



ELECTRONICS, INC.  
 44 FARRAND STREET  
 BLOOMFIELD, NJ 07003  
 (973) 748-5089  
<http://www.nteinc.com>

## NTE944 & NTE944M Integrated Circuit Programmable Operational Amplifier

**Description:**

The NTE944 (8-Lead Metal Can) and NTE944M (8-Lead MiniDIP) are extremely versatile programmable monolithic operational amplifiers. A single external master bias current setting resistor programs the input bias current, input offset current, quiescent power consumption, slew rate, input noise, and the gain-bandwidth product. These devices are truly general purpose operational amplifiers.

**Features:**

- $\pm 1V$  to  $\pm 18V$  power supply operation
- 3nA input offset current
- Standby power consumption as low as 500nW
- No frequency compensation required
- Programmable electrical characteristics
- Offset voltage nulling capability
- Can be powered by two flashlight batteries
- Short circuit protection

**Absolute Maximum Ratings:**

Supply Voltage	$\pm 18V$
Power Dissipation (Note 1)	500mW
Differential Input Voltage	$\pm 30V$
Input Voltage (Note 2)	$\pm 15V$
$I_{SET}$ Current	150 $\mu A$
Output Short Circuit Duration	Indefinite
Operating Temperature Range	$0^{\circ} \leq T_A \leq +70^{\circ}C$
Storage Temperature Range	$-65^{\circ}$ to $+150^{\circ}C$
Lead Temperature (Soldering, 10sec)	$+300^{\circ}C$

Note 1. The maximum junction temperature of the NTE944 is 100°C. For operating at elevated temperatures, the NTE944 must be derated based on a thermal resistance of 150°C/W junction to ambient, or 45°C/W junction to case. The thermal resistance of the NTE944M is +125°C/W.

Note 2. For supply voltages less than  $\pm 15V$ , the absolute maximum input voltage is equal to the supply voltage.

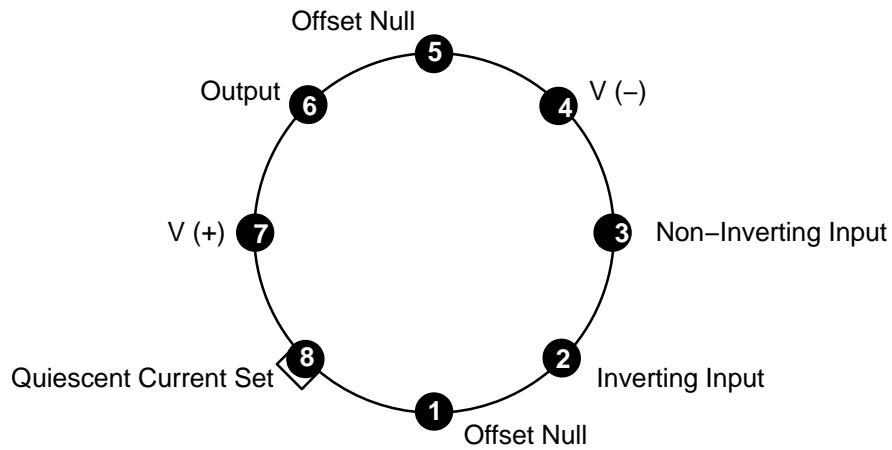
**Electrical Characteristics:** ( $0^{\circ} \leq T_A \leq +70^{\circ}\text{C}$ , unless otherwise specified)

