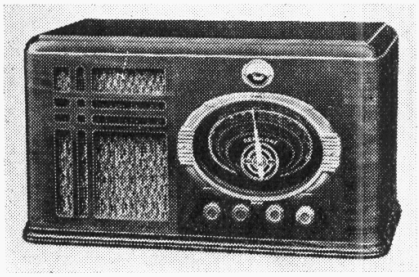
'TRADER' SERVICE SHEET 311

BELMONT 700, 720 AND 721



The Belmont model 700 table superhet. The 720 and 721 radiograms have similar chassis.

OCTAL-BASED American-type valves are employed in the Belmont 700 5-valve (plus rectifier) AC 3-band superhet, features of which are a short-wave range of 16·5-56·5 m, a cathode-ray tuning indicator and provision for connecting a gramophone pick-up. The receiver is suitable for mains of 190-280 V, 50-100 C/S.

The chassis fitted in the 720 radiogram and 721 automatic radiogram are very similar and the differences are explained under "Radiogram Modifications," but these models are for 50-60 C/S mains. This *Service Sheet*, however, was prepared on a 700 table model.

CIRCUIT DESCRIPTION

Aerial input on SW and LW via coupling coils **L3** (SW) and **L5** (LW) to single-tuned circuits **L6, C21** (SW) and **L8, C21** (LW). On MW, input is via coupling coil **L1** to pre-tuned circuit **L2, C16** and secondary circuit **L7, C21**; coupling by coil **L4.**

First valve (**V1, Brimar 6L7G**) is a heptode operating as frequency changer with grid injection in conjunction with separate oscillator valve (**V2, Belmont 6C5G**). Grid coils **L10** (SW), **L11** (MW) and **L12** (LW) are tuned by **C27**; parallel trimming by **C25** (SW), **C26** (MW) and **C3, C22** (LW); series tracking by **C2** (SW), **C24** (MW) and **C23** (LW). Reaction by coil **L9** (SW) and direct coupling on MW and LW.

Third valve (**V3, Belmont 6K7G**) is a variable-mu RF pentode operating as intermediate frequency amplifier with tuned-primary tuned-secondary transformer couplings **C28, L13, L14, C29** and **C30, L15, L16, C31.**

Intermediate frequency 465 KC/S.

