'TRADER' SERVICE SHEET 163

COSSOR 3733

3-BAND A.C. RECEIVER

A VERY interesting circuit is used in the Cossor 3733 3-valve battery-operated all-wave receiver in that although it operates as a T.R.F. type on the medium and long waves, it is converted into a superhet on the short waves. The short wave band covered is 17-53 metres.

The receiver employs a heptode and two pentodes and provision is made for an extension speaker.

CIRCUIT DESCRIPTION

Aerial input via fixed series condenser **C1** and coupling coils **L1** (S.W.) and **L3** (M.W., and L.W.) to single tuned circuits comprising **C14** and **L2** (S.W.), and **L2, L4, L5** (M.W. and L.W.).

First valve (**V1. Cossor metallised 210SPG**) is a heptode working as variable-mu pentode H.F. amplifier on M.W. and L.W., and as frequency changer on S.W. with oscillator grid coil **L6** tuned by **C16,** tracking by fixed series condenser **C5,** and anode reaction coil **L7.**

Tuned-primary transformer coupling on M.W. and L.W. by **C16, L8, L9, L12, L13** to H.F. pentode detector valve (**V2, Cossor metallised 210SPT**), which operates on grid leak system with **C8** and **R8.** Reaction is applied from anode by coils **L10, L11,** and controlled by variable condenser **C18.** On S.W. band, the H.F. transformer operates as an untuned intermediate frequency transformer with reaction.

Parallel-fed auto-transformer coupling by **R10, C11** and **T1** between **V2** and output pentode valve (**V3, Cossor 220HPT**). Tone correction by fixed R.C. filter **R11, C13** in anode circuit. Provision for connection of high impedance external speaker across primary of internal speaker transformer **T2.**

COMPONENTS AND VALUES

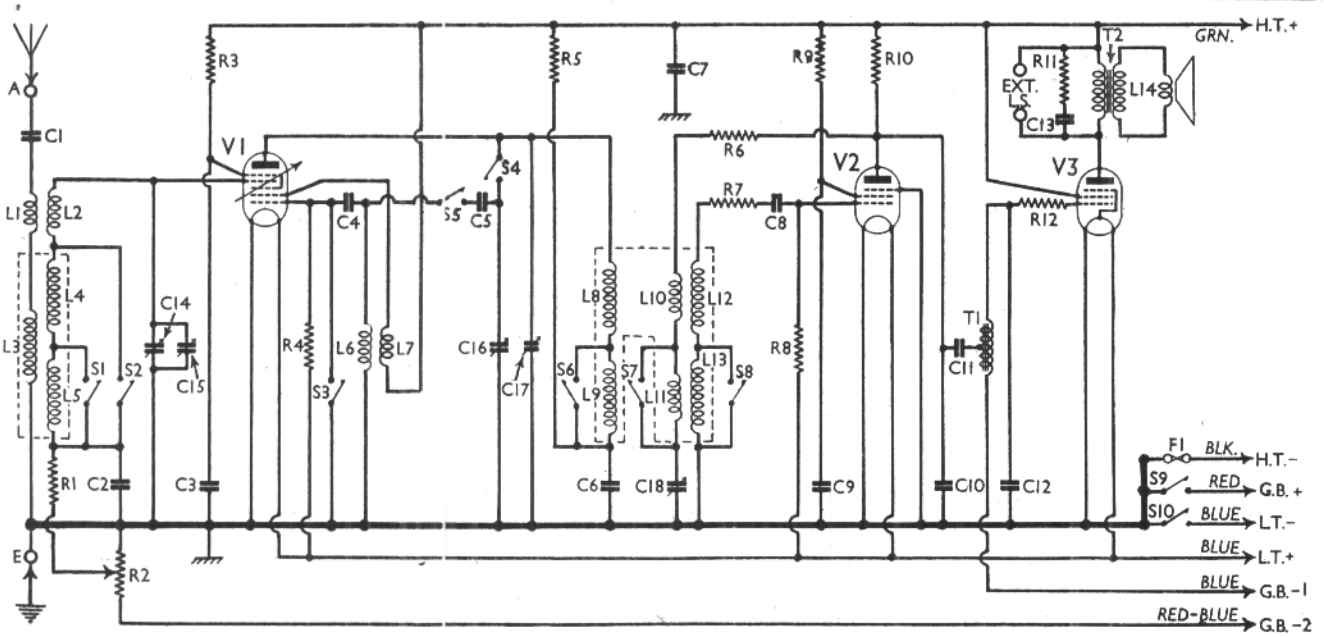
	RESISTANCES	Values (ohms)
R1	V1 tet. C.G. decoupling resistance	2,000,000
R2	V1 gain control	50,000
R3	V1 S.G. H.T. feed	50,000
R4	V1 oscillator grid resistance (S.W.)	50,000
R5	V1 tet. anode decoupling	10,000
R6	V2 reaction circuit stabiliser	200
R7	V2 C.G. circuit stabiliser	200
R8	V2 grid leak	2,000,000
R9	V2 S.G. H.T. feed	500,000
R10	V2 anode load	50,000
R11	Part V3 imp. limiting filter	30,000
R12	V3 C.G. H.F. and I.F. stopper	100,000

