EVENT DATA RECORDERS IN AUTOMOBILES: EFFECTIVE USE OF DATA FROM AIRBAG CONTROL MODULES IN MOTOR VEHICLE CRASH RECONSTRUCTION

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I. INTRODUCTION

A. Event Data Recorders (EDR): What are they?

1. A component of the vehicle's Airbag Control Module (ACM)
   a. The ACM is a small (usually) silver box usually located under the front seat or center console

2. Sometimes called the car's "black box"

3. Main components: Accelerometer and Microprocessor

4. EDR has ability to provide a comprehensive snapshot of the entire crash event -- pre-crash, crash and post-crash

B. Primary Function of Airbag Control Module: Safety!

1. Measure severity of event

2. Determine whether to deploy airbags and/or activate pretensioner (device that removes slack from seat belt)

3. Secondary Function: record and store crash data with EDR

C. Airbag Control Module vs. Engine Control Module (ECM) in diesel engines

1. ECM's also have EDR - different capacity/function

D. Our focus is on Original Equipment Manufacturer (OEM) parts

1. After market products also available
   a. Parents can monitor teen's driving habits
   b. Insurance companies can monitor insureds' driving

E. EDR data not available from all vehicles

1. Some manufacturers consider data proprietary trade secrets

F. Each manufacturer has a different name for their ACM

1. General Motors: “Sensing and Diagnostic Module” (SDM)
   a. General Motors is and has been the pioneer in EDR technology

2. Ford: “Restraint Control Module” (RCM)
   a. New in 2008 - “Powertrain Control Module” (PCM)
      i. Also contains EDR
      ii. Similar to SDM in pre-crash data recording capabilities
      iii. Can record minutes of data, but easily overwritten

3. Chrysler: “On-Board Restraint Control”
   a. Data available as of 2007 (in limited models)

G. 2007 report: estimated 30 million cars and light vehicles (15% of fleet) equipped with EDR’s
   a. Figures expected to increase significantly every year

II. HISTORY OF EVENT DATA RECORDERS

A. 1950's

1. Flight Data Recorders introduced
   a. The real “black box”
      i. It’s actually orange!
   b. Purpose: capture and record in-flight data for post-crash review

B. 1970's

1. General Motors introduces Event Data Recorders

2. National Transportation Safety Board (NTSB) launches EDR research program

C. Late 1990's

1. GM introduces Sensing and Diagnostic Module (SDM)
   a. Allows recording of pre-crash data

2. National Highway Transportation Safety Administration (NHTSA) involvement
   a. EDR Working Group formed by NHTSA

3. In 1999, GM awards Vetronix (now BOSCH) exclusive contract to develop the Crash Data Retrieval (CDR) system
   a. CDR system became available to the public in 2000
   b. Vetronix/BOSCH later form similar agreement with Ford and Chrysler

D. August 2006: NHTSA publishes Federal "Event Data Recorder" Rule: 49 CFR §563

1. NHTSA does not require manufacturers to install EDR's - still voluntary

2. Rule specifies uniform requirements for the "accuracy, collection, storage, survivability and retrievability of onboard motor vehicle crash event data in passenger cars and light vehicles"

C. January 14, 2008: NHTSA publishes "Revised" version of 49 CFR §563

1. Rule sets forth comprehensive set of EDR definitions

2. Rule lists "Data Elements Required for all Vehicles Equipped with an EDR"

3. Requires manufacturers to publicly share how to download EDR data and requires statement in Owner's Manual that vehicle has an EDR

4. Compliance date: September 1, 2012, unless vehicle manufactured in 2 or more stages, then September 1, 2013

III. EVENT DATA RETRIEVAL AND STORAGE

A. What constitutes an "Event"?

1. "A crash or other physical occurrence that causes the trigger threshold to be met or exceeded, or an airbag to be deployed, whichever occurs first" 49 CFR §563.5(b)

2. "Non-Deployment Event"
   a. Negative acceleration observed along the car's longitudinal (x) axis is sufficient to "wake up" the airbag sensing algorithm but which is insufficient to warrant an actual airbag deployment.

3. Non-Deployment Event - data storage

a. EDR only records and stores one event
b. Event is "cleared" after 250 ignition cycles
c. Data may be overwritten by next, more severe non-deployment event
d. Non-Deployment Event data will be locked if there is a deployment event within 5 seconds (unless second deployment event occurs within 5 seconds later, then non-deployment event data is overwritten)

4. "Deployment Event"
   a. Negative acceleration observed along the car's longitudinal (x) axis is sufficient to "wake up" the airbag sensing algorithm to "enable" in order to anticipate a collision severity which warrants deployment

5. Deployment Event - data storage
   a. EDR records and stores up to 2 events if they occur within 5 seconds of each other
   b. Deployment event data cannot be erased or overwritten
   c. SDM must be replaced after a deployment event

IV. DATA AVAILABLE FROM EVENT DATA RECORDER

A. Pre-crash data - EDR records and is capable of storing data from 5 seconds before event

1. Vehicle speed (MPH)

2. Engine speed (RPM)

3. Throttle position

4. Brake application

5. In newer models:
   a. Driver steering input, lateral acceleration, passenger's seat belt use, seat track positions, cruise control settings, etc...

B. Crash Data
1. Change in velocity (Delta-V): 100 - 300 milliseconds after "algorithm enable" (initial trigger event)
   a. Includes time from "algorithm enable" to deployment (typically 10 milliseconds)

2. Seat belt switch status

C. Automatic Crash Notification

1. Data from EDR and on-board GPS will be sent like an electronic 911 call via "On-Star" or similar system so that police and EMS are immediately notified of crash location and severity

V. EDR DATA EXTRACTION

A. BOSCH Crash Data Retrieval (CDR) kit

1. Specific equipment and cables are required

B. Data ports in vehicle are available for direct download from vehicle

1. ACM can also be removed

C. Data is encoded in a hexadecimal format

1. BOSCH software is required

D. Software decodes data and provides written report and graph of data

VI. POTENTIAL USES OF EDR DATA

A. Accident investigation / reconstruction

B. Litigation defense

1. Liability
   a. Comparative negligence (excessive speed, driver inattention, etc...)

2. Causation/damages
   a. Impact severity
   b. Use or non-use of seat belt

3. Benefits of computerized engine data vs. eyewitness testimony
   a. Not subject to memory lapses, bias, etc...

VII. EDR DATA: LIMITATIONS AND ISSUES

A. Privacy issues

1. Driving habits are recorded without driver's knowledge - invasion of privacy??
    a. 20 states have enacted or are proposing legislation requiring disclosure of EDR by manufacturer and/or restricting EDR downloads and use of the data against the driver in criminal prosecution
    b. Ohio NOT among those states proposing EDR legislation (yet...)

B. Ownership issues

1. Vehicle owner owns the data

2. Without owner's consent, must have court order/warrant
    a. Insurance companies will be putting consent clauses in policy

C. Not all collisions generate data

1. Generally frontal impact required (though this is evolving)

D. Loss or deletion of data

1. Loss of electrical power could affect validity of data

2. Severe crash may destroy/damage ACM

3. Data from non-deployment event is overwritten after 250 ignition cycles
    a. Demonstrates importance of timely download

E. EDR Data is not conclusive

1. Data is one piece of evidence - does not replace a thorough accident reconstruction

2. Must have qualified Accident Reconstructionist analyze data in conjunction with all other physical evidence

F. Practical Considerations

1. Expenses involved

G. Admissibility in Court -- *Frye* and *Daubert* reliability challenges

1. *Bachman v. GMC*, 332 Ill. App. 3d 760 (2002)

a. Trial court did not abuse it's discretion by finding that the "process of recording and downloading SDM data is sufficiently established to have gained general acceptance in the relevant scientific community" and properly admitted SDM data

2. *State of Ohio v. Wilson*, (Nov. 17, 2005), Perry App. No. 05-CA-05); 2005 Ohio App. LEXIS 5595
   a. Vehiclular homicide conviction based on EDR speed data was affirmed

3. Will need properly trained and qualified expert

APPENDIX A: Department of Transportation, National Highway Traffic Safety Administration Publication of Final Rules as Revised, 49 CFR §563, January 14, 2008

APPENDIX B: BOSCH CDR Vehicle List - Version 3.0.1 (includes available 2008 models)

Administrator of General Services all such holdings that are not necessary to satisfy existing or known and verified planned programs; and

(2) Establish information systems, implement inventory controls and conduct surveys, in accordance with procedures established by the Administrator of General Services, so that a governmentwide reporting system may be developed.

