To the office of defect investigation of the National Highway Traffic Safety Administration (NHTSA).

This letter requests that NHTSA's Office of Defect Investigation, conduct an investigation of a General Motors electronic algorithm which can and has inhibited airbag deployment of properly belted passengers resulting in severe injury and death. This request stems from the investigation of a April 9, 2011 accident on westbound Expressway 83 in Mission Hidalgo County Texas, involving a 2008 Chevrolet Impala, a case named Martinez versus GM (Cause No. C-2573-11-C), see Attachment 2.

Briefly, the case involves an elderly couple Mr. and Mrs. Martinez, each weighing approximately 170 pounds, properly belted who inadvertently entered a road construction site, first impacting a Jersey barrier which redirected them moments later into a frontal fixed barrier at a CDR recorded Delta V of 27 mph (see Attachment 3). The CDR record indicates the deployment of the driver airbag and the inhibiting of the passenger airbag occupied by a small adult. Tire marks on the Jersey barrier indicate the vehicle was lifted and bounced just prior to the frontal barrier impact. The lift and bounce momentarily reduced the weight of the passenger to that of a small adult. Further investigation by downloading the Passive Occupant Detection System (PODS) control module revealed that the pressure (weight) on the seat was continuously monitored and recorded five changes in occupant classification during the ignition cycle. The records show that at engine ignition the passenger seat was empty and then occupied by a full size adult with subsequent varying weight. There is also a record of passenger weight each second prior to algorithm enable (AE). Message #46 indicates that the relative pressure (weight) one second before the frontal impact event was 49, a small adult classification (See Attachment 4).

The algorithm for the weight of the passenger used the instantaneous weight to determine whether to inhibit the airbag deployment. Using a weight averaged over a few tens of seconds would have avoided suppressing the airbag and the resulting serious injury and fatality. Since the control module is field reprogrammable a simple recall and modifying a few lines of code can avoid repeat occurrences.

The advanced airbag provisions of FMVSS 208 calls for this weight and or size discrimination and its implementation by GM likely occurred by 2003 in all vehicle lines and models including millions of vehicles. This investigator has no information as to whether this defect has ever been corrected to this date. It should be noted that in 2010 the Highway Loss Data Institute (HLDI) of Insurance Institute of Highway Safety (IIHS) reported a 15% increase primarily in small adult fatalities for vehicles equipped with advanced airbags as compared to the previous generation airbags (See Attachment 5).

Detailed interpretation of Delphi serial port message requests and PODS control module response.

The serial communication box requests information from the Passive Occupant Detection System (PODS) ECU by transmitting (Tx) a request message asking for a specific packet of variables, like a Data Packet ID (DPID) or Data ID (DID). The PODS ECU responds (Rx) to the request by repeating the variable ID and the associate data in memory.

The exchange in this case was limited to requests for verification of the vehicle, control module and calibrations being interrogated for the decision to suppress airbag deployment for the passenger. The tables supplied in the report up to message #20 are for this purpose. Message #24 and beyond are data request and responses pertinent to the decision for deployment. A simplified chart has been created for this purpose.

Records 24-32 indicate that there are no faults present (everything's working the way it is supposed to).

Table 1 includes the following data:

Record 36-38 is the classification record of the passenger occupant identified by the event record starting at the impact event (current) then first previous classification, then second, third and fourth previous classification.

Data records 44-46 are the times before the event at which the classifications changed.

Table 1.

Changed classification and times before current

Events	Current	1st prior	2nd prior	3rd prior	4th prior
Changed*	Small	Large	Small	Small	Empty
Times**	1.2 sec	925.0 sec	0.2 sec	0.1 sec	28.2 sec

* Files #36-38 Changed classification

** Files #44-46 Times at which the classifications changed

Files #50-72 are relative, filtered and BTS seat pressures from current event to 18 seconds before event and are shown in Table 2.

Table 2.

Second by second measured passenger seat pressure (relative, filtered, BTS)

Time	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Relative	49	58	117	122	122	121	122	121	121	121	121	121	?	121	121	121	121	121
Filtered	131	132	179	182	182	181	182	181	181	181	181	181	?	181	181	181	181	181
BTS	116	93	64	56	56	56	56	56	56	56	56	56	?	56	56	56	56	56

November 2013

Administrator
National Highway Traffic Safety Administration
1200 New Jersey Ave., SE West Building
Washington, DC 20590

Re: Petition for Defect and Recall

To the office of defect investigation of the National Highway Traffic Safety Administration (NHTSA)

Gentlemen,

Enclosed are materials which lead me to believe there is a major defect in the GM algorithms identifying the weight and size of occupants at impact which has and may inhibit airbag deployment in response to the advanced airbag requirements of 2000. This defect is probably in all GM vehicles from 2003-2010.

The enclosures include:

1) Basis for defect request
2) Legal Claim
3) CDR record of the 2008 Chevrolet Impala accident
4) the Delphi download of stored data in the passive occupant protection system (PODS) control module
5) IIHS Status Report identifying a 15% increase of fatalities in post advanced airbag accidents.

Thank you for your consideration,
Donald Friedman
Xprts, LLC
501 Meigs Road
Santa Barbara, CA 93109
Ph: 805-683-6835

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Martinez Vehicle
2008 Chevrolet Impala Sedan
VIN# 2G1WT58K781376787

EDR Summary Report

Andrew H. Curtis
Mechanical Engineer
Delphi Electronics & Safety

4th April, 2012

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Review:

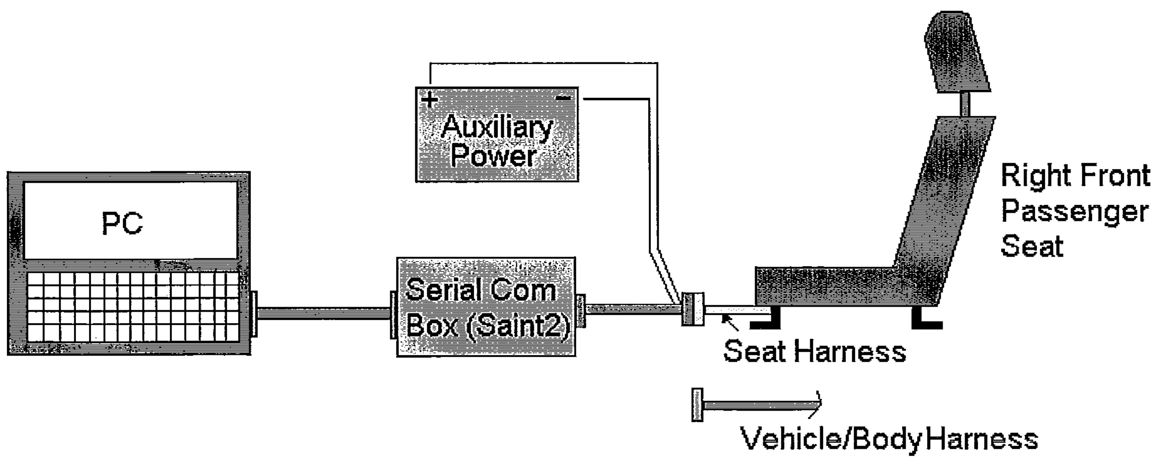
The subject vehicle is a 2008 MY Chevrolet Impala Sedan that was involved in an accident near Mission, Texas. Delphi was asked to download the Event Data Record (EDR) from the Electronic Control Unit (ECU) of the Passive Occupant Detection System (PODS) in the subject vehicle. Delphi met with the following individuals on the 20th of March, 2012 at 317 N. Shary Rd., Mission, Texas 78572, where the subject vehicle was being stored.

Jennifer Brooks, David Viano, Steve Bailo, R. Patrick Donahue, William E. Gest, Zach Jackson, Manuel Guerra, Allen Price and other representatives of Plaintiffs.

Protocol:

The subject vehicle was first visually inspected and photographed. The EDR record was then extracted from the ECU memory and a copy of the record was made available on site to Manuel Guerra, R. Patrick Donahue and others.

The EDR was downloaded from the PODS ECU using a serial communication box, cables, auxiliary power and a PC. Connection to the PODS ECU was established through the right front passenger seat harness connector. The existing connection between the passenger seat harness and the vehicle harness was disconnected, and connection was made to the serial communication box and PC, as shown in the following diagram. The connection from the passenger seat harness to the vehicle harness was restored at the close of the inspection.



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Data Record Format Explanation:

The serial communication box requests information from the PODS ECU by transmitting (Tx) a request message asking for a specific packet of variables, like a DPID or DID. The PODS ECU responds (Rx) to the request by repeating the variable ID and the associate data in memory. The structures of the request and response message strings are summarized in the following table.

(Tx) Transmition, (Rx) Received	Request ID (0245) Response ID (0545 or 0645)	Continuation String Notice	Data String Length	Service Request/Response ID.	Subservice parameter	DPID or DID ID	Requested Bits	Data Byte #1	Data Byte #2	Data Byte #3	Data Byte #4	Data Byte #5	Data Byte #6	Data Byte #7

E.G. DID 21 Software Release

10	Tx	02	45		02	1A		21								
11	Rx	06	45	10	08	5A		21		6A	31	B3	96			

DPID 40 Record Lock Status

23	Tx	02	45	3	AA	1	40							
24	Rx	05	45				40	80	A5	01	00	00	00	00

The data translated in this report are the values reported in Data Bytes 1 through 7.

The EDR data as reported by the serial communication box, in text form, is appended to this report as Appendix "A" and can be compared with this table to better understand and correlate the reported data to the translation tables.

The ECU has the capability to store up to three records. The ECU of the subject vehicle only had data in the first record. Only this record is translated. Records 2 and 3 are listed in Appendix "A" but are not translated.

The Product Definition Document/s for the PODS-B product and GM LAN Protocol were referenced during the creation of the following EDR summary report.

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Translation:

The following pages list the response messages from the PODS ECU, translating the IDs, bytes, values, definitions, conversions and meanings where applicable.

1) Product Information: (DIDs 21, Service ID A9, B4 and CB)

Msg# 11 Rx 06 45 10 08 5A 21 6A 31 B3 96

	Byte	Value	Definition	Conversion	Translation/Meaning
DID 21 Software Release/Version	Byte #1	6A	Software Release Date	2006 October 31st Day	6 is the year, A is the Month, 31 is the day.
	Byte #2	31			
	Byte #3	B3	Software Check Sum	B396	Value of the Software Check Sum
	Byte #4	96			
	Byte #5		Calibration Check Sum		Calibration Check Sum Value
	Byte #6				

Note:

The entire data string was longer than an 8 byte string response. The request message from the serial communication box did not instruct the ECU to send the subsequent bytes of information.

Msg# 13 Rx 05 45 81 00 00 00 B3 00 00 00

	Byte	Value	Definition	Conversion	Translation/Meaning
Service A9 Faults in History	Byte #1	00	No Faults in History	00	No Faults in History
	Byte #2	00	No Faults in History	00	
	Byte #3	00	No Faults in History	00	
	Byte #4	B3	List of DTC status flags	B3	End of String
	Byte #5	00	Padded Zero		
	Byte #6	00	Padded Zero		
	Byte #7	00	Padded Zero		

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1) Product Information: (cont.)

Msg# 15 Rx 06 45 10 12 5A B4 42 52 35 35
Msg# 17 Rx 06 45 21 36 35 56 31 37 35 38
Msg# 18 Rx 06 45 22 31 51 44 39 38 00 00

	Byte	Value	Definition	Conversion	Translation/Meaning
DID B4 Traceability Info	Byte #1	42	Product Bar Code Tracebility Information Hex to ASCII	B	Plant Designator
	Byte #2	52		R	
	Byte #3	35		5	Last four digits of product part number
	Byte #4	35		5	
	Byte #5	36		6	
	Byte #6	35		5	
	Byte #7	56		V	Supplier Code
	Byte #8	31		1	Julian Date
	Byte #9	37		7	
	Byte #10	35		5	
	Byte #11	38		8	Calendar year
	Byte #12	31		1	Serial No.
	Byte #13	51		Q	
	Byte #14	44		D	
	Byte #15	39		9	
	Byte #16	38		8	

Msg#20 Rx 06 45 06 5A CB 01 8A 38 2D 00

	Byte	Value	Definition	Conversion	Translation/Meaning
DID CB End Model Part No.	Byte #1	01	End Model Part Number in Hex Format	25835565	Controller End Model Part Number
	Byte #2	8A			
	Byte #3	38			
	Byte #4	2D			

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2) EDR #1 Data:

Msg# 24 Rx 05 45 40 80 A5 01 00 00 00 00

		Value	Description	Conversion	Translation/Meaning
DPID 40 Record Lock, Status, Event Type	Byte #1	80	Event Record Status, Locked	10000000	Event Record is Locked
	Byte #2	A5	Event Record Complete Flag	A5	Event Record is Complete
	Byte #3	01	Event Trigger Type	01	Event Type is a Frontal
	Byte #4	00	Not implemented, padded zeros		
	Byte #5	00	Not implemented, padded zeros		
	Byte #6	00	Not implemented, padded zeros		
	Byte #7	00	Not implemented, padded zeros		

Msg# 26 Rx 05 45 41 0B 5E 00 00 80 00 00

		Value	Description	Conversion	Translation/Meaning
DPID 41 AOS Counter Power Mode	Byte #1	0B	Syncronization Counter with SDM	2910	Record is syncronized.
	Byte #2	5E			
	Byte #3	00	Not implemented, padded zeros		
	Byte #4	00	Not implemented, padded zeros		
	Byte #5	80	Power Mode Status.	10000000	Power mode is in Run Mode.
	Byte #6	00	Not implemented, padded zeros		
	Byte #7	00	Not implemented, padded zeros		

Msg# 28 Rx 05 45 42 FF FF FF FF FF FF 00

		Value	Description	Conversion	Translation/Meaning
DPID 42 DTCs at Event Enable	Byte #1	FF	No values written, no faults present	255	No faults present, No values written
	Byte #2	FF		255	
	Byte #3	FF	No values written, no faults present	255	No faults present, No values written
	Byte #4	FF	No values written, no faults present	255	No faults present, No values written
	Byte #5	FF		255	
	Byte #6	FF	No values written, no faults present	255	No faults present, No values written
	Byte #7	00	Not implemented, padded zeros	0	

Msg# 30 Rx 05 45 43 FF FF FF FF FF FF 00

		Value	Description	Conversion	Translation/Meaning
DPID 43 DTCs at Event Enable	Byte #1	FF	No values written, no faults present	255	No faults present, No values written
	Byte #2	FF		255	
	Byte #3	FF	No values written, no faults present	255	No faults present, No values written
	Byte #4	FF	No values written, no faults present	255	No faults present, No values written
	Byte #5	FF		255	
	Byte #6	FF	No values written, no faults present	255	No faults present, No values written
	Byte #7	00	Not implemented, padded zeros	0	

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2) EDR #1 Data: (cont.)

