AMPLIFIER AM9/9

General Description

The amplifier AM9/9 comprises two separate low-noise transistor amplifiers assembled on a common printed circuit board. It was first designed for use as a microphone channel input stage, in the Type-D studio equipment, to permit a wide range of preset gain control while maintaining the required signal-to-noise ratio. Its use in this connection forms part of patent No. 1,119,391.

The circuit board measures $4\frac{1}{2}$ by $1\frac{3}{4}$ inches. It is fixed in position in the module by two 6 B.A. bolts, and all external connections are made to tag-posts riveted to the board.

The input and output circuits are unbalanced as no transformers are fitted to the board. In use an LG/63A input transformer should be provided for each section. The voltage gain of each amplifier is adjustable to any value between 4 dB and 30 dB by selecting the value of a resistor mounted between two tag-posts on the board.

Large numbers of these amplifiers are in service, but the transistors are now obsolescent, and the design has been superseded by the AM9/10.

Circuit Description (Fig. 2)

The circuit of each amplifier is identical except that the output of the second is built out to give an output impedance of about 85 ohms. The circuit is generally similar to that of the AM9/8 and consists of three d.c.-coupled transistor stages with an emitter-follower as the output stage.

The amplifier gain is set by inserting a resistor between tags 5 and 6 or 11 and 12 and the value may vary from 12 kilohms for a gain of 4 dB to 68 ohms for a gain of 30 dB.

The conditions for acceptable noise level output described for the amplifier AM9/8 also apply to the AM9/9.

Test Specification

Power Supply

D.C. supply	24 volts
Current consumption	44 ±2 mA

Test Conditions

Source impedance	1 kilohm
Load impedance	1·2 kilohms
Output level	0 dB
Set-gain resistor	68 ohms ±0·1%

Maximum Voltage Output Level

+14 dB across 1·2 kilohms

Voltage Gain

First amplifier	29·6 ±0·2 dB
Second amplifier	29·0 ±0·2 dB

Frequency Response

Relative to 1 kHz, and measured with a constant e.m.f. from a source impedance of 1 kilohm.

First amplifier	±0·1 dB from 20 Hz to 20 kHz
Second amplifier	±0·1 dB from 50 Hz to 20 kHz, +0·2 to −0·3 dB at 20 Hz

Input Impedance

At 20 Hz	33 kilohms ±20%
At 1 kHz	45 kilohms ±20%
At 20 kHz	12 kilohms ±20%

Output Impedance

First amplifier	1·2 ohms at 1 kHz 5·2 ohms at 20 kHz
Second amplifier	83 ohms at 1 kHz 88 ohms at 20 kHz

Harmonic Distortion

Total distortion at output voltage level of +12 dB	< 0·1% from 60 Hz to 5 kHz
Output voltage level for visual distortion on an oscilloscope	⩽ +14 dB

Noise

See under *Test Procedure.*

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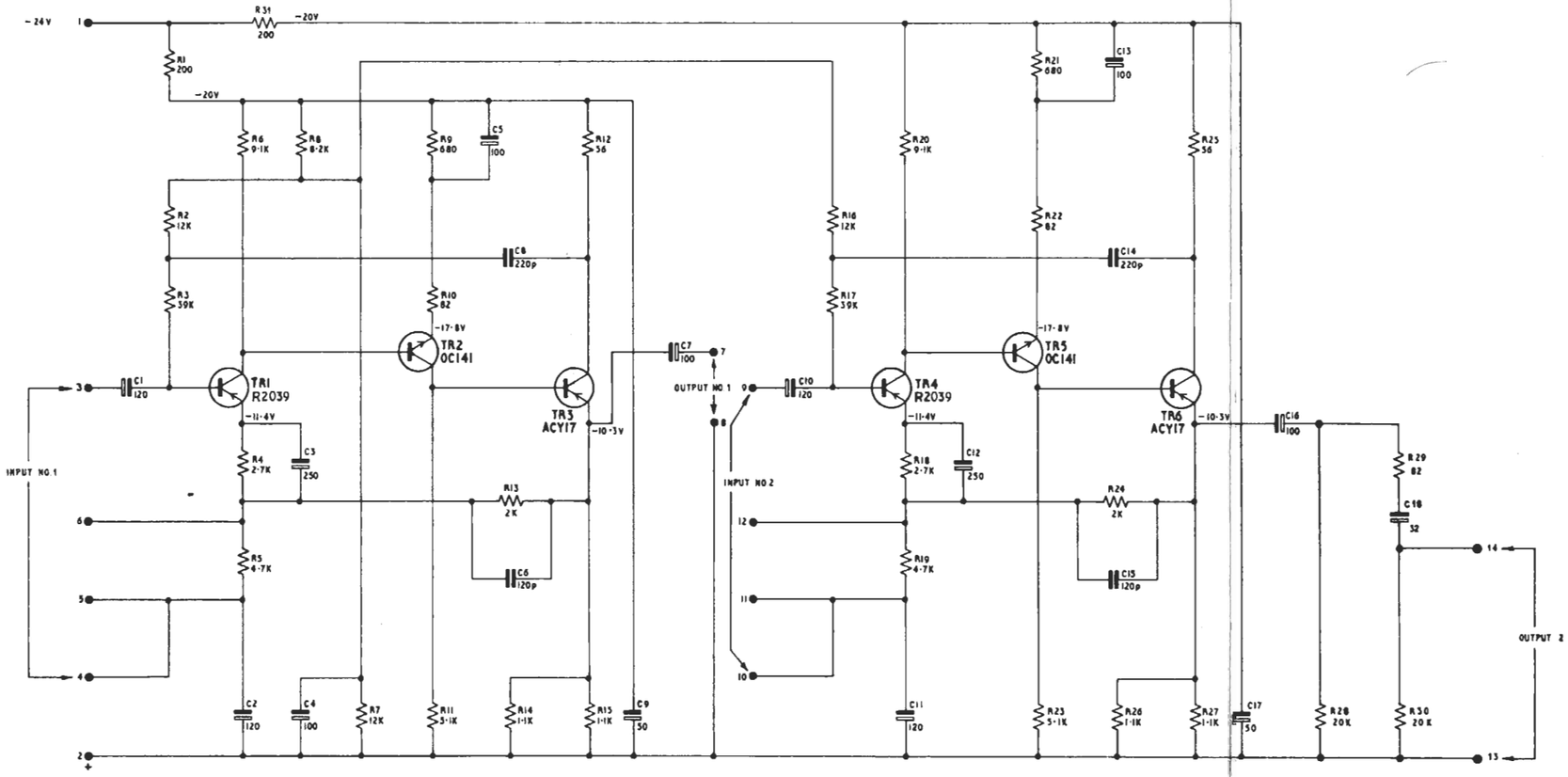

