In my previous newsletter, I wrote that Kia and Hyundai had developed and were selling (through distributors) their own crash data retrieval systems, which they call Event Data Recorders, although the recording function occurs in the airbag control module. An article in Volume 8, Issue 1, of ***Collision*** magazine (www.collisionpublishing.com) described some preliminary information about the two systems. They are identical in appearance except for color; the Hyundai model is blue while the Kia model is red. Each "EDR" set includes cables to connect to various airbag control modules (ACMs) and to a computer. The computer must have the proprietary software installed to be able to interpret the data obtained from the ACM. According to that article, the current cost of the Hyundai kit is US$4000.00; the current cost of the Kia kit is US$4300.00. The annual software subscription price is US$195.00 for each kit. Shipping charges are not included in those prices. Each unit is called a "Vehicle Communication Interface" (VCI). The blue Hyundai and the red Kia VCIs are shown to the right. The cables used to connect these VCIs to the ACMs are yellow in color; cables used to connect the VCIs to computers are black in color.

The article in ***Collision*** described certain features and characteristics of these units and their reports, based on some limited comparison testing using staged collisions of instrumented vehicles. One of the first aspects of these instruments is that they do not and cannot provide an electronic copy of the data—the downloaded data set is presented in Adobe Portable Document Format (i.e., as a pdf), and it is not secure. In other words, someone with Adobe Acrobat could modify the pdf at some later date and time. With the Bosch CDR system, the data set is saved first in a proprietary Bosch format (*.cdrx) from which a printed report can be prepared. A pdf can also be generated from the proprietary Bosch file, but that does not alter the contents of the original file. Also, that original file can be opened in a later version of the Bosch software, and that later opening can reveal information which was not available when originally downloaded. For example, the on/off condition of the brake switch is typically monitored for eight time segments before algorithm enable (AE); most pre-crash time segments are at one second intervals. In early versions of the software, only the five pre-crash segments closest to AE were shown; in later versions, a table showing the brake switch state in all eight pre-crash time segments is provided. Opening the Bosch file in a later version of the software, or re-opening it in the original version, does not alter the downloaded data, nor can the downloaded data be changed by the computer operator or the software.

Another aspect of the VCIs is that they do not access or record a vehicle's VIN during an interrogation. Therefore, a given pdf file generated by an EDR download using a VCI cannot be linked to or positively identified as having come from a specific vehicle. Recent court cases have rejected the admission of EDR data when there is insufficient documentation and/or the ACM from which the data set was downloaded has not been saved. Many of the vehicles whose ACMs can be interrogated using the Bosch CDR Toolkit will report (to the software) the VIN of the car or light truck in which it is installed, where it becomes a permanent part of the *cdrx file.

"Spoofing" is a term which describes a method of accessing data in an ACM by using a VIN from another vehicle. The Bosch CDR software will not allow a user to proceed without a valid VIN from a vehicle covered by the software. However, and especially for older vehicles where the ACM did not report the VIN of the vehicle in which it was installed, a vehicle which had EDR capabilities in the ACM but which was not covered by the Bosch CDR software could be interrogated using a VIN from a similar vehicle. That method would often allow an operator to obtain a CDR report which appeared normal and proper, but the trouble with that method is that there is no way to verify that the digital data stored in the ACM was properly translated. A primary function of the software is to interpret the digitized data (stored as zeroes and ones) and present the results in a format and language that we understand—speed in mph, engine speed in rpm, etc. If an unsupported vehicle's ACM has been interrogated by spoofing, the "translation" may not be accurate, and there is no way to verify or document its accuracy or authenticity.. Therein lies one of the major shortcomings of the VCI reports—there is no requirement that the operator match the VIN to the specific ACM installed in a vehicle, so that a Hyundai or a Kia ACM could be easily spoofed, either accidentally or deliberately, and there would be no way to identify that process after the report was printed.

As I've previously written, 49 CFR 563, commonly called Part 563 or simply 563, went into effect on September 1, 2012. Among the provisions and requirements was one regarding the accuracy of reported crash data—plus or minus ten percent. According to the article in ***Collision*** magazine, limited crash testing has shown some values of VCI-reported data to be as much as twenty percent higher than the corresponding data obtained with calibrated instruments used in the staged collision. The authors of the article caution that this observation is based on a very limited data set and that more testing is anticipated. I expect that, within a year or less, there will be more extensive, documented crash testing of Hyundai and Kia vehicles to compare the data contained in their ACMs with the real-world data obtained from on-board, highly accurate, calibrated instruments. In the meantime, I will not be encouraging anyone to invest in a crash data download from any Hyundai or Kia vehicle. Even if subsequent crash testing demonstrates that the recorded data set falls within the tolerances allowed by Part 563, there are many other issues which would probably prevent a report from a Hyundai or Kia VCI to be admitted as evidence in either civil or criminal courts.

Another article in Volume 8, Issue 1, of ***Collision*** addressed the topic of the effect of tinting on the reduction of light emitted by headlamps. Many of you have probably seen "smokey"

headlight enclosures. There are Federal standards regarding the amount of light emitted by headlights, and manufacturers design vehicles and components to at least meet, and usually exceed, those minimum standards. Aftermarket products and processes are available to make covers and lenses "smokey." The author of the paper used one specific vehicle, a constant source of 12.7 volts DC, and two different sets of headlamp bulbs, both of the same type: one set was removed from a vehicle which had been involved in a night-time collision while the other set was new. One headlamp of the test vehicle was tinted ("smoked"), and the other was left in normal condition. Tests were conducted in a rural area with essentially no ambient illumination. One series of tests compared the light available through the tinted headlamp housing for the used bulb and the new bulb. The used bulb only provided a little over half as much illumination through the tint as the new bulb. Interestingly, when the same comparison was made using the untinted headlamp assembly, there was very little difference in the illumination provided by the new bulb versus the old bulb. One of the purposes of this series of experiments was to demonstrate that the driver of a vehicle with tinted headlights would have serious difficulties in observing and discerning the environment ahead of him, due to the significant reduction in emitted light. Another aspect of the testing, however, is what the author described as the distance to "drop off," the limit at which the luminance from the headlamp can be detected above the level of ambient illuminance—in other words, the limit at which an observer would be able to detect that there was a light source moving toward him. For the old bulb in low-beam mode and the tinted lens, that distance was only 88 feet! With the new bulb, that distance only increased to 100 feet—about one second of travel at 60 mph. With the old bulb in low-beam mode in the untinted headlamp housing, the distance was greater than 300 feet. (The author had used a 300-foot tape to make his distance measurements, and the light level at 300 feet with the old bulb/low beam/untinted headlight was still above the minimum detection threshold.) The results from these experiments show that an operator of a vehicle with tinted headlights would have difficulty observing his environment but also showed that pedestrians and drivers of other vehicles would have trouble perceiving the presence of that vehicle at any significant distance.

I will admit that I was pleasantly surprised when Bosch announced that 2014 Mercedes Benz cars, SUVs, and light trucks manufactured for sale in the United States would be covered under version 11.0 of the software, with two new ACM cables associated with that release. I already have one of those cables and the software; the other ACM cable is expected to be available for pre-order in September of this year. Wonders never cease, do they?

I have already had my week of family vacation, and I have also attended and was a guest speaker at the crash conference held in Charleston, SC, the last week in July. I anticipate that I will share some of the crash conference details in my next newsletter. In the meantime, please stay tuned to www.ralphcunningham.net and contact me anytime you have need of the motor-vehicle-related services I offer.

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