

"TRADER" SERVICE SHEET

1147

COMPONENTS AND VALUES

| CAPACITORS |                             | Values  | Locations |
|------------|-----------------------------|---------|-----------|
| C1         | Aerial series ...           | 50pF    | H4        |
| C2         | L.W. aerial shunt... 800pF  | 800pF   | G4        |
| C3         | S.W. aerial trim... 20pF    | 20pF    | H4        |
| C4         | L.W. aerial trim... 60pF    | 60pF    | G4        |
| C5         | V1 C.G. ...                 | 50pF    | G4        |
| C6         | A.G.C. decoupling ...       | 0.1μF   | G4        |
| C7         | 1st I.F. trans. tuning ...  | 110pF   | C2        |
| C8         | ing ...                     | 110pF   | C2        |
| C9         | V1 cath. by-pass ...        | 0.05μF  | G3        |
| C10        | V1 osc. C.G. ...            | 45pF    | G4        |
| C11        | M.W. osc. tracker... 556pF  | 556pF   | G3        |
| C12        | L.W. osc. tracker... 390pF  | 390pF   | G3        |
| C13        | L.W. osc. trimmer 180pF     | 180pF   | G3        |
| C14        | H.T. decoupling ...         | 0.05μF  | G4        |
| C15        | A.G.C. decoupling ...       | 0.05μF  | G4        |
| C16        | V2 S.G. decoupling ...      | 0.05μF  | G4        |
| C17        | V2 anode decoupling ...     | 0.05μF  | F4        |
| C18        | 2nd I.F. trans. tuning ...  | 110pF   | B2        |
| C19        | ing ...                     | 110pF   | B2        |
| C20        | V2 cath. by-pass ...        | 0.05μF  | F4        |
| C21*       | V3 cath. by-pass ...        | 50μF    | F3        |
| C22        | I.F. by-pass ...            | 100pF   | F4        |
| C23        | A.F. coupling ...           | 0.01μF  | F3        |
| C24        | A.G.C. coupling ...         | 50pF    | F4        |
| C25        | Tone corrector ...          | 0.002μF | F4        |
| C26        | A.F. coupling ...           | 0.01μF  | F4        |
| C27        | Neg. feed-back ...          | 0.1μF   | F3        |
| C28        | Part tone control... 0.05μF | 0.05μF  | E4        |
| C29        | Part tone control... 0.05μF | 0.05μF  | E3        |
| C30        | Tone correctors ...         | 0.001μF | E4        |
| C31        | —                           | —       | —         |
| C32*       | H.T. smoothing ...          | 32μF    | C2        |
| C33*       | —                           | 16μF    | O2        |
| C34†       | Aerial tuning ...           | 528pF   | A2        |
| C35†       | Oscillator tuning ...       | 528pF   | A1        |
| C36†       | S.W. osc. trimmer... 40pF   | 40pF    | H3        |
| C37†       | M.W. osc. trimmer 40pF      | 40pF    | H3        |
| C38†       | L.W. osc. trimmer 40pF      | 40pF    | G3        |

# BUSH AC34

A.C. Transportable Superhet

EMPLOYING series-fed heaters and an A.C./D.C. range of valves, the Bush AC34 is a 3-band 4-valve (plus rectifier) A.C. transportable table receiver, designed to operate from A.C. mains of 100-120 V and 200-250 V, 40-100 c/s. The waveband ranges are 16-50 m, 182-560 m and 833-2,068 m.

Release date and original price: August, 1953, £19 12s 9d. Purchase tax extra.



## CIRCUIT DESCRIPTION

Aerial input via coupling coils L2, L3, L4 to single-tuned circuits L5, C34 (S.W.), L6, C34 (M.W.) and L7, C34 (L.W.), which precede triode hexode valve (V1, Mullard UCH42) operating as frequency changer. Reception from an internal frame aerial L1 is provided on M.W. and L.W., the winding being connected in series

