

100-kHz OSCILLATOR OS2/37

### Introduction

The OS2/37 is designed to produce 100 kHz at  $10 \pm 0.3$  volts in a load of not less than 2.2 kilohms. It was first used to generate bias in the RD4/4 magnetic recorder, and particular care has been taken to ensure a low harmonic content in the output, which feeds the RD4/4 erase and record heads through power amplifiers. There are no controls.

### Mechanical Details

All components, including the transformers, are mounted on a printed wiring board of standard ISEP size (7 in by 4.4 in) fitted with a 25-way plug for use in a standard ISEP nest. A screening plate is fitted on spacers to the copper side of the card. Coding pin positions are 3, 9 and 17.

### General Specification

Supply	+24 volts 38.5 mA.
Frequency	100 kHz $\pm 10$ Hz.
Output	$10 \pm 0.3$ volts into a minimum resistive load of 2.2 kilohms.
Harmonic Content	Less than 0.01% (mostly second harmonic)

### Circuit Description

The circuit of the oscillator is shown in Fig. 1, which has been annotated to describe the functions of the different parts. The main objective of the design has been to reduce even-order harmonics as far as possible, to avoid endangering the recorded noise level by an asymmetrical bias waveform. The three techniques adopted to achieve this end are class-A operation, a push-pull configuration and a tuned tank circuit.

### Maintenance Tests

#### Test Apparatus Required

- 24-volt power supplier
- A.C. voltmeter with input impedance greater than 1 megohm
- Oscilloscope
- Digital frequency meter
- Avometer Model 9
- 5-kilohm carbon-track potentiometer
- 2.2-kilohm Erie Type-N6 resistor

