VIDEO MATRIX DESTINATION AMPLIFIER AM23/502A

Introduction

The AM23/502A is the output (destination) amplifier of the Video Matrix MA2/501 and variants. It has a maximum of 25 inputs, each having a series switch element, and gives a single output signal at standard level. It inverts the signal and has a negative-feedback gain control. It requires an external power supply.

The amplifier is built on to a printed-circuit card approximately 15⅞ in. × 4⅞ in. and control connections are made via a 62-way plug. The letter suffix to the code indicates the number of input switches fitted. Normally cards are fully equipped and coded A.

A remotely controlled d.c. signal is used to open and close the input switches, only one of which may be activated at a time.

General Specification

Input Signal	0·75mA p-p with 4mA d.c.
Output Signal	1V p-p
Output D.C.	mid point of picture signal at 0V ±50mV
D.C. Control Potential Input	+50V
Power Requirements	±15V, 65mA from each

Circuit Description

The circuit diagram is given in Fig. 1 on page 3. The series gate TR60 is opened by the input control potential. This raises the F.E.T. gate potential to approximately 0·24 volts (due to diode D60). The series impedance of the F.E.T. from drain to source is about 30 ohms under these conditions and this with R23, gives the unit an input impedance of about 80 ohms. This 80 ohms is in series with the 1300 ohms output impedance of an associated AM23/501 source amplifier. The d.c. voltage (5·5V) at the output of the source amplifier provides an input current drive of 4mA d.c. on which is superimposed a signal current of 0·75 mA p-p. When the control potential is removed, the F.E.T. gate potential falls to about −11·8 volts (via R80) and the F.E.T. ceases to conduct, opening the circuit.

With the input gate open, the signal current is amplified by TR9 and then passed by the emitter follower TR10 to TR11 which has a gain of approximately 20 dB. TR12 stabilises the emitter potential of TR11 and provides means of setting the output d.c. level to zero at the mid-point of the picture signal. D5 produces the d.c. bias between the bases of the complementary output transistors.

Negative feedback from the emitters of the output transistors via R36, C12 and C13 and controlled by R48, provides gain control to set the output signal level to 1 volt p-p.

The voltage regulators are conventional in form. Their purpose is to reduce the impedance of the power sources so that crosstalk between the AM23/502 and associated amplifiers of the matrix, all of which use the same power source, shall be eliminated. The output potentials are set to ±12·05V ±50mV during initial tests and operational adjustment is not necessary. The chokes in the ±15 volt input lines are to prevent damage to the series regulators in the event of the amplifier card being plugged into position in the matrix with the external power supply switched on. Additionally, they provide protection for the series regulators against the discharge current of C6 (or C7) should a short-circuit occur on one of the input 15-volt lines.

The AM23/502 is intended to be driven from one source only. If two sources are inadvertently connected, the d.c. current into TR9 is increased above the normal 4mA. This causes the collector of TR11 to move negatively to an abnormal extent until caught by diode D4. This earths the base of TR13 thus preventing any signal from appearing at the output.

It is important that the d.c. level at the output should be maintained irrespective of whether or not a source is connected. This is achieved by holding the potential of the collector of TR11 at the normal level by the action of TR7, TR8 and TR16. When a source is connected both TR7 and TR8 are cut off and the potential at TR11 collector is set by the input d.c. signal. If a source is not connected then TR7 conducts and raises the gate potential of TR8 which conducts allowing the emitter potential of TR16 to hold the base potential of TR13 at its normal value.

Maintenance

Routine maintenance is not required. It is a definite feature of the matrix system that all destination 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 which allows all normal tests to be carried out under matrix conditions.

The jig accommodates a destination amplifier and two source amplifiers and requires external power sources of +15 volts (+0, −0·2 volts), −15 volts (+0·2, −0 volts) and 50V ±2V.

The d.c. output of the amplifier is set by adjustment of R30, accessible through the hole in the screening cover farthest from the signal output connector. The setting is not critical but zero d.c. should nominally correspond to the mid point of the picture component of a 50% average picture level signal; e.g. the all-lines staircase.

