*Supplement to Wireless & Electrical Trader, 8 April 1961*

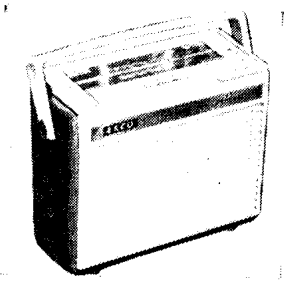


"TRADER" SERVICE SHEET

1493

# EKCO BPT351

## 2-Band Portable Receiver



*Appearance of the Ekco BPT351.*

DOUBLE-ENDED push-pull output is provided in the Ekco BPT351, a 6-transistor 2-band portable receiver with a self-contained ferrite rod aerial. A socket is provided in the base of the carrying case for a car radio aerial, and the scale is calibrated in both directions so that it can still be read when the receiver is lying down in the glove box. Waveband ranges are 185-555.5m (1,625-540kc/s) and 1,200-2,000m (250-150kc/s).

*Release date and original price: August* 1959, £15 10*s*. *Purchase tax extra.*

### TRANSISTOR ANALYSIS

Transistor voltages and currents given in the table below are those derived from the makers' service manual. They were measured while the receiver was tuned to about 200kc/s (1,500m) with the volume control at minimum, but with no signal input. Voltages were measured with a 20,000 ohms-per-volt meter whose positive lead was connected to chassis. Total current consumption is given as 14mA in the quiescent condition and 80mA at full output, which is quoted as 350mW at 10 per cent. distortion.

**Transistor Table**

| Transistor | Collector | | Emitter | | Base |
|---|---|---|---|---|---|
| | V | mA | V | mA | V |
| TR1 OC44 | 7·2 | — | 1·4 | 0·36 | 1·35 |
| TR2 OC45 | 7·1 | — | 0·6 | 0·88 | 0·7 |
| TR3 OC45 | 7·1 | — | 0·9 | 0·9 | 1·05 |
| TR4 OC78D | 8·6 | — | 1·45 | 2·6 | 1·6 |
| TR5 OC78 | 8·9 | 2·3 | — | — | 0·2 |
| TR6 OC78 | 8·9 | 2·3 | — | — | 0·2 |

### CIRCUIT DESCRIPTION

Tuned ferrite rod aerial comprising coils **L1** (M.W.) and **L3** (L.W.) with gang section **C4** is coupled by low impedance coils **L2** and **L4** to the base of the first transistor **TR1,** which operates as self-oscillating mixer and frequency changer. Oscillator coupling between collector and emitter is provided by **L5** and **L6,** while **L7** is tuned over the M.W. band by **C10,** and over the L.W. band by the addition of **C12, C13** which are shunted across it via **S5.** A socket is provided for the connection of a car radio aerial.

Signals in the collector circuit at intermediate frequency are tuned by I.F. transformer **L8, L9** and passed on to the base circuit of **TR2,** which operates as I.F. amplifier. **TR3** provides a second stage of I.F. amplification, with input and output couplings by single-tuned transformers **L10, L11** and **L12, L13.** Feedback couplings **C23, R11, C17, R10** neutralize transistor internal capacitances.

**Intermediate frequency 470kc/s.**

A.F. output from crystal diode second detector **X1** is developed across volume control **VR1,** which acts as load resistor, and is passed via electrolytic capacitor **C25** to the base of **TR4,** a special A.F. transistor which acts as driver to the double-ended push-pull

