

Ralph's Accident Reconstruction Newsletter—Volume 2, Number 4—November 2003

At the end of July, I attended a joint conference of the South Carolina Accident Reconstruction Society (SCARS) and the Southeast Accident Reconstruction Society (SeARS) in Mt. Pleasant (Charleston), South Carolina. In addition to many fine presentations, there were two staged collisions and a ramping demonstration. The purpose of these live demonstrations was to validate equations and methods used in reconstructing such collisions and events; when pre-crash details and speeds are accurately known, putting the pieces together after the crash using reconstruction formulas and methods and arriving at results that are essentially identical to the known quantities shows that the methods applied to events with unknown parameters are accurate. Rusty Haight with Collision Safety Institute, who is widely known as the human crash dummy, drove the bullet car in both of the staged collisions.



This photo shows a Ford Crown Victoria as it was becoming airborne at the end of a ramp designed for this purpose. The speed at takeoff was documented using light-activated timers, and the horizontal and vertical details of its landing point were carefully documented with Total Station equipment. The ramp had been constructed to a known angle from horizontal. Calculations based on the measurements and other physical details were compared with the known departure speed; all equations and methods yielded results which were slightly below the actual speed when it left the ramp, demonstrating the validity of using those methods to determine the speed of a vehicle when it became airborne.



A Ford Crown Victoria was driven into the right side of a Mercury Capri convertible at an angle such that the right side of the front of the Ford first contacted the Mercury. Although this Mercury was not capable of moving under its own power and had not been stored in the best of circumstances, a charged battery was placed under the hood. One of the purposes of this staged collision was to demonstrate whether or not a side impact could fire an air bag. And it did! The Mercury was parked at impact, but the collision by the Ford, traveling at a speed over 50 mph, caused the airbag in the center of the steering wheel to fire. One of the purposes of this collision was to demonstrate that a side impact can fire airbags, that the firing of a front airbag from a side impact is not an indication of a defect or malfunction.



Being a convertible, this Capri did not have much side-impact strength; what primarily stopped the penetration by the Ford Crown Victoria was when the front tires of the Ford reached the side of the Mercury, subsequently pushing the Capri away with surprising post-impact speed. The intended impact speed was 55 mph; the actual impact speed, as shown by the timing set placed just before the impact position of the Ford, was 53.8 mph. The EDR in the Ford showed a total delta-v of 21.8 mph. An accelerometer mounted in the Capri showed a delta-v of 29.6 mph. The time of this collision was 0.145 second (145 milliseconds). After impact, the Ford traveled 80.7 feet with brakes applied; the Capri traveled approximately 62 feet after it was struck by the Ford.



This is an overhead view of the Capri at rest, after the impact by the Ford. This Capri had not been an in-use vehicle for a significant period of time, and some of its parts had been previously removed (presumably salvaged) by others before being used as a target vehicle. Also, it had been sitting somewhere outside, exposed to the elements, and its undercarriage exhibited significant corrosion. Therefore, the damages to this chassis by the impact are probably atypical. But nobody volunteered to allow their personal vehicle to be used as a target, or even a bullet. Imagine that!

If you would like more information on this topic, please write your name plus your telephone number or email address: _____

Or, you may contact me directly with your questions, by the method of your choosing.

If you have any comments, questions, or suggestions regarding content of this or future newsletters, I welcome them. You may use this form to comment by filling in the lines and mailing it, or, as always, you are welcome to contact me by any method of your convenience: _____