Supplement to The Wireless & Electrical Trader, March 11, 1939

"TRADER" SERVICE SHEET

390

BRUNSWICK 39/EH AND DECCA PT/M

The Brunswick 39/EH table radiogram, with press-button tuning only.

AN interesting point in the design of the Brunswick 39/EH table radiogram is that while press-button tuning of the trimmer type is provided for six stations, there is no manual tuning. The action of pressing any of the station buttons switches the set on, and there are additional buttons for gramophone and off switching.

There are two versions of the radiogram, a small quantity of the first production being designed for an IF of 125 KC/S, while later models use 465KC/S. This *Service Sheet* was prepared on one of the later models (465KC/S).

A similar chassis is fitted in the Decca PT/M table model receiver.

Release date of both models: October, 1938.

CIRCUIT DESCRIPTION

As no manual tuning is employed in this receiver, the tuning condensers are referred to as such and not as automatic tuning trimmers. The switch numbers are coded, as they have been in previous service sheets dealing with press-button sytems, so that their functions may be observed from a study of the diagram: switches bearing the same number are operated by the same press-button; those bearing a suffix **a, b** or **c** close when their button is depressed, while those with a suffix **x** open.

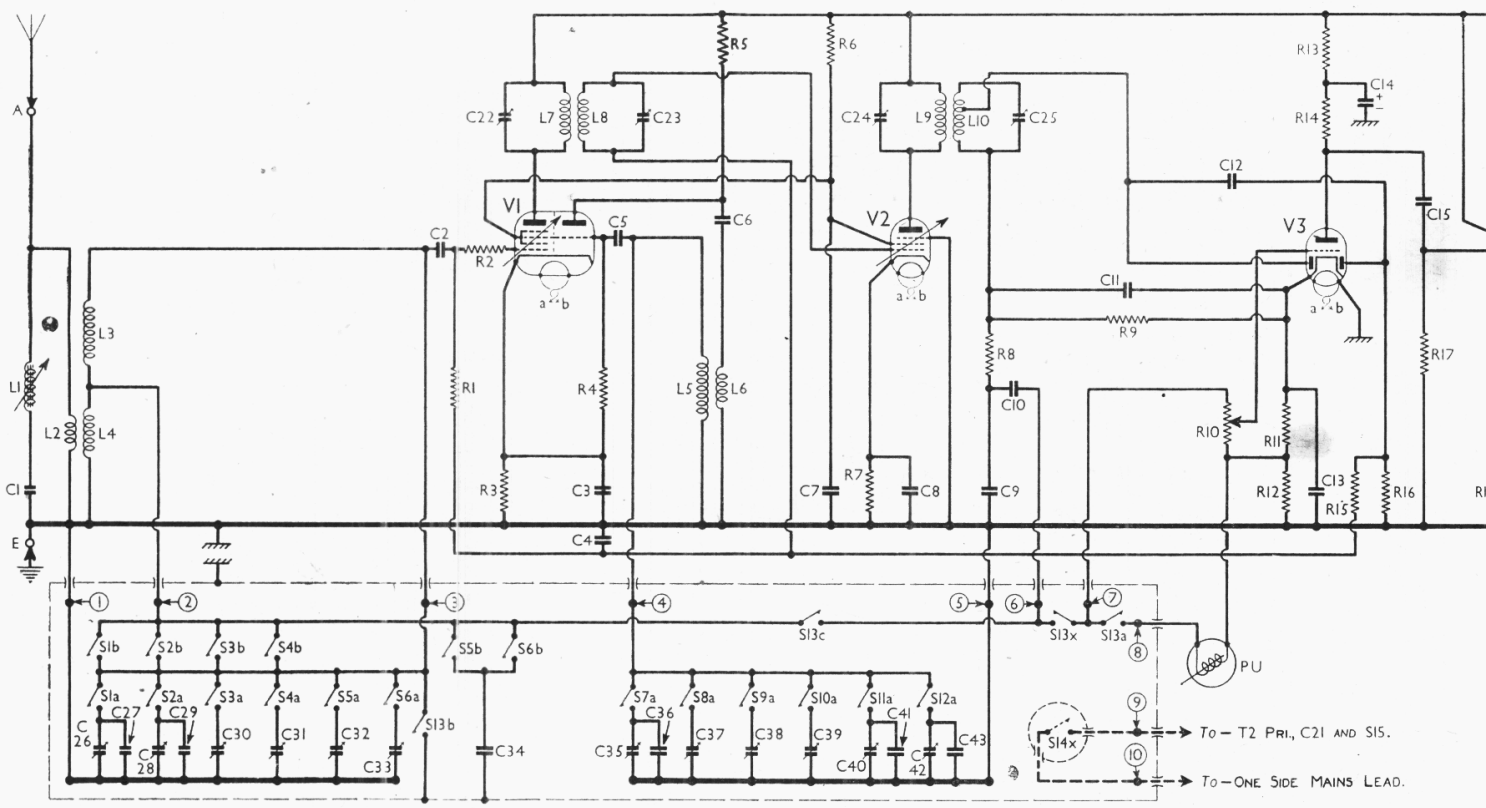
Aerial input is via coupling coil **L2** to tuning coil **L4** (MW) or, via **L4,** to **L3** (LW). Tuning condensers **C26** to **C31** (MW) or **C32, C33** (LW) are brought into circuit via selector switches **S1a** to **S6a.** Waveband switching is effected by switches **S1b** to **S4b** (MW) which short-circuit **L3** or **S5b, S6b** (LW) which connect **C34** across **L4.**

