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.**

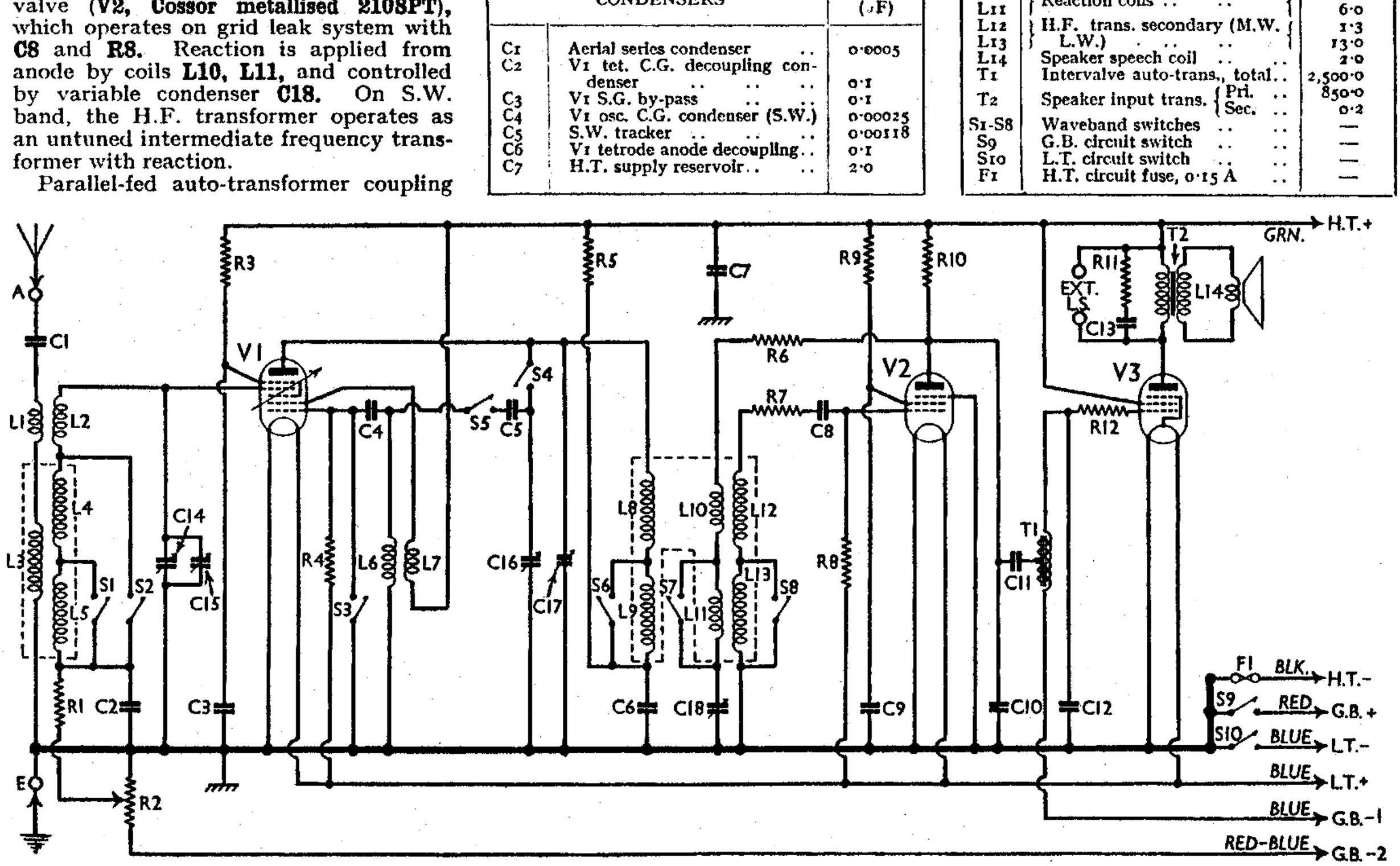
COMPONENTS AND VALUES

	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
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.