	CONDENSERS	Values (μF)
C1	Aerial series condenser	0·0005
C2	V1 tet. C.G. decoupling condenser	0·1
C3	V1 S.G. by-pass	0·1
C4	V1 osc. C.G. condenser (S.W.)	0·00025
C5	S.W. tracker	0·00118
C6	V1 tetrode anode decoupling	0·1
C7	H.T. supply reservoir	2·0

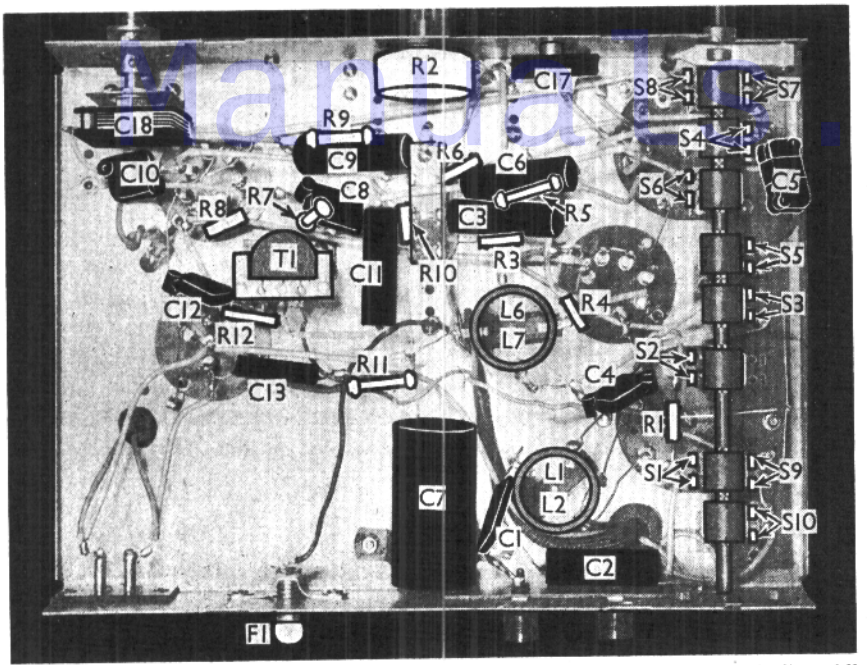
	CONDENSERS (*Continued*)	Values (μF)
C8	V2 C.G. condenser	0·0001
C9	V2 S.G. by-pass	0·1
C10	V2 anode by-pass	0·00005
C11	L.F. coupling to T1	0·1
C12	V3 C.G. H.F. and I.F. by-pass	0·0001
C13	Part V3 imp. limiting filter	0·005
C14†	Aerial circuit tuning	0·0005
C15†	Aerial circuit trimmer	—
C16†	H.F. trans. pri. tuning (M.W. and L.W.) and osc. circuit tuning (S.W.)	0·0005
C17‡	H.F. trans. pri. trimmer	—
C18†	Reaction control	0·0005

† Variable. ‡ Pre-set.

	OTHER COMPONENTS	Approx. Values (ohms)
L1	Aerial S.W. coupling coil	0·2
L2	Aerial S.W. tuning coil	Very low
L3	Aerial M.W. and L.W. coupling coil	8·5
L4, L5	Aerial M.W. and L.W. tuning coils	1·3 / 13·0
L6	Osc. C. G. tuning coil (S.W.)	Very low
L7	Osc. anode reaction coil (S.W.)	8·5
L8, L9	H.F. trans. primary (M.W. and L.W.)	1·3 / 13·0
L10, L11	Reaction coils	0·8 / 6·0
L12, L13	H.F. trans. secondary (M.W. L.W.)	1·3 / 13·0
L14	Speaker speech coil	2·0
T1	Intervalve auto-trans., total	2,500·0
T2	Speaker input trans. Pri. / Sec.	850·0 / 0·2
S1-S8	Waveband switches	—
S9	G.B. circuit switch	—
S10	L.T. circuit switch	—
F1	H.T. circuit fuse, 0·15 A	—



Circuit diagram of the Cossor 3733 A.C. receiver, which includes one S.W. band. The receiver operates as a straight three on M.W. and L.W., and as a simple superhet on S.W.



Under-chassis view. L1, L2 and L6, L7 are the S.W. coils. F1 is a fuse bulb. All the switches are included in the unit on the right.

DISMANTLING THE SET

A detachable bottom is fitted to the receiver and upon removal (two screws and washers) gives access to most of the under-chassis components.

Removing Chassis.—If it is necessary to remove the chassis from the cabinet, remove the small tuning knob (screw down the centre), taking care not to lose the three washers on the spindle, and the other four knobs (recessed screws). Now remove the four bolts (with lock washers and washers) holding the chassis to the bottom of the cabinet and the two round-head wood screws holding the top of the tuning scale to the front of the cabinet.