Msg# 32 Rx 05 45 44 01 00 01 00 00 00 00

		Value	Description	Conversion	Translation/Meaning
DPID 44 AOS Status	Byte #1	01	AOS Enable Request	01	Transmittted
	Byte #2	00	AOS Fault Status,	00	No faults present
	Byte #3	01	AOS Enable Status	01	AOS system is enabled
	Byte #4	00	Not implemented, padded zeros		
	Byte #5	00	Not implemented, padded zeros		
	Byte #6	00	Not implemented, padded zeros		
	Byte #7	00	Not implemented, padded zeros		

Msg# 36 Rx 05 45 45 84 81 8A 81 84 00 00

		Value	Description	Conversion	Translation/Meaning
DPID 45 Classification History 1	Byte #1	84	Current Transmitted Pass Class Type	10000100	Small Occupant
	Byte #2	81	Current Received Pass Class Type	10000001	Confirmed Message Received
	Byte #3	8A	1st Previous Transmitted Pass Class Type	10001010	Large Occupant
	Byte #4	81	1st Previous Received Pass Class Type	10000001	Confirmed Message Received
	Byte #5	84	2nd Previous Transmitted Pass Class Type	10000100	Small Occupant
	Byte #6	00	2nd Previous Received Pass Class Type	00000000	Not Confirmed Message Received
	Byte #7	00	Not implemented, padded zeros	0	

Msg# 38 Rx 05 45 46 83 00 82 81 00 00 00

		Value	Description	Conversion	Translation/Meaning
DPID 46 Classification History 2	Byte #1	83	3rd Previous Transmitted Pass Class Type	10000011	Small Occupant
	Byte #2	00	3rd Previous Received Pass Class Type	00000000	Not Confirmed Message Received
	Byte #3	82	4th Previous Transmitted Pass Class Type	100000010	Empty Seat
	Byte #4	81	4th Previous Received Pass Class Type	100000001	Confirmed Message Received
	Byte #5	00	Not implemented, padded zeros	00000000	
	Byte #6	00	Not implemented, padded zeros	00000000	
	Byte #7	00	Not implemented, padded zeros	00000000	

Msg# 40 Rx 05 45 50 00 AF 80 38 04 02 3D

		Value	Description	Conversion	Translation/Meaning
DPID 50 AOS Operational Data #1	Byte #1	00	Occupant Lock Status	00000000	Classification Not Locked
	Byte #2	AF	Filtered Temperature (counts)	175	value in counts
	Byte #3	80	Filtered Pressure (counts) at event	128	value in counts
	Byte #4	38	Empty Count (counts	56	value in counts
	Byte #5	04	Empty Learn (counts)	4	value in counts
	Byte #6	02	Foam Compress Adjust (counts)	2	value in counts
	Byte #7	3D	Final Empty Value (counts)	61	value in counts

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2) EDR #1 Data: (cont.)

Msg# 42 Rx 05 45 51 4F 87 00 4F 00 4F 26

		Value	Description	Conversion	Translation/Meaning
DPID 51 AOS Operational Data #2	Byte #1	4F	Allow Threshold	79	value in counts
	Byte #2	87	Seat Life, MSB (Most Significant Byte)	135	value in counts
	Byte #3	00	Foam Gain Modifier	0	value in counts
	Byte #4	4F	Unadjust Allow Threshold	79	value in counts
	Byte #5	00	Ride Learn Adjustment	0	value in counts
	Byte #6	4F	Final Allow Threshold	79	value in counts
	Byte #7	26	Relative Pressure at event	38	value in counts

Msg# 44 Rx 05 45 52 86 1F 05 00 0C 24 22

		Value	Description	Conversion	Translation/Meaning
DPID 52 AOS Operational Data #3	Byte #1	86	Filtered BTS at event	134	value in counts
	Byte #2	1F	BTS Adjustment	31	value in counts
	Byte #3	05	Number of classification changes	5	number per ignition cycle
	Byte #4	00			
	Byte #5	0C	Current Classification Timer	12	1.2 seconds (value x 100ms)
	Byte #6	24			
	Byte #7	22	First Previous Classification Timer	9250	925.0 seconds (value x 100ms)

Msg# 46 Rx 05 45 53 00 02 00 01 01 1A 31

		Value	Description	Conversion	Translation/Meaning
DPID 53 AOS Operational Data #4	Byte #1	00			
	Byte #2	02	Second Previous Classification Timer	2	0.2 seconds (value x 100ms)
	Byte #3	00			
	Byte #4	01	Third Previous Classificaiton Timer	1	0.1 seconds (value x 100ms)
	Byte #5	01			
	Byte #6	1A	Fouth Previous Classificaiton Timer	282	28.2 seconds (value x 100ms)
	Byte #7	31	Relative Pressure 1 sec. before event	49	value in counts

Msg# 50 Rx 05 45 54 4F 83 74 3A 35 84 5D

		Value	Description	Conversion	Translation/Meaning
DPID 54 AOS Operational Data #5	Byte #1	4F	Final Allow Threshold, 1 sec before event	79	value in counts
	Byte #2	83	Filtered Pressure, 1 sec before event	131	value in counts
	Byte #3	74	Filtered BTS, 1 sec before event	116	value in counts
	Byte #4	3A	Relative Pressure, 2 sec before event	58	value in counts
	Byte #5	35	Final Allow Threshold, 2 sec before event	53	value in counts
	Byte #6	84	Filtered Pressure, 2 sec before event	132	value in counts
	Byte #7	5D	Filtered BTS, 2 sec before event	93	value in counts

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2) EDR #1 Data: (cont.)

Msg# 52 Rx 05 45 55 75 35 B3 40 7A 35 B6

		Value	Description	Conversion	Translation/Meaning
DPID 55 AOS Operational Data #6	Byte #1	75	Relative Pressure, 3 sec before event	117	value in counts
	Byte #2	35	Final Allow Threshold, 3 sec before event	53	value in counts
	Byte #3	B3	Filtered Pressure, 3 sec before event	179	value in counts
	Byte #4	40	Filtered BTS, 3 sec before event	64	value in counts
	Byte #5	7A	Relative Pressure, 4 sec before event	122	value in counts
	Byte #6	35	Final Allow Threshold, 4 sec before event	53	value in counts
	Byte #7	B6	Filtered Pressure, 4 sec before event	182	value in counts

Msg# 54 Rx 05 45 56 38 7A 35 B6 38 79 35

		Value	Description	Conversion	Translation/Meaning
DPID 56 AOS Operational Data #7	Byte #1	38	Filtered BTS, 4 sec before event	56	value in counts
	Byte #2	7A	Relative Pressure, 5 sec before event	122	value in counts
	Byte #3	35	Final Allow Threshold, 5 sec before event	53	value in counts
	Byte #4	B6	Filtered Pressure, 5 sec before event	182	value in counts
	Byte #5	38	Filtered BTS, 5 sec before event	56	value in counts
	Byte #6	79	Relative Pressure, 6 sec before event	121	value in counts
	Byte #7	35	Final Allow Threshold, 6 sec before event	53	value in counts

Msg# 56 Rx 05 45 57 B5 38 7A 35 B6 38 79

		Value	Description	Conversion	Translation/Meaning
DPID 57 AOS Operational Data #8	Byte #1	B5	Filtered Pressure, 6 sec before event	181	value in counts
	Byte #2	38	Filtered BTS, 6 sec before event	56	value in counts
	Byte #3	7A	Relative Pressure, 7 sec before event	122	value in counts
	Byte #4	35	Final Allow Threshold, 7 sec before event	53	value in counts
	Byte #5	B6	Filtered Pressure, 7 sec before event	182	value in counts
	Byte #6	38	Filtered BTS, 7 sec before event	56	value in counts
	Byte #7	79	Relative Pressure, 8 sec before event	121	value in counts

Msg# 58 Rx 05 45 58 35 B5 38 79 35 B5 38

		Value	Description	Conversion	Translation/Meaning
DPID 58 AOS Operational Data #9	Byte #1	35	Final Allow Threshold, 8 sec before event	53	value in counts
	Byte #2	B5	Filtered Pressure, 8 sec before event	181	value in counts
	Byte #3	38	Filtered BTS, 8 sec before event	56	value in counts
	Byte #4	79	Relative Pressure, 9 sec before event	121	value in counts
	Byte #5	35	Final Allow Threshold, 9 sec before event	53	value in counts
	Byte #6	B5	Filtered Pressure, 9 sec before event	181	value in counts
	Byte #7	38	Filtered BTS, 9 sec before event	56	value in counts

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2) EDR #1 Data: (cont.)

Msg# 62 Rx 05 45 59 79 35 B5 38 79 35 B5

		Value	Description	Conversion	Translation/Meaning
DPID 59 AOS Operational Data #10	Byte #1	79	Relative Pressure, 10 sec before event	121	value in counts
	Byte #2	35	Final Allow Threshold, 10 sec before event	53	value in counts
	Byte #3	B5	Filtered Pressure, 10 sec before event	181	value in counts
	Byte #4	38	Filtered BTS, 10 sec before event	56	value in counts
	Byte #5	79	Relative Pressure, 11 sec before event	121	value in counts
	Byte #6	35	Final Allow Threshold, 11 sec before event	53	value in counts
	Byte #7	B5	Filtered Pressure, 11 sec before event	181	value in counts

Msg# 64 Rx 05 45 5A 38 79 35 B5 38 79 35

		Value	Description	Conversion	Translation/Meaning
DPID 5A AOS Operational Data #11	Byte #1	38	Filtered BTS, 11 sec before event	56	value in counts
	Byte #2	79	Relative Pressure, 12 sec before event	121	value in counts
	Byte #3	35	Final Allow Threshold, 12 sec before event	53	value in counts
	Byte #4	B5	Filtered Pressure, 12 sec before event	181	value in counts
	Byte #5	38	Filtered BTS, 12 sec before event	56	value in counts
	Byte #6	79	Final Allow Threshold, 13 sec before event	121	value in counts
	Byte #7	35	Filtered Pressure, 13 sec before event	53	value in counts

Msg# 66 Rx 05 45 5B B5 38 79 35 B5 38 79

		Value	Description	Conversion	Translation/Meaning
DPID 5B AOS Operational Data #12	Byte #1	B5	Filtered Pressure, 13 sec before event	181	value in counts
	Byte #2	38	Filtered BTS, 13 sec before event	56	value in counts
	Byte #3	79	Relative Pressure, 14 sec before event	121	value in counts
	Byte #4	35	Final Allow Threshold, 14 sec before event	53	value in counts
	Byte #5	B5	Filtered Pressure, 14 sec before event	181	value in counts
	Byte #6	38	Filtered BTS, 14 sec before event	56	value in counts
	Byte #7	79	Relative Pressure, 15 sec before event	121	value in counts

Msg# 68 Rx 05 45 5C 35 B5 38 79 35 B5 38

		Value	Description	Conversion	Translation/Meaning
DPID 5C AOS Operational Data #13	Byte #1	35	Final Allow Threshold, 15 sec before event	53	value in counts
	Byte #2	B5	Filtered Pressure, 15 sec before event	181	value in counts
	Byte #3	38	Filtered BTS, 15 sec before event	56	value in counts
	Byte #4	79	Relative Pressure, 16 sec before event	121	value in counts
	Byte #5	35	Final Allow Threshold, 16 sec before event	53	value in counts
	Byte #6	B5	Filtered Pressure, 16 sec before event	181	value in counts
	Byte #7	38	Filtered BTS, 16 sec before event	56	value in counts

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2) EDR #1 Data: (cont.)

