

RECORDING AND PLAYBACK AMPLIFIER

This integrated circuit incorporates all amplifier circuits necessary for the record/playback functions, with the exception of the audio power output amplifier. It comprises:

- a preamplifier for microphone or playback,
- a recording amplifier with automatic level control,
- a dynamic limiter with a short limiting time.

Compared to its predecessor TDA1002, this type features an improved automatic level control circuit; the control range has been enlarged from 40 to 55 dB and the spread in control characteristic has been reduced to less than 2 dB.

QUICK REFERENCE DATA

Supply voltage range	V_P		4 to 12 V
Operating ambient temperature	T_{amb}		-25 to + 125 °C
Total quiescent current ($V_P = 9$ V)	I_{tot}	typ.	15 mA
Preamplifier			
Input impedance (pin 1)	$ Z_i $	typ.	16 k Ω
Open loop gain	G_o	typ.	70 dB
Clipping level (pin 4); $V_P = 9$ V; r.m.s. value	$V_{4-5(rms)}$	typ.	2 V
Equivalent noise input voltage $R_S = 500 \Omega$; B = 300 Hz to 15 kHz	$V_{n(rms)}$	<	0,75 μ V
Recording amplifier			
Input impedance (pin 8)	$ Z_i $	typ.	40 k Ω
Open loop gain	G_o	typ.	80 dB
Clipping level (pin 9); $V_P = 9$ V; r.m.s. value	$V_{9-10(rms)}$	typ.	2 V
Automatic Level Control (A.L.C.)			
Input impedance (pin 6)			
at low signal level at pin 8	$ Z_i $	typ.	250 k Ω
at high signal level pin 8	$ Z_i $	typ.	25 Ω
Control voltage			
$V_{4-5} = 10$ mV; f = 1 kHz; $V_P = 9$ V	V_{9-10}	typ.	250 mV
$V_{4-5} = 1000$ mV; f = 1 kHz; $V_P = 9$ V	V_{9-10}	typ.	750 mV
Limiting time (Fig. 12)	t_l	typ.	10 ms
Level setting time (Fig. 12)	t_s	typ.	4 s
Recovery time (Fig. 13)	t_r	typ.	35 s

PACKAGE OUTLINE

16-lead DIL; plastic (SOT-38).

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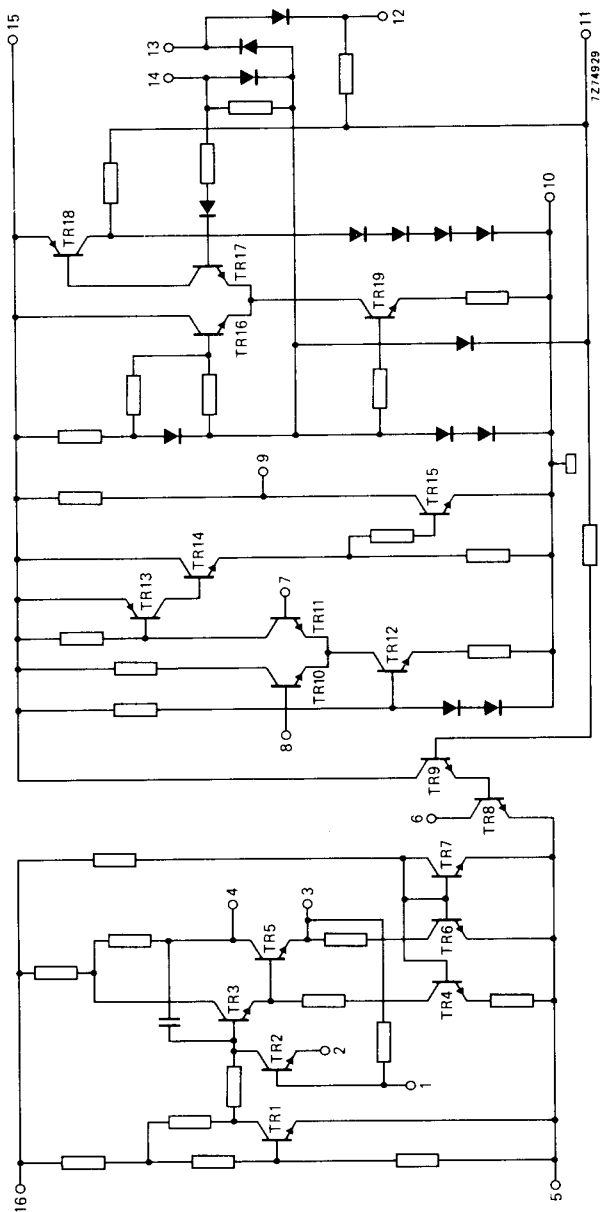


