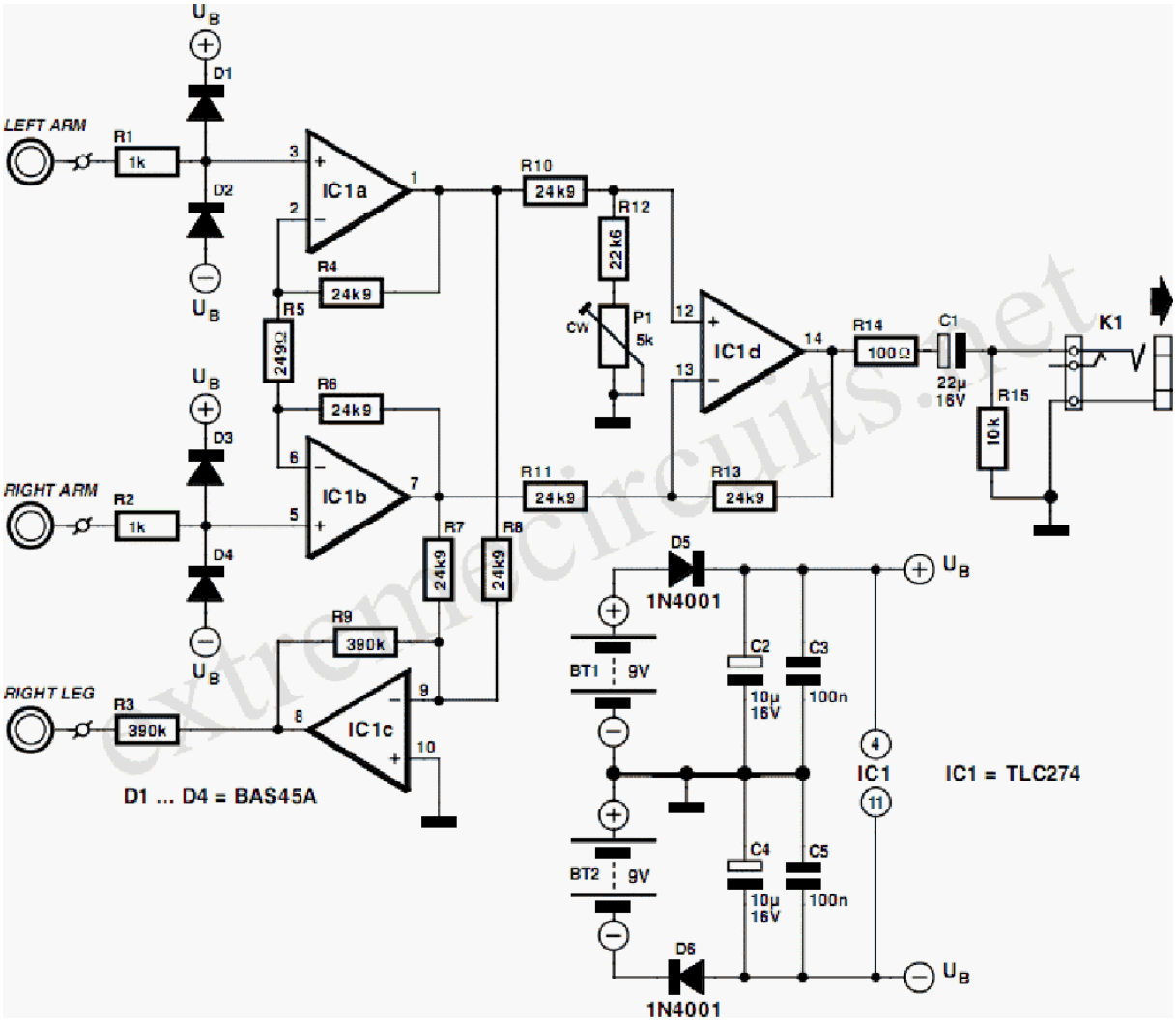
ECG Amplifier By TLC274

This circuit allows an ECG signal to be displayed on an oscilloscope. Opamps IC1a, b and d form an instrumentation amplifier with a gain of 201. IC1c amplifies the common-mode signal by a factor of 31, and supplies this signal to the right leg. The first consequence of this is that the body is brought to a defined common-mode level, so that the signal will not lie outside the range of the instrumentation amplifier. The second consequence is that negative feedback is applied to the common-mode signal, so that the amplitude of this (undesired) signal is reduced even further. Diodes D1 through D4, along with resistors R1 and R5, are added to the circuit to protect the inputs against damage from excessive electrostatic charges. The CMRR (common-mode rejection ratio) of the instrumentation amplifier can be set using P1.



To make this adjustment, connect both inputs of the instrumentation amplifier together, and then connect a 100mV, 50Hz AC signal between the connected inputs and earth. Measure the output signal using an oscilloscope, and adjust P1 to minimize the level of the output signal. It is important that the electrodes make very good contact with the skin. In our test measurements, winding three uninsulated copper wires several times around the index fingers (and the right leg) proved to be sufficient to provide a good signal.

The amplitude of the ECG signal measured with this arrangement was 200mV. The current consumption of this circuit is only 2mA, so the batteries should last a long time. This circuit must never be connected to a mains-operated power supply, in consideration of safety precautions that are necessary when making this sort of measurement on the human body.