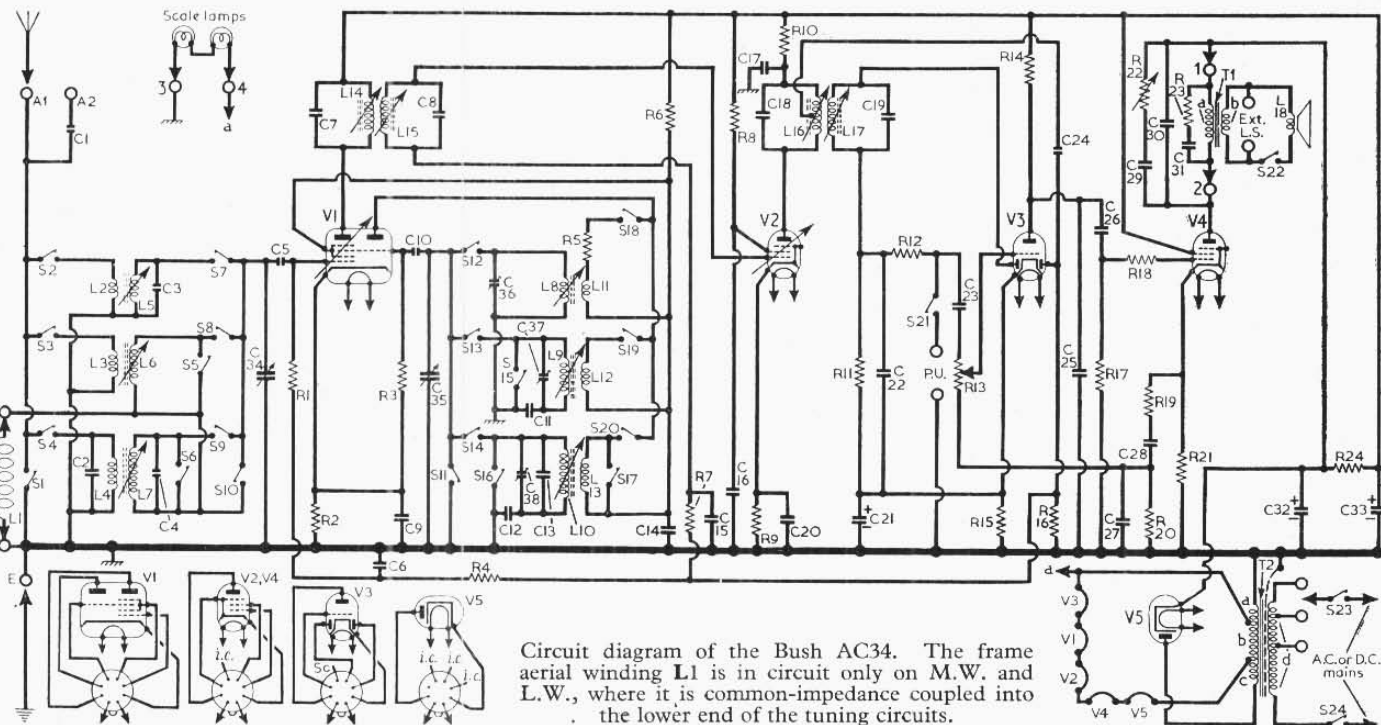
with the chassis end of the two tuning coils. Oscillator grid coils L8, L9 and L10 are tuned by C35. Parallel trimming by C36 (S.W.), C37 (M.W.) and C38 (L.W.); series tracking

(Continued col. 1 overleaf)

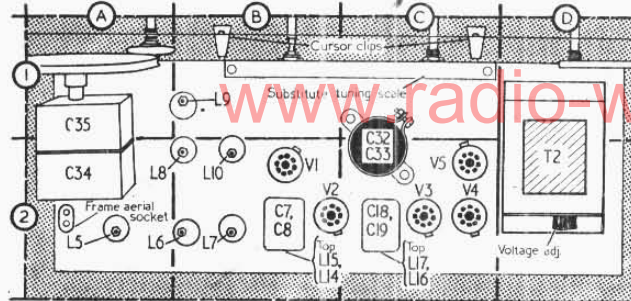
| RESISTORS |                         | Values | Locations |
|-----------|-------------------------|--------|-----------|
| R1        | V1 C.G. ...             | 470kΩ  | G4        |
| R2        | V1 G.B. ...             | 220Ω   | G4        |
| R3        | V1 osc. C.G. ...        | 47kΩ   | G4        |
| R4        | A.G.C. decoupling ...   | 1MΩ    | F4        |
| R5        | S.W. stabilizer ...     | 47Ω    | H4        |
| R6        | H.T. feed ...           | 15kΩ   | G4        |
| R7        | A.G.C. decoupling ...   | 2.2MΩ  | G4        |
| R8        | V2 S.G. decoupling ...  | 47kΩ   | F4        |
| R9        | V2 G.B. ...             | 330Ω   | F4        |
| R10       | V2 anode decoupling ... | 10kΩ   | F4        |
| R11       | Signal diode load ...   | 330kΩ  | F4        |
| R12       | I.F. stopper ...        | 100kΩ  | F3        |
| R13       | Volume control ...      | 2.2MΩ  | F3        |
| R14       | V3 triode load ...      | 150kΩ  | F4        |
| R15       | V3 G.B. ...             | 5.6kΩ  | F4        |
| R16       | A.G.C. diode load ...   | 1MΩ    | F4        |
| R17       | V4 C.G. ...             | 470kΩ  | F4        |
| R18       | V4 C.G. stopper ...     | 47kΩ   | F4        |
| R19       | —                       | 1kΩ    | F3        |
| R20       | Neg. feed-back ...      | 10kΩ   | E4        |
| R21       | V4 G.B. ...             | 220Ω   | E4        |
| R22       | Tone control ...        | 50kΩ   | E3        |
| R23       | Tone corrector ...      | 10kΩ   | —         |
| R24       | H.T. smoothing ...      | 10kΩ   | E4        |

