

**ORDERING INFORMATION**

| Device    | Alternate             | Temperature Range | Package     |
|-----------|-----------------------|-------------------|-------------|
| MC1741CD  | —                     | 0°C to +75°C      | SO-8        |
| MC1741CG  | LM741CH, $\mu$ A741HC | 0°C to +75°C      | Metal Can   |
| MC1741CP1 | LM741CN, $\mu$ A741YC | 0°C to +75°C      | Plastic DIP |
| MC1741CU  | —                     | 0°C to +75°C      | Ceramic DIP |
| MC1741G   | —                     | -55°C to +125°C   | Metal Can   |
| MC1741U   | —                     | -55°C to +125°C   | Ceramic DIP |

**MC1741  
MC1741C**

**2**

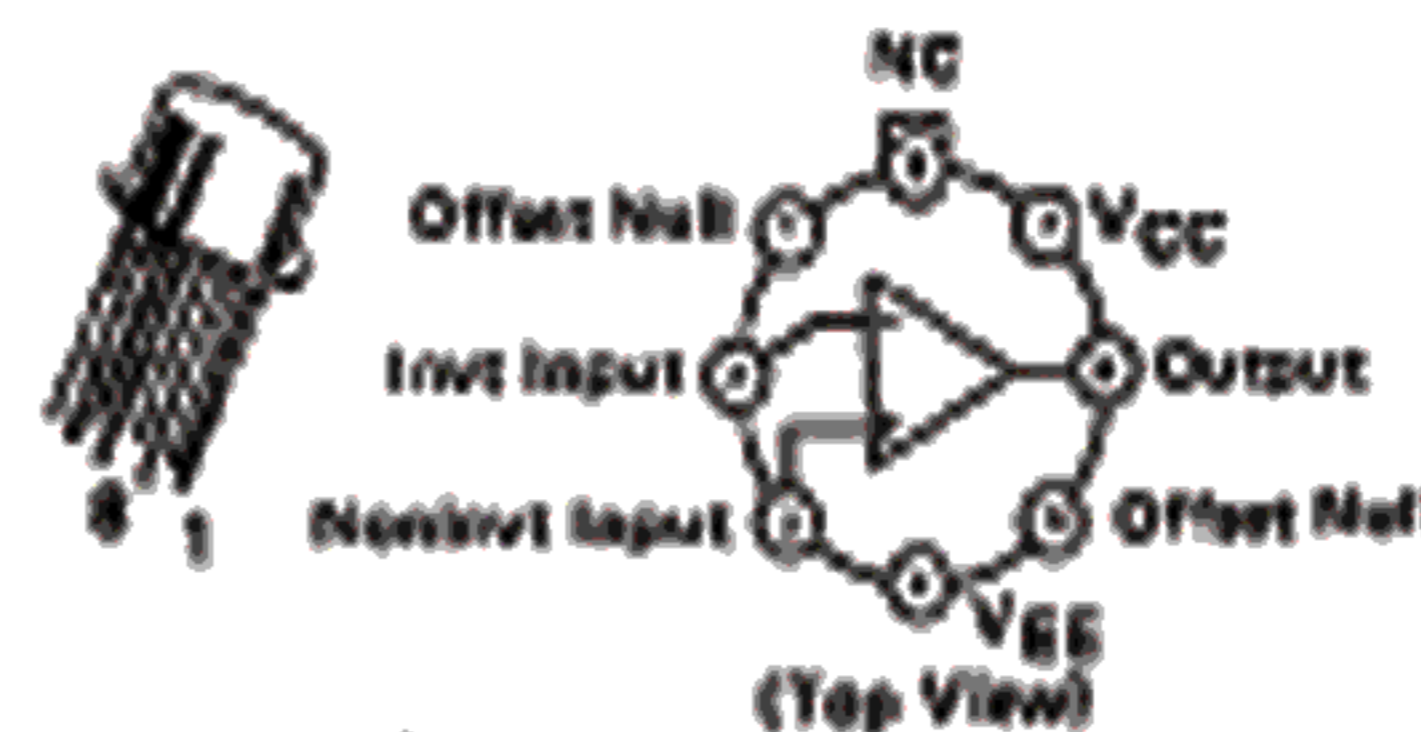
**INTERNALLY COMPENSATED, HIGH PERFORMANCE OPERATIONAL AMPLIFIERS**

... designed for use as a summing amplifier, integrator, or amplifier with operating characteristics as a function of the external feedback components.

- No Frequency Compensation Required
- Short-Circuit Protection
- Offset Voltage Null Capability
- Wide Common-Mode and Differential Voltage Ranges
- Low-Power Consumption
- No Latch Up