Fig. 1 Circuit diagram.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

Supply voltage preamplifier	V ₁₆₋₅	max.	12 V
Supply voltage recording amplifier	V ₁₅₋₁₀	max.	12 V
Total power dissipation	see derating curve Fig. 2		
Storage temperature	T _{stg}	-65 to + 125 °C	
Operating ambient temperature	T _{amb}	-25 to + 125 °C	

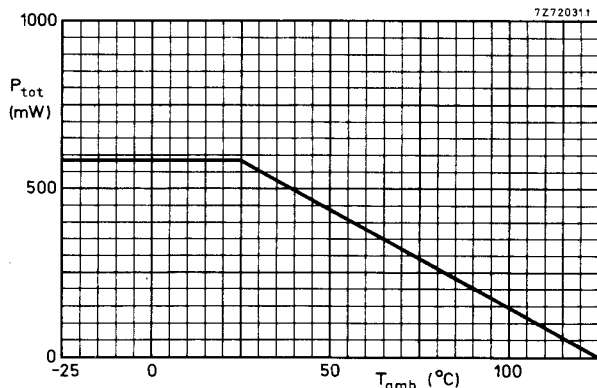


Fig. 2 Power dissipation derating curve.

D.C. CHARACTERISTICS

T_{amb} = 25 °C unless otherwise specified.

Supply voltage recording amplifier	V ₁₅₋₁₀	4 to 12 V
Supply voltage preamplifier	V ₁₆₋₅	4 to 12 V
Quiescent current rec. amplifier; V _p = 9 V	I ₁₅	typ. 10 mA
Quiescent current preamplifier; V _p = 9 V	I ₁₆	typ. 5 mA
Output voltage recording amplifier	V ₉₋₁₀	typ. ½ V _p V
Output voltage preamplifier	V ₄₋₅	typ. ½ V _p - 0,35 V

A.C. CHARACTERISTICS

$T_{amb} = 25^{\circ}\text{C}$; $V_p = 9\text{ V}$ unless otherwise specified.

Preamplifier (note 1)

			recording	playback
Open loop voltage gain	G_o	typ.	70	70 dB
Closed loop voltage gain at $f = 1\text{ kHz}$	G_c	typ.	38	45 dB
Output voltage (clipping level); r.m.s. value	$V_{4-5(rms)}$	typ.	2	2 V
Equivalent noise input voltage; r.m.s. value (note 2)	V_n	<	0,75	0,75 μV
Input impedance (pin 1)	$ Z_i $	typ.	16	16 k Ω
Total harmonic distortion				
$f = 1\text{ kHz}$; $V_{4-5} = 150\text{ mV}$	d_t	typ.	—	0,12 %
$f = 1\text{ kHz}$; $V_{4-5} = 500\text{ mV}$	d_t	<	0,2	—
Amplitude response			flat: 20 Hz to 20 kHz see Fig. 7	

Recording amplifier (Fig. 9)

with A.L.C.; unless otherwise specified.

Open loop gain	G_o	typ.	80 dB
Closed loop voltage gain at $f = 1\text{ kHz}$ (note 3)	G_c	typ.	49 dB
Output voltage (clipping level); r.m.s. value	$V_{9-10(rms)}$	typ.	2 V
Input impedance pin 8	$ Z_i $	typ.	40 k Ω
Input impedance pin 6			
low signal levels	$ Z_i $	typ.	250 k Ω
high signal levels	$ Z_i $	typ.	25 Ω
Total harmonic distortion		see Fig. 11	
Amplitude response (note 3)		see Fig. 10	

Automatic level control (see Fig. 8)

