Issue 2
Aug 1979

The AM7/12 is a low-gain general-purpose audio-frequency amplifier intended primarily for feeding programme-signals to internal BBC lines.

Two output feeds are available at the amplifier connector. The Line Output is intended to drive a single line; the Low Impedance output is used to feed one or more lines or branched systems.

The Low Impedance output is distributed via externally connected resistors inserted into each leg of the line(s). The minimum permissible load impedance at the Low Impedance output is 50 ohms.

The output also appears at a pair of test sockets, O/P MON, mounted on the front panel of the unit.

The gain of the amplifier to all outputs is normally unity but can be adjusted over the range −5dB to +5dB by selection of the value of a resistor connected between tags of the amplifier connector.

The amplifier uses a chassis type CH1/65A and normally obtains its power supplies from a PS2/163 power supplier which has been designed for use with the AM7/12 and other similar audio amplifiers.

Gain	−5dB to +5dB
Input	
Volume	−5dB to + 5dB
Impedance	50kΩ balanced and isolated
Outputs	
Line	
Volume	0dB ±0·1dB into high impedance
Impedance	50Ω ±2Ω balanced and isolated from earth
Low Impedance	
Volume	0dB ±0·1dB into high impedance
Impedance	4·5Ω ±0·5Ω balanced and isolated from earth
Clipping level	+16dB (50Ω load)
	>+18dB (high impedance load)
Minimum Load Impedance	50Ω
Test Sockets	
Volume	0dB ±0·1dB into high impedance
Resistance	600Ω ±2% balanced and isolated from earth
Distortion	<0·1% (40Hz to 15kHz)
Signal to Noise	>70dB4W
Frequency Response	±0·1dB (50Hz to 15kHz)
	±0·2dB (40Hz to 20kHz)
	−3dB at about 4Hz and 75kHz
Signal Delay	5·6μs ± 1μs (f> 1kHz)
Power Supply Requirements	
Voltage	+12V and −12V
Current	
Quiescent	about 35mA (not critical)
At Clipping level	60mA

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WARNING: PROBES OR CROCODILE CLIPS MUST NOT BE CLIPPED ON THE TOP OF T2. THIS COULD FRACTURE THE FINE WINDING WIRES CONNECTED TO THE PINS.

FAULT LOCATION

Fuse Failure

Faults which cause either supply fuse to blow are best found by using a resistance meter, with the amplifier supplies disconnected. Possible faults are:

FS1 blows as soon as power supply connected	*FS2 blows as soon as power supply connected*
C8 short-circuit	C9 short-circuit
TR2, 4, 7 or 8 collector-base or collector-emitter short-circuit	TR6, 9 or 10 collector-base or collector-emitter short-circuit

D.C. Conditions

Because of the large amount of d.c. negative feedback used a single fault within the output amplifier is likely to upset the d.c. potentials throughout.

A recommended method of approach to fault location is to take a systematic series of d.c. voltage measurements starting with the voltage across T2 primary. The polarity of this voltage, with reference to 0V, will then indicate the subsequent course of action.

The justification for this approach can be illustrated by considering the operation of the output current limiting diodes, D1 and D2, since the patterns of the potential distribution which occur in the two limiting conditions, (TR7/TR8 limiting, or TR9/TR10 limiting), are extremes which include the voltage distribution pattern likely to occur due to a fault.

Output Current Limiting

D1 and D2 protect the output transistor pairs against input or output overload by limiting their current to 250mA. In the simplified circuit of the output amplifier opposite, the normal voltages at various points, with reference to 0V, are shown in black, and the corresponding voltages for the two limiting conditions, TR7/TR8 limiting and TR9/TR10 limiting, are shown in red and blue respectively. These two limiting conditions arise as follows:

