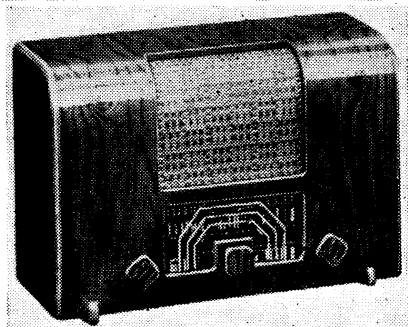


"TRADER" SERVICE SHEET
536

BELMONT 650

AC/DC MIDGET SUPERHET



THE Belmont 650 is a 4-valve (plus rectifier) 3-band midget superhet, designed for use with AC or DC mains of 200-260 V, 40-100 C/S in the case of AC. The SW range is 16-55 m.

Release date: April, 1938.

CIRCUIT DESCRIPTION

Aerial input via **C1**, **C2**, which form a potential divider, and coil **L3** to single tuned circuits **L4**, **C23** (SW), **L5**, **C23** (MW) and **L6**, **C23** (LW) which precede heptode frequency changer valve (**V1**, **6A8G**). Oscillator grid coils **L7** (SW), **L8** (MW) and **L9** (LW) are tuned by **C24**. Parallel trimming by **C27** (SW), **C25** (MW) and **C26** (LW); series tracking by **C5** (SW), **C28** (MW) and **C29** (LW). Reaction by **L10** (SW) and common im-

pedance of trackers **C28** (MW) and **C29** (LW).

Second valve (**V2**, **6U7G**) is a variable-mu RF pentode operating as IF amplifier with tuned-primary, tuned-secondary transformer couplings.

Intermediate frequency 465 KC/S.

Diode second detector is part of double diode triode valve (**V3**, **6Q7G**), in which the diodes are strapped together. Audio frequency output is developed across load resistance **R11** and passed via **C11** and manual volume control **R10** to CG of triode section.

DC potential across **R11** is fed back as GB to FC and IF valves, giving AVC.

Resistance-capacity coupling by **R13**, **C14**, **R14** between **V3** triode and pentode output valve (**V4**, **25A6G**). Fixed tone correction by **C15**, and provision for connection of high impedance external speaker, in anode circuit.

When operating with AC mains, HT current is supplied by rectifying valve operating as half-wave rectifier (**V5**, **25Z6G**) which, with DC mains, behaves as a low resistance. Smoothing by speaker field **L16** and electrolytic condensers **C17**, **C18**.

Valve heaters, together with scale lamps, and ballast resistances **R17**, **R18**, **R19**, are connected in series across mains input.

VALVE ANALYSIS

Valve voltages and currents given in the table below are those measured in our receiver when it was operating with AC mains of 237 V. The receiver was tuned to the lowest wave-

length on the MW band, and the volume control was at maximum, but there was no signal input.