| OTHER COMPONENTS |                               | Approx. Values (ohms) | Locations |
|------------------|-------------------------------|-----------------------|-----------|
| L1               | Frame aerial ...              | 0.5                   | —         |
| L2               | —                             | —                     | —         |
| L3               | Aerial coupling ...           | 0.6                   | H4        |
| L4               | coils ...                     | 32.0                  | G4        |
| L5               | —                             | —                     | H4        |
| L6               | Aerial tuning coils ...       | 4.0                   | H4        |
| L7               | —                             | 16.0                  | G4        |
| L8               | —                             | —                     | H3        |
| L9               | Oscillator tuning coils ...   | 3.2                   | H3        |
| L10              | —                             | 4.0                   | G3        |
| L11              | —                             | —                     | H3        |
| L12              | Oscillator reaction coils ... | 0.6                   | H3        |
| L13              | —                             | 1.5                   | G3        |
| L14              | 1st I.F. trans. { Pri. Sec. } | 12.5                  | O2        |
| L15              | —                             | 12.5                  | O2        |
| L16              | 2nd I.F. trans. { Pri. Sec. } | 12.5                  | B2        |
| L17              | —                             | 12.5                  | B2        |
| L18              | Speech coil ...               | 2.5                   | —         |
| T1               | O.P. trans { a b }            | 500.0                 | —         |
|                  | —                             | 0.5                   | —         |
|                  | —                             | 3.2                   | —         |
|                  | —                             | 45.2                  | —         |
|                  | —                             | 237.0                 | D2        |
|                  | —                             | 48.0                  | —         |
| S1-S21           | Waveband/gram sw.             | —                     | H4        |
| S22              | Speaker switch ...            | —                     | —         |
| S23              | —                             | —                     | —         |
| S24              | Mains sw., g'd R13 {          | —                     | F3        |

\* Electrolytic. † Variable. ‡ Pre-set.



Circuit diagram of the Bush AC34. The frame aerial winding L1 is in circuit only on M.W. and L.W., where it is common-impedance coupled into the lower end of the tuning circuits.



Plan view of chassis showing the position of the substitute tuning scale referred to in "Circuit Alignment."

**Circuit Description—continued**

by **C11** (M.W.) and **C12** (L.W.). Reaction coupling from anode by **L11**, **L12** and **L13**.  
 Second valve (**V2**, Mullard **UF41**) is a variable- $\mu$  R.F. pentode operating as intermediate frequency amplifier with tuned transformer couplings **C7**, **L14**, **L15**, **C8** and **C18**, **L16**, **L17**, **C19**.  
 Intermediate frequency 470 kc/s diode signal detector is part of double diode triode valve (**V3**, Mullard **UBC41**). Audio frequency component in its rectified output is developed across diode load resistor **R1**, and passed via **C23** and volume control **R13** to grid

**CIRCUIT ALIGNMENT**

**I.F. Stages.**—Switch receiver to medium waves and tune it to 300 m. Connect output of signal generator, via an 0.1  $\mu$ F capacitor in one lead, to control grid (pin 6) of **V2** and chassis, feed in a 470 kc/s (638.3 m) signal and adjust the cores of **L17** (location reference **C2**) and **L16** (**C2**) for maximum output. Transfer signal generator leads to control grid (pin 6) of **V1** and chassis, and, feeding in a 470 kc/s signal adjust the cores of **L15** (**B2**) and **L14** (**B2**) for maximum output. Repeat these adjustments until no further improvement results.

