CUT-FADE AMPLIFIER AM1/508

Introduction

The AM1/508 is a transistor cut-fade amplifier designed specifically to operate with the mixing amplifier AM1/510. A number of cut-fade amplifiers feed into a single mixing amplifier and the composite unit, together with a power supplier PS2/505, forms part of a video mixer.

The cut-fade amplifier has three modes of operation. In the *On* mode a video signal is passed through the amplifier with relatively small attenuation; in the *Fade* mode the signal is attenuated but the attenuation is controlled by the setting of an external fader; in the *Off* mode the signal is greatly attenuated. The amplifier is triggered from one of these modes to another by the application of pulses or d.c. potentials which are generated in an external unit.

A number of these amplifiers, each associated with a particular channel, are connected in parallel and it is arranged that pulses which trigger one amplifier into either the *On* or the *Fade* mode automatically trigger the other associated amplifiers into the *Off* mode.

The amplifier is constructed using printed-wiring boards mounted on a CH1/12A chassis. (The index-peg positions are 5 and 13.) Monitoring points for the input, control and triggering signals are provided on the front of the amplifier and preset controls are mounted on the side. Power and signal connections are made via a multi-way connector at the rear.

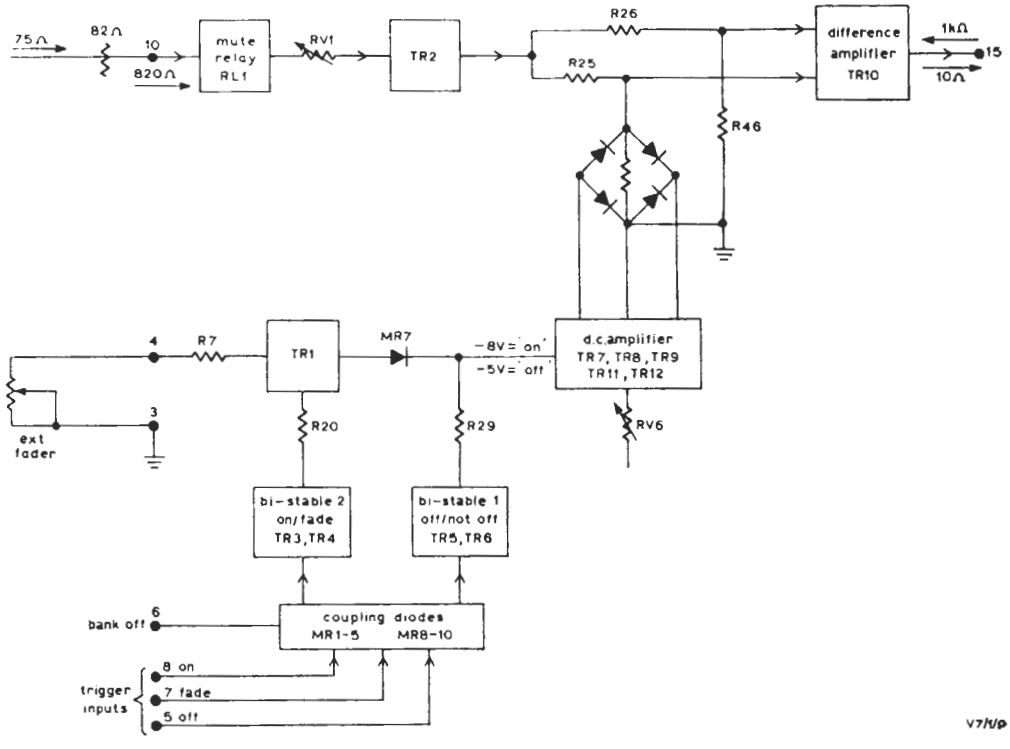

Fig. 1. AM1/508: Block Diagram

General Specification

The general specification is given in conjunction with that for mixing amplifier AM1/510.

Circuit Description

Video Circuits

A block diagram of the amplifier is given in Fig. 1 and full circuit details are shown in Fig. 2.

In the *Off* condition the muting relay RL1 reinforces the action of the amplifier. Transistor TR2 is connected as an emitter-follower which

drives a video bridge circuit. The bridge arms are:

(a) resistor R25 and its associated coarse, fine and high-frequency trimming components,
(b) the impedance of a diode bridge circuit which is connected between the base of TR10 and earth,
(c) resistor R26,
(d) the impedance of the emitter circuit of TR10 (R46 and associated components).

Transistor TR10 is operated as a difference amplifier and its output signal is the difference between the signals which are applied to the base and to the emitter circuits; when these signals are equal (i.e., the video bridge is balanced) there is no output.

With the diodes cut off the diode bridge is adjusted for balance by means of RV2, RV3 and C8; when the diodes are forward biased the diode bridge is no longer balanced and it presents a low-impedance path to earth. Thus the balance of the video bridge can be controlled by adjusting the bias applied to the diodes.

The diode bridge is driven by a long-tailed pair comprising the two Darlington pairs TR7/TR8 and TR11/TR12. Transistor TR9, in the common emitter circuit, ensures that the amplifier draws a constant current. Resistor RV6 is adjusted to obtain the correct fader characteristic.

Control Circuits

The mode of operation is determined by two bistable circuits which incorporate transistors TR3/TR4 and TR5/TR6; the conditions of these two circuits are set by potentials which are applied from an external circuit. The bistable circuit TR3/TR4 (see *Television Engineering*, Volume 3) switches the amplifier between the *On* and *Fade* modes; the second bistable circuit switches the amplifier between the *Off* mode and a condition where the first bistable circuit has control.