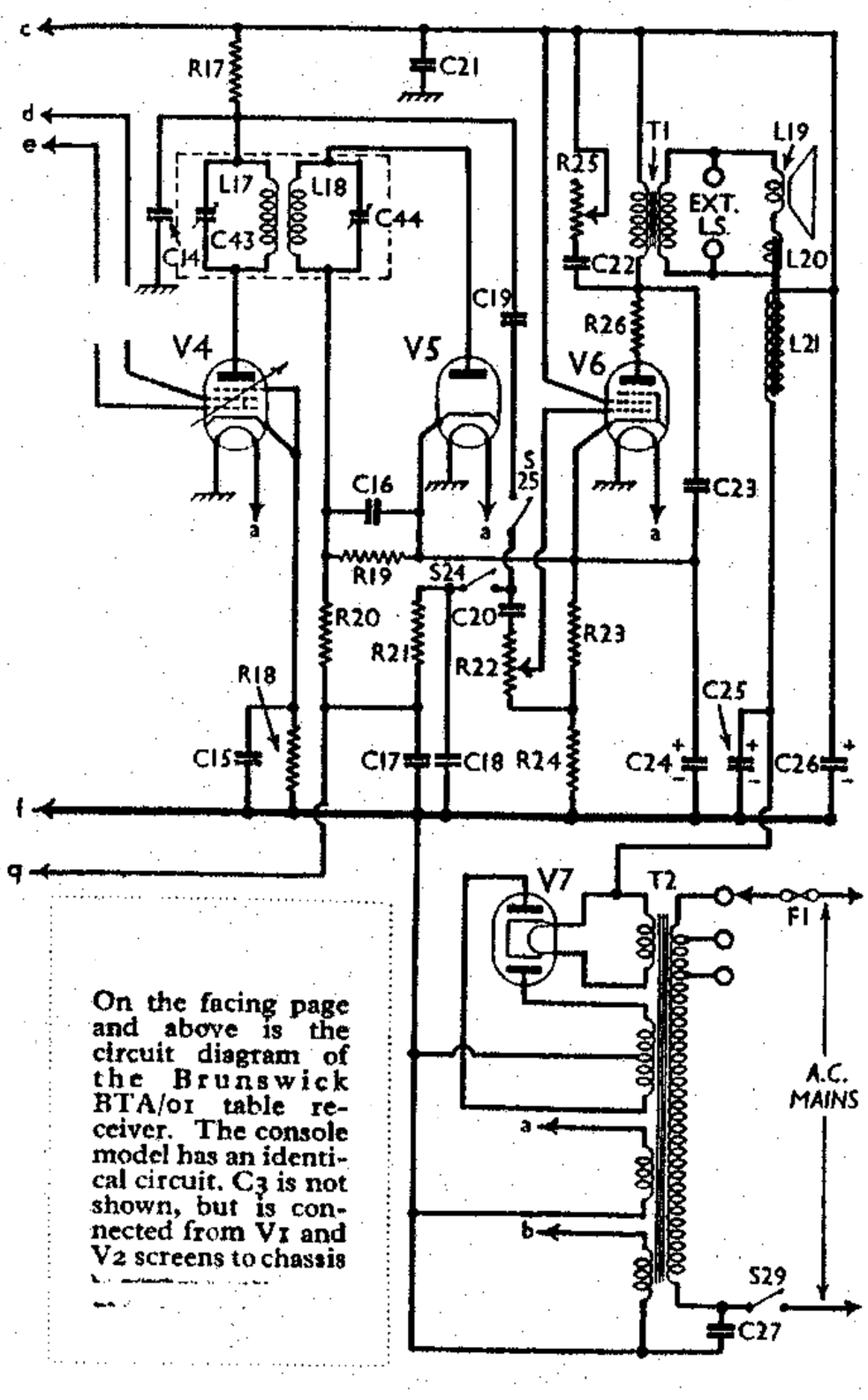
	OTHER COMPONENTS	Approx. Values (ohms)
L1	Aerial S.W. coupling coil	0·2
L2	Aerial S.W. tuning coil	Very low
L3	Aerial M.W. and L.W. coupling coil	8·5
L4	Aerial M.W. and L.W. tuning coils	1·3
L5		13·0
L6	Osc. C. G. tuning coil (S.W.)	Very low
L7	Osc. anode reaction coil (S.W.)	8·5
L8	H.F. trans. primary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

