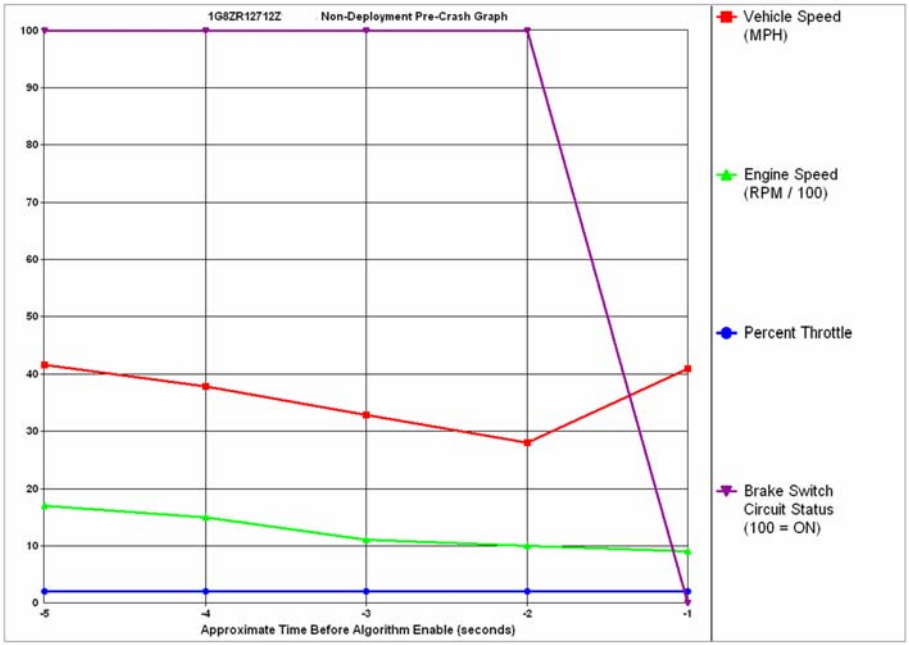
The chart below is part of a Crash Data Retrieval (CDR) file from a late-model General Motors car. What makes this chart interesting is that it is from one of three vehicles involved in a collision sequence; one of the other two vehicles was stopped, and the third did not have an accessible Event Data Recorder (EDR).



The car which struck the car which contained this chart as part of the CDR file did so in a right-front to left-rear manner; i.e., it struck this vehicle at the left rear corner. That impact accelerated this car forward and moved it toward its right, where it collided with a stopped vehicle. The vehicle speed line (red) shows an increase from -2 seconds to -1 second, the brake pedal was released in the same time interval, but the engine speed continued to decrease and the throttle position remained steady during that time interval—the increase in speed was not from engine power but was a result of the first impact. That impact, being directed from the rear toward the front of the struck vehicle, did not awaken the algorithm which "decides" whether or not to fire the airbags. The second impact, between this car and the stopped vehicle, awakened the algorithm, but the airbags did not fire. Even though the airbags weren't fired, the previous five seconds of vehicle operation were stored in the non-volatile memory of the module. This is called a non-deployment event.

How do I know which impact awakened the algorithm? Because the sensors which consider vehicle motion ignore forward acceleration, and the first impact to this car included forces primarily toward its front and also toward its right side. Plus, we see an increase in speed which had to have come from some external force, since the throttle position was constant and the engine speed was decreasing while the speed of the vehicle increased.

To me, the interesting aspect of this is that data included in the download from the GM vehicle involved in this incident allowed me to more narrowly define certain parameters of this collision sequence. Although I was not retained on behalf of the owner of this vehicle, I was given permission to examine it, and I was given specific permission to download the EDR in this chassis. Since the first collision was more sideswipe (sliding contact) than full engagement, the observed crush was not particularly helpful in assessing energy losses or transfers. Since the second impact involved the same general region as the first, there was also no method of segregating the damages which occurred during the first collision from the damages which occurred during the second collision in which this particular vehicle was involved. However, the speed increase to this vehicle, combined with knowledge about the weights (masses) of both vehicles, allowed me to calculate the momentum transfer which occurred during the first collision. That value, in combination with the pre-collision skidding of the other car and its post-collision travel, allowed me to narrowly define its speed at the initiation of its skidding. The post-impact speed of the vehicle with the EDR, combined with its post-impact travel and rotation until the second impact, allowed me to narrowly define the speed of this vehicle at the point of its impact with the stopped vehicle. Under the specific circumstances of this collision sequence, there would have been large areas of ambiguity to this reconstruction without the EDR data.