(c) Executive Order 13327, *Federal Real Property Asset Management*, dated February 4, 2004, requires that the Administrator of General Services, in consultation with the Federal Real Property Council, establish and maintain a single, comprehensive and descriptive database of all real property under the custody and control of all executive branch agencies, except when otherwise required for reasons of national security. The Executive Order authorizes the Administrator to collect from each Executive agency such descriptive information, except for classified information, as the Administrator considers will best describe the nature, use, and extent of the real property holdings of the Federal Government.

§ 102–84.20 Where should I obtain the data required to be reported for the Annual Real Property Inventory?

You should obtain data reported for the Annual Real Property Inventory from the most accurate real property asset management and financial management records maintained by your agency.

§ 102–84.25 Is it necessary for my agency to designate an official to serve as the point of contact for the real property inventories?

Yes. You must designate an official to serve as your agency's point of contact for the Annual Real Property Inventories. We recommend that you designate the same point of contact for the Federally-owned and leased real property inventory, although separate points of contact are permitted. You must advise the General Services Administration, Office of Governmentwide Policy, Office of Real Property (MP), 1800 F Street, NW., Washington, DC 20405, in writing, of the name(s) of these representative(s) and any subsequent changes.

§ 102–84.30 Is it necessary for my agency to certify the accuracy of its real property inventory submission?

Yes. Your agency's official designated in accordance with § 102–84.25 must certify the accuracy of the real property information submitted to GSA.

§ 102–84.35 Which agencies must submit a report for inclusion in the Annual Real Property Inventory?

Each agency that has jurisdiction, custody, control, or otherwise manages Federal real property or enters into leases, is responsible for submitting the real property inventory information. Additional information on the responsibility for reporting inventory data is contained in the annual Guidance for Real Property Inventory Reporting.

§ 102–84.40 What types of real property must I report for the Annual Real Property Inventory?

You must report for the Annual Real Property Inventory all land, buildings, and other structures and facilities owned by the United States (including wholly-owned Federal Government corporations) throughout the world, all real property leased by the United States from private individuals, organizations, and municipal, county, State, and foreign governments, and all real property otherwise managed by the United States where the ownership interest is held by a State or foreign government. Property to be reported includes, but is not limited to:

(a) Real property acquired by purchase, construction, donation, eminent domain proceedings, or any other method;

(b) Real property in which the Government has a long-term interest considered by the reporting agency as being equivalent to ownership. This would include land acquired by treaty or long-term lease (*e.g.*, 99-year lease), and that your agency considers equivalent to Federally-owned land;

(c) Buildings or other structures and facilities owned by or leased to the Government, whether or not located on Government-owned land;

(d) Excess and surplus real property;

(e) Leased real property (including leased land, leased buildings, leased other structures and facilities, or any combination thereof);

(f) Real property leased rent free or for a nominal rental rate, if the real property is considered significant by the reporting agency; and

(g) Real property where title is held by a State or foreign government, but rights for use have been granted to a Federal entity in an arrangement other than a leasehold.

§ 102–84.45 What types of real property are excluded from reporting for the Annual Real Property Inventory?

The following real property assets are excluded from Executive Order 13327 and reporting is optional:

(a) Land easements or rights-of-way held by the Federal Government.

(b) Public domain land (including lands withdrawn for military purposes) or land reserved or dedicated for national forest, national park, or national wildlife refuge purposes, except for improvements on those lands.

(c) Land held in trust or restricted-fee status for individual Indians or Indian tribes.

(d) Land, and interests in land, that are withheld from the scope of Executive Order 13327 by agency heads for reasons of national security, foreign policy or public safety.

§ 102–84.50 May the GSA Form 1166 be used to report information?

No. Agencies must submit information in accordance with the electronic format outlined in the annual reporting instructions by either submitting an XML file in a predetermined format or by entering the data manually into the online Federal Real Property Profile system. For more information on format requirements, or any other information and guidance on the Annual Real Property Inventory, contact GSA's Office of Governmentwide Policy, Office of Real Property (MP), 1800 F Street, NW., Washington, DC 20405, or by telephone at (202) 501–0856.

§ 102–84.55 When are the Annual Real Property Inventory reports due?

You must prepare the Annual Real Property Inventory information prescribed in § 102–84.50 as of the last day of each fiscal year. This information must be submitted electronically to the General Services Administration, Office of Governmentwide Policy, Office of Real Property (MP), 1800 F Street, NW., Washington, DC 20405, no later than December 15 of each year.

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DEPARTMENT OF TRANSPORTATION

National Highway Traffic Safety Administration

49 CFR Part 563

[Docket No. NHTSA–2008–0004]

RIN 2127–AK12

Event Data Recorders

AGENCY: National Highway Traffic Safety Administration (NHTSA), Department of Transportation.

ACTION: Final rule; response to petitions for reconsideration.

SUMMARY: In August 2006, NHTSA published a final rule specifying uniform requirements for the accuracy, collection, storage, survivability, and retrievability of onboard motor vehicle crash event data in passenger cars and other light vehicles voluntarily equipped with event data recorders (EDRs). The final rule was intended to standardize the data collected through EDRs so that it could be put to the most effective future use. This document responds to several petitions for reconsideration of the August 2006 rule. After carefully considering the issues raised, the agency is granting some aspects of the petitions, and denying some aspects. This document amends the final rule accordingly.

DATES: *Effective Date:* The amendments in this rule are effective March 14, 2008.

Compliance Dates: Except as provided below, light vehicles manufactured on or after September 1, 2012 that are equipped with an EDR and manufacturers of those vehicles must comply with this rule. However, vehicles that are manufactured in two or more stages or that are altered are not required to comply with the rule until September 1, 2013. Voluntary compliance is permitted before that date.

Petitions: If you wish to submit a petition for reconsideration of this rule, your petition must be received by February 28, 2008.

ADDRESSES: Petitions for reconsideration should refer to the docket number and be submitted to: Administrator, National Highway Traffic Safety Administration, 1200 New Jersey Avenue, SE., West Building, 4th Floor, Washington, DC 20590. Please see the Privacy Act heading under Regulatory Notices.

FOR FURTHER INFORMATION CONTACT: For technical and policy issues, contact David Sutula, Office of Crashworthiness Standards, by telephone at (202) 366–1740, or by fax at (202) 493–2739.

For legal issues, contact Rebecca Schade, Office of the Chief Counsel, by telephone at (202) 366–2992, or by fax at (202) 366–3820.

Both persons may be reached by mail at the following address: National Highway Traffic Safety Administration, U.S. Department of Transportation, 1200 New Jersey Avenue, SE., Washington, DC 20590.