RESISTANCES		Values (ohms)
R1	V1 C.G. decoupling	100,000
R2	V1 anode and V1, V2 S.G.'s H.T. potential divider	30,000
R3		100,000
R4	V1 fixed G.B. resistance ..	400
R5	V2 fixed G.B. resistance ..	300
R6	V2 osc. C.G. resistance ..	50,000
R7	V2 osc. anode resistance ..	20,000
R8	V3 C.G. decoupling	500,000
R9	V3 and V4 S.G.'s H.T. potential divider ..	35,000
R10		30,000
R11	A.V.C. line decoupling ..	300,000
R12	Sensitivity control	50,000
R13	V3 fixed G.B. resistance ..	1,000
R14	Gram. pick-up shunt	50,000
R15	V4 C.G. decoupling ..	500,000
R16		500,000
R17	V4 anode decoupling	10,000
R18	V4 fixed G.B. resistance ..	400
R19	V5 diode load	100,000
R20	I.F. stoppers	70,000
R21		70,000
R22	Manual volume control ..	500,000
R23	V6 G.B. and A.V.C. delay voltage resistances ..	·140
R24		160
R25	Variable tone control	100,000
R26	V6 anode circuit stabiliser ..	150

OTHER COMPONENTS			Approx. Values (ohms)
L1	Aerial M.W. coupling coil ..		15·0
L2	Aerial M.W. tuning coil ..		4·8
L3	Aerial L.W. coupling coil ..		100·0
L4	Aerial L.W. tuning coil ..		23·0
L5	H.F. trans. M.W. primary ..		0·9
L6	H.F. trans. M.W. sec... ..		4·6
L7	H.F. trans. L.W. primary ..		25·0
L8	H.F. trans. L.W. sec. ..		23·0
L9	Osc. M.W. tuning coil ..		7·0
L10	Osc. M.W. reaction coil ..		1·7
L11	Osc. L.W. tuning coil.. ..		12·5
L12	Osc. L.W. reaction coil ..		3·7
L13	1st I.F. trans.	Pri. ..	8·5
L14		Sec. ..	8·5
L15	2nd I.F. trans.	Pri. ..	8·5
L16		Sec. ..	8·5
L17	3rd I.F. trans.	Pri. ..	8·5
L18		Sec. ..	8·5
L19	Speaker speech coil		1·8
L20	Hum neutralising coil.. ..		0·1



On the facing page and above is the circuit diagram of the Brunswick BTA/01 table receiver. The console model has an identical circuit. C3 is not shown, but is connected from V1 and V2 screens to chassis

OTHER COMPONENTS (*Continued*)			Approx. Values (ohms)
L21	Speaker field coil		2500·0
T1	Speaker input trans.	Pri. ..	750·0
		Sec. ..	0·3
T2	Mains trans.	Pri. total ..	28·5
		Heater sec. ..	1·0
		Lamp sec. ..	0·3
		Rect. heat. sec.	0·1
		H.T. sec. total	600·0
S1-23	Waveband switches		—
S24-25	Radio-gram. switches.. ..		—
S26-28	Scale lamp switches		—
S29	Mains switch, ganged R22 ..		—

DISMANTLING THE SET

Removing Chassis.—If it is desired to remove the chassis from the cabinet, first remove the three small knobs (recessed grub screws) and the large tuning knob (pull off). Now remove the four bolts (with claw washers) holding the chassis to the bottom of the cabinet and free the speaker leads from the cleat on the side of the cabinet. The chassis can now be withdrawn to the extent of the speaker leads, which is sufficient for normal purposes.

To free the chassis entirely, unsolder the speaker leads. *When replacing*, connect the leads as follows, numbering the tags from bottom to top:—1, blue; 2, black; 3, red; 4, blank.

Removing Speaker.—To remove the speaker from the cabinet, unsolder the leads from the transformer terminal strip, and remove the nuts and lock washers from the four bolts holding it to the sub-baffle, and unsolder the leads to the extension speaker socket panel. *When replacing*, see that the leads to the extension speaker panel are connected to the outer tags on the strip carrying the leads from the speech coil and make sure that the transformer is on the left.

