MODEL 1212

CURRENT PREAMPLEFIER

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The Model 1212 current preamplifier is designed as a low cost, general purpose, bench top instrument to provide a high performance detection system for small ac and dc currents. The 1212 operates with a virtual ground at its input which mitigates unpredictable high frequency roll off due to input cables and stray capacitance. The zero input impedance also allows photodiode detectors to operate linearly over a very wide dynamic range and photomultiplier tubes to operate with minimal distortion.

It is optimized to have the widest bandwidth consistent with standard lock-ins, yet not be over peaked when operated with moderate capacitance transducers such as small area PIN photodiodes. Models 1211 and 1641, by comparison, are more highly damped, and work with higher capacitance input devices. The 1212 is switchable for operation directly from an ac power line or from internal, sealed, lead-acid, rechargeable batteries.

The input stage of the 1212 utilizes a low noise configuration (7nV $\sqrt{Hz}$ typical) which assures good noise performance in the presence of adverse input shunt capacitance to ground. Likewise, the output noise (typically under 40nV $\sqrt{Hz}$) contributes little to the system noise- particularly at 10^{-5} A/V sensitivity and above, where output noise is dominated by Johnson noise of the feedback resistor, R.

The 600 Ω front Panel output BNC is short circuit proof and may be loaded by over 20 feet of 50 Ω coaxial cable before significant high frequency roll off occurs. The internal output buffer makes the 1212 immune to any capacitive loading effects at the output, resulting in stable operation even when both the input and output have large capacitive loads.

SPECIFICATIONS

SENSITIVITY: 10^{-4} to 10^{-9} ampere/volt with five decade current gain ranges.