SUPPLEMENTARY INFORMATION:

Table of Contents

I. Summary of the Final Rule; Responses to Petitions for Reconsideration

In this document, NHTSA responds to petitions for reconsideration of its August 2006 final rule concerning EDRs. That rule specified uniform requirements for the accuracy, collection, storage, survivability, and retrievability of onboard motor vehicle crash event data in passenger cars and other light vehicles voluntarily equipped with event data recorders (EDRs).

We are granting a number of the petitions in part. In granting these petitions, today's final rule makes several changes to the regulatory text of 49 CFR part 563, *Event Data Recorders.* These are largely technical changes, all of which are consistent with agency's goal in the original final rule of limiting the requirements to those necessary to achieve our stated purposes, reflecting current EDR technology, and avoiding unnecessary costs. Changes to the regulatory text are summarized below.

We are denying a petition from Public Citizen asking that we require EDRs, include requirements for additional data elements, and increase the stringency of the data survivability requirements. We are also denying a request from Mr. Thomas Kowalick that we require inclusion of a mechanical lockout port to prevent EDR data tampering.

Summary of Changes

1. In order to avoid vehicle manufacturers incurring significant additional costs, unintended by the final rule, to redevelop EDR system architectures outside the normal product cycle, § 563.3 is being amended to include a later compliance date. Specifically, the compliance date will generally be September 1, 2012, but September 1, 2013 for vehicles that are manufactured in two or more stages or that are altered after having been previously certified to the FMVSS. This change will also allow the agency to continue to collect data from vehicles with EDRs that do not meet the full requirements of the final rule.

2. To avoid EDR data being filtered beyond usefulness, the agency is removing the Society of Automotive Engineers (SAE) J211–1 filter class from Table III of § 563.8 and from incorporation by reference in § 563.4. The agency agrees, based on additional information, that current technology EDRs on the market are able to filter data internally, and an additional filtering step is usually unnecessary if not unhelpful.

3. To clarify the final rule more fully, the agency is adding definitions in § 563.5 for ''maximum delta–V, resultant'' and ''time, maximum delta–V, resultant,'' and amending the definitions for ''end of event time,'' ''engine RPM,'' ''event,'' and ''time zero.''

4. To clarify the definition and permissible uses of the frontal air bag warning lamp, and to clarify that the ignition cycle at time of download need only be reported during the download process, footnotes are being added to Table I in § 563.7.

5. As petitioners pointed out to the agency, the SAE standard on which Part 563 was originally based contained standards for *reporting* rather than *recording* data elements. To avoid requiring EDRs to function at levels well beyond those necessary for the purposes of the final rule, § 563.8 and Table III are being amended to clarify that the format specified is for reported, not recorded, data elements.

6. As written in the final rule, § 563.9 required EDRs to erase recorded data before beginning to record new data of an air bag deployment. This consumes EDR system resources and time, which may be needed to record a closely-

following second deployment event, and in long events, the EDR may inappropriately process and prioritize event data. We are amending § 563.9 to allow the EDR to ''overwrite'' rather than erase previous event data contained in the EDR memory buffers, and to clarify how the EDR should prioritize multiple events and events involving deployable restraint systems other than air bags.

II. EDR Background

Event data recorders are a rapidly developing technology used in a variety of transportation modes to collect crash information. In motor vehicles, that information aids NHTSA in improving our understanding of crash events and safety system performance. Ideally, it can help manufacturers to develop future safer vehicle designs and NHTSA to develop more effective safety regulations. EDR data will also likely play an increasing role in advancing developing networks for providing emergency medical services, like automatic crash notification (ACN) and electronic 9–1–1 (e–911).

As a technology, EDRs have experienced dramatic changes in the past decade, both in terms of their technical capabilities and their penetration into vehicle fleets. EDRs today demonstrate a range of features: Some systems collect only vehicle acceleration and deceleration data, but others collect these plus additional complementary data, such as driver inputs (like braking and steering) and vehicle system status. NHTSA's challenge has been to encourage broad application of EDR technologies in motor vehicles and maximize the usefulness of EDR data for vehicle designers, researchers, and the medical community, without imposing unnecessary burdens or deterring future improvements to EDRs that have been voluntarily installed.

For much more background information on EDR technologies, please see the NPRM and the final rule, at 69 FR 32932 (June 14, 2004) [1] and 71 FR 50998 (August 28, 2006),[2] respectively.

III. Discussion and Analysis of Responses to Petitions for Reconsideration

The agency received eight petitions for reconsideration in response to the final rule. Petitions were received from two vehicle manufacturer associations, the Alliance of Automobile Manufacturers (Alliance) and the Association of International Automobile Manufacturers (AIAM); two individual vehicle manufacturers, Nissan and Toyota; a manufacturer of EDR components, Delphi Corporation; the Automotive Occupant Restraints Council (AORC); Public Citizen; and one private citizen, Mr. Thomas M. Kowalick. We note that letters were also received from the American Automobile Association (AAA) and 433 private citizens.

In addition, the agency held ex parte meetings with AORC, the Alliance, Toyota, GM, Hyundai, and Mr. Kowalick.[3] AORC, the Alliance, Toyota, GM, and Mr. Kowalick each explained their concerns and outlined their petitions for reconsideration. Hyundai asked for clarification of the provisions of the rule, but did not submit any information or requests for the agency to consider.

The petitions and comments expressed concerns with the following general areas of the rule: event storage, data format, sensor accuracy and range, data survivability and retrievability, required data elements, lead time, and public privacy and notification. The sections below examine each topic in turn, discussing the petitions and explaining the agency's response.

A. Event Data Storage

Petitioners' requests on storage of crash event data in EDRs involved three topics: Data storage in the case of multiple event scenarios, event recording intervals, and reusability of EDRs with ''locked'' data.

1. Storage of Multiple Events

AORC [4] petitioned NHTSA to clarify the ''end of event'' criteria, arguing that as the final rule was written, the definition of multiple event storage and delta–V ''trigger threshold'' would allow the EDR to record overlapping or incomplete event data. It further argued that once the end of event criteria is reached, there is no further useful data to obtain. AORC also petitioned NHTSA to redefine the trigger threshold to limit the start of an event to ''a 150 ms interval, or the time since the most recent time zero, whichever is shorter,'' in order to avoid the EDR capturing non-events. Allowing the EDR to cease recording once the criteria is reached will conserve microprocessor resources, and prevent incomplete recording of subsequent significant events. AORC suggested that this would prevent the accumulation of multiple insignificant events (such as pothole events) that may have a net cumulative delta–V in excess of 8 km/h.

The Alliance [5] petitioned NHTSA to rewrite § 563.9 to clarify the criteria for overwriting data and to address the event data storage criteria for multiple events. The Alliance mentioned three specific concerns with Part 563's data capture provisions. First, the Alliance stated that the language contradicts itself by stating that air bag deployment data must be locked to prevent overwriting by a future event, while also requiring that all previous data be removed from the EDR with the occurrence of either a deployment or a non-deployment event. Second, the Alliance argued that the erasure requirement is not needed—if an EDR has two non-volatile buffers,[6] only one of which is occupied with data from a previous event, the erasure requirement would reduce the amount of useful information held by the EDR and consume crucial processing time to perform. And third, the Alliance requested clarification as to what NHTSA meant by ''an air bag deployment crash,'' given the existence of other deployable restraints with lower deployment thresholds.

The Alliance recommended that § 563.9 be re-written as follows:

> ''The EDR must capture and record the data elements for events in accordance with the following conditions and circumstances:
>
> (a) In a frontal or side air bag deployment crash, capture and record the current deployment data, up to two events.
>
> (b) In a deployment event that involves another type of deployable restraint (*e.g.*, pretensioners, knee bolsters, pedestrian protection, etc.), or in a non-deployment event that meets the trigger threshold, capture and record the current non-deployment data, up to two events, subject to the following conditions:
>
> (1) If an EDR non-volatile memory buffer void of previous-event data is available, the current non-deployment event data is recorded in the buffer.
>
> (2) If an EDR non-volatile memory buffer void of previous event data is not available, the manufacturer may choose to either overwrite the previous non-deployment event data with the current non-deployment event data, or to not record the current non-deployment data.
>
> (3) EDR buffers containing previous deployment-event data must not be overwritten by the current non-deployment event data.''

