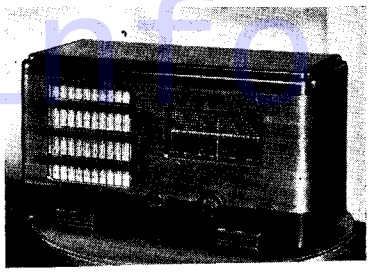
COSSOR 396 THREE-BAND A.C. SIX



Five valves, plus rectifier, are used in the 396. Triode output is a feature and three wavebands are covered.

CIRCUIT.—The aerial input is *via* a series aerial condenser and selectively switched H.F. aerial transformers to the signal grid of V1, an H.F. pentode operating as an R.F. amplifier.

A further set of selectively switched H.F. transformer coils couples V1 to the triode-hexode frequency-changer V2. In the oscillator section, the oscillator anode potentials are fed *via* C12, and unused coils are shorted by a wipe connected to chassis.

An iron-cored I.F. transformer, tuned to 465 kc., adjusted by variation of the iron core, provides the coupling between V2 and the I.F. amplifier V3. It will be observed that the screens of V1, V2 and V3 are fed from a common decoupling source.

Another I.F. transformer of similar construction is connected in the anode circuit of V3. It will be noticed that the primary and secondary windings are centre tapped, the primary tap feeding the A.V.C. diode of V4, a double diode triode, *via* a coupling condenser. The secondary tap feeds the demodulating diode of V4.

The coupling arrangements to the grid of the triode section of V4 include a manual volume control. A tone control circuit, C21 and R13, modifies the treble response.

V4 is resistance capacity coupled to V5, an output triode. Bias to the grids of V4 and V5 is obtained from a potentiometer network comprising R4, R5 and R6 shunted by a condenser. V5 is of the directly heated type, and connection to the chassis is made through a centre-tapped resistance R3.

Mains equipment consists of a transformer, a full-wave rectifying valve, V6, electrolytic smoothing condensers and a smoothing choke (the speaker field).

