'TRADER' SERVICE SHEET 261

BELMONT 600

A.C./D.C. 3-BAND SUPERHET

BELMONT fit a 4-valve (plus rectifier) A.C./D.C. 3-band superhet chassis in their model 600 receiver, the short-wave range covered being 18-55 m. The set is for mains of 200-260 V.

CIRCUIT DESCRIPTION

Aerial input via series condenser **C1** and coupling coils **L2** (S.W.), **L3** (M.W.) and **L4** (L.W.) to single-tuned circuits **L5, C28** (S.W.), **L6, C28** (M.W.), and **L7, C28** (L.W.). I.F. fitter **L1, C24** across aerial input circuit.

First valve (**V1, Belmont 6A8G**) is a heptode operating as frequency changer with electron coupling. Oscillator grid coils **L8** (S.W.), **L9** (M.W.) and **L10** (L.W.) are tuned by **C29**; parallel trimming by **C32** (S.W.), **C33** (M.W.) and **C7, C34** (L.W.); series tracking by **C30** (M.W.) and **C31** (L.W.). Anode reaction by coils **L11** (S.W.), **L12** (M.W.) and **L13** (L.W.).

Second valve, a variable-mu R.F. pentode (**V2, Belmont 6K7G**), operates as intermediate frequency amplifier with tuned-primary tuned-secondary transformer couplings **C35, L14, L15, C36** and **C37, L16, L17, C38.**

Intermediate frequency 465 KC/S.

Diode second detector is part of double-diode triode valve (**V3, Belmont 6Q7G**), the two diodes being strapped together. Audio frequency component in rectified output is developed across load resistance **R10** and passed via coupling condenser **C15** and manual volume control **R9** to C.G. of triode section, which operates as A.F. amplifier. I.F. filtering by **C14** and **C17.**

D.C. potential developed across **R10** is fed back through decoupling circuits as G.B. to F.C. (except on S.W.) and I.F. valves, giving automatic volume control.

Resistance-capacity coupling by **R12, C18, R13** between **V3** triode and pentode output valve (**V4, Belmont 25A6G**). Fixed tone correction in anode circuit by condenser **C20.**

When the receiver is used with A.C. mains, H.T. current is supplied by rectifying valve (**V5, Belmont 25Z6G**) with both anodes and both cathodes strapped to operate as half-wave rectifier, which, with D.C. supplies, behaves as a low resistance. Smoothing is effected by speaker field **L20** and dry electrolytic condensers **C21, C22.**

Valve heaters are connected in series, together with ballast resistances **R16, R17, (resistance tube K52H), R16** shunting the scale lamps, and **R18** (which is located in the mains lead), across the mains input.

DISMANTLING THE SET

Removing Chassis.—If it is desired to remove the chassis from the cabinet, remove the three control knobs (recessed grub screws) and the felt washers. Next remove the four bolts (with washers and rubber washers) holding the chassis to the bottom of the cabinet and free the speaker leads from the cleat holding them to the inside of the cabinet.

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

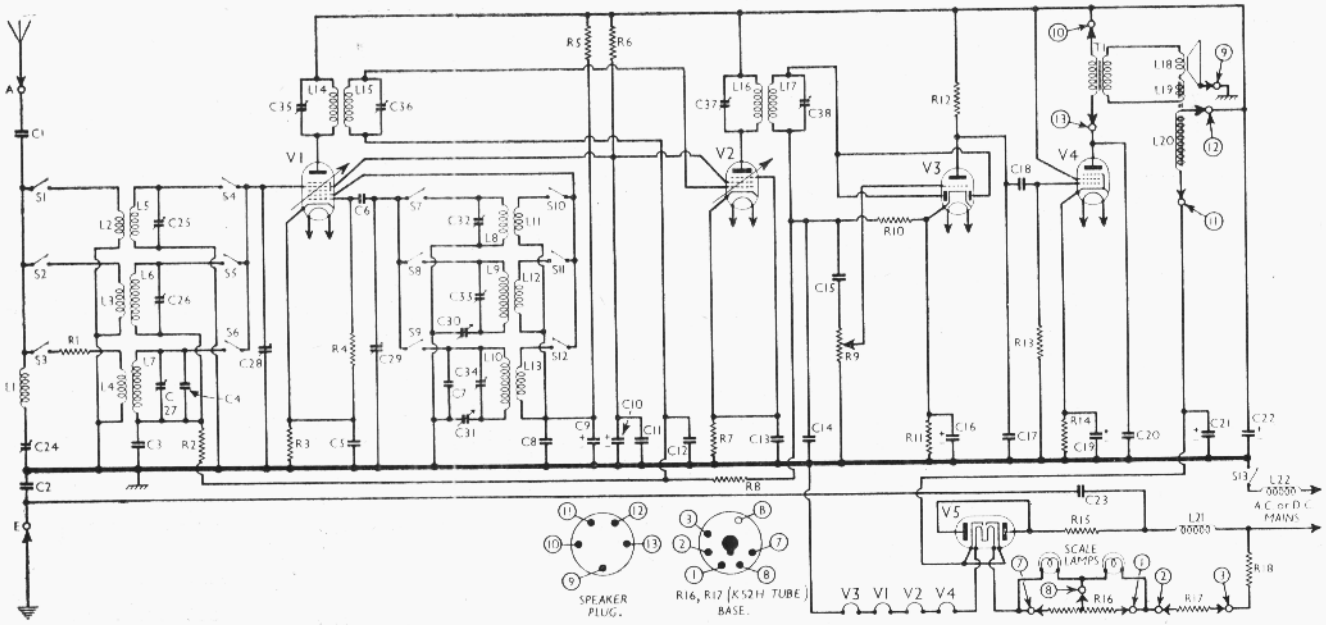
To free the chassis entirely, unplug the speaker leads from the socket at the back of the chassis.