The Alliance argued that this rewrite would clarify the apparent contradiction and ensure that NHTSA would receive the highest-interest event data.

[1] Docket No. NHTSA–2004–18029.

[2] Docket No. NHTSA–2006–25666.

[3] NHTSA's records of these meetings are available at Docket No. NHTSA–2006–25666.

[4] Docket No. NHTSA–2006–25666–436.

[5] Docket No. NHTSA–2006–25666–441.

[6] A non-volatile buffer temporarily stores data until the EDR is ready to receive or process it into semi-permanent memory. Many current technology EDRs do have two non-volatile buffers.

Additionally, according to that petition, manufacturers would be able to prioritize the significance of non-deployment event data based on the varying deployment level thresholds for other restraint systems. Toyota [7] supported the Alliance petition.

AIAM [8] argued that although EDRs may be capable of recording multiple events, they may only do so if the external power source and sensors are not damaged in the first event, and petitioned the agency to clarify this. Nissan [9] supported the AIAM petition.

Agency response: We are granting the Alliance's petition to clarify § 563.9, but we are not adopting its definition verbatim. The final rule required EDRs to record only two events. To ensure that air bag deployment events were properly recorded, the agency required that previous data be erased from memory buffers prior to recording the deployment event. The agency adopted the ''end of event'' definition in SAE J1698–1, *Vehicle Event Data Interface—Output Data Definition* (March 2005) to provide a distinction between when the first event had ended and the second event began.

However, the erasure process consumes EDR system resources and time, which may be needed to record a closely-following second deployment event. In addition, during some multiple events, the timing of event triggers may appear to the EDR as one long event. This may cause the EDR to process and prioritize event data inappropriately.

To address this problem, we are adopting most of the Alliance's recommended rewrite of § 563.9. The EDR will be permitted to ''overwrite'' rather than erase previous event data contained in the EDR memory buffers. The revised § 563.9 will also clarify how the EDR must prioritize multiple events and events involving deployable restraint systems other than air bags. Finally, by allowing the EDR to overwrite data, the revision will also address the AORC concerns about multiple event timing and the potential for double buffering (unintentionally recording the same event twice) or recording of insignificant data. We are including a requirement that the data from an air bag deployment event remain locked,[10] in order to discourage tampering. Thus, we are changing § 563.9(a), to read:

(a) In a frontal or side air bag deployment crash, capture and record the current deployment data, up to two events. *The memory for each air bag deployment event must be locked to prevent any future overwriting of these data.*

The revision also addresses AORC's concern about the trigger threshold, because the revised regulatory text permits the EDR algorithm to define on its own when the end of event has occurred. Thus, the EDR could capture the 150 ms pre-event interval in a new memory buffer, while ceasing to record the previous event. In this case, the full set of data from the deployment event would be captured, and the data from the prior event would be contained in a second memory buffer.

We agree with AIAM that subsequent events need not be recorded if the external power source and sensors are damaged in the first event, but we do not believe that a change to the regulatory text is necessary. The regulation does not contain test requirements to determine if an EDR could survive two consecutive severe crashes. For the test requirements which are included, if an event is severe enough to interrupt the power source to the EDR, the EDR must be able to finish capturing that event, but is not required to be in a condition such that it could capture subsequent events.

2. Event Recording Intervals

AORC petitioned NHTSA to clarify that an air bag deployment is itself a trigger, even in the absence of a delta–V trigger. AORC recommended modifying the definition for ''time zero'' to account for this, and to modify the definition of ''end of event'' to allow for both a delta–V end of event and air bag control unit reset.

The Alliance also petitioned NHTSA to clarify that an air bag deployment is itself a trigger, and recommended modifying the definition of ''time zero'' and ''event'' accordingly. The Alliance argued that a strict reading of the existing ''event'' definition could preclude a manufacturer from recording cases in which an air bag deploys (due to shock to the vehicle) even though the trigger threshold was not exceeded. In these cases, it would be important to have EDR data to evaluate air bag performance.

Toyota supported the Alliance petition and petitioned for clarification of the ''end of event'' definition. Toyota argued for a ''judgment period'' of 30 ms to identify the actual end of the event in the case of a crash where the cumulative delta–V hovers near 0.8 km/h. The judgment period would enable the EDR to determine whether a true end of event has occurred, or whether the previous event has simply continued.

AIAM stated that the delta–V recording intervals specified in Tables I and II do not agree with the final rule preamble. The maximum delta–V recording intervals in the tables are specified as 0–300 ms, but the preamble stated that NHTSA believed that a 250 ms recording time would be sufficient for 95 percent of the event cases. AIAM urged the agency to reconcile the language. Nissan supported the AIAM petition.

Agency response: We are granting the petitions to clarify that an air bag deployment may be considered an event trigger by itself. In the final rule, the agency had decided not to adopt a recommendation to tie the trigger threshold to an air bag deployment because we believed that using a set delta–V trigger would better collect the type of information that the agency was most interested in, namely high delta–V crashes irrespective of air bag deployment. We were concerned that tying the trigger threshold to air bag deployment could result in different thresholds depending on manufacturer deployment strategies and vehicle platforms.

We agree, however, that EDR data would be valuable in the case of events where an air bag was deployed and the trigger threshold was not met or exceeded. Including a reference to air bag deployment as a trigger by itself, while maintaining the delta–V trigger, is consistent with the agency's intent in the final rule. We are therefore modifying the definitions of ''event'' and ''time zero'' as follows:

Event means a crash or other physical occurrence that causes the trigger threshold to be met or exceeded, or an air bag to be deployed, whichever occurs first.

Time zero means whichever of the following occurs first:

(a) For systems with ''wake-up'' air bag control systems, the time at which the occupant restraint control algorithm is activated; or

(b) For continuously running algorithms,

(i) The first point in the interval where a longitudinal cumulative delta–V of over 0.8 km/h (0.5 mph) is reached within a 20 ms time period; or

(ii) For vehicles that record ''delta–V, lateral,'' the first point in the interval where a lateral cumulative delta–V of over 0.8 km/h (0.5 mph) is reached within a 5 ms time period; or

(c) An air bag deployment.

Further, we are granting the petitions to clarify the ''end of event'' definition to allow the EDR to determine if an actual end of event has occurred. To address

[7] Docket Nos. NHTSA–2006–25666–439 and –447.

[8] Docket No. NHTSA–2006–25666–442.

[9] Docket No. NHTSA–2006–25666–448.

[10] The meaning of ''locked'' is discussed below in section A3.

the AORC and Toyota requests, we are modifying the definition as follows:

End of event time means the moment at which the cumulative delta–V within a 20 ms time period becomes 0.8 km/h (0.5 mph) or less, or the moment at which the crash detection algorithm of the air bag control unit resets.

3. Reusability of EDRs

AORC petitioned NHTSA to define the term ''locked'' so that the EDR itself could not overwrite event data, but so that external means could be used to erase data after download. They argued that in some cases, the EDR may be reusable after a deployment event, and allowing data to be erased would facilitate reuse.

Agency response: We are denying this petition. We do not believe that reuse of the EDR is a sufficient reason to allow its erasure by external means. If we allowed the EDR to be erased by external means, it could encourage development of tools to erase EDR data potentially beneficial to our programs, and would make it difficult to ensure that this feature was not being misused. Although the final rule did not define the term ''locked,'' we consider it to mean to protect EDR data from changes or deletion. This would include by external means.