Radio Chassis Removal.—Remove the six screws securing the back and the four

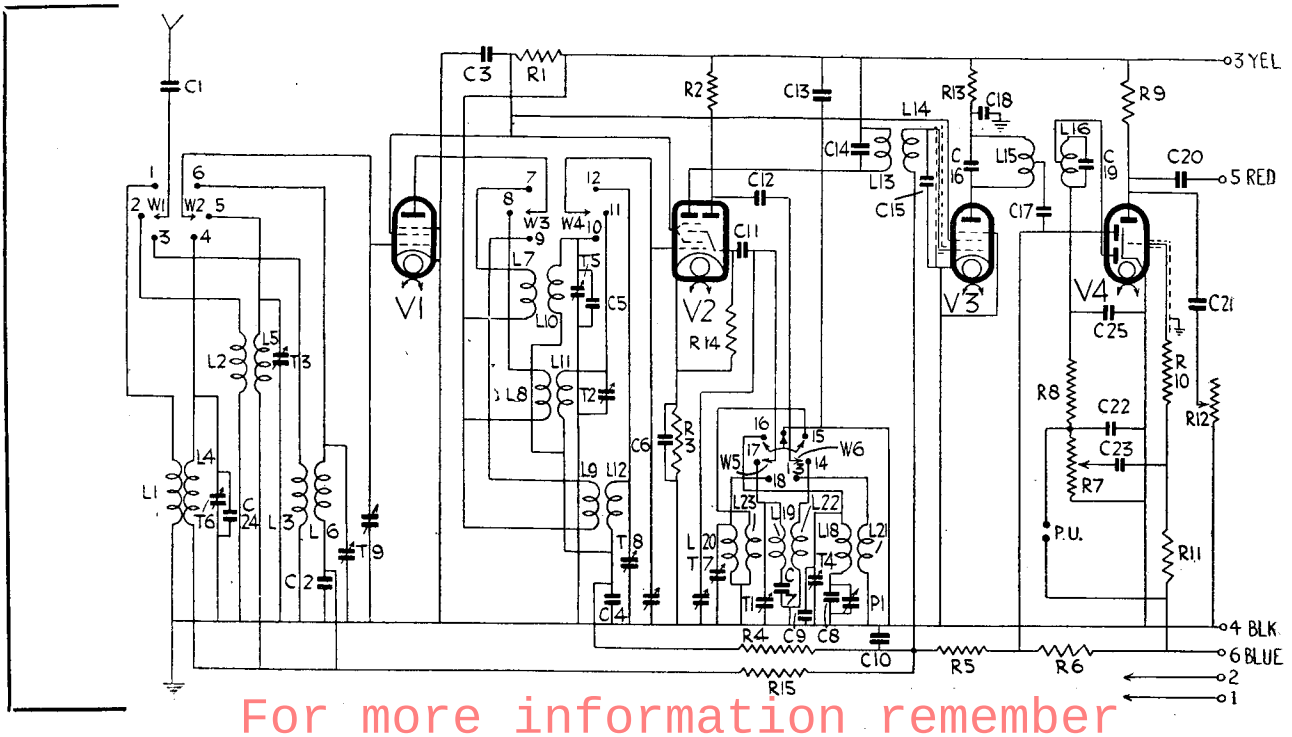
VALVE READINGS

No signal. Volume maximum. M.W. band min. capacity. 200 volt A.C. mains.

V.	Type.	Electrode.	Volts.	Ma.
	(All Cossor.)			
1	MVS/Pen. ..	Anode ..	250	5.5
		Screen ..	118	2.6
2	41 STH ..	Anode ..	250	2
		Screen ..	118	4.2
		Osc.anode	75	6
3	MVS/Pen. ..	Anode ..	210	6.5
		Screen ..	118	2
4	DDT	Anode ..	115	2.8
5	4XP	Anode ..	245	42
6	43IU	Cathode	255	—

CONDENSERS

C.	Purpose.	Mfds.	C.	Purpose.	Mfds.
	Radio Chassis.			*Radio Chassis.*	
1	Series aerial	.0005	17	A.V.C. diode coupling ..	.00005
2	V1 A.V.C. decoupling ..	.05	18	V3 anode decoupling ..	.1
3	V1, V2 and V3 screens decoupling.	.1	19	I.F.T.2 sec. fixed trimmer	.000075
			20	L.F. coupling.	.01
4	V2 A.V.C. decoupling ..	.05	21	Tone control	.03
5	L.W. H.F. fixed trimmer ..	.000015	22	H.F. bypass	.00005
6	V2 cathode bias shunt ..	.1	23	L.F. coupling.	.01
7	M.W. osc. fixed padder ..	.00057	24	L.W. aerial fixed trimmer ..	.000015
8	L.W. osc. fixed padder ..	.00012	25	H.F. bypass	.00005
9	L.W. osc. fixed trimmer ..	.00004			
10	V3 A.V.C. decoupling ..	.05		*Output Chassis.*	
11	Osc. grid.	.0001	1	H.T. smoothing	8
12	Osc. anode coupling ..	.0002	2	H.T. smoothing	8
13	H.T. line bypass	.1	3	Field shunt	.05
14	I.F.T.1 prim. fixed trimmer. .	.00025	4	Bias potr. shunt	10
15	I.F.T.1. sec. fixed trimmer ..	.00025	5	Mains suppressor	.01
16	I.F.T.2 prim. fixed trimmer. .	.00006	6	Mains suppressor	.01



grub-screw-secured control knobs. Remove the two bolts from the wood cross bar at the back of the cabinet and take out the bar. Next remove the two wood screws one from each side of the top of the wavelength scale.

The chassis may then be withdrawn to the extent of sundry cables. If desired the connecting plug may be withdrawn from the output chassis and the radio chassis is then perfectly free of all leads.

Output Chassis Removal.—Remove the mains on-off switch from the side of the cabinet. Then remove the four chassis-securing bolts from the base. Pull out the radio chassis plug and the speaker-connecting plug. The output chassis can then be withdrawn.

Special Notes.—An insulating panel on the chassis deck near V4 has sockets for a pick-up. The pick-up should be removed during radio reception.

A pair of sockets at the rear of the output chassis are for connection to an extension speaker. This should incorporate a matching transformer of 3,000 ohms impedance.

The mains voltage adjustment panel at the rear of the output chassis takes the form of a common socket and three sockets marked with voltage values. An insulation-headed member bridges sockets as required.