Msg# 70 Rx 05 45 5D 79 35 B5 38 79 35 B5

		Value	Description	Conversion	Translation/Meaning
DPID 5D AOS Operational Data #14	Byte #1	79	Relative Pressure, 17 sec before event	121	value in counts
	Byte #2	35	Final Allow Threshold, 17 sec before event	53	value in counts
	Byte #3	B5	Filtered Pressure, 17 sec before event	181	value in counts
	Byte #4	38	Filtered BTS, 17 sec before event	56	value in counts
	Byte #5	79	Relative Pressure, 18 sec before event	121	value in counts
	Byte #6	35	Final Allow Threshold, 18 sec before event	53	value in counts
	Byte #7	B5	Filtered Pressure, 18 sec before event	181	value in counts

Msg# 72 Rx 05 45 5E 38 00 00 00 00 00 00

		Value	Description	Conversion	Translation/Meaning
DPID 5E AOS Operational Data #15	Byte #1	38	Filtered BTS, 18 sec before event	56	value in counts
	Byte #2	00	Not implemented, Padded Zeros	0	
	Byte #3	00	Not implemented, Padded Zeros	0	
	Byte #4	00	Not implemented, Padded Zeros	0	
	Byte #5	00	Not implemented, Padded Zeros	0	
	Byte #6	00	Not implemented, Padded Zeros	0	
	Byte #7	00	Not implemented, Padded Zeros	0	

Sincerely,

Andrew H. Curtis
Mechanical Engineer
Forensic Engineering
Delphi Electronics & Safety

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Appendix "A": EDR Data Record

```
;*********************************************************
; Buffer Saved At: 3/20/2012 1:02:59 PM
; Saint firmware: SZ00MV - Saint2 Functional Block v003.012.000
; Saint Bus Monitor 2 version: 4.3.1.0
; Saint Bus Engine 2 version: v1.12.1.0
; Filters Enabled: no
; Emulation Enabled: no
; Comments: #INSERT COMMENT HERE#
;*********************************************************
;Msg#  Port    TS(ms) Bus   Tx/Rx  Data
;----  ----    ------ ---   -----  -----------
1      SZ00MV  0      CAN1  Tx CMD     02 02
2      SZ00MV  204    CAN1  Tx     01 00 00 00 00 00 00 00 00
3      SZ00MV  104    CAN1  Rx     8F FF E0 59
4      SZ00MV  97     CAN1  Tx     01 00 00 00 00 00 00 00 00
5      SZ00MV  196    CAN1  Tx CMD     02 03
6      SZ00MV  502    CAN1  Tx     02 45 01 28
7      SZ00MV  6      CAN1  Rx     06 45 01 68 00 00 00 00 00
8      SZ00MV  494    CAN1  Tx     02 45 01 3E
9      SZ00MV  5      CAN1  Rx     06 45 01 7E 00 00 00 00 00
10     SZ00MV  496    CAN1  Tx     02 45 02 1A 21
11     SZ00MV  3      CAN1  Rx     06 45 10 08 5A 21 6A 31 B3 96
12     SZ00MV  497    CAN1  Tx     02 45 03 A9 81 12
13     SZ00MV  13     CAN1  Rx     05 45 81 00 00 00 B3 00 00 00
14     SZ00MV  487    CAN1  Tx     02 45 02 1A B4
15     SZ00MV  13     CAN1  Rx     06 45 10 12 5A B4 42 52 35 35
16     SZ00MV  38     CAN1  Tx     02 45 30 00 00
17     SZ00MV  12     CAN1  Rx     06 45 21 36 35 56 31 37 35 38
18     SZ00MV  10     CAN1  Rx     06 45 22 31 51 44 39 38 00 00
19     SZ00MV  478    CAN1  Tx     02 45 02 1A CB
20     SZ00MV  11     CAN1  Rx     06 45 06 5A CB 01 8A 38 2D 00
21     SZ00MV  488    CAN1  Tx     02 45 01 3E
22     SZ00MV  12     CAN1  Rx     06 45 01 7E 00 00 00 00 00 00
23     SZ00MV  489    CAN1  Tx     02 45 03 AA 01 40
24     SZ00MV  11     CAN1  Rx     05 45 40 80 A5 01 00 00 00 00
25     SZ00MV  488    CAN1  Tx     02 45 03 AA 01 41
26     SZ00MV  11     CAN1  Rx     05 45 41 0B 5E 00 00 80 00 00
27     SZ00MV  489    CAN1  Tx     02 45 03 AA 01 42
28     SZ00MV  11     CAN1  Rx     05 45 42 FF FF FF FF FF FF 00
29     SZ00MV  489    CAN1  Tx     02 45 03 AA 01 43
30     SZ00MV  11     CAN1  Rx     05 45 43 FF FF FF FF FF FF 00
31     SZ00MV  489    CAN1  Tx     02 45 03 AA 01 44
32     SZ00MV  10     CAN1  Rx     05 45 44 01 00 01 00 00 00 00
33     SZ00MV  489    CAN1  Tx     02 45 01 3E
34     SZ00MV  11     CAN1  Rx     06 45 01 7E 00 00 00 00 00 00
35     SZ00MV  490    CAN1  Tx     02 45 03 AA 01 45
36     SZ00MV  9      CAN1  Rx     05 45 45 84 81 8A 81 84 00 00
37     SZ00MV  491    CAN1  Tx     02 45 03 AA 01 46
38     SZ00MV  9      CAN1  Rx     05 45 46 83 00 82 81 00 00 00
39     SZ00MV  491    CAN1  Tx     02 45 03 AA 01 50
40     SZ00MV  9      CAN1  Rx     05 45 50 00 AF 80 38 04 02 3D
41     SZ00MV  491    CAN1  Tx     02 45 03 AA 01 51
```

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42	SZ00MV	8	CAN1	Rx	05 45 51 4F 87 00 4F 00 4F 26
43	SZ00MV	492	CAN1	Tx	02 45 03 AA 01 52
44	SZ00MV	8	CAN1	Rx	05 45 52 86 1F 05 00 0C 24 22
45	SZ00MV	492	CAN1	Tx	02 45 03 AA 01 53
46	SZ00MV	7	CAN1	Rx	05 45 53 00 02 00 01 01 1A 31
47	SZ00MV	492	CAN1	Tx	02 45 01 3E
48	SZ00MV	8	CAN1	Rx	06 45 01 7E 00 00 00 00 00 00
49	SZ00MV	493	CAN1	Tx	02 45 03 AA 01 54
50	SZ00MV	7	CAN1	Rx	05 45 54 4F 83 74 3A 35 84 5D
51	SZ00MV	494	CAN1	Tx	02 45 03 AA 01 55
52	SZ00MV	5	CAN1	Rx	05 45 55 75 35 B3 40 7A 35 B6
53	SZ00MV	494	CAN1	Tx	02 45 03 AA 01 56
54	SZ00MV	6	CAN1	Rx	05 45 56 38 7A 35 B6 38 79 35
55	SZ00MV	494	CAN1	Tx	02 45 03 AA 01 57
56	SZ00MV	6	CAN1	Rx	05 45 57 B5 38 7A 35 B6 38 79
57	SZ00MV	494	CAN1	Tx	02 45 03 AA 01 58
58	SZ00MV	5	CAN1	Rx	05 45 58 35 B5 38 79 35 B5 38
59	SZ00MV	494	CAN1	Tx	02 45 01 3E
60	SZ00MV	6	CAN1	Rx	06 45 01 7E 00 00 00 00 00 00
61	SZ00MV	495	CAN1	Tx	02 45 03 AA 01 59
62	SZ00MV	4	CAN1	Rx	05 45 59 79 35 B5 38 79 35 B5
63	SZ00MV	496	CAN1	Tx	02 45 03 AA 01 5A
64	SZ00MV	4	CAN1	Rx	05 45 5A 38 79 35 B5 38 79 35
65	SZ00MV	496	CAN1	Tx	02 45 03 AA 01 5B
66	SZ00MV	4	CAN1	Rx	05 45 5B B5 38 79 35 B5 38 79
67	SZ00MV	496	CAN1	Tx	02 45 03 AA 01 5C
68	SZ00MV	13	CAN1	Rx	05 45 5C 35 B5 38 79 35 B5 38
69	SZ00MV	487	CAN1	Tx	02 45 03 AA 01 5D
70	SZ00MV	13	CAN1	Rx	05 45 5D 79 35 B5 38 79 35 B5
71	SZ00MV	487	CAN1	Tx	02 45 03 AA 01 5E
72	SZ00MV	13	CAN1	Rx	05 45 5E 38 00 00 00 00 00 00
73	SZ00MV	487	CAN1	Tx	02 45 01 3E
74	SZ00MV	12	CAN1	Rx	06 45 01 7E 00 00 00 00 00 00
75	SZ00MV	489	CAN1	Tx	02 45 03 AA 01 60
76	SZ00MV	11	CAN1	Rx	05 45 60 FF FF 07 00 00 00 00
77	SZ00MV	489	CAN1	Tx	02 45 03 AA 01 61
78	SZ00MV	11	CAN1	Rx	05 45 61 FF FF 00 00 E0 00 00
79	SZ00MV	489	CAN1	Tx	02 45 03 AA 01 62
80	SZ00MV	10	CAN1	Rx	05 45 62 FF FF FF FF FF FF 00
81	SZ00MV	490	CAN1	Tx	02 45 03 AA 01 63
82	SZ00MV	10	CAN1	Rx	05 45 63 FF FF FF FF FF FF 00
83	SZ00MV	490	CAN1	Tx	02 45 03 AA 01 64
84	SZ00MV	10	CAN1	Rx	05 45 64 01 FF 01 00 00 00 00
85	SZ00MV	489	CAN1	Tx	02 45 01 3E
86	SZ00MV	10	CAN1	Rx	06 45 01 7E 00 00 00 00 00 00
87	SZ00MV	491	CAN1	Tx	02 45 03 AA 01 65
88	SZ00MV	9	CAN1	Rx	05 45 65 FF FF FF FF FF FF 00
89	SZ00MV	491	CAN1	Tx	02 45 03 AA 01 66
90	SZ00MV	9	CAN1	Rx	05 45 66 FF FF FF FF 00 00 00
91	SZ00MV	491	CAN1	Tx	02 45 03 AA 01 70
92	SZ00MV	8	CAN1	Rx	05 45 70 FF FF FF FF FF FF FF
93	SZ00MV	492	CAN1	Tx	02 45 03 AA 01 71
94	SZ00MV	8	CAN1	Rx	05 45 71 FF FF FF FF FF FF FF
95	SZ00MV	492	CAN1	Tx	02 45 03 AA 01 72
96	SZ00MV	8	CAN1	Rx	05 45 72 FF FF FF FF FF FF FF
97	SZ00MV	492	CAN1	Tx	02 45 03 AA 01 73

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98	SZ00MV	7	CAN1	Rx	05 45 73 FF FF FF FF FF FF FF
99	SZ00MV	492	CAN1	Tx	02 45 01 3E
100	SZ00MV	8	CAN1	Rx	06 45 01 7E 00 00 00 00 00 00
101	SZ00MV	493	CAN1	Tx	02 45 03 AA 01 74
102	SZ00MV	7	CAN1	Rx	05 45 74 FF FF FF FF FF FF FF
103	SZ00MV	493	CAN1	Tx	02 45 03 AA 01 75
104	SZ00MV	6	CAN1	Rx	05 45 75 FF FF FF FF FF FF FF
105	SZ00MV	494	CAN1	Tx	02 45 03 AA 01 76
106	SZ00MV	6	CAN1	Rx	05 45 76 FF FF FF FF FF FF FF
107	SZ00MV	494	CAN1	Tx	02 45 03 AA 01 77
108	SZ00MV	5	CAN1	Rx	05 45 77 FF FF FF FF FF FF FF
109	SZ00MV	495	CAN1	Tx	02 45 03 AA 01 78
110	SZ00MV	5	CAN1	Rx	05 45 78 FF FF FF FF FF FF FF
111	SZ00MV	494	CAN1	Tx	02 45 01 3E
112	SZ00MV	5	CAN1	Rx	06 45 01 7E 00 00 00 00 00 00
113	SZ00MV	496	CAN1	Tx	02 45 03 AA 01 79
114	SZ00MV	4	CAN1	Rx	05 45 79 FF FF FF FF FF FF FF
115	SZ00MV	496	CAN1	Tx	02 45 03 AA 01 7A
116	SZ00MV	14	CAN1	Rx	05 45 7A FF FF FF FF FF FF FF
117	SZ00MV	486	CAN1	Tx	02 45 03 AA 01 7B
118	SZ00MV	13	CAN1	Rx	05 45 7B FF FF FF FF FF FF FF
119	SZ00MV	487	CAN1	Tx	02 45 03 AA 01 7C
120	SZ00MV	13	CAN1	Rx	05 45 7C FF FF FF FF FF FF FF
121	SZ00MV	487	CAN1	Tx	02 45 03 AA 01 7D
122	SZ00MV	13	CAN1	Rx	05 45 7D FF FF FF FF FF FF FF
123	SZ00MV	487	CAN1	Tx	02 45 03 AA 01 7E
124	SZ00MV	12	CAN1	Rx	05 45 7E FF 00 00 00 00 00 00
125	SZ00MV	487	CAN1	Tx	02 45 01 3E
126	SZ00MV	13	CAN1	Rx	06 45 01 7E 00 00 00 00 00 00
127	SZ00MV	488	CAN1	Tx	02 45 03 AA 01 90
128	SZ00MV	12	CAN1	Rx	05 45 90 FF FF 07 00 00 00 00
129	SZ00MV	488	CAN1	Tx	02 45 03 AA 01 91
130	SZ00MV	11	CAN1	Rx	05 45 91 FF FF 00 00 E0 00 00
131	SZ00MV	489	CAN1	Tx	02 45 03 AA 01 92
132	SZ00MV	11	CAN1	Rx	05 45 92 FF FF FF FF FF FF 00
133	SZ00MV	489	CAN1	Tx	02 45 03 AA 01 93
134	SZ00MV	11	CAN1	Rx	05 45 93 FF FF FF FF FF FF 00
135	SZ00MV	489	CAN1	Tx	02 45 03 AA 01 94
136	SZ00MV	10	CAN1	Rx	05 45 94 01 FF 01 00 00 00 00
137	SZ00MV	489	CAN1	Tx	02 45 01 3E
138	SZ00MV	11	CAN1	Rx	06 45 01 7E 00 00 00 00 00 00
139	SZ00MV	490	CAN1	Tx	02 45 03 AA 01 95
140	SZ00MV	9	CAN1	Rx	05 45 95 FF FF FF FF FF FF 00
141	SZ00MV	491	CAN1	Tx	02 45 03 AA 01 96
142	SZ00MV	9	CAN1	Rx	05 45 96 FF FF FF FF 00 00 00
143	SZ00MV	491	CAN1	Tx	02 45 03 AA 01 A0
144	SZ00MV	9	CAN1	Rx	05 45 A0 FF FF FF FF FF FF FF
145	SZ00MV	491	CAN1	Tx	02 45 03 AA 01 A1
146	SZ00MV	8	CAN1	Rx	05 45 A1 FF FF FF FF FF FF FF
147	SZ00MV	492	CAN1	Tx	02 45 03 AA 01 A2
148	SZ00MV	8	CAN1	Rx	05 45 A2 FF FF FF FF FF FF FF
149	SZ00MV	492	CAN1	Tx	02 45 03 AA 01 A3
150	SZ00MV	7	CAN1	Rx	05 45 A3 FF FF FF FF FF FF FF
151	SZ00MV	492	CAN1	Tx	02 45 01 3E
152	SZ00MV	8	CAN1	Rx	06 45 01 7E 00 00 00 00 00 00
153	SZ00MV	493	CAN1	Tx	02 45 03 AA 01 A4