dc GAIN ACCURACY: ±1% max

dc OPEN LOOP GAIN: >250,000

INPUT LEAKAGE CURRENT: ± 25 pA max @ 25°C

INPUT OFFSET VOLTAGE: Adjustable to 0 V

POWER CONSUMPTION: 105-130 Vac or
210-260 Vac 47/440 Hz, 40W

BATTERY OPERATION TIME: 20 Hours

RECHARGE TIME: 8 Hours

OUTPUT SWING: 15V p-p (5Vrms) min

OUTPUT IMPEDANCE: 600Ω

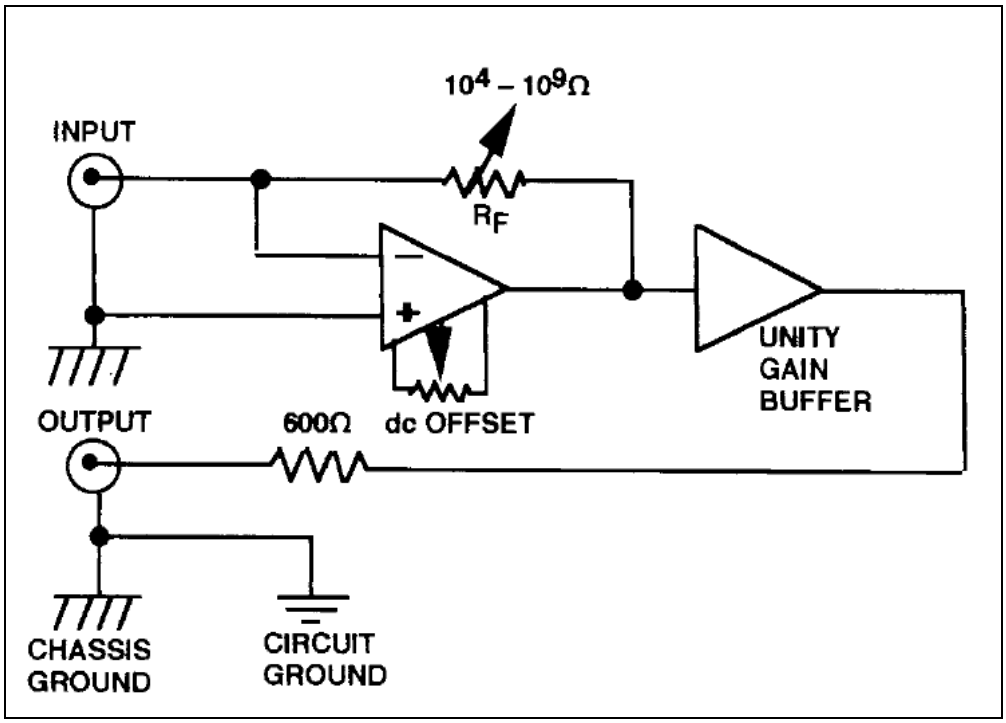
OUTPUT POLARITY: inverted

OVERLAOD DETECTION: Before nonlinearity (± 9V typical)

OPERATION TEMPERATURE: 5°C to 70°C

DIMENSIONS: 320 x 137 x 66mm (2.6 Inch x 5.4 Inch x 12.6 Inch)

WEIGHT: 3 kg (6.5lb)



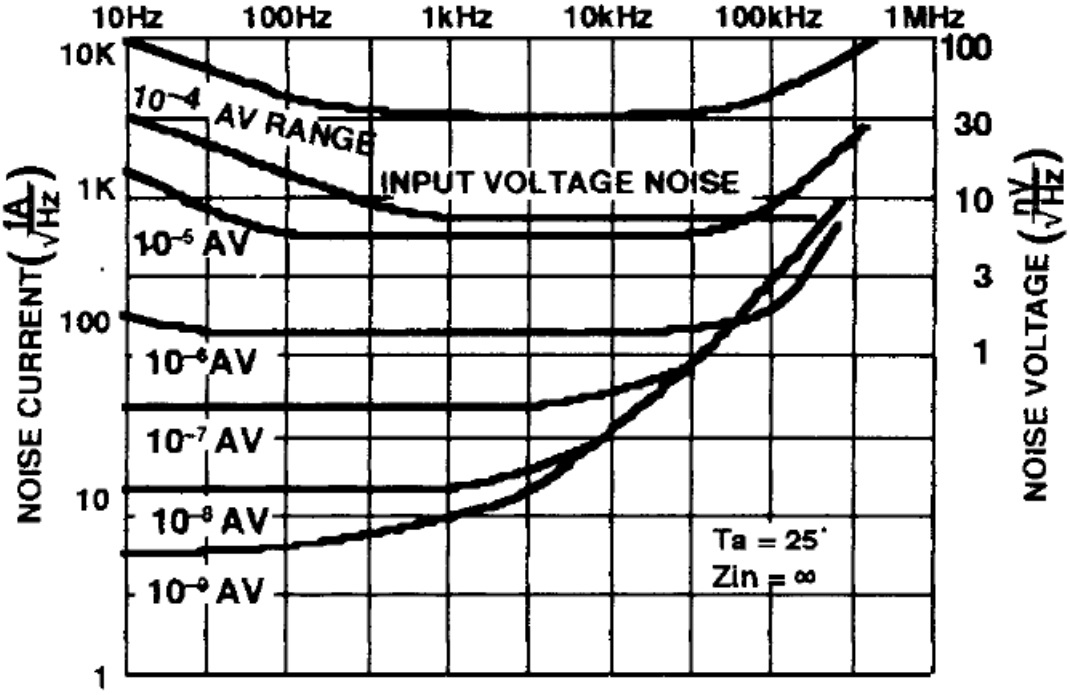
Model 1212 Block Diagram

Range A/V	Full Scale p-p	Min 3 dB Frequency*	Open Circuit Input Noise ** $A/\sqrt{Hz}$
10^{-9}	10nA	4 kHz	5.0×10^{-15}
10^{-8}	100nA	12 kHz	1.3×10^{-14}
10^{-7}	1µA	45 kHz	4.1×10^{-14}
10^{-6}	10µA	100 kHz	1.3×10^{-13}
10^{-5}	100µA	180 kHz	5.0×10^{-13}
10^{-4}	1mA	200 kHz	3.0×10^{-12}