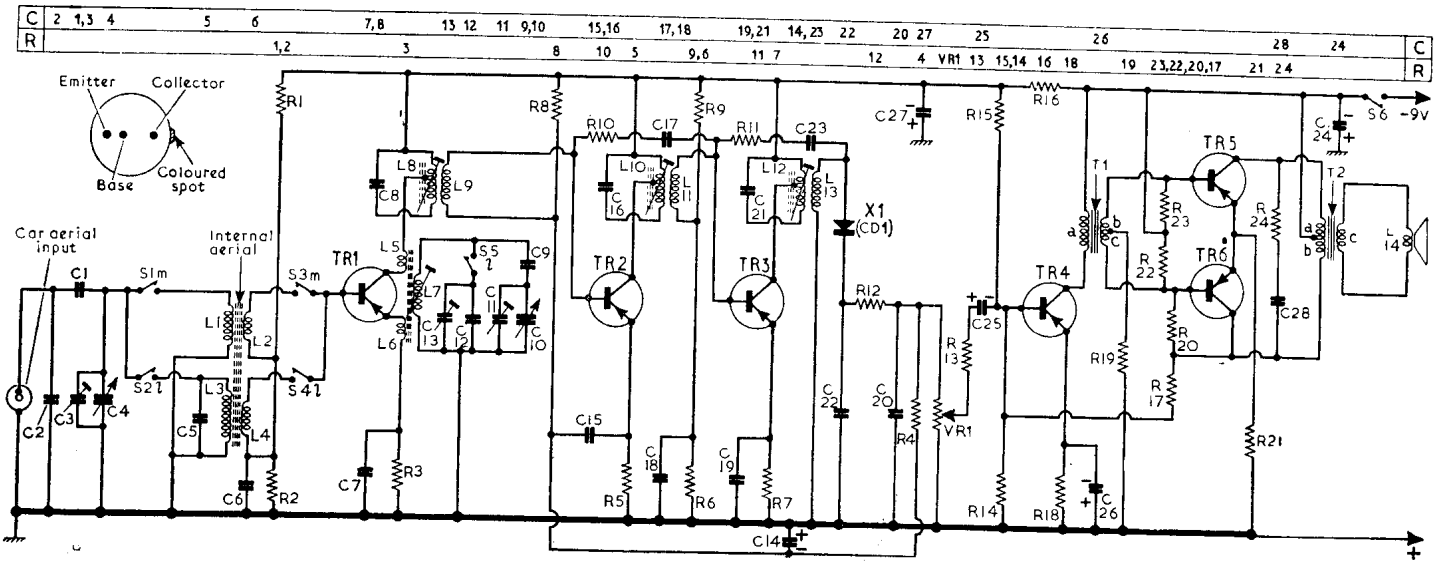
(*Continued overleaf, col.* 1)

### COMPONENT VALUES AND LOCATIONS

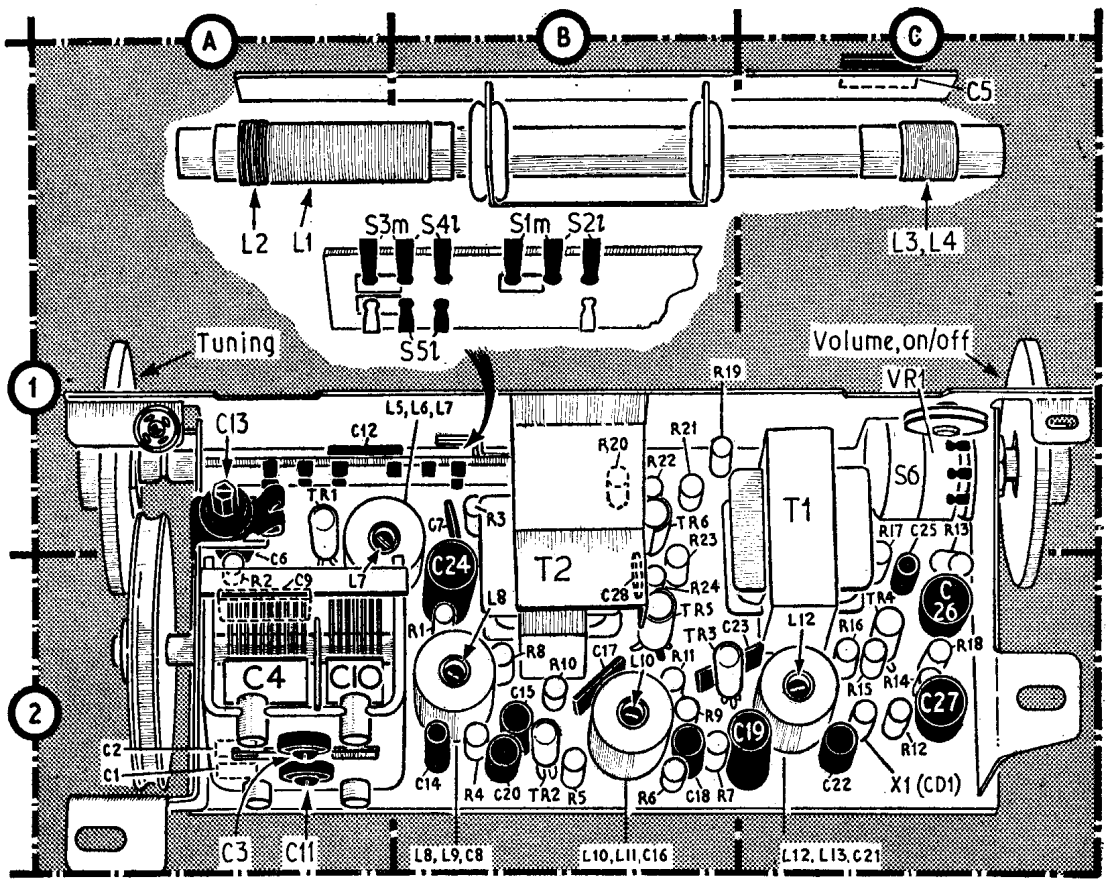
| | | |
|---|---|---|
| ***Capacitors*** | | |
| C1 | 3pF | A2 |
| C2 | 12pF | A2 |
| C3 | 25pF | A2 |
| C4 | — | A2 |
| C5 | 82pF | C1 |
| C6 | 0·04μF | A2 |
| C7 | 0·01μF | B1 |
| C8 | 250pF | B2 |
| C9 | 286pF | A2 |
| C10 | — | A2 |
| C11 | 25pF | A2 |
| C12 | 230pF | A1 |
| C13 | 30pF | A1 |
| C14 | 8μF | B2 |
| C15 | 0·04μF | B2 |
| C16 | 250pF | B2 |
| C17 | 56pF | B2 |
| C18 | 0·04μF | B2 |
| C19 | 0·1μF | C2 |
| C20 | 0·04μF | B2 |
| C21 | 250pF | C2 |
| C22 | 0·04μF | C2 |
| C23 | 18pF | C2 |
| C24 | 100μF | B2 |
| C25 | 8μF | C2 |
| C26 | 100μF | C2 |
| C27 | 100μF | C2 |
| C28 | 0·01μF | B2 |