**OPERATIONAL AMPLIFIER  
SILICON MONOLITHIC  
INTEGRATED CIRCUIT**

**G SUFFIX  
METAL PACKAGE  
CASE 601-04**



**P1 SUFFIX  
PLASTIC PACKAGE  
CASE 628-05**



**U SUFFIX  
CERAMIC PACKAGE  
CASE 693-02**

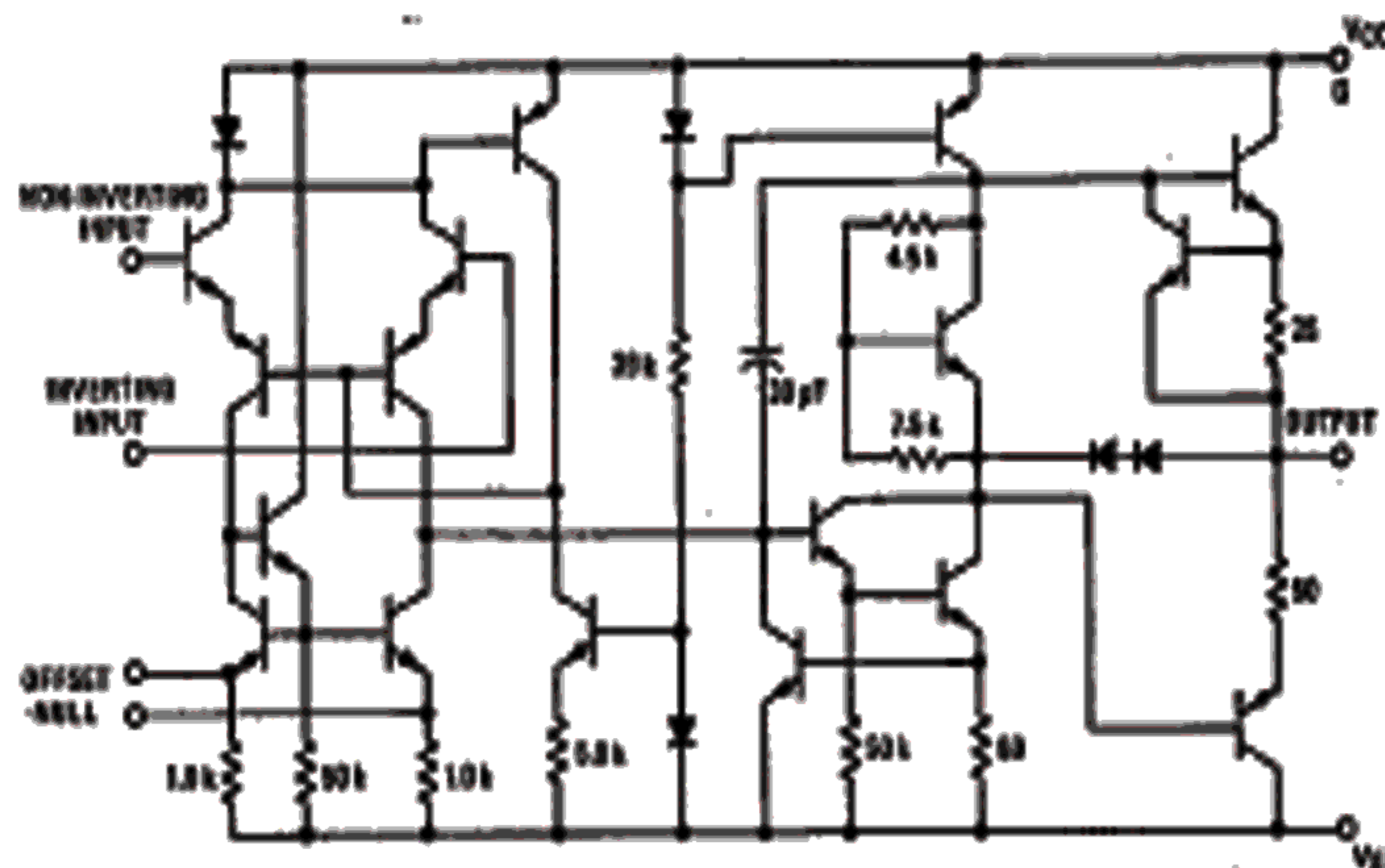


**MAXIMUM RATINGS (T<sub>A</sub> = +25°C unless otherwise noted)**

| Rating  | Symbol           | MC1741C     | MC1741      | Unit  |
|---|------------------|-------------|-------------|-------|
| Power Supply Voltage  | V <sub>CC</sub>  | +18         | +22         | Vdc   |
|   | V <sub>EE</sub>  | -18         | -22         | Vdc   |
| Input Differential Voltage  | V <sub>ID</sub>  | ±30         |             | Volts |
| Input Common Mode Voltage (Note 1)  | V <sub>ICM</sub> | ±15         |             | Volts |
| Output Short Circuit Duration (Note 2)                                      | t <sub>s</sub>   | Continuous  |             |       |
| Operating Ambient Temperature Range   | T <sub>A</sub>   | 0 to +70    | -55 to +125 | °C    |
| Storage Temperature Range<br>Metal and Ceramic Packages<br>Plastic Packages | T <sub>stg</sub> | -65 to +150 |             | °C    |
|   |                  | -55 to +125 |             |       |

Note 1. For supply voltages less than +15 V, the absolute maximum input voltage is equal to the supply voltage.  
Note 2. Supply voltage equal to or less than 15 V.

**EQUIVALENT CIRCUIT SCHEMATIC**



**MOTOROLA LINEAR/INTERFACE DEVICES**

ELECTRICAL CHARACTERISTICS ( $V_{CC} = +15\text{ V}$ ,  $V_{EE} = -15\text{ V}$ ,  $T_A = 25^\circ\text{C}$  unless otherwise noted).

| Characteristic   | Symbol    | MC1741               |                      |     | MC1741C              |                      |     | Unit             |
|--|-----------|----------------------|----------------------|-----|----------------------|----------------------|-----|------------------|
|  |           | Min                  | Typ                  | Max | Min                  | Typ                  | Max |                  |
| Input Offset Voltage<br>( $R_G \leq 10\text{ k}$ )   | $V_{IO}$  | -                    | 1.0                  | 6.0 | -                    | 2.0                  | 6.0 | mV               |
| Input Offset Current   | $I_{IO}$  | -                    | 20                   | 200 | -                    | 20                   | 200 | nA               |
| Input Bias Current   | $I_{IB}$  | -                    | 80                   | 500 | -                    | 80                   | 500 | nA               |
| Input Resistance   | $r_i$     | 0.3                  | 2.0                  | -   | 0.3                  | 2.0                  | -   | M $\Omega$       |
| Input Capacitance  | $C_i$     | -                    | 1.4                  | -   | -                    | 1.4                  | -   | pF               |
| Offset Voltage Adjustment Range  | $V_{IOA}$ | -                    | $\pm 15$             | -   | -                    | $\pm 15$             | -   | mV               |
| Common Mode Input Voltage Range  | $V_{ICR}$ | $\pm 12$             | $\pm 13$             | -   | $\pm 12$             | $\pm 13$             | -   | V                |
| Large Signal Voltage Gain<br>( $V_O = \pm 10\text{ V}$ , $R_L \geq 2.0\text{ k}$ )   | $A_v$     | 50                   | 200                  | -   | 20                   | 200                  | -   | V/mV             |
| Output Resistance  | $r_o$     | -                    | 75                   | -   | -                    | 75                   | -   | $\Omega$         |
| Common Mode Rejection Ratio<br>( $R_G \leq 10\text{ k}$ )  | CMRR      | 70                   | 90                   | -   | 70                   | 90                   | -   | dB               |
| Supply Voltage Rejection Ratio<br>( $R_G \leq 10\text{ k}$ )   | PSRR      | -                    | 30                   | 150 | -                    | 30                   | 100 | $\mu\text{V/V}$  |
| Output Voltage Swing<br>( $R_L \geq 10\text{ k}$ )<br>( $R_L \geq 2\text{ k}$ )  | $V_O$     | $\pm 12$<br>$\pm 10$ | $\pm 14$<br>$\pm 13$ | -   | $\pm 12$<br>$\pm 10$ | $\pm 14$<br>$\pm 13$ | -   | V                |
| Output Short-Circuit Current   | $I_{OS}$  | -                    | 20                   | -   | -                    | 20                   | -   | mA               |
| Supply Current   | $I_D$     | -                    | 1.7                  | 2.8 | -                    | 1.7                  | 2.8 | mA               |
| Power Consumption  | $P_C$     | -                    | 50                   | 85  | -                    | 50                   | 85  | mW               |
| Transient Response (Unity Gain - Non-Inverting)<br>( $V_i = 20\text{ mV}$ , $R_L \geq 2\text{ k}$ , $C_L \leq 100\text{ pF}$ ) |           |                      |                      |     |                      |                      |     |                  |
| Rise Time  | $t_{RH}$  | -                    | 0.3                  | -   | -                    | 0.3                  | -   | $\mu\text{s}$    |
| Overshoot  | os        | -                    | 15                   | -   | -                    | 15                   | -   | %                |
| Slew Rate<br>( $V_i = 10\text{ V}$ , $R_L \geq 2\text{ k}$ , $C_L \leq 100\text{ pF}$ )  | SR        | -                    | 0.5                  | -   | -                    | 0.5                  | -   | V/ $\mu\text{s}$ |

ELECTRICAL CHARACTERISTICS ( $V_{CC} = +15\text{ V}$ ,  $V_{EE} = -15\text{ V}$ ,  $T_A = T_{low}$  to  $T_{high}$  unless otherwise noted).

| Characteristic   | Symbol    | MC1741               |                      |                  | MC1741C |     |          | Unit            |
|--|-----------|----------------------|----------------------|------------------|---------|-----|----------|-----------------|
|  |           | Min                  | Typ                  | Max              | Min     | Typ | Max      |                 |
| Input Offset Voltage<br>( $R_G \leq 10\text{ k}$ )   | $V_{IO}$  | -                    | 1.0                  | 6.0              | -       | -   | 7.5      | mV              |
| Input Offset Current<br>( $T_A = 125^\circ\text{C}$ )<br>( $T_A = -55^\circ\text{C}$ )<br>( $T_A = 0^\circ\text{C}$ to $+70^\circ\text{C}$ ) | $I_{IO}$  | -                    | 7.0<br>85<br>-       | 300<br>500<br>-  | -       | -   | -<br>300 | nA              |
| Input Bias Current<br>( $T_A = 125^\circ\text{C}$ )<br>( $T_A = -55^\circ\text{C}$ )<br>( $T_A = 0^\circ\text{C}$ to $+70^\circ\text{C}$ )   | $I_{IB}$  | -                    | 30<br>300<br>-       | 600<br>1500<br>- | -       | -   | -<br>800 | nA              |
| Common Mode Input Voltage Range  | $V_{ICR}$ | $\pm 12$             | $\pm 13$             | -                | -       | -   | -        | V               |
| Common Mode Rejection Ratio<br>( $R_G \leq 10\text{ k}$ )  | CMRR      | 70                   | 90                   | -                | -       | -   | -        | dB              |
| Supply Voltage Rejection Ratio<br>( $R_G \leq 10\text{ k}$ )   | PSRR      | -                    | 30                   | 150              | -       | -   | -        | $\mu\text{V/V}$ |
| Output Voltage Swing<br>( $R_L \geq 10\text{ k}$ )<br>( $R_L \geq 2\text{ k}$ )  | $V_O$     | $\pm 12$<br>$\pm 10$ | $\pm 14$<br>$\pm 13$ | -                | -       | -   | -        | V               |
| Large Signal Voltage Gain<br>( $R_L \geq 2\text{ k}$ , $V_{out} = \pm 10\text{ V}$ )   | $A_v$     | 25                   | -                    | -                | 15      | -   | -        | V/mV            |
| Supply Currents<br>( $T_A = 125^\circ\text{C}$ )<br>( $T_A = -55^\circ\text{C}$ )  | $I_D$     | -                    | 1.5<br>2.0           | 2.5<br>3.3       | -       | -   | -        | mA              |
| Power Consumption ( $T_A = +125^\circ\text{C}$ )<br>( $T_A = -55^\circ\text{C}$ )  | $P_C$     | -                    | 45<br>60             | 75<br>100        | -       | -   | -        | mW              |

