REPRODUCING AMPLIFIER AM16/7

Introduction

The AM16/7 is for use in disk reproducers. It is particularly intended for direct connection to pickup arms fitted with the Goldring G800 cartridge and, in this application, compensates for the relatively low sensitivity of the cartridge and also corrects its frequency characteristic, in addition to providing the necessary equalisation for fine-groove recordings.

The amplifier unit, which is transistor operated, is assembled in a die-cast box occupying a space of about 5 by 4 by 3 in. The unit is designed to be mounted within the cabinet of a reproducer, from which it must draw a d.c. supply. A multipole plug at one end and a Dzus fastener fitted in one face of the box are positioned to permit installation of the unit on an amplifier mounting and supply panel AMS/1.

General Specification

Gain	20 ± 1 dB maximum, at 1 kHz, when input is via a Goldring G800 cartridge and output is into 600-ohm load.
Harmonic Distortion	Not more than 1 per cent total distortion for outputs up to −4 dB at 1 kHz or −11 dB at 80 Hz.
Noise	Not worse than −90 dB at maximum gain, measured on an ATM/1 in the T.P.M. mode, when a Goldring G800 cartridge is across the amplifier input.
Input Impedance	About 50 kilohms, at 1 kHz, when the *H.F. Eq.* control is at maximum resistance.
Output Impedance	About 350 ohms, at 1 kHz, when the gain control is at maximum.
Supply Required	+290 volts, 15 mA.
Frequency Response (relative to 1 kHz)	As in Table 1. For measuring procedure, see under *Maintenance Tests*. Tolerance, ± 1 dB.

TABLE 1

Frequency	*Relative Response, dB*	
	H.F. Eq. Control at 50 kilohms	*H.F. Eq. Control at 10 kilohms*
Hz		
40	13·3	13·2
60	12·9	12·8
100	10·9	10·8
200	6·8	6·7
500	1·7	1·6
kHz		
1	0	0
2	−0·8	−0·5
4	−2·6	−1·8
6	−4·5	−4·0
8	−5·9	−7·0
10	−7·2	−10·2
12	−8·3	−12·9
15	−10·5	−16·4

Circuit Description (Fig. 1)

The circuit consists of two common-emitter stages followed by two emitter-followers in cascade.

A negative feedback path, from the emitter of TR3 to the emitter of TR1, contains a resistance-capacitance network, R4, R5, R17, R18, C8 and C9, which provides a frequency response suitable for reproducing fine-groove recordings.

Correction for the frequency characteristic of the Goldring G800 pickup cartridge is introduced at two points. The *H.F. Eq.* control, R20, shunts the input of the amplifier at frequencies at which the

