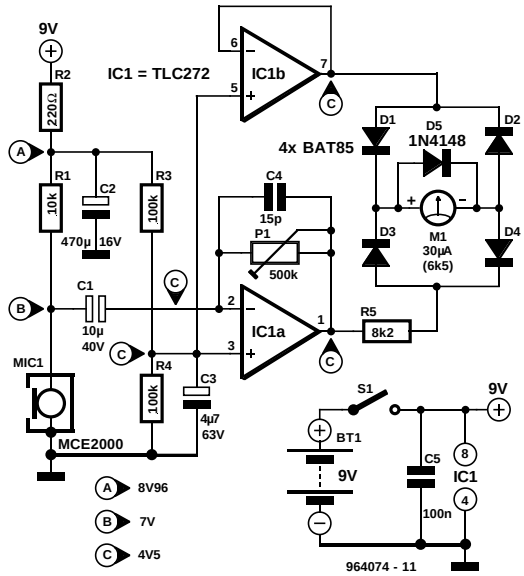
sound pressure meter

The design, consisting of an electret microphone, amplifier, and moving-coil meter, arranges for the meter to give a reading that is linearly proportional to the sound pressure. Sound pressure meters usually have a logarithmic scale, but this would make the design more complicated. Moreover, linear proportionality results in greater sensitivity to sound pressure differences. If a test CD with noise bands in 60-Hz steps is available, the meter may be used to obtain a frequency characteristic of a loudspeaker.

The microphone is a Type MCE2000 electret from Monacor. The operating point of the FET contained in this is set with R_1. Resistor R_2 and capacitor C_2 prevent noise on the supply lines from reaching the input.

The operating point of op amp IC_{1a} is set to half the supply voltage with R_3 and R_4.

The degree of amplification is determined by the ratio of P_1 to the output impedance of the microphone. With component values as specified in the circuit diagram, the amplification is ×60, which makes a 90 dB sound pressure result in full-scale deflection of the meter. In the prototype, P_1 is then roughly at the centre of its travel.



Capacitor C_1 is a bipolar electrolytic type, since the spread of the FET in the microphone may cause the voltage at metering point B to be lower than the 4.5 V at the input of the op amp. Note, by the way, that the voltages shown in the circuit diagram are taken from the prototype.

Half the supply voltage is buffered by IC_{1b}, so that the circuit can be driven by IC_{1a} without any difficulty. The buffering makes an additional potential divider in the metering circuit superfluous; this is a benefit, because such a divider affects the meter deflection and increases the current drain.

The meter, M, is a 30 µA moving-coil type with an internal resistance of 6.5 kΩ. The use of a meter with as low a current drain as possible keeps the voltage drop across bridge rectifier D_1–D_4 low. Resistor R_5 and diode D_5 limit the peak current through the meter.

The current drain of the complete circuit is only 1.5 mA.

The use of a wobbulator and the present meter enables, say, a subwoofer to be matched to an existing system. First measure the standard speakers at a frequency of 400–500 Hz, wobbulated over ⅓ octave. The level of the signal must be high enough to suppress ambient noises. Adjust P_1 for maximum meter reading. The, apply a 40–50 Hz signal to the subwoofer and adjust the active filter in the amplifier or subwoofer for an identical meter reading. These measurements should be taken at a distance of about 1 m (3 ft) from the loudspeakers.

[T. Giesberts – 964074]