Most of you, perhaps all of you, will be familiar with the topic of perception-reaction time (PRT) as it relates to traffic crash reconstruction. There are now extensive statistical studies which have documented ranges of real-world driver responses in a variety of driving situations. Would you believe PRT studies for boaters? There is a marine boat-building standards organization, the American Boat and Yacht Council (ABYC—www.abycinc.org) which has been in existence for many decades and which provides a wealth of standards for construction of boats and yachts. That organization publishes a quarterly magazine called Reference Point. Two men, Captain James E. Getz (ret.) of the Illinois Conservation Police and Dr. Patrick J. Robins of Virtual Crash Animation and Reconstruction, have tested persons for PRTs in powerboating situations using a simulated helm console and a color display monitor. As of summer of 2014, their subjects included 496 usable responses from participants in boat accident investigation classes. The group included 47 women, and the rest were men. There was a wide range of boating experience among the participants. The methodology used a simulated boating view displayed on the monitor. The test began when the participant pushed the throttle on the simulated helm to wide open. When a red screen appeared on the monitor with the yellow words "Look Out," the participants were required to turn the wheel ¼ turn left or right or pull the throttle lever back to the neutral position. This is similar to studies on drivers of cars, using a simple simulator and a red light which signaled the tested person to step on the brake pedal of the simulator. We now know that this simple simulation testing does not necessarily translate into real-world PRTs, but it was a start. Similarly, the PRT study for the simulated powerboating situation will not necessarily translate into real-world boating situations, but it's a start. A summary of the analysis of the results is supposed to appear in the Autumn 2014 edition of Reference Point.

In the realm of wheeled vehicles, electric motorcycles are beginning to make news. In the past, most electric, two-wheeled vehicles were scooters and low-powered bicycles which had very little appeal in the American market. A company called Zero Motorcycles introduced its first full-size electric motorcycle in 2010, and it expects to sell 2400 bikes this year. Harley Davidson is introducing its version of an electric motorcycle by providing handmade demonstration models to an invitation-only event in New York. The production bike that is anticipated to result from the introduction in New York would be silent, except for a relatively loud humming from the gears, and it would not need to shift. It would accelerate from zero to 60 mph in about four seconds and have a range of about 130 miles, after which a recharge of one-half to one hour would be required. An image of the Harley Davidson prototype and an image of its control panel appear at the top of the column to the right. The police department of San Jose State University has two electric motorcycles made by Zero Motorcycles, and the officers are said to be "super happy" with them. As with four-wheeled, all-electric vehicles, they can be great for short/local trips but are not currently practical for long journeys.

Most of you have heard of Indian motorcycles. The company went out of business in the 1950s, but Polaris has bought the name and is producing two models of cruising motorcycles. Each one features an 1800 cc engine. Looks like Harley Davidson may have some serious competition.

According to *Consumer Reports,* the rate of fatal crashes is 31 percent lower for motorcycles with an anti-lock braking system (ABS) than for those without ABS. Brands with standard or optional ABS on their motorcycles include Aprilla, BMW, Can-Am, Ducati, Harley Davidson, Honda, Kawasaki, Kymco, Moto Guzzi, Star, Suzuki, Triumph, Victory, and Yamaha. The larger motorcycles are the ones more likely to be equipped with ABS, but that feature is now becoming more available on the smaller, entry-level motorcycles. Perhaps ABS will help new riders become less fearful of using the front brake, which should be the primary brake in most, perhaps all, operations of motorcycles. In many of the motorcycle crashes I've investigated, the evidence showed that the motorcyclist had used only the rear brake but that the incident would have been avoided or mitigated had both brakes been used.

There were many staged collisions at the 2014 Southeastern Crash Conference held in July in Charleston, South Carolina. Among those were two pole crashes, conducted at higher speeds than the pole crashes conducted in 2013, to help refine the techniques associated with determining pole impact speeds by vehicles. Each pole was broken at impact, and impact speeds were high enough that neither car was struck by the falling pole. Perhaps the most interesting of the staged crashes was a three-vehicle sequence: a Pontiac Grand Prix was struck from behind by a Dodge Intrepid, which was immediately struck from behind by a Ford Crown Victoria. The photo above was taken

during the first crash, before the vehicles came to rest. The photograph below shows the vehicles during the second impact, before all three came to rest. There were many conclusions to be drawn from this collision sequence, and several methods of solving for impact speeds were used to calculate those values and comparing the calculated values with the known impact speeds. Perhaps most interesting to a technical reconstructionist was the use of a force-balance method to solve for impact speeds using only the delta-v data from the Intrepid; the application of that method to the crash data showed its accuracy and validity. The force-balance method is based on Newton's third law and on basic CRASH3 principles developed decades ago. Application of the force-balance method to this crash, where impact speeds had been documented, substantiated the accuracy of the method.

A primary purpose in conducting staged collisions is to verify the accuracy and validity of accepted reconstruction methods and formulas. Just as skid testing from known speeds documented the accuracy and validity of the formula for calculating the initial speed of a vehicle which skids to a stop (based on the definitions of kinetic energy and the coefficient of friction plus the application of Newton's three laws) many decades ago, staged collisions with vehicles and with other objects document, verify, and/or refine the analytical methods developed for determining speeds and delta-v values in a wide variety of crashes.

Several of my fellow reconstructionists and I conducted roll-down tests of three different vehicles on crash test day, between the times of the staged collisions. As I write this newsletter, the data sets from those roll-down tests have not been analyzed. We intend to present the derived data in some form, perhaps as an article or presentation, in the near future. I suspect that many people will be surprised at the numbers which result from that analysis.

Volkswagen! Starting with 2015 model Volkswagen Beetles (including convertibles), Jettas (including hybrids), Passats, Golfs (including eGolfs), and Touaregs sold in the United States, the Bosch CDR Toolkit will be able to access crash data in the airbag control modules (ACMs) of those vehicles. Vehicles sold outside the United States are specifically excluded from having data extracted from their ACMs using the Bosch system. This is apparently to comply with the United States Federal Rule regarding ACMs; i.e., if they contain data, they must contain a minimum amount of data, and the data must be accessible with a commercially available system. This requirement is not present in other countries. Hurray for the USA!

1804 Thornhill Pass, SE
Conyers, GA 30013
770.918.0973
Fax: 770.918.8076

Ralph Cunningham, Inc.
1804 Thornhill Pass, SE
Conyers, GA 30013