B. Data Format

''Recording'' versus ''Reporting'' data:

Several petitioners argued that the title of Table III should be changed from ''Recorded Data Format'' to ''Reported Data Format,'' essentially because differences in EDRs may cause them to record data differently, and requiring identical recording capabilities could be more onerous than the agency likely intended. AORC argued that it appears that post processing of data collected from an EDR is allowable, and that the title of Table III should be changed to ''Reported Data Format'' to clarify this point. Along those lines, AORC petitioned that the ''resolution'' column in Table III be changed to ''Reported Format,'' and that NHTSA clarify that the actual sensor resolution may differ from the reported format.

The Alliance stated that SAE J1698 and J1698–1 provide guidelines for reporting EDR data, not recording EDR data. In support, the Alliance cited the scope of SAE J1698, which states:

This recommended practice aims to establish a common output format of crash-related data recorded and stored within certain electronic components currently installed in many light-duty vehicles. This recommended practice pertains only to the post-download format of such data and is not intended to standardize the format of the data stored within any on-board storage unit, or to standardize the method of data recording, storage, or extraction.''

Therefore, the Alliance petitioned that § 563.8(a) be revised to read ''The data elements listed in Tables I and II, as applicable, must be reported in accordance with the range, accuracy, resolution, and filter class specified in Table III.'' It further requested that the title of Table III be changed to ''Reporting Data Element Format.'' Toyota supported the Alliance petition.

Agency response: We are granting these petitions. In the final rule, the agency expressed its intent to specify recording requirements identical to or less stringent than those found in SAE J1698. As the Alliance noted, that standard was intended for the purpose of ''reporting'' EDR data, not ''recording'' it. To remedy this oversight in the final rule, we are revising the title of Table III to ''Reported Data Element Format,'' and revising § 563.8(a) as follows:

(a) The data elements listed in Tables I and II, as applicable, must be reported in accordance with the range, accuracy, and resolution specified in Table III.

We are not changing the ''resolution'' column title as requested by AORC, because the revised Table III title should sufficiently address their concerns.

SAE J211–1 Filter Class

The AORC petitioned NHTSA to remove the SAE J211–1 Class 60 filter class from the final rule, because it applies to vehicle instrumentation in laboratory tests and may be inconsistent with some of the data collected by EDRs. The Alliance also petitioned to remove the SAE J211–1 filter class from Table III, because component suppliers typically incorporate their own filtering techniques into the acceleration data acquisition hardware, and an additional filtering requirement may cause data processing issues for EDRs.

Agency response: We are granting these petitions. NHTSA included the SAE J211–1 filter class in the final rule to ease comparison of data collected from EDRs with data collected during agency crash tests. Data filters are used to eliminate noise from sensor signals and extract the useful data. We believed that by specifying the same filter class used during agency crash tests, EDRs would provide information more readily comparable to the data collected by instruments used during our crash tests. It also allowed comparison amongst EDRs from different manufacturers. However, in ex parte meetings with AORC, the Alliance, AIAM, and Toyota,[11] the petitioners presented additional material indicating that current EDRs contain internal filtering capability. Additional filtering of the already-filtered data could remove useful signal content, and could result in attenuation or phase shifting of the data. Based on this information, we are removing the SAE J211–1 filter class requirement from § 563.8(a) and the corresponding column from Table III.

Requirements for Particular Data Elements

The Alliance petitioned NHTSA to revise the resolution requirement in Table III for acceleration data to ''the range of the sensor divided by the number of available states in one byte.'' In this manner, a 100 g sensor (± 50 g) would have a resolution of 0.39 g (100 g/255).[12] The Alliance argued that the accelerometers required in crash testing (capable of measuring at a 0.01 g resolution) are not of the type employed in EDRs. Such accelerometers would double the EDR memory requirements and increase sensor cost, with no apparent benefit.

The Alliance also petitioned NHTSA to revise the recording interval from 250 to 70 ms from time zero, and allow a range of sampling rates from 100 to 500 Hz, to prevent the need for upgraded accelerometers and requisite memory with no added benefit. It argued that some accelerometers sample at rates as low as 100 Hz, compared to the 500 Hz rate specified in Table II, and that many EDRs record acceleration data for only 50–70 ms from time zero, compared to the 250 ms requirement in the final rule.

Toyota also recommended that the agency change the time interval for delta–V data to ''0–250 ms or 0–End of Event Time plus 30 ms, whichever is shorter.'' Likewise, Toyota recommended changing the time interval for maximum delta–V to ''0–300 ms or 0–End of Event Time plus 30 ms, whichever is shorter.''

AIAM also addressed the issue of the time interval for maximum delta–V data. It argued that the time interval specified in Table III was not in agreement with the preamble, and petitioned that the agency specify in Table III that the maximum delta–V time interval was 0–250 ms.

AIAM also stated that the final rule did not provide a method for verifying the format of the data elements, and that it was therefore unclear how the agency

[11] *See* Docket No. NHTSA 2006–25666 for the records of these meetings.

[12] There are 255 states in one byte of memory. One byte is equal to 2^8 (256) bits. The number of states in each byte is equal to the number of bits minus 1 (256 − 1 = 255).

intended the accuracy criterion to be applied. AIAM requested that the agency provide a procedure for determining Table III data element accuracy, range, and resolution verification.

Nissan [13] supported the AIAM petition with regard to recorded data format, and also recommended that the agency revise the acceleration data element resolution from 0.01 g to 0.5 g.

Agency response: We are granting the petitions regarding the resolution capability required for accelerometers in the final rule, because we recognize that current technology accelerometers used in EDRs are not, in fact, able to meet the resolution requirement in Table III. As discussed above, this stems in part from the agency's substituting ''Recording'' for ''Reporting'' format in our attempts to align the EDR regulation with the standard industry practice of SAE J1698. The 0.01 g acceleration data resolution specified in Table III would require manufacturers to add additional memory to the EDR and upgrade the accelerometers to laboratory-grade reference accelerometers.[14] Data submitted by the Alliance,[15] AORC,[16] and Toyota[17] indicate that there would be no significant loss in acceleration data quality if accelerometer accuracy and resolution were revised to 0.5 g. Since the agency intended for the EDR rule to have a low cost impact, and since the data quality will not be significantly reduced, we are changing the resolution for acceleration data elements in Table III to 0.5 g.

For similar reasons, we are granting the petitions to amend the minimum output for the accelerometer ranges. If acceleration is recorded, it must be included in the EDR output and reported in the minimum format specified in Table III. In meetings with the agency, the Alliance and Toyota argued that the sampling rate was too high for many accelerometers, and would raise EDR manufacturing costs by requiring up to five times the memory storage capacity currently common for EDRs. NHTSA intended to maintain a low cost impact as part of the final rule, but also intended to standardize EDR output data. Consequently, we are amending the minimum data sampling requirements for EDR accelerometer data from 500 Hz to 100 Hz, and are also amending the accelerometer data minimum formats in Table III to reflect the typical acceleration ranges recorded by the accelerometer components.

Regarding the issue of maximum delta–V interval times, we are granting the petition to change the data format in Table III to reflect the new time interval changes. NHTSA is adopting Toyota's suggestion of setting the time interval for the delta–V elements as ''0–250 ms or 0–End of Event Time plus 30 ms, whichever is shorter,'' and for maximum delta–V, ''0–300 ms or 0–End of Event Time plus 30 ms, whichever is shorter.'' This will also partially address the AIAM concern about the maximum delta–V interval times in Table III. We do not agree that the maximum delta–V interval time need match that of the other delta–V elements, because in some cases, the resultant maximum delta–V may be achieved after the initial 250 ms time interval. However, the revisions allow a shorter time interval for maximum delta–V if the EDR decides that the event has ended and seeks to reset the event time clock.