| | | |
|---|---|---|
| ***Coils**** | | |
| L1 | 1·4 | A1 |
| L2 | — | A1 |
| L3 | 10·6 | C1 |
| L4 | — | C1 |
| L5 | — | A1 |
| L6 | — | A1 |
| L7 | — | A1 |
| L8 | — | B2 |
| L9 | — | B2 |
| L10 | — | B2 |
| L11 | — | B2 |
| L12 | — | C2 |
| L13 | — | C2 |
| L14 | — | — |
| ***Resistors*** | | |
| R1 | 56kΩ | B2 |
| R2 | 10kΩ | A2 |
| R3 | 3·9kΩ | B1 |
| R4 | 8·2kΩ | B2 |
| R5 | 680Ω | B2 |
| R6 | 4·7kΩ | B2 |
| R7 | 1kΩ | B2 |
| R8 | 68kΩ | B2 |
| R9 | 22kΩ | B2 |
| R10 | 1·2kΩ | B2 |
| R11 | 3·9kΩ | B2 |
| R12 | 470Ω | C2 |
| R13 | 2·2kΩ | C2 |
| R14 | 12kΩ | C2 |
| R15 | 39kΩ | C2 |
| R16 | 680Ω | C2 |
| R17 | 1MΩ | C2 |
| R18 | 560Ω | C2 |
| R19 | 22Ω | B1 |
| R20 | 15kΩ | B1 |
| R21 | 4·7Ω | B1 |
| R22 | 15kΩ | B1 |
| R23 | 7·5kΩ | B2 |
| R24 | 150Ω | B2 |
| VR1 | 5kΩ | C1 |
| ***Miscellaneous**** | | |
| T1 a | 150·0 | C1 |
| T1 b+c | 150·0 | C1 |
| T2 a+b | 5·2 | B2 |
| T2 c | 0·2 | B2 |
| X1(CD1) | OA70 | C2 |
| S1-S5 | — | A1 |
| S6 | — | C1 |

*Approximate D.C. resistance in ohms.




*Circuit diagram of the Ekco BPT351. The manufacturers' component numbers are printed on the printed circuit panel and have therefore been used in this diagram. A key is provided. The letter "m" or "l" added to a switch number shows whether it closes on M.W. (m) or L.W. (l).*




*Rear view of the chassis showing the component side of the printed circuit panel. The aerial is drawn out of position to give a clear view of the components; it is mounted over* **T2.** *A diagram of the switch unit is inset, drawn as seen from below.*

**Circuit Description**—*continued*

output stage comprising transistors **TR5, TR6.**

Base bias throughout is taken from potential dividers connected across the battery supply lines, and emitter bias resistors provide an opposing bias should the emitter current rise with temperature. **TR2** base bias potentiometer includes the volume control, across which the detector output is developed, and as the positive-going D.C. potential from the rectified output rises with increased signal strength, **TR2** base bias becomes more positive, giving automatic gain control.

