DOLBY NOISE REDUCTION SYSTEM — NE660

Preliminary

DESCRIPTION

The NE660 is a monolithic audio noise reduction circuit designed for low power supply voltage applications. It is used to reduce the level of background noise introduced during recording and playback of audio signals on magnetic tape. This circuit is available only to licensees of Dolby* Laboratories Licensing Corporation, San Francisco, California.

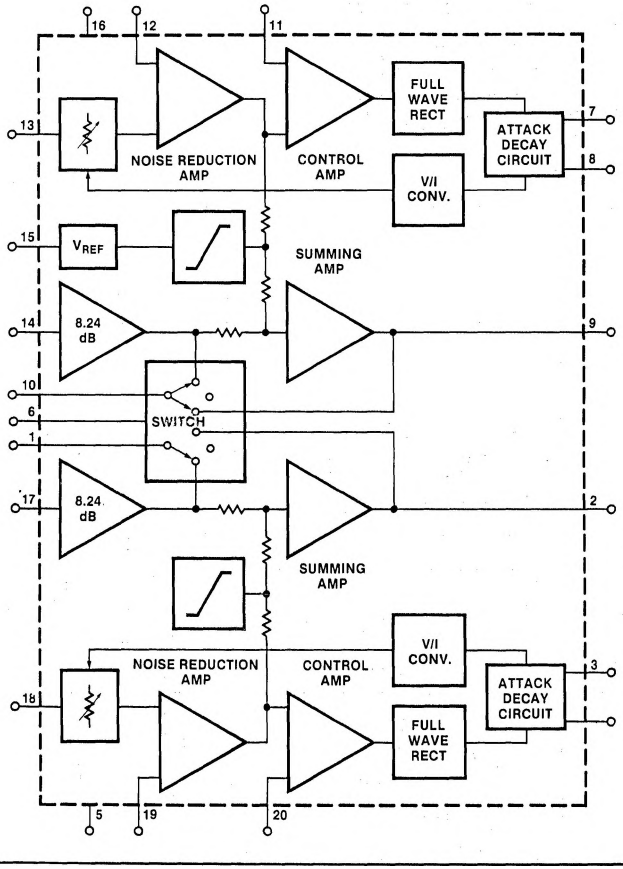
FEATURES

- **Low voltage operation**
- **Large headroom (17dB typical at 1.8V)**
- **Single or dual supply operation**
- **Excellent channel to channel matching**
- **Low noise**
- **Very low distortion**
- **Electronic Record/Play, on/off switch**
- **Minimum external part count**

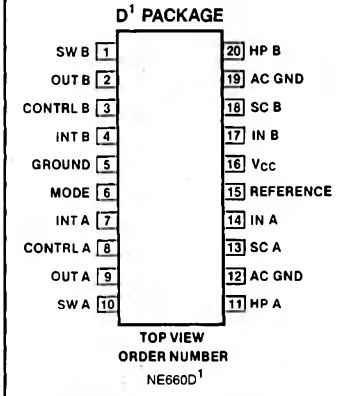
ABSOLUTE MAXIMUM RATINGS

PARAMETER	RATING	UNIT
Supply voltage	8	V
Temperature range		
Operating	−20 to +70	°C
Storage	−65 to +150	°C

BLOCK DIAGRAM



PIN CONFIGURATION



1. Switch output channel B
2. Output channel B
3. Control voltage B
4. Integrating filter B
5. Ground
6. Mode
7. Integrating filter A
8. Control voltage A
9. Output channel A
10. Switch output channel A
11. High pass filter channel A
12. AC ground channel A
13. Side chain channel A
14. Input channel A
15. Reference
16. V_{CC}
17. Input channel B
18. Side chain channel B
19. AC ground channel B
20. High pass filter channel B

1. SOL - Released in Large SO package only.
2. SOL and non-standard pinout.
3. SO and non-standard pinots.

*Available only to licensees of Dolby Laboratories Corporation, San Francisco, from whom licensing and application information must be obtained.
Dolby is a registered trademark of Dolby Laboratories Corporation, San Francisco, California.

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ELECTRICAL CHARACTERISTICS STANDARD CONDITIONS: $V_{CC} = 3V$, frequency range: 20Hz-20kHz, $T_A = 25°C$. All levels referenced to 77.5mV = 0dB at test point (T.P.) In test circuit of Fig. 1.