\* $T_{high} = 125^\circ\text{C}$  for MC1741 and  $70^\circ\text{C}$  for MC1741C  
 $T_{low} = -55^\circ\text{C}$  for MC1741 and  $0^\circ\text{C}$  for MC1741C

FIGURE 1 - BURST NOISE versus SOURCE RESISTANCE

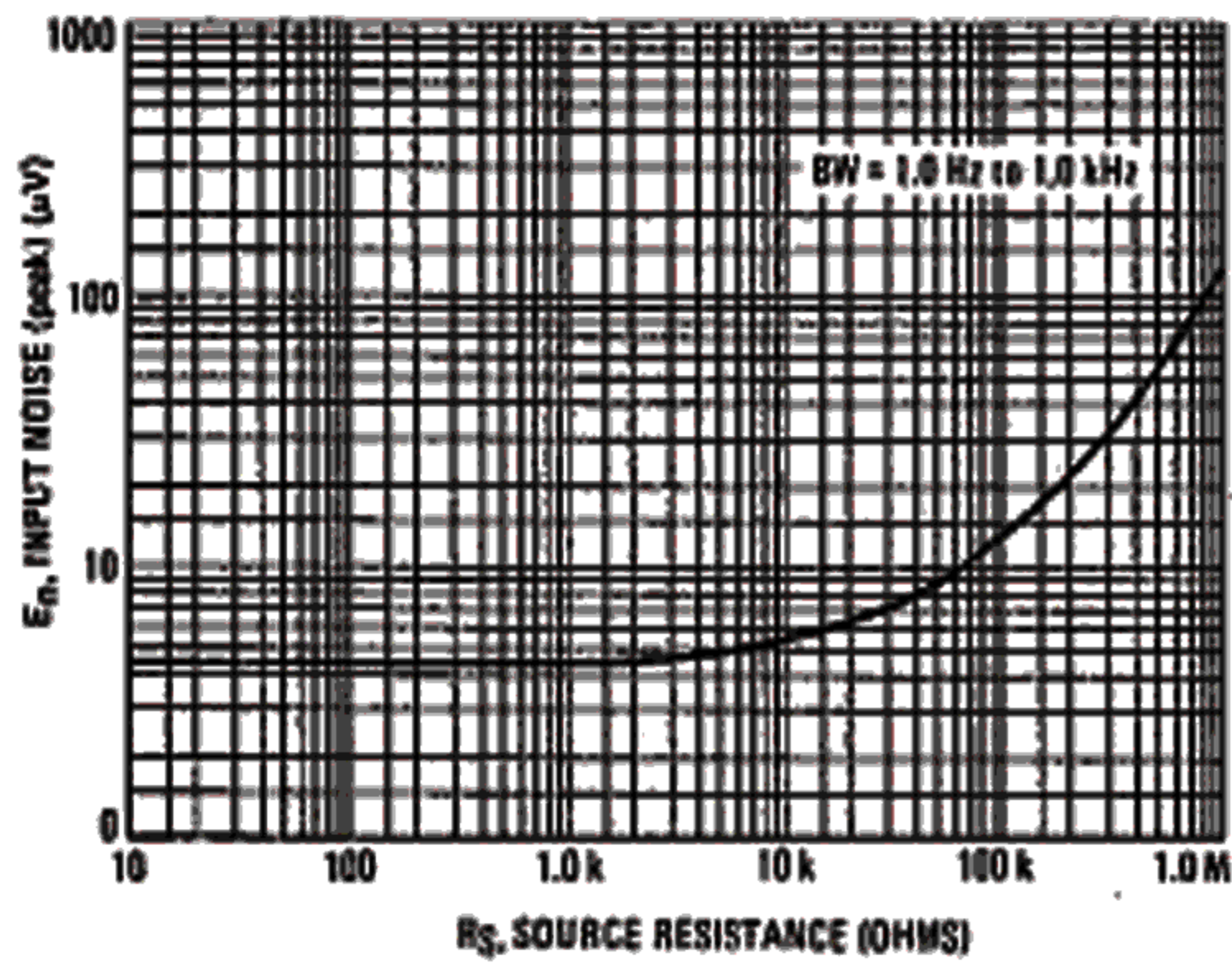