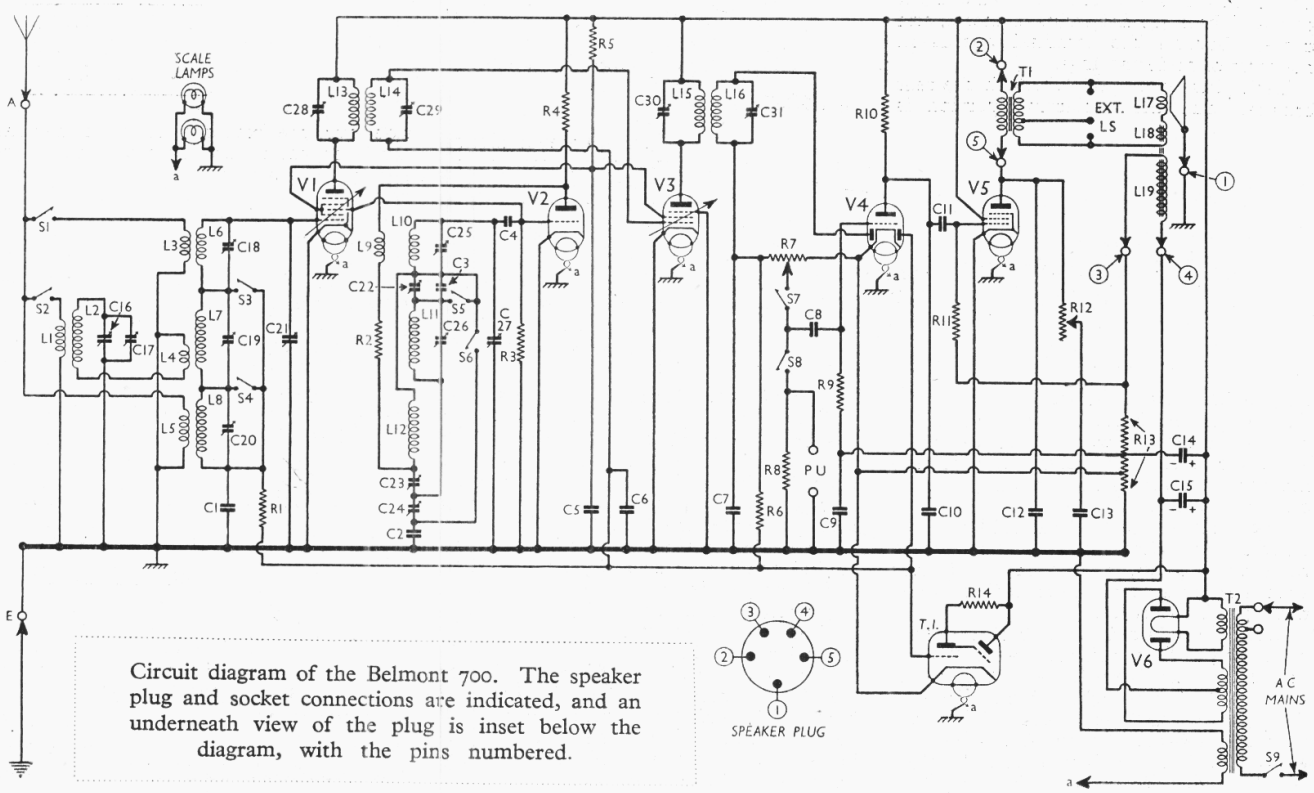
Diode second detector is part of double-diode triode valve (**V4, Belmont 6Q7G**). Audio frequency component in rectified output is developed across load resistance **R7,** which also operates as manual volume control on radio, and passed via switch **S7,** AF coupling condenser **C8** and CG resistances **R9** to CG of triode section which operates as AF amplifier.

Provision for connection of gramophone pick-up, via **S8,** between **C8** and chassis.

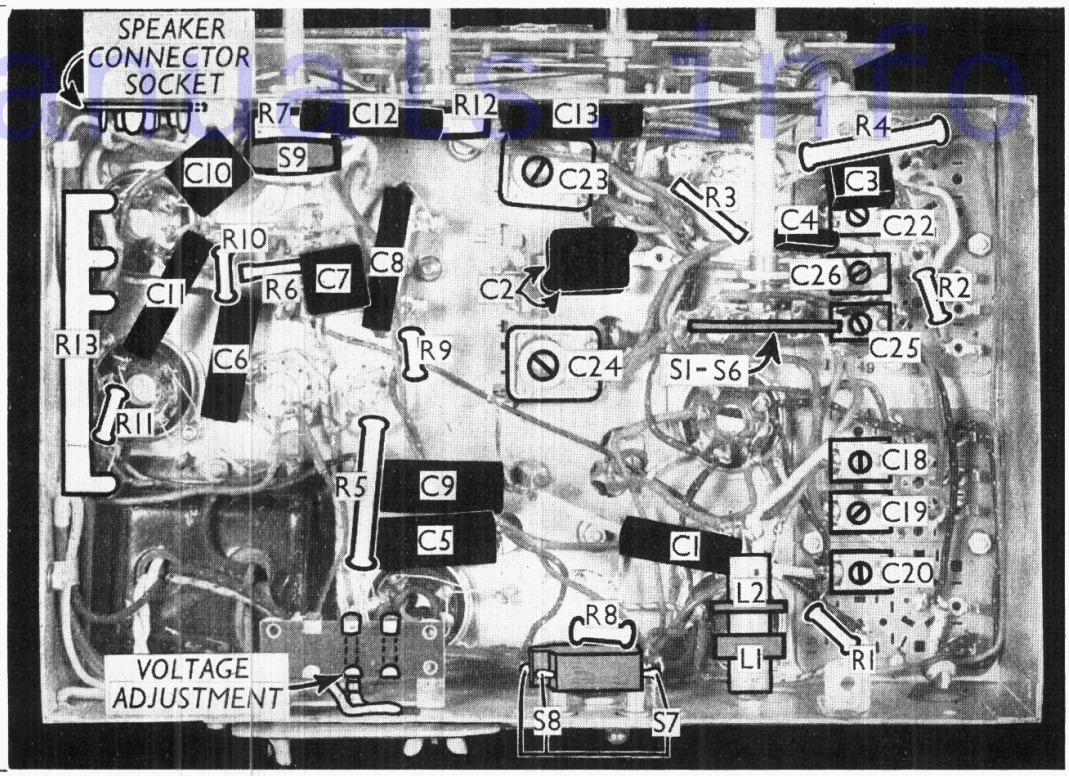
DC potential developed across **R7** is fed back as GB to FC and IF valves, giving automatic volume control. It is also used to provide operating potential for tuning indicator (**T.I., Belmont 6G5**). Second diode of **V4** is connected across **T.I.** grid circuit.