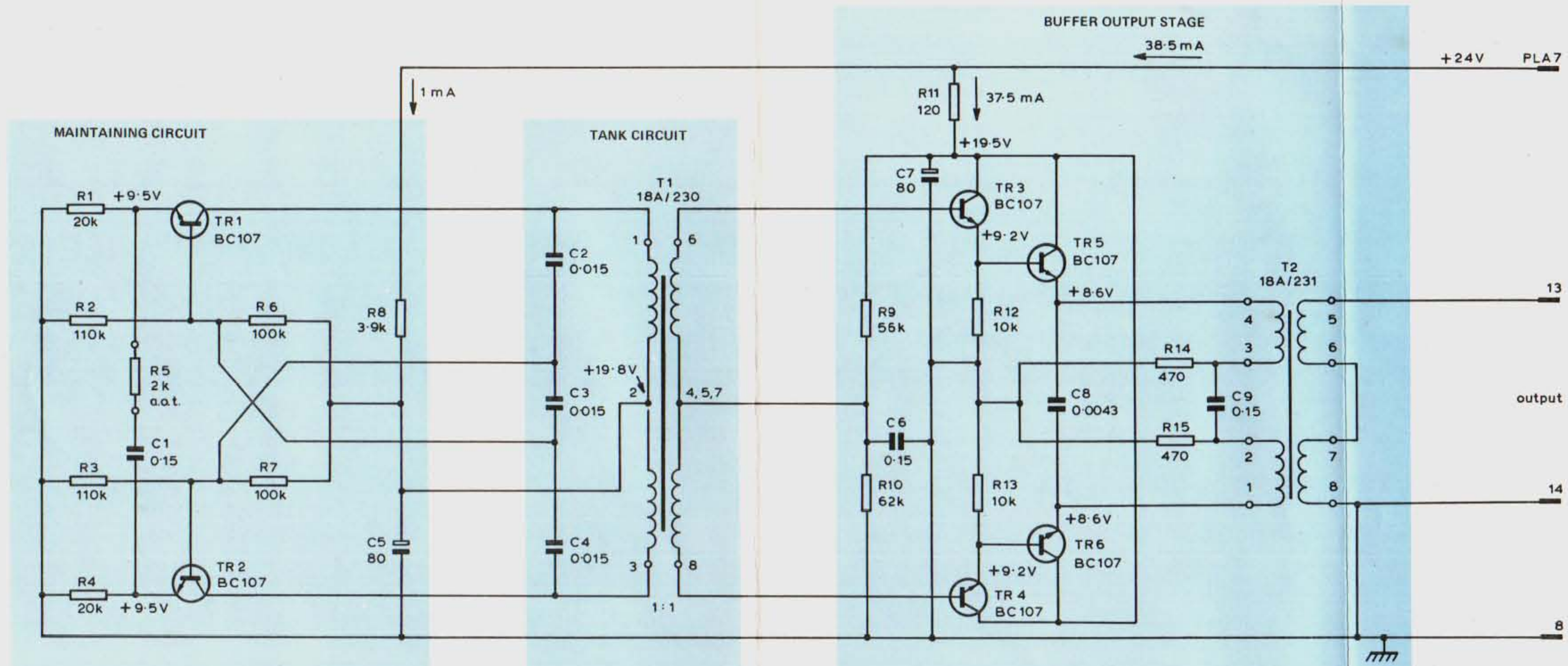
### D.C. Conditions

The following are typical voltage and current values measured with the 30-volt and 100-mA ranges of the Avometer Model 9 and with no resistor connected across the tags provided for R5. Oscillation does not take place in this condition.

Supply voltage	+24 volts
Total current	38.5 mA
TR1 & TR2 emitters	+9.5 volts
Junction R8/C5	+19.5 volts
TR3 & TR4 emitters	+9.2 volts
TR5 & TR6 emitters	+8.6 volts
Junction R11/C7	+19.5

### Adjustment of Output

1. Connect a 2.2-kilohm  $\pm 2$  per cent resistor across output tags PLA13/14. Connect the measuring equipment (a.c. voltmeter, oscilloscope or digital frequency meter as required) across the resistor. If the capacitance of the leads of the measuring instrument affects the output, split the 2.2-kilohm load into two 1.1-kilohm resistors and measure across the earthy one.
2. Connect a 5-kilohm carbon-track potentiometer to the pins provided for R5, with very short leads. Adjust to give an output of  $10 \pm 0.3$  volts across the 2.2-kilohm resistor.
3. Adjust the core of T1 to give a frequency of 100 kHz  $\pm 10$  Hz. Re-check the output voltage as above. It should not be necessary to adjust the core of T2 as this will have been done during the tests on this component.
4. Replace the 5-kilohm potentiometer with a fixed resistor of value close enough to that of the adjusted potentiometer to maintain an output of  $10 \pm 0.3$  volts.
5. The waveform displayed on the oscilloscope should appear perfectly sinusoidal. The unit should give less than 0.01 per cent second harmonic distortion, but a wave analyser would be necessary for the measurement of such a low value. However, if the distortion is greater than this and cannot be detected by visual examination, it will be detected in the recording process.
6. Note that the voltages shown under the heading D.C. Conditions should not change significantly when the unit is oscillating.



Operates in class-A push-pull to ensure low even-order harmonic distortion. Resistors R6, R2 and R7, R3 provide base bias for class-A working and ensure that d.c. emitter current does not change significantly whether unit is oscillating or not. This circuit is a modified long-tailed-pair amplifier (note that if R5 were zero, TR1 and TR2 would have a common emitter resistance of 10 kilohms), in which negative feedback can be increased by increasing the value of R5. The correct output voltage is set by adjusting R5 as described in the text.

High-Q primary winding with high degree of symmetry to help in the separation between fundamental and second harmonic frequencies. Tuning capacitance in sections enables correct amount of positive feedback to be applied to TR1 and TR2 bases.

Push-pull class-A Darlington-connected stage (double emitter follower), giving high input impedance essential to avoid loading the oscillator and thus degrading the Q of the tank circuit. Output transformer T2 is wound to a high degree of symmetry and tuned by capacitor C8.

REF	TYPE	BASE
TR 1, 2, 3, 4, 5, 6	BC107	<p>view on leads</p>

coding pins 3, 9, 17

from D 248 27 A 3

OS2/37/1A

Fig.1. Circuit of OS2/37