69 Instrument Sensitivity Booster

☐ This tiny, high-impedance amplifier will boost the sensitivity of your oscilloscope or voltmeter by a factor of 10 or 100. So, if your oscilloscope's maximum sensitivity at present is 10mV/div, you can boost it to 1mV/div or .1mV/div. Signals you previously could not measure, such as the output of your magnetic phono cartridge, will now be visible. Note also that if all you own is a 20K-ohms-per-volt VOM, the sensitivity booster will not only let you measure smaller voltages, it will give you a 1-megohm input impedance besides.

Switch S2 selects the gain—10 if closed and 100 is open. When you need direct coupling to measure DC voltages, close S1. Otherwise, leave it open for AC coupling. If the booster is to be used with a scope, feed a 20-kHz square wave to its input, and adjust C3 for the best-looking square wave at the output. For use with just a VOM, C2 and C3 will have little effect; therefore, you can leave them out. The amp can be nulled by grounding its input and adjusting R4 for zero output. Sinewave response extends to 400 kHz at a gain of 10, and 40 kHz at a gain of 100. Limit input signals to less than ±100 mV.

PARTS LIST FOR INSTRUMENT SENSITIVITY BOOSTER

C1—0.1-uF mylar capacitor
C2—30-pF polystyrene capacitor
C3—5-80-pF trimmer capacitor (Arco 462 or equivalent)
C4, C5—0.01-uF ceramic disc capacitor
IC1—3140 FET-input op amp (RCA or equivalent)
R1, R7—100,000-ohm, ½-watt resistor (all resistors 5% unless noted.)
R2—1,000,000-ohm, ½-watt resistor
R3—4,700-ohm, ½-watt resistor
R4—10,000-ohm, linear-taper potentiometer
R5—1,000-ohm, ½-watt resistor
R6—10,000-ohm, ½-watt resistor
S1, S2—SPST switch