Resistance-capacity coupling by **R10, C11** and **R11** between **V4** triode and pentode output valve (**V5, Belmont 6F6G**). Fixed tone correction by **C12** and variable tone control by **R12, C13,** in anode circuit. Provision for connection of low impedance external speaker across part of secondary of internal speaker input transformer **T1.**

HT current is supplied by full-wave rectifying valve (**V6, Belmont 5Y3G**). Smoothing by speaker field **L19** in negative lead, and dry electrolytic condensers **C14, C15.**



Circuit diagram of the Belmont 700. The speaker plug and socket connections are indicated, and an underneath view of the plug is inset below the diagram, with the pins numbered.



Under-chassis view. A diagram of the **S1-S6** switch unit is on page IV. **S7, S8** are the radio-gram switches. **R13** is a tapped resistor of the metal cased type. There are six trimmers and two variable trackers beneath the chassis.

COMPONENTS AND VALUES

	RESISTANCES	Values (ohms)
R1	V1 CG decoupling	100,000
R2	V2 anode circuit stabiliser	50
R3	V2 CG resistance	50,000
R4	V2 anode HT feed	9,000
R5	V1, V2 SG's HT feed	19,000
R6	AVC line decoupling	1,000,000
R7	V4 diode load; radio manual volume control	1,000,000
R8	PU shunt	100,000
R9	V4 triode CG resistance	3,000,000
R10	V4 triode anode load	100,000
R11	V5 CG resistance	500,000
R12	Variable tone control	50,000
R13	V4, V5 auto GB resistance	305*
R14	T.I. anode HT feed	1,000,000

* Tapped 52 O + 33 O + 220 O.

	CONDENSERS	Values (μF)
C1	V1 CG decoupling	0·05
C2	Osc. circuit SW tracker	0·003
C3	Osc. circuit LW fixed trimmer	0·00004
C4	V2 CG condenser	0·00005
C5	V1, V2 SG's decoupling	0·1
C6	V3 CG decoupling	0·05
C7	IF by-pass	0·00025
C8	AF coupling to V4 triode	0·01
C9	V4 triode CG decoupling	0·1
C10	V4 triode anode IF by-pass	0·00025
C11	V4 triode to V5 AF coupling	0·01
C12	Fixed tone corrector	0·005
C13	Part of variable tone control	0·025
C14* / C15*	HT smoothing	8·0
C16†	Aerial MW pre-selector tuning	—
C17‡	Aerial MW pre-selector trimmer	—
C18‡	Aerial circuit SW trimmer	—
C19‡	Aerial MW secondary trimmer	—
C20‡	Aerial circuit LW trimmer	—
C21†	SW, LW aerial and MW secondary tuning	—
C22‡	Osc. circuit LW trimmer	—
C23‡	Osc. circuit LW tracker	—
C24‡	Osc. circuit MW tracker	—
C25‡	Osc. circuit SW trimmer	—
C26‡	Osc. circuit MW trimmer	—
C27†	Oscillator circuit tuning	—
C28‡	1st IF trans. pri. tuning	—
C29‡	1st IF trans. sec. tuning	—
C30‡	2nd IF trans. pri. tuning	—
C31‡	2nd IF trans. sec. tuning	—