Parameter	Test Conditions		$I_{SET} = 1\mu\text{A}$		$I_{SET} = 10\mu\text{A}$		Unit
			Min	Max	Min	Max	
$V_{OS}$	$V_S = \pm 1.5\text{V}$	$T_A = +25^{\circ}\text{C}, R_S \leq 100\text{k}\Omega$	–	5	–	6	mV
	$V_S = \pm 15\text{V}$		–	5	–	6	mV
	$V_S = \pm 1.5\text{V}$	$R_S \leq 10\text{k}\Omega$	–	6.5	–	7.5	mV
	$V_S = \pm 15\text{V}$		–	6.5	–	7.5	mV
$I_{OS}$	$V_S = \pm 1.5\text{V}$	$T_A = +25^{\circ}\text{C}$	–	6	–	20	nA
	$V_S = \pm 15\text{V}$		–	6	–	20	nA
	$V_S = \pm 1.5\text{V}$		–	8	–	25	nA
	$V_S = \pm 15\text{V}$		–	8	–	25	nA
$I_{bias}$	$V_S = \pm 1.5\text{V}$	$T_A = +25^{\circ}\text{C}$	–	10	–	75	nA
	$V_S = \pm 15\text{V}$		–	10	–	75	nA
	$V_S = \pm 1.5\text{V}$		–	10	–	80	nA
	$V_S = \pm 15\text{V}$		–	10	–	80	nA
Large Signal Voltage Gain	$V_S = \pm 1.5\text{V}$	$T_A = +25^{\circ}\text{C}, R_L \leq 100\text{k}\Omega$	25k	–	–	–	
		$V_O = \pm 0.6\text{V}, R_L \leq 10\text{k}\Omega$	–	–	25k	–	
	$V_S = \pm 15\text{V}$	$T_A = +25^{\circ}\text{C}, R_L \leq 100\text{k}\Omega$	60k	–	–	–	
		$V_O = \pm 10\text{V}, R_L \leq 10\text{k}\Omega$	–	–	60k	–	
	$V_S = \pm 1.5\text{V}$	$V_O = \pm 0.5\text{V}, R_L = 100\text{k}\Omega$	25k	–	–	–	
		$R_L = 10\text{k}\Omega$	–	–	25k	–	
	$V_S = \pm 15\text{V}$	$V_O = \pm 10\text{V}, R_L = 100\text{k}\Omega$	50k	–	–	–	
		$R_L = 10\text{k}\Omega$	–	–	50k	–	
Supply Current	$V_S = \pm 1.5\text{V}$	$T_A = +25^{\circ}\text{C}$	–	8	–	90	$\mu\text{A}$
	$V_S = \pm 15\text{V}$		–	11	–	100	$\mu\text{A}$
	$V_S = \pm 1.5\text{V}$		–	8	–	90	$\mu\text{A}$
	$V_S = \pm 15\text{V}$		–	11	–	100	$\mu\text{A}$
Power Consumption	$V_S = \pm 1.5\text{V}$	$T_A = +25^{\circ}\text{C}$	–	24	–	270	$\mu\text{W}$
	$V_S = \pm 15\text{V}$		–	330	–	3k	$\mu\text{W}$
	$V_S = \pm 1.5\text{V}$		–	24	–	270	$\mu\text{W}$
	$V_S = \pm 15\text{V}$		–	330	–	3k	$\mu\text{W}$
Output Voltage Swing	$V_S = \pm 1.5\text{V}$	$R_L = 100\text{k}\Omega$	$\pm 0.6$	–	–	–	V
		$R_L = 10\text{k}\Omega$	–	–	$\pm 0.6$	–	V
	$V_S = \pm 15\text{V}$	$R_L = 100\text{k}\Omega$	$\pm 12$	–	–	–	V
		$R_L = 10\text{k}\Omega$	–	–	$\pm 12$	–	V
Common Mode Rejection Ratio	$V_S = \pm 1.5\text{V}$	$R_S \leq 10\text{k}\Omega$	70	–	70	–	dB
	$V_S = \pm 15\text{V}$		70	–	70	–	dB
Supply Voltage Rejection Ratio	$V_S = \pm 1.5\text{V}$	$R_S \leq 10\text{k}\Omega$	74	–	74	–	dB
	$V_S = \pm 15\text{V}$		74	–	74	–	dB

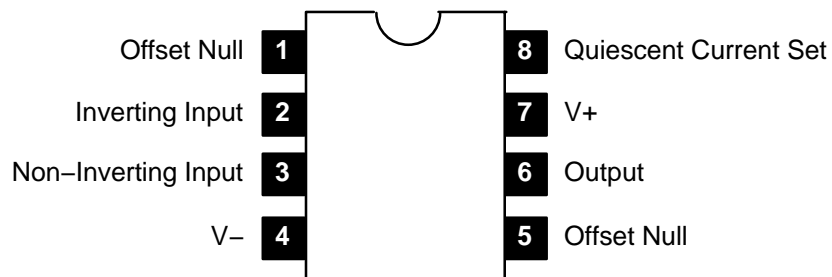
**Resistor Biasing:** (Set Current Setting Resistor to V<sub>-</sub>)

V <sub>S</sub>	I <sub>SET</sub>				
	0.1μA	0.5μA	1.0μA	5μA	10μA
±1.5V	25.6MΩ	5.04MΩ	2.5MΩ	492.0kΩ	244.0kΩ
±3.0V	55.6MΩ	11.0MΩ	5.5MΩ	1.09MΩ	544.0kΩ
±6.0V	116.0MΩ	23.0MΩ	11.5MΩ	2.29MΩ	1.14MΩ
±9.0V	176.0MΩ	35.0MΩ	17.5MΩ	3.49MΩ	1.74MΩ
±12.0V	236.0MΩ	47.0MΩ	23.5MΩ	4.69MΩ	2.34MΩ
±15.0V	296.0MΩ	59.0MΩ	29.5MΩ	5.89MΩ	2.94MΩ

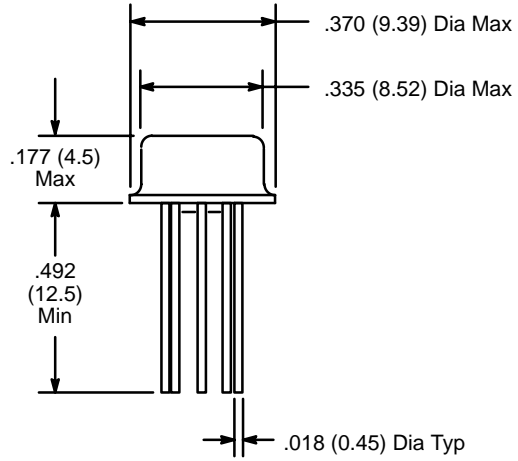
**Pin Connection Diagram**  
**NTE944**  
 (Top View)



**Pin Connection Diagram**  
**NTE944M**



**Dimensional Drawing  
NTE944**



**Dimensional Drawing  
NTE944M**

