

BRUNSWICK BTA/OI AND BCA/OI

A SIGNAL frequency amplifier and two I.F. amplifying valves are used in the Brunswick BTA/OI 6-valve (plus rectifier) A.C. superhet, which is for operation on mains of 195-255 V, 50-60 c.p.s. The circuit consists of a variable-mu pentode signal frequency amplifier, a heptode frequency changer, two variable-mu pentode I.F. amplifiers, a single diode, and a pentode output valve. Provision is made for a gramophone pick-up and an extension speaker.

An identical chassis is also fitted in the BCA/OI console receiver, but this Service Sheet was prepared on the table model.

The BTA/OI and BCA/OI models are also similar, but have a S.W. band added.

CIRCUIT DESCRIPTION

Aerial input via coupling coils L1 (M.W.) and L3 (L.W.) to single tuned circuits, comprising C30 and L2 (M.W.) and L4 (L.W.), which precede variable-mu pentode signal frequency amplifier (V1, Brimar 9D2).

Tuned-secondary transformer couplings by L5, L6, C33 (M.W.) and L7, L8, C33 (L.W.) to heptode-frequency changer

couplings C39, L13, L14, C40; C41, L15, L16, C42, and C43, L17, L18, C44.

Intermediate frequency 400 KC/S. Variable resistance R12 in V3 cathode circuit operates as sensitivity control by varying fixed G.B. applied.

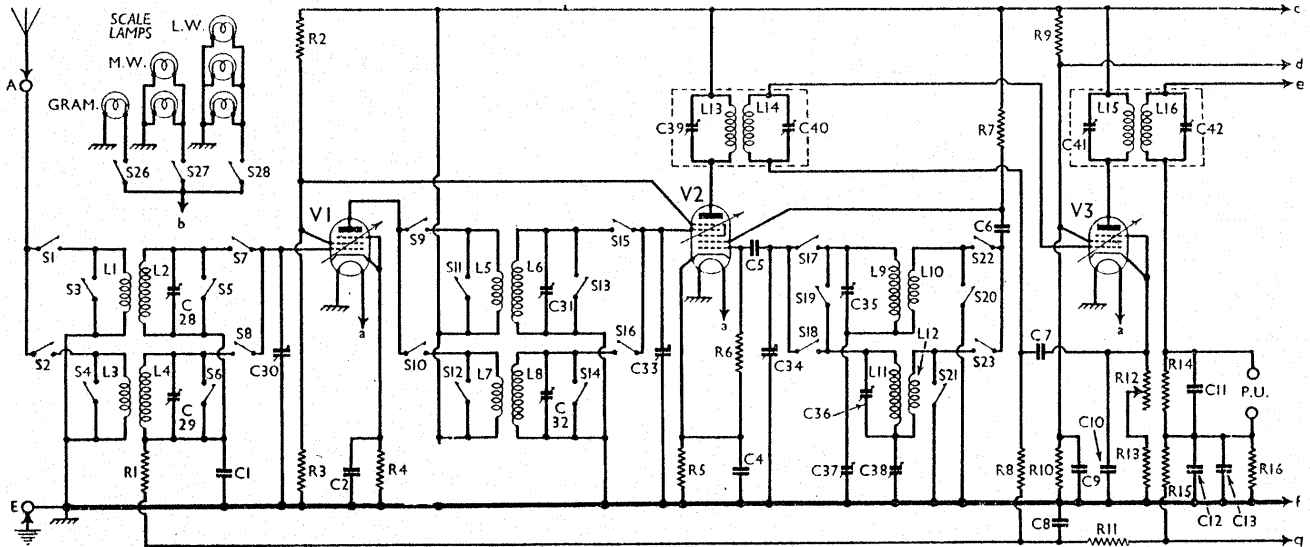
Diode second detection is carried out by separate diode valve (V5, Brimar 10D1). Audio-frequency component in rectified output is developed across load resistance R19 and passed via I.F. filters C15, R20, C17, R21, C18, coupling condenser C20, and manual volume control R22 to C.G. of pentode output valve (V6, Brimar 7D8). Variable tone control by R.C. filter R25, C22 in anode circuit; fixed tone correction by C23. Provision for connection of low-impedance external speaker across secondary of internal speaker transformer T1.

D.C. potential in rectified output from V5 is fed back through decoupling circuits as G.B. to H.F. and I.F. valves, giving automatic volume control. Delay voltage is obtained from drop along V6 cathode resistances R23, R24, and this is applied as positive G.B. to the controlled valves in order to avoid the distortion which is usually introduced in systems using a negatively biased diode for A.V.C.