VALVE ANALYSIS

Valve voltages and currents given in the table below are those measured in our receiver when it was operating on mains of 210 V, using the 200-215 V tapping on the mains transformer. The receiver was tuned to the lowest wavelength on the medium band, and the volume and sensitivity controls were at maximum (fully clockwise) but there was no signal input.

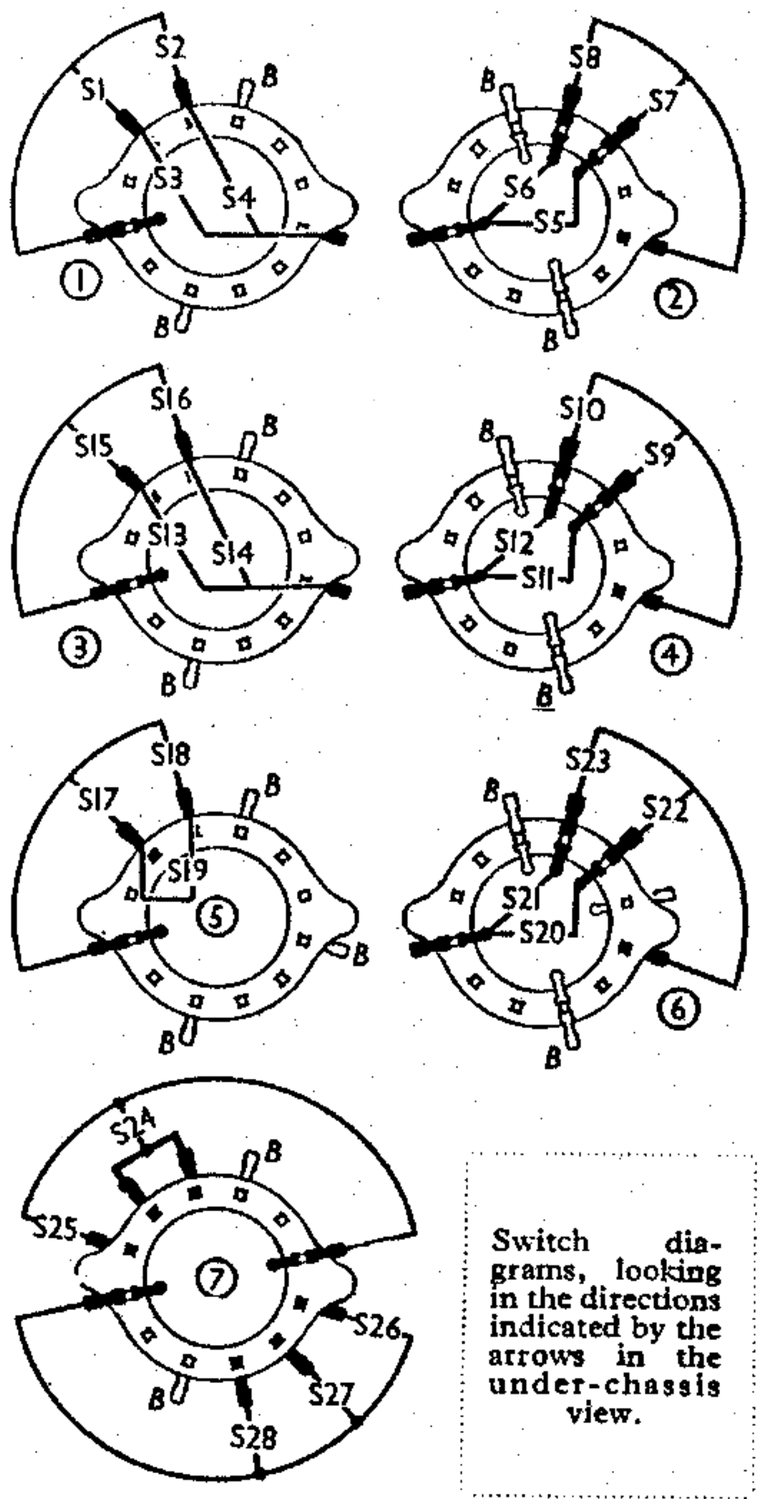
Voltages were measured on the 1,200 V scale of an Avometer, chassis being negative.