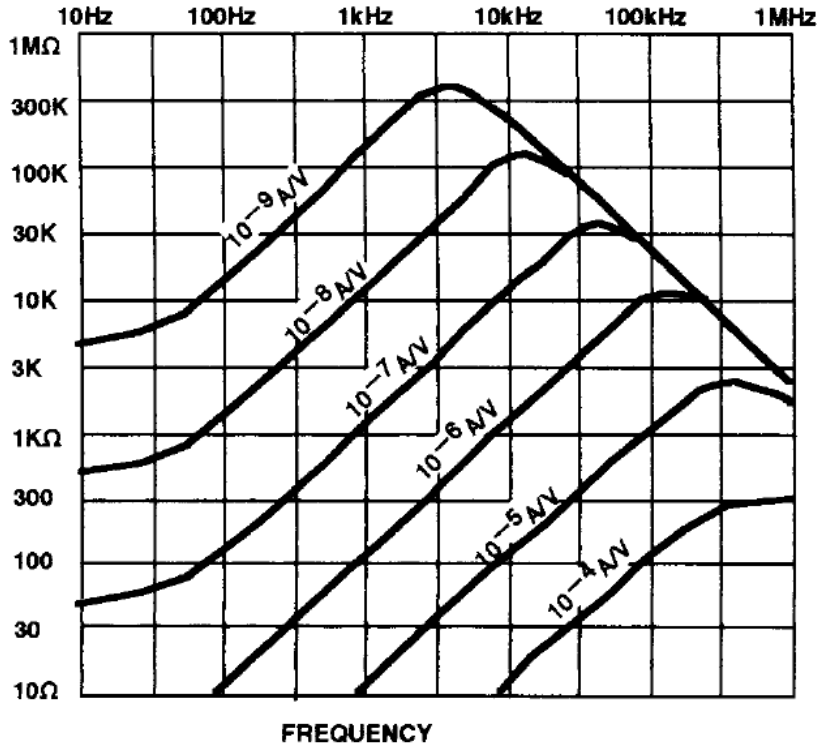
* for small capacitance loading at input

