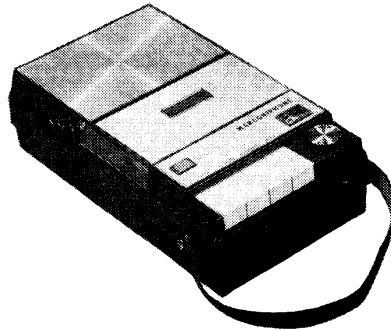


# ERT SERVICE CHART 1800



## MARCONIPHONE 4240

### Cassette tape recorder

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**COMPACT**, portable, twin-track cassette tape recorder Marconiphone 4240 incorporates six transistors and a diode in the amplifier, and two transistors and two diodes in a motor control circuit.

The volume/record level control is rotary, all others are push button.

**Batteries.** 7.5V. Five HP11 cells or equivalent.

**Consumption.** Approximately 100mA.

**Transistors.** TR1 AF pre-amplifier AF15, TR2 AF amplifier AF2 (BC109), TR3 AF amplifier AF2 (BC109), TR4 record level DC amplifier and output driver AF6 (BC107), TR5 OP21B (AC176) and TR6 OP2A (AC128) complementary push-pull output and bias oscillator, TR7 and TR8 part of motor control circuit, types not specified.

**Diodes.** W1 output stage stabilising D3 (AA120) W2 and W3 motor governor temperature compensation, not specified.

**Tracks.** Two.

**Frequency response.** 120Hz—8kHz  $\pm 3$ dB.

**Signal/noise ratio,** 36dB unweighted.

**Wow and flutter.** Better than 0.5 per cent RMS.

**Cassette.** C60, C90 or C120 compact cassette.

**Output.** 320mW.

**Speaker.** Impedance 8ohm.

**Bias frequency.** 34kHz.

**Erase.** AC. Better than 70dB.

**Level meter.** MC meter—also battery condition indicator.

**Deck.** Thorn DE21.

**Rewind time.** 2 minutes—C60 cassette.

**Microphone.** 400ohm.

**Inputs.** Five pin DIN, skt 2: 0.15mV into 2Kohm suitable for microphone or radio, pins 1-4 and 2; 165mV into 2M2ohm suitable for crystal pick-ups, pins 3-5 and

2. Skt 1—six pin: 0.15mV into 2Kohm for microphone or radio, pin 2 and pin 6.

**Outlets.** Skt 2: 500mV at 3K3ohm to external amplifier or radio pin 3-5 and 2. Skt 1: 500mV at 3K3ohm to external amplifier or radio, pin 4 and pin 6; remote control pin 3 and pin 5; external power supply—7.5V—pin 1 positive, pin 3 negative.

**Dimensions.**  $9\frac{1}{2} \times 7 \times 2\frac{3}{4}$ in.

**Price.** £26.50

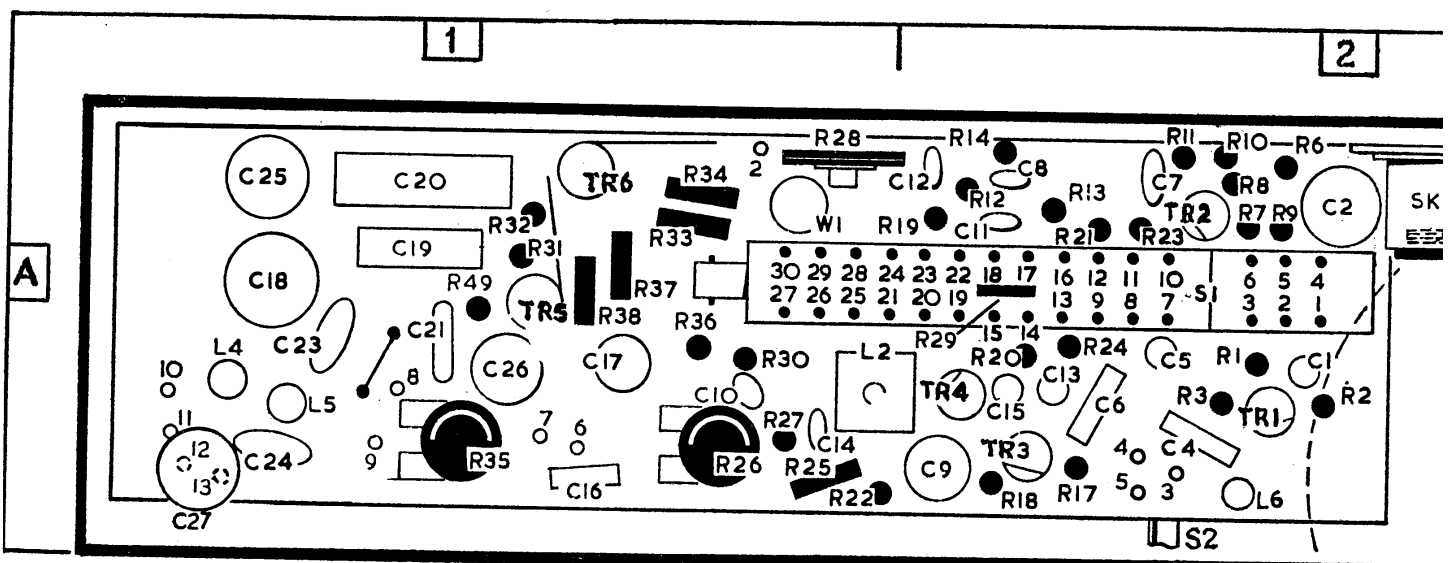
**Manufacturer.** British Radio Corporation Ltd.

