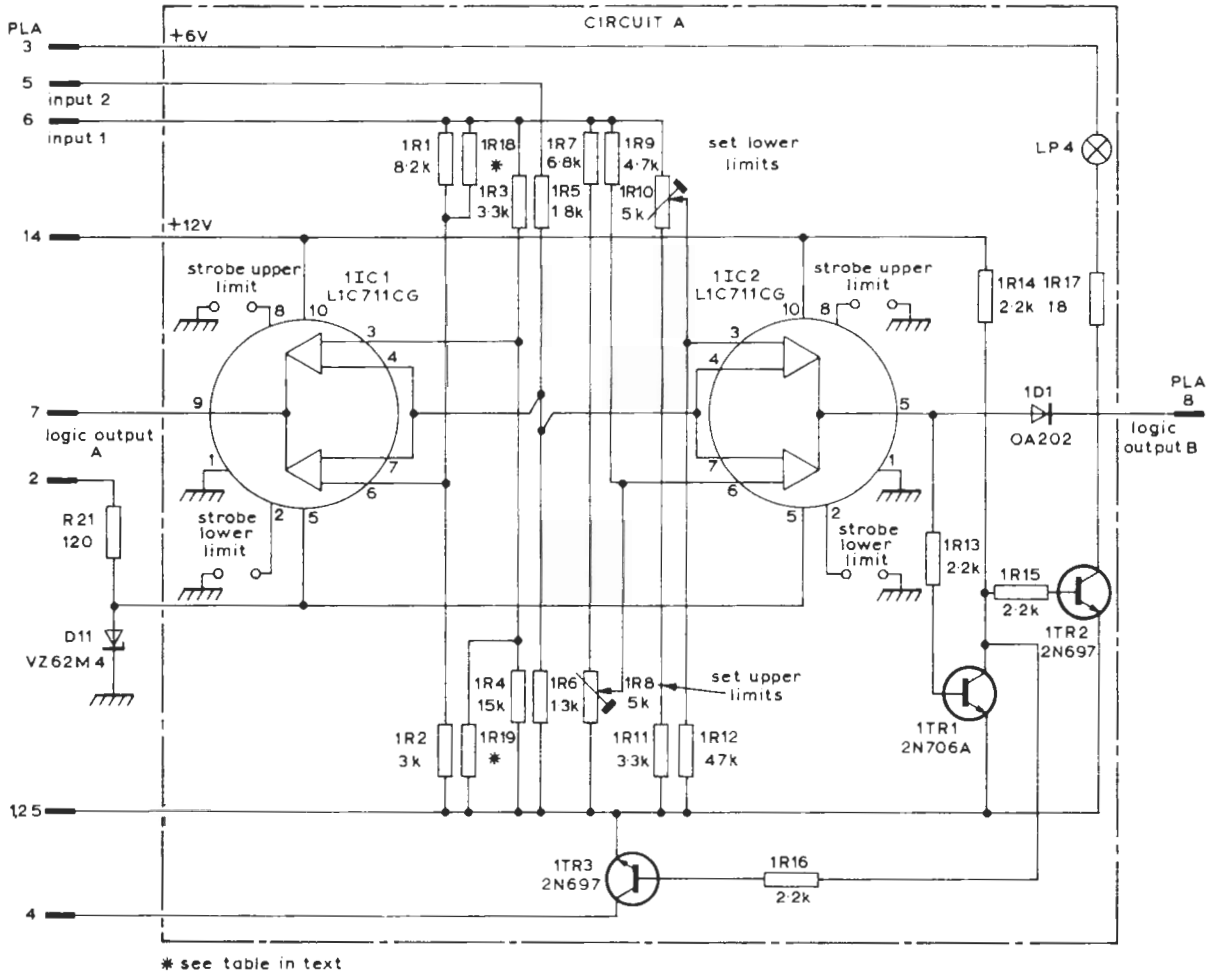


LIMIT UNIT IN2/504A



Corresponding pin connections for each circuit

PLA pins		1,25	2	3	4	5	6	7	8	14
from D29104A2:iss2 parts list D29105A 4	circuit A									
	circuit B	to PLA1,25		to PLA 3	12	11	10	9	13	to PLA 14
	circuit C	to PLA1,25		to PLA 3	19	18	17	16	15	to PLA 14
	circuit D	to PLA1,25		to PLA 3	21	22	23	24	20	to PLA 14

IN2/504/2

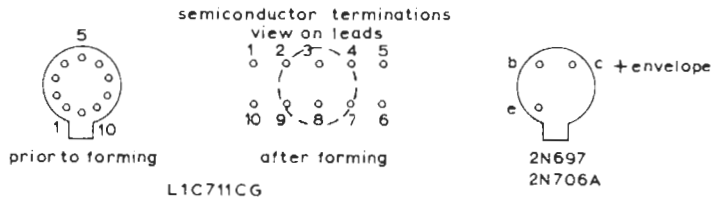


Fig. 1. Circuit of the IN2/504

### Introduction

The IN2/504A comprises four identical comparator circuits. Each circuit accepts two d.c. input signals. If the difference between the two signals exceeds preset limits d.c. output signals are produced and a lamp indication is given. The unit is designed to be used with a Television Automatic Monitor MN2M/518.

### Construction

The four comparator circuits are built on a single printed wiring board which is mounted on a chassis CH1/43A with index pegs in positions 1, 3 and 13. Component references are prefixed by 1, 2, 3 or 4 according to which circuit is involved. Indicator lamps, LP1, LP2, LP3 and LP4, are mounted on the front panel of the unit.