Valve	Anode Voltage (V)	Anode Current (mA)	Screen Voltage (V)	Screen Current (mA)
V1 9D2*	225	6·2	70	1·5
V2 15D1	225	1·3	70	2·5
V3 9D2	225	4·0	65	0·6
V4 9D2	180	3·1	65	1·4
V5 10D1	—	—	—	—
V6 7D8	200	31·0	225	6·0
V7 1W3	360†	—	—	—

* Oscillator anode (G2) 150 V, 3·5 mA.
† Each anode, A.C.

GENERAL NOTES

Switches.—**S1-S23** are the waveband switches, **S24, S25** the radio-gram. switches, and **S26-S28** the scale lamp switches, ganged together in seven rotary units beneath the chassis. These units are indicated in the under-chassis view, and the arrows show the directions in which they are viewed in the diagrams above, on which are marked the individual switches.



Switch diagrams, looking in the directions indicated by the arrows in the under-chassis view.

The table below gives the switch positions for the various control settings, O indicating open, and C closed.

Switch	M.W.	L.W.	Gram.
S1	C	O	O
S2	O	C	O
S3	O	C	C
S4	C	O	C
S5	O	O	C
S6	C	O	C
S7	C	O	O
S8	O	C	O
S9	C	O	O
S10	O	C	O
S11	O	C	C
S12	C	O	C
S13	O	O	C
S14	C	O	O
S15	C	O	O
S16	O	C	O
S17	C	O	O
S18	O	C	C
S19	O	C	C
S20	O	C	C
S21	C	O	C
S22	C	O	O
S23	O	C	O
S24	C	C	O
S25	O	O	C
S26	O	O	C
S27	C	O	C
S28	O	C	O

S29 is the Q.M.B. mains switch, ganged with the volume control, **R22.**

Coils.—The H.F. and oscillator coils, **L1-L12,** are in unscreened units beneath the chassis, each unit containing two coils. In most cases, in the under-chassis view, each unit is numbered with the upper coil first. In the case of the **L9, L10** unit, **L10** is wound over **L9,** while

(*Continued overleaf*)

BRUNSWICK BTA/01—*Continued*

in the case of the **L11, L12** unit, the upper two windings form **L11,** the lower one being **L12.**

L13-L18 form the three I.F. transformers, in three screened units on the chassis deck.

Scale Lamps.—In all there are six scale lamps, one lighting on gram., two on M.W., and three on L.W. They are controlled by **S26-S28.** The lamps are M.E.S. types, marked 6 V, 0·3 A.

Fuse F1.—This is a wire fuse incorporated in the mains voltage adjuster.

External Speaker.—Sockets are provided on a paxolin panel mounted at the top of the rear of the cabinet for a low resistance (2 O) external speaker.

Trackers C37, C38.—These are mounted near the **L9, L10** coil unit, and can be reached for adjustment through holes in the rear of the chassis.

Condensers C25, C26.—These are two 8 μF dry electrolytics in a single unit beneath the chassis, with a common negative (black) lead. The yellow lead is the positive of **C25,** and the red the positive of **C26.**

