AMPLIFIER AM9/8

General Description

The amplifier AM9/8 is constructed on an unmounted printed circuit board $2\frac{1}{4}$ by $1\frac{5}{8}$ inches in size, first designed for use in Type-D studio equipment to raise the level at a number of points in the chain. It is fixed in position in the modules by two 6 B.A. screws, and the external connections are soldered to tag-posts riveted to the board. The input and output circuits are unbalanced as no transformers are fitted on the board. The voltage gain is adjustable to any value between 10 and 40 dB by selecting the value of a resistor mounted between two tag-posts on the board.

The amplifier is not unconditionally stable for all reactive terminations, and advice on particular applications should be obtained from Designs Department. Many hundreds of the amplifiers are in service but the transistors are now obsolescent and the design has been superseded by the AM5/7.

Circuit Description (Fig. 1)

The amplifier consists of three d.c.-coupled transistor stages with an emitter-follower as the output stage. The amplifier gain is set by inserting a resistance between tags 3 and 4, and the value may vary from 2800 ohms for a gain of 10 dB to 62 ohms for a gain of 40 dB. D.C. feedback is provided by R4 and R8 and a.c. feedback by R6 and the gain-adjusting resistor.

For most applications it is necessary that the noise output from the amplifier shall be as low as possible and for this reason a special low-noise transistor, R2039, has been chosen for TR1. Only transistors which conform to the R2039 specification are suitable for use in this position. TR2 and TR3 can also contribute to the amplifier noise output, and selection may sometimes be necessary in all three cases in order to meet the specified limit.

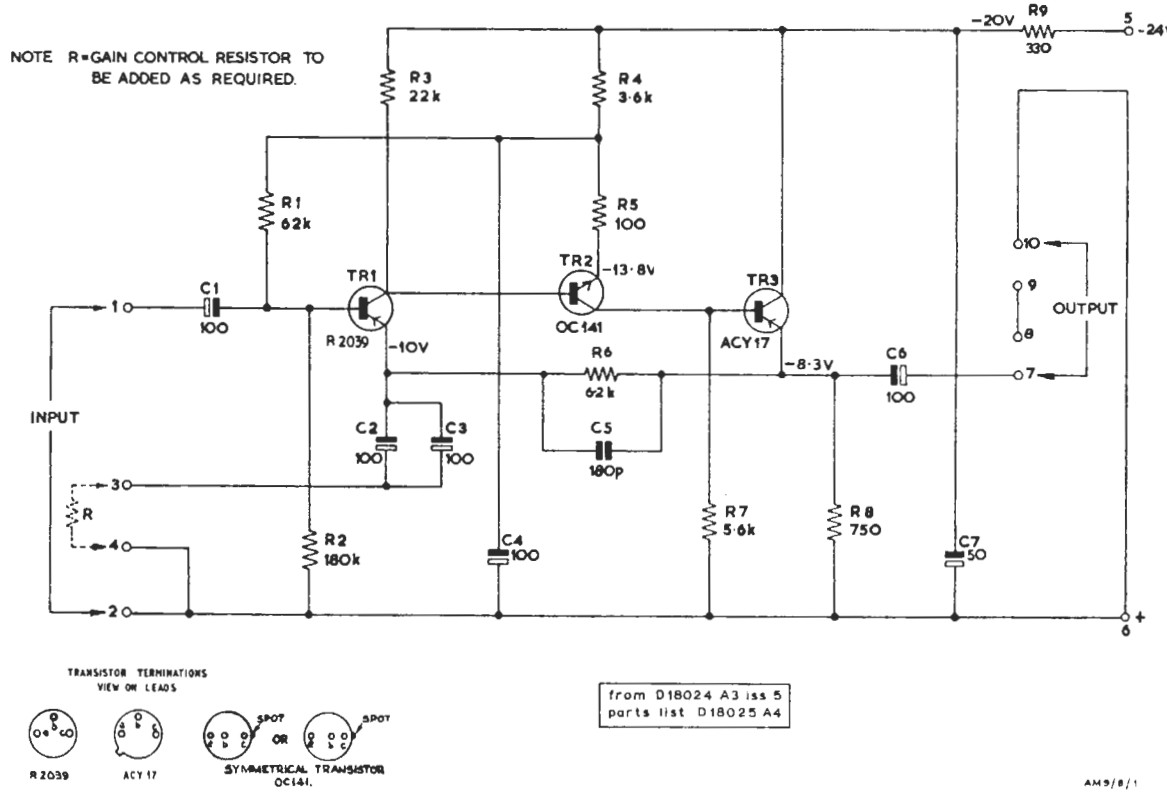

Fig. 1. Circuit of the AM9/8

Test Specification

Power Supply

D.C. supply	24 volts
Current consumption	13 ±1 mA

Test Conditions

Source impedance	600 ohms
Load impedance	1·2 kilohms
Output level	0 dB
Set-gain resistor	120 ohms ±0·1%

Maximum Voltage Output Level

+12 dB across 1·2 kilohms

Voltage Gain

34·3 ±0·2 dB

Frequency Response

Measured with constant input to an external source resistor of 600 ohms.

50 Hz to 10 kHz	±0·1 dB relative to 1 kHz
20 Hz to 20 kHz	±0·2 dB relative to 1 kHz

Input Impedance

At 20 Hz	50 kilohms ±20%
At 1 kHz	40 kilohms ±20%
At 20 kHz	25 kilohms ±20%

Output Impedance

At 1 kHz	about 1 ohm
At 20 kHz	about 1·5 ohms

Harmonic Distortion

Total distortion at output voltage level of +10 dB	< 0·1% from 60 Hz to 5 kHz
Output voltage level for visual distortion on an oscilloscope	≮ +12 dB

Noise

With the input terminated in 600 ohms, the noise level at the output measured by a T.P.M. peaking to *6* should not exceed −90 dB.

Or, preferably, the limited band test as described for the AM9/9 should be used, in this case with a source resistor of 600 ohms, and a figure of −47 dB obtained.

External Connections: Special Requirements

When the AM9/8 is fitted into a Type-D module, or other equipment, certain additional components may have to be introduced into the circuit.

Firstly, when the amplifier is operating into a reactive load, e.g., a transformer or long line, a 100-ohm resistor should be fitted in series with the output. This resistor isolates the amplifier feedback network from the reactive load, preventing instability.

Secondly, when the input or output of the amplifier is connected to any form of switching, such as stud faders, relay contacts, and so on, an extra series capacitor and shunt resistor are used to reduce the d.c. leakage through the switching components. This reduces the noise which might otherwise be introduced by the operation of the switches.

In addition, since the amplifier has an unbalanced input and output, it is necessary to take care to avoid neutral loops. Connections 2, 6 and 10 to the amplifier are common, and one connection between neutrals is allowed. Examples of the appropriate neutral wiring in typical circuits can be found in the Type-D module schematics.

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