Pre-crash data

Parameter	-1.0 sec	-0.5 sec
Reduced Engine Power Mode	OFF	OFF
Cruise Control Active (If Equipped)	No	No
Cruise Control Resume Switch Active (If Equipped)	No	No
Cruise Control Set Switch Active (If Equipped)	No	No
Engine Torque (foot pounds)	78	45.73

There have been many changes to Crash Data Retrieval since my last newsletter on the topic. A change in the output data is shown in the table to the left, which was part of a download from a 2007 Chevrolet truck. This chart shows the status of the cruise control system and engine torque (in foot pounds) for two increments within a second of algorithm enable.

Vetronix, the company which developed the Crash Data Retrieval system and which was also known for a large variety of aftermarket vehicle diagnostic equipment, was purchased by Bosch. The CDR system is still marketed and supported under the Vetronix trade name, but costs of software and hardware upgrades have increased. (Nothing new under the sun, right?) It is reported that an agreement has been reached with the Chrysler division of Daimler Chrysler such that the Vetronix CDR Toolkit will soon be able to access data from selected Chrysler and Dodge vehicles. No information yet on which specific year/make/model vehicles in their lineup will be included as accessible. Also, Ford Motor Company has incorporated hardware and software upgrades on select, late-model vehicles which allow up to 25 seconds of operational data to be stored in the powertrain control module (PCM). Reportedly, Vetronix is also working with Ford Motor Company to allow CDR Toolkit owners to add the software and hardware components needed to access the PCM data. A note of caution: the data are stored in an as-running state. For a Ford vehicle equipped with the PCM data storage, turning on the ignition switch and leaving it on for 25 seconds or more will overwrite all data elements with zeroes (or idle-speed values, if the engine is running).

Pre-crash data

Parameter	-2.5 sec	-2.0 sec	-1.5 sec	-1.0 sec	-0.5 sec
Vehicle Speed (MPH)	44	44	44	44	38
Engine Speed (RPM)	1216	1152	1088	1152	1024
Percent Throttle	30	26	21	14	28
Brake Switch Circuit Status	OFF	OFF	OFF	OFF	ON

Another change which has occurred is the elimination of the five-second pre-crash graph. This graph was often misinterpreted and was a source of much confusion. Although the data points were sampled at intervals which were approximately one second apart, they were not simultaneously sampled, and the variation could often be plus or minus two-tenths of a second. In a collision situation, two-tenths of a second can be a very long time. And the lines between each point gave the impression of continuity from one point to the next, but testing showed that there could be discontinuities in the one-second intervals which would never appear in the graph. The chart above replaces the graph, and it also shows parameters in five increments of one-half second each. Some printouts from GM products also show steering angle.

Another change which can be extremely useful to a reconstructionist is the inclusion of longitudinal and lateral velocity-change data in printouts from most very-late-model GM products. The longitudinal accelerometer is the one whose operation primarily dictates the firing of the frontal airbags, but most collisions are not entirely head-on: most involve at least some off-center and/or lateral component, and some are essentially broadside. An important factor in most accident reconstructions is the principal direction of force (PDOF). In the past, the value of that parameter often had to be estimated or approximated based on known values or observations, like vehicle damages, pre-impact velocity vectors, and/or post-impact trajectories. A recent download from a 2007 Chevrolet truck showed values both of longitudinal velocity change and lateral velocity change for a 300-millisecond time span; the vehicle's air-bag control module (ACM) now includes a dual-axis accelerometer. These values of velocity change (delta-v) can be used to numerically and precisely determine the PDOF for that vehicle.

Time (milliseconds)	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150
Lateral Axis Recorded Velocity Change (MPH)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.64	1.91	3.18	4.46	3.82	3.18	2.55	2.55
Time (milliseconds)	160	170	180	190	200	210	220	230	240	250	260	270	280	290	300
Lateral Axis Recorded Velocity Change (MPH)	3.18	3.18	3.18	3.82	4.46	5.09	5.09	5.09	5.09	5.73	5.73	5.73	5.73	5.73	5.73

Time (milliseconds)	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150
Longitudinal Axis Recorded Velocity	0.00	0.00	0.00	0.00	0.00	-0.64	-3.18	-7.00	-11.46	-15.92	-18.47	-21.01	-22.92	-24.83	-25.47
Time (milliseconds)	160	170	180	190	200	210	220	230	240	250	260	270	280	290	300
Longitudinal Axis Recorded Velocity	-26.11	-26.74	-27.38	-28.02	-28.02	-28.02	-28.02	-28.02	-28.02	-28.65	-28.65	-28.65	-28.65	-28.65	-28.65

The two tables above show the data from the accelerometers. To numerically determine PDOF for this vehicle, the data sets need to be compared at the same time values. Some of the printouts from some of the vehicles equipped with dual-axis accelerometers list a calculated value for PDOF, but great care must be exercised in using that value: it is determined by using the maximum values for longitudinal and lateral acceleration, but those values often do not occur at the same time. Combining the acceleration in one direction from the perpendicular acceleration at a different time will give an obviously wrong value for PDOF, and the resulting error can be very large.

The expanded data set also includes an entire page of tabulated data, including the status of driver and right front seat belt usage, driver's seat position, a listing of nine diagnostic trouble codes present at the time of deployment, belt pretensioner deployment, rollover occupant containment status, head-curtain airbag status and deployment, and other very detailed information. As before, the complete hexadecimal data set is also included with each CDR report, but that data set is now larger. And, of course, let us not forget the ever-present and always important Data Limitations listing, which is usually at least one page long and may need two pages.