

# COSSOR 3864 FOUR-WAVEBAND SIX

**CIRCUIT.**—An inductively coupled aerial coil coupled the aerial to the grid of V1, a variable mu H.F. pentode, the grid circuit of which is tuned.

An inductively coupled H.F. transformer provides the coupling to the grid of V2, which is a triode-hexode frequency changer.

An I.F. transformer tuned to 465 kc. couples the frequency changer to V3, a second H.F. pentode, the output of which passes through a second I.F. transformer to the demodulating diode of V4, a double diode triode. The other diode of this provides the A.V.C. in the usual manner.

The grid of the triode section is coupled to the demodulating diode via a resistance-capacity network incorporating the volume control.

The output of V4 is fed to V5, an output pentode, and thence to the speaker. It will be noted that a tone control is incorporated in the anode circuit of V4.

Mains equipment consists of mains transformer, a heavy-duty indirectly-heated full-wave rectifier, and smoothing equipment which adequately supplies the needs of the receiver.

**Special Notes.**—The dial lights are painted white to obviate glare. The holders are fixed by two spring clips, one on each side of the wavelength dial. They are Osram M.E.S. bulbs and are rated at 6.5 volts and consume .3 amp. each.

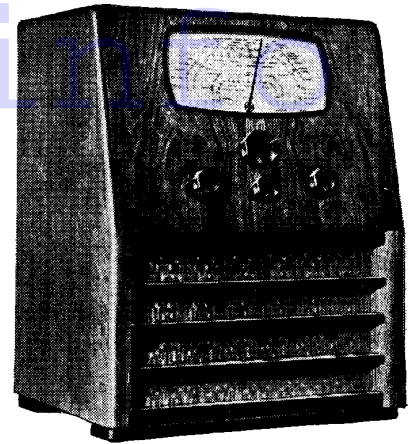
When replacing care must be taken that

the holders do not touch the metal wavelength dial, but the spaghetti sleeving fully insulates the support.

Sockets on the back of the chassis enable an external speaker to be used if required. This should have its own matching transformer.

A plug is provided for the extra speaker connection. If the plug is pushed right home the set speaker will be silenced; if both speakers are required to operate at the same time, the plug should only be pushed in far enough to obtain a hold.

An adjacent pair of sockets enable a



The Cossor 3864 is a five valve and rectifier A.C. superhet. Four wavebands are covered and a radio-frequency amplifier precedes the frequency changer.

## VALVE READINGS

No signal. Volume maximum. 200-volt A.C. mains.

V.	Type.	Electrode.	Volts.	Ma.
1	All Coscor. MVS/Pen. met. (7)	Anode ..	240	1.3
		Screen ..	83	3.8
2	41STH met. (7)	Anode ..	218	1.2
		Screen ..	85	3.9
		Osc. anode ..	82	5.2
3	MVS/Pen. met. (7)	Anode ..	249	3.3
		Screen ..	86	5.2
4	DDT met. (7)	Anode ..	120	1.15
5	42MP/Pen. (7)	Anode ..	218	34
		Screen ..	241	27
6	442BU (4)	Filament ..	350	—