COMPONENTS AND VALUES

CONDENSERS		Values (μF)
C1	V1 C.G. decoupling	0.02
C2	V1 cathode by-pass	0.05
C3	V1 and V2 S.G.'s decoupling ..	0.1
C4	V2 cathode by-pass	0.05
C5	V2 osc. C.G. condenser	0.0001
C6	V2 osc. anode condenser	0.002
C7	V3 C.G. decoupling	0.02
C8	A.V.C. line decoupling	0.02
C9	V3 and V4 S.G.'s by-pass	0.5
C10	V3 cathode by-pass	0.1
C11	Gram pick-up shunt	0.006
C12	V4 C.G. decoupling	0.02
C13	V4 anode decoupling	0.006
C14	V4 cathode by-pass	0.1
C15	I.F. by-passes	0.0001
C16	I.F. by-passes	0.0001
C17	I.F. by-passes	0.0002
C18	I.F. by-passes	0.0002
C19	V4 to V6 coupling (gram.)	0.02
C20	V5 to V6 coupling	0.02
C21	H.T. supply H.F. by-pass	0.5
C22	Part variable T.C. filter	0.02
C23	Fixed tone corrector	0.006
C24	V6 cathode by-pass	50.0
C25	H.T. smoothing	8.0
C26	H.T. smoothing	8.0
C27	Mains H.F. by-pass	0.006
C28	Aerial circuit M.W. trimmer	—
C29	Aerial circuit L.W. trimmer	—
C30	Aerial circuit tuning	—
C31	H.F. trans. M.W. trimmer	—
C32	H.F. trans. L.W. trimmer	—
C33	H.F. trans. tuning	—
C34	Osc. circuit tuning	—

(Continued at foot of column)



valve (V2, Brimar 15D1). Oscillator grid coils L9 (M.W.) and L11 (L.W.) are tuned by C34; trimming by parallel condensers C35 (M.W.) and C36 (L.W.); tracking by series condensers C37 (M.W.) and C38 (L.W.); anode reaction coils L10 (M.W.) and L12 (L.W.).

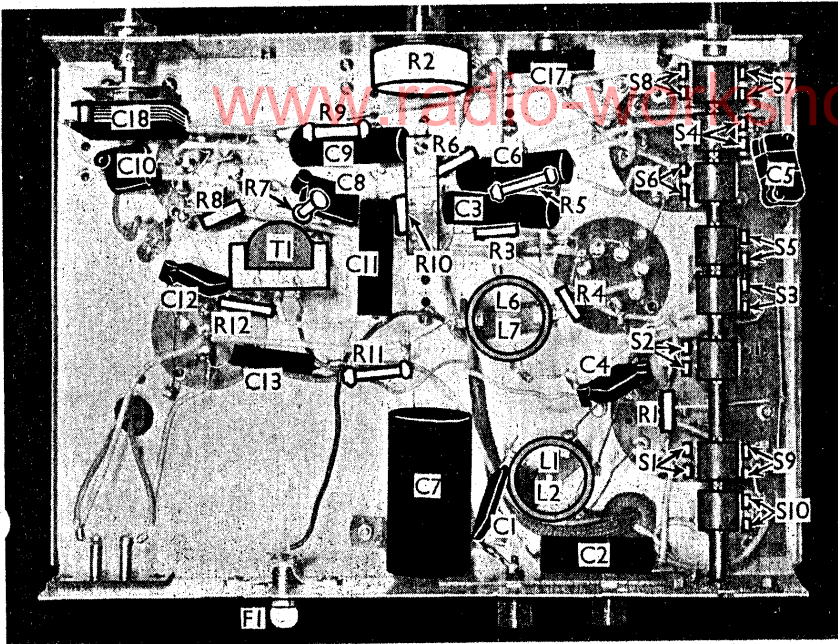
Two variable-mu H.F. pentode intermediate frequency amplifiers (V3 and V4, Brimar 9D2's) operating with tuned-primary tuned-secondary transformer

Provision for connection of gramophone pick-up in C.G. circuit of second I.F. amplifying valve, which, on gramophone, operates as L.F. amplifier. Radio decoupling resistance R17 forms anode load, and C19 couples V4 to V6.

H.T. current is supplied by I.H.C. full-wave rectifying valve (V7, Mullard IW3). Smoothing by speaker field coil L21 and dry electrolytic condensers C25, C26. Mains H.F. by-passing by C27.

CONDENSERS (Continued)		Values (μF)
C35	Osc. circuit M.W. trimmer	—
C36	Osc. circuit L.W. trimmer	—
C37	Osc. circuit M.W. tracker	—
C38	Osc. circuit L.W. tracker	—
C39	1st I.F. trans. pri. tuning	—
C40	1st I.F. trans. sec. tuning	—
C41	2nd I.F. trans. pri. tuning	—
C42	2nd I.F. trans. sec. tuning	—
C43	3rd I.F. trans. pri. tuning	—
C44	3rd I.F. trans. sec. tuning	—

* Electrolytic. † Variable. ‡ Pre-set.



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

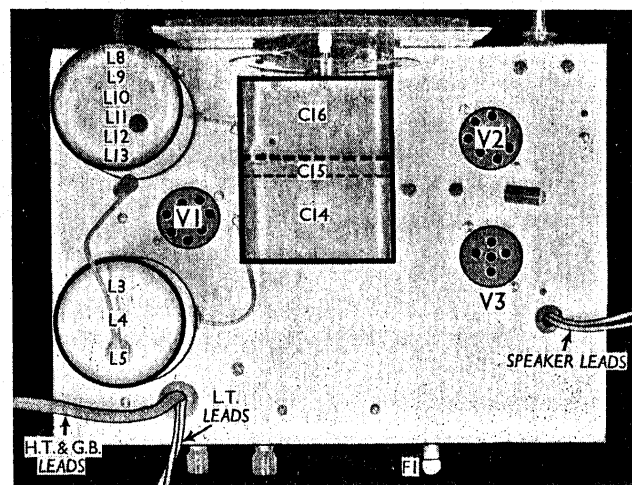
maximum and the reaction control was at minimum. There was no signal input.

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	C
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 alignment 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.