### General Specification

Normal Input Signal Voltage	5 volts d.c.
Maximum Input Voltage	8 volts d.c.
Input Resistance	2.5 kilohms minimum
Power Requirements	+12 volts d.c. at 100 mA -12 volts d.c. at 40 mA +6 volts d.c. at 250 mA
Pin Connections	25-way ISEP

### Circuit Description (Fig. 1)

Fig. 1 is a circuit diagram of one comparator. The other three are the same.

Each comparator uses two linear integrated circuits and each circuit comprises two differential amplifiers with a common output. If the voltages applied to the two inputs of each amplifier are the same there is no output; if the voltages differ an output is produced.

The inputs to each of the amplifiers 11C1 and 11C2 are fed through potential dividers. Amplifier 11C2 produces an output when the difference in input voltage exceeds a certain narrow limit; amplifier 11C1 produces an output when the difference at the input exceeds the narrow limit by a preset amount.

Normally a d.c. reference voltage is applied to pin PLA5 and a voltage corresponding to a measurement made on a test signal to pin PLA6. If the two voltages are within preset limits there is no output from either differential amplifier; transistor TR2 conducts, lamp LP4 is switched on and pin PLA4 is at earth potential.

If the voltage at pin PLA6 differs from that at pin PLA5 by an amount which just exceeds the so-called narrow limit, lamp LP4 is switched off, pin PLA8 rises by at least 3.5 volts and pin PLA4 is made open-circuit. If the input voltages differ by the so-called wide limit the previously mentioned actions take place and in addition pin PLA7 rises by at least 3.5 volts.

The narrow limits are adjusted by variable resistors 1R8 (upper limit) and 1R9 (lower limit). The wide limits are set by resistors 1R2 (upper limit) and 1R1 (lower limit).

The upper or lower limit action can be inhibited by connecting either pins 2 (lower limit) or pins 8 (upper limit), so-called 'strobe' terminals, on each integrated circuit to chassis. In practice the lower limit condition only is affected.

### Test Schedule

#### Apparatus Required

- +12 volt stabilised power supplier
- 12 volt stabilised power supplier
- +6 volt stabilised power supplier
- Source of +5 volts d.c. potential
- Source of +1 to +8 volts d.c., continuously variable
- High-impedance voltmeter

### Test Procedure

1. Check, when the front panel lamps are alight, that the potential measured at pins PLA8, 13, 15 and 20 is in each instance less than 250 mV with respect to earth. Check when the lamps are off that the potential is greater than 3.5 volts.
2. Connect separate one-kilohm resistors between pins PLA4, 12, 19 and 20 and the 12-volt positive supply.
3. Check, when the front panel lamps are alight, that the output at each of these pins is less than 350 mV. Check that when the lamps are off the outputs rise to almost 12 volts.
4. Check that when the wide limit setting is exceeded the potential at pins PLA7, 9, 16 and 24 rises from less than 250 mV to more than 3.5 volts with respect to each.

Note:- Individual indicator units are set up to deal with specific parameters. Units in use have a self-adhesive label, numbered 1, 2 or 3, fixed to the front panel to show the particular use.

*No. 1 Units*

Narrow limits are set by adjustment of variable resistors R8 (upper limit) and R10 (lower limit).

Wide limits are set by selecting suitable values for resistors R1 (upper limit) and R4 (lower limit). Typical values are given in Table 1.

TABLE 1

<i>Limit per cent</i>	<i>Upper Limit R1 (kilohms)</i>	<i>Lower Limit R4 (kilohms)</i>
50	8.2	18
45	7.5	11
40	7.5	7.5
35	6.8	7.5
30	6.8	5.1
25	6.2	4.3
20	5.6	3.6
15	5.6	3.3
10	5.1	3.0
5	4.7	2.7

Each of these values is the larger of the nearest preferred values. If a slightly smaller value is necessary suitable resistors 1R18 (upper limit) and 1R19 (lower limit) can be connected in parallel with the resistor selected from the table.

*No. 2 Units*

The A and B circuits of these units are used to indicate noise and low-frequency distortion respectively. A lower limit is not applicable and a strap is connected across the appropriate strobe terminals.

A two-volt reference level is used and resistor R2 is changed to 820 ohms.

The upper narrow limit is set by adjusting variable resistor R8. The wide limits are set by selecting a suitable value for resistor R1 from Table 2.

Each of these resistor values is, as mentioned in connection with Table 1, the larger of the nearest preferred values.

If the noise limit is specified only in dB reference should be made to a dB/voltage conversion curve given in the UN20/519 Instruction.

The C and D circuits of No. 2 Units are used to indicate chrominance/luminance gain and delay measurements.

Chrominance/luminance gain percentage measurements are directly compared with the equivalent percentage of five volts.

Chrominance/luminance delay measurements operate from an input in which one volt is equivalent to 100 ns. The required limit is converted to a percentage of five volts and the value of resistor is obtained from Table 1.

*No. 3 Units*

**Bar Slope:-** Each 10 per cent of bar slope produces a change of one volt about the nominal five-volt reference level. The required limit is converted to a percentage of five volts and Table 1 is used.

**K' Pulse:** The normal input is zero volts, each five per cent error increases the output by one volt. A two-volt reference level is used and the lower limit is made inoperative.

TABLE 2

	<i>Level dB</i>	<i>Volts</i>	<i>R1 kΩ</i>
L.F. Error	-20	5.0	6.2
	-28	2.0	3.6
Noise	29.5	6.0	7.5
	30	5.6	6.8
	32	4.4	5.6
	34	3.5	4.7
	36	2.8	3.9
	38	2.3	3.8

**Chrominance/Luminance Crosstalk:-** The normal input is five volts. Each 10 per cent error changes the input by one volt. A five-volt reference level is used.

**Reference**

Design Department Specification 11.146(72).

**Reference to Typical Associated Equipment**

Television Automatic Monitor MN2M/518.