MICROPHONE AMPLIFIER AM9/11

See also AM9/10

Introduction

The amplifier AM9/11 provides two similar microphone-channel input stages for use in Type-D sound equipment. In each channel there is a two-section amplifier AM9/10 the gain of which is variable from 4 dB to 70 dB in steps of 3 dB. Between the two sections of each AM9/10 there is a notch filter giving an attenuation of about 40 dB at 15.6 kHz, to remove acoustic noise from television monitors.

The equipment is mounted in a chassis CH1/37A, having overall dimensions of 7 by 2¼ by 10½ inches (18 by 5.7 by 27 mm).

General Description

On the front panel are mounted two gain controls PZZN/12Y1. Inside the chassis below the lower gain control are filter inductors L102, L202 mounted on a bracket, and behind them on the sides of the chassis are printed circuit boards carrying the amplifiers, UN11/6C units containing the input and interstage transformers (T101, 102) and filter components. Each board mounts a 250-mA anti-surge fuse for the amplifier supply and between the boards there is an electrostatic screen. On the rear of the chassis are output transformers T103, 203, and a screen is fitted between the lower output transformer and the adjacent input transformer for the other channel.

Circuit Description (Fig. 1)

At the input to each channel there is a filter to suppress r.f. interference, followed by an input transformer compensated for winding capacitance unbalance. The gain control of the AM9/10 amplifier is a three-section attenuator consisting of two variable resistors, one in the feedback circuit of each section of the AM9/10 and a potential divider connected at its input. From maximum output, the control first reduces the gain of the second section by 27 dB in steps of 3 dB, then reduces the gain of the first section by the same amount, and finally reduces the input to the amplifier by 12 dB in similar steps, thus protecting the amplifier from overloading. Between the output of the first amplifier section and the input of the second section there is the notch filter tuned to 15.63 kHz.

Test Procedure

Apparatus Required

Low Distortion Oscillator
A.C. Test Meter ATM/1
Wave Analyser
Distortion Test Set
Frequency Counter
Oscilloscope
Amplifier AM7/2A
Filter FL1/14
Avometer Model 8
24-volt Power Supply
Repeating Coil
Variable Attenuator
Balanced 600-ohm load
Variable Capacitor 800 pF maximum
Two Resistors 300 ohms ±2%
One Resistor 5 ohms ±2%
One Resistor 1000 ohms ±2%
Two Resistors 5100 ohms ±2%

Operating Conditions

Input Level	−80 dB to +12 dB
Maximum Output Level	+18 dB into 5 kilohms
Source Resistance	300 ohms
Load Resistance	5 kilohms
Input Impedance	1850 ohms at 1 kHz
Output Impedance	1500 ohms at 1 kHz
Power Consumption	88 mA from 24-volt supply