*Electrolytic. † Variable. ‡ Pre-set.

	OTHER COMPONENTS	Approx. Values (ohms)
L1	Aerial MW coupling coil	37·0
L2	Aerial MW pre-selector coil	4·0
L3	Aerial SW coupling coil	0·6
L4	Aerial secondary coupling coil	0·6
L5	Aerial LW coupling coil	60·0
L6	Aerial SW tuning coil.	0·6
L7	Aerial MW sec. tuning coil	4·0
L8	Aerial LW tuning coil	15·0
L9	Oscillator SW reaction	0·6
L10	Osc. circuit SW tuning coil	0·1
L11	Osc. circuit MW tuning coil	12·0
L12	Osc. circuit LW tuning coil	22·0
L13 / L14	1st IF trans. Pri. / Sec.	9·0 / 70·0
L15 / L16	2nd IF trans. Pri. / Sec.	9·0 / 70·0
L17	Speaker speech coil	2·2
L18	Hum neutralising coil.	0·15
L19	Speaker field coil	1,550·0
T1	Speaker input Pri. / Sec., total	400·0 / 0·4
T2	Mains trans. Pri., total / Heater sec. / Rect. heat. sec. / HT sec., total	35·0 / 0·1 / 0·1 / 650·0
S1-S6	Waveband switches	—
S7, S8	Radio-gram change switches	—
S9	Mains switch, ganged R7.	—

DISMANTLING THE SET

Removing Chassis.—To remove the chassis from the cabinet, remove the knobs and felt washers from the four control spindles, and the four bolts (with washers and rubber washers) holding the chassis to the bottom of the cabinet. Now free the tuning indicator from its clips, when the chassis may be withdrawn to the extent of the speaker leads, which is adequate for normal purposes.

When replacing, see that there is a rubber washer for each of the fixing bolts, between the chassis and cabinet bottom, and do not forget to replace the felt washers on the control spindles.

If it is desired to free the chassis entirely, unplug the speaker leads from the socket on the front member of the chassis.

Removing Speaker.—To remove the speaker from the cabinet, unsolder the leads and remove the nuts and lock-washers from the four bolts holding it to the sub-baffle. *When replacing*, see that the transformer is on the right, do not forget to replace the tag for the earthing lead on the top right-hand screw, and connect the leads as follows, numbering the tags from bottom to top:—Left-hand, 1, green/red; 2, brown/red. Right-hand, 1, black/green; 2, 3 and 4, no external connection; 5, yellow/green. The white lead goes to the tag on speaker fixing screw.

VALVE ANALYSIS

Valve	Anode Voltage (V)	Anode Current (mA)	Screen Voltage (V)	Screen Current (mA)
V1 6L7G	210	2·3	88	4·6
V2 6C5G	134	7·2	—	—
V3 6K7G	210	4·9	88	1·1
V4 6Q7G	120	0·7	—	—
V5 6F6G	197	26·0	210	4·4
V6 5Y3G	293†	—	—	—
T.I. 6G5	12 / Target / 210	0·2 / 1·7	—	—

Valve voltages and currents given in the table above are those measured in our receiver when it was operating on mains of 227 V, using the 190-240 V tapping on the mains transformer. The receiver was tuned to the lowest wavelength on the medium band and the volume control was at maximum, but there was no signal input as the aerial and earth leads were connected together.