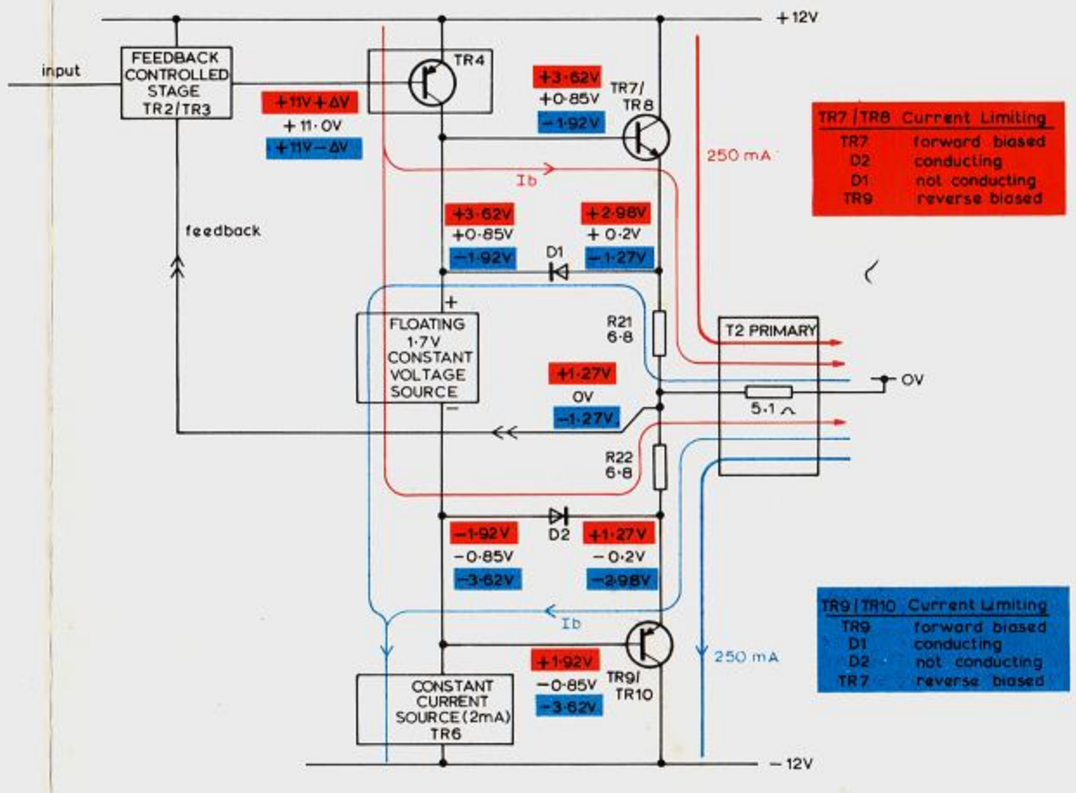
If TR7/TR8 current increases, due to either excessive TR4 current, or low TR6 current, the potential across R21 increases. The consequent rise of TR7 base potential with reference to 0V is transferred through the floating 1·7V constant-voltage source to D2. If TR7/TR8 current reaches 250mA the rise in potential is sufficient to forward bias D2, which conducts to bypass further drive to TR7. This is the limiting condition shown in red on the diagram.

Excessive TR6 current, or low TR4 current, similarly causes TR9/TR10 current to increase; if this current reaches 250mA, D1 becomes forward biased to prevent any increase of TR9 base current. This is the limiting condition for TR9/TR10 shown in blue on the diagram.

A.C. Conditions

If a fault cannot be located using d.c. tests then the signal levels at various points in the amplifier may be checked using an oscilloscope.

If high frequency oscillations (100kHz to 400kHz) are present, components C6, R14, C10, R24 should be checked. Low frequency oscillation, (approximately 17Hz), may be caused by incorrect phasing of the feedback winding of T2.



