

LOUDSPEAKER EQUALISATION AMPLIFIER AM1/20

General

The AM1/20 is designed as a preamplifier for use with loudspeaker amplifier AM8/11, where that amplifier is used with a first grade monitoring loudspeaker. It provides a volume control and a balanced earth-free input of 15 kilohms impedance. Bass and treble equalisation (Fig. 1) to suit the particular loudspeaker and its surroundings may be set by wiring straps on a tagboard under a perspex cover. The input connection may be made by either a four-pin Multicon connector or a three-point jackplug.

The output is taken by a lead about 20 inches long carrying a seven-way 159 plug which matches the input socket on the AM8/11. The connection

Operational Data

| | |
|------------------------|----------------------------------|
| Current Consumption | 12 mA from 38-volt d.c. supply |
| Input Impedance | 15 kilohms balanced |
| Load Impedance | 50 kilohms |
| Output Impedance | 60 ohms unbalanced |
| Input Programme Volume | -20 dB with gain control at max. |
| Output Volume | -10 dB |

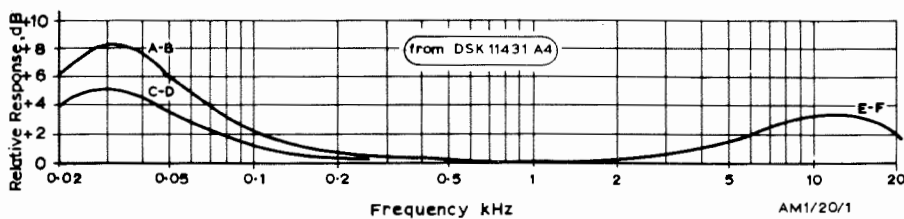


Fig. 1. Frequency Response of AM1/20

for the 38-volt d.c. supply from the AM8/11 is also run in this lead.

The unit is constructed in a diecast aluminium box having overall dimensions of 120 by 95 by 56 mm. Apart from the input transformer, choke L1 and volume control, the components are mounted on two printed circuit boards, one carrying the amplifier stages and the other the adjustable equalisation.

Circuit Description (Fig. 2)

Special precautions are necessary at the input jack to the input transformer to reduce possible r.f. interference. These require the capacitors C1, C2, and ferrite beads on the leads. Following the volume control on the secondary of the input transformer are two amplifier stages TR1, TR2 with overall feedback via R9.

The three equaliser circuits, giving two values of bass equalisation and one of treble, consist of three series tuned circuits which can be connected by means of straps across resistors in a chain coupling the collector of TR2 with the base of the emitter-follower output transistor TR3. Also in this chain there is a lowpass filter L3, C10 and C11 to restrict the out-of-band response of the amplifier.

D1 and D2, R19 and R20, C14 and C15 provide a stabilised and smoothed 12-volt supply derived from the nominally 38-volt d.c. output from the AM8/11 power amplifier. Across the output of the amplifier there is a capacitor C16 to provide r.f. decoupling.

When the amplifier is used with BBC designed monitor loudspeakers, it should be adjusted as shown in Table 1 (on page 3).

In the LS5/1 or 1A, modification to CF 8078 should have been carried out. If this has not been done, h.f. equalisation will be required. (These loudspeakers are normally fitted with AM8/4 amplifiers which have plug-in h.f. equalisers.)

TEST PROCEDURE

Apparatus Required

- Low Distortion Tone Source
- Test Meter ATM/1
- Harmonic Distortion Meter
- Low Noise Amplifier (AM9/5)
- Oscilloscope
- Avometer 8
- 600-ohm precision centre-tapped load
- Power Supply: 30-40 volts 15 mA

D.C. Test

Apply 38 volts d.c. to pins 5 (positive) and 2 of the amplifier output plug. The voltage measured at the positive of C3 should be $+12.5 \pm 1$ volts: For a variation in supply volts from 30 to 40 volts, this should not vary by more than ± 0.5 volt.

