AUTOMATIC TIME-CONSTANT CONTROLLER UN3/503

Introduction

This unit accepts pulses produced by an error-signal amplifier[1], and produces two control potentials intended to be fed back to the error-signal amplifier. One of these control potentials depends on the noise content of the incoming pulses and the other on ambient temperature. The unit contains a square-wave generator which produces a signal for checking the performance of the unit.

The unit is assembled on a printed-wiring board accommodated in a CH1/12A chassis with index-peg positions 1 and 20.

General Specification

D.C. Supplies	+12 V +4 V
Current Consumption	
at 12 V	23 mA
at 4 V (under *Test* condition only)	13 mA
Input Impedance	
22 kHz to 28 kHz	75 ohms (approx.)
Output Resistance (both outputs)	2·5 kilohms (approx.)

Circuit Description

The circuit diagram of the unit is given in Fig. 1. L1—L7, C4—C10 form a band-pass filter which accepts signals of 22—28 kHz. The signal has no energy within this band and therefore only the noise content of the error-pulse signal is passed by the filter. This noise signal is amplified, rectified and integrated to form the control potential which is fed out of the unit via pin 11 of the connector. The gain control RV1 and the standing-potential control RV2 are pre-set controls located inside the unit, on the printed-wiring board.

The temperature-compensation control potential is derived from the potential divider TH1, R22; the resistance of the thermistor TH1 is sensitive to variations of ambient temperature.

The test multivibrator is switched into circuit when required by means of SA. This switch is mounted on a bracket inside the unit, and is actuated by means of a lever bar inscribed *Normal/Test*. When the switch is set to *Test*, this bar projects outside the physical outline of the unit; thus the test condition cannot exist when the unit is in place in an assembly of equipment. This is a safeguard against the multivibrator being left connected in operational conditions.

Maintenance

Apparatus required

Avometer, model 8
Oscilloscope, with high-input-impedance probe
Oscillator, covering the frequency-range 18 kHz—32 kHz (typically, Wayne Kerr Type 0.222)
Stabilised power-supplier, providing 25 mA at +12 volts and 15 mA at +4 volts (typically PS2/10)
Suitably-wired connectors for coupling the unit to the power-supplier (the unit connector mates with Painton Type 316128).

To Check Performance of Bandpass Filter

1. Connect the oscillator to the monitoring-point M1 on the unit, and shunt the connection with 10 ohms.
2. Identify the lead connecting C10 (on the component-plate carrying the filter) to the junction of R8, R9, TR3 on the printed-wiring board. Break this connection, and load the filter with 1 kilohm.
3. Set the oscillator frequency to 25 kHz and, using the oscilloscope, measure the amplitude of the signal at M1 and at the output of the filter. The output signal should be between 6 dB and 8 dB greater than the input signal.
4. Set the oscillator frequency to each in turn of the frequencies listed in Table 1, maintaining a constant input-signal amplitude, and check the output-signal amplitude at each frequency against those given in Table 1.
5. Restore the connection broken in 2 above, and disconnect the oscillator and oscilloscope.

To Check Temperature-compensation Potential

1. Connect the unit to the power-supplier, and switch on.
2. Measure the potential with respect to chassis at monitoring-point M3; it should be +11 volts ±5% at normal room temperatures.