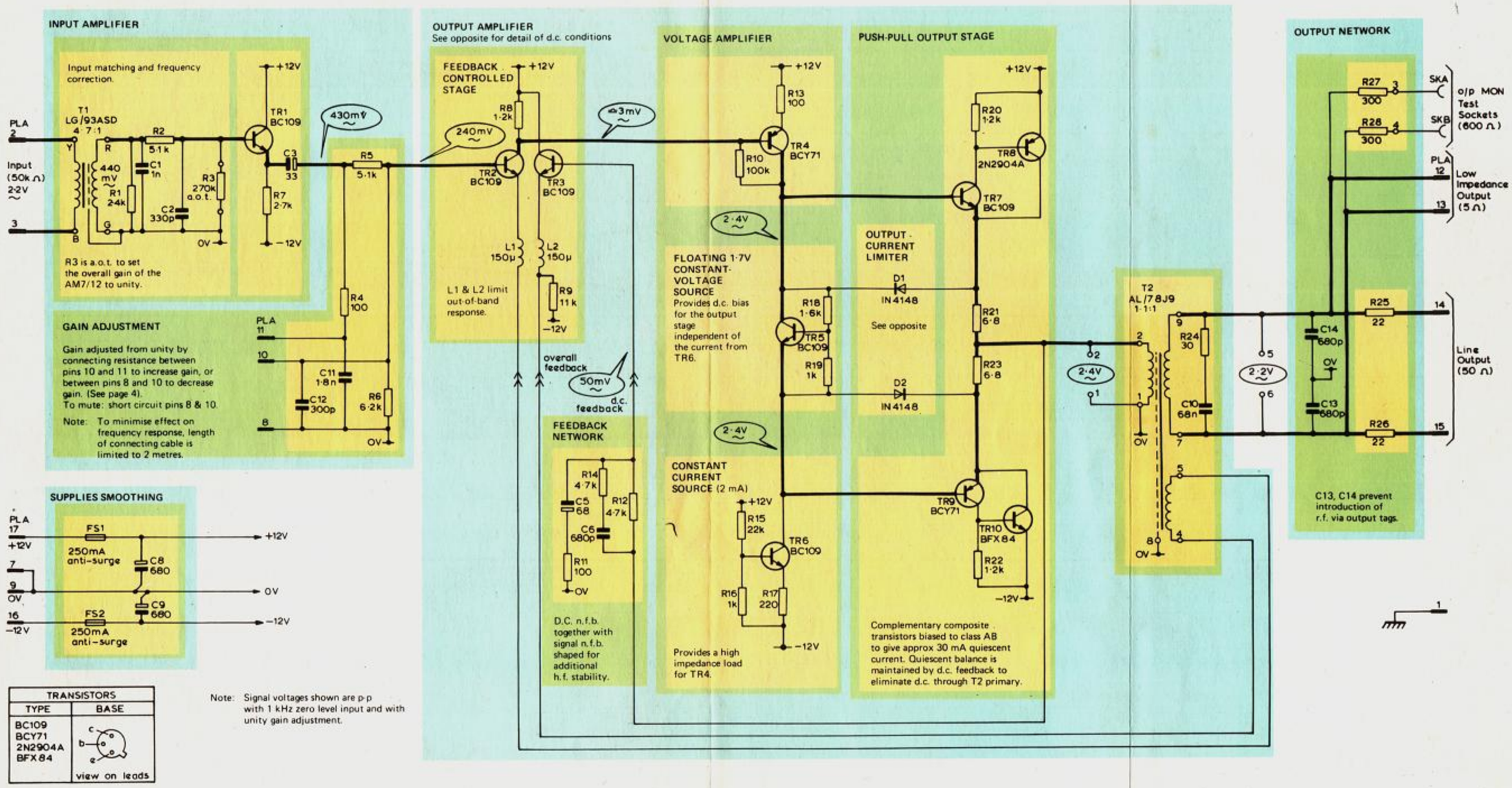
Maintenance Note

The value of the a.o.t. resistor R3 is determined during initial tests and **must not be changed.**

CHANGES

Updated to DD CF 12617 (4)

FUNCTIONAL CIRCUIT DIAGRAM



TRANSISTORS	
TYPE	BASE
BC109 BCY71 2N2904A BFX84	view on leads

Note: Signal voltages shown are p-p with 1 kHz zero level input and with unity gain adjustment.