There are two dials lights mounted in rubber holders to eliminate crackle. The holders are removed by rotating half a

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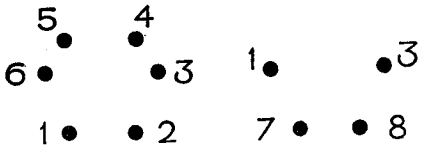
RESISTANCES

R.	Purpose.	Ohms.
	Radio Chassis.	
1	V1, V2, and V3 screens decoupling.	15,000
2	Osc. anode load	30,000
3	V2 cathode bias	300
4	V2 A.V.C. decoupling	500,000
5	V3 A.V.C. decoupling	2 meg.
6	A.V.C. diode load	1 meg.
7	Volume control	500,000
8	H.F. stopper	50,000
9	V4 anode load	50,000
10	V4 grid stopper	100,000
11	V4 grid resistance	2 meg.
12	Tone control	100,000
13	V3 anode decoupling	5,000
14	Osc. grid leak	25,000
15	V1 A.V.C. decoupling	500,000
	Output Chassis.	
1	V5 grid resistance	500,000
2	V5 grid stopper	100,000
3	V5 heaters centre tap	25
4	Bias potr. (part)	20,000
5	Bias potr. (part)	300,000
6	Bias potr. (part)	750,000

WINDINGS (D.C. Resistances)

L.	Ohms.	Range.	Where measured.
1	114	L.W.	C1 and chassis.
2	14.7	M.W.	C1 and chassis.
3	.75	S.W.	C1 and chassis.
4	36.8	L.W.	Grid pin V1 and C2.
5	3.4	M.W.	Grid pin V1 and C2.
6	Below .1	S.W.	Grid pin V1 and C2.
7	13.4	L.W.	Top anode V1 and H.T.
8	4.9	M.W.	Top anode V1 and H.T.
9	.5	S.W.	Top anode V1 and H.T.
10	33.5	L.W.	Top grid V2 and C4
11	3.2	M.W.	Top grid V2 and C4.
12	.5	S.W.	Top grid V2 and C4.
13	3.7	Any	Anode V2 and H.T.
14	4	Any	Top grid V3 and C10.
15	17	Any	Anode pin V3 and R13+C18.
16 (part)	10	Any	Diode V3 and C25.
17	1,400	Any	Black and blue leads speaker panel.
18	9.5	L.W.	W5 and P1.
19	4	M.W.	W5 and C7.
20	Below .1	S.W.	W5 and chassis.
21	3.2	L.W.	W6 and chassis.
22	1.7	M.W.	W6 and chassis.
23	.5	S.W.	W6 and chassis.
O.T. prim.	180	Any	Red and yellow leads speaker panel.
M.T. prim.	29	Any	Mains plug pins.
Total H.T. sec.	270	Any	Anodes V6.



Left, numbers of chassis connecting plug (see circuit) looking at the pins. Right, connections of L.S. plug looking at back of pins.

Cossor 396 on Test

MODEL 396.—Standard model for A.C. mains, 200-250 volts, 40-100 cycles. PRICE—£9 19s. 6d.

DESCRIPTION. — Five-valve, plus rectifier, three-waveband table model superhet, with triode output.

FEATURES. — Full-vision scale, coloured as to waveband, calibrated in metres and station names. Short waves also calibrated in megacycles. Scale traversed by vertical pointer. Speaker at side of chassis. Controls for tuning, wave selection, tone, volume and separate master switch. Sockets for speaker and pick-up.

LOADING.—78 watts.

Sensitivity and Selectivity

SHORT WAVES (16-52.5 metres).—Very good selectivity and gain well maintained. No drift and easy handling.

MEDIUM WAVES (195-560 metres).—Excellent all-round performance with local station spread on adjacent channels only. Well-maintained gain and a good background.

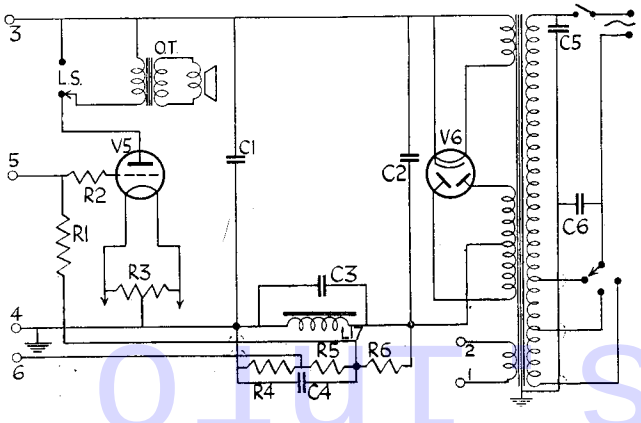
LONG WAVES (810-2,085 metres).—Similar performance to medium waveband, with very little interference on Deutschlandsender.