CIRCUIT ALIGNMENT

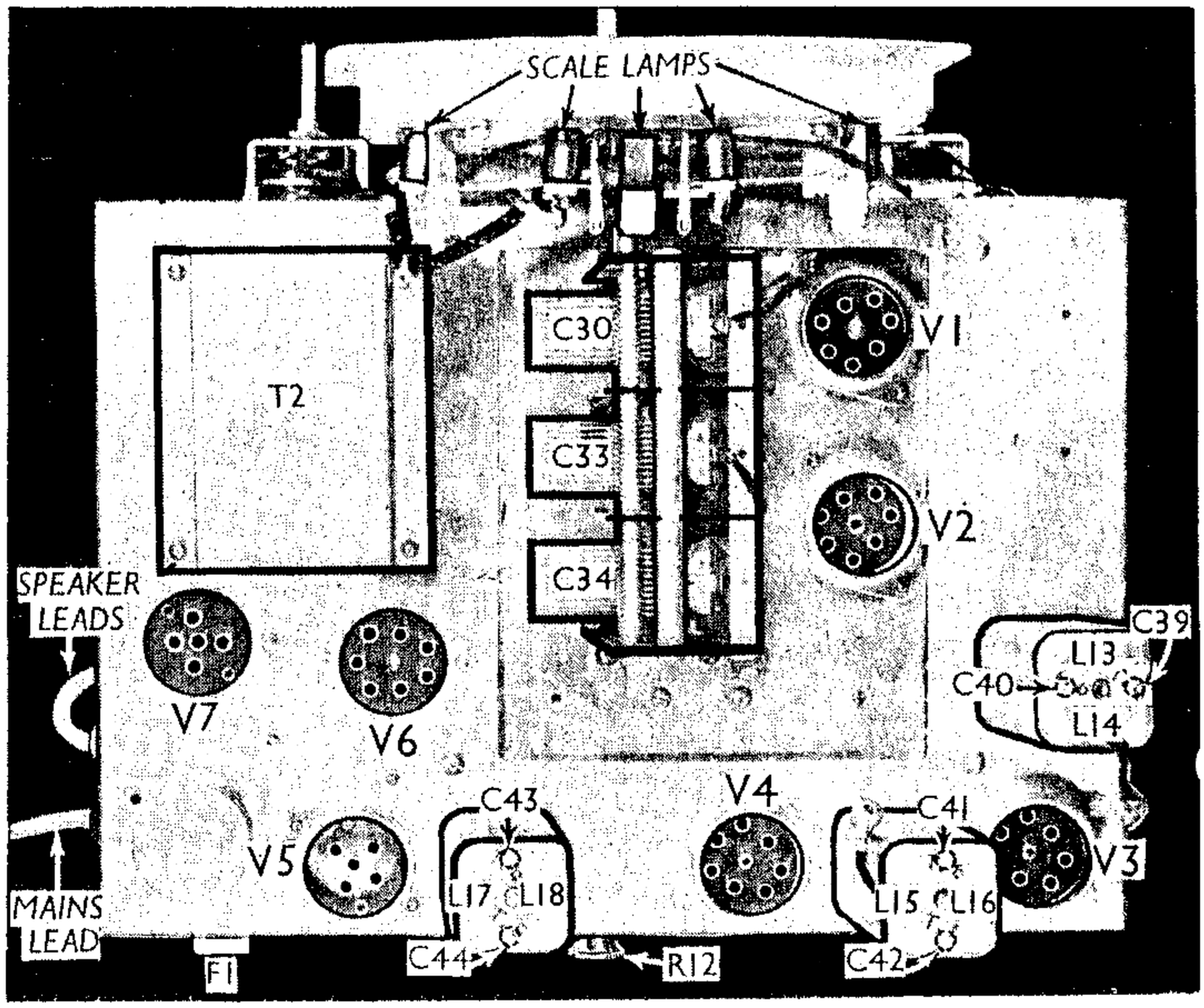
I.F. Transformers.—Feed in a 400 KC/S modulated signal between frequency changer C.G. (top cap) and chassis and adjust I.F. tuning condensers **C44, C43, C42, C41, C40,** and **C39,** in that order, for maximum reading on output meter.

Signal Frequency and Oscillator Circuits.—With the wavechange switch set to M.W. and the tuning pointer set to 220 m., feed in a 220 m. modulated signal via a dummy aerial or a 0.0002 μF condenser to the aerial ond earth sockets. Adjust first of all the oscillator parallel M.W. trimmer **C35** for maximum output, bearing in mind that if two peaks are noted, the one occurring with the trimmer nearer to minimum capacity is correct. Now adjust the aerial and H.F transformer M.W. trimmers **C28** and **C31.**