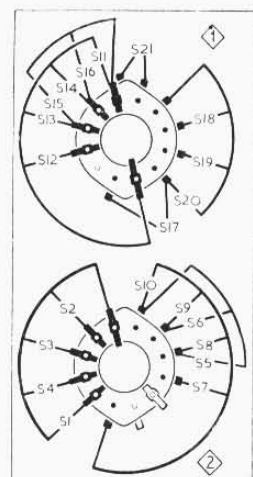
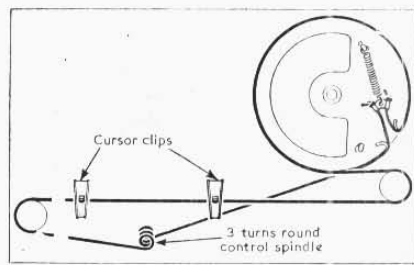
**R.F. and Oscillator Stages.**—In order that the receiver may be aligned with the chassis in its cabinet, three holes are provided in the cabinet base to give access to **C36**, **C37** and **C38**. If, however, the chassis is removed from its cabinet for alignment, the frame aerial should be disconnected and a shorting link placed across the frame aerial sockets. As the tuning scale is fixed to the cabinet, reference should be made in this case to the substitute tuning scale fixed along the front of the chassis deck. A temporary cursor, such as a paper clip, should be fixed to the tuning drive, and, with the gang at maximum, aligned with the datum line on the substitute tuning scale.

**L.W.**—Switch receiver to L.W. and connect signal generator output leads to **A** and **E** sockets. Tune receiver to 2,000 m, feed in a 2,000 m (150 kc/s) signal and adjust the cores of **L10** (**B2**) and **L7** (**B2**) for maximum output. Tune receiver to 1,000 m, feed in a 1,000 m (300 kc/s) signal and adjust **C38** (**G3**) for maximum output. Repeat these adjustments until no further improvement results.

**M.W.**—Switch receiver to M.W., tune to 500 m, feed in a 500 m (600 kc/s) signal and adjust the cores of **L9** (**B1**) and **L6** (**B2**) for maximum output. Tune receiver to 200 m, feed in a 200 m (1,500 kc/s) signal and adjust **C37** (**H3**) for maximum output. Repeat these adjustments until no further improvement results.

**S.W.**—Switch receiver to S.W., tune to 50 m, feed in a 50 m (6 Mc/s) signal and adjust the cores of **L8** (**B2**) and **L5** (**A2**) for maximum output. Tune receiver to 25 m, feed in a 25 m (12 Mc/s) signal and adjust **C36** (**H3**) for maximum output. Repeat these adjustments until no further improvement results.

**L.W. Check.**—If alignment has been carried out with the chassis out of its cabinet, the cores of **L7** and **L10** should be re-adjusted for maximum output at 2,000 m (150 kc/s) after the chassis has been replaced in its cabinet and the frame aerial re-connected.



Above: Sketch of the tuning drive cord system as seen from the front of an upright chassis.

Left: Diagram of the waveband switch units, which are drawn as seen in the directions indicated by the arrows in the under-chassis illustration.

of triode section. I.F. filtering by **C22**, **R12** and the capacitance of the screened leads.  
 Second diode of **V3** is fed from **V2** anode via **C24**, and the resulting D.C. potential developed across load resistor **R16** is fed back as bias to **V1** and **V2**, giving A.G.C.  
 Resistance-capacitance coupling by **R14**, **C26** and **R17** between **V3** triode anode and pentode output valve (**V4**, Mullard **UL41**). Tone correction in anode circuit by **C30**, **C31** and **R23**. Variable tone control by **R22**, **C29**. Negative feed-back tone correction between **V4** cathode circuit and **V3** grid circuit via **R19**, **C28**, **R20**, **C27**.  
 H.T. current is supplied by I.H.C. half-wave rectifying valve (**V5**, Mullard **UY41**). H.T. smoothing by **R24** and electrolytic capacitors **C32**, **C33**. Valve heaters are connected in series across section **b** of the mains transformer secondary winding, which is isolated from the mains.