$V_{4-5} = 10\text{ mV}$; $f = 1\text{ kHz}$	V_{9-10}	typ.	250 mV
$V_{4-5} = 100\text{ mV}$; $f = 1\text{ kHz}$	V_{9-10}	typ.	450 mV
$V_{4-5} = 1000\text{ mV}$; $f = 1\text{ kHz}$	V_{9-10}	typ.	750 mV
$V_{4-5} = 2000\text{ mV}$; $f = 1\text{ kHz}$	V_{9-10}	typ.	880 mV
Limiting time (see Fig. 12)	t_l	typ.	10 ms
Level setting time (see Fig. 12)	t_s	typ.	4 s
Recovery time (see Fig. 13)	t_r	typ.	35 s

Notes

1. For recording see Fig. 3; for playback see Fig. 5.
2. $R_S = 500\text{ }\Omega$; bandwidth = 300 Hz to 15 kHz.
3. Pin 6 not connected to pin 8.

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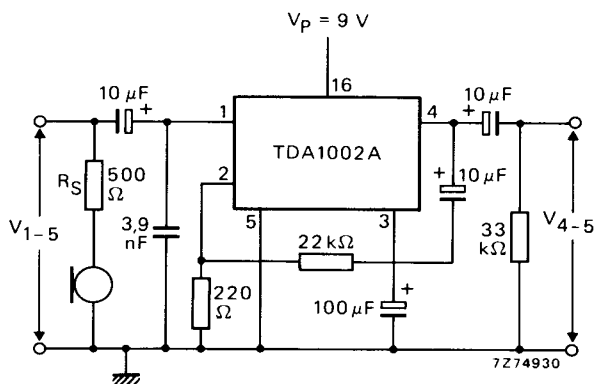


Fig. 3 Preamplifier used as microphone amplifier.

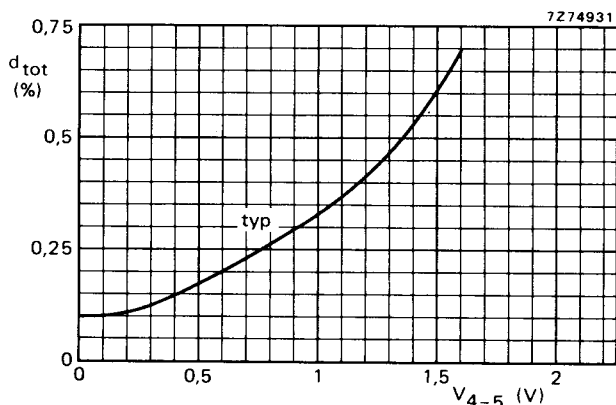


Fig. 4 Total harmonic distortion of preamplifier used for recording.

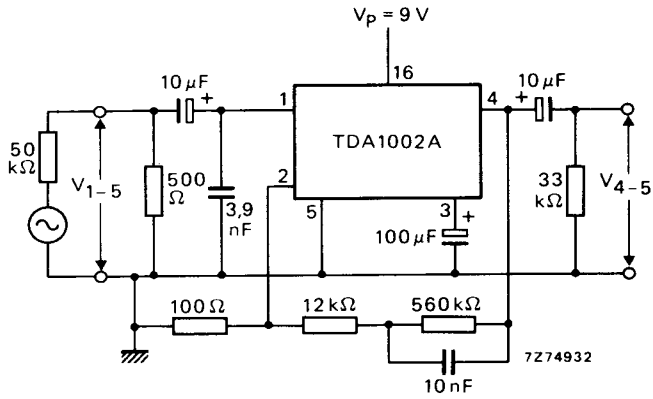


Fig. 5 Preamplifier used for playback.

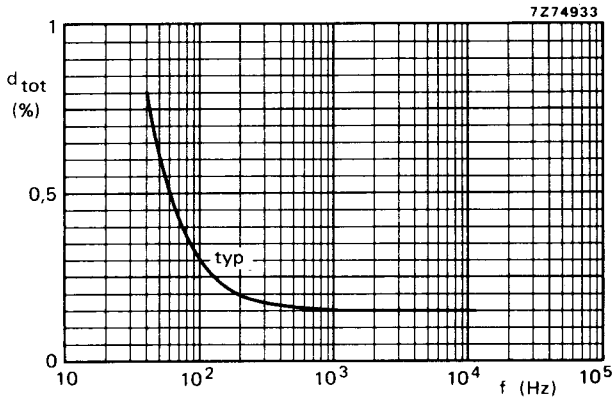


Fig. 6 Total harmonic distortion of preamplifier used for playback at $V_{4-5} = 150$ mV.