First valve (**V1, Brimar 6P8G**) is a triode hexode operating as frequency changer with internal coupling. One pair of coils only is used to cover both wave bands in the oscillator circuit: triode oscillator grid coil **L5** is tuned by condensers **C35** to **C39** (MW) or **C40** to **C43** (LW) via selector switches **S7a** to **S12a.** Reaction by anode coil **L6** via coupling condenser **C6.**

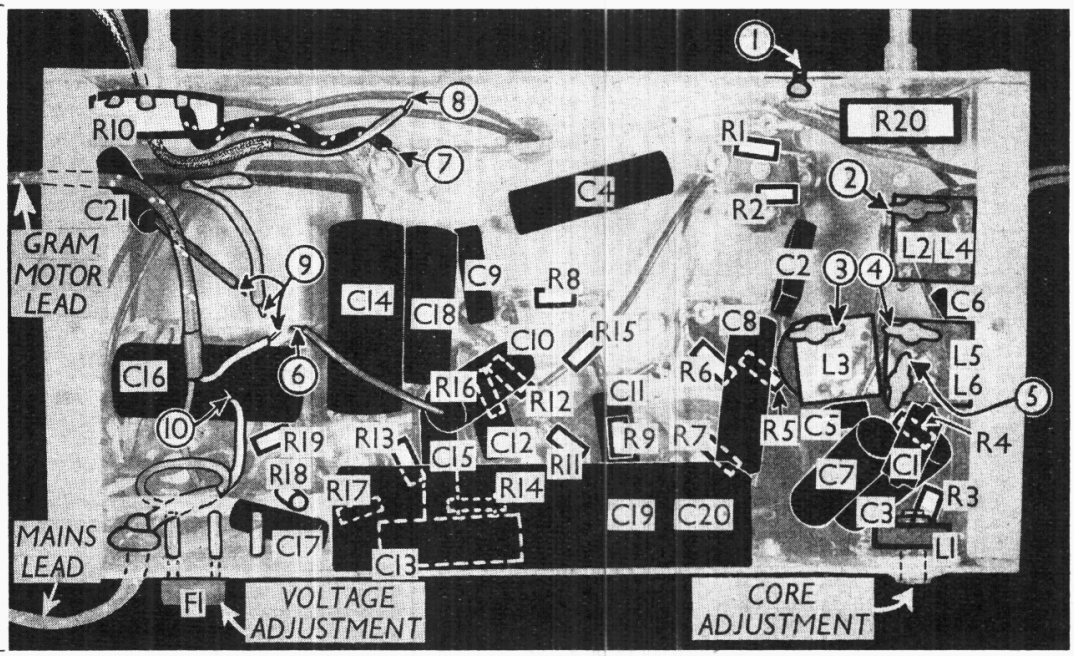
Second valve (**V2, Brimar 6U7G**) is a variable-mu RF pentode operating as intermediate frequency amplifier with tuned-primary tuned-secondary transformer couplings **C22, L7, L8, C23** and **C24, L9, L10, C25.**

Intermediate frequency 465KC/S.