Continued on page 5

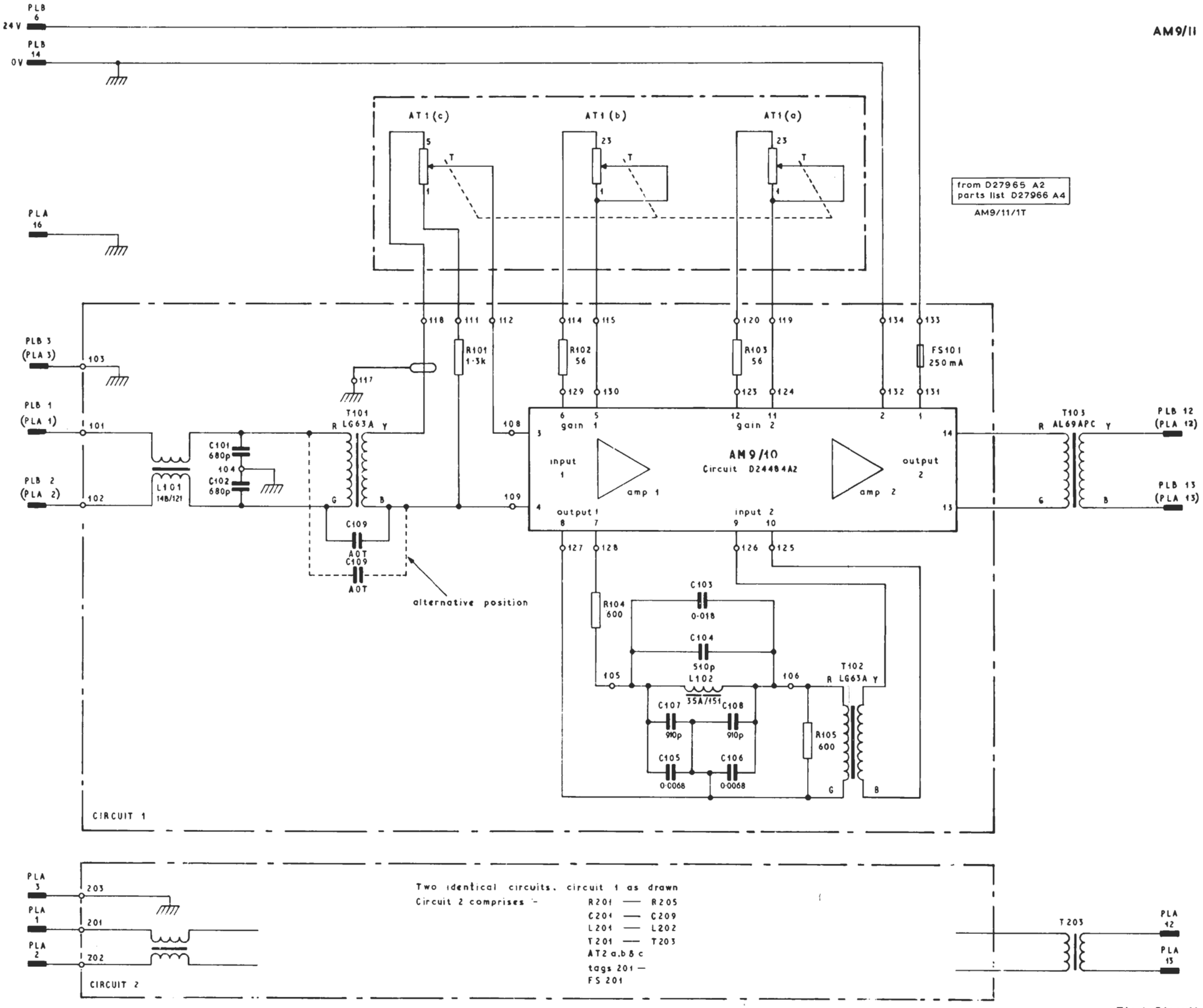

Fig. 1. Circuit of AM9/11

General Procedure

Set up the test circuit as shown in Fig. 2. Connect to tags on plug PLA for channel 1 and PLB for channel 2. (Note that channel 1 is circuit 2 and channel 2 is circuit 1.) Apply identical tests to each channel. Make all level measurements using the high-impedance input of the ATM/1 except where instructed otherwise.

Distortion

1. Set the gain switch to maximum.
2. Adjust the input to give an output of +16 dB at 1 kHz.
3. Measure total harmonic distortion, which should be not greater than 0·1%.

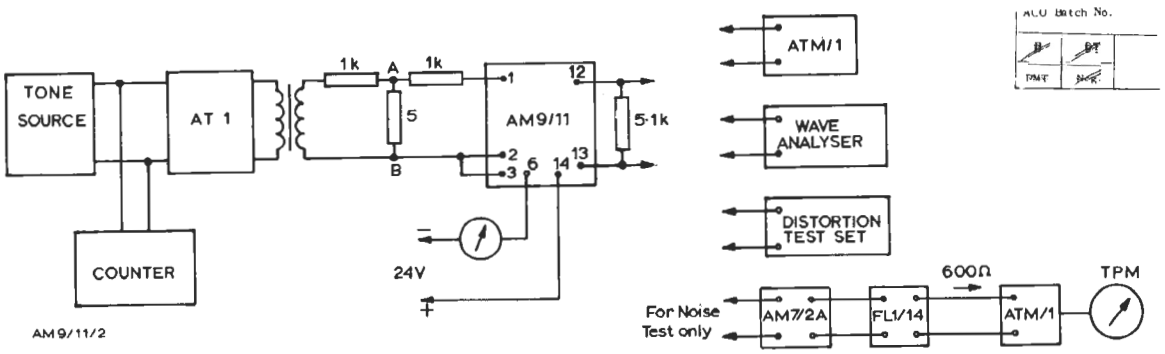

Fig. 2. AM9/11 Test Circuit 1

Gain

1. Set the gain switch to maximum and adjust the level of 1-kHz tone at A-B to −60 dB. Measure the level at the output, which should be +10 ±0.5 dB.
2. Set the gain switch to position 22 and successively lower positions, repeating the output level measurement each time. The output level should be reduced by 3 ±0.8 dB at each step. On position 1 it should be −56 ±1 dB.