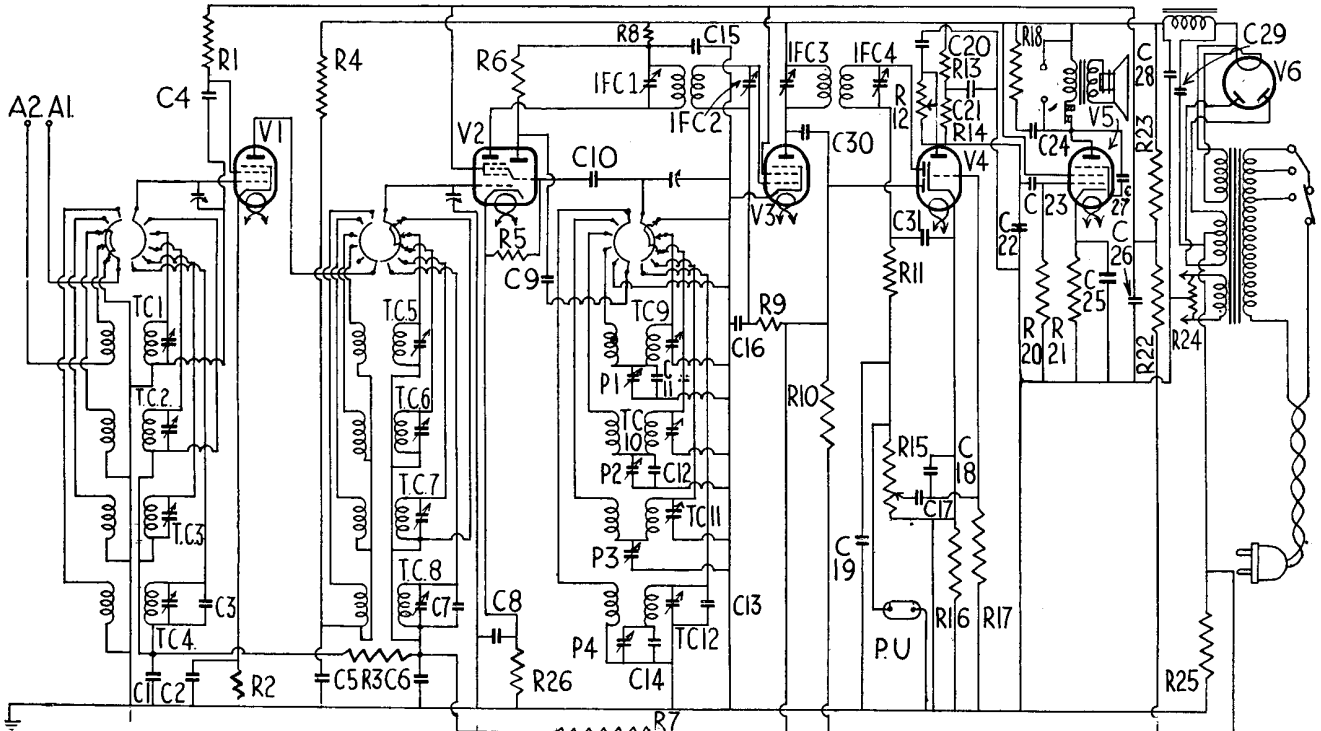
pick-up to be used for gramophone reproduction. The volume of this is controlled by the set control.

The mains voltage adjustment is found on the mains transformer panel on the top of the chassis.

In the under chassis layout the resistance strip is drawn horizontally for the purpose of showing the various components.

**Removing Chassis.**—Remove the four screws fixing the back to the cabinet and also the five control knobs on the face. These are fixed with grub screws.

Unscrew the two fixing bolts and washers counter-sunk in the upper surface



The 3864 is a carefully designed example of an orthodox superhet six. Transformer coils are employed before and after the radio-frequency amplifier.

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of the black set support. The speaker leads must be detached from the baffle before the set can be removed.

There are four contacts to the speaker assembly. Counting from the top the first tag is blank, red lead goes to No. 2, blue to No. 3, and yellow to No. 4, which is the bottom terminal.

The mains on/off switch is mounted in a recessed metal cup mounted on the side of the receiver. This cup may be removed if dismantling of the main switch proves difficult, and a purchase obtained with it when the fixing nut is removed. The set can then be completely withdrawn from the cabinet.

### Circuit Alignment Notes

For the purpose of aligning the I.F. and signal circuits only sufficient input from the service oscillator must be injected to give a reliable signal. If too

heavy an input be injected the A.V.C. commences to operate, and this must be avoided.

The padding condensers, P1, P2, P3 and P4 are accessible only on the top of the chassis. The receiver should be turned up on one end, with the mains transformer nearest the bench. Then both the trimmers and the padders will be simultaneously available.

With the gang condensers at maximum, the pointer should coincide with the last mark on the upper end of the tuning scale.

**I.F. Circuits.**—Remove the screening cap and lead of V2. Turn the volume control to maximum.

Inject a 465 kc. modulated signal between the grid of V2 and chassis in the usual manner. The output meter is connected across the primary of the speaker transformer.

Tune IFC1, IFC2, IFC3 and IFC4 for maximum output. Continue adjusting these trimmers until best results are obtained, reducing the oscillator output as the circuits are brought into line.