Removing Speaker.—To remove the speaker from the cabinet, remove the nuts and lock washers from the four screws holding it to the sub-baffle. *When replacing*, see that the transformer is on the right. If the leads should have been unsoldered, connect them as follows, numbering the tags from bottom to top:—1, black/green; 2, green/red; 3, brown/red; 4, yellow/blue. The white "earthing" lead goes to one of the lugs holding the terminal panel to the transformer.

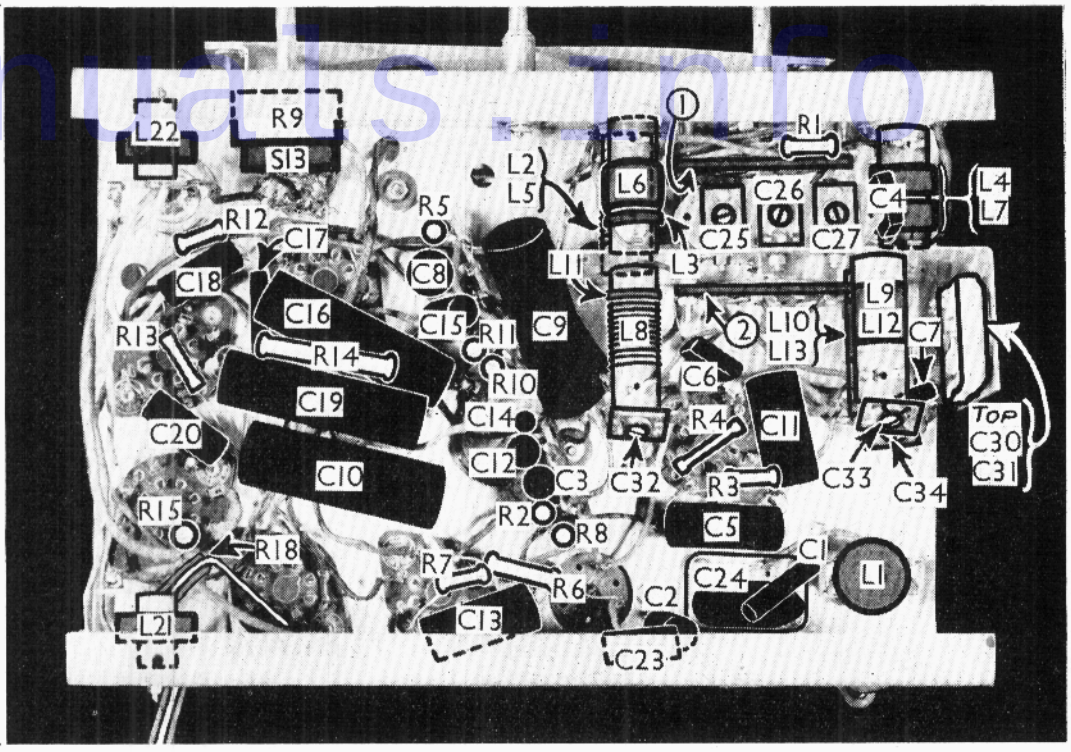
COMPONENTS AND VALUES

	RESISTANCES	Values (ohms)
R1	Aerial circuit L.W. damping	1,000
R2	V1 tetrode C.G. decoupling	250,000
R3	V1 fixed G.B.	250
R4	V1 osc. C.G. resistance	50,000
R5	V1 osc. anode H.T. feed	10,000
R6	V1, V2 S.G.'s H.T. feed	25,000
R7	V2 fixed G.B.	250
R8	A.V.C. line decoupling	250,000
R9	Manual volume control	1,000,000
R10	V3 diodes load resistance	500,000
R11	V3 triode G.B. resistance	5,000
R12	V3 triode anode load	250,000
R13	V4 C.G. resistance	500,000
R14	V4 G.B. resistance	500
R15	V5 anodes surge limiter	50
R16	Part heater circuit ballast and scale lamps shunt	*56
R17	Part heater circuit ballast	*134
R18	Mains heater circuit ballast	†350

* K52H tube; R16 centre tapped. † In mains lead.



Circuit diagram of the Belmont 600. **R16** and **R17** are included in a special K52H resistance tube, with an octal base. The connections are numbered in accordance with the diagram beneath the circuit. The speaker plug is also numbered. **R18** is included in the mains lead.



Under-chassis view. **R18** is a flexible resistance inside the mains lead. **L2**, **L5** are beneath **L3**, **L6**, and **L10**, **L13** are beneath **L9**, **L12**. **L21** and **L22** are mains filter chokes.

	CONDENSERS	Values (μF)
C1	Aerial series condenser	0·0005
C2	Earth blocking condenser	0·01
C3	V1 tetrode C.G. decoupling	0·05
C4	Aerial circuit L.W. fixed trimmer	0·000025
C5	V1 cathode by-pass	0·1
C6	V1 osc. C.G. condenser	0·00005
C7	Osc. circuit L.W. fixed trimmer	0·00007
C8	V1 osc. anode R.F. by-pass	0·1
C9*	V1 osc. anode decoupling	8·0
