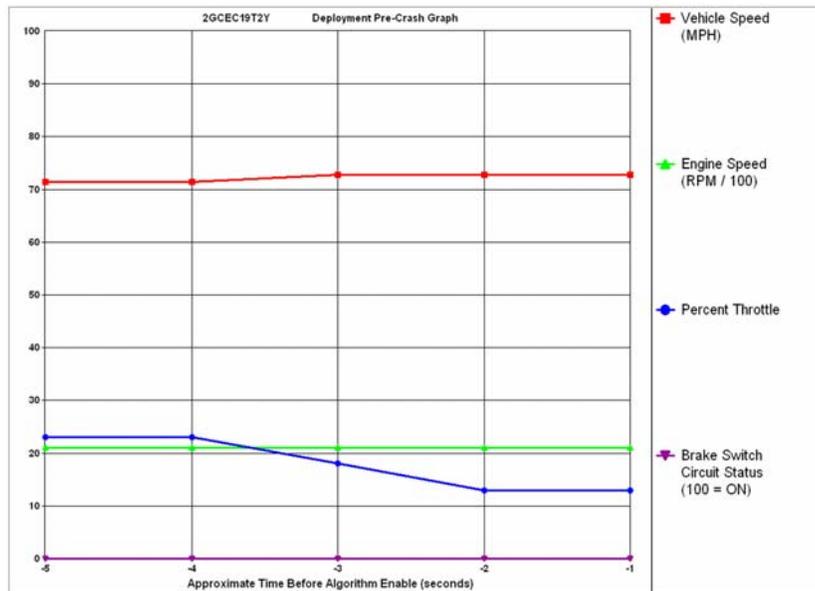


The graph to the left is from a real case in which I was involved in 2004. This graph and a brief explanation were used on my Web site as my October 18 current feature. This newsletter will describe more details and uses of downloads from Event Data Recorders (EDRs). Because this is an actual case, the identifying numbers at the end of the VIN have been omitted, and this newsletter will only describe some aspects of this particular reconstruction in general terms.

This graph is called a pre-crash graph. The EDR in this truck was designed to monitor certain parameters of vehicle operation and, in the event of a collision which resulted in the firing of the airbags, write the last five seconds of data preceding the crash in non-volatile memory inside the module. Technically, the starting point is algorithm enablement, but that occurs within a few thousandths of a second after contact is made; as a practical matter, the starting point for a collision of this magnitude is when the vehicles first make contact. The indicated parameters are monitored and recorded at one-second intervals. There are several points to be made about this data set.



The first point to be made is that this collection of data is coming from different sensors around the vehicle; these data points are available from the unit's data bus. But not each point is sampled at the same instant. Also, for some of these data points, a significant change is required before being shown as a different value. The graph above, for example, shows the engine speed as rock-solid constant for the five seconds preceding the crash. Because the recording sensor does not respond to small changes in engine speed, it will not report minor changes. In this particular case, the truck was starting to go downhill, and the cruise control was likely engaged, so the throttle was partially released as the road speed began to increase, resulting in so little change to the engine speed that no change was reported. It is also noteworthy that interruption of electrical power to the EDR and/or previous data sets (as from a non-deployment event, when the algorithm was enabled but did not fire the airbags because the anticipated collision severity did not warrant that action) can interfere with or corrupt the data for a deployment-level event in some of the EDRs presently in use, so each download must be evaluated in light of other data contained in the EDR (if any) and with the external physical evidence of the collision.

In this particular case, a pickup truck and a car collided, left-front-to-left-front, on a two-lane, two-way road. One vehicle was fully within its normal lane of travel at impact; the other vehicle had encroached. There was no evidence of pre-collision skidding or other evasive action taken by the driver of either vehicle. After impact, each vehicle moved to its respective final position. An energy-based evaluation using appropriate crush coefficients for the observed damages and considering their post-collision travels yielded a speed range for each vehicle. Since the velocity vectors of these vehicles were essentially parallel (but oppositely directed) at impact, conservation of momentum principles could not be used to evaluate the impact speed of each vehicle without some means of determining the speed of one of the vehicles. But wait! We have the speed of one vehicle! The chart above shows the truck at 73 mph one second before algorithm enablement, the brake switch was off one second before algorithm enablement, there was no indication of pre-collision skidding or a pre-impact swerve—this truck was traveling at approximately 73 mph at impact! As it turns out, the speed evaluation based on conservation of energy principles produced a number which was only slightly higher. When a speed of

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: \_\_\_\_\_