STEREO DISK REPRODUCING PREAMPLIFIER AM16/8

General Description

This unit comprises two 30-dB preamplifiers for use with a Goldring 800 stereo pickup. Each preamplifier has the standard 3180/318/75-μs equalisation characteristic for fine-groove disks. Equalisation to accommodate differences between pickups is provided by two circuits, one at the input and one at the output. A preset gain control is provided at the output of the amplifier.

Each preamplifier is intended to work into a 50-kilohm minimum load, and each requires a power supply of 3·6 mA at −24 volts.

The components of the two preamplifiers are mounted on a single printed wiring board of standard ISEP size (7 by 4·4 inches) fitted with a 25-way plug (coding pins 3, 7 and 13) for use in a standard ISEP nest. The two preset gain controls are of the printed wiring multiturn type and are available for adjustment on the front edge of the board. The two preset frequency controls are mounted on the board near the 25-way plug and require a suitable extender board for adjustment.

Reference

Disk reproducer RP2/6*.

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

Circuit Description (Fig. 1)

Each preamplifier has three stages and the total 1-kHz gain of about 30 dB raises the output level of a Goldring 800 pickup playing a 1-kHz 1-cm/s r.m.s. velocity recording from 1 mV to about −28 dB. Standard fine-groove equalisation is provided by C7-C6-R11-R12-R13 in the negative feedback circuit which includes R9-C2-R3. Variable equalisation is provided by R14-R15-C8-VR1 which allow compensation for the middle-frequency step in the response of the pickup, and by C9-VR2-R16 which allow compensation for the high-frequency resonance. The step and the resonance have been changed by the maker over the years, and the values of R15-C8 and R16-C9 may need adjustment on test to suit any particular batch of pickups.

The first stage of the amplifier uses a low-noise transistor operating with a collector current of about 50 μA and provides an input impedance of about 60 kilohms at 1 kHz. The feedback connection in the emitter circuit C2-R3 provides a low-frequency roll-off in conjunction with the feedback components from TR3, which attenuates transistor low-frequency noise. Base bias is obtained from the second stage in a d.c. negative feedback loop. The 680-pF capacitor from TR1 base to the 0-volt rail and the 100-pF capacitor between collector and base of TR2 limit the high-frequency response, guarding against parasitic oscillations and r.f. interference.

The output of the amplifier is taken from the slider of VR1 and should not be loaded with any impedance less than 50 kilohms.