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

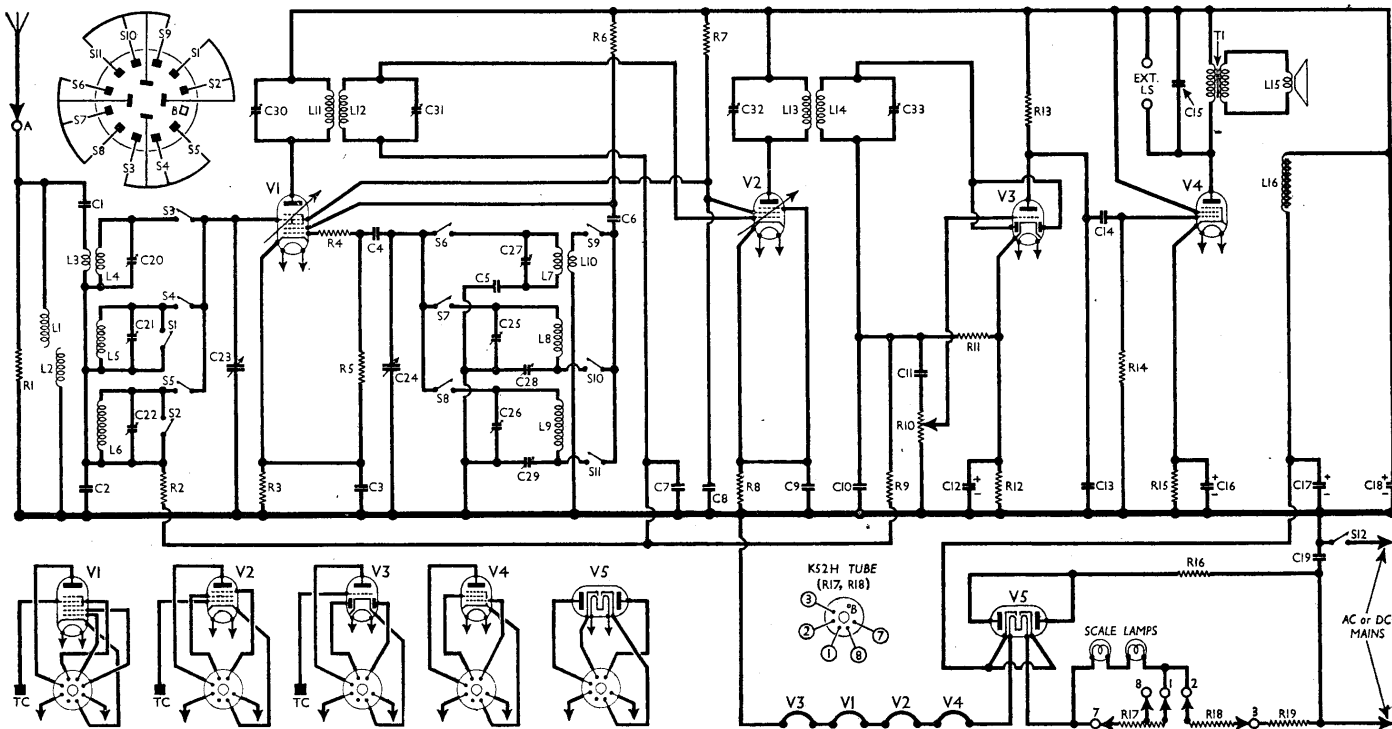
| Valve | Anode Voltage (V) | Anode Current (mA) | Screen Voltage (V) | Screen Current (mA) |
|----------|---|--------------------|--------------------|---------------------|
| V1 6A8G | { 143 Oscillator } { 103 3-5 } | 2.4 | 60 | 3.0 |
| V2 6U7G | 143 | 4.3 | 60 | 1.0 |
| V3 6Q7G | 27 | 0.2 | — | — |
| V4 25A6G | 126 | 41.0 | 143 | 9.2 |
| V5 25Z6G | 259† | — | — | — |

† Cathode to chassis, DC.

COMPONENTS AND VALUES

| RESISTANCES | | Values (ohms) |
|-------------|------------------------------|---------------|
| R1 | Aerial circuit shunt ... | 25,000 |
| R2 | V1 tetrode CG decoupling ... | 500,000 |
| R3 | V1 fixed GB resistance ... | 500 |
| R4 | V1 osc. CG stabiliser ... | 150 |
| R5 | V1 osc. CG resistance ... | 50,000 |
| R6 | V1 osc. anode HT feed ... | 10,000 |
| R7 | V1, V2 SG's HT feed ... | 25,000 |
| R8 | V2 fixed GB resistance ... | 500 |
| R9 | AVC line decoupling ... | 500,000 |
| R10 | Manual volume control ... | 500,000 |
| R11 | V3 diode load resistance ... | 500,000 |
| R12 | V3 triode GB ... | 10,000 |
| R13 | V3 triode anode load ... | 500,000 |
| R14 | V4 CG resistance ... | 500,000 |
| R15 | V4 GB resistance ... | 500 |
| R16 | V5 anode surge limiter ... | 50 |
| R17 | Scale lamps shunt ... | 20† |
| R18 | Heater circuit ballast ... | 135† |
| R19 | Line cord resistance ... | 360 |

† In K52H tube; measured cold.



Circuit diagram of the Belmont 650 AC/DC midget. **R17**, **R18** are in a K52H resistance tube, and the numbers relate to the pins of its base, a diagram of which, viewed from the free ends of the pins, is inset to the left of **V5**. **R19** is a line cord resistance in the mains lead.