GAIN CONTROL SETTINGS

CHANGES

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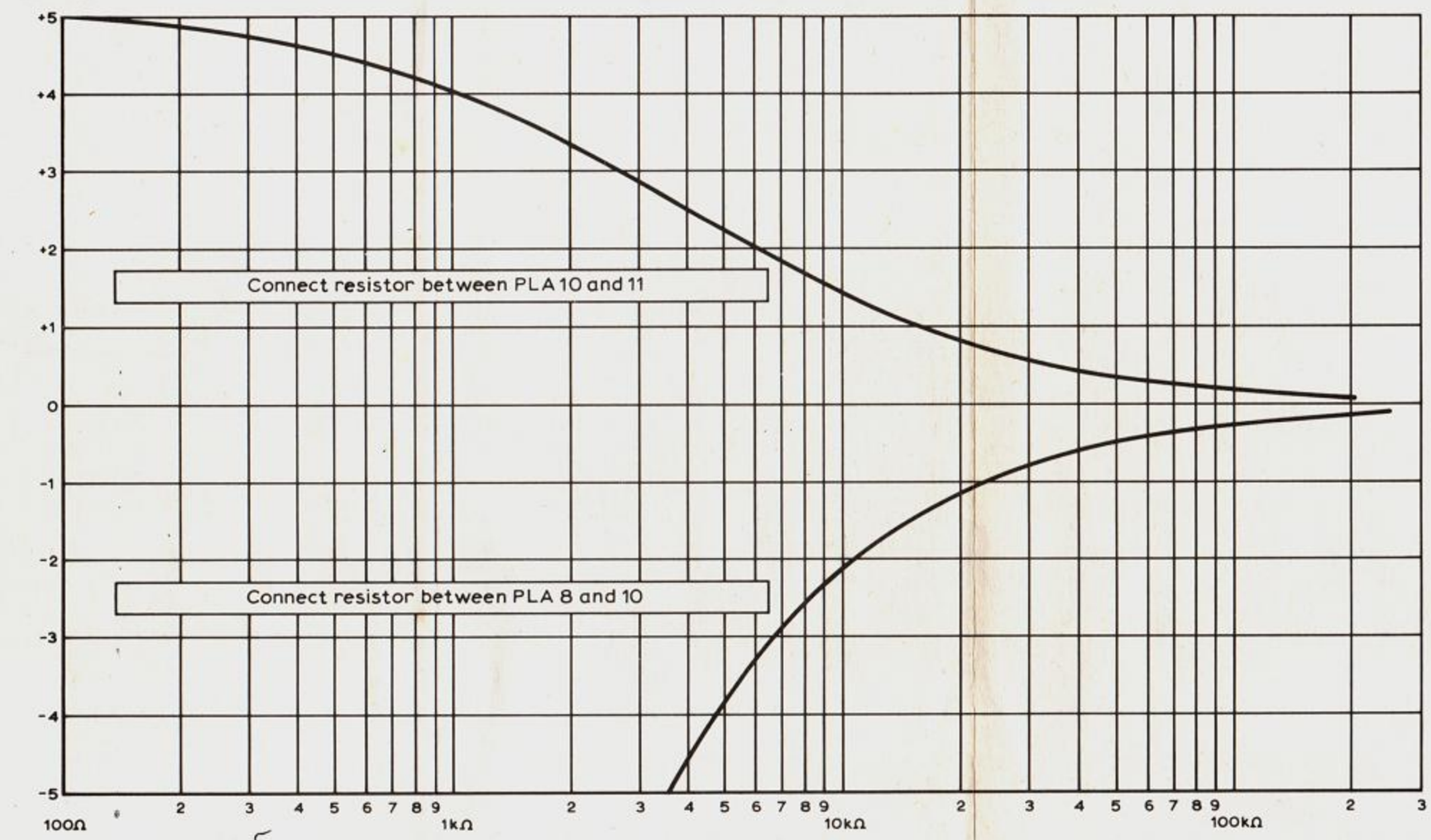
FIXED GAIN ARRANGEMENT



VARIABLE GAIN ARRANGEMENT ±5dB