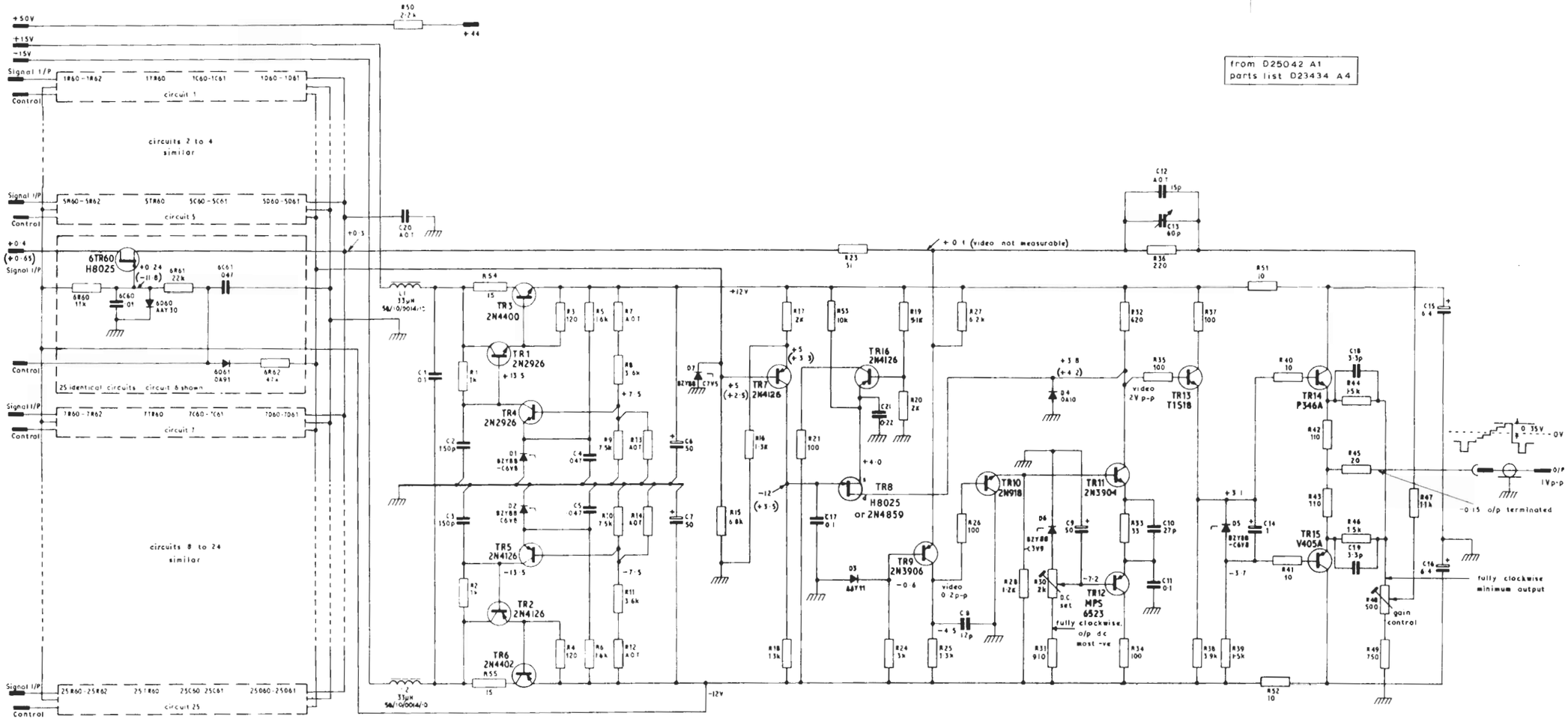
The gain of the amplifier is adjusted by R48 and should give 1V p-p output. The control is accessible through the screen near to the signal output connector. The gain setting and the d.c. setting are not interdependent.

C13 provides a fine adjustment of subcarrier gain relative to l.f. gain with a range of 0·2 dB.

Reference

1. Designs Department Specification No. ~~8.502(69)~~ 8.347 (69)

AIB 9/70



AM23/502/1T

Note:-

Figures are approx d.c. potentials.

Figures in brackets refer to potentials when all FET'S are off.

Video levels are for 1V p-p input signal to matrix.

transistor terminations view on leads

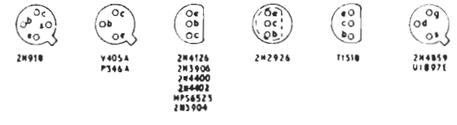


Fig.1 Circuit of the Video Matrix Destination Amplifier AM23/502