We are denying AIAM's request for a verification method for Table III data elements. The agency will verify the data based on the above revisions to Table III and standard laboratory procedures. Standard laboratory procedures would include instrumentation that is traceable to a standard reference and calibrated to a degree of accuracy that is better than the device being tested to verify that the test device is measuring properly. Therefore, when the EDR data is downloaded, the data from the reference accelerometer would verify that the EDR measured the crash pulse accurately.

C. Sensor Accuracy and Range

1. Sensor Accuracy

AORC petitioned the agency to widen the tolerance for recorded delta–V and the underlying accelerometers from ±5% to ±8%. It argued that standard accuracy for accelerometers currently utilized for air bag control units ranges from ±5% to ±10%. They further argued that factors such as misalignment and digitization errors contribute to sensor inaccuracy and necessitate the wider sensor tolerance. AIAM also petitioned for a wider tolerance of ±10% for the accelerometer and delta–V data elements.

The Alliance and Toyota petitioned the agency to remove the acceleration data elements entirely from the final rule, arguing that such data can be derived from the delta–V and event time data elements. If the agency decided to retain the acceleration data elements, however, the Alliance and Toyota requested that the tolerance for acceleration data and delta–V data be increased to ±10%. Delphi petitioned the agency to eliminate the range and accuracy requirements on all inertially-sensed data elements (e.g., acceleration and angular rate), recommending that the agency instead add data elements that indicate the actual range and accuracy characteristics of the inertial parameters included in the record.

The Alliance also petitioned the agency to clarify that accelerometer accuracy is calibrated in comparison with a laboratory grade sensor, and that decreased accelerometer accuracy is allowed in the event of sensor saturation, arguing that accelerometers can lose signal accuracy in certain cases when they experience forces beyond their capability to measure. AORC petitioned that NHTSA specify the temperature conditions when measuring accelerometer accuracy, and that the tolerances apply only within the range of the sensors used in the application and data derived from those signals. Like the Alliance, AORC stated that signals that exceed the range of the sensor may result in clipping of the data, which can affect the overall accuracy of the delta–V calculation.

Agency response: We are granting the petitions to widen the tolerance on accelerometer and delta–V accuracy, but denying the petitions to remove acceleration data elements from the final rule. In the final rule, the agency noted that acceleration is a common data element collected in engineering studies and crash tests to determine crash severity and the shape of the crash pulse in frontal and rear crashes. Therefore, we believe it is appropriate to standardize acceleration data captured by EDRs. However, error source data submitted after the final rule by the Alliance, AORC, and Toyota [18] indicate that current technology EDR accelerometers have lower accuracies than NHTSA previously believed, near ±10%. If we maintain the requirement in the final rule, costs would be imposed beyond what we had analyzed and intended. For these reasons, we are revising the tolerance for accelerometer accuracy to ±10% in order to accommodate current technology EDR accelerometers. Similarly, because delta–V data is derived from acceleration data, it cannot be more accurate than the acceleration measurements, so we are revising the delta–V tolerance to ±10% as well.

[13] Docket No. NHTSA–2006–25666–448.

[14] The AORC reported that current air bag control units use 8–10 bit acceleration data resolution, whereas laboratory-grade reference accelerometers use 14–16 bit resolution to achieve a 0.01 g resolution. See Docket No. NHTSA–2006–25666–436.

[15] See Docket No. NHTSA–2006–25666–441.

[16] See Docket No. NHTSA–2006–25666–436.

[17] See Docket No. NHTSA–2006–25666–447.

[18] *See supra* notes 17–19.

We are denying the petitions to modify the final rule to allow additional EDR inaccuracy due to sensor saturation or data clipping. NHTSA recognizes that in certain rare extreme crash scenarios, the crash pulse may exceed the sensor detection capacity and result in data saturation, even in sensors that have been optimized for their given purpose. In these situations, the crash pulse may cause additional reported data inaccuracy or clipping; however, by doubling the tolerance on the accelerometer data, we believe this has been sufficiently addressed.

We also believe it is unnecessary to specify how accelerometers should be calibrated. To a certain extent, accelerometers will be calibrated when NHTSA crash tests the vehicle. The reference accelerometer used during the test will indicate whether the accelerations reported by the EDR are within ±10% of the reference accelerometer. Additionally, we believe that the manufacturers' interest in guaranteeing that the delta–V calculation made by the vehicle is accurate will ensure that accelerometers are properly calibrated in the first place. If the acceleration is off by too much, the delta–V calculated may be off and the air bag may not fire at the appropriate time in the crash test. However, because each manufacturer may have a different strategy for placement of sensors and for normalization of the data from those sensors to make a deployment decision, there may be many different ways to achieve that necessary accuracy, and we have no interest in requiring a single method simply for purposes of this rulemaking.

2. Sensor Range

AORC petitioned NHTSA to clarify that the ±50 g accelerometer range is a minimum range for post-download data output format only, and to add a footnote to the ''Range'' column in Table III denoting that actual sensor range may differ from table values for crash performance reasons. It argued that the ±50 g range is too wide for lateral and vertical sensors and too narrow for longitudinal sensors, and requested that NHTSA allow higher range longitudinal accelerometers and narrower range lateral and vertical accelerometers provided that the output format is ±50 g at a minimum. The Alliance also argued that lateral accelerometers used for rollover mitigation and electronic stability control systems do not have the same range as frontal crash accelerometers, and are more likely to be 2 to 5 g full-scale than 50 g.

AIAM petitioned NHTSA to allow delta–V calculation errors due to accelerometer data truncation to the ±50 g range, and to specify that the acceleration data element ranges in Table III are minimum ranges. AIAM argued that in certain severe crashes, the longitudinal acceleration component may be higher than the ±50 g range specified in Table III. Thus, in those cases, the acceleration value recorded by the EDR would be truncated at 50 g and the resultant delta–V calculation might not meet the accuracy specified in section 563.

AIAM also stated that current EDR designs could include accelerometers with ranges as low as ±30 g to measure some longitudinal and lateral acceleration components, and as low as ±1 g to measure normal (vertical) acceleration components. AIAM petitioned NHTSA to modify the acceleration ranges specified in the final rule to accommodate current EDR designs, and to allow alternative ranges for lateral and vertical accelerometers. Nissan supported the AIAM petition.

Agency response: As discussed in Section III.B above, we are modifying the specified accelerometer ranges to be ''reported'' and not ''recorded.'' We believe this will resolve the concerns expressed by the petitioners. Additionally, based on the comments and agency research, we recognize that the ranges specified for acceleration data elements may not be appropriate for sensors optimized for specific roles. Whereas longitudinal accelerometers may well measure data over the full range of ±50 g, lateral and normal accelerometers might be optimized to measure data over only a fraction of that range, because vehicles simply do not typically experience the kinds of lateral and normal acceleration as they do longitudinal acceleration. To clarify the issue, we are granting the petition to specify that the ranges are reported minimums such that alternative sensing ranges are permitted, and we are specifying minimum reporting ranges of ±5 g for the lateral and normal accelerometer data elements consistent with current technology practices.

D. Data Survivability and Retrievability

The Alliance argued that for the purpose of determining compliance, NHTSA should clarify in the regulatory text that the EDR is restored to and stabilized at the conditions during the FMVSS No. 208 crash test procedure. Thus, it petitioned the agency to specify environmental conditions for the time period prior to data download for compliance purposes; namely, that the vehicles be kept dry and at a temperature during download that has been maintained at 66—78 °F prior to any read-out being used to assess compliance.