(Continued on page 29)

### CONDENSERS

C.	Purpose.	Mfd.
1	V1 A.V.C. decoupling	.05
2	V1 cathode bias shunt	.1
3	L.W. aerial shunt	.00004
4	V1 screen decoupling	.1
5	V1 anode decoupling	.25
6	V1 A.V.C. decoupling	.05
7	L.W. H.F. shunt	.00005
8	V2 cathode bias shunt	.1
9	Osc. anode coupling	.002
10	Osc. grid	.0001
11	B1 osc. padder	.0032
12	B2 osc. padder	.001475
13	L.W.H.F. shunt	.00008
14	L.W. osc. padder	.00008
15	V2 anode decoupling	.1
16	V3 A.V.C. decoupling	.05
17	L.F. coupling	.01
18	V4 cathode bias shunt	.25
19	H.F. by-pass	.00005
20	Tone control	.03
21	V4 anode decoupling	.2
22	D.D.T. H.F. by-pass	.001
23	L.F. coupling	.01
24	Tone filter	.01
25	V5 cathode bias shunt	.25
26	V1, V2 and V3 screen potr. decoupling	.1
27	Pentode compensator	.0005
28	H.T. smoothing	8
29	H.T. smoothing	8
30	A.V.C. diode coupling	.00005
31	H.F. by-pass	.00005

### RESISTANCES

R.	Purpose.	Ohms.
1	V1 screen decoupling	4,000
2	V1 cathode bias	750
3	V1 A.V.C. decoupling	1 meg.
4	V1 anode decoupling	4,000
5	Osc. grid leak	25,000
6	Osc. anode load	30,000
7	V1, V2 A.V.C. decoupling	1 meg.
8	F.C. anode decoupling	4,000
9	V3 A.V.C. bias decoupling	2 meg.
10	A.V.C. diode load	1 meg.
11	H.F. filter	50,000
12	Tone control	20,000
13	V4 anode decoupling	50,000
14	V4 anode load	50,000
15	Volume control	½ meg.
16	V4 cathode bias	2,000
17	V4 grid leak	1 meg.
18	Tone filter	10,000
19	V5 grid stopper	100,000
20	V5 grid leak	½ meg.
21	V5 cathode bias	150
22	Potr. of V1, V2 and V3 screens	8,000
23	Potr. of V1, V2 and V3 screens	10,000
24	Fils., potr.	25
25	A.V.C. diode delay bias	30
26	V2 cathode bias	300

## Cossor 3864 on Test

**MODEL 3864.**—Standard model for A.C. mains operation, 200-250 volts, 40-100 cycles. Price 14 gns.

**DESCRIPTION.**—Four-waveband, five-valve, plus rectifier, table model superhet.

**FEATURES.**—Large full-vision scale calibrated in wavelengths and station names. Controls for tuning, tone, volume and wave selection. Sockets are provided for a pick-up and an extension speaker. Scale on slightly sloping front above the speaker opening. Ordinary and dipole aerial connections.

**LOADING.**—90 watts.

### Sensitivity and Selectivity

**SHORT WAVES (38-100, 13-40 metres).**—Sensitivity excellent and selectivity very good. There is no oscillator drift. The tuning control ratio is very suitable and the set handles easily.

**MEDIUM WAVES (195-550 metres).**—Sensitivity and selectivity very good. Spread only on adjacent channels. Quiet background, free from whistles. Well maintained gain.

**LONG WAVES (1,000-2,000 metres).**—Similar performance to medium waves. All main stations received clearly with ample reserve power.

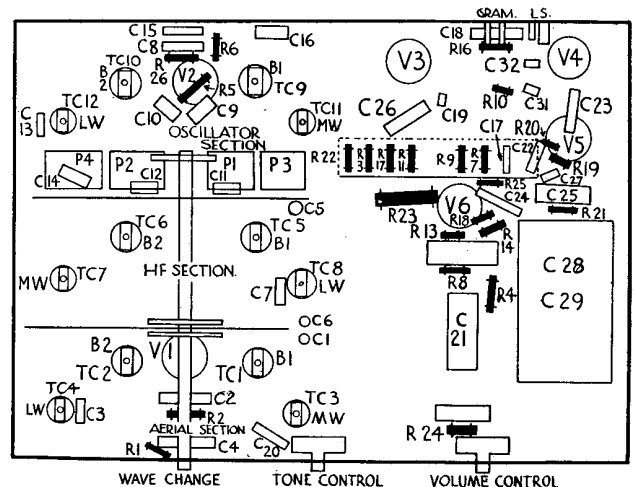
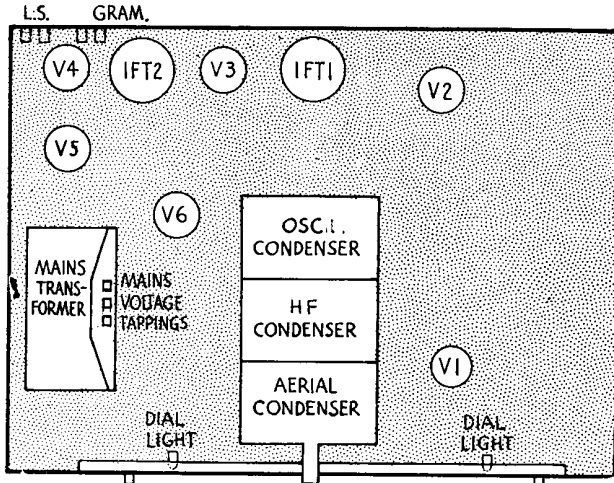
### Acoustic Output

Ample volume for a large room with a very full tone. Colouration on speech is almost entirely absent and the balance is pleasing. Tone control is vigorous in action.