The chassis can now be withdrawn to the extent of the speaker leads, which is sufficient for normal purposes.

Removing Speaker.—To remove the speaker from the cabinet, disconnect the leads (screw terminals) and slacken the four clamps holding it to the false front to the cabinet. *When replacing*, see that the transformer is at the top.

VALVE ANALYSIS

Valve voltages and currents given in the table below are those measured in our receiver when it was operating from a new H.T. battery reading 128 V and

Valve	Anode Voltage (V)	Anode Current (mA)	Screen Voltage (V)	Screen Current (mA)
V1 210SPG*	110	1·0	40	1·6
V2 210SPT	70	0·9	25	0·2
V3 220HPT	124	3·0	128	0·6

* Oscillator anode (G2) 128 V, 2·0 mA.

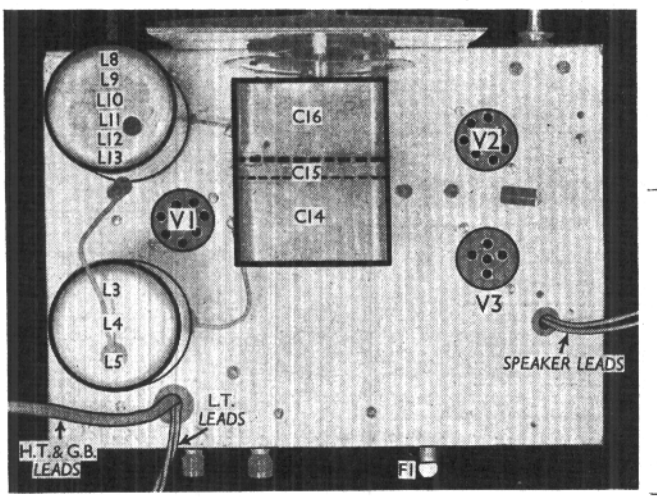
with 4½ V applied to GB-1, as recommended in the instruction book. The receiver was switched to the medium waves, the volume control was at maximum and the reaction control was at minimum. There was no signal input.

Voltages were measured on the 1,200 V scale of an Avometer, chassis being negative.

GENERAL NOTES

Switches.—**S1-S8** are the waveband switches, and **S9, S10** the battery switches, ganged in a single unit stretching right across the chassis. The table below gives the switch positions for the various control settings, O indicating open, and C, closed.

Switch	Off	S.W.	M.W.	L.W.
S1	C	C	C	O
S2	O	C	O	O
S3	O	O	C	C
S4	O	O	C	C
S5	O	C	O	O
S6	O	C	C	O
S7	O	C	C	O
S8	O	C	C	O
S9	O	C	C	C
S10	O	C	C	C



Plan view of the chassis. C15 is the air dielectric trimmer of C14, incorporated in the ganged unit, and operated by a spindle and knob concentric with the main tuning control.

Coils.—**L1, L2** and **L6, L7** are in two unscreened units beneath the chassis. The thick windings are **L2** and **L6** respectively. **L3-L5** and **L8-L13** are in two screened units on the chassis deck.

Fuse F1.—This screws into a holder at the rear of the chassis, and consists of an Osram M.E.S. bulb rated at 3·5 V, 0·15 A.

External Speaker.—Provision is made at the rear of the chassis for a high impedance (20,000 O) external speaker. The Cossor Moving Coil Model 595, used with the No. 4 transformer tapping, is recommended.

Batteries.—Recommended types are: L.T., Cossor E370 or E245 glass cased mass type 2 V cells. H.T., Cossor Type 1120 120 V unit (or Type 2120 double capacity). G.B., Cossor Type 933 9 V unit.

Battery Leads and Voltages.—Blue lead, black spade tag, L.T. negative; Blue lead, red spade tag, L.T. positive 2 V; Black lead, black plug, H.T. negative; Green lead, black plug (marked "Power"), H.T. positive 120 V; Red lead, black plug, G.B. positive; Blue lead, black plug, G.B. negative 1, −4·5 V; Red and blue lead, black plug, G.B. negative 2, −9 V.

Condenser C15.—This is an air dielectric trimmer, associated with **C14,** which is included in the gang condenser, and operated by a knob concentric with the main tuning knob.

Condenser C5.—This consists of two moulded units in parallel, to give the correct capacity. The accuracy is within 2 per cent.

CIRCUIT ALIGNMENT

For alignment purposes this receiver should be treated as an ordinary straight H.F., detector and L.F. type. The S.W. band will be brought into line automatically after aligning on the M.W. band.

Switch the set to the M.W. band, and tune the set to 300 m. on the scale, after making sure that the pointer indicates 200 m. when the tuning knob is rotated fully anti-clockwise.

Inject a 300 m. signal at the **A** and **E** terminals, and adjust **C15** (concentric with main trimmer knob) for maximum output. Next adjust **C17** (through hole in front of chassis), for maximum output, at the same time rocking knob of **C15** in an attempt to increase the output. Alignment should be performed with a fair amount of reaction in use.