Diode second detector is part of double diode triode valve (**V3, Brimar 6R7G**).



Circuit diagram of the latest model Brunswick 39/EH. Note that **L3** is the LW coil. Earlier models had a few minor modifications, explained in colu slightly, the differences being shown in columns 5 and 6 overleaf.



Under - chassis view with the switch and trimmer unit removed. The inter - connecting points and leads are numbered to agree with the circuit diagram. Note that three leads are numbered 9, since they all go to point 9 on the switch unit.

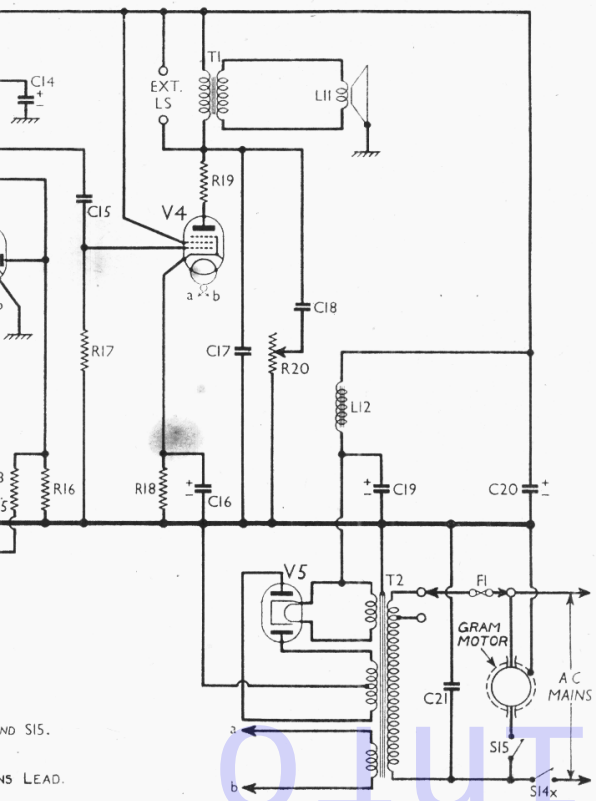
Audio frequency component in rectified output is developed across load resistance **R9** and passed via **R8, C10, S13x** (in press-button unit) and manual volume control **R10** to CG of triode section, which operates as AF amplifier. When the "Gram" button is depressed, **S13a** closes to connect the pick-up to **R10, S13b** closes to short-circuit **L3 and L4, S13c** closes and **S13x** opens to mute radio. IF filtering by **C9, R8** and **C11.**

Second diode of **V3,** fed from tap on **L10** via **C12,** provides DC potential which is developed across load resistance **R16** and fed back through decoupling circuit as GB to FC and IF valves, giving automatic volume control. Delay voltage, together with GB for **V3** triode is obtained from drop along resistances **R11, R12** in cathode lead to chassis.

Resistance-capacity coupling by **R14, C15** and **R17** between **V3** triode and pentode output valve (**V4, Brimar 6V6G**). Fixed tone correction in anode circuit by **C17.** Variable tone control by **C18, R20** also in anode circuit. Provision for connection high impedance external speaker across primary of internal speaker input transformer **T1.**

HT current is supplied by IHC full-wave rectifying valve (**V5, Brimar 5Z4G**). Smoothing by iron-cored choke **L12** and dry electrolytic condensers **C19, C20.** Mains RF filtering by **C21.**