AIAM also petitioned that NHTSA specify that vehicles must be stored and protected from extreme environmental conditions (temperature or precipitation) prior to data download during EDR compliance assessment. AIAM argued that although a 10-day data storage requirement is reasonable, a crash test vehicle left unprotected from severe elements for 10 days could experience data loss. Nissan supported the AIAM petition.

Public Citizen, on the other hand, reiterated the position it stated in its comments to the NPRM that the agency should specify more extreme survivability requirements for EDR data. It argued that fatal crashes include ones resulting in fires and fluid immersion, and that EDR data from those crashes are essential to NHTSA researchers in fully reconstructing crashes and developing more comprehensive safety standards. Public Citizen also petitioned that NHTSA require EDRs to meet survivability standards for crash events at speeds higher than 50 mph. It argued that the final rule as written neglects higher speed, rear impact, and rollover crash tests.

Agency response: We are denying the petitions to shelter crashed vehicles to protect them from environmental conditions for the 10-day survivability period, or to stabilize them at room temperature for 24 hours prior to data download for compliance purposes. NHTSA's experience does not indicate that this should be a problem for compliance. We recognize that during the compliance tests, the vehicle glazing components may become damaged and could expose EDR modules to precipitation. However, this routinely happens to vehicles in the real world. Crashed vehicles stored in a tow yard are typically only minimally protected from environmental conditions, yet NHTSA has been successful in downloading data from nearly 5,000 vehicles to date. We believe that the vast majority of EDRs available today can maintain crash data for 10 days after the event despite adverse weather conditions, and are therefore denying these requests.

Additionally, we are denying the petitions to increase the survivability requirements to include data retrievability after high-speed (above 50 mph) and extreme fire and fluid immersion crashes. As we stated regarding fire and fluid immersion crashes in the final rule,

In the NPRM,[19] we stated that EDR data from such crashes might be useful, but we do not have sufficient information to propose survivability requirements that would address such crashes. We also stated that countermeasures that would ensure the survivability of EDR data in fires might be costly. We have not engaged in research to promulgate survivability requirements for EDR data in these extreme cases. Moreover, we reiterate that the most important benefits of EDR data comes from enabling ACN and composite analysis, and we believe that this final rule will allow researchers to gather sufficient EDR data of statistical significance. We believe that we can meet the objectives of this rulemaking without requiring EDR survivability in extreme crashes.[20]

Public Citizen provided no additional data in its petition to contradict our continued belief that the rule as written will allow researchers to gather enough EDR data of statistical significance. As explained, we believe that requiring such extreme survivability is unnecessary given the objectives of this rulemaking.

As for high speed crashes, the agency has specified that compliance tests will be conducted in conjunction with FMVSS Nos. 208 and 214, which ensures that reliable information about severe crashes will be preserved while minimizing the rule's potential cost impact. We note that the FMVSS No. 208 crash tests are now performed at speeds of up to 56 km/h (35 mph), which represent the cumulative delta–V for 99% of frontal crashes.[21]

We disagree that the final rule neglects rear impact or rollover crashes. The final rule standardizes lateral acceleration, longitudinal acceleration, and vehicle roll angle data elements recorded by EDRs. We note that many manufacturers are already utilizing rollover sensors as part of their side curtain air bag systems. However, not all manufacturers have rollover systems installed in their fleets, or capture rollover data. Therefore, NHTSA does not believe that it is necessary at this time to require EDRs to record, for example, lateral acceleration or vehicle roll angle, at the risk of increasing the costs associated with installing EDRs in vehicles.

As for rear impact crashes, the final rule's definition of trigger threshold uses an absolute value, rather than specifying that deceleration or acceleration should be a trigger.[22] Through vehicle symmetry, longitudinal accelerometers will capture rear impact data the same as frontal impact data. Therefore, we believe that rear impact crashes will be covered just as well as frontal impact crashes.

E. Required Data Elements

1. Peripheral Sensors

AORC petitioned to exclude peripheral sensors from the scope of the final rule. It argued that state-of-the-art EDRs utilize peripheral sensors which may be positioned in the crushable zone of a vehicle and may not survive the entire crash. AORC further argued that it believes the agency intended EDRs to capture ''rigid body'' data for event reconstruction, and that sensors located in the crushable zones of vehicles may not meet the requirements of the final rule.

The Alliance also petitioned to exclude satellite sensors from the scope of the final rule. It stated that satellite sensors may be optimized for functions unrelated to EDRs and crash investigations, and have ranges and tolerances that are radically different than those specified in the final rule. The Alliance argued that accelerometers located in the air bag control modules, closer to the vehicle center of gravity, provide a more accurate indication of actual rigid-body acceleration.

Delphi expressed concern that some data elements in Table I[23] may not be available to the EDR in vehicles with functionally independent, non-interconnected subsystems in severe crash scenarios. Delphi suggested that manufacturers may not include EDRs in vehicles if they are required to record these data elements. Therefore, Delphi petitioned NHTSA to consider an exception to certain Table I elements if those data sets are not available to the EDR.

Agency response: We are granting the petitions with regard to satellite or peripheral sensors, although we believe it is unnecessary to change the regulatory text to make this clarification. In the final rule, the agency expressed its intent for the EDR to capture the rigid body motion of vehicles in crashes. As the petitioners noted, the rigid body motion is best captured by collecting data centrally located in the occupant compartment of the vehicle. Data from satellite or peripheral sensors are not used for these purposes, but rather help the air bag control module and other occupant protection systems to perform optimally. We recognize that sensors located in vehicles' crushable zones may not meet the survivability standards set forth in the final rule, and therefore exclude them from those standards.

However, we are denying Delphi's petition to exempt data elements from Table I if those data sets are not available to the EDR. While NHTSA recognizes that it may save EDR development costs to utilize sensor systems currently in place, we believe that the EDR should be capable of recording data from these systems for the interval times specified in the final rule. The sensor systems identified by Delphi as examples of ''functionally independent, non-interconnected subsystems'' are all data elements of primary interest to NHTSA in determining the pre-crash conditions, and therefore would likely still be available to the EDR. Further, the agency believes that the crash scenarios in which these systems may become disconnected, and thus no longer available to the EDR, would involve extremely severe or rare conditions that are not of interest to the agency at this time for practical reasons. The compliance test procedures specified in the final rule do not recreate such extreme conditions, so data from these subsystems would still be available for compliance purposes.

2. Steering Input and Wheel Angle

AORC stated that the ''steering input'' data element in Table II appears to be equivalent to the ''steering wheel angle'' data element in Table III. AORC additionally petitioned that NHTSA specify that Table II steering input and wheel angle tolerance values are minimums, and that there is no need to truncate the data to fit the Table III format. AORC also requested that the Table III accuracy for steering wheel angle be changed to a percent of the full scale rather than a fixed angle tolerance.

Agency response: We are granting these requests as technical amendments. When the final rule was drafted, NHTSA believed that the steering angle during an event would rarely exceed ±250 degrees from the normal position. AORC explained in subsequent meetings that state-of-the-art EDRs in fact report steering wheel accuracy in terms of a percent of the full scale, and that there is therefore no need to limit the steering input data element to the ±250 degree range. Changing the format of how the steering input data is reported is simply a technical change, and will not substantively change the type of data collected for the agency's research purposes. This response to petitions changes the steering wheel angle accuracy in Table III from ±5 degrees to ±5 percent, and changes the resolution from 5 degrees to 1 percent.

[19] 69 FR 32943 (Jun. 14, 2004).

[20] 71 FR 51024 (Aug. 28, 2006).