### Replacement Condensers

**THREE** exact service replacement condensers for the Cossor 3864 are available from A. H. Hunt, Ltd., of Garratt Lane, Wandsworth, London, S.W.18. For both C18 and C25, which are similar, there is replacement 2918, at 1s. 9d. For C21 there is 3542 (2s.), and the block containing C.s 28, 29 is provided in 2860 (7s. 6d.).

### EXTENSION



These two layout diagrams clearly show how the parts are arranged on (left) and below (right) the Cossor chassis. Aerial, H.F., and oscillator sections, it will be seen, are grouped in three compartments.

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The output transformer provides for the connection of an extra speaker across the secondary.

Mains equipment consists of a series-connected rectifier, V5, with a limiting resistance, R24, H.F. chokes, a smoothing choke and smoothing condensers.

**Special Notes.**—The dial light is rated at 6.2 volts .3 amp., and is of the screw-in type and is made by Mazda. It is mounted on the wavelength pointer, and is surrounded by a slotted screen, through which a line of light illuminates the dial.

To remove the bulb, slide the screen off the bracket, and the bulb can now be taken out. Sockets are provided for an external speaker, which should have a low impedance—that is, no matching transformer being necessary.

C12 is inside the aerial coil can, C19, C20 and C22 are inside the oscillator coil can, and C27, C28 and R13 are in the second I.F. coil can. R25 is incorporated in the lead to the grid of V3.

In the model examined V2 was an Ekco VPU1 valve, not a Mullard VP13C, as given in the data.

**Removing Chassis.**—First remove the three knobs from the front of the set. These are held by grub screws. Also remove the on-off switch from the side of the cabinet by taking off the fixing nut.

Next remove the four bolts holding the chassis to the bottom of the cabinet. The

## VALVE READINGS

No signal. Volume maximum. 200 volt A.C. mains.

V.	Type.	Electrode.	Volts.	Ma.
1	TH21C met. (7) Mullard.	Anode ..	148	2.1
		Screen ..	107	6.0
		Osc. anode ..	112	3.5
2	VPU1 met. (7) Ekco.	Anode ..	148	inaccess- ible
		Screen ..	149	
3	TDD13C met. (7) Mullard.	Anode ..	77	1.2
		Screen ..	149	—
4	Pen 36L (7) Mullard.	Anode ..	140	28
		Screen ..	149	4.6
5	UR1C (5) Mullard.	Anode ..	165	—
		Cathode ..	165	—

chassis can then be removed to the extent of the speaker leads.

If necessary, the speaker can be removed by undoing the four bolts holding the baffle to the front of the cabinet.

## Circuit Alignment Notes

**I.F. Circuit.**—Adjustments are made by screwing iron cores along the lateral axes of the coils. The cores are sealed, and the wax must be melted with a soldering iron. Do not force with a screw-driver. The slots in the cores are made to fit  $\frac{1}{8}$ -in. non-metallic screw-driver.

Connect a modulated oscillator to the top grid cap of V1 through a .0002 mfd. condenser. Tune the set to the bottom of the long waveband and the modulated oscillator to 460 kc.

Adjust I.F. cores for maximum deflection on an output meter connected to the external speaker sockets. Use the minimum oscillator signal that gives a reliable meter reading.

**Calibration.**—When the gang condenser is at maximum capacity the pointer should be on the 2,100 metre mark.

**Short Waves.**—Tune the oscillator and set to 15 megacycles (20 metres). Connect the oscillator to "A" socket through a 400-ohm non-inductive resistance. Close the dipole switch. Adjust the oscillator gang trimmer and aerial gang trimmer for maximum reading on the meter.

## Ekco UAW78 on Test

**MODEL UAW78.**—Standard model for A.C. or D.C. mains. 200-250 volts, 40-100 cycles. Price 10½ gns. (Black and chromium, 7s. 6d. extra.)