## CIRCUIT ALIGNMENT

**I.F. Stages.**—Connect a 0-100 mW output meter across the secondary winding of **T2,** using a 3Ω load if the speech coil is disconnected. Connect the signal generator, via a 0.1μF capacitor in each lead, across the M.W. secondary aerial coil **L2.** Switch set to M.W. and tune to a quiet position near 700kc/s.

Feed in a 30 per cent modulated 470kc/s signal, and adjust **L12, L10** and **L8** (location references B2 and C2) for maximum output, reducing the signal generator output as the circuits come into line to avoid A.G.C. action. At no time should the output be allowed to exceed 50mW. Repeat these adjustments until no improvement can be obtained.

**R.F. Stages.**—A coupling loop is required between the signal generator and the ferrite rod aerial for these adjustments, and it may be made up by winding 20 turns of 20 S.W.G. enamelled copper wire on an air-cored former, the turns being equally spaced to occupy a length of 2⅜in. The inductance should be about 40μH.

Transfer the signal generator leads from **L2** to the ends of the loop, discarding the isolating capacitors, and place the loop about 12in. from, and on the same axis as, the ferrite rod.

**M.W.**—Check that with the gang at maximum capacitance the cursor coincides with the datum marks at the high wavelength end of the scale. Feed into the loop a 600kc/s signal, tune to 500m on scale, and adjust the core of **L1** (but only if it has been disturbed or a new aerial fitted) by sliding it along the ferrite rod. Feed in a 1,500kc/s signal, tune to 200m on scale, and adjust **C11** and **C3** (A2) for maximum output, rocking the gang for optimum results to avoid "pulling."

**L.W.**—Again the L.W. aerial coil should not be adjusted unless it has been disturbed. If it has, feed in a 214kc/s signal, tune to 1,400m on scale, and adjust **C13** and (if necessary) **L3** for maximum output. If the aerial coils are in their correct positions, calibration should hold over the M.W. and L.W. bands. If the coils are adjusted they should be sealed in their new positions by a spot of cement.

## GENERAL NOTES

**Switches.—S1** to **S5** are the waveband switches, ganged in a slide-type unit on the chassis deck. Their position is indicated in our chassis illustration in location reference A1, and a sketch above the chassis outline identifies the switch contacts. Suffix letters "m" and "l" here and in the circuit diagram indicate that the switch in question closes on medium or long wave respectively.

**Diode XI.**—This is a Mullard OA70 germanium crystal diode detector. On the printed circuit panel its position, like that of each other component, is indicated by its circuit number, but the makers use the reference CD1 for it, and that is the marking that will be found on the panel. In our chassis illustration we show it in location reference C2 as **X1 (CD1).**

**Drive Cord Replacement.**—About 3ft of nylon braided glass yarn is required for a new drive cord. Start with the gang at maximum capacitance, bringing the cord out from the tension spring and making a half-turn clockwise round the drive drum. Then follow the path taken in the sketch below, which is drawn as seen when viewed from the tuning drive end of the chassis.

**Battery.**—The makers recommend the use of a 9V transistor batery, Ever Ready PP9 or equivalent.

**Transistor Notes.**—The usual warnings concerning the possibility of damage to the transistors during service work are repeated by the makers. Always use a heat sink when soldering transistor leads, and never let them bend near the seal from which they emerge. Do not break a transistor circuit for the insertion of a meter while the battery is connected. Do not make continuity tests with transistors in circuit, and do not reverse the polarity of the receiver battery. When mains-connected equipment is used with a transistor set, connect it via capacitors, not directly.

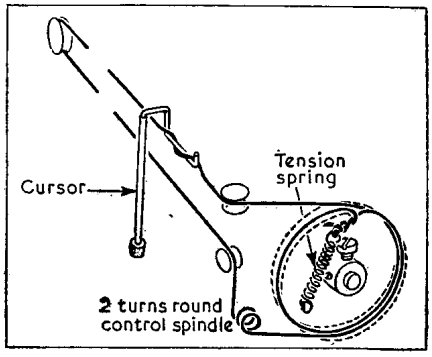



*Diagram of the tuning drive system drawn as seen from the front right-hand corner of the chassis.*

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