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

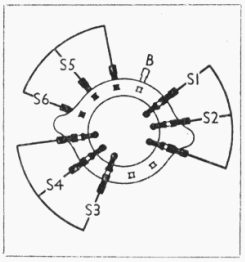
Continued overleaf

BELMONT 700—*Continued*

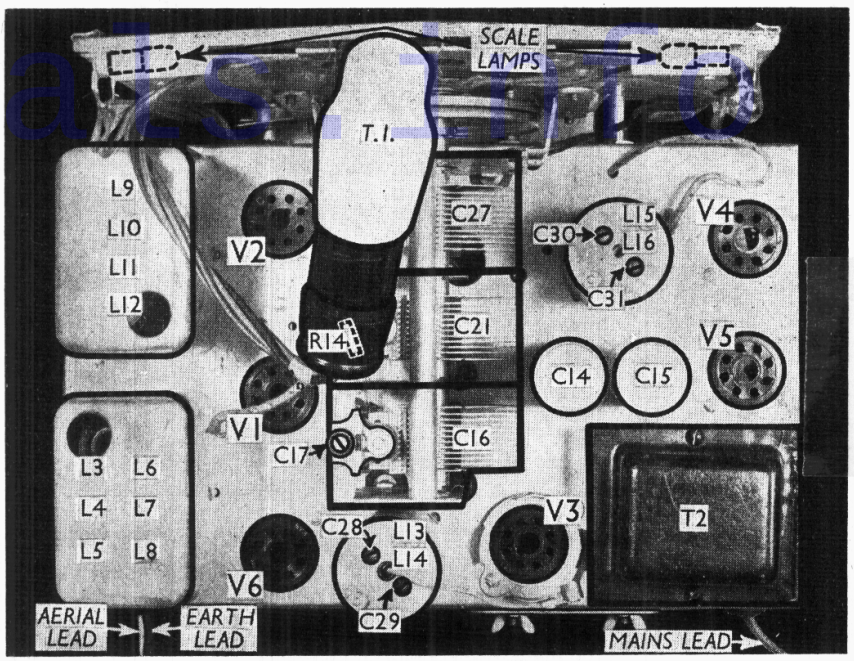
GENERAL NOTES

Switches.—**S1-S6** are the waveband switches, in a single rotary unit beneath the chassis, indicated in our under-chassis view. The switches are shown in detail in the diagram below, while the table below gives the switch positions for the three control settings, starting from fully anti-clockwise. A dash indicates *open*, and **C**, *closed*.

Switch	LW	MW	SW
S1	—	—	C
S2	—	C	C
S3	—	—	C
S4	—	C	C
S5	—	C	C
S6	—	—	C



Switch diagram, looking from the rear of the underside of the chassis.



Plan view of the chassis. **C17** is the only trimmer on the gang condenser. **R14** is inside the tuning indicator holder.

S7, S8 are the radio-gram switches, in a single QMB unit at the rear of the chassis. The two switches together form a single-pole changeover switch. In the radio position of the knob (" rad "), **S7** is *closed* and **S8** *open*. In the gram position (" pho "), **S8** is *closed* and **S7** *open*.

S9 is the QMB mains switch, ganged with the volume control **R7.**

Coils.—**L1, L2** are in an unscreened unit beneath the chassis. **L3-L8**; **L9-L12**; and the IF transformers **L13, L14** and **L15, L16** are in four screened units on the chassis deck. The last two have trimmers reached through holes in the tops of the cans, but the first two have their six associated trimmers beneath the chassis.

Scale Lamps.—These are two Tre Vita MES types, rated at 6·0 V, 0·15 A.

External Speaker.—No sockets are provided for this, but there are tags on the **T1** connection panel, on the internal speaker, to which an external low impedance (about 2 O) speaker can be connected.

In point of fact there are tags at each end of the secondary of **T1** and one at a tapping. It is probably best to use the connection to the tapping, and the end of the secondary to which **L18** is connected, but other connections can be tried.