The gramophone motor is connected directly across the mains input on the receiver side of the mains switch **S14x** but on the mains side of **T2** voltage adjustment and **F1.** The motor has an independent mains voltage adjustment and is controlled by an independent toggle switch **S15.**



xplained in column 5 overleaf. The Decca PT/M also differs

COMPONENTS AND VALUES

	RESISTANCES	Values (ohms)
R1	V1 hexode CG resistance ..	500,000
R2	V1 hexode grid stopper ..	40
R3	V1 fixed GB resistance ..	300
R4	V1 osc. CG resistance ..	50,000
R5	V1 osc. anode load ..	50,000
R6	V1, V2 SG's HT feed ..	35,000
R7	V2 fixed GB resistance ..	200
R8	IF stopper	70,000

	RESISTANCES (*Continued*)	Values (ohms)
R9	V3 signal diode load	300,000
R10	Manual volume control ..	500,000
R11, R12	V3 triode GB and AVC delay resistances	3,000 / 5,000
R13	V3 triode anode decoupling ..	25,000
R14	V3 triode anode load ..	100,000
R15	AVC line decoupling ..	500,000
R16	V3 AVC diode load	500,000
R17	V4 CG resistance	250,000
R18	V4 GB resistance	250
R19	V4 anode RF stopper ..	100
R20	Variable tone control ..	50,000

	CONDENSERS	Values (μF)
C1	Aerial IF filter tuning ..	0·00006
C2	V1 hexode CG condenser ..	0·0001
C3	V1 cathode by-pass	0·1
C4	AVC line decoupling	0·1
C5	V1 osc. CG condenser ..	0·0001
C6	V1 osc. anode coupling ..	0·002
C7	V1, V2 SG's decoupling ..	0·1
C8	V2 cathode by-pass	0·1
C9	IF by-pass	0·0001
C10	AF coupling to V3 triode ..	0·02
C11	IF by-pass	0·0001
C12	Coupling to V3 AVC diode ..	0·0001
C13	V3 cathode by-pass	0·25
C14*	V3 triode anode decoupling ..	4·0
C15	V3 triode to V4 AF coupling	0·01
C16*	V4 cathode by-pass	50·0
C17	Fixed tone corrector ..	0·006
C18	Part of variable tone control	0·05
C19*, C20*	HT smoothing condensers ..	8·0 / 8·0
C21	Mains RF by-pass	0·006
C22‡	1st IF trans. pri. tuning ..	—
C23‡	1st IF trans. sec. tuning ..	—
C24‡	2nd IF trans. pri. tuning ..	—
C25‡	2nd IF trans. sec. tuning ..	—
C26‡		—
C27		0·00003
C28‡		—
C29	Aerial circuit tuning condensers ..	0·00006
C30‡		—
C31‡		—
C32‡		—
C33‡		—
C34	Part aerial LW coupling ..	0·00125

* Electrolytic ‡ Pre-Set

Continued overleaf

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CONDENSERS (*Continued*)		Values (μF)
C35‡	Oscillator circuit tuning condensers	—
C36		0·00003
C37‡		—
C38‡		—
C39‡		—
C40‡		—
C41		0·00036
C42‡		—
C43		0·00036

* Electrolytic. ‡ Pre-set.

OTHER COMPONENTS			Approx. Values (ohms)
L1	Aerial IF filter coil		8·5
L2	Aerial coupling coil		14·0
L3	Aerial LW tuning coil		42·0
L4	Aerial MW tuning coil		2·7
L5	Osc. circuit tuning coil		2·2
L6	Oscillator reaction coil		0·6
L7	1st IF trans.	Pri.	6·0
L8		Sec.	6·0
L9	2nd IF trans.	Pri.	6·0
L10		Sec., total	6·0
L11	Speaker speech coil		2·8
L12	HT smoothing choke		360·0
T1	Speaker input trans.	Pri.	280·0
		Sec.	0·25
T2	Mains trans.	Pri., total	28·0
		Heater sec.	0·3
		Rect. heat. sec.	0·15
		HT sec., total	275·0
PU	Gramophone pick-up		5,000·0
Gram. Motor	Collaro AC37, total		800·0*
S1a-4a	Aerial MW selector switches		—
S5a, 6a	Aerial LW selector switches		—
S1b-6b	Waveband switches		—
S7a-10a	Oscillator MW selector switches		—
S11a, S12a	Oscillator LW selector switches		—
S13a,* b, c, x	Radio/gram change switches		—
S14x	Mains switch		—
S15	Gram. motor switch		—
F1	Mains circuit fuse		—

* Two windings in series.