Text continued on page 5

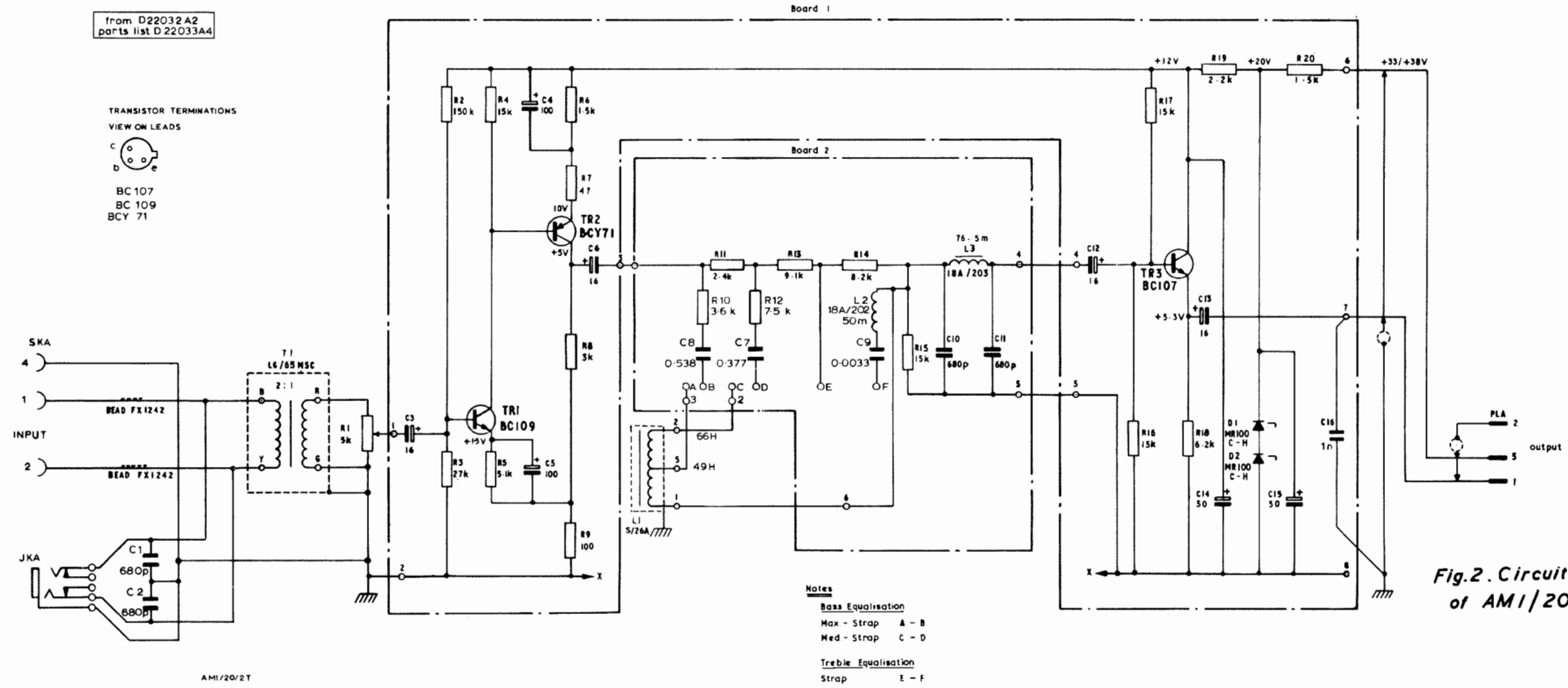


Fig.2. Circuit of AM1/20

TABLE 1

| Type | Response Curve | Strap |
|---------------|--|------------|
| LS3/1, 1A, 1B | Flat | - |
| LS3/4 | Flat | - |
| LS3/6 | Flat | - |
| LS5/1, 1A | Flat | - |
| LS5/2, 2A | H.F. Lift | E - F |
| | L.F. Lift, Med. or Max. to suit room acoustics | C-D or A-B |
| LS5/5 | L.F. Lift, Med. | C - D |

A.C. Tests (Fig. 3)

Test Conditions

| | |
|--|------------|
| Supply Volts | 38 volts |
| Source Impedance | 300 ohms |
| Load Impedance | 50 kilohms |
| Equaliser Straps | Off |
| Output Level with gain control at max. | -20 dB |

All measurements should be made using the high-impedance input of the ATM/1.

Gain: Test Circuit A

The maximum voltage gain at a frequency of 1 kHz measured from CD to EF should be 10 dB \pm 2 dB.

Frequency Response: Test Circuit A

The frequency response for the four equalisation conditions, measured at EF with the source voltage

V_s constant, should be as shown on Fig. 1, within ± 0.5 dB.

