

VIDEO MATRIX SOURCE AMPLIFIER AM23/501A-D

Introduction

The AM23/501 is the source amplifier of the Video Matrix MA2/501. It has a gain of 3 dB, inverts the signal and provides up to 12 outputs from a single input. Each output is associated with a shunt switch element.

The number of fully equipped outputs, between 12 and 9, is indicated by code suffixes A-D. Amplifiers are normally coded with suffix A and have shunt switches in all 12 positions.

The amplifier is normally fed either via an equaliser EQ1/516, for correcting input cable loss up to 5 MHz, or via a pad; both arrangements give a loss of 3 dB. This loss is made up by the amplifier to maintain an overall gain of unity to the input of the shunt switch.

An external power supply at ± 15 volts with tap at zero volts is required.

The AM23/501 is constructed on a printed-circuit board, $11\frac{1}{2}$ in. by 4 in., with gold-plated edge contacts.

General Specification

Input Signal	0.7V p-p
Gain	3 dB
D.C. Output Level (at output bus bar)	5.5V positive
Propagation Time Variation through Amplifier at 4.43 MHz	$\pm 2^\circ$ max

Circuit Description

The circuit diagram is given in Fig. 1 on page 3. Transistors TR7, TR8, TR9 and TR10 together form a negative-feedback amplifier which provides the 3 dB gain. R28 provides gain control to set the signal level at the output bus bar (emitter of TR12) to 1 volt p-p. C14 adjusts the gain at sub-carrier frequency to give a luminance/chrominance ratio of unity. D3 is a d.c.-level shifting diode and D4 and D5 provide temperature compensation for the base/emitter junctions of TR11 and TR12.

The output-signal bus bar feeds 12 identical shunt switch elements of which circuit 1 is shown in Fig. 1. The two transistors, 1TR50 and 1TR51, which form the shunt switch operate in conjunction

with a series switch in an associated AM23/502 Destination Amplifier. When the associated switch is 'on', i.e. is conducting, the AM23/502 presents an impedance of about 80 ohms to the source amplifier and the output signal current is 0.75mA p-p superimposed on 4mA d.c. Under these conditions the shunt switch presents a high impedance to the circuit. When the associated switch is off, the impedance seen by the source amplifier at the junction of 1R50 and 1TR50 becomes high and the circuit for the 4mA is broken. The potential at the emitter of 1TR50 rises until it is finally arrested at about 0.65 volts by the shunt switch as it starts to conduct. When fully conducting the shunt switch presents a shunt impedance of about 1 ohm to signal currents.

1TR50 and 1TR51 form a feedback amplifier with both transistors either on or off. The change of state is abrupt and is controlled by the potential at the emitter of 1TR50.

The 1.3 kilohm resistor in each output reduces the signal at the cross points in the 'off' condition, thus minimising crosstalk, and also ensures that a constant load is presented to the amplifier irrespective of the number of outputs in use. The effect is due to the high ratio between the 1.3 kilohm and the load resistance, whether this is the 1 ohm of the shunt switch or the 80 ohms of the following destination amplifier.

The series power regulators on the 15V power lines are primarily to provide isolation against crosstalk from and to associated amplifiers of the matrix using the same power supply. The output potentials are set to 12V during initial testing and operational adjustments are not provided. The input chokes are surge limiters to protect the series regulators, TR3 and TR6, in the event of the amplifier card being plugged into the matrix with the power supply on. Protection is also given against short circuits on the input 15V lines, when C6 or C7 would discharge into the short circuit via the regulator.

Maintenance

Routine maintenance is not required. It is a definite feature of the matrix system that all source amplifiers are interchangeable. They are therefore set up very accurately before installation

using a special test jig, TE2/501, which simulates the matrix conditions. A maintenance test jig TE2/502, is available for operational use. This allows all normal amplifier tests, including testing the shunt switch, to be carried out under matrix conditions.

The jig accommodates two source amplifiers and one destination amplifier and requires external power sources of +15 volts (+0, -0.2 volts), -15 volts (+0.2, -0 volts) and 50 \pm 2 volts.

The d.c. output level at the emitter of TR12 is set to +5.5 volts by R19 to provide the required current drive to the shunt switches and to the destination amplifiers.

The l.f. gain is set by R28 to be +3 dB to offset the 3 dB loss at the input to give 1V p-p at TR12 emitter. If R28 is adjusted, R19 will require resetting.