SYMBOL & PARAMETER	MODE	FREQ. Hz	TEST CONDITIONS	LIMITS			UNIT
				MIN	TYP	MAX	
Supply Voltage Range				1.8	3	7	V
Supply Current	Off		No input signal		6	9	mA
Voltage Gain	Off	1K	$20 \log \frac{V \text{ (Pin 2 or 9)}}{V \text{ (Pin 17 or 14)}}$	7.25	8.25	9.25	dB
Signal Handling at Output, Note 1	Off	1K	THD = 1%		20		dB
	R	1K	THD = 1%	18	22		dB
			$V_{CC} = 1.8V$, THD = 1%	12	17		dB
Distortion, Note 4	Off	1K	0dB		.02	.1	%
Distortion + Noise			+ 12dB		.03	.15	%
Distortion, Note 4	R	1K	0dB		.03	.25	%
Distortion + Noise			+ 12dB		.04	.2	%
Signal to Noise Ratio, Note 2	R		CCIR/ARM	64	69		dB
	P				80		dB
Frequency Response, Note 3	R	1K	T.P. Level = 0dB	− 1	0	+ 1	dB
		10K		− 1	+ .3	+ 1.5	dB
		2K	T.P. Level = − 25dB	− 19.5	− 18	− 16.5	dB
		10K	T.P. Level = − 30dB	− 25	− 23.5	− 22	dB
		5K	T.P. Level = − 40dB	− 30.2	− 29.7	− 28.7	dB
Channel to Channel Unbalance	R	2K	T.P. Level = − 20dB		.2	1.3	dB
Channel to Channel Crosstalk	R	2K	0dB in Channel "A"	50			dB
Ripple Rejection	R	50			48		dB
Input Resistance			No input termination	35	50	65	kOhm
Switching Thresholds (Relative to Voltage on Pin 15)	Off		Voltage at Pin 6	− .5		+ .5	V
	R			+ .8			V
	P					− .8	V
Maximum Frequency Response Shift vs. Temperature (Relative to $T_A = 25°C$)	R	20Hz to 20K	$-20 \leqq T_A \leqq 70°C$		± 1		dB
Maximum Frequency Response Shift vs. Supply Voltage (Relative to $V_{CC} = 3V$)	R	2K	T.P. Level = − 20dB $1.8 \leqq V_{CC} \leqq 7V$		± .2	± .6	dB

NOTES:
1. 12dB headroom guaranteed at 1.8V; however, system remains operational to $V_{CC} \geq 1.6V$.
2. See Dolby Laboratories bulletin No. 19.
3. In DC coupled configuration when Pins 12 and 19 are connected to Pin 15, the RECORD curves might read slightly different than in AC coupled mode (Fig. 1). The variation is typically .5dB at the worst case input level/frequency combination. A slight degradation of Channel to Channel Crosstalk will also occur. When device is intended for use in DC coupled configuration, factory test is to be requested accordingly.
4. 0dB distortion is specified with each harmonic measured in a 20Hz B.W. 12dB distortion is specified as the wideband (20Hz-20kHz) measurement of the harmonics plus noise.