**DESCRIPTION.**—Three-waveband, four-valve plus rectifier, table model universal superhet.

**FEATURES.**—Bakelite cabinet. Large tuning controls. Semi-circular full-vision scale calibrated in names and wavelengths. Extension speaker sockets. No pick-up connection.

**LOADING.**—60 watts.

**Sensitivity and Selectivity**

**SHORT WAVES (15.5-52 metres).**—Very good sensitivity and usual selectivity. Tuning ratio very suitable. No noticeable drift. Very easily handled.

**MEDIUM WAVES (200-550 metres).**—Representative performance as regards sensitivity and selectivity for the valve combination. Local stations spread on adjacent channels only. Gain well maintained.

**LONG WAVES (950-2,000 metres).**—Similar performance to medium waves. Good programme strength on all main stations. Little overlap on Deutschlandsender.

**Acoustic Output**

Ample volume for an ordinary room, with well-balanced pentode output. No undue accentuation or over-correction and very little noticeable colouration on speech.

**Medium Waves.**—Tune the set and the oscillator to 250 metres (1,200 kc.). Adjust medium-wave oscillator trimmer, C5, and medium-wave aerial trimmer, C3, for maximum.

**Long Waves.**—Tune the set and oscillator to 1,100 metres (275 kc.). Adjust long-wave oscillator trimmer, C6, and long-wave aerial trimmer, C4, for maximum.

Recheck at 7 megacycles for calibration.

**B.1—Short Wave.**—This must be aligned very carefully if maximum results are to be obtained.

Tune the receiver to 18 megacycles and inject a signal of 18 megacycles. Adjust TC9 for maximum output.

Tune the receiver to 21 megacycles and inject a corresponding signal. Tune TC1 for maximum output.

If the 21 megacycle signal is out of calibration, adjust P1 until calibration is obtained; then line up TC5 and TC1 for maximum. While TC5 and TC1 are being brought into line the gang condenser should be rocked until the loudest signal is obtained during adjustment.

Check for calibration by tuning the receiver to 9 megacycles and injecting a 9 megacycle signal. If out of calibration, move wire connecting the oscillator section of the gang condenser, nearest the back of the chassis, either up or down according to the position of 9 megacycle signal, until the required adjustment is obtained.

Recheck at 18 megacycles and 21 megacycles.

## CIRCUIT

**NO** circuit diagram is given with this review because E. K. Cole, Ltd., do not permit the circuits of their receivers to be published.

A particularly long description of the circuit is given in this review, however, and the component tables, in conjunction with the chassis diagrams, will enable you to understand the receiver sufficiently for all ordinary fault-finding.

Nothing in the general design should cause confusion; there are no unusual features.

## COSSOR MODEL 3864 ALL-WAVE SIX

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**Signal Circuits.**—Connect the oscillator via a dummy aerial to the aerial sockets A1 and E, making sure that the shorting clip is fixed between A2 and E.

**Long Waves.**—Tune the receiver to 1,000 metres (300 kc.), and inject a modulated 1,000-metre signal. Adjust TC12, TC8, and TC4 respectively for maximum output.

Check for calibration by tuning the receiver to 1,875 metres (160 kc.) and inject a signal of this wavelength. Adjust P1 on top of chassis for loudest signal.

Check again at 1,000 metres.

**Medium Waves.**—Tune the receiver to 214 metres (140 kc.), inject a signal of 214 metres and adjust TC11 and TC7 and TC3 for maximum.

Check for calibration at 522 metres (574 kc.) by tuning the receiver to 522 metres and injecting an oscillator signal of this wavelength. Adjust P3 for maximum output.

Recheck for calibration at 214 metres. If out, adjust with TC11 and bring TC7 and TC3 into line for maximum output.

Further check for calibration on National and London Regional, which are to be heard at audible strength for checking without aerial.

**B.2—Short Wave.**—Tune the receiver to 7 megacycles and inject a signal of this wavelength. Adjust TC10, TC6 and TC2 for maximum response.

Check for proper peak on oscillator trimmer by tuning the receiver to six megacycles and injecting a 6 megacycle signal. This should fall on 6 or 6.1 mc. on the wavelength dial.

Tune the receiver to 3 megacycles, inject a 3 megacycle signal, and adjust P2 for maximum.

## QUICK TESTS

Quick tests are available on this receiver on the speaker transformer. Volts measured between this and the chassis should be:—

Red lead, 218 volts.

Blue, 350 volts, unsmoothed.

Yellow, 240 volts.