DISMANTLING THE SET

A detachable bottom is fitted to the cabinet and upon removal (four countersunk-head wood screws) gives access to the trimmers for the press-button stations.

Removing Chassis.—To remove the chassis from the cabinet, remove the two rotary control knobs (pull off), the two bolts (with washers and claw washers) holding the chassis to the bottom of the cabinet and the eight countersunk-head wood screws holding the motor board to the cabinet.

Now unsolder the leads to the aerial-earth and extension speaker sockets and the earthing lead from the chassis to the speaker, when the chassis and motor board can be withdrawn together from the cabinet, to the extent of the speaker leads.

When replacing, note that the black/white lead goes to the aerial socket, do not forget to replace the felt washers on the control spindles, and when bolting down the chassis see that the buttons do not foul the escutcheon.

Before access can be gained to the components beneath the press-button unit, it will be necessary to remove the unit. This can be done as follows. Unsolder from the coils the three leads on the right of the unit and the earthing lead from the chassis, the three leads on the left of the unit, including that going to the condenser (**C10**) under the unit, and the four leads to the mains switch.

Then pull the buttons off the switch plungers and remove the nuts and lock washers from the screws holding the unit to the front of the chassis and the two round-head screws holding the unit to the back of the chassis. The unit can now be withdrawn, and *when replacing*, consult the illustrations of the unit and under-chassis for the connections.

Removing Speaker.—The speaker can be removed from the cabinet by first removing the chassis as described above, unsoldering the speaker leads from the panel on the side of the chassis and removing the six countersunk-head wood screws holding the sub-baffle to the cabinet. *When replacing*, see that the transformer is on the right.

VALVE ANALYSIS

Valve voltages and currents given in the table below are those measured in our receiver when it was operating on mains of 228 V, using the 240 V tapping on the mains transformer. The receiver was tuned to the lowest wavelength on the medium band (Radio Normandie button) and the volume control was at maximum, but there was no signal input as the aerial and earth leads were shorted.

Voltages were measured on the 400 V scale of a model 7 Universal Avometer, chassis being negative.

If, as in our case, **V2** should become unstable when its screen current is being measured, it can be stabilised by connecting a non-inductive condenser of about 0·1 μF from grid (top cap) to chassis.

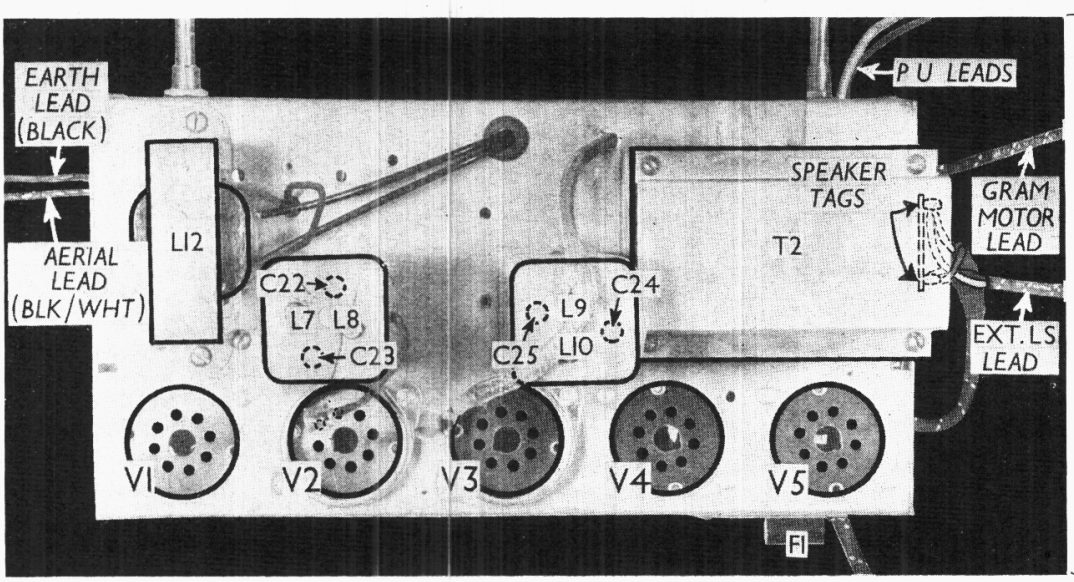
Valve	Anode Voltage (V)	Anode Current (mA)	Screen Voltage (V)	Screen Current (mA)
V1 6P8G	235	2·2	74	2·6
	Oscillator			
	90	2·9		
V2 6U7G	235	6·0	74	1·8
V3 6R7G	75	1·3	—	—
V4 6V6G	217	40·0	235	2·7
V5 5Z4G	237†	—	—	—