C10*	V1, V2 S.G.'s decoupling	8·0
C11	V1, V2 S.G.'s R.F. by-pass	0·1
C12	V2 C.G. decoupling	0·05
C13	V2 cathode by-pass	0·1
C14	I.F. by-pass	0·0002
C15	A.F. coupling to V3 triode	0·01
C16*	V3 cathode by-pass	50·0
C17	V3 anode I.F. by-pass	0·0002
C18	V3 triode to V4 A.F. coupling	0·01
C19*	V4 cathode by-pass	10·0
C20	Fixed tone corrector	0·01
C21*	H.T. smoothing	32·0
C22*	H.T. smoothing	10·0
C23	Mains R.F. by-pass	0·01
C24‡	Aerial I.F. filter tuning	—
C25‡	Aerial circuit S.W. trimmer	—
C26‡	Aerial circuit M.W. trimmer	—
C27‡	Aerial circuit L.W. trimmer	—
C28†	Aerial circuit tuning	—
C29†	Oscillator circuit tuning	—
C30‡	Oscillator circuit M.W. tracker	—
C31‡	Oscillator circuit L.W. tracker	—
C32‡	Oscillator circuit S.W. trimmer	—
C33‡	Oscillator circuit M.W. trimmer	—
C34‡	Oscillator circuit L.W. trimmer	—
C35‡	1st I.F. trans. pri. tuning	—
C36‡	1st I.F. trans. sec. tuning	—
C37‡	2nd I.F. trans. pri. tuning	—
C38‡	2nd I.F. trans. sec. tuning	—

* Electrolytic. † Variable. ‡ Pre-set.

	OTHER COMPONENTS	Approx. Values (ohms)
L1	Aerial I.F. filter coil	9·0
L2	Aerial S.W. coupling	0·3
L3	Aerial M.W. coupling	2·8
L4	Aerial L.W. coupling	42·0
L5	Aerial S.W. tuning coil	0·05
L6	Aerial M.W. tuning coil	3·0
L7	Aerial L.W. tuning coil	18·0

	OTHER COMPONENTS (*Continued*)		Approx. Values (ohms)
L8	Osc. circuit S.W. tuning coil		0·05
L9	Osc. circuit M.W. tuning coil		4·25
L10	Osc. circuit L.W. tuning coil		6·5
L11	Oscillator S.W. reaction		25·0
L12	Oscillator M.W. reaction		70·0
L13	Oscillator L.W. reaction		8·0
L14	1st I.F. trans.	Pri.	9·0
L15		Sec.	10·0
L16	2nd I.F. trans.	Pri.	9·0
L17		Sec.	10·0
L18	Speaker speech coil		1·75
L19	Hum neutralising coil		0·1
L20	Speaker field coil		2,000·0
L21	Mains filter chokes		3·5
L22			3·5
T1	Speaker input trans.	Pri.	250·0
		Sec.	0·2
S1-S12	Waveband switches		—
S13	Mains switch, ganged R9		—

VALVE ANALYSIS

Valve voltages and currents given in the table below are those measured in our receiver when it was operating on A.C. mains of 233 V. 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 shorted together.