Harmonic Distortion: Test Circuit A

Set the output level to -2 dB, and measure the total harmonic distortion, which should not exceed:

- At 60 Hz : 0.3 per cent
- At 1 kHz : 0.2 per cent

Noise: Test Circuit B

Measured with the T.P.M. meter peaking to 6, the reading on the ATM/1 should not exceed -4 dB at any setting of the volume control,

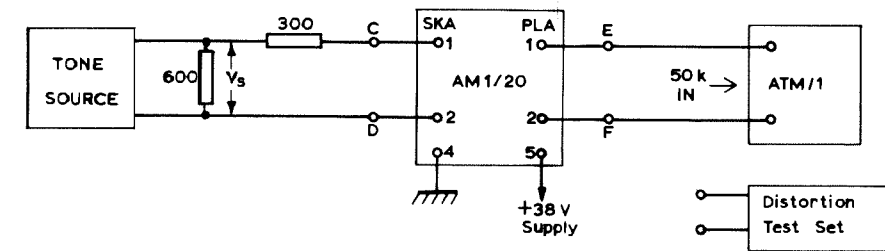
Input Balance: Test Circuit C

Set the source voltage V_s to be -10 dB at 10 kHz. Measure the level at the output, which should not exceed -50 dB.

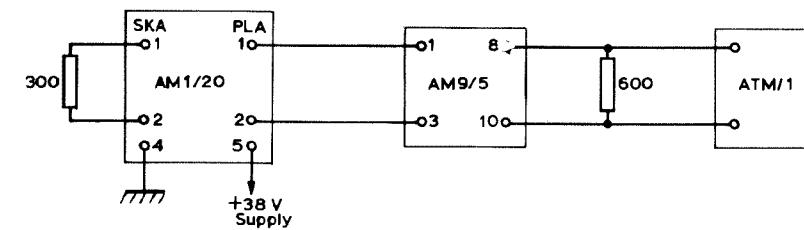
Phase: Test Circuit D

With an asymmetric waveform applied to the input, use an oscilloscope to check that the output on PLA pin 1 is in phase with the input on SKA pin 1 and the tip of the input jack.

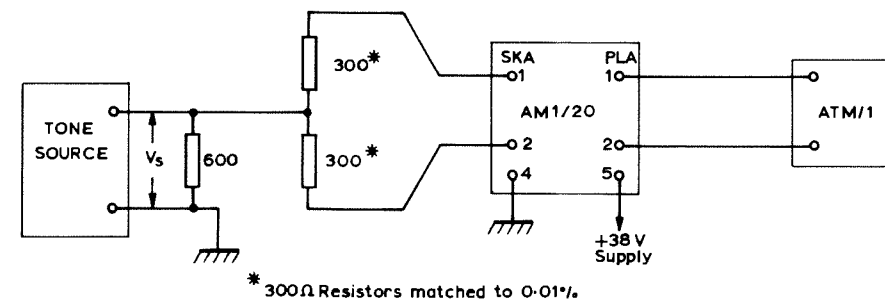
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TEST CIRCUIT A

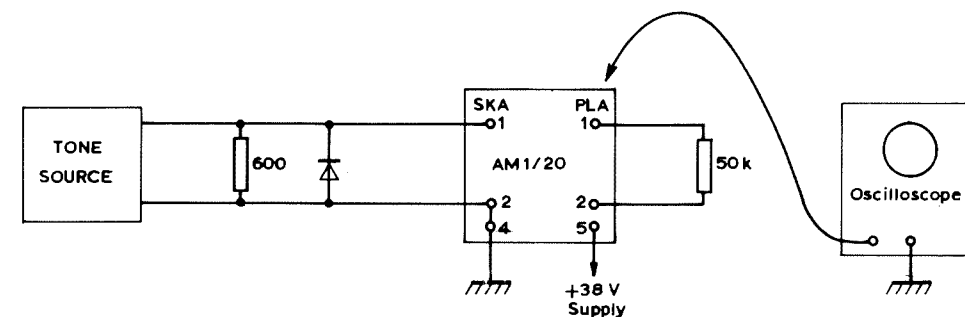


TEST CIRCUIT B



* 300 ohm Resistors matched to 0.01%

TEST CIRCUIT C



AM1/20/3

TEST CIRCUIT D

Fig. 3. Test Circuits for AM1/20