[21] *See* Docket No. NHTSA–2006–26555–1, at 60.

[22] A vehicle will decelerate rapidly in a frontal crash, and accelerate rapidly in a rear-impact crash.

[23] *E.g.,* vehicle speed indicated, % engine throttle, and service brake indicator.

The steering input data element of Table II has also been specified under minimum conditions. Additionally, we agree that the terms steering input and steering wheel angle refer to the same thing, and are changing ''steering wheel angle'' in Table III to ''steering input'' for purposes of consistency.

3. Vehicle Roll Angle Accuracy

AORC argued that the typical accuracy for state-of-the-art roll angle sensors is about 7%, and petitioned that the agency measure that accuracy as a percent of the full sensor range rather than as a fixed roll angle. AORC further requested that the EDR should only be required to store the roll angle data element up to the deployment of the air bag, and that the accuracy requirement only apply within the range of the sensors used in the application and at room temperature.

Agency response: We are granting the petition with regard to roll angle accuracy being measured as a percent of the full sensor range, but denying the request that the EDR should only be required to store roll angle data up to the deployment of the air bag and that the accuracy need only apply at room temperature. As discussed above, we are revising the acceleration accuracies in Table III to ±10%. We believe that the inertial sensors utilized in roll angle sensor systems will exhibit similar accuracy traits, and should be measured as a percent of the full range of the sensor.

We believe there is no need to limit collection of roll angle sensor data to the time interval prior to air bag deployment. As footnoted in Table II, the recording interval is a suggested period only. This is because the agency recognized the potential for misalignment of sensors and consequent loss of accuracy due to vehicle damage during a rollover event. NHTSA would not consider it non-compliant if an EDR was unable to collect roll angle sensor data for the full recording interval; therefore, an additional limit to the recording interval is not necessary.

4. Data Element Definitions

(a) Definition of Time to Maximum Delta–V Resultant

AORC stated that it believes that the ''resultant'' maximum delta–V means the magnitude of the vector-added longitudinal and lateral maximum delta–V, and that this value can be processed during the data downloading procedure. AORC petitioned NHTSA to define ''Time, Max Delta–V Resultant'' in § 563.5.

Agency response: We are granting the petition to define ''Time, Maximum Delta–V Resultant,'' and are also defining ''Maximum Delta–V Resultant'' for clarification. These changes clarify the regulatory text and are technical in nature, having no effect on the substantive requirements of the rule. The new definitions will be added to § 563.5 as follows:

Maximum delta–V, resultant means the time-correlated maximum value of the cumulative change in velocity, as recorded by the EDR or processed during data download, along the vector-added longitudinal and lateral axes.

Time, maximum delta–V resultant means the time from crash time zero to the point where the maximum delta–V resultant occurs, as recorded by the EDR or processed during data download.

(b) Clarification of Engine RPM Definitions

The Alliance petitioned the agency to revise the Engine RPM definition to include hybrid vehicles with one or more drive systems. It recommended that the measurement point be moved to the point of entry to the transmission gearbox.

Agency response: We are granting this petition for clarity's sake. For hybrid and other vehicles not entirely powered by internal combustion engines, when the vehicle is running on a power system other than the internal combustion engine, the engine RPM data element would not be utilized. However, as the Alliance noted, the operating speed of the engine or motor of a hybrid vehicle could be measured from the transmission. This clarification is technical in nature and will have no effect on the substantive requirements of the final rule. NHTSA is redefining engine RPM as follows:

Engine RPM means, for vehicles powered by internal combustion engines, the number of revolutions per minute of the main crankshaft of the vehicle's engine, and for vehicles not entirely powered by internal combustion engines, the number of revolutions per minute of the motor shaft at the point at which it enters the vehicle transmission gearbox.

Additionally, since some electric and fuel cell vehicles may not have transmissions at all, for these vehicles, we believe it would be appropriate for the EDR to record output of the vehicle power plant. We do not plan to address this in the regulatory text until a significant number of these vehicles are produced.

(c) Clarification of Readiness Indicator Lamp

The Alliance petitioned NHTSA to either delete the Table I data element ''frontal air bag warning lamp'' or change that data element to ''Readiness Indicator Lamp.'' It suggested that the readiness indicator lamp as described in FMVSS No. 208 (S4.5.2) is the data element that NHTSA intended for EDRs to record. The Alliance argued that the name should be changed for accuracy's sake, since the readiness indicator may illuminate to indicate a malfunction in many parts of the restraint system besides the frontal air bag, including the seat belt pretensioners, the passenger seat weight sensors, the side impact sensors, the curtain air bag modules, and so forth.

AIAM also petitioned to clarify that the ''readiness indicator'' referred to the indicator specified in S4.5.2 of FMVSS No. 208. It recommended that the EDR record the status of the safety system as a whole, and not simply whether or not the readiness indicator lamp is illuminated. AIAM further petitioned that NHTSA confirm that the EDR may record additional safety system readiness information, such as the state of side air bag systems. Nissan supported the AIAM petition.

Agency response: We are granting the petitions on this issue in part. In its meeting with the agency, the Alliance reported that the readiness indicator may also illuminate to indicate a malfunction in the restraint system other than a frontal air bag. For example, the indicator may illuminate if a malfunction is detected in a side curtain air bag, or in a deployable seat belt pretensioner. The agency did not intend to require by the final rule that readiness indicator lamps be used only for the frontal air bag; we agree that it may also indicate malfunctions in other parts of the restraint system.[24] We are adding a clarifying footnote to Table I corresponding to ''Frontal air bag warning lamp, on/off'' as follows:

[2] The frontal air bag warning lamp is the readiness indicator specified in S4.5.2 of FMVSS No. 208.

5. Whether the Suppression Switch ''Auto'' Data Element in Table II Should Be Retained

The Alliance petitioned NHTSA to remove the frontal air bag suppression switch ''auto'' data element from Table II. It argued that the air bag system can be deactivated through numerous methods, and is either on or off at the time of the event (*i.e.,* it would not be ''auto''). The Alliance stated that an EDR that records ''auto'' would not seem to answer an end-user inquiry as to why an air bag did or did not deploy.

[24] We have previously confirmed this by interpretation. See Letter to Michael Love, Porsche Cars North America, Inc., Jul. 30, 1996. *Available at http://isearch.nhtsa.gov/files/PORSCH3.wpd.html* (last accessed Oct. 5, 2007).

Agency response: We are denying this petition. Recording the position of the air bag suppression switch, even if it is in the ''auto'' position, may help the agency in determining whether advanced air bag systems with automatic suppression systems are performing properly. Given that this falls within the scope of the rulemaking's intent, we are not granting this petition. For clarity, we are also making a technical correction to Table III to reflect that the ''auto'' option in the reported data element format be for the frontal air bag suppression switch status.

6. Whether the ''Vehicle Speed Indicated'' Data Element in Table III Is Feasible

AIAM petitioned NHTSA to revise the vehicle speed data element accuracy to ±10 km/h, arguing that the listed accuracy requirement in Table III of the final rule is not feasible. However, AIAM suggested that if the agency's intent was to specify a ±1 km/h resolution for data reporting purposes only, the data element would not be problematic. Nissan supported the AIAM petition.

Agency response: We are denying this petition. While variations in tire and rim sizes may introduce additional inaccuracy in the vehicle speed indicated, we do not believe that the indicated speed will have an inaccuracy as high as ±10 km/h (approximately ±6 mph) outside of wheel slippage due to road surface conditions. However, we agree with the petitioner that the agency's intent was to specify a ±1 km/h resolution for data reporting purposes only. Since revisions are already being made to the title of Table III and to § 563.8(a) to specify that the data element formats are reporting, not recording formats, we are not changing the