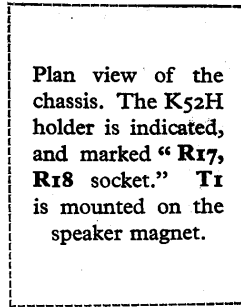
| CONDENSERS | | Values (μF) |
|------------|---------------------------------------|-------------|
| C1 | Aerial coupling potential divider ... | 0-0025 |
| C2 | V1 cathode by-pass ... | 0-0024 |
| C3 | V1 osc. CG condenser ... | 0-1 |
| C4 | V1 osc. CG condenser ... | 0-00012 |
| C5 | Osc. circ. SW tracker ... | 0-0014 |
| C6 | V1 anode coupling ... | 0-0025 |
| C7 | V2 CG decoupling ... | 0-05 |
| C8 | V1, V2 SG's decoupling ... | 0-1 |
| C9 | V2 cathode by-pass ... | 0-1 |
| C10 | IF by-pass ... | 0-00025 |
| C11 | AF coupling to V3 triode ... | 0-01 |
| C12* | V3 cathode by-pass ... | 5-0 |
| C13* | IF by-pass ... | 0-0006 |
| C14 | V3 triode to V4 coupling ... | 0-01 |
| C15 | Fixed tone corrector ... | 0-01 |
| C16* | V4 cathode by-pass ... | 5-0 |
| C17* | HT smoothing condensers | 10-0 |
| C18* | | 8-0 |
| C19 | Mains RF by-pass ... | 0-1 |
| C20† | Aerial circ. SW trimmer ... | — |
| C21† | Aerial circ. MW trimmer ... | — |
| C22† | Aerial circ. LW trimmer ... | — |
| C23† | Aerial circuit tuning ... | — |
| C24† | Oscillator circuit tuning ... | — |
| C25† | Osc. circ. MW trimmer ... | — |
| C26† | Osc. circ. LW trimmer ... | — |
| C27† | Osc. circ. SW trimmer ... | — |
| C28† | Osc. circ. MW tracker ... | — |
| C29† | Osc. circ. LW tracker ... | — |
| C30† | 1st IF trans. pri. tuning ... | — |
| C31† | 1st IF trans. sec. tuning ... | — |
| C32† | 2nd IF trans. pri. tuning ... | — |
| C33† | 2nd IF trans. sec. tuning ... | — |

* Electrolytic. † Variable. ‡ Pre-set.

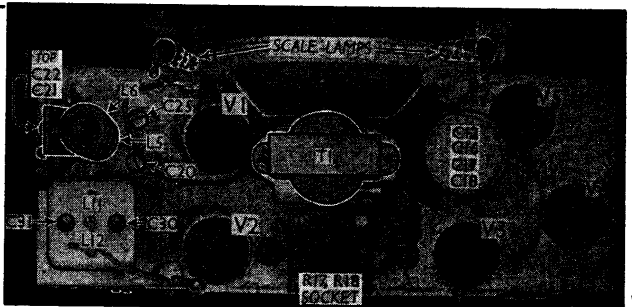
| OTHER COMPONENTS | | Approx. Values (ohms) |
|------------------|---------------------------------|-----------------------|
| L1 | Aerial circuit shunt coils | — |
| L2 | | — |
| L3 | Aerial SW coupling coil ... | 0-25 |
| L4 | Aerial SW tuning coil ... | Very low |
| L5 | Aerial MW tuning coil ... | 4-5 |
| L6 | Aerial LW tuning coil ... | 14-5 |
| L7 | Osc. SW tuning coil ... | Very low |
| L8 | Osc. MW tuning coil ... | 8-0 |
| L9 | Osc. LW tuning coil ... | 1-5 |
| L10 | Osc. SW reaction coil ... | 0-25 |
| L11 | 1st IF trans. { Pri. ... | 3-0 |
| L12 | | { Sec. ... |
| L13 | 2nd IF trans. { Pri. ... | 16-5 |
| L14 | | { Sec. ... |
| L15 | Speaker speech coil ... | 3-0 |
| L16 | Speaker field coil ... | 1,500-0 |
| T1 | Speaker input trans. { Pri. ... | 300-0 |
| | { Sec. ... | 0-8 |
| S1-S11 | Waveband switches ... | — |
| S12 | Mains switch, ganged R10 ... | — |

GENERAL NOTES

Switches.—S1-S11 are the waveband switches, in a single rotary unit beneath the chassis. A diagram of the unit, as seen when viewed from the rear of the underside of the chassis, appears in the top left-hand corner of the circuit diagram, while the table (next col.) gives the



Plan view of the chassis. The K52H holder is indicated, and marked "R17, R18 socket." T1 is mounted on the speaker magnet.



switch positions for the three control settings, starting from the fully anti-clockwise position of the control. A dash indicates open, and C, closed.

S12 is the QMB mains switch, ganged with the volume control R10.

Switch Table

| Switch | SW | MW | LW |
|--------|----|----|----|
| S1 | — | — | C |
| S2 | — | — | — |
| S3 | C | C | — |
| S4 | — | — | — |
| S5 | — | C | C |
| S6 | C | — | — |
| S7 | — | C | — |
| S8 | — | — | — |
| S9 | C | C | — |
| S10 | — | — | — |
| S11 | — | — | C |

Coils.—All the RF and oscillator coils L3-L10 are mounted in a separable unit at one end of the chassis, and can be detached from the chassis if the six wires connecting it to the chassis proper are unsoldered, and four fixing screws are removed. L1, L2 are mounted on the rear member, near the aerial socket.