** Johnson noise from free feedback resistor plus amplifier voltage noise at room temperature, typical

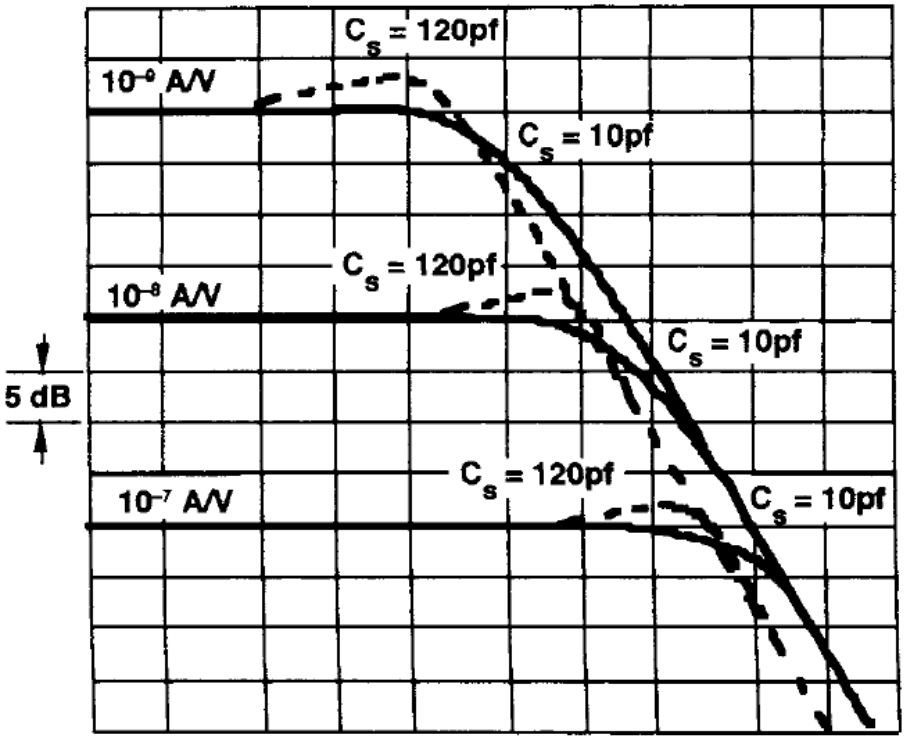
ac Characteristics



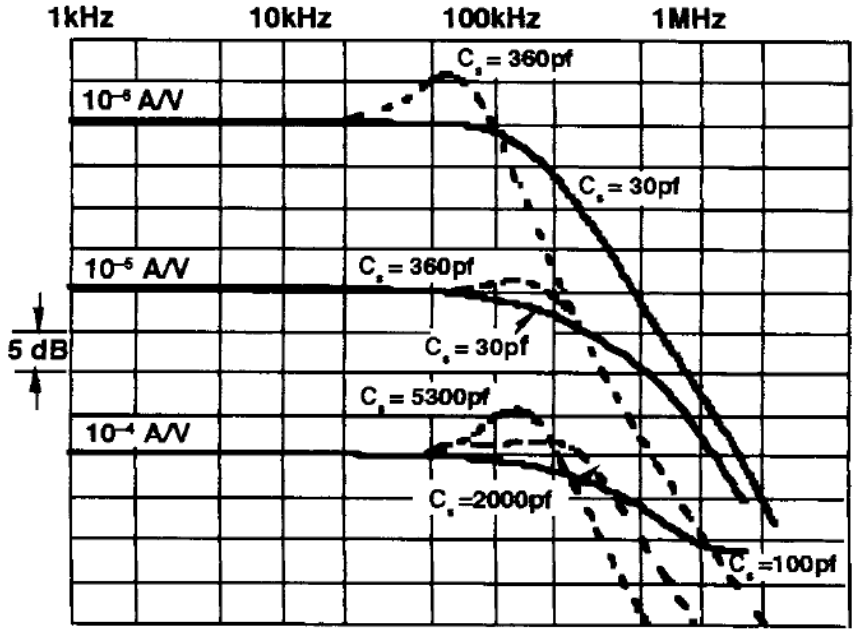
Noise Voltage and Effective Noise Current



Input Impedance



Frequency Response vs Source Shunt Capacitance



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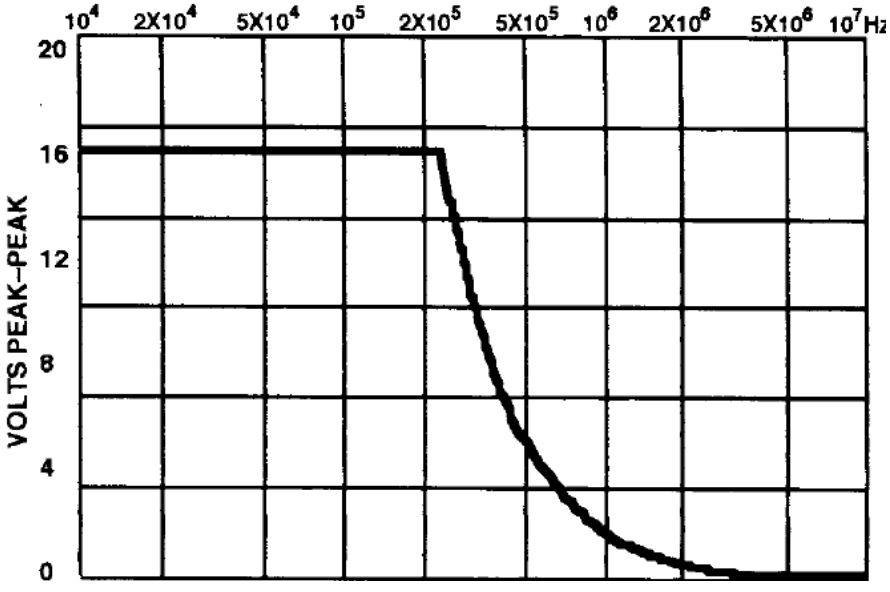

Maximum Sinusoidal Output Swing vs Frequency

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