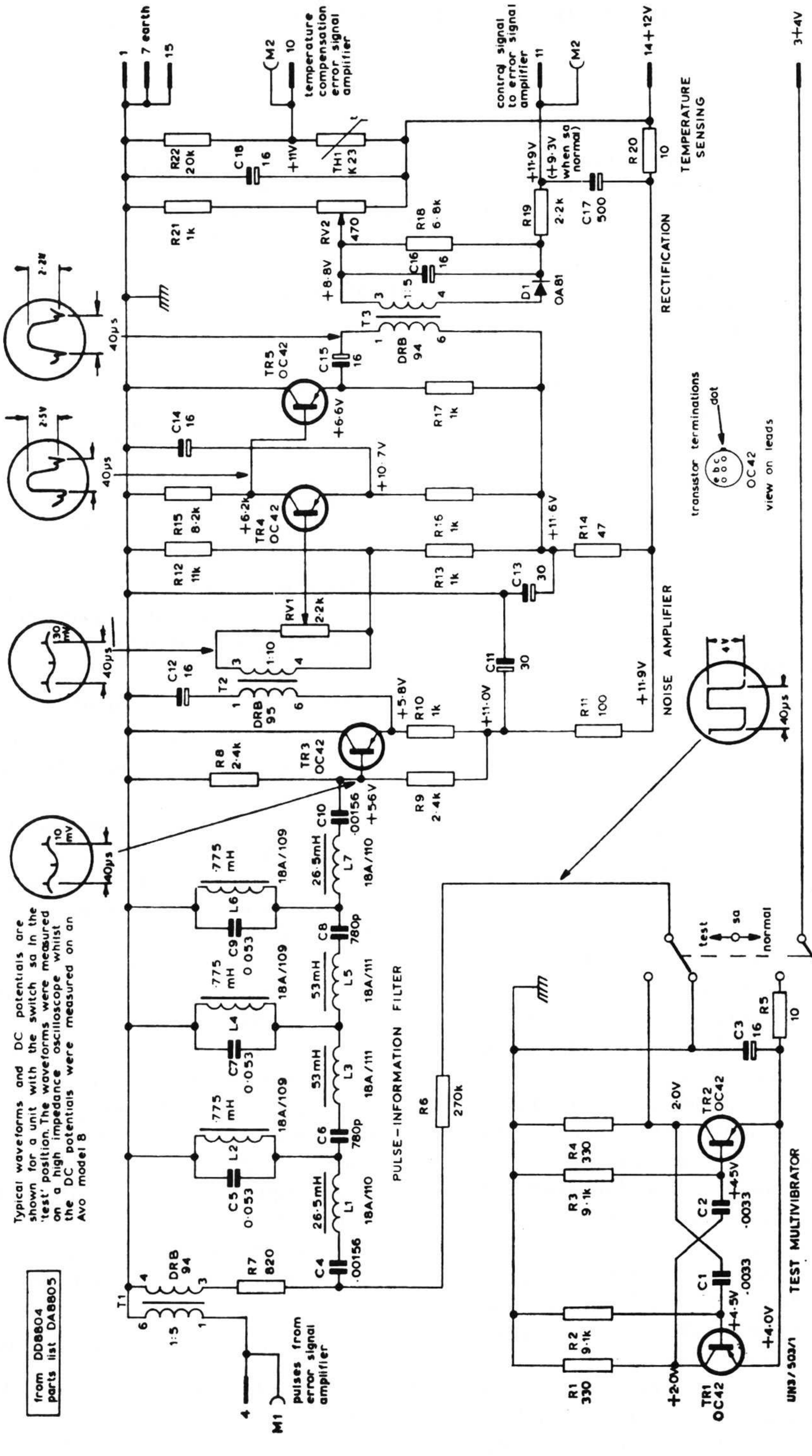


Fig. 1 Circuit of the UN3/503

TABLE 1

Frequency (kHz)	*Circuit Gain* (dB)	*Tolerance* (dB)
18 and below	Less than —51	0
20	—51	15
21	—31	10
22	—4	10
23—27	7	2
28	—3	10
29	—28	10
30	—41	10
31	—51	15
32 and above	Less than —51	0

To Check Error-signal Control Potential

1. Connect the unit to the power-supplier, if this has not already been done, and switch on.
2. Check that SA is set to *Normal*.
3. Measure the potential with respect to chassis at monitoring-point M2 and adjust RV2 to obtain a measured potential of +8·8 volts.

To Check the Action of the Test Multivibrator

1. Connect the unit to the power-supplier, if this has not already been done, and switch on.
2. Set SA to *Test* and, using the oscilloscope, examine the signal at the collector of TR2. It should be of square waveform, with an amplitude of 4 ±0·5V p-p, and a fundamental frequency of 25 ± 1 kHz.
3. Restore SA to *Normal*.

To Adjust the Gain of the Noise amplifier

1. Carry out 1 and 2 of the previous test.
2. Measure the potential with respect to chassis at monitoring-point M2 and adjust RV1 to obtain a measured potential of +11·9 volts.
3. Restore SA to *Normal*.

References

1. Error-signal Amplifier AM3/501
2. Designs Department Technical Memorandum No. 8.129(62)
3. Designs Department Specification No. 6.85(62)

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