Scale Lamps.—These are two Tre Vita MES types, with tubular bulbs, rated at 6 V, 0.15 A. They are shunted across resistance R17, which forms part of the K52H resistance tube.

K52H Tube.—This is a metal cased resistance tube, mounted on a universal octal valve base, a diagram of which, viewed from the free ends of the pins, is inset just above the heater chain in the circuit diagram. The whole unit operates as part of the heater circuit ballast resistance, the remainder being the line cord, and the scale lamps are shunted across part of it. This part (R17) is connected internally to pins 1, 8 and 7 of the base; the rest (R18) is connected between

pins 2 and 3. Pins 1 and 2 are unconnected in the tube, but are connected together on the socket. Pin 6 is blank.

R19.—This is the line cord, connected in series with the K52H tube. It drops half the applied mains voltage, and forms part of the heater circuit ballast. The resistance element is wound round the black insulated mains lead conductor, and is insulated by asbestos, which is also wound round the conductor, and is terminated at the receiver end of the mains lead by a blue lead which emerges from the mains lead.

C12, C16, C17, C18.—These are four dry electrolytics in a single cardboard tubular container. The red lead is the positive of C17 (10 μF), the yellow is the positive of C18 (8 μF), and the two green leads the positives of C12 and C16 (both 5 μF). C17 and C18 are rated at 250 V working, and their common negative lead is black; C12 and C16 are rated at 50 V working, and their common negative lead is brown.

A. and E. Sockets.—Our chassis was fitted with a panel on which these were mounted, each being identified by engraved lettering. The earth socket was, however, not connected to the circuit.

External Speaker.—Two sockets are provided at the rear of the chassis for a high impedance (4,000-5,000 Ω) external speaker, whose leads would be "live" to the mains. A low impedance type (4-8 Ω) could be connected to the speech coil tags on T1 secondary.

CIRCUIT ALIGNMENT

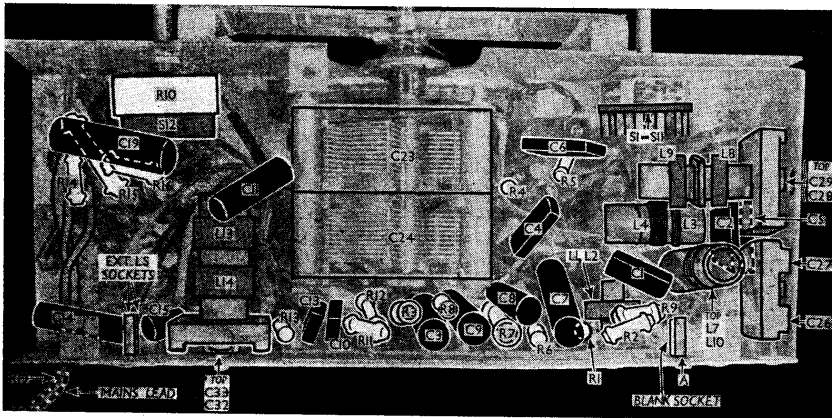
IF Stages.—Switch set to MW, turn the volume control to maximum, and the gang to minimum. Connect signal generator leads to control grid (top cap) of V2 and, via a 0.1 μF condenser, chassis. Feed in a 465 KC/S (645.16 m.) signal, and adjust C32 and C33 for maximum output. Transfer signal generator lead to control grid (top cap) of V1, and adjust C30 and C31 for maximum output.

RF and Oscillator Stages.—Transfer "live" signal generator lead to aerial socket, via a suitable dummy aerial. With the gang at either end of its travel, the pointer should be horizontal.

SW.—Switch set to SW, tune to 19 m. on scale, feed in a 19 m (15.8 MC/S) signal, and adjust C27 for maximum output, using the peak involving the lesser trimmer capacity. Tune to 20 m on scale, feed in a 20 m (15 MC/S) signal, and adjust C20 for maximum output. Check calibration at 50 m and 43 m (6 MC/S and 7 MC/S).

MW.—Switch set to MW, tune to 200 m on scale, feed in a 200 m (1,500 KC/S) signal, and adjust C25 for maximum output. Tune to 214 m on scale, feed in a 214 m (1,400 KC/S) signal, and adjust C21 for maximum output. Feed in 500 m (600 KC/S) signal, tune it in, and adjust C28 for maximum output, while rocking the gang for optimum results. Repeat until no further improvement results.

LW.—Switch set to LW, tune to 1,090 m on scale, feed in 1,090 m (275 KC/S) signal, and adjust C26, C22 for maximum output. Feed in a 1,710 m (175 KC/S) signal, tune it in, and adjust C29 for maximum output, while rocking the gang for optimum results.



Under-chassis view. R19 is the line cord, located in the mains lead.