FIGURE 2 - RMS NOISE versus SOURCE RESISTANCE

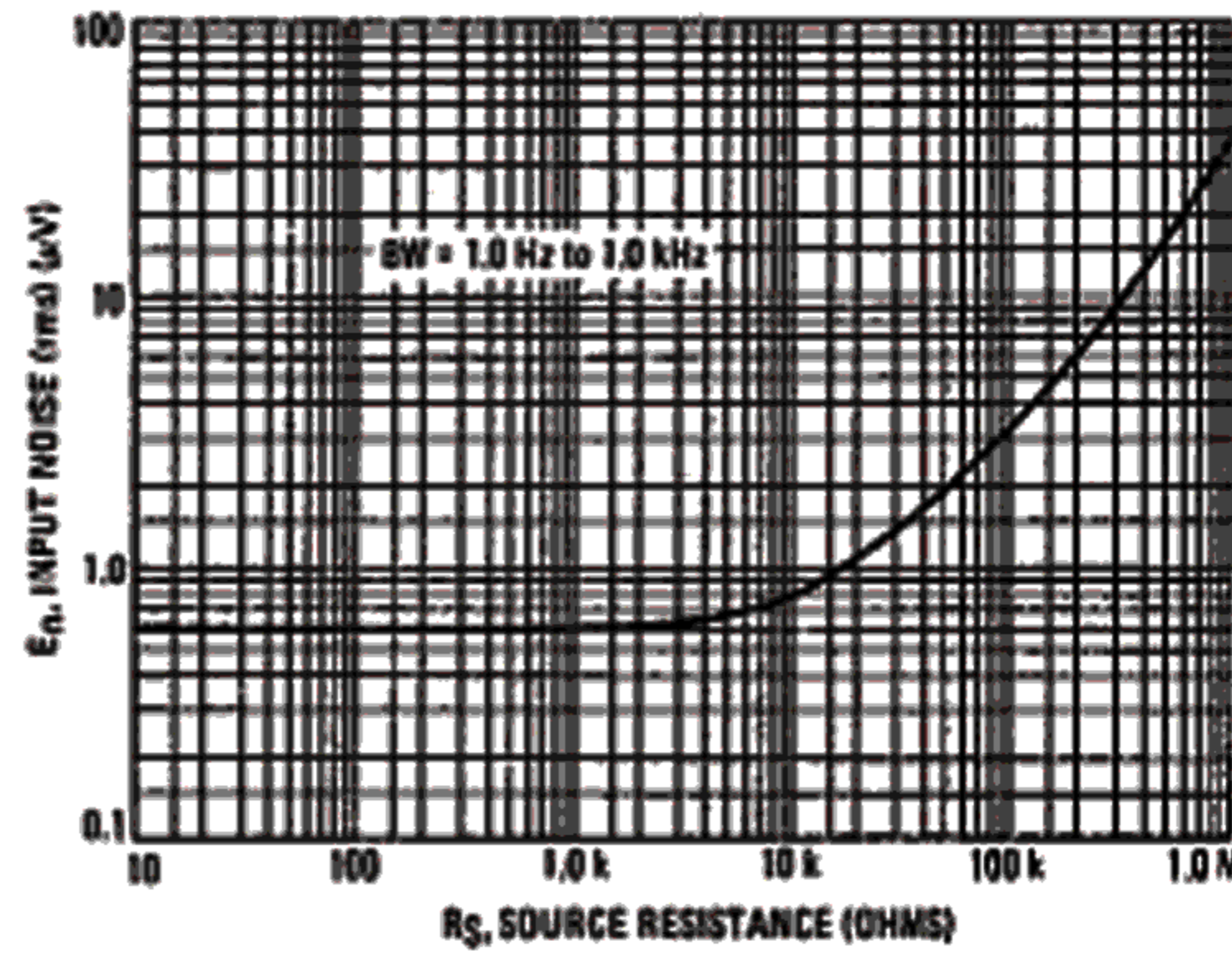


FIGURE 3 - OUTPUT NOISE versus SOURCE RESISTANCE

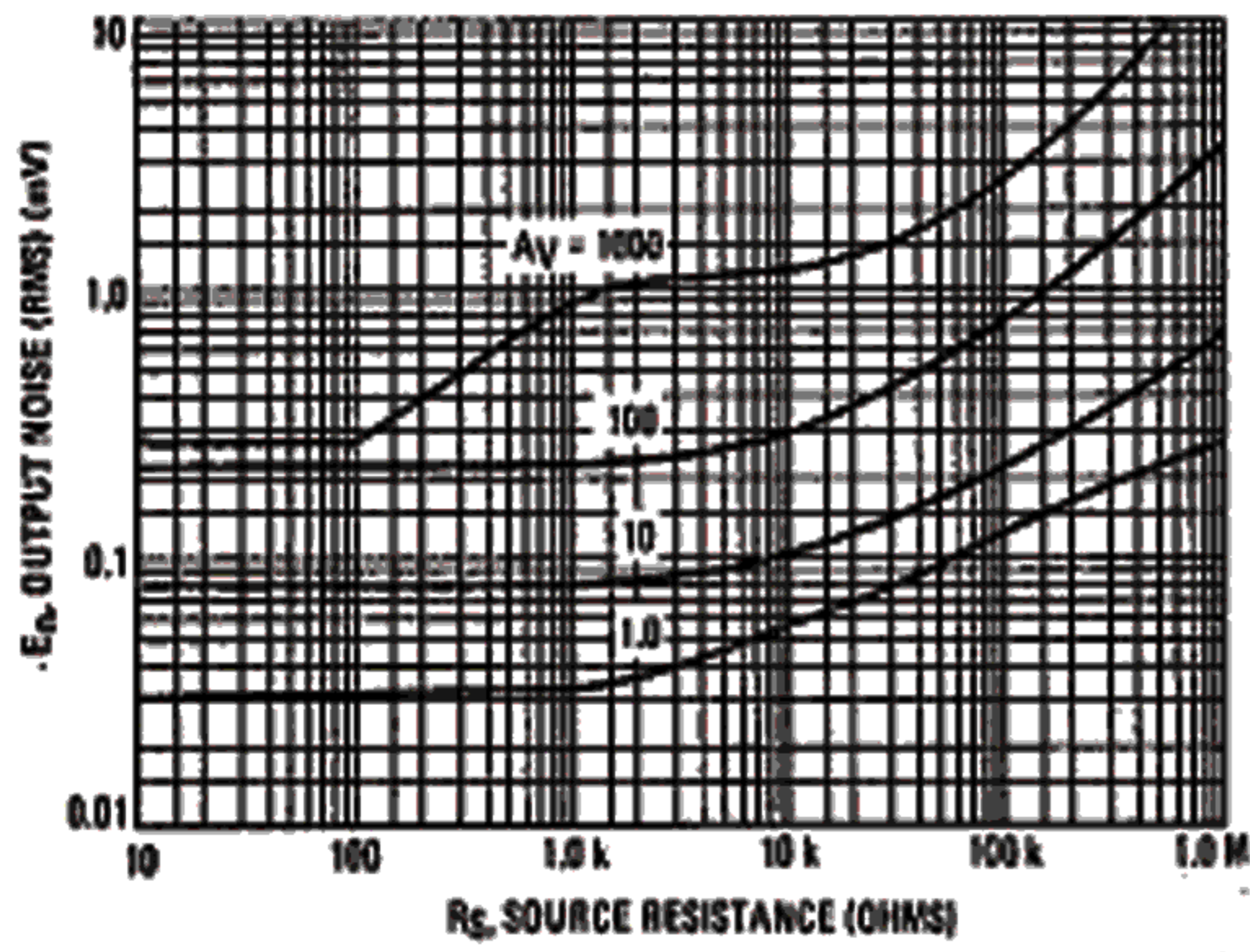


FIGURE 4 - SPECTRAL NOISE DENSITY

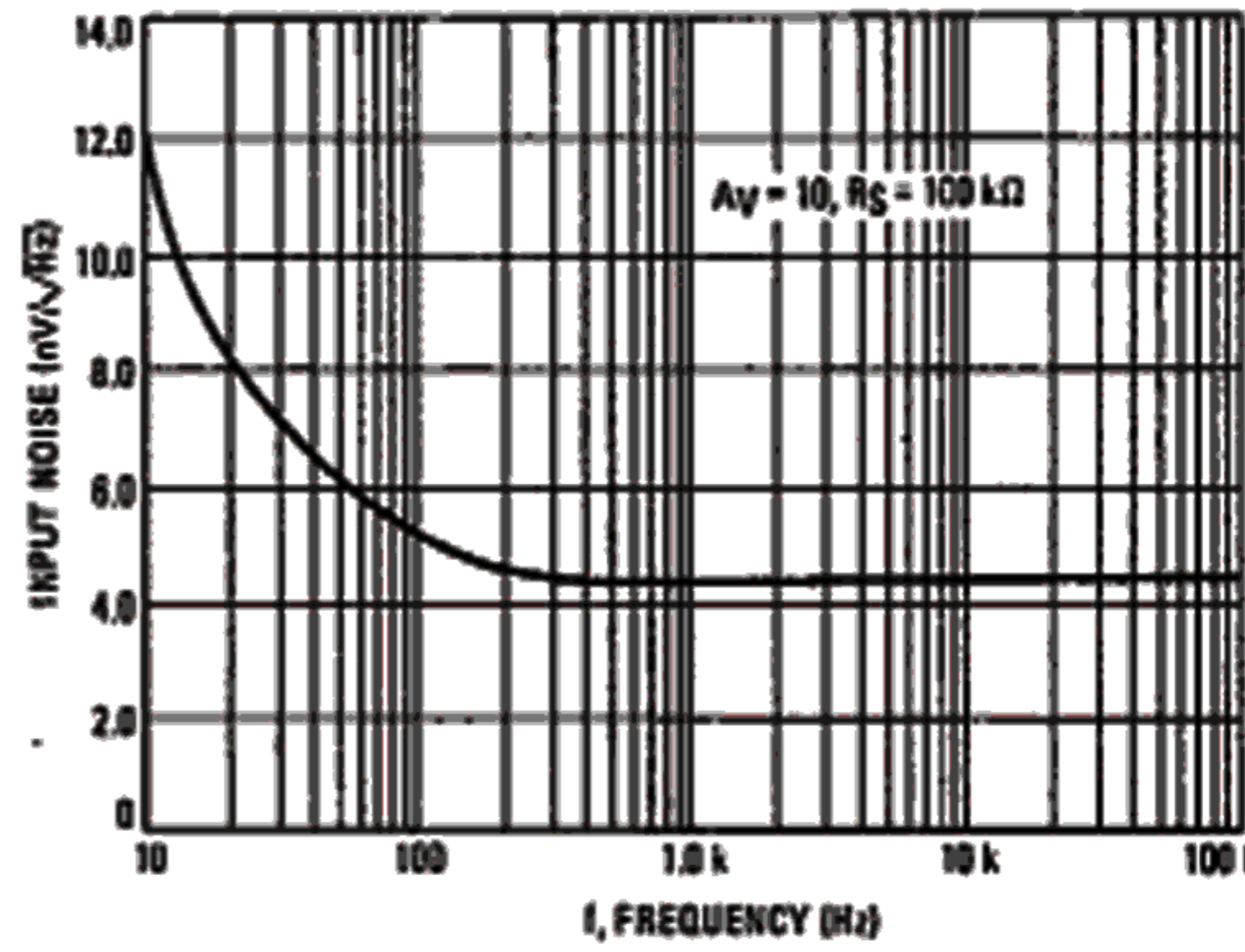
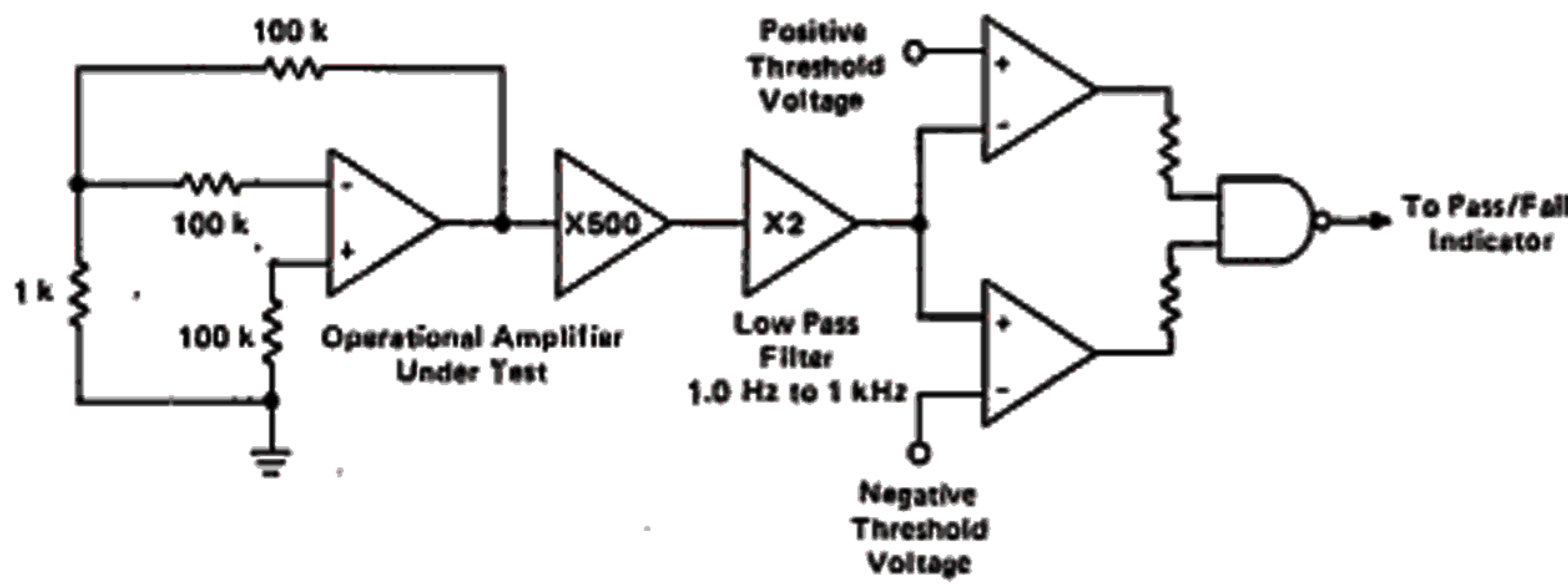