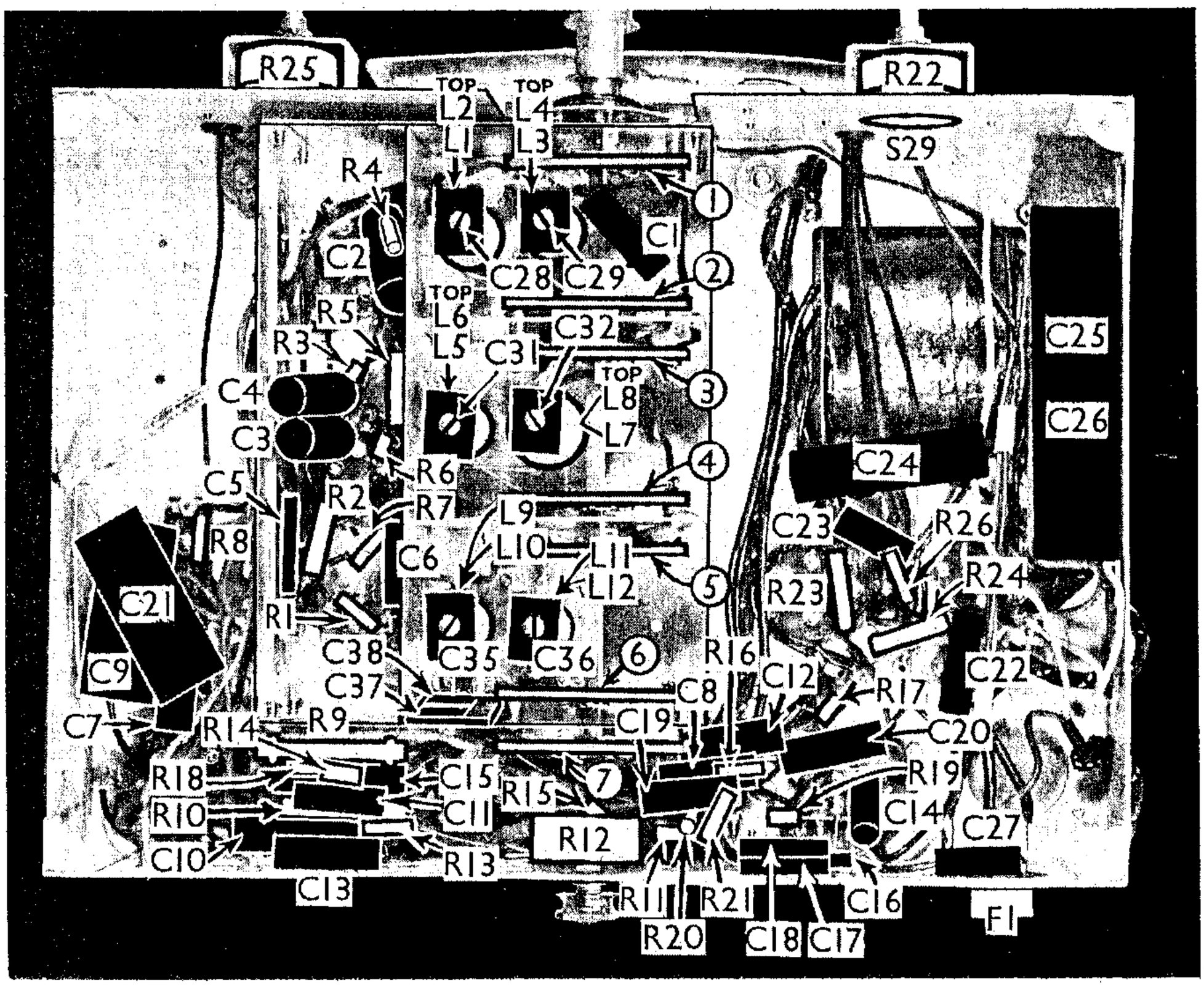
Set signal generator and tuning condenser to 500 m. and adjust M.W series tracker **C37** fo maximum output while rocking the gang.

Set wavechange switch to L.W. and tuning pointer to 1,200 m., and feed in a 1,200 m. signal. Adjust trimmers **C36, C32** and **C29** for maximum output.

Re-set tuning pointer to 1,900 m. and feed in a 1,900 m. signal. Adjust oscillator L.W. tracker **C38** for maximum output while rocking the gang.



Plan view of the chassis. The three I.F. transformers and their trimmers are the only coils on the chassis deck.



Under-chassis view. Note the tuning coils in pairs, with their associated trimmers. The seven switch units are numbered, and the arrows show the directions in which they are viewed in the diagrams on p. VII.

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