The gain at subcarrier frequency relative to l.f. is set by C14 which provides a 1-dB adjustment. The control is accessible through a hole in the amplifier screen. The screens must be in position when making this adjustment.

Reference

1. Designs Department Specification No. ~~8.34(69)~~ ⁸⁻³⁴⁶⁻⁽⁶⁹⁾

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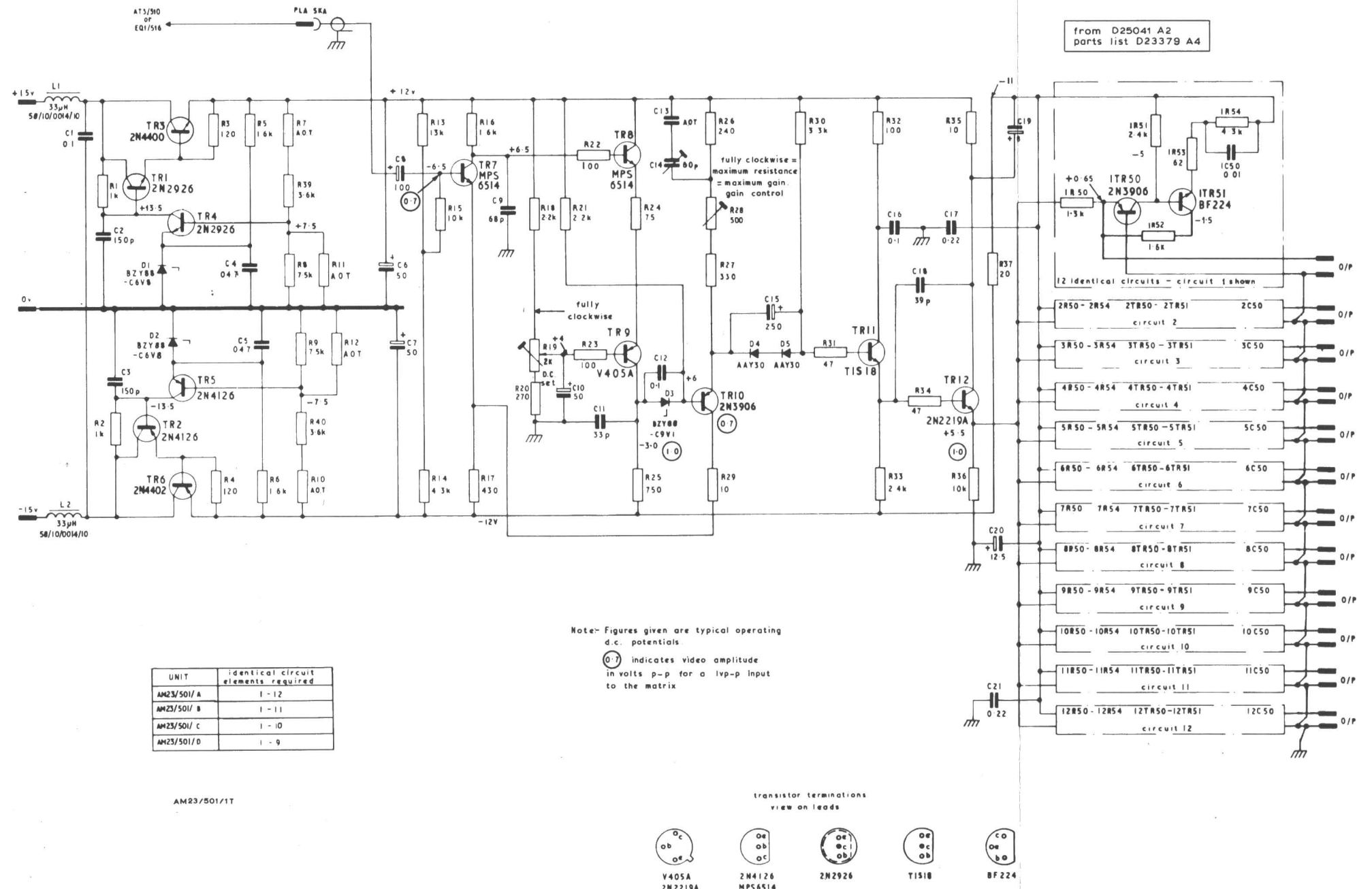


Fig.1 Circuit of the Video Matrix Source Amplifier AM23/SOI