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

Valve	Anode Voltage (V)	Anode Current (mA)	Screen Voltage (V)	Screen Current (mA)
V1 6A8G*	175	1·9	70	2·5
V2 6K7G	175	5·8	70	1·3
V3 6Q7G	58	0·2	—	—
V4 25A6G	163	38·0	175	7·0
V5 25Z6G	230†	—	—	—

* Oscillator anode (G2) 133 V, 3·1 mA.
† Each anode, A.C.

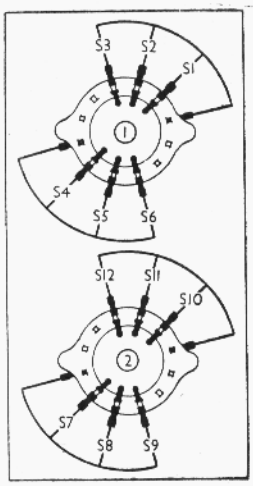
GENERAL NOTES

Switches.—S1-S12 are the waveband switches, in two rotary units beneath the chassis. These are indicated in our under-chassis view, and are shown in detail in the diagrams on this page.

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	S.W.	M.W.	L.W.
S1	C	—	—
S2	—	C	—
S3	—	—	C
S4	C	—	—
S5	—	C	—
S6	—	—	C
S7	C	—	—
S8	—	C	—
S9	—	—	C
S10	C	—	—
S11	—	C	—
S12	—	—	C

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



S13 is the Q.M.B. mains switch, ganged with the volume control, **R9**.

Continued overleaf

BELMONT 600—*Continued*

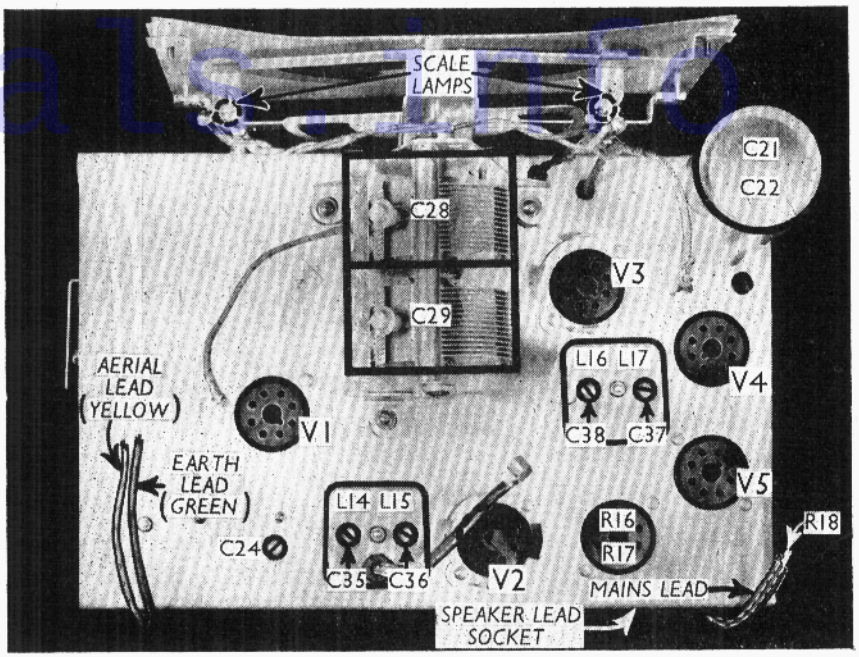
Coils.—**L1** is attached to the underside of the chassis. The remaining coils up to **L13** are in pairs on tubular formers beneath the chassis, attached to the screen between the two switch units. They are indicated in our under-chassis view. The I.F. transformers **L14, L15** and **L16, L17** are in two screened units on the chassis deck, with their associated trimmers. The chokes **L21** and **L22** are on separate formers beneath the chassis.

Scale Lamps.—These are two M.E.S. types, with tubular bulbs, rated at 6·0 V, 0·15 A. Those fitted are marked Tre Vita.