**Service department.** London: PO Box No. 121, Lea Valley Trading Estate, Angel Road, Edmonton, London, N18 3BP. Tel: 01-807 3060. Spare parts Tel: 01-807 0791. Answering service: 01-807 6332. Manchester: Thorn House, Derby Street, Cheetham, Manchester 8. Tel: 061-832 2499. Glasgow: 155 Shieldhall Road, Glasgow, SW1. Tel: 041-882 4512.

#### DISMANTLING

Remove battery and detach back cover (two screws).

Detach handle and remove slotted stud on each side of case.



Pull off volume control knob and felt washer, then unscrew and remove two screws—located in the battery compartment—securing chassis to case.

When separating the chassis from the case, push back the record button latch—located on the rear left-hand corner of the cassette compartment—to prevent it fouling.

When reassembling the printed panel on to the tape deck assembly, ensure that the slide switch locates correctly in the fork of the switch operating lever and ensure that insulating washers are refitted to the printed panel fixing screws.

Before refitting the top cover, check that the meter and record button are correctly positioned. Slide the record button interlock bracket towards the loudspeaker to allow it to fit into the slot provided at the top of the cassette compartment.

### CIRCUIT DESCRIPTIONS

**Record.** An input signal fed in via either Skt 1 or Skt 2 is routed via S1 contacts 2 and 3 and DC blocking capacitor C1 to base of pre-amplifier TR1. The output developed across R3—part collector load—is fed via C4, R5—level control in this instance—C5 and R7 to first AF amplifier TR2.

After further amplification by TR3 the signal is proportionately split. The main signal path being via S1 contacts 17 and 18 to record head L1 via R20—constant current feed—and bias rejector L2/C14.

Equalisation of the recording characteristic is carried out in a parallel T feedback network C8, R12, C11 and R14, C12, R19.

Bias and erase current is derived via the push-pull oscillator stage TR5/TR6 which incorporates the erase head L3 and C19, C20 and C21 is the frequency maintaining circuit. Tank drive and feedback taps are formed by C20 and C19/C20, respectively.

A proportion of the signal at TR3 collector is rectified and amplified by TR4 and fed to M1, record level meter. Sensitivity can be adjusted by R28—sensitivity control.

**Playback.** When switched to playback the signal developed across play head, L1, is fed via S1 contacts 4/5 and 1/2 and is then amplified by TR1, TR2 and TR3 as for record. Negative feedback from TR3 collector via S1, contacts 16 and 17, R13 and C7 to TR2 emitter provides for the equalisation of the replay characteristic.

The main signal path from TR3 collector

is via TR4, operating as driver when in this mode, its output being fed to the now complementary push-pull audio output stage TR5 and TR6.

**Motor control circuit.** Within the limits of the system the motor control unit is designed to maintain motor speed constant irrespective of changes in battery voltage, load and ambient temperature.

Under normal operating conditions the effective forward resistance of TR7 is low compared with R40.

Bias, provided by TR8 collector current, is set for conduction so that the appropriate EMF is applied to the motor. At the same time temperature compensation diodes, W2 and W3, from the manner of their connection are forward biased to the constant voltage portion of their characteristics.

If the supply voltage falls, the change is transferred direct to the emitter of TR8. A smaller fall, defined by potentiometer R41, R42, R43, R44 and R47 is applied to the base of TR8. This results in a net increase in forward bias. The collector current of TR8 rises, driving TR7 on harder, thereby reducing the effective series resistance and offsetting the reduction in supply voltage.

The magnitude of the motor armature current is directly related to the load imposed on the motor. Because of this relationship, as the load varies the PD across the motor resistance—sum of the winding resistance and the electrical equivalent of the friction loss—also varies proportionately. If the EMF applied to the motor can be altered to offset this change in PD the speed will remain constant.

With increasing load and motor current the PD across R45/R46 increases. This change is applied to the base/emitter diode of TR8 via the base potentiometer network R41-R44, R47 and W2, W3, causing a net increase in the forward bias and a corresponding increase in collector current which drives TR7 on harder. This increases the voltage applied to the motor by an amount just sufficient to offset the increased voltage drop in the system.

In order to initiate conduction in TR7 and TR8 at switch on, a by-pass resistor, R48, is included in the design so that TR7 and TR8 are forward biased. Without this initial forward bias the transistors will remain permanently cut-off.

Capacitor C22 and resistor R39 maintain the mean value of base bias to TR7, the

time constant is such as to allow the base voltage to fluctuate about this mean, thereby enabling TR7 to respond to rapid variations of collector current.