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154	SZ00MV	7	CAN1	Rx	05 45 A4 FF FF FF FF FF FF FF
155	SZ00MV	493	CAN1	Tx	02 45 03 AA 01 A5
156	SZ00MV	6	CAN1	Rx	05 45 A5 FF FF FF FF FF FF FF
157	SZ00MV	494	CAN1	Tx	02 45 03 AA 01 A6
158	SZ00MV	6	CAN1	Rx	05 45 A6 FF FF FF FF FF FF FF
159	SZ00MV	494	CAN1	Tx	02 45 03 AA 01 A7
160	SZ00MV	6	CAN1	Rx	05 45 A7 FF FF FF FF FF FF FF
161	SZ00MV	494	CAN1	Tx	02 45 03 AA 01 A8
162	SZ00MV	5	CAN1	Rx	05 45 A8 FF FF FF FF FF FF FF
163	SZ00MV	494	CAN1	Tx	02 45 01 3E
164	SZ00MV	6	CAN1	Rx	06 45 01 7E 00 00 00 00 00 00
165	SZ00MV	495	CAN1	Tx	02 45 03 AA 01 A9
166	SZ00MV	4	CAN1	Rx	05 45 A9 FF FF FF FF FF FF FF
167	SZ00MV	496	CAN1	Tx	02 45 03 AA 01 AA
168	SZ00MV	4	CAN1	Rx	05 45 AA FF FF FF FF FF FF FF
169	SZ00MV	496	CAN1	Tx	02 45 03 AA 01 AB
170	SZ00MV	14	CAN1	Rx	05 45 AB FF FF FF FF FF FF FF
171	SZ00MV	486	CAN1	Tx	02 45 03 AA 01 AC
172	SZ00MV	13	CAN1	Rx	05 45 AC FF FF FF FF FF FF FF
173	SZ00MV	487	CAN1	Tx	02 45 03 AA 01 AD
174	SZ00MV	13	CAN1	Rx	05 45 AD FF FF FF FF FF FF FF
175	SZ00MV	487	CAN1	Tx	02 45 03 AA 01 AE
176	SZ00MV	13	CAN1	Rx	05 45 AE FF 00 00 00 00 00 00
177	SZ00MV	1988	CAN1	Rx	06 45 01 60 00 00 00 00 00 00

IMPORTANT NOTICE: Robert Bosch LLC and the manufacturers whose vehicles are accessible using the CDR System urge end users to use the latest production release of the Crash Data Retrieval system software when viewing, printing or exporting any retrieved data from within the CDR program. Using the latest version of the CDR software is the best way to ensure that retrieved data has been translated using the most current information provided by the manufacturers of the vehicles supported by this product.

CDR File Information

User Entered VIN	2G1WT58K781376787
User	PHILLIP NOTTINGHAM
Case Number	730204
EDR Data Imaging Date	07/12/2011
Crash Date	04/09/2011
Filename	2G1WT58K781376787_ACM.CDRX
Saved on	Tuesday, July 12 2011 at 14:31:24
Collected with CDR version	Crash Data Retrieval Tool 4.0
Reported with CDR version	Crash Data Retrieval Tool 4.0
EDR Device Type	airbag control module
Event(s) recovered	Deployment

Comments

- DOWNLOADED AT 317 N SHARY RD, MISSION, TX
- DLC USED
- SIR LAMP: SIR LAMP CAME ON AND DID NOT FLASH
- MILEAGE: 8,779
- BATTERY PACK USED TO POWER VEHICLE SYSTEMS
- ATTENDED BY: ALLEN PRICE (LEGAL ASSISTANT), MANUEL GUERRA (ATTORNEY), STEVE IRWIN (RECONSTRUCTIONIST), BENTON RANDLE (RECONSTRUCTIONIST), JOE MENDOZA (VIDEO), HOMER VALDEZ (PHOTOGRAPHER), MONICA GUERRERO (ATTORNEY)

Data Limitations

Recorded Crash Events:

There are two types of recorded crash events. The first is the Non-Deployment Event. A Non-Deployment Event records data but does not deploy the air bag(s). The minimum SDM Recorded Vehicle Velocity Change, that is needed to record a Non-Deployment Event, is five MPH. A Non-Deployment Event may contain Pre-Crash and Crash data. The SDM can store up to one Non-Deployment Event. This event will be cleared by the SDM, after approximately 250 ignition cycles. This event can be overwritten by a second Deployment Event, referred to as Deployment Event #2, if the Non-Deployment Event is not locked. A locked Non Deployment Event cannot be overwritten by the SDM.
The second type of SDM recorded crash event is the Deployment Event. It also may contain Pre-Crash and Crash data. The SDM can store up to two different Deployment Events. If a second Deployment Event occurs any time after the Deployment Event, the Deployment Event #2 will overwrite any non-locked Non-Deployment Event. Deployment Events cannot be overwritten or cleared by the SDM. Once the SDM has deployed an air bag, the SDM must be replaced.

Data:

-SDM Recorded Vehicle Velocity Change reflects the change in velocity that the sensing system experienced during the recorded portion of the event. SDM Recorded Vehicle Velocity Change is the change in velocity during the recording time and is not the speed the vehicle was traveling before the event, and is also not the Barrier Equivalent Velocity. For Deployment Events, the SDM can record 220 milliseconds of data after deployment criteria is met and up to 70 milliseconds before deployment criteria is met. For Non-Deployment Events, the SDM can record up to the first 300 milliseconds of data after algorithm enable. Velocity Change data is displayed in SAE sign convention.

-The CDR tool displays time from Algorithm Enable (AE) to time of deployment command in a deployment event and AE to time of maximum SDM recorded vehicle velocity change in a non-deployment event. Time from AE begins when the first air bag system enable threshold is met and ends when deployment command criteria is met or at maximum SDM recorded vehicle velocity change. Air bag systems such as frontal, side, or rollover, may be a source of an enable. The time represented in a CDR report can be that of the enable of one air bag system to the deployment time of another air bag system.

-Maximum Recorded Vehicle Velocity Change is the maximum square root value of the sum of the squares for the vehicle's combined "X" and "Y" axis change in velocity.

-Event Recording Complete will indicate if data from the recorded event has been fully written to the SDM memory or if it has been interrupted and not fully written.

-SDM Recorded Vehicle Speed accuracy can be affected by various factors, including but not limited to the following:
 -significant changes in the tire's rolling radius
 -final drive axle ratio changes
 -wheel lockup and wheel slip
-Brake Switch Circuit Status indicates the status of the brake switch circuit.
-Pre-Crash data is recorded asynchronously.
-Pre-Crash Electronic Data Validity Check Status indicates "Data Invalid" if:
 -the SDM receives a message with an "invalid" flag from the module sending the pre-crash data
 -no data is received from the module sending the pre-crash data
 -no module present to send the pre-crash data
-Driver's and Passenger's Belt Switch Circuit Status indicates the status of the seat belt switch circuit.
-The Time Between Non-Deployment to Deployment Events is displayed in seconds. If the time between the two events is greater than five seconds, "N/A" is displayed in place of the time. If the value is negative, then the Deployment Event occurred first. If the value is positive, then the Non-Deployment Event occurred first.
-If power to the SDM is lost during a crash event, all or part of the crash record may not be recorded.
-The ignition cycle counter relies upon the transitions through OFF->RUN->CRANK power-moding messages, on the GMLAN communication bus, to increment the counter. Applying and removing of battery power to the module will not increment the ignition cycle counter.
-All data should be examined in conjunction with other available physical evidence from the vehicle and scene.

Data Source:
All SDM recorded data is measured, calculated, and stored internally, except for the following:
-Vehicle Status Data (Pre-Crash) is transmitted to the SDM, by various vehicle control modules, via the vehicle's communication network.
-The Belt Switch Circuit is wired directly to the SDM.

01004_SDMC-autoliv_r001

Multiple Event Data

Associated Events Not Recorded	0
Event(s) was an Extended Concatenated Event	No
An Event(s) was in Between the Recorded Event(s)	No
An Event(s) Followed the Recorded Event(s)	No
The Event(s) Not Recorded was a Deployment Event(s)	No
The Event(s) Not Recorded was a Non-Deployment Event(s)	No

System Status At AE

Low Tire Pressure Warning Lamp (If Equipped)	Invalid
Vehicle Power Mode Status	Run
Remote Start Status (If Equipped)	Inactive
Run/Crank Ignition Switch Logic Level	Active

Pre-crash data

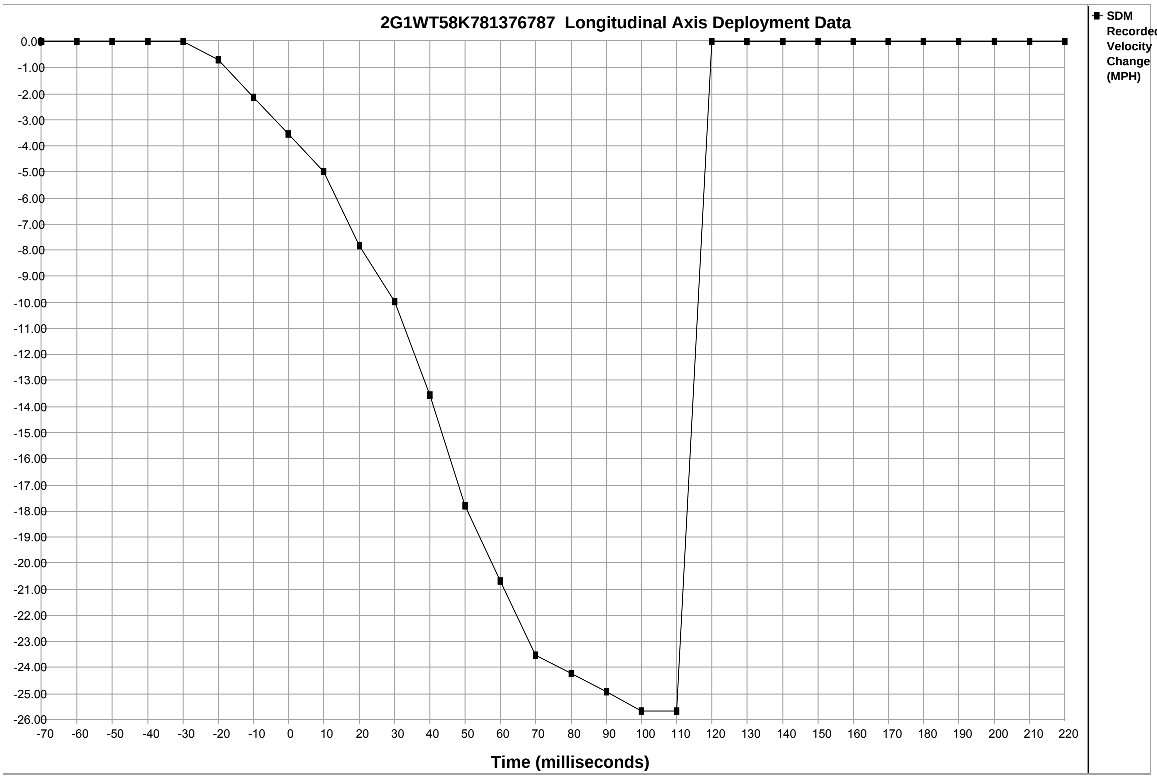
Parameter	-1.0 sec	-0.5 sec
Reduced Engine Power Mode	OFF	OFF
Cruise Control Active (If Equipped)	No	No
Cruise Control Resume Switch Active (If Equipped)	No	No
Cruise Control Set Switch Active (If Equipped)	No	No
Engine Torque (foot pounds)	Invalid	Invalid