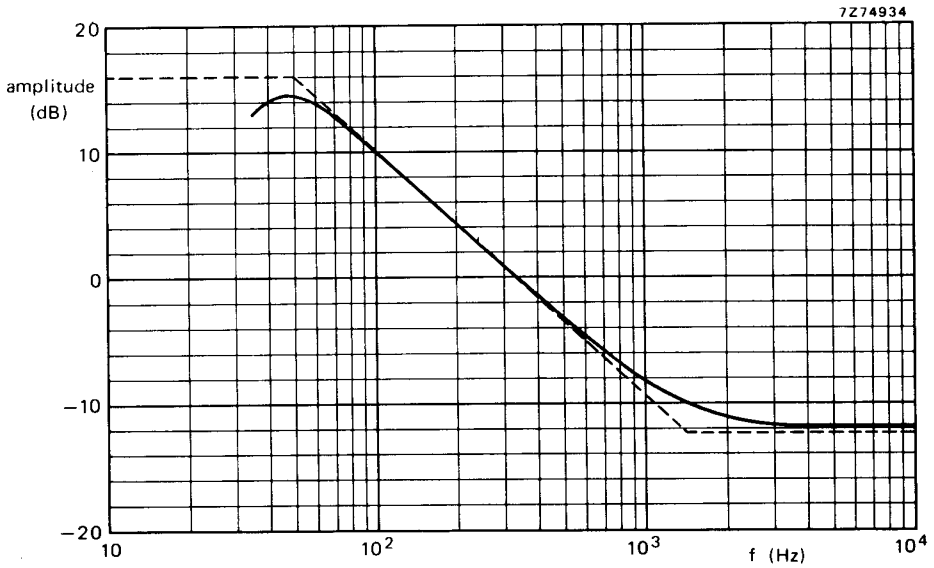


Fig. 7 Amplitude response of preamplifier used for playback; typical values.
0 dB = input voltage of 0,3 mV at $f = 333$ Hz. Dotted line according to DIN 45513.

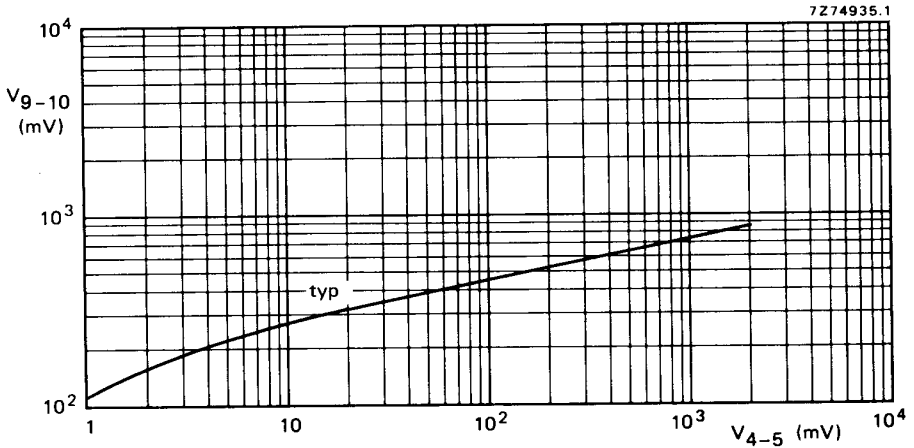


Fig. 8 Automatic level control; for circuitry see Fig. 9; $f = 1$ kHz.

