



Soft Stairs Take Flight

by John D. Wagner

How would you like to earn a quick 15 bucks and be part of some very peculiar research? It's easy. First, put on a padded flight suit, strap on a helmet, wrap your neck in a cervical collar, and pad your buttocks and lower back. Next, get into a parachute harness and hook yourself to an overhead cable track. Ready? Comfortable?

Now, walk up and down a flight of stairs and, when you least expect it, you will trip an infrared sensing device that will collapse the entire stairway out from under you. You take the big fall. If you're afraid you'd look silly, we should also tell you before you sign up that your fall will be filmed.

It's not Hollywood, and it may not be worth the 15 clams to dress up like an OSHA-approved version of D.B. Cooper, but Dr. John Templer, from the College of Architecture at the Georgia Institute of Technology in Atlanta, will be happy for the data you supply with him. He is researching how to limit injury for people who fall while climbing or descending stairs. As some of you may have found out the hard way, going up and down stairs can be a dangerous undertaking. In 1986, 800,000 people received hospital treatment for injuries from falls on stairs. 4,000 of them died. In fact, stair injuries may total over 2.5 million yearly.

Dr. Templer has isolated 12 different types of stair injuries. "Ascending injuries" include catching your toe on nosing, or catching your toe against the riser. "Descending injuries" include overstepping, and—my favorite—"unintentional use," which is an academic way of saying that you fell down stairs you didn't know were there.

By setting up a specially designed stairway in his lab, Templer is able to simulate a wide variety of structural breakdowns and mishaps. For each instance, Templer makes a videotape of the type of fall that occurs. He then studies how the limbs and torso react, digitizes the information, and plots it on X-Y axis for computer simulation and reenactment.

Here's how a day at the office goes for Dr. Templer: Once volunteer subjects are dressed up in protective garb, they are fitted with headphones through which they hear music and a metronome. (The music is played to mask the sound of the trick stairs' hydraulic mechanism. The subject can't

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expect the fall, otherwise the data would not be true-to-life.)

The subject walks up and down the stairs at the pace set by the metronome. Once the subject is comfortably climbing and descending the stairs, Templer activates an infrared beam. The subject's foot crosses the beam and switches on a hydraulic system. The hydraulic system is preprogrammed to make the stairs "break" a certain way by pushing or withdrawing steel rods that support each



Research technicians program these trick stairs to "break" in a number of ways when a subject is walking up or down them. A hydraulic system controlled by a light-activated switch can make any part of the stair selectively blow out or move. This causes the subject to trip and fall.



Dressed in protective clothing, this volunteer will experience a fall induced by a lab technician who manipulates these trick stairs. The fall will be filmed and analyzed.

stair. A riser may blow out, for instance, or the nosing may extend 2 inches and catch the subject's toe. Of course, this happens very quickly. The subject is thrown for a fall, but the harness and cable suspend him before he hits the ground. At this point, Templer knows what he needs to know.

You may have heard that old expression, "It's not the fall that hurts you, it's the sudden stop." Well, the object of Templer's research is to design a safer, "softer" stair that will reduce injury when people do come to that sudden stop. Just as car manufacturers are accommodating the wishes of increasingly safety-conscious buyers, Templer hopes that stair manufacturers may someday do the same for homeowners.

Currently, Templer and his associates are just beginning to examine stair flooring, finish materials, and the energy-absorbing capabilities of other assorted building materials in hopes of producing a more "empathetic stair."

But don't look for next year's codes to spec foam cushions, overhead cables, and balsa. The research on building materials will take some time. Until then, keep a firm grip on the banister, tighten up your harnesses, and don't forget your helmet before you even consider taking flight. ■

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