Pre-Crash Data

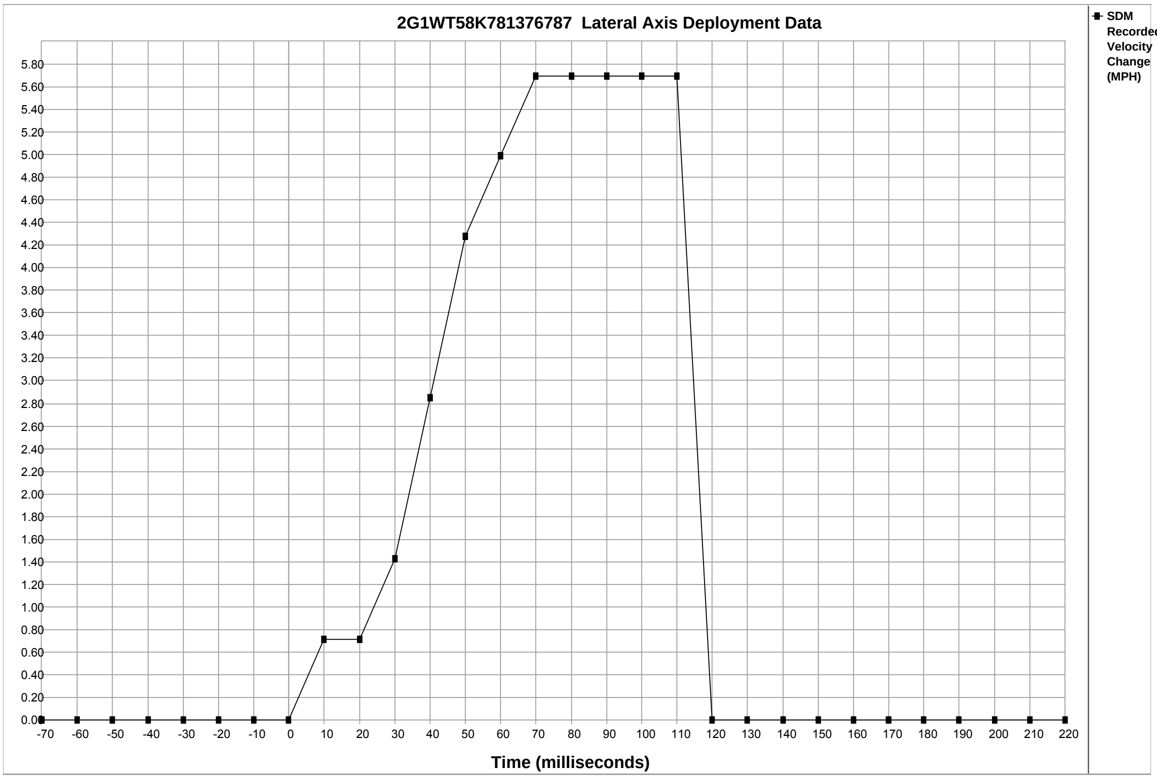
Parameter	-2.5 sec	-2.0 sec	-1.5 sec	-1.0 sec	-0.5 sec
Accelerator Pedal Position (percent)	0	0	0	0	0
Vehicle Speed (MPH)	65	60	57	55	50
Engine Speed (RPM)	1344	1344	1216	1088	1024
Percent Throttle	13	13	13	12	12
Brake Switch Circuit State	OFF	OFF	OFF	OFF	OFF

System Status At Deployment

Ignition Cycles At Investigation	2911
SIR Warning Lamp Status	OFF
SIR Warning Lamp ON Time Continuously (seconds)	0
Number of Ignition Cycles SIR Warning Lamp was ON/OFF Continuously	2903
Ignition Cycles At Event	2911
Ignition Cycles Since DTCs Were Last Cleared	255
Driver's Belt Switch Circuit Status	BUCKLED
Passenger's Belt Switch Circuit Status	BUCKLED
Passenger Classification Status at Event Enable	Small Occupant Classification Type #2
Current Passenger Position Status at Event Enable	Position Not Applicable
Previous Passenger Position Status at Event Enable	Unknown
Passenger Air Bag Indicator Status at Event Enable	OFF
Diagnostic Trouble Codes at Event, fault number: 1	N/A
Diagnostic Trouble Codes at Event, fault number: 2	N/A
Diagnostic Trouble Codes at Event, fault number: 3	N/A
Diagnostic Trouble Codes at Event, fault number: 4	N/A
Diagnostic Trouble Codes at Event, fault number: 5	N/A
Diagnostic Trouble Codes at Event, fault number: 6	N/A
Diagnostic Trouble Codes at Event, fault number: 7	N/A
Diagnostic Trouble Codes at Event, fault number: 8	N/A
Diagnostic Trouble Codes at Event, fault number: 9	N/A
Driver 1st Stage Time From Algorithm Enable to Deployment Command Criteria Met (msec)	28
Driver 2nd Stage Time From Algorithm Enable to Deployment Command Criteria Met (msec)	30
Passenger 1st Stage Time From Algorithm Enable to Deployment Command Criteria Met (msec)	Suppressed
Passenger 2nd Stage Time From Algorithm Enable to Deployment Command Criteria Met (msec)	Suppressed
Driver Side or Roof Rail/Head Curtain Time From Algorithm Enable to Deployment Command Criteria Met (msec)	N/A
Passenger Side or Roof Rail/Head Curtain Time From Algorithm Enable to Deployment Command Criteria Met (msec)	N/A
Time Between Events (sec)	0
Crash Record Locked	Yes
Multiple Event Data/Vehicle Event Data (Pre-Crash) Associated With This Event	Yes
SDM Synchronization Counter	2910
Event Recording Complete	Yes
Driver First Stage Deployment Loop Commanded	Yes
Passenger First Stage Deployment Loop Commanded	No
Driver Second Stage Deployment Loop Commanded	Yes
Driver 2nd Stage Deployment Loop Commanded for Disposal	No
Passenger Second Stage Deployment Loop Commanded	No
Passenger 2nd Stage Deployment Loop Commanded for Disposal	No
Driver Pretensioner Deployment Loop Commanded	Yes
Passenger Pretensioner Deployment Loop Commanded	Yes
Driver Side Deployment Loop Commanded	No
Passenger Side Deployment Loop Commanded	No
Second Row Left Side Deployment Loop Commanded	No
Second Row Right Side Deployment Loop Commanded	No
Driver (Initiator 1) Roof Rail/Head Curtain Loop Commanded	No
Passenger (Initiator 1) Roof Rail/Head Curtain Loop Commanded	No
Driver (Initiator 2) Roof Rail/Head Curtain Loop Commanded	No
Passenger (Initiator 2) Roof Rail/Head Curtain Loop Commanded	No
Driver (Initiator 3) Roof Rail/Head Curtain Loop Commanded	No
Passenger (Initiator 3) Roof Rail/Head Curtain Loop Commanded	No
Driver Knee Deployment Loop Commanded	No
Passenger Knee Deployment Loop Commanded	No
Second Row Left Pretensioner Deployment Loop Commanded	No
Second Row Right Pretensioner Deployment Loop Commanded	No
Second Row Center Pretensioner Deployment Loop Commanded	No



Time (milliseconds)	-70	-60	-50	-40	-30	-20	-10	0	10	20	30	40	50	60	70
SDM Longitudinal Axis Recorded Velocity Change (MPH)	0.00	0.00	0.00	0.00	0.00	-0.71	-2.14	-3.56	-4.99	-7.84	-9.98	-13.54	-17.82	-20.67	-23.52
Time (milliseconds)	80	90	100	110	120	130	140	150	160	170	180	190	200	210	220
SDM Longitudinal Axis Recorded Velocity Change (MPH)	-24.23	-24.94	-25.66	-25.66	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00



Time (milliseconds)	-70	-60	-50	-40	-30	-20	-10	0	10	20	30	40	50	60	70
SDM Lateral Axis Recorded Velocity Change (MPH)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.71	0.71	1.43	2.85	4.28	4.99	5.70
Time (milliseconds)	80	90	100	110	120	130	140	150	160	170	180	190	200	210	220
SDM Lateral Axis Recorded Velocity Change (MPH)	5.70	5.70	5.70	5.70	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Hexadecimal Data

Data that the vehicle manufacturer has specified for data retrieval is shown in the hexadecimal data section of the CDR report. The hexadecimal data section of the CDR report may contain data that is not translated by the CDR program. The control module contains additional data that is not retrievable by the CDR system.

$01	02	0A	00	01	00	00	00
$02	47	31	57	54	35	38	4B
$03	37	38	31	33	37	36	37
$04	38	37	00	00	00	00	00
$05	02	39	00	00	00	00	00
$06	C5	00	00	00	00	00	00
$0A	08	00	00	20	00	00	00
$0B	01	01	00	00	00	00	00
$0C	00	00	00	00	00	46	00
$0D	00	06	63	00	00	00	00
$0E	02	00	00	00	00	00	00
$0F	00	00	00	00	00	00	00
$10	00	00	00	00	00	00	00
$11	01	15	15	00	00	00	00
$12	FF	00	F0	F0	C0	00	00
$13	FF	00	F0	30	40	00	00
$14	FF	00	F0	30	40	00	00
$15	01	02	03	04	0B	0C	05
$16	06	00	00	00	00	00	00
$17	00	00	00	00	00	00	00
$18	01	03	04	05	00	00	00
$19	07	02	07	03	02	02	07
$1A	07	00	00	00	00	00	00
$1B	00	00	00	00	00	00	00
$1C	07	07	07	07	00	00	00
$1D	01	00	0A	01	01	01	00
$1E	01	00	00	00	00	00	00
$1F	00	02	43	00	00	00	00
$20	00	02	43	00	00	00	00
$21	00	02	42	00	00	00	00
$22	00	02	42	00	00	00	00
$23	00	00	00	00	00	00	00
$24	00	00	00	00	00	00	00
$25	00	00	00	00	00	00	00
$26	00	39	38	38	2D	56	08
$27	01	75	00	00	00	00	00
$28	00	00	00	00	00	00	00
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CAUSE NO.: C-2573-11-C

AURORA MARTINEZ, Individually, AND AS REPRESENTATIVE OF THE ESTATE OF ROBERTO MARITNEZ, Incapacitated, PLAINTIFFS,	§	**IN THE DISTRICT COURT**
VS.	§	**139TH JUDICIAL DISTRICT**
GENERAL MOTORS, L.L.C., AND CHARLES CLARK CHEVROLET CO., DEFENDANT.	§	**HIDALGO COUNTY, TEXAS**

PLAINTIFFS' ORIGINAL PETITION, REQUEST FOR DISCLOSURES AND REQUEST FOR PRODUCTION

TO THE HONORABLE JUDGE OF SAID COURT:

NOW COMES, Aurora Martinez, Individually, And as Representative of the Estate of Roberto Martinez, Incapacitated, (hereinafter collectively referred to as "Plaintiffs") complaining of Defendant, GENERAL MOTORS LLC (hereinafter referred to as "GM") and Defendant, Charles Clark Chevrolet Co., (hereinafter referred to as "CLARK CHEVROLET") in support of this cause of action, would respectfully show unto the Court the following:

I
DISCOVERY CONTROL PLAN

Pursuant to Rule 190 of the Texas Rules of Civil Procedure, discovery is intended to be conducted under Level 3 as set forth in Rule 190.4.

II
PARTIES

Plaintiff Aurora Martinez, Individually, And as Representative of the Estate of Roberto Martinez, Incapacitated, is and was at the time of the collision giving rise to this case, a resident of Hidalgo County and a citizen of the State of Texas.

Defendant, General Motors, L.L.C. ("GM") is a foreign corporation, organized and formed under the laws of the State of Michigan. GM designed, manufactured, tested, marketed, and distributed the vehicle involved in this case. GM was at the time of this collision doing business in the State of Texas and its principal place of business and registered service agent are in Dallas County, Texas. Defendant GM may be served with process through its Registered Agent, CT Corporation System located at 350 North St. Paul Street, suite 2900, Dallas Texas.

Defendant, Charles Clark Chevrolet Co. is organized under the laws of the State of Texas, doing business in and maintaining agents and agencies within the State of Texas. Service of process may be effected upon said Defendant by serving the registered agent of the corporation, Kirk A. Clark, at its principal place of business located at 911 Hwy 83, McAllen, Texas 78501.

III.
JURISDICTION AND VENUE

Jurisdiction is appropriate in this Court in that this is a lawsuit seeking damages within the jurisdictional limits of the District Courts of the State of Texas, and this Court has personal jurisdiction over Defendant as set out above.

Jurisdiction would not be proper in federal court as there is no complete diversity of citizenship between the Plaintiffs and the Defendant in this case. Moreover, Plaintiffs are not asserting any claims or causes of action based on federal statutes, treaties, or laws. Plaintiffs expressly disavow any federal claims or causes of action. Moreover, this lawsuit asserts no claims against the United States, nor does it involve any claims based on maritime law.