When TR6 is saturated its collector and emitter have almost the same potential and so R29 is effectively connected in parallel with R30. This drives the base of TR7 in a positive direction and cuts off the diodes in the diode bridge circuit. This produces maximum attenuation of the video signal and is the *Off* mode. When TR5 is saturated and TR6 is cut off the potential at the base of TR7 is controlled by transistor TR4.

When TR4 is cut off (with TR6 cut off also) the emitter circuit of TR1 is open-circuited and so the base of TR7 is returned to −14 volts via R31; TR7 is driven into conduction, the diodes are forward biased, the video bridge is unbalanced and the video signal is passed to the output with minimum attenuation. This is the *On* condition.

In the *Fade* mode TR4 is saturated and TR3 is cut off. The collector current of TR4 flows also through TR1 and so the potential at the base of TR7 is determined by the bias current flowing into TR1 base. The external fader, which controls this bias, thus controls the amplitude of the output video signal.

Trigger Circuits

The two bistable circuits are identical and a particular mode is selected by applying a positive potential to the base of the required transistor. The full circuit diagram given in Fig. 2 shows four control lines marked *On*, *Off*, *Fade* and *Bank Off*; signals applied to any of these are coupled via diodes to the other control lines as required. This sometimes results in the control signal being applied to both sides of a bistable circuit but the unwanted potential is attenuated by the extra diodes through which it passes. The line marked *Bank Off* is the interlock circuit whereby the action of switching one amplifier to either the *On* or the *Fade* mode automatically switches all other amplifiers in the bank to *Off*.

To prevent accidental triggering by small induced voltages, diodes MR4, MR8, MR5, MR9 and MR10 are reverse biased through R14. The bypass capacitors C2, C6 and C7 serve also to store incoming pulses.

Maintenance

Maintenance of the AM1/508 is described in connection with mixing amplifier AM1/510.

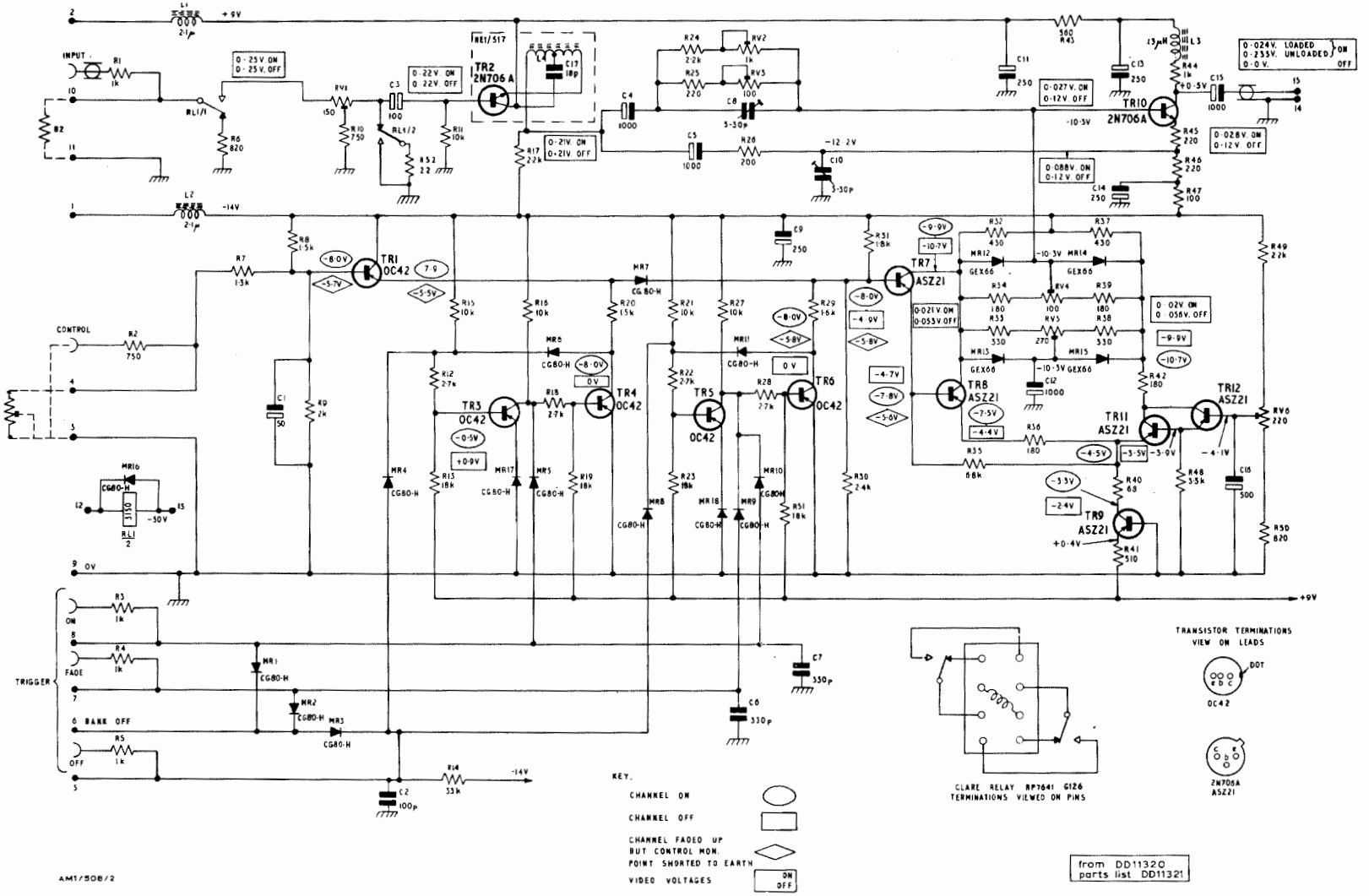

Fig. 2 Circuit of the cut-fade Amplifier AM1/50A