FIGURE 5 - BURST NOISE TEST CIRCUIT



Unlike conventional peak reading or RMS meters, this system was especially designed to provide the quick response time essential to burst (popcorn) noise testing.

The test time employed is 10 seconds and the 20  $\mu$ V peak limit refers to the operational amplifier input thus eliminating errors in the closed-loop gain factor of the operational amplifier under test.

TYPICAL CHARACTERISTICS

( $V_{CC} = +15$  Vdc,  $V_{EE} = -15$  Vdc,  $T_A = +25^\circ\text{C}$  unless otherwise noted)

FIGURE 6 - POWER BANDWIDTH  
(LARGE SIGNAL SWING versus FREQUENCY)

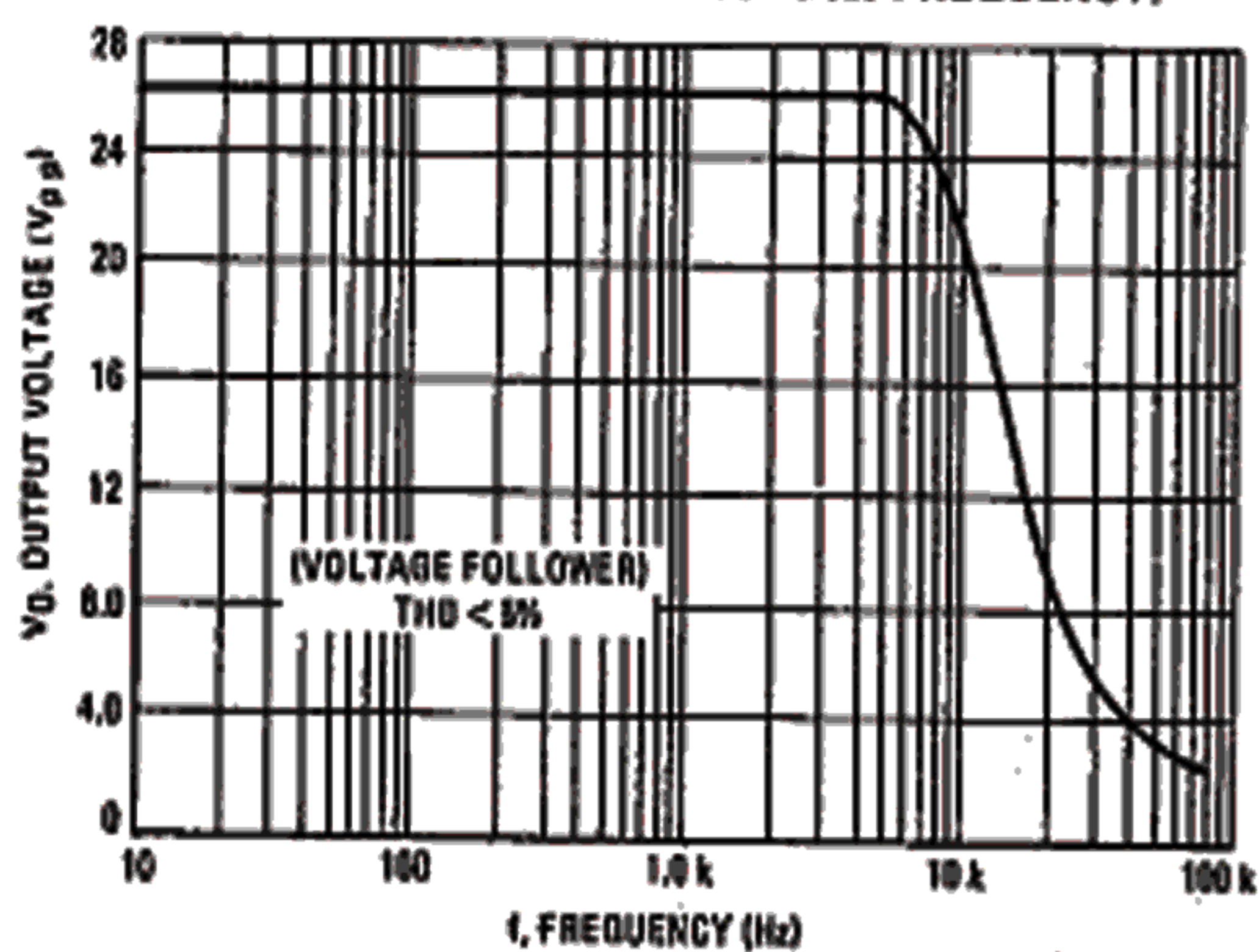


FIGURE 7 - OPEN LOOP FREQUENCY RESPONSE

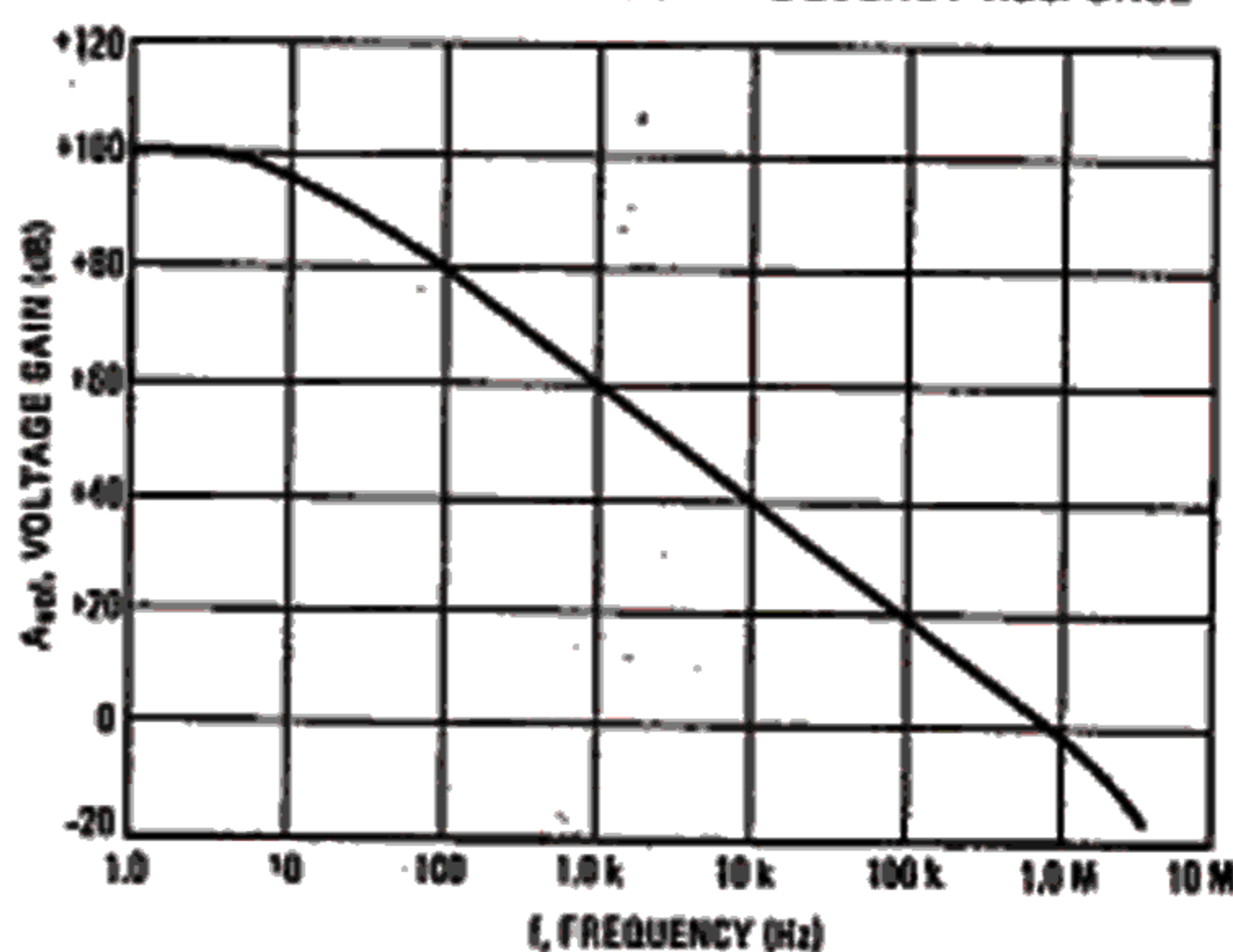