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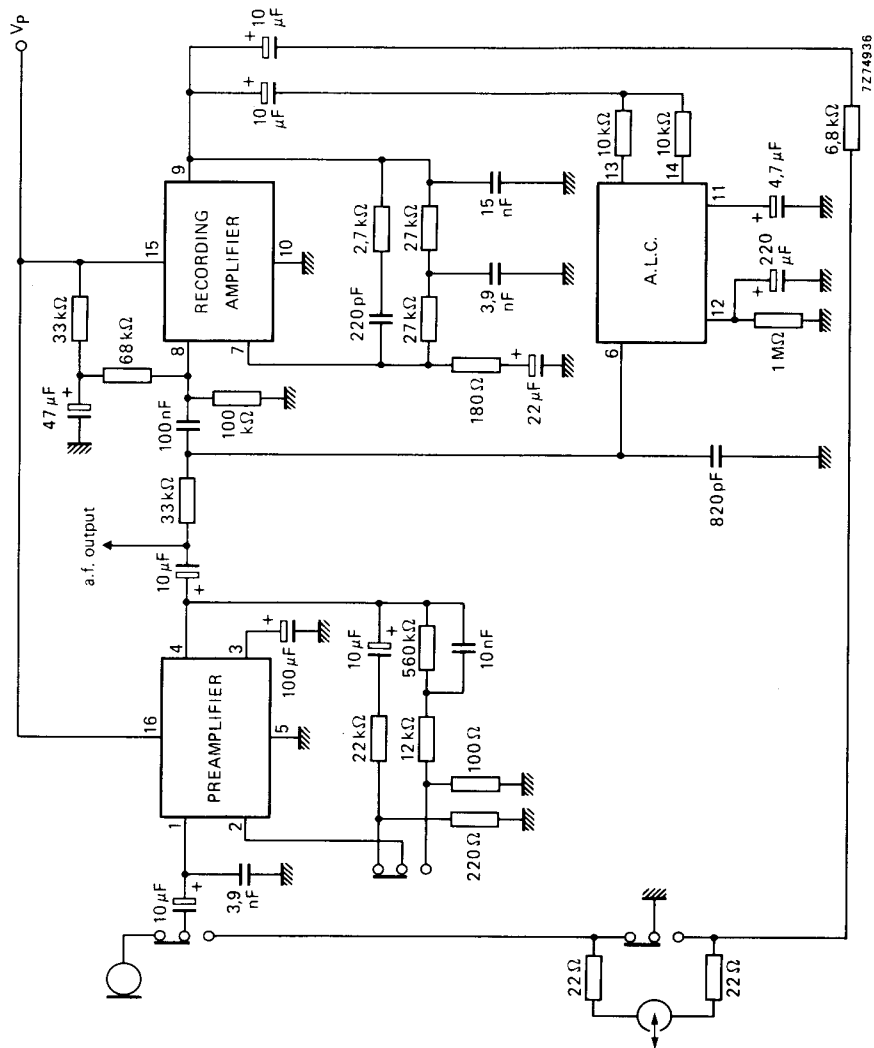


Fig. 9 Application of TDA1002A (recording position).