**Switches.**—**S1-S21** are the waveband and radio/gram changeover switches, ganged in two rotary units beneath the chassis. These units are indicated in our underside illustration of the chassis and shown in detail in the switch diagram in column 4 where they are drawn as seen in the direction of the indicating arrows in the chassis view. In the associated switch table, a dash indicates open, and **c**, closed.  
**S22** is the internal speaker muting switch and is mounted, together with the external speaker sockets, in the top rear corner of the cabinet.

| Switches | S.W.     | M.W.     | L.W.     | Gram     |
|----------|----------|----------|----------|----------|
| S1       | —        | —        | —        | <b>c</b> |
| S2       | <b>c</b> | —        | —        | —        |
| S3       | —        | <b>c</b> | —        | —        |
| S4       | —        | —        | <b>c</b> | —        |
| S5       | <b>c</b> | —        | —        | —        |
| S6       | <b>c</b> | <b>c</b> | —        | —        |
| S7       | <b>c</b> | —        | —        | —        |
| S8       | —        | —        | —        | —        |
| S9       | —        | —        | <b>c</b> | —        |
| S10      | —        | —        | —        | <b>c</b> |
| S11      | —        | —        | —        | <b>c</b> |
| S12      | <b>c</b> | —        | —        | —        |
| S13      | —        | <b>c</b> | —        | —        |
| S14      | —        | —        | <b>c</b> | —        |
| S15      | <b>c</b> | —        | —        | —        |
| S16      | <b>c</b> | <b>c</b> | —        | —        |
| S17      | —        | <b>c</b> | —        | —        |
| S18      | <b>c</b> | —        | —        | —        |
| S19      | —        | <b>c</b> | —        | —        |
| S20      | —        | —        | <b>c</b> | —        |
| S21      | —        | —        | —        | <b>c</b> |

**Scale Lamps.**—These are 6.2 V, 0.3 A, lamps with large clear spherical bulbs and M.E.S. bases.

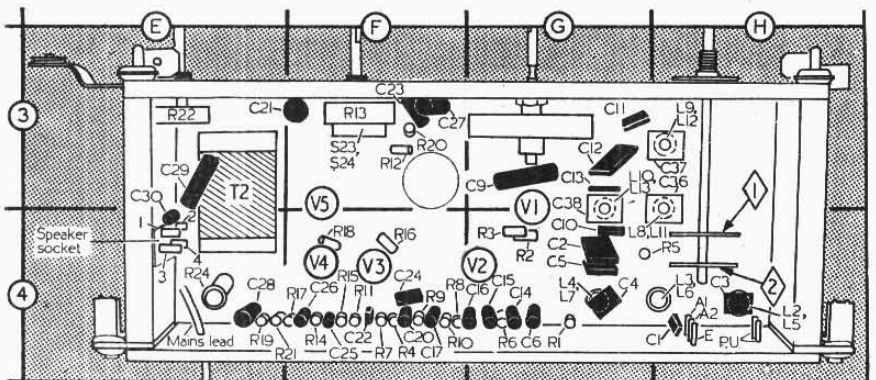
**Drive Cord Replacement.**—About 4ft 6in of nylon braided glass yarn is required for a new drive cord which should be run as shown in the sketch of the drive cord system, starting with the gang at maximum capacitance and running the cord off clockwise round the drum.

**VALVE ANALYSIS**

Valve voltages and currents given in the table below are those derived from the manufacturer's information. They were measured on a receiver which was operated from A.C. mains of 230 V and tuned to the highest wavelength end of M.W. There was no signal input.  
 Voltages were measured on the 10 V and 1,000 V ranges of a Model 7 Avometer, chassis being the negative connection in every case.

| Valve    | Anode     |      | Screen |     | Cath.  |
|----------|-----------|------|--------|-----|--------|
|          | V         | mA   | V      | mA  | V      |
| V1 UCH42 | 120       | 3.0  | 60     | 1.5 | 1.2    |
| V2 UF41  | Oscil'tor |      | —      | —   | —      |
|          | 60        | 1.5  | —      | —   | —      |
| V3 UBC41 | 84        | 3.5  | 62     | 1.5 | 1.5    |
| V4 UL41  | 60        | 0.2  | —      | —   | 0.8    |
| V5 UY41  | 264       | 31.0 | 120    | 4.0 | 8.0    |
|          | 263*      | —    | —      | —   | 282.0† |

\* A.C. reading. † Cathode current 46 mA.



Underside view of chassis. The speaker socket in E4 also connects up with the scale lamps.