† Each anode, AC.

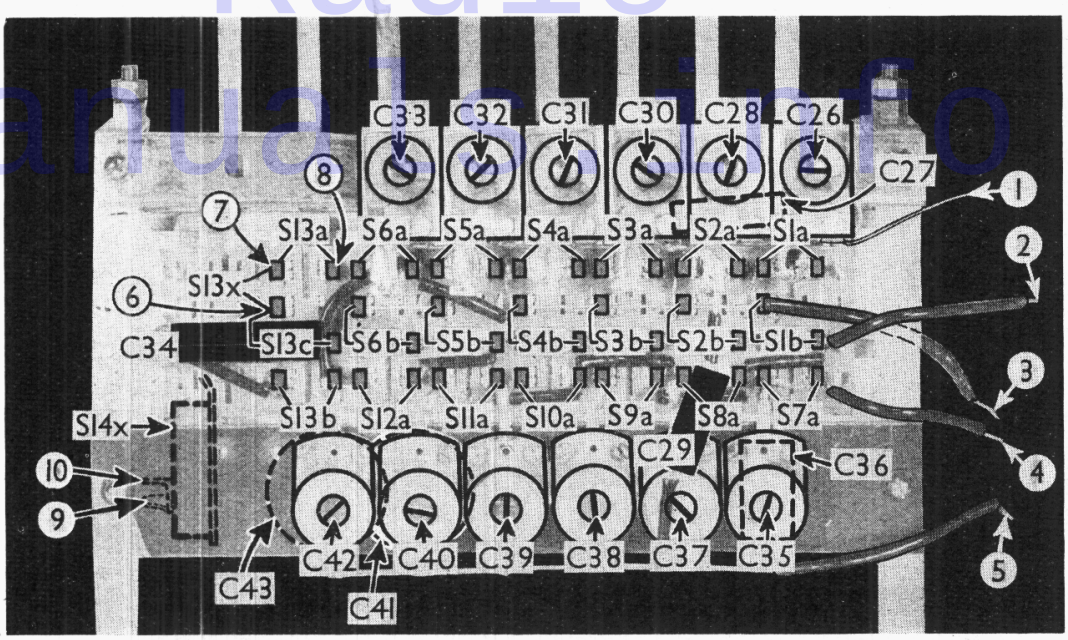
GENERAL NOTES

Switches.—**S1a,b** to **S6a,b** and **S7a** to **S12a** are the waveband and station selector switches, and **S13a,b,c,x** the radio/gram change switches, all incorporated in the press-button switch unit. The contacts of the various switches are indicated in our view of the press-button assembly.

As will be seen from this illustration, each of the first six press-buttons, counting from right to left, control two groups of switches. Thus the first button



Plan view of the chassis. **L12** is omitted in the Decca PT/M model, where the field of the energised speaker employed takes its place. **F1** is a wire fuse incorporated in the voltage adjusting plug.



View of the press-button unit, showing all the switch contacts and the pre-set condensers. The leads and tags which connect to the main chassis are all numbered to agree with the circuit diagram.

controls **S1a,b** and **S7a,** the second, **S2a,b** and **S8a,** and so on. The seventh button (gram) controls **S13a,b,c,x,** while the eighth (off) controls **S14x,** which is of the QMB type, mounted in a small flat cylindrical unit. This is shown in our circuit diagram in its correct position, at the bottom right-hand corner, and also (with dotted lines) in the press-button unit enclosure beneath the main diagram.