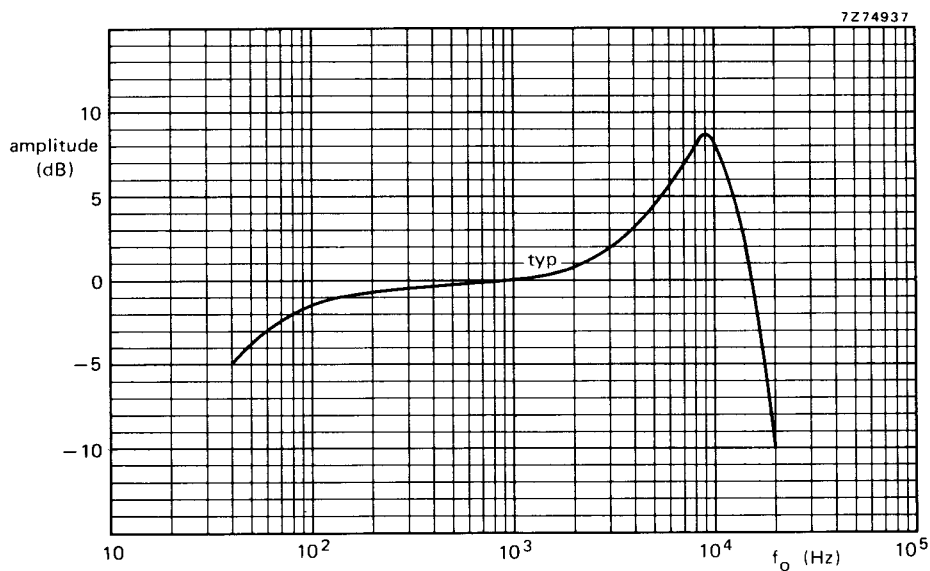
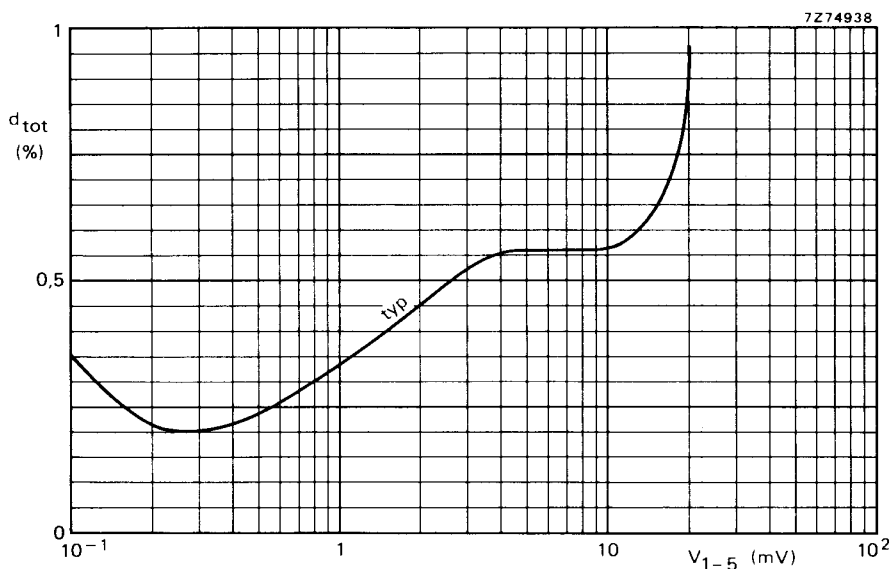


Fig. 10 Amplitude response of recording amplifier (A.L.C. not connected).

Fig. 11 Total harmonic distortion recording amplifier with A.L.C.; $f = 1$ kHz.

TIMING DIAGRAMS

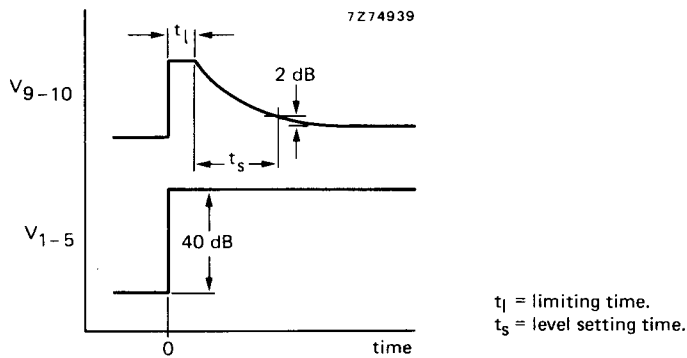


Fig. 12 Output response at input level jumps.

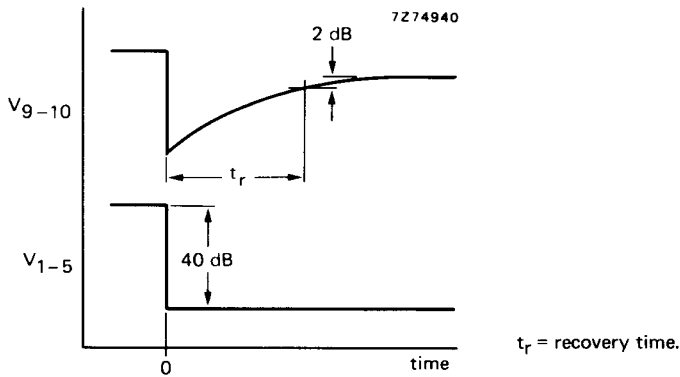


Fig. 13 Output response at input level jumps.