FIGURE 8 - POSITIVE OUTPUT VOLTAGE SWING  
versus LOAD RESISTANCE

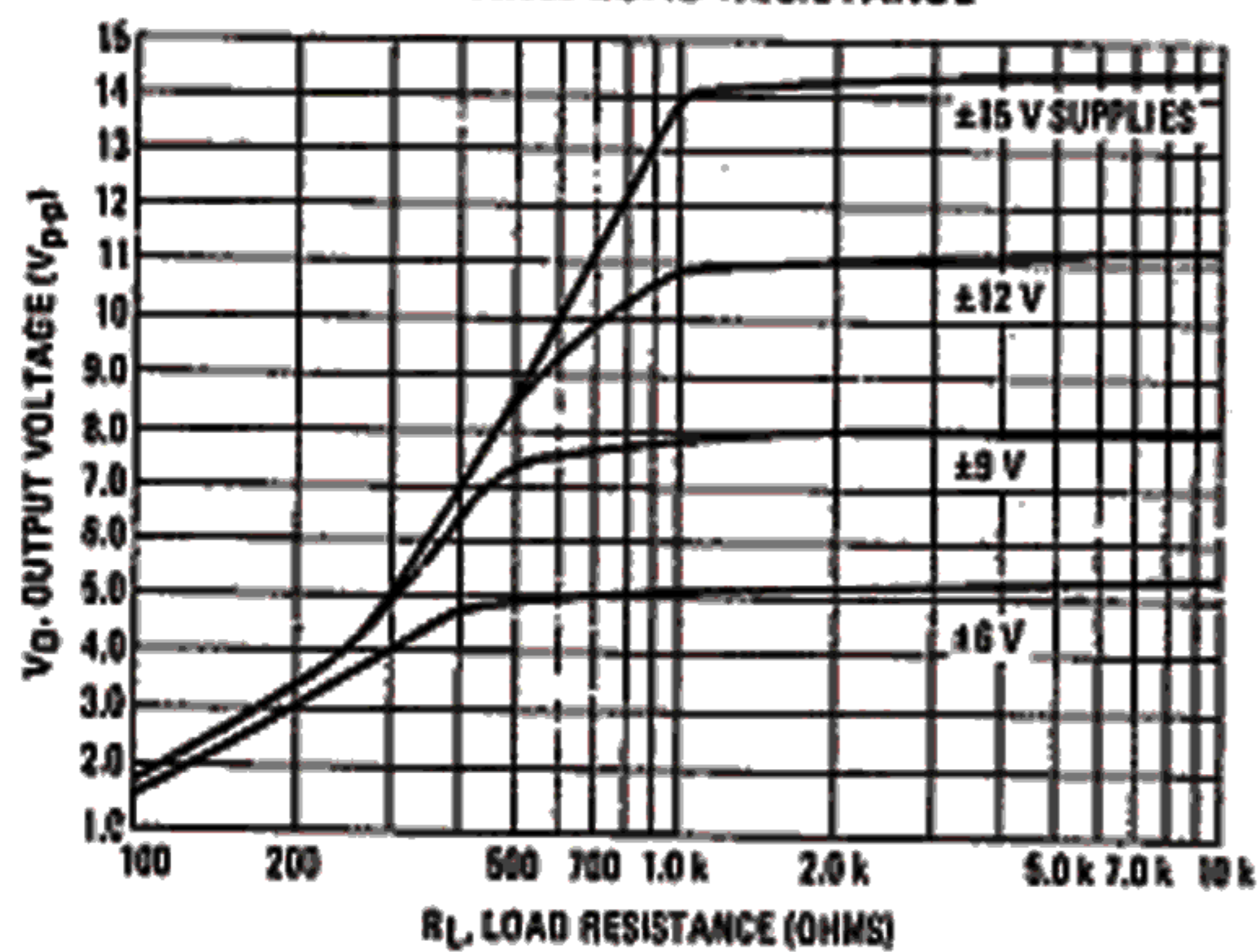


FIGURE 9 - NEGATIVE OUTPUT VOLTAGE SWING  
versus LOAD RESISTANCE

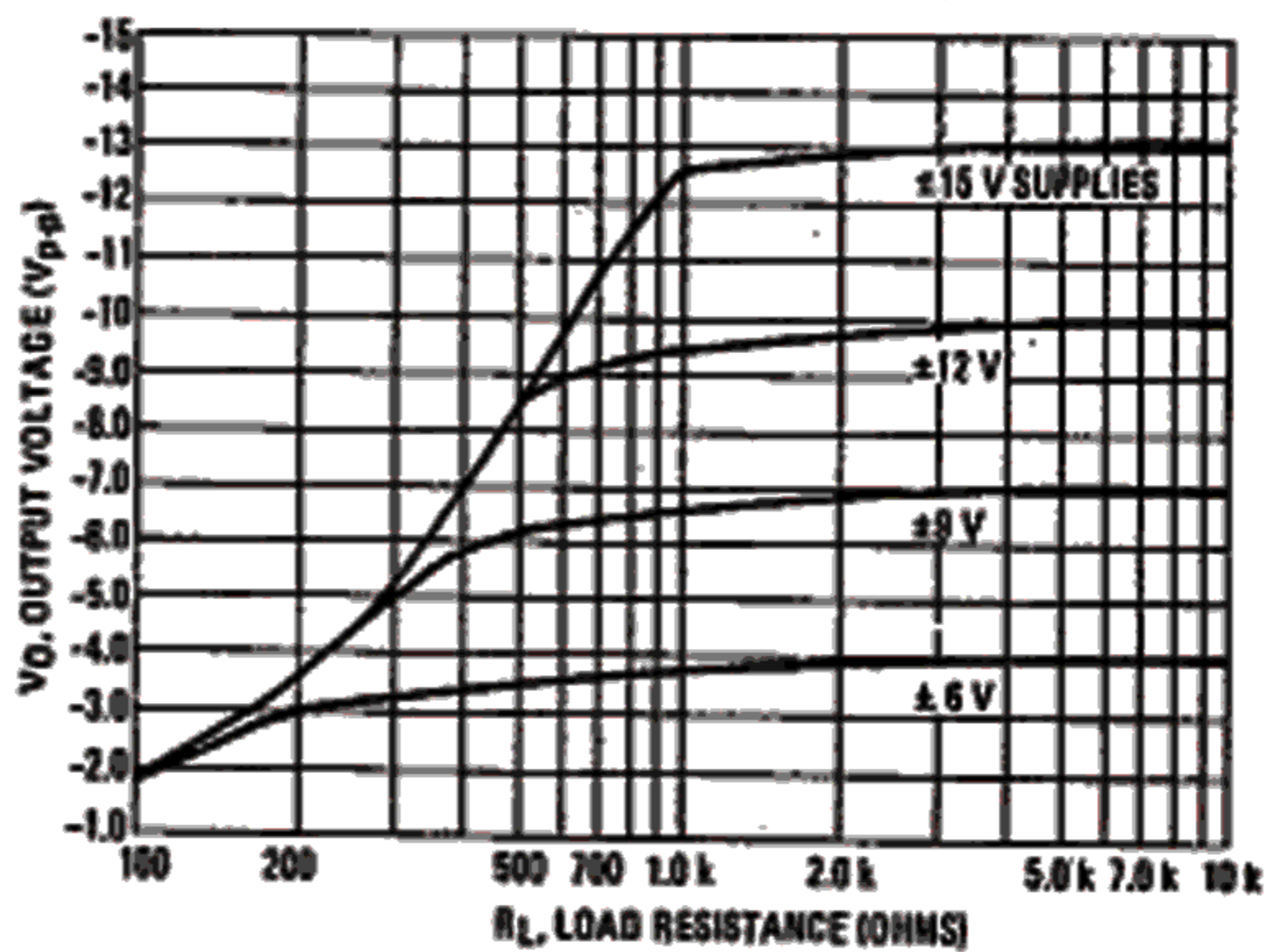


FIGURE 10 - OUTPUT VOLTAGE SWING versus  
LOAD RESISTANCE (Single Supply Operation)

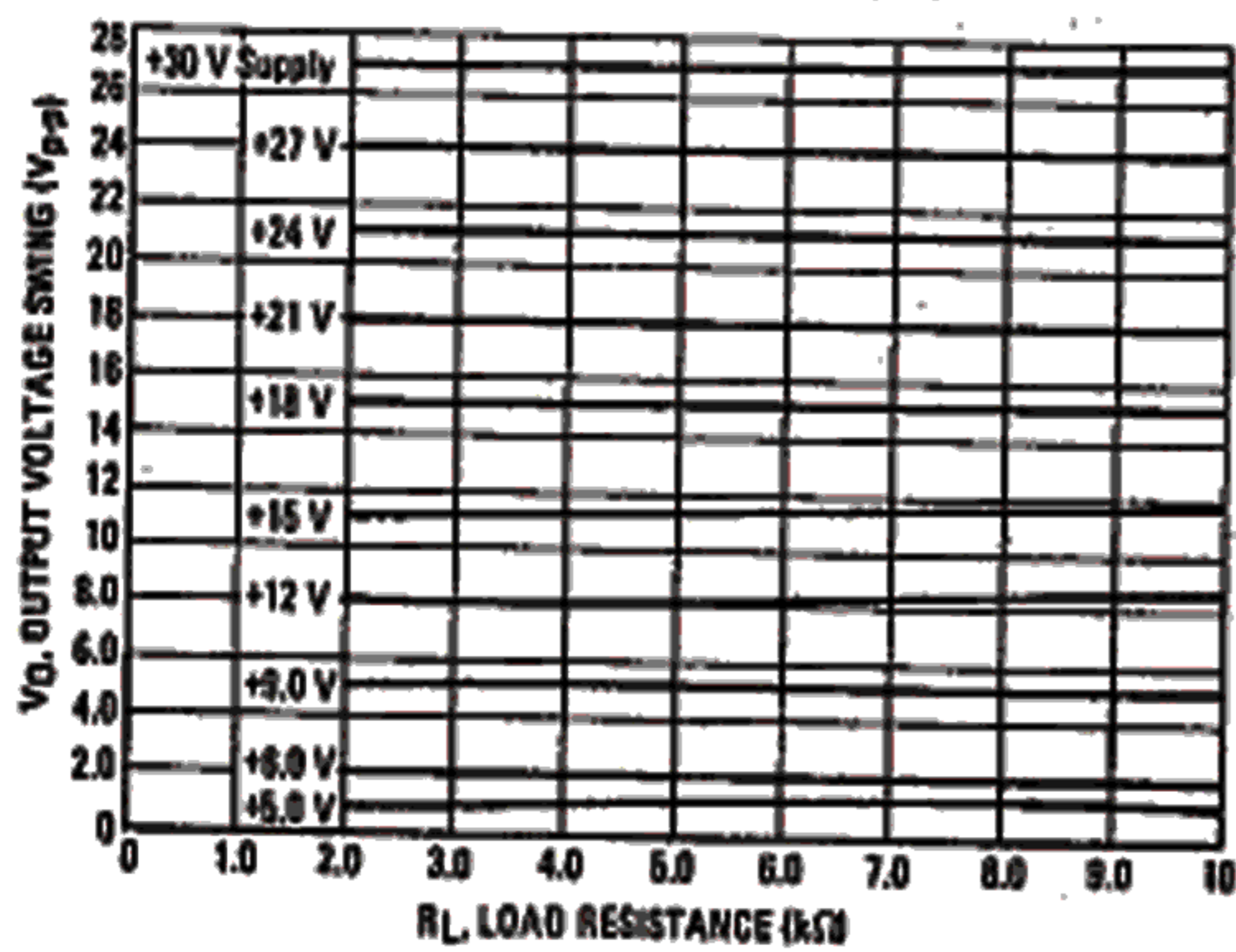
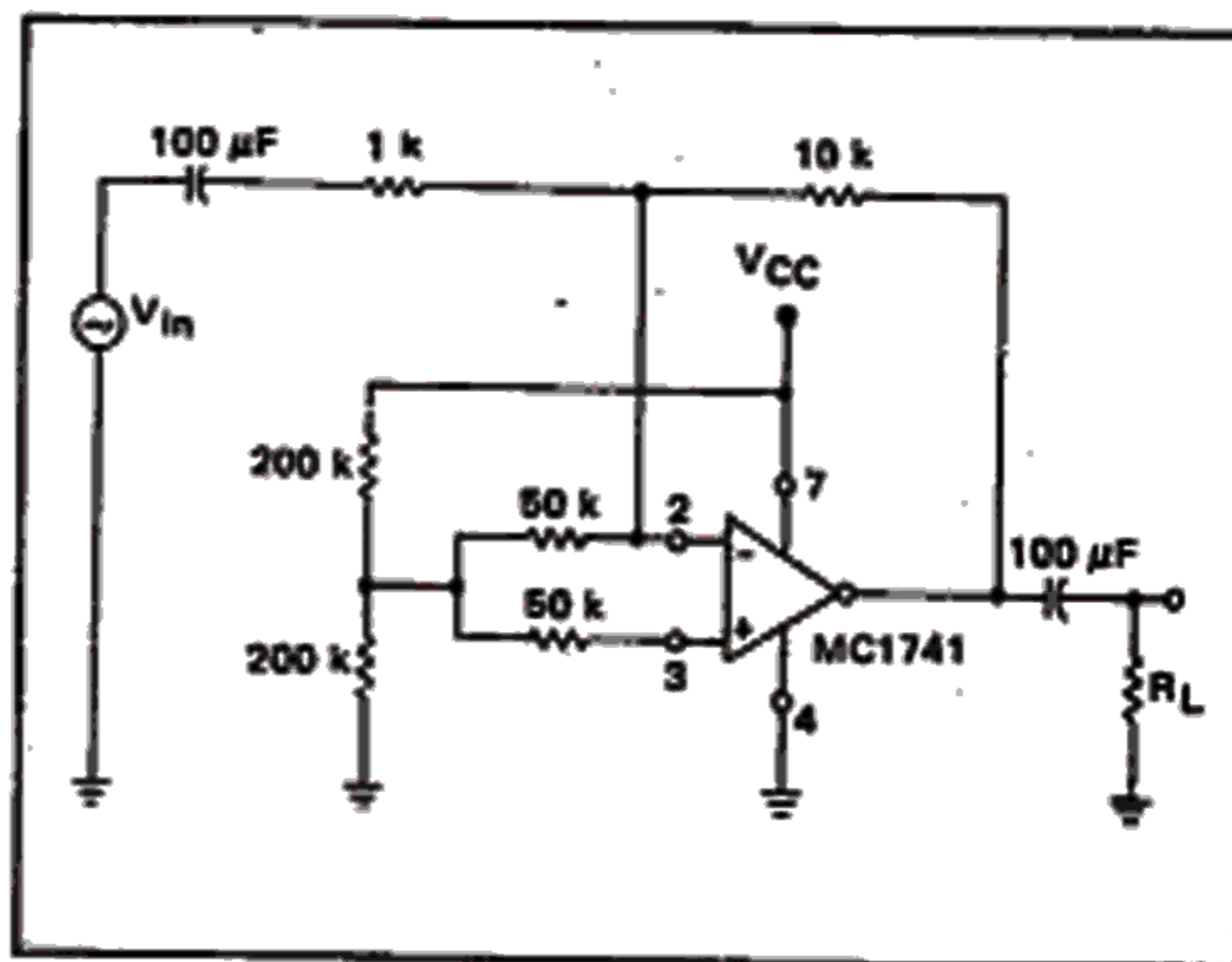