The court has jurisdiction over this matter, and venue is proper in Hidalgo County, Texas, pursuant to Section 15.002(a)(1) & (2) of the Texas Civil Practices and Remedies Code, because Hidalgo County is a county in which a substantial part of the omissions giving rise to the underlying claim occurred; and where Defendant, CLARK CHEVROLET, maintain their corporate office and are resident entities of Hidalgo County, Texas; therefore, venue is proper in Hidalgo County, Texas pursuant to Section 15.002(a)(3) of the Texas Civil Practices and Remedies Code.

IV.
FACTS

On April 9, 2011, at approximately 5:20 p.m., Mrs. Aurora Martinez and Mr. Roberto Martinez were traveling in their 2008 White Chevrolet Impala, Vehicle Identification No. 2G1WT58K781376787, westbound on Expressway 83 in Mission Hidalgo County Texas. Plaintiffs' vehicle was struck on the right passenger side by a Chevrolet Tahoe forcing them to violently collide into the center cement retaining barrier with its front left side of their vehicle. Although Mr. Roberto Martinez, seated in the front passenger seat, was properly wearing his seat belt, he sustained severe and permanent brain injuries in the side impact collision when his side air bag failed to properly inflate.

Defendant GM designed, manufactured, marketed and placed the subject Chevrolet Impala Sedan Model into the stream of commerce in a defective and unreasonably dangerous condition.

At the time of the accident, the subject Chevrolet Impala Sedan Model was in the same or substantially the same condition as it was when it left the possession of Defendant GM.

As a result of the negligence of Defendants, Plaintiff suffered, and continues to suffer, permanently disabling injuries and damages as more fully described below.

V. 402B MISREPRESENTATION

Plaintiffs adopt and re-allege all prior paragraphs as if fully set forth herein.

GM misrepresented the safety and effectiveness of the side air bag system to its consumers in general and the owner of the vehicle, Mr. Roberto Martinez, in particular.

Plaintiffs purchased the new 2008 Chevrolet Impala from Defendant, CLARK CHEVROLET in McAllen, Texas.

GM represented to the public and Mr. Martinez that the 2008 Impala side air bag system would inflate in moderate to severe side impact collisions where something hits the side of the vehicle.

The side air bag failed to inflate in the moderate to severe side impact collision from the semi that directly struck the side of the vehicle.

The representations about the side air bag system involved a material fact concerning the character or quality of the automobile in question. Mr. Martinez relied on the representations made by Defendants when purchasing the vehicle in question.

Defendants' misrepresentations were a producing cause of the injury in question.

VI. PLAINTIFF'S CAUSES OF ACTION AGAINST DEFENDANTS

The defective vehicle was designed, manufactured, assembled, and/or distributed by your Defendant GM. and placed into the stream of commerce for ultimate use by consumers. The air bag system of the vehicle was defective at the time it left the possession of your defendant.

CLARK CHEVROLET placed the defective vehicle into the stream of commerce for ultimate use by consumers.

The incident complained of herein and the resulting injuries and damages to Plaintiff were proximately caused by the negligence of Defendants in one or more of the following respects:

a) In failing to warn your Plaintiff of the defective condition of the air bag system;

b) In failing to inspect, adjust, replace and/or repair the air bag system prior to distribution and sale to your Plaintiff;

c) In manufacturing a defective and unreasonably dangerous product by the inclusion of defective component parts which were not properly tested or analyzed for use in combination with the 2008 Chevrolet Impala under normal operating conditions prior to distribution;

d) Breaches of express and implied warranties of fitness for a particular purpose; and

e) Strict liability in tort.

Each of these acts and omissions, singularly or in combination with others, constituted negligence, proximately causing the incident resulting in the Plaintiffs' injuries and damages.

<u>NEGLIGENCE CAUSE OF ACTION AGAINST GM</u>

Plaintiffs re-allege and adopt all previous paragraphs as if fully set forth herein.

GM had a duty to exercise ordinary care in the design, manufacture, testing, marketing, and distribution of the vehicle to ensure that it was not unreasonably dangerous for its foreseeable use as its Chevrolet Impala Sedan Model.

GM knew, or in the exercise of ordinary care should have known, that the Chevrolet Impala Sedan Model was defective and/or unreasonably dangerous to those persons likely to be involved in side impact collisions.

GM breached their duty of care by:

a) Failing to adequately monitor the performance of GM's vehicles in the field to ensure that they were reasonably minimizing injuries and deaths in foreseeable side impact collisions;

b) Designing or distributing the Chevrolet Impala Sedan Model with a side impact design standard that was intended to meet the minimum government regulations, instead of safely designing the vehicle to reasonably minimize head injuries and deaths in foreseeable side impact collisions;

c) Failing to adequately test the Chevrolet Impala Sedan Model to ensure that it would be reasonably safe in foreseeable side impact collisions; and

d) Failing to recall, retrofit, or issue a post-sale warning after GM knew, or should have known, that the Chevrolet Impala Sedan Model was defective and unreasonably dangerous.

Defendants' negligence was a proximate cause of Plaintiffs' injuries and resulting damages.

VII.
<u>STRICT LIABILITY CAUSE OF ACTION AGAINST GM</u>

Plaintiffs adopt and re-allege all prior paragraphs as if fully set forth herein.

It was entirely foreseeable to and well known by GM that side impact collisions such as occurred herein would on occasion take place in the ordinary and foreseeable use of the Chevrolet Impala Sedan Model.

GM defectively designed, manufactured, assembled, marketed, and GM and CLARK CHEVROLET distributed the Chevrolet Impala Sedan Model as follows:

a) The side air bag system was defectively designed, manufactured, and marketed because it failed to inflate in the moderate to severe side impact collision;

b) The side air bag system was defectively designed because it failed to have two remote sensors to properly detect and promptly deploy the side air bag system;

c) The side air bag system was defectively designed because it failed to inflate for a sufficient amount of time to properly protect an occupant in a foreseeable side impact collision;

d) The side air bag system was defectively designed because it failed to have a side curtain and/or head air bag in the vehicle; and

e) The side structure was defectively designed because it failed to reasonably minimize the intrusion into the occupant compartment in the side impact collision; and

f) The defective and unreasonably dangerous Chevrolet Impala Sedan Model was a producing cause of Plaintiffs' injuries and resulting damages.

VIII.
DAMAGES FOR PLAINTIFF ROBERTO MARTINEZ

Plaintiff, Roberto Martinez, Incapacitated, was caused to sustain injuries and damages as a direct and proximate cause of Defendants' negligence. The damages which are provided by law that Plaintiff is entitled to have the jury in this case consider separately to determine the sum of money to compensate Plaintiff, Roberto Martinez, Incapacitated, are as follows:

a) Physical pain and sustained as a result of the incident in question up to the time of trial and which in all reasonable probability will be incurred in the future;

b) Mental anguish suffered as a result of the incident in question up to the time of trial and which in all reasonable probability will be incurred in the future;

c) Physical impairment sustained as a result of the incident in question up to the time of trial and which in all reasonable probability will be incurred in the future;

d) Physical disfigurement sustained as a result of the incident in question up to the time of trial and in the future;

e) The amount of reasonable medical expenses paid and incurred in the treatment of the injuries which Plaintiff sustained up to the time of trial and which in all reasonable medical probability will be incurred in the future;

f) Permanent brain damage causing extensive physical and psychological impairment, incapacity and disability; and

g) Pecuniary damages and the ability to conduct household tasks and other aspects of personal care and services.

Because of all of the above and foregoing, Plaintiff has been damaged, and will continue to be damaged in the just and reasonable sum of an amount which is within the jurisdictional limits of this Honorable Court and for which amount Plaintiff here now sues.

DAMAGES FOR PLAINTIFF AURORA MARTINEZ

Plaintiff, Aurora Martinez, was caused to sustain injuries and damages as a direct and proximate cause of Defendants' negligence and gross negligence. The damages which are provided by law that Plaintiff is entitled to have the jury in this case consider separately to determine the sum of money to compensate Plaintiff, Aurora Martinez, are as follows:

a) Physical pain and sustained as a result of the incident in question up to the time of trial and which in all reasonable probability will be incurred in the future;

b) Mental anguish suffered as a result of the incident in question up to the time of trial and which in all reasonable probability will be incurred in the future;

c) Physical impairment sustained as a result of the incident in question up to the time of trial and which in all reasonable probability will be incurred in the future;

d) Physical disfigurement sustained as a result of the incident in question up to the time of trial and in the future;

e) The amount of reasonable medical expenses paid and incurred in the treatment of the injuries which plaintiff sustained up to the time of trial and which in all reasonable medical probability will be incurred in the future;

f) Loss of consortium; and

g) Loss of household services.

h) Bystander damages.

Because of all of the above and foregoing, Plaintiff has been damaged, and will continue to be damaged in the just and reasonable sum of an amount which is within the jurisdictional limits of this Honorable Court and for which amount Plaintiff here now sues.

IX.
EXEMPLARY DAMAGES

Plaintiffs re-allege and adopt all previous paragraphs as if fully set forth herein.

Defendants' actions were malicious when viewed objectively at the time of the occurrence, and involved an extreme degree of risk considering the probability and magnitude of the potential harm to Defendants' consumers and users, such as Plaintiffs, Roberto Martinez and Aurora Martinez.

Defendants had actual awareness of the risks involved and of safer alternative designs that would have minimized or prevented the risks, but nevertheless proceeded with conscious indifference to the rights, safety, or welfare of its consumers.

Exemplary damages should therefore be assessed against Defendants, GM and CLARK CHEVROLET, to deter it and other automobile manufacturers from maliciously disregarding the rights, safety and welfare of their consumers.

X.
CLAIM FOR INTEREST

Plaintiffs claim prejudgment and post judgment interest in accordance in accordance with Texas Finance Code § 304.102, and any other applicable law or principle of equity.

XI.
PRE- AND POST-JUDGMENT INTEREST

Plaintiffs seek recovery of such pre-judgment and post-judgment interest as permitted by law.

XII
RESERVATION OF RIGHTS

Plaintiffs reserve the right to prove the amount of damages at trial. Plaintiffs reserve the right to amend their petition to add additional counts upon further discovery and as their investigation continues.

XIII
REQUEST FOR JURY TRIAL

Plaintiffs, in accordance with Rule 216 of the Texas Rules of Civil Procedure, request a trial by jury.

XIV
CONDITIONS PRECEDENT

Pursuant to Rule 54 of the Texas Rules of Civil Procedure, all conditions precedent to Plaintiffs right to recover herein has been performed or has occurred.

XV
PRAYER

WHEREFORE, PREMISES CONSIDERED, Aurora Martinez, Individually, And as Representative of the Estate of Roberto Martinez, Incapacitated, pray that this cause be set for trial before a jury, and that Plaintiffs recover judgment of and from Defendants, GENERAL MOTORS LLC and CHARLES CLARK CHEVROLET CO., for their actual damages in such an amount as the evidence may show and the jury may determine to be proper, together with pre-judgment interest, post-judgment interest, costs of suit, and such other and further relief to which they may show themselves to be justly entitled, whether at law or in equity, by this pleading or proper amendment thereto.

XVI
REQUEST FOR DISCLOSURES TO DEFENDANTS, GENERAL MOTORS LLC and CHARLES CLARK CHEVROLET CO.

Pursuant to Rule 194 of the Texas Rules of Civil Procedure, Plaintiffs request that Defendants, GENERAL MOTORS LLC and CHARLES CLARK CHEVROLET CO., to provide and disclose, within 50 days of service of this request, the all of the mandatory information and material described in Rule 194.2 of the Texas Rules of Civil Procedure as provided therein.

XVII
REQUEST FOR PRODUCTION OF DOCUMENTS TO DEFENDANT GENERAL MOTORS LLC

Pursuant to Rule 196 of the Texas Rules of Civil Procedure, Plaintiffs request those Defendants, GENERAL MOTORS LLC and CHARLES CLARK CHEVROLET CO., to produce, within 50 days of service of this request, the following documents for inspection and copying:

a) A true and correct copy of all insuring agreements, both primary and excess liability coverage which were in existence at the time of the incident made the basis of this suit and which may be available to provide coverage for the losses sustained by the Plaintiffs as alleged herein.