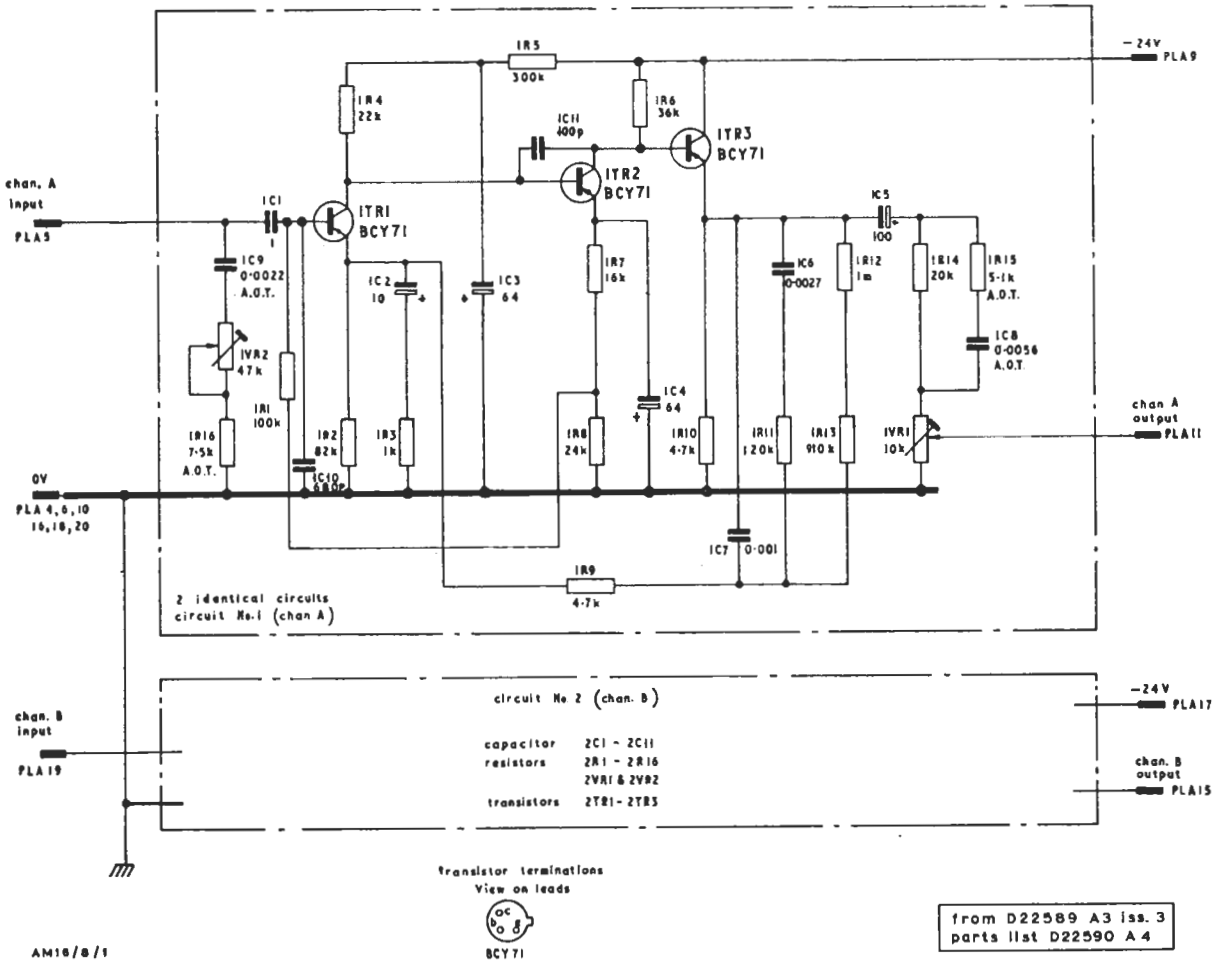

Fig. 1. Circuit of the AM16/8

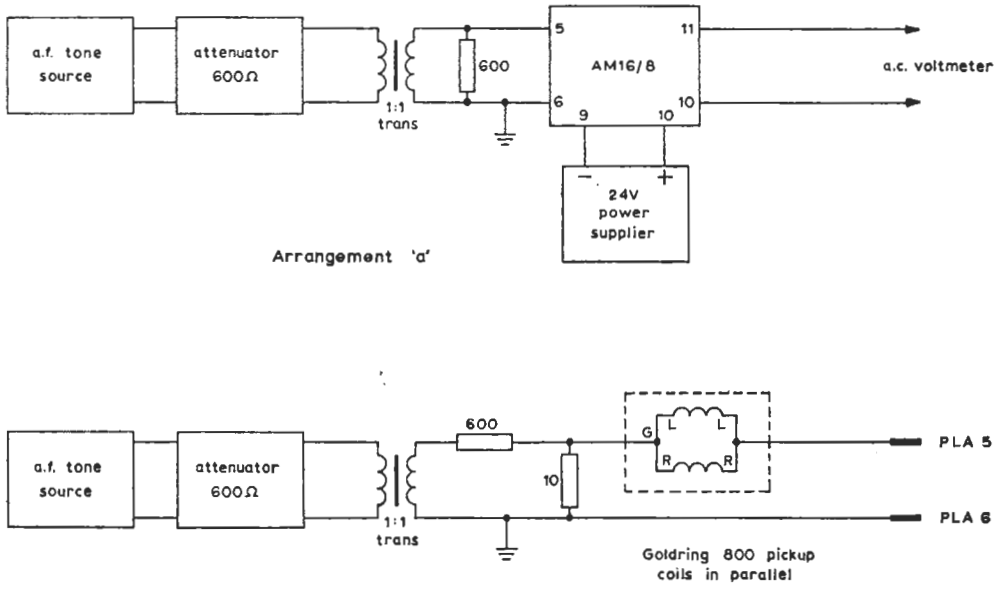

Fig. 2. Test Circuits for AM16/8

Maintenance

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 0-10 mA range. They apply to each preamplifier separately.

Supply voltage	−24 volts
Total current	3·6 mA
TR1 emitter	−4·2 volts
TR2 emitter	−3·1 volts
TR3 emitter	−15·6 volts

Impedances at 1 kHz

Source impedance	Goldring 800 pickup
Input impedance	about 60 kilohms when VR2 = 47 kilohms
Output impedance	about 6·2 kilohms when VR1 = 10 kilohms
Load impedance	minimum 50 kilohms

NOTE:—Each coil of the Goldring 800 pickup has an inductance of about 0·4 henry and a resistance of about 500 ohms.

Gain at 1 kHz

Use the test circuit shown in Fig. 2 arrangement 'a'. (The resistance of the a.c. voltmeter should be at least 1 megohm.) Adjust VR2 to 47 kilohms and VR1 to 10 kilohms. Adjust the input level at PLA pins 5 and 6 to about −40 dB. The gain should then be 30 ±1 dB.

Frequency Response

To include the effect of VR2 on pickup h.f. response, it is necessary to measure the AM16/8 response by the 'injection' technique, with the pickup coil in series with the test circuit.

1. Set up the test circuit shown in Fig. 2 arrangement 'b', with the part of the circuit to the right of pins 5 and 6 connected as in arrangement 'a'.
2. Set VR2 to its maximum value of 47 kilohms (i.e., fully clockwise). Set VR1 to its maximum value of 10 kilohms.
3. Set the frequency to 1 kHz and, using an a.c. voltmeter with a resistance of at least 1 megohm, adjust the output level at pins 11 and 10 to about −10 dB.
4. With the a.c. voltmeter, measure the level across the 10-ohm resistor.

5. Repeat operations 3 and 4 at each of the frequencies shown in Table 1, and tabulate the input levels at these frequencies relative to the input level at 1 kHz, as gain in dB. (Remember the output level is constant at −10 dB at all frequencies.)
6. Set VR2 to zero (i.e., fully anticlockwise), and repeat operation 5.

The results obtained should be as shown in Table 1.

Nonlinearity

At 1 kHz an output of +8 dB should be obtained before clipping is visible on an oscilloscope and at 80 Hz the corresponding figure should be +4 dB.

Noise Level

With a Goldring 800 pickup connected to the input of the amplifier and VR1 and VR2 both at maximum setting the noise level measured with an a.c. voltmeter with minimum resistance 1 megohm should be better than −85 dB relative to 0·775 volt r.m.s.

TABLE 1

f (*Hz*)	*Response* (*dB*)		*f* (*Hz*)	*Response* (*dB*)	
	VR2 47 kΩ	*VR2* 0		*VR2* 47 kΩ	*VR2* 0
10	14·7		1	0	0
20	17·7		2	−1	−0·5
30	17·3		4	−3·8	−2·5
40	16·4		6	−6·6	−5
60	14·5		8	−9	−8·1
100	11·2		10	−10·7	−11·1
200	6·5		12	−12·2	−14
500	1·4		15	−13·9	−17·5
1000	0		20	−16·2	−21·6

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