FIGURE 11 - SINGLE SUPPLY INVERTING AMPLIFIER



2

FIGURE 12 — NONINVERTING PULSE RESPONSE

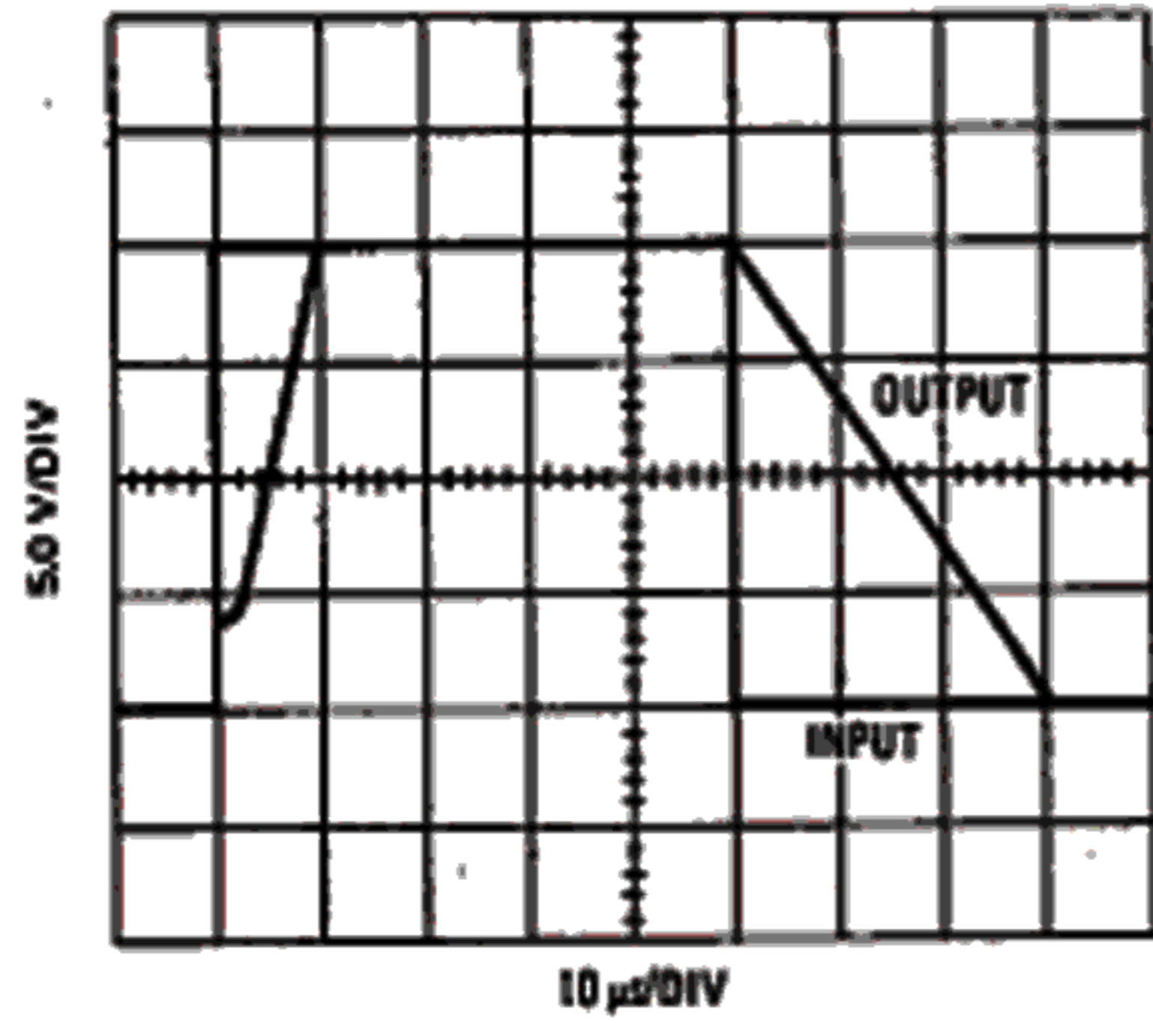


FIGURE 13 — TRANSIENT RESPONSE TEST CIRCUIT

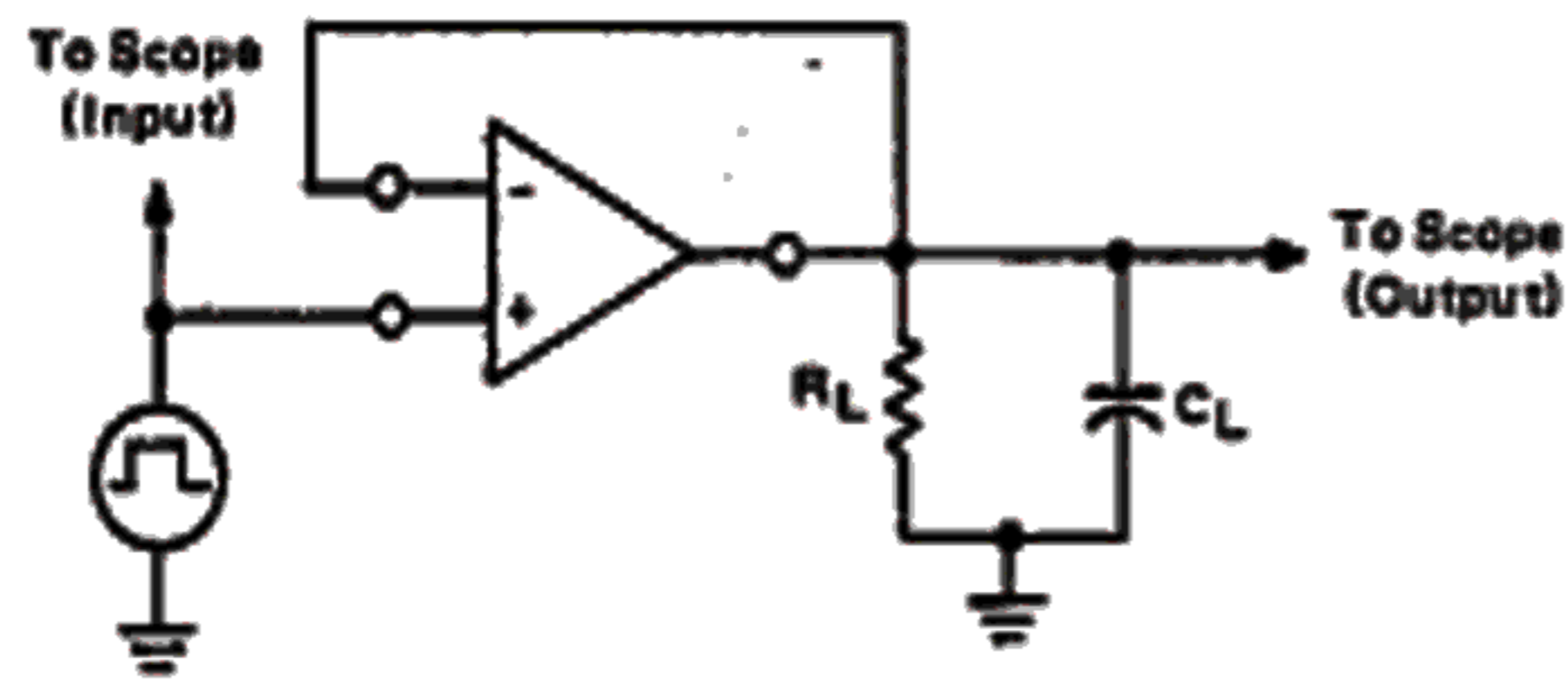


FIGURE 14 — OPEN LOOP VOLTAGE GAIN VERSUS SUPPLY VOLTAGE