Frequency Response

1. Set the gain switch to position 13. Adjust the level of 1-kHz tone at A-B to −60 dB. Measure the output level which should be about −20 dB.
2. Set the level at A-B to −60 dB successively at 20 Hz, 10 kHz and 20 kHz. Measure the output level relative to that at 1 kHz. It should be:

20 Hz	±1.5 dB
10 kHz	±1 dB
20 kHz	−5 to −9 dB

3. Set the input frequency to 15.63 kHz, measured on a frequency counter. Measure the output level, which should be −35 dB relative to that at 1 kHz. If it is not, adjust L102 or L202.

Maximum Output

1. Set the gain switch to maximum.
2. Apply 1-kHz tone to the input and increase the level until the output waveform observed on an oscilloscope just begins to clip.
3. Measure the output level, which should be not less than +18 dB.

Noise

1. Connect up the output circuit as indicated for 'noise test' in Fig. 2. Set the gain switch to maximum output. Switch the filter FL1/14 to its bandpass position and disconnect AT1 from the repeating coil. Set the T.P.M. to peak to 5 on the meter. The dial setting should be more negative than −44 dB and the meter should be steady within 1 dB.
2. Switch the FL1/14 to its allpass position and again adjust the T.P.M. to peak to 5. The T.P.M. reading should be less than −44 dB. An oscilloscope or loudspeaker may be used to check for absence of hum.

Crosstalk

For this test aluminium plates should be placed against the sides of the unit, and a small screen inserted temporarily between the two plugs on the back panel.

1. Terminate both inputs in 300 ohms and both outputs in 5100 ohms.
2. Set Channel 1 and Channel 2 gain switches to maximum.
3. Apply 10-kHz tone to the input of Channel 1 and adjust AT1 to give an output of +10 dB. Measure the crosstalk with a wave analyser at the output of Channel 2. It should be less than −60 dB.
4. Remove the 5-ohm source shunt resistor.
5. Set the gain of Channel 1 to a minimum and adjust AT1 to give an output of +10 dB. The crosstalk at the output of Channel 2 should

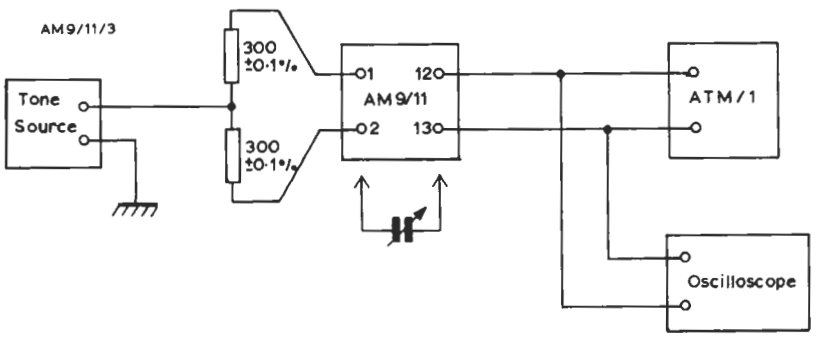

Fig. 3. AM9/11 Test Circuit 2

again be less than −60 dB. Repeat the tests with 10 kHz tone into Channel 2, measuring the crosstalk on the output of Channel 1.

Microphone Input Balance

1. Set up the test circuit given in Fig. 3. Connect the variable capacitor between the pins with blue and green leads of T101. Set the gain switch to maximum output. Apply 10-kHz tone at −30 dB between the centre point of the 600-ohm balanced load and earth.
2. Adjust the variable capacitor for minimum output from the module as measured by the ATM/1 or oscilloscope.
3. If a minimum cannot be achieved, connect the capacitor between the pins with blue and red leads, and repeat the procedure. Measure the value of the capacitor thus obtained, and fit a polystyrene capacitor of the nearest preferred value between the relevant transformer pins close to the conductor side of the board.

Phase

Apply an asymmetrical signal to the input and check with an oscilloscope that the input and output are in phase.

WWM(X) 2/72