Acoustic Output

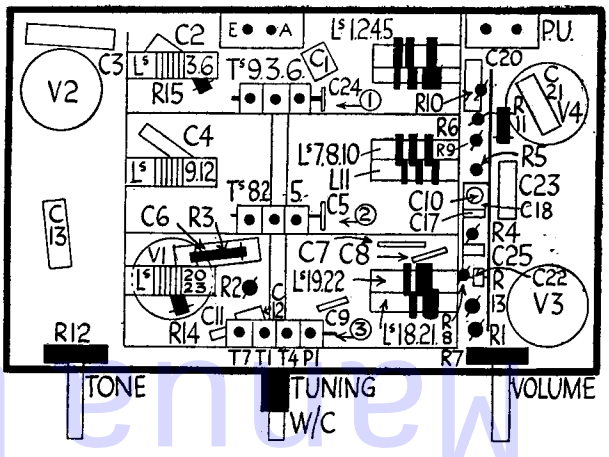
Well balanced tone, with good crisp top and excellent lower radiation. Speech pleasing and instrumental reproduction natural. Ample volume for an ordinary room.

Replacement Condensers

EXACT replacement condensers for the 396 are available from A. H. Hunt, Ltd., Garratt Lane, Wandsworth, London, S.W.18. For the block containing C1 and C2, there is unit 2860, price 7s. 3d.; for C4 there is unit 3723, 1s. 6d.



There are two chassis in the 396, one for the radio side (see circuit on facing page) and one for output and mains supply (see above).



The under-side layout of the radio chassis is above. Other layout diagrams are on page 43.

Cossor 396 Three-band Six

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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 between 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.

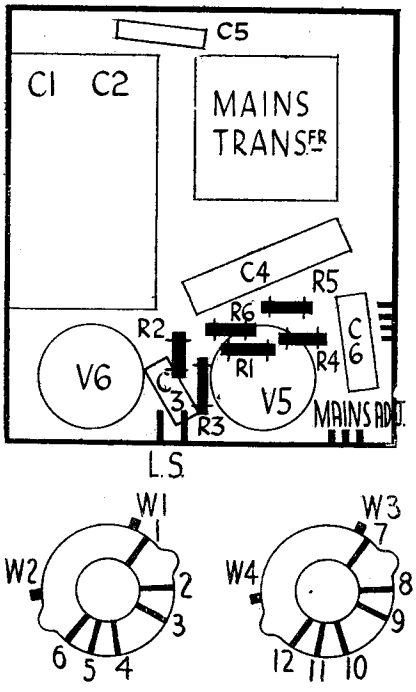
Long Wave.—Tune set and oscillator to 1,200 metres (250 kc.) and adjust T4, T5 and then T6 for maximum response.

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

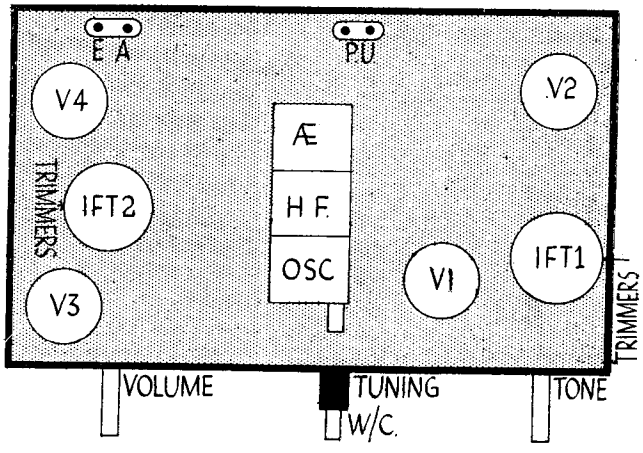
Repeat both operations until no further improvement results.

Short Waves.—Tune set and oscillator to 18 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

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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 retuned 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. 10d.: 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.