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AM9/9/1T

TRANSISTOR TERMINATIONS
VIEW ON LEADS

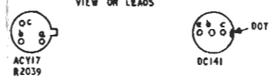

Fig. 2. Circuit of AM9/9

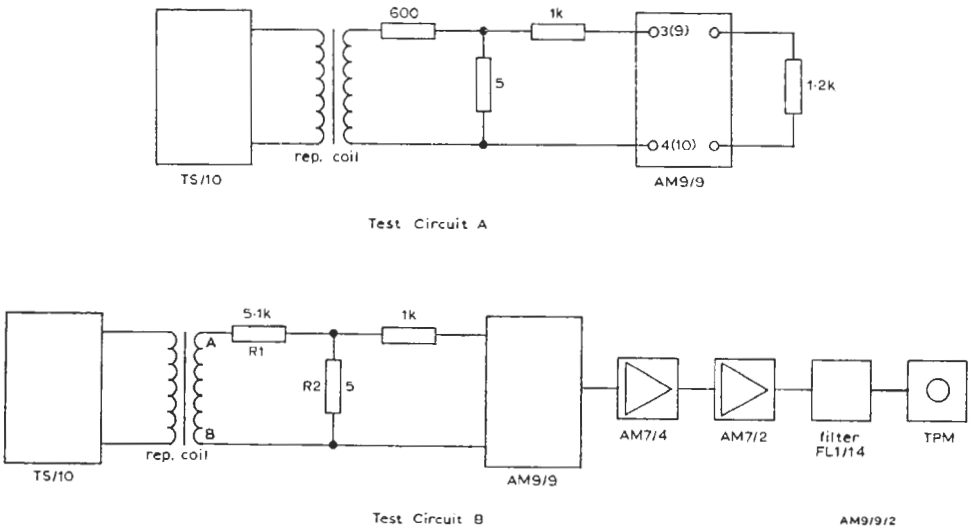

Fig. 1. Test Arrangements for the AM9/9

Test Procedure

Apparatus Required

Low-distortion oscillator
Test meter ATM/1
Harmonic distortion test set
Oscilloscope
Amplifier AM7/4
Amplifier AM7/2
24-volt power supply
Bandpass filter FL1/14
Repeating coil LL/63R

Tone-source Connections

Each half of the AM9/9 is intended to be used with an input transformer, the secondary winding of which is connected to tags 3 and 4 (first section) or 9 and 10 (second section). To simulate this condition when using a 600-ohm tone source, arrangement *A* of Fig. 1 should be used.

Note that tags 4 and 10 must not be earthed.

Noise Test

The circuit required for the special noise test is as indicated by arrangement *B* of Fig. 1.

The output noise volume is obtained as follows:

1. Calculate the attenuation due to the measured values of R1 and R2.
2. Apply 1-kHz tone and adjust the level at A, B to give a level of —80 dB across R2.
3. Adjust the gain of the AM7/4 to give a reading on the T.P.M. of 0 dB.
4. Break the connection R1/R2 to avoid pick-up of hum or r.f. on open-circuit rep coil.
5. Measure the noise volume on the T.P.M., peaking to *6*.

The maximum value of noise should not be greater than —46 dB.

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