### SERVICE NOTES

Volts indicated on the circuit diagram were measured with a 20,000ohm/V meter and are all positive with respect to chassis. When switched to record the potential—measured with an electronic voltmeter—across the erase head, L3, should be 20V AC.

**Meter sensitivity (R28).** This adjustment will normally be required only if any of the following components have been replaced:

M1, R24, R25, R26, R28, C15 or TR4. To adjust, switch to record and feed in a 1kHz signal. Adjust level control to produce an output of 100mV at junction C13/R24. Adjust R28 so that the meter indicates peak recording level.

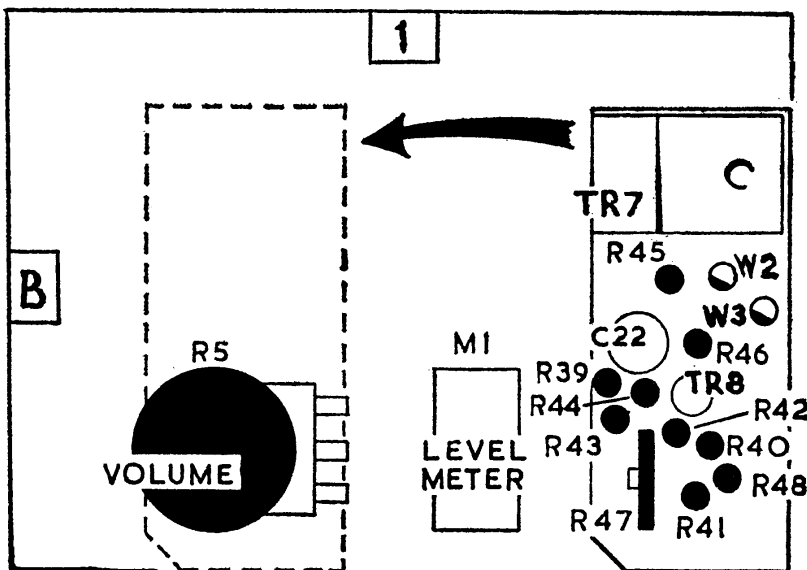
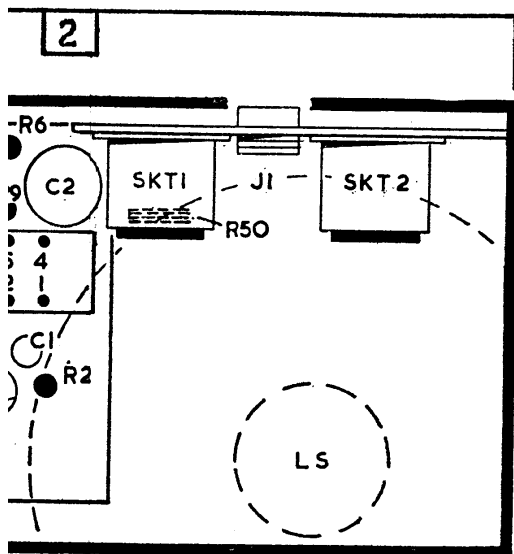
**Output balance control (R26).** Connect an oscilloscope between earphone socket J1a and chassis. Switch to playback and feed in a 1kHz signal between junction S1/C1 and chassis. Rotate volume control to maximum and increase input signal amplitude until clipping of output waveform occurs. Adjust R26 for symmetrical clipping at positive and negative peaks.

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**Bias filter coil L2.** This adjustment is accessible through a hole in the tape deck chassis and must be carried out with printed panel in situ.

To adjust L2 switch to record, turn level control to maximum then adjust core of L2 to give maximum voltage reading at junction of C13/R24 with no input signal.

**Bias control R35.** To adjust R35 feed in a constant level signal of 10mV-15dB below 1kHz peak recording level—into the radio input socket via a 1M5ohm resistor. Rotate level control to maximum and R35

to centre of its travel. Make recordings at 1kHz and 8kHz.

Play back and measure the output level at the radio output socket with an electronic voltmeter. The output at 8kHz should be within the range 0 to -3dB with reference to the 1kHz level.

If the 8kHz output is too high increase the bias; if too low, reduce the bias setting. Repeat the record/playback check and, if necessary, repeat the entire procedure to obtain correct response.

If it is found necessary to reduce the bias level to the point where the 1kHz

output falls significantly it must be assumed that a fault exists which affects the frequency response of the amplifier. This must be corrected before completing the adjustment of R35.

**Motor speed R47.** With new batteries fitted the speed control R47 is set to give correct frequency playback of a tape pre-recorded with a known signal. Alternatively, the speed may be checked by timing the replay of a known length of tape and readjusting R47 until the correct result is obtained.

RESISTO
R1
R2
R3
R6
R7
R8
R9
R10
R11
R12
R13
R14
R17
R18
R19

R	35	1	50	2	3	5	6	7	9	8	10	12	13	14	17	18	19	22	20	21
C	21	20	16	1	2	4	5				8	6	7	9	11	12	13	14		
L	1	3			6															2