Speaker Plug and Socket.—The speaker is connected to the chassis by a 5-pin plug and socket. The connections are indicated in the circuit diagram by numbered circles and arrows, while a diagram of the underside of the plug is inset below the circuit. The coding of the wires connected to the plug is: 1, white; 2, green/red; 3, yellow/green; 4, black/green; 5, brown/red.

Resistance R13.—This is a Muter strip type, with a total resistance of 305 O, with tappings to give 52+33+220 O.

Resistance R14.—This is inside the T.I. holder.

Condensers C2.—This consists of two units in parallel, with a total capacity of 0·003 μF.

Condenser C12.—This was 0·005 μF in our chassis, but is shown in the makers' diagram as 0·002 μF.

Extra Resistor.—The makers' diagram shows a 150 O resistor in series with the lead from the modulator grid of **V1** to the control grid of **V2.** This was not present in our chassis.

V1 Connections.—The 6L7G is a heptode mixer valve, and has internal connections different from those of an ordinary heptode. Using the usual octal base pin numbering, the connections are: 1, blank; 2, heater; 3, anode; 4, grids 2 and 4; 5, grid 3; 6, no pin; 7, heater; 8, cathode and grid 5; top cap, grid 1.

Voltage Adjustment.—Note that a flying lead, and two sockets are used for this. The third socket is merely a bearer for the flying lead.

RADIOGRAM MODIFICATIONS

The chassis of the 720 and 721 radiograms are similar to that of the table model, except that the single-pole changeover switch formed by **S7, S8** is replaced by a double-pole changeover type mounted on the motor board. One of the poles of this takes the place of **S7** and **S8** and is connected similarly, while the other pole disconnects the top of **R5** from the HT line on gram, thus muting radio.

CIRCUIT ALIGNMENT

IF Stages.—Turn volume control to maximum, switch set to MW, and turn gang to minimum. Connect signal generator, via a 0·1 μF condenser to control grid (top cap) of **V3** and chassis. Feed in a 465 KC/S signal, and adjust **C30** and **C31** for maximum output. Transfer signal generator to top cap of **V1,** and adjust **C28** and **C29** for maximum output. Re-adjust **C30** and **C31** if necessary.

RF and Oscillator Stages. — SW.—Switch set to SW, connect signal generator via a 0·1 μF condenser and 400 O resistor in series to aerial and earth leads. Turn gang to minimum (plates fully unmeshed), and feed in a 16·5 m (18·2 MC/S) signal. Adjust **C25** for maximum output. Feed in a 17·5 m (17·0 MC/S) signal, tune it in, and adjust **C18** for maximum output. Check sensitivity at 50 m.

MW.—Switch set to MW, turn gang to minimum, and use a dummy aerial of 0·0002 μF and 20 O in series with the signal generator and the aerial lead. Feed in a 187 m (1,600 KC/S) signal, and adjust **C26** for maximum output. Feed in a 214 m (1,400 KC/S) signal, tune it in, and adjust **C19** and **C17** (on gang) for maximum output. Feed in a 500 m (600 KC/S) signal, tune it in, and adjust **C24** for maximum output, while rocking the gang for optimum results. Repeat the adjustments at 187 m and 214 m, and check sensitivity at 300 m.

NOTE.—The MW band must be re-checked after the LW band has been adjusted.

LW.—Switch set to LW, turn gang to minimum, and feed in an 800 m (350 KC/S) signal (using dummy aerial as for MW). Adjust **C22** for maximum output. Feed in a 925 m (325 KC/S) signal, tune it in, and adjust **C20** for maximum output. Feed in a 2,000 m (150 KC/S) signal, tune it in, and adjust **C23** for maximum output, while rocking the gang for optimum results. Repeat the 860 m and 925 m adjustments.

NOTE.—The LW band must be re-checked after the MW band has also been rechecked, as explained in the note above.