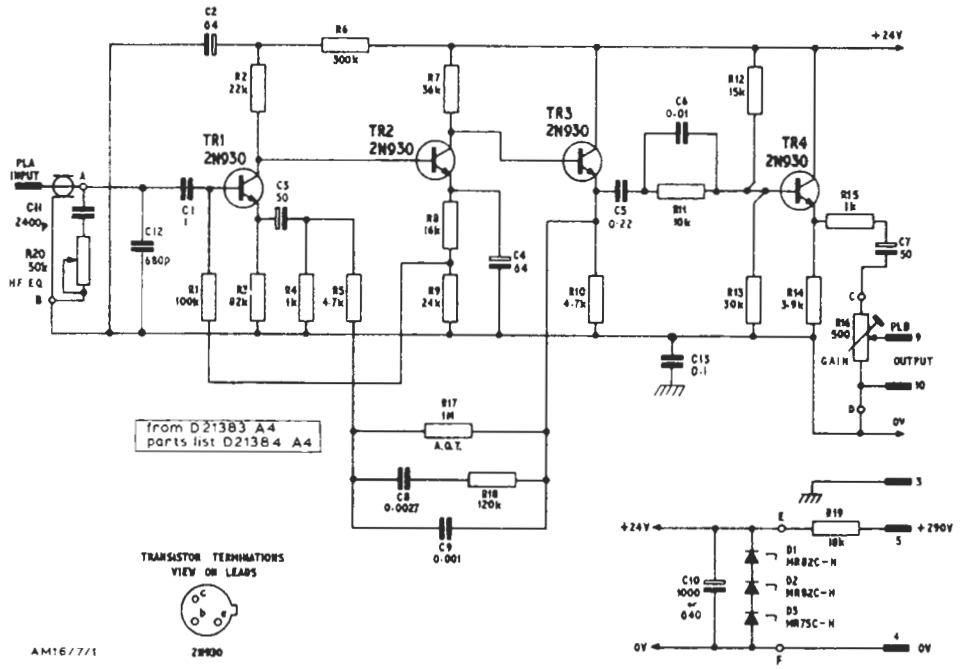

Fig. 1. Circuit of the AM16/7

reactance of C11 is low, and can be set to prevent excessive output from the pickup cartridge at the upper audio frequencies. (The 680-pF capacitor, also shunting the amplifier input, is a precaution against r.f. interference.) The components C5, C6 and R11, coupling TR3 to TR4, compensate for the raised step at the bass end of the frequency response of the pickup cartridge.

A preset gain control, R16, is provided at the output of the amplifier.

The amplifier is intended for connection to a 290-volt h.t. supply in a disk reproducer. A series resistor, R19, mounted outside the amplifier unit, and a shunt chain of three reference diodes inside the unit, reduce the voltage and provide a stabilised 24-volt supply for the transistor stages.

Maintenance Tests

D.C. Conditions

Check that the voltages obtained on the amplifier agree with the following typical values. Use an Avometer Model 9, and measure emitter voltage on the 30-volt range.

H.T. Supply:	290 volts
TR1 Emitter:	3·6 volts
TR2 Emitter:	7·5 volts
TR3 Emitter:	16·2 volts
TR4 Emitter:	15·0 volts

Gain (Fig. 2)

Feed the amplifier from a tone source TS/10 via a 1:1 transformer and a T network in which the first series arm (connected to the transformer secondary) is a 600-ohm resistor, the second series arm (connected to the amplifier input) is a Goldring G800 pickup cartridge with both coils connected in parallel, and the shunt arm is a 10-ohm resistor. Set the amplifier gain to maximum and load the output with a 600-ohm resistor.

Using an a.c. test meter ATM/1 to measure levels, set the level at the 10-ohm resistor to be −40 dB at 1 kHz and, with the amplifier *H.F. Eq.* control at maximum resistance, check that the following levels are obtained within ± 1 dB:

At TR1 Collector:	−49 dB
At TR2 Collector:	−1·4 dB
At TR3 Emitter:	−1·4 dB
At TR4 Emitter:	−6·6 dB
At 600-ohm Load:	−20 dB

Frequency Response (Fig. 2)

Using the same arrangement as for testing gain, check that the frequency response conforms to Table 1 by noting the signal levels required at the 10-ohm resistor to produce −20 dB output at all frequencies.

If necessary, adjust the value of R17.

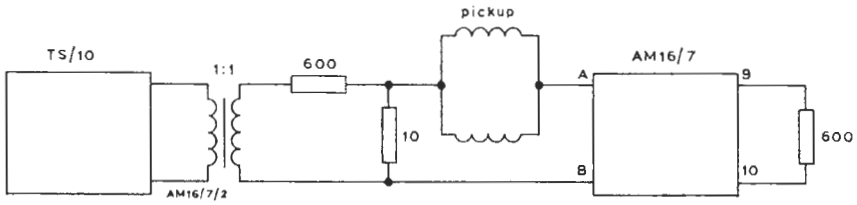

Fig. 2. AM16/7 Test Circuit

Harmonic Distortion

Using the same arrangement as for testing gain, connect a harmonic analyser across the 600-ohm amplifier load. The harmonic analyser should have an input impedance of over 100 kilohms. Check that the amplifier distortion is within the limits given under *General Specification.*

Noise

See under *General Specification.*

References

1. Disk Reproducer DRD/5B.
2. Designs Department Specification No. 1.44(68).

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