

How Much Current Is Fatal?

THE FOLLOWING information, supplied by Tektronics Inc., is something we feel should be read and understood by all electronics experimenters, technicians, hams, and engineers, regardless of what area of electronics or electrical work they are in.

Unfortunately, most of us think that a shock of 10 kV would be more deadly than one of 100 volts. This is not so. People have been electrocuted by ordinary 117-volt appliances and by voltages as low as 42 volts dc! The real measure of the degree of shock is not the voltage applied, but the amount of current forced through the body—and that need not be very much.

While any amount of current over 10 mA is capable of producing a painful to a severe shock (as shown in the chart), current between 100 and 200 mA can be considered lethal. Currents above 200 mA, while producing severe burns and unconsciousness, do not usually cause death if the victim is given *immediate* resuscitation (artificial respiration).

Voltage is not a consideration; it is important only because its level and the body resistance between the points of contact determine how much current flows. Since resistance varies greatly, it is impossible to predict a dangerous voltage. The resistance may vary from 1000 ohms for wet skin to over 500,000 ohms for dry skin—remembering that the resistance from point to point under the skin may be only a few hundred ohms. Also remember that the contact resistance decreases with time and the fatal current may be reached rapidly.

As shown on the chart, a current as low as 20 mA is very dangerous and painful, and the victim can't let go of the circuit. As the current approaches 100 mA, ventricular fibrillation of the heart usually occurs. Above 200 mA, the muscular contractions are so severe that the heart is often forcibly clamped during the shock. This clamping sometimes protects the heart from going into ventricular fibrillation and the victim's chances for survival are good.

Now, what lesson can we learn from all of this? First, regard *all* voltage sources (even some batteries) as potential killers.

When working around electrical equipment make sure you know where you are with respect to the voltage source. Don't lunge after fallen tools. Kill all power before diving into circuits. Don't work when you are mentally or physically fatigued. Keep one hand in your pocket when investigating live electrical equipment. Be particularly observant of what you are standing on—don't work on a metal floor, damp concrete, or any other well-grounded surface. Don't handle electrical equipment while wearing damp clothing—particularly shoes—or when the skin is wet from water or perspiration.

In the event of an accident, either cut the voltage or get the victim away from his contact—using some form of insulation to do the job or you will get caught too. If the victim is unconscious and has stopped breathing, start artificial respiration at once. Do not stop until proper medical aid has arrived. ♦

It's not the voltage that causes the big problems, but the current level being driven through body tissues.