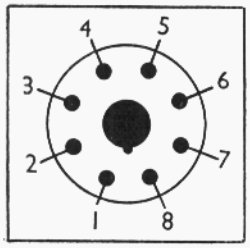
External Speaker.—No provision is made for this, but a low impedance type could be connected across the secondary of the internal speaker transformer. As the set is for A.C./D.C. operation, no external speaker should be connected to the primary of **T1.**

Condenser C21, C22.—These are two dry electrolytics in a single tubular metal case on the chassis deck. The case forms the common negative connection. Of the two wires emerging beneath the chassis, the yellow is the positive of **C22** (10 F) and the red the positive of **C21** (32 F).

Resistances R16, R17.—These are ballast resistors, contained in a metal-cased unit fitted with an octal base, and plugging into a holder on the chassis deck. In the circuit diagram the ends of the two resistances, and the centre tap of **R16** are indicated by numbers in circles, which correspond with the pin numbers of the base, a diagram of which is beneath the circuit diagram. Pins 4 and 6 are missing, and pin 5 is blank. The unit is an American K52H.



Plan view of the chassis. The octal holder marked **R16, R17** takes the K52H resistance tube. **R18** is incorporated in the mains lead.



Octal base, and table of pin connections.

VALVE	PIN 1	2	3	4	5	6	7	8	TOP CAP
6A8G	B	H	A	G3, G5	G1	G2	H	C	G4
6K7G	B	H	A	G2	G3	—	H	C	G1
6Q7G	B	H	A	D1	D2	—	H	C	G
25A6G	B	H	A	G2	G1	—	H	C	—
25Z6G	B	H	A2	C2	A1	—	H	C1	—

Resistance R18.—This is a flexible resistor included in the mains lead.

Speaker Connections.—These are taken to a special 5-pin plug, fitting into a socket at the rear of the chassis. The connections are numbered from 9 to 13 in the circuit diagram, and beneath it is a diagram of the plug, looking at its underside.

Valves.—These are all octal types, and a diagram of the base is given on this page, together with a table of connections. B indicates a blank pin, and a dash, no pin.

CIRCUIT ALIGNMENT

I.F. Stages.—Feed a 465 KC/S signal into control grid (top cap) of **V1** and earth connection (not chassis), and adjust **C38, C37, C36** and **C35** for maximum output.

R.F. and Oscillator Stages.—With gang at maximum, pointer should cover the 550 m. mark on the M.W. scale.

S.W.—Connect signal generator to **A** and **E** leads, feed in a 17·6 MC/S (17 m.) signal, switch set to S.W. and tune to 17 m. on scale. Adjust **C32** and **C25** for maximum output.

M.W.—Switch set to M.W., feed in a 1,500 KC/S (200 m.) signal, tune to 200 m. on scale, and adjust **C33** and **C26** for maximum output. Feed in a 600 KC/S (500 m.) signal, tune it in, and adjust **C30** for maximum output, rocking the gang slighly for optimum results.

L.W.—Switch set to L.W., feed in a 300 KC/S (1,000 m.) signal, tune to 1,000 m. on scale, and adjust **C34** and **C27** for maximum output. Feed in a 150 KC/S (2,000 m.) signal, tune it in, and adjust **C31** for maximum output, rocking the gang slightly for optimum results.

I.F. Filter.—Feed a 465 KC/S signal into **A** and **E** connections, switch set to L.W., tune to 1,300 m. on scale (a harmonic of 465 KC/S) and adjust **C24** for *minimum* output.

MAINTENANCE PROBLEMS

Varying Bias Resistor

IN the course of checking a new batch of receivers, I came across a Murphy AD32, which at first appeared normal, but after a short period of running burst into severe oscillation, this occurring only on stations below about 280 m.

Valve replacement did not cure the trouble, and all likely decoupling condensers were found to be up standard, including the main smoothing block, in which low capacity sometimes gives the above effect.

Eventually, slight variations in the voltages at the frequency changer led to a resistance test of the bias resistor of this valve (TP2620) showing it to be of changing value, sometimes considerably higher than its nominal 500 O.

Replacement of this component effected a complete cure. I.F. and R.F. circuits disturbed in testing were readjusted to finish the repair.—R. R. GREEN, MARLOW.

Faulty Grid Resistance

I EXPERIENCED rather an unusual fault in a Marconi 257 battery set. On switching on, no sound could be heard for about 15 or 20 seconds, and then the programme faded slowly in. After this process of "heating up" the set worked perfectly. I tried a new set of valves, tested all voltages and emissions but found everything in order.

I then proceeded to localise the fault and found it to be in the L.F. end of the set. While looking around here I happened to notice a spot of verdigris on one end of the V3 C.G. resistance in the G.B. —1 circuit. I replaced this, and the fault disappeared. To make sure it was not a dry soldered joint I put back the old resistance, and the fault showed up again. —J. N. CORK.