Note that all **a, b** and **c** switches close when their associated button is depressed ; **x** switches open.

S15 is the QMB motor switch, mounted on the motor board.

Coils.—L1-L6 are all beneath the chassis, and are indicated in our view of the underside of the chassis with the press-button unit removed. **L1** is in one unit, with a variable iron core. **L2, L4, L3,** and **L5, L6** are in three further units.

The IF transformers **L7, L8** and **L9, L10** are in two screened units on the chassis deck, with their associated trimmers. **L12** is the iron-cored smoothing choke on the chassis deck.

External Speaker.—Two sockets are provided on a small panel at the rear of the cabinet for a high impedance (8,000O) external speaker.

Fuse F1.—This is combined with the 2-pin voltage adjustment plug at the rear of the chassis. The actual fuse is a short length of 2A fuse wire connected inside the insulating portion of the plug between the two pins.

Condensers C19, C20.—These are two 8μF dry electrolytics in a single carton beneath the chassis, having a common negative (black) lead. The yellow lead is the positive of **C19,** and the red the positive of **C20.**

Pre-Set Condensers.—There are six aerial pre-set trimmers for station selection, of the mica dielectric compression type, two of them having fixed trimmers in parallel. The six oscillator pre-set trimmers are of the Tempa silver type, and three of these have additional fixed trimmers in parallel. All the trimmers are indicated in our view of the press-button unit.

Press-Button Unit Connections.—In case the press-button unit has to be removed for any reason, our circuit diagram shows its connections with the main chassis, and the chassis illustrations show the various inter-connecting wires numbered to agree with the circuit diagram. In all there are ten inter-connections. Note that three leads from the main chassis go to point 9 on the press-button unit.

BRUNSWICK 39/EH MODIFICATIONS

Early models of the chassis employed an intermediate frequency of 125 KC/S (not 465 KC/S), in which case **L7-L10** each had a resistance of about 60 O. **L10** was not tapped, and was untuned, **C25** being omitted.

There were also several other small modifications, notably that the aerial circuit IF filter was different, consisting of an air-cored coil (about 72O) and variable condenser in series. The aerial coil unit was also different, and had the IF filter trimmer mounted on it. A 20 $\mu\mu$F coupling condenser was wired between the aerial connection to the top of the filter coil, and the top of the aerial coil.

DECCA PT/M MODIFICATIONS

Apart from the omission of the pick-up, gramophone motor and its switch, the only notable difference in this receiver is that an energised speaker is used, in which the field coil takes the place of **L12,** and the HT secondary of **T2** has a higher voltage to compensate for the higher resistance of the speaker field.

Models using 125 KC/S as the intermediate frequency were also made, in which modifications mentioned for the Brunswick 39/EH 125 KC/S model will be found.

STATION SELECTION ADJUSTMENT

The press-button trimmers can be reached by removing the wooden panel beneath the base of the cabinet. To select a station, first press the appropriate button and adjust the oscillator trimmer associated with it, then adjust the appropriate aerial trimmer.

A signal generator can be used to provide a signal of the necessary wavelength, but final adjustments should be carried out on the actual station.

CIRCUIT ALIGNMENT

The only alignment adjustments are for the IF stages. Connect signal generator to control grid (top cap) of **V2** and chassis. Feed in a 465 KC/S signal, and adjust **C25,** then **C24,** for maximum output.

Transfer signal generator to control grid (top cap) of **V1** and adjust **C23** and **C22** for maximum output.

Connect signal generator to **A** and **E** sockets, feed in a 465 KC/S signal, and adjust the core of **L1** for *minimum* output.

In 125 KC/S models, use a 125 KC/S input. There will be only three IF trimmers to be adjusted (**C25** being omitted), while the IF filter is adjusted by the trimmer on top of the aerial coil unit, which takes the place of the variable core of **L1.**