maximum response. Reduce the input from the service oscillator as the circuits come into line to keep below the A.V.C. point. The cores are sealed with wax compound and should be re-sealed after adjustment.

Signal Circuits.—The pointer should coincide with the last calibration mark on the scale when the gang is at maximum.

Connect the service oscillator to the aerial and earth sockets *via* a dummy

aerial. Only feed sufficient input to obtain reliable peaks in the output meter, and progressively reduce the input as the circuits come into line.

Medium Wave.—Tune set and oscillator to 214 metres (1,400 kc.), and adjust T1, T2 and T3 for maximum response.

The medium wave padding is fixed, but check at 214 metres.

Long Wave.—Tune set and oscillator to 1,200 metres (250 kc.) and adjust T4, T5 and then T6 for maximum response.

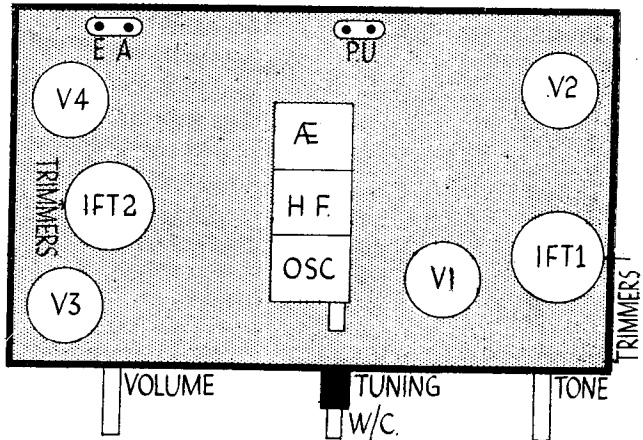
Long Waves.—Tune set and oscillator to 1,875 metres (160 kc.) and adjust P1 for maximum simultaneously rocking the gang.

Repeat both operations until no further improvement results.

Short Waves.—Tune set and oscillator to 175 megacycles and adjust T7, T8 and T9 in that order for maximum response.

There are no padding adjustments, but check calibration throughout the band.

Right: The layout diagram identifying parts on top of the Cossor radio chassis. The underneath diagram of the power chassis is on the left. Below are the switch banks lettered according to the circuit.



Philips 470A Four

(Continued from page 47)

top grid cap of V1 (*via* a .032 mfd. condenser) and chassis.

Connect a 50,000 ohms resistance across points 1 and 2 and an 80,000 ohms resistance across points 3 and 4 (see underside of chassis drawing).

Tune service oscillator to 128 kc., and adjust T1 and then T2 for maximum.

Remove resistances and connect the 50,000 ohms resistance across points 5 and 6 and the 80,000 ohms resistance across 7 and 8.

Then adjust T3 and then T4 for maximum. Remove resistances.

I.F. Wavetrap.—Connect the service oscillator to the aerial and earth sockets *via* a dummy aerial.

Tune receiver to upper end of long waves (about 2,000 metres), inject a fairly strong 128 kc. signal and adjust T5 for minimum response.

Signal Circuits.—Only feed sufficient input from the service oscillator (connected to the aerial and earth sockets *via* a dummy aerial) to obtain reliable peaks in the output meter and progressively reduce the input as the circuits come

into line. This is to prevent operation of the A.V.C.

Medium Waves.—Fit 15 deg. jig on gang and set the gang to the jig. Tune service oscillator to 208 metres (1,442 kc.), and adjust the trimmers T6, T7 and T8 in that order for maximum. Then repeat with T6 and T7. Remove jig.

Long Waves.—Connect the output meter to output terminals of a GM2404 aperiodic amplifier and then connect amplifier to the anode of V1. Earth the oscillator grid *via* a .1 mfd. condenser.

Tune service oscillator to 750 metres (400 kc.) and rotate the gang for maximum on output meter.

Disconnect aperiodic amplifier, remove shorting condenser from oscillator grid, reconnect output meter to receiver and, without altering the tuning control, adjust P1 for maximum response.

P1 consists of an insulating bush internally sprayed with metal and covered on the outside with a winding of copper wire. In trimming, turns are removed until the output indicator begins to drop back, some of the wire is replaced until a maximum output is obtained, when the surplus wire is clipped off.

Short Waves.—There are no separate adjustments to be effected on this band.

Pye 812 Console

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15 metres (20 mc.) and adjust T1 for maximum response.

Tune set and oscillator to 50 metres (6 mc.) and move the yellow lead to the gang condenser in relation to the short wave winding on the oscillator coil for maximum response.

Then move the black lead to the aerial coil short wave winding in relation to this winding for maximum.

The gang must be returned each time a lead is moved. If much adjustment is required it will be necessary to readjust T1.

Medium Waves.—Tune set and oscillator to 210 metres (1,425 kc.) and adjust T2 and then T3 for maximum.

Long Waves.—Tune set and oscillator to 1,800 metres (1,166 kc.) and adjust P1 for maximum while rocking the gang.

Replacement Condensers

Exact replacement condensers, available from A. H. Hunt, Ltd., Garratt Lane, Wandsworth, London, S.W.17, are: For C18, unit list number 4,107, 3s.; C27, 2,964, 1s. 9d.; C28, 4,105, 1s. 6d.; C34, 2,935, 1s. 9d.; C36, 4,137, 1s. 6d.; and for the block containing Cs 38, 39 and 40, unit 4,200, 9s. 3d.