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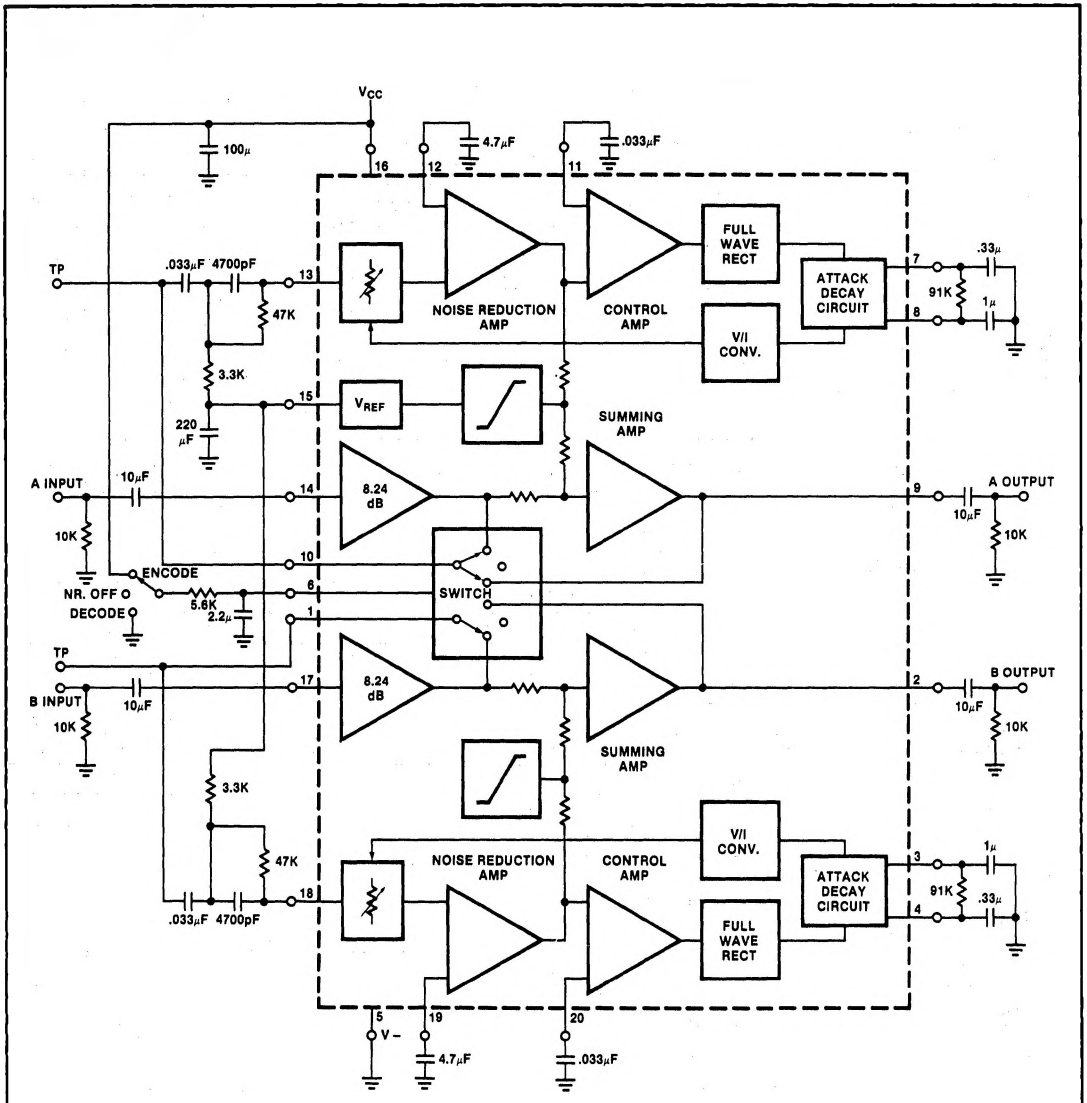

Figure 1. Test Circuit

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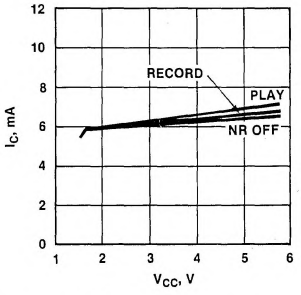

Figure 2. Supply Current vs. V_{CC}

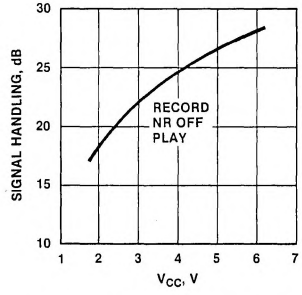

Figure 3. Signal Handling (THD — 1%)

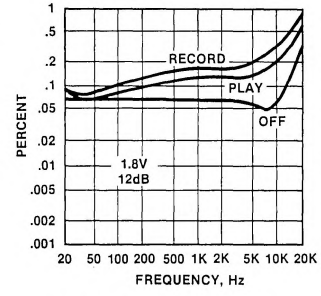

Figure 4. Distortion + Noise

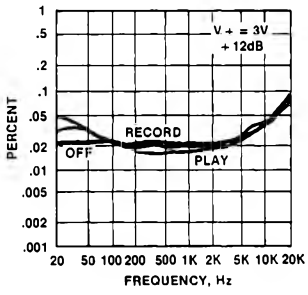

Figure 5. Harmonic Distortion + Noise

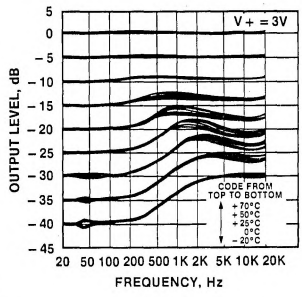

Figure 6. Encode Transfer Curve Shift With Temperature

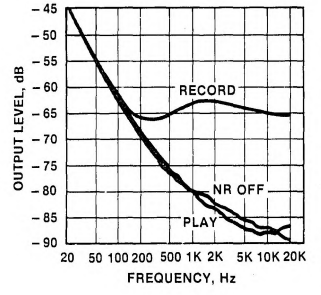

Figure 7. Crosstalk, $V_{CC} = 3V$