Respectfully submitted,

GUERRA LAW FIRM
320 W. Pecan Avenue
McAllen, Texas 78501
Tel. (956) 618-2557
Fax. (956) 618-1690

By: ______________________

MANUEL GUERRA, III
Texas Bar No. 00798226

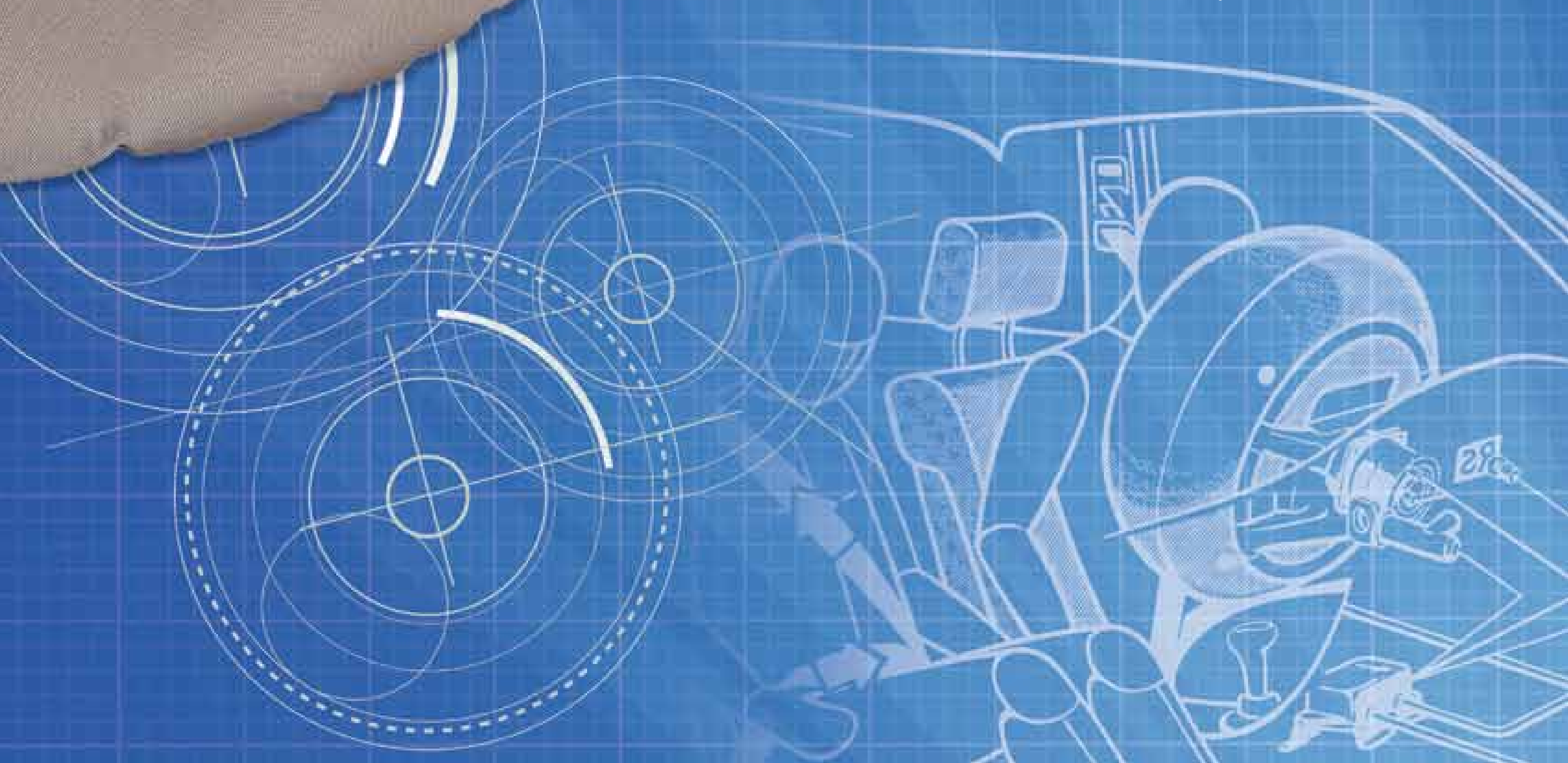
Attorney for Plaintiffs, Aurora Martinez, Individually, And as Representative of the Estate of Roberto Martinez, Incapacitated

STATUS REPORT
INSURANCE INSTITUTE FOR HIGHWAY SAFETY
Vol. 45, No. 1, Feb. 6, 2010

AIRBAGS HAVE EVOLVED

to do a better job of protecting people in multiple kinds of crashes, and each generation has done a better job of this than the one before. That is, until now. A new Institute study suggests that frontal airbags designed to meet the latest federal standards haven't improved protection of adults and, in fact, appear to have reduced protection of belted drivers.

"The newest airbags appear to provide suboptimal protection for drivers who buckle up compared with the airbags that preceded them," says Institute president Adrian Lund. "It's a surprising finding. Based on our analysis of death rates in frontal crashes, belted drivers seem to fare better in vehicles that have many of the advanced



features of current systems but weren't certified to the latest airbag safety standard."

Together with safety belts, airbags are the cornerstone of protection in frontal crashes. Ones to safeguard drivers and front-seat passengers have been standard in all passenger vehicles since 1999. They've saved more than 28,000 lives, the National Highway Traffic Safety Administration (NHTSA) estimates.

A big difference between today's airbags and first-generation ones is that they deploy with less force. Problems cropped up with the first generation of airbags in the mid-1990s. During crashes they were inflating with such force that they killed or seriously injured some children, small-stature adults, and other people who were too close to the bag when it inflated (see *Status Report*, June 17, 2000; on the web at iihs.org). NHTSA attributes 296 deaths to frontal airbags, including 191 children, 92 drivers, and 13 adult passengers as of Jan. 1, 2009. Nearly 90 percent of deaths occurred in vehicles made before 1998 when the agency first changed frontal crash safety standards in ways that promoted less forceful deployments.

"Early airbags as opposed to crash forces were the source of injury in some cases," Lund explains. "They saved many lives but at the same time put some vulnerable passengers at risk. When it became clear what was happening, NHTSA allowed automakers to redesign airbags, and once the fixes were in place, deaths dropped sharply."

Steps to address injuries: As a first step NHTSA modified safety rules in 1997 to encourage automakers to take energy out of the airbags. Depowering began with 1998 models. Manufacturers were given the option to use sled tests with unbelted dummies to certify that their vehicles met crash performance rules. Or they could continue to run barrier tests with both belted and unbelted dummies.

Most manufacturers picked sled tests, in which a whole or partial vehicle is attached to a moving platform that simulates vehicle crash decelerations and mimics the forces on occupants during crashes. The maximum sled accelerations NHTSA prescribed under this option were lower than typically occur in crash tests so airbags didn't need to deploy as quickly or forcefully to catch and cushion unbelted dummies. Airbags meeting this

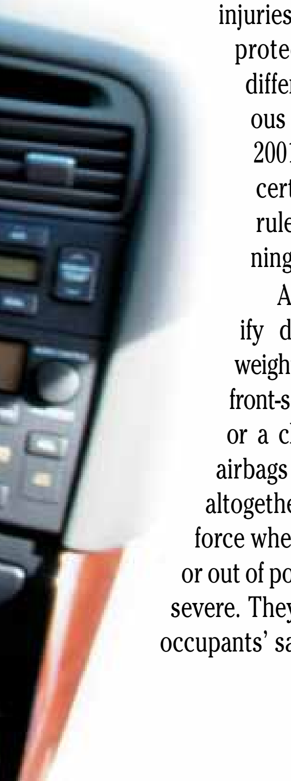
standard are called sled-certified. The Institute previously examined the impact of NHTSA's move to allow depowering and found an overall reduction in fatal crash risk associated with depowered airbags compared with earlier designs (see *Status Report*, March 6, 2004; on the web at iihs.org).

Other research has shown that the fatality risk among children in front seats decreased with sled-certified airbags (see *Status Report*, June 9, 2008; on the web at iihs.org). At the same time a large-scale public education campaign encouraged parents to restrain children, especially infants in rear-facing restraints, in the back seat, where they're safest. Legislators in many states enacted laws requiring children to sit in the rear. Parents largely got the message.

Today most kids ride restrained in back seats. These and other changes plus increasing belt use have contributed to the drastic decline in frontal airbag-related deaths, the bulk of which occurred in vehicles made before 1998 (see *Status Report*, Aug. 1, 2004, and Aug. 6, 2005; on the web at iihs.org).

Tailored deployment: The sled test option was meant to be a stopgap until NHTSA could write a new standard to explicitly address airbag-induced injuries while also improving protection for a range of different-size people in various frontal crashes. During 2001 the agency issued a certified advanced airbag rule, with phase-in beginning with 2003 models.

Advanced airbags modify deployment patterns if weight sensors detect a small front-seat driver or passenger or a child safety seat. These airbags can be suppressed altogether or deploy with less force when passengers are small or out of position or if a crash isn't severe. They also can determine if occupants' safety belts are buckled.



Certified-advanced airbags generally deploy at lower thresholds for people who aren't using belts.

This changed the way auto manufacturers test vehicles for compliance. It introduced a range of tests, including head-on and offset frontal crash tests plus out-of-position tests of airbags using different-size dummies. For the first time, the automakers were directed to use dummies representing 5th percentile females and children 1, 3, and 6 years old, in addition to the standard 50th percentile male dummy.

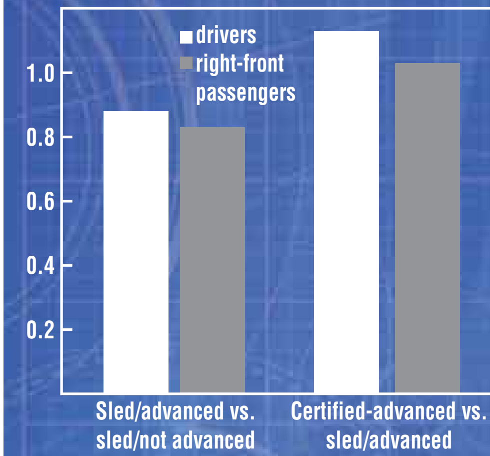
Crash test speeds also changed. For belted male dummies, the rule phased in a 5 mph speed increase, to 35 mph, beginning with 2007 model vehicles. Rigid-barrier tests for unbelted occupants were reinstated, but the crash test speed was lowered from 30 mph to 25 mph (see *Status Report*, June 17, 2000; on the web at iihs.org).

Anticipating the design changes that an advanced airbag standard would require, some automakers added new features ahead of the rule. These included dual-stage inflators, belt status sensors, seat position sensors, and occupant size and weight sensors. Some new airbag systems also had sensors to detect rear-facing infant restraints in front seats and prevent airbags from deploying. Many of these systems closely resemble certified-advanced airbags.

"The advanced features automakers added changed the game," Lund says. "Instead of tailoring protection and deployment for one group — average-size men in a typical crash — manufacturers were able to design airbag systems to provide better protection for a range of people in a variety of crash situations."

What the changes mean: What hadn't been known is how advanced airbags compare with the previous designs. To find out, Institute researchers recently compared mortality rates in frontal crashes among front-seat occupants in vehicles with certified-advanced airbags — the latest generation *(continues on p.6)*

ADJUSTED MORTALITY RATE RATIOS OF DRIVERS AND ADULT RIGHT-FRONT PASSENGERS



BELTED DRIVERS HAVE HIGHER MORTALITY RATES IN VEHICLES MEETING THE ADVANCED AIRBAG RULE COMPARED WITH DRIVERS WHOSE AIRBAGS HAVE ADVANCED FEATURES BUT AREN'T CERTIFIED TO THE LATEST SAFETY STANDARD.

DRINKING CONTINUES TO DECLINE AMONG WEEKEND DRIVERS

Alcohol use by nighttime drivers on weekends is down sharply since 1973 but remains a major problem in fatal crashes. The latest national roadside breath-test survey indicates 2.2 percent of drivers had blood alcohol concentrations (BACs) of 0.08 percent or more in 2007, marking a 71 percent decline from 1973 when the first survey was conducted. At the same time, 16 percent of nighttime weekend drivers tested positive for drugs, the National Highway Traffic Safety Administration (NHTSA) says. The agency cautions that its first-ever estimate of driver drug use doesn't necessarily imply that these drivers were impaired.

The percentage of alcohol-impaired nighttime drivers in 2007 compares with 4.3 percent in 1996, 5.4 percent in 1986, and 7.5 percent in 1973. There were similar declines during the same period in the percentages of drivers with any detectable alcohol in their systems.

The 2007 survey involved randomly stopping drivers at 300 locations in 48 states on Friday and Saturday nights and during the day on Fridays. The daytime component was new for 2007, along with drug screens, and for the first time the survey included motorcycles.

Drivers were more likely to be impaired by alcohol between 1 and 3 am (4.8 percent) than during the daytime (0.2 percent) or early evening (1.2 percent). This is in line with federal data showing that alcohol involvement in fatal crashes peaks at night and is higher on weekends. All 50 states and the District of Columbia have per se laws defining it as a crime for people to drive with a BAC at or above a proscribed level, 0.08 percent.

"The roadside surveys suggest that the prevalence of alcohol-impaired driving has gone down over time, and that's great news," says Anne McCartt, Institute senior vice president for research. "Fatal crashes tell a different story. The reductions aren't showing up in federal crash data. We can't explain the disconnect, so this merits more research."

Based on fatal crash data, the proportion of fatally injured drivers with BACs at or above 0.08 percent declined by about a third between 1982 and 1994, from 49 percent to 33 percent. Since 1994 the percentage of fatally injured nighttime drivers with BACs at or above 0.08 percent has remained about a third. Likewise, the percentage of fatally injured drivers with 0.15 percent or higher BACs has slid 30 percent since 1982 but with little change since 1996.

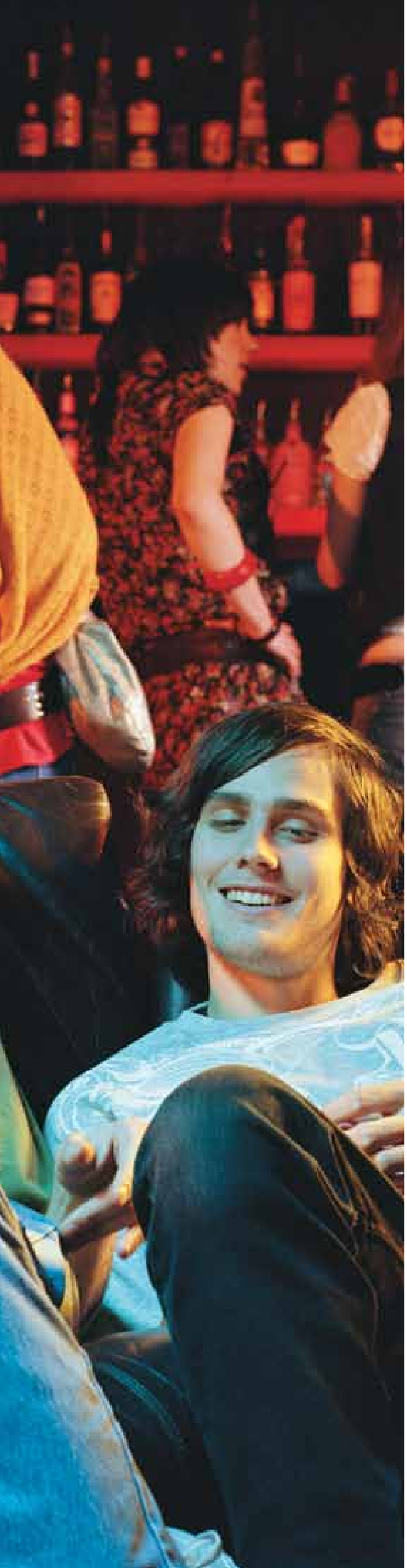
A complication in the latest roadside survey may be that drivers were less willing to participate in 2007 than in years past. NHTSA notes that the 85 percent participation rate was lower than the 96 percent recorded in 1996 and 94 percent recorded in 1986. This might reflect driver concerns about litigation and privacy rights. It also might reflect a general reluctance to be interviewed. NHTSA accounted for this by using passive alcohol sensors to estimate refusers' BACs.

Surveyed male drivers were more likely to have illegal BACs than females (2.6 percent versus 1.5 percent). Compared with 1996, a lower percentage of males had illegal BACs in 2007 (3.5 percent in 1996). The percentage of female drivers with illegal BACs didn't change between 1996 and 2007. Fatal crashes among male drivers are much more likely to involve alcohol than those among females.

Motorcycle riders in the 2007 survey were more than twice as likely as car drivers to have BACs at or above 0.08 percent (5.6 versus 2.3 percent), followed by pickup truck drivers (3.3 percent). However, crash data indicate that alcohol is a bigger factor in passenger vehicle driver deaths. Thirty-five percent of fatally injured passenger vehicle drivers versus 30 percent of cyclists had BACs of 0.08 percent or more in 2008.

Drivers were asked to complete a questionnaire to estimate the prevalence of binge drinking, defined as consuming 6 or more drinks on a single occasion at least monthly, and heavy drinking, defined as 5 or more drinks a day 4 or more times a week. About 26 percent of drivers said they don't drink.

Binge drinking was widely reported by nighttime drivers with high BACs. Among people who said they drink, about 19 percent met the criteria for heavy drinking and 18 percent



for bingeing. These two groups accounted for the largest percentage of drivers with positive BAC results in the roadside survey. Since this questionnaire was new for 2007 NHTSA can't compare responses with prior surveys. The agency says the results suggest the need to focus on binge drinkers through tougher enforcement of DUI/DWI laws and prevention programs.

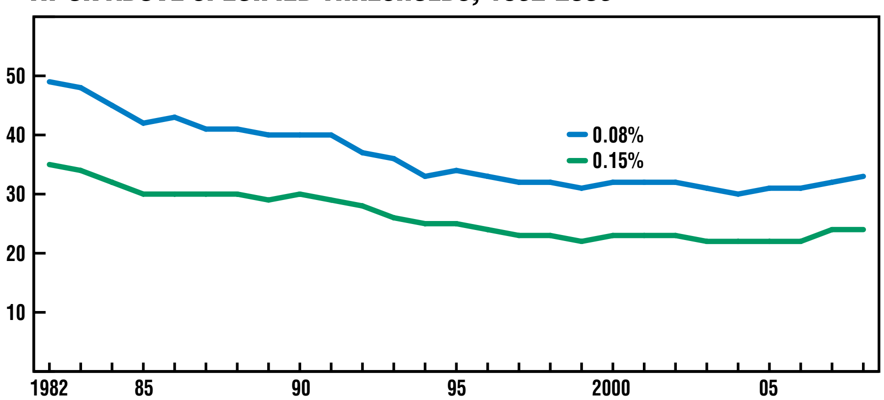
"Another option is requiring alcohol detection devices for all drivers once the technology is fully developed," McCartt says. The devices would prevent any driver from starting a vehicle after drinking too much. This idea has strong public support (see *Status Report*, Sept. 17, 2009; on the web at iihs.org).

Previous roadside surveys estimated only alcohol use, but NHTSA expanded testing in 2007 to include screening of saliva and blood samples for over-the-counter, prescription, and illegal drugs. More nighttime than daytime drivers tested positive (14 versus 11 percent). The drugs most often detected were marijuana (8.3 percent), cocaine (3.9 percent), and methamphetamine (1.3 percent).

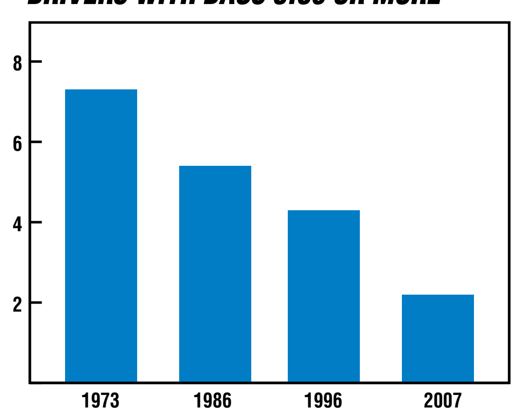
It's difficult to tell whether the drivers were impaired by the drugs because some drugs can be detected in the body weeks after use. Also unclear is the dose at which driving is impaired. NHTSA is conducting more research to understand the impact of drug use on highway safety, including which drugs impair driving ability and at what dose levels and which drugs are linked to higher crash rates.

Access "2007 national roadside survey of alcohol and drug use: alcohol prevalence rates" and "2007 national roadside survey of alcohol and drug use: drug prevalence rates" at www.nhtsa.dot.gov.

PERCENT OF FATALLY INJURED DRIVERS WITH BACS AT OR ABOVE SPECIFIED THRESHOLDS, 1982-2008



PERCENT OF WEEKEND NIGHTTIME DRIVERS WITH BACS 0.08 OR MORE



The percentage of impaired nighttime drivers in the 2007 roadside survey was 2.2 percent. This compares with 4.3 percent in 1996, 5.4 percent in 1986, and 7.5 percent in 1973. There were similar declines in percentages of drivers with any detectable alcohol in their systems during the same period. Drivers with BACs of 0.15 percent or more accounted for 0.4 percent of all drivers in 2007 versus 0.6 percent in 1996, 1 percent in 1986, and 1.4 percent in 1973.

NHTSA EXAMINES FATAL CRASH FACTORS

Airbags and safety belts vastly improve occupant protection, yet thousands of people die in frontal crashes each year. A federal study of the factors behind these deaths suggests the need for improved vehicle designs and advanced restraints to better protect people in corner and oblique crashes, impacts with narrow objects like poles, and underrides with large trucks and trailers. The findings are in line with Institute research.

Last year the Institute combed federal crash data to explore why crash deaths and serious injuries happen in vehicles that earn good ratings based on frontal tests and suggested crash types for further analysis (see *Status Report*, March 7, 2009; on the web at iihs.org). Similarly, a research team from the National Highway Traffic Safety Administration reviewed every crash in which a belted driver or right front-seat passenger died in a model year 2000 or newer vehicle to obtain a sample of 121 crashes to study. Data are from the Crashworthiness Data System of the National Automotive Sampling System.

While the Institute looked at deaths and serious injuries, limiting cases to vehicles with good crash test ratings, the federal researchers focused on fatalities and didn't put any conditions on test performance. The agency's results skew toward 2000-03 models, and the Institute's work focuses on 2004-06 models with more crashworthy designs.

Just over half of the people who died were in exceedingly severe crashes or had physical conditions that may have raised their injury risk. Being elderly or obese were common factors.

The next most common factor involved vehicle structures that didn't line up well enough to absorb crash energy, resulting in lots of occupant compartment intrusion. This was the case in corner crashes, impacts with poles and trees, underrides, and crashes with an oblique impact direction.

Access "Fatalities in frontal crashes despite seat belts and airbags" at www-nrd.nhtsa.dot.gov/Pubs/811102.PDF. Access "A study of the factors affecting fatalities of airbag and belt-restrained occupants in frontal crashes" by R.W. Rudd et al. at www-nrd.nhtsa.dot.gov/database/nrd-01/esv/asp/esvpdf.asp.

(continued from p.3) of airbags — with sled-certified ones with advanced features. They also looked at mortality among front-seat occupants of vehicles with sled-certified airbags with advanced features versus those without advanced features. The researchers analyzed the effects of airbag design changes by driver age, gender, and belt use. They also looked at mortality rates for children in front seats. The study included 1998-2006 model vehicles in crashes during 2004-07.

Some people were benefiting from advanced airbag features even before airbags were certified as advanced. Mortality rates were 16 percent lower for drivers of vehicles with sled-certified airbags with advanced features than for people who drove vehicles with sled-certified airbags without advanced features. The benefit was 17 percent for adults riding in front passenger seats.

Death rates were lower for both male and female drivers ages 15-59, as well as for men older than 60. Unbelted male drivers had a 38 percent lower death rate in vehicles with sled-certified airbags with advanced features compared with vehicles with sled-certified airbags lacking such features.

Results for certified-advanced airbags don't follow the same pattern. Although children benefited from both kinds of advanced airbag systems, drivers didn't. People who drove vehicles with certified-advanced airbags had a higher mortality rate than drivers of vehicles equipped with sled-certified airbags with advanced features.

Belted drivers had the biggest uptick in the risk of death — 21 percent — compared with drivers of vehicles with sled-certified airbags with advanced features.

"This finding puzzles us because these drivers had otherwise done everything right in terms of buckling up," Lund says. "It suggests there might be potential problems with the way manufacturers are required to certify airbags as advanced because the technology introduced in vehicles during the sled test era seems to work. But when the new standard is fully in effect we don't see an improvement."

The agency's 2001 decision to reintroduce a rigid-barrier crash test for unbelted occupants was controversial. Automakers contended the unbelted test would prompt a return to overly aggressive airbags. The Institute initially objected to reinstating the unbelted barrier test, while other safety groups favored it (see *Status Report*, Oct. 9, 1998, and Feb. 6, 1999; on the web at iihs.org).

The maximum test speed sparked debate, too. NHTSA at first proposed 30 mph but settled on 25 mph in the final rule, a change the Institute supported (see *Status Report*, March 15, 2003; on the web at iihs.org). Some safety groups, however, feared 25 mph would provide inadequate protection for large occupants, particularly unbelted men. Public Citizen and the Center for Auto Safety sued NHTSA, but a federal appeals court upheld the agency (see *Status Report*, Aug. 1, 2004; on the web at iihs.org).

"Automakers may have had a point," Lund concedes. "Airbags may be too aggressive because of the rigid-barrier test requirements for unbelted dummies. It's also possible that advanced deployment algorithms result in some airbags not deploying at all when they would be beneficial. NHTSA needs to look at our study and try to understand if the new standard missed the mark on striking a balance between protection for both belted and unbelted occupants. In particular, belted drivers aren't reaping the benefits we expected."

For a copy of "How have changes in airbag designs affected frontal crash mortality?" by E.R. Braver et al., write Publications, Insurance Institute for Highway Safety, 1005 North Glebe Road, Arlington, Va. 22201, or email publications@iihs.org.

NEW SAFETY RATINGS FOR SMALL PICKUPS

The Nissan Frontier has the strongest roof and the Chevrolet Colorado the weakest among five 2010 small pickup trucks the Institute recently evaluated for occupant protection in rollover crashes. The Frontier, which also is sold as the Suzuki Equator, is the only pickup in the group to earn the highest rating of good. The Ford Ranger is rated acceptable while the Dodge Dakota, Toyota Tacoma, and Colorado, which also is sold as the GMC Canyon, earn the second lowest rating of marginal. Go to iihs.org for full results.

The rating system is based on Institute research showing that occupants in rollover crashes benefit from stronger roofs (see *Status Report*, March 24, 2009; on the web at iihs.org). Vehicles that earn good ratings must have roofs that are more than twice as strong as the minimum required by the current federal safety standard. As a group, small pickups aren't performing as well as small cars or small SUVs.

"It's harder to find a small pickup truck that performs well in all of our crashworthiness evaluations," says Institute senior vice president David Zuby. In fact, no small pickup earns the Institute's *TOP SAFETY PICK* award.

The Institute also conducted new side impact tests of small pickups. Earning good ratings are the Frontier with standard front and rear head curtain airbags and the Ranger with standard front-seat mounted combination head and torso airbags. Also rated good is the Tacoma. In contrast, the Colorado is rated poor for side protection.

ROOF STRENGTH

GOOD	NISSAN FRONTIER SUZUKI EQUATOR
ACCEPTABLE	FORD RANGER
MARGINAL	DODGE DAKOTA
MARGINAL	TOYOTA TACOMA
MARGINAL	CHEVROLET COLORADO GMC CANYON

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