# LINE AND PFL AMPLIFIER AM1/27

## General Description

The AM1/27 comprises a line amplifier and a prefade listen amplifier. The line amplifier has an input impedance of about 45 kilohms, a gain of 30 dB and delivers BBC levels to a 600-ohm line. The PFL amplifier is intended to be used with high-impedance headphones. These amplifiers have no controls.

The components of the amplifiers are mounted on a printed wiring board of standard ISEP size (7 by 4·4 in) and fitted with a 25-way plug (coding pins 3, 19 and 23) for use in a standard ISEP nest. The output transformer is mounted separately.

## Circuit Description (Fig. 2)

The first stage TR1 provides an unbalanced input impedance of 45 kilohms. The stage has emitter negative feedback which is used for determining the amplifier gain. Base bias is obtained from TR2, one of the paraphase pair TR2-TR3. TR1 is a.c.-coupled to the paraphase pair, which in turn feeds the Darlington paired class-A push-pull output stage TR4 to TR7. The output stage is coupled to an externally mounted output transformer which provides a balanced output of 50 ohms source impedance. This is padded with two 270-ohm resistors to present a roughly 600-ohm output for feeding a 600-ohm line.

The PFL amplifier is a simple single-stage unit, using emitter-coupled negative feedback and normal potential-divider biasing to provide an unbalanced input impedance of about 3·3 kilohms. The output can be paralleled with a similar stage for stereo working and the two together are loaded by a single external 5-kilohm volume control for high-impedance headphones.

## Reference

Disk reproducer RP2/6*.

## General Specification

*Impedances at 1 kHz*

(*a*) *Line Amplifier*

| | |
|---|---|
| Input impedance | 47 kilohms (about) |
| Source impedance | 10 kilohms |
| Output impedance | 600 ohms |
| Load impedance | 600 ohms |

(*b*) *PFL Amplifier*

| | |
|---|---|
| Input impedance | 2·8 kilohms (about) |
| Source impedance | 600 ohms |
| Output impedance | 2 kilohms (about) |
| Load impedance | 5 kilohms |

*Gain at 1 kHz*

| | |
|---|---|
| Line amplifier | 30 ±1 dB with 600-ohm load |
| PFL amplifier | 17·5 ±1 dB with 5·1-kilohm load |

*Frequency Response*

| | |
|---|---|
| Line amplifier | 40 Hz to 1 kHz, ±0·2 dB; 1 kHz to 15 kHz, ±1 dB |
| PFL amplifier | 40 Hz to 15 kHz, ±0·5 dB |

*Nonlinearity at 1 kHz*

| | |
|---|---|
| Line amplifier | less than 0·65% total harmonic distortion at +18·5 dB output level |

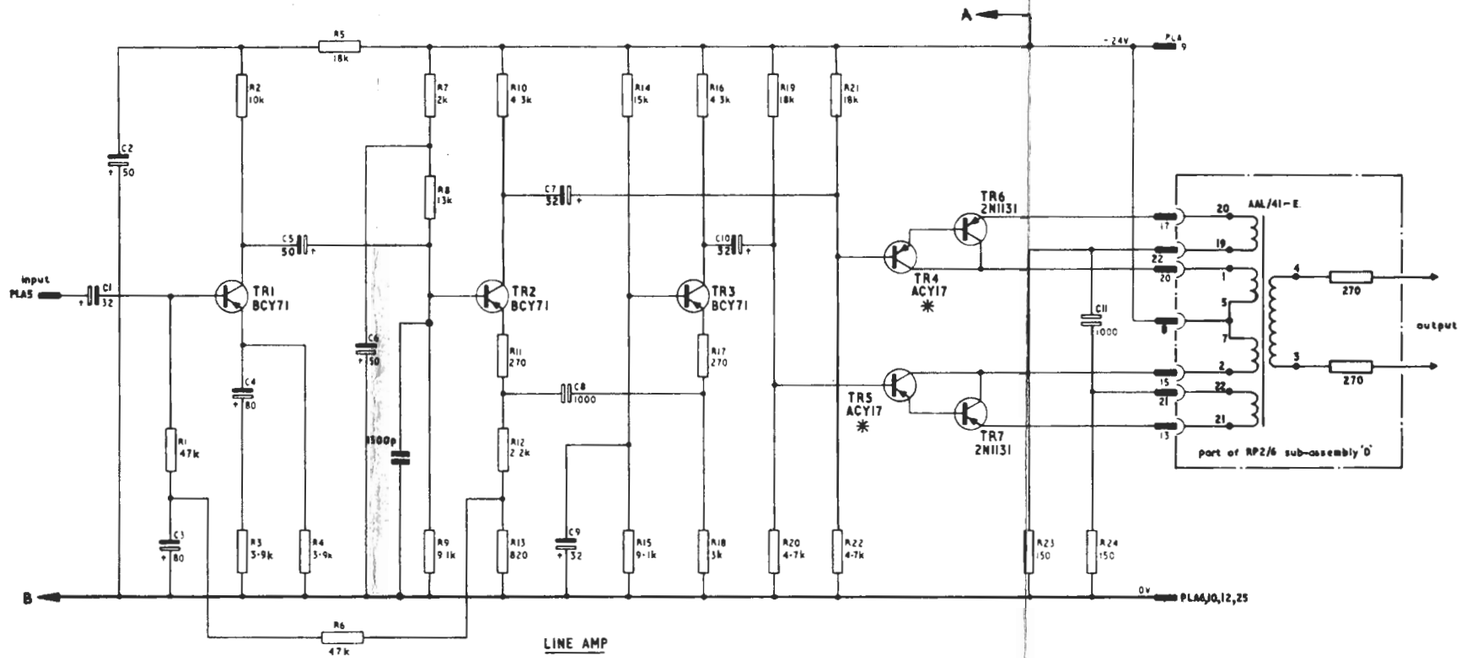
*Noise Level*

| | |
|---|---|
| Line amplifier | input termination 10 kilohms and output termination 600 ohms: noise level using a.c. voltmeter not above −75 dB relative to 0·775 volt r.m.s.; noise level using high-*Z* TPM not above −72 dB relative to 0·775 volt r.m.s. (i.e., relative to meter reading of *4* with attenuator dials at 0 dB) |
| PFL amplifier | input termination 600 ohms and output termination 5·1 kilohms: noise level −80 dB on a.c. voltmeter or −76 dB on high-*Z* TPM |

*Power Supply*

| | |
|---|---|
| Line amplifier | −24 volts, 68 mA |
| PFL amplifier | −24 volts, 12·5 mA |

*Designs Department Technical Memorandum No. 1.51(70).



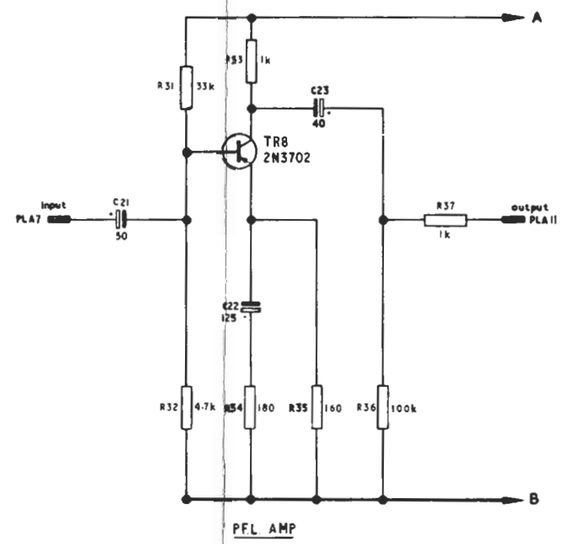




*Fig. 2. Circuit of AMI/27*

**Test Specification**

*Apparatus Required*

24-volt power supplier
A.F. tone source
600-ohm attenuator
Harmonic routine tester FHP/3
Amplifier test meter ATM/1
A.C. voltmeter with input impedance greater than 1 megohm
1 : 1 transformer
Avometer with resistance of 20,000 ohms per volt
Oscilloscope
2 resistors 600 ohms ±2 per cent
Resistor 5·1 kilohms ±2 per cent
Resistor 10 kilohms ±2 per cent

*D.C. Tests*

The following are typical voltage and current readings, measured with an Avometer Model 9 Mark 2 on the 0-30 volt or 0-100 mA range.

| | |
|---|---|
| Supply voltage | —24 volts |
| Total current | 80 mA |
| TR1 emitter | —1·4 volts |
| TR2 emitter | —8·5 volts |
| TR3 emitter | —8·5 volts |
| TR4 base | —4·9 volts |
| TR5 base | —4·9 volts |
| TR6 emitter | —4·2 volts |
| TR7 emitter | —4·2 volts |
| TR8 emitter | —2 volts |

*A.C. Tests*

Fig. 1 shows the test circuit for the line amplifier. The 270-ohm resistors are part of the amplifier output transformer assembly which itself is part of desk RP2/6 assembly D. The part of the test circuit shown to the left of the amplifier is also used for testing the PFL amplifier.

Input levels should be measured across PLA-5 and PLA-6 for the line amplifier and across PLA-7 and PLA-6 for the PFL amplifier.

Output levels should be measured across the 600-ohm termination as shown for the line amplifier and across PLA-11 and PLA-12 for the PFL amplifier.

*Gain at 1 kHz*

See General Specification.

*Line Amplifier Signal Voltages*

Typical r.m.s. voltages measured with a.c. voltmeter, with input level of —29·3 dB.

| | |
|---|---|
| TR1 collector | 44 mV |
| TR2 collector | 167 mV |
| TR3 collector | 140 mV |
| TR6 collector | 1·38 volts |
| TR7 collector | 1·38 volts |
| Output transformer tags 3 and 4 | 1·5 volts |

*PFL Amplifier Levels*

Connect the input section of the test circuit to PLA-7 and PLA-6 and measure the output across PLA-11 and PLA-12 with and without a 5·1-kilohm load.

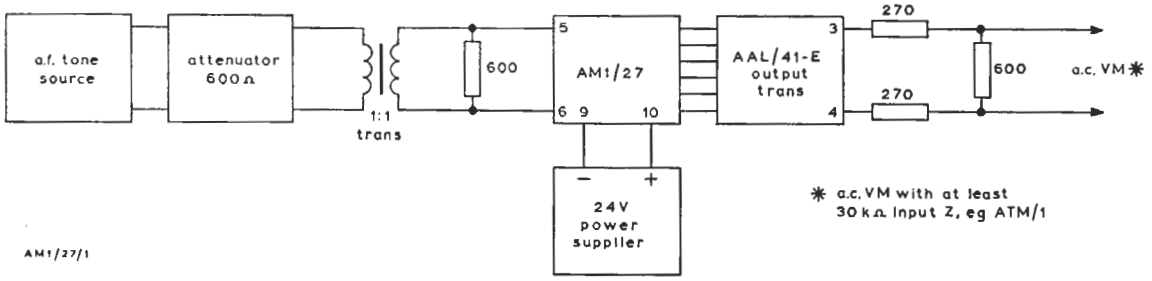



*Fig. 1. Test Circuit for AM1/27*

| | |
|---|---|
| Input level | —17·5 dB |
| Output level with 5·1-kilohm load | 0 dB |

*Frequency Response*

See General Specification.

*Nonlinearity at 1 kHz*

(*a*) *Line Amplifier*

| | |
|---|---|
| Total harmonic distortion at output level of +18·5 dB | less than 0·65% |
| Output level for onset of visible clipping | +19·5 dB |

(*b*) *PFL Amplifier*

| | |
|---|---|
| Output level for onset of visible clipping with 5·1-kilohm load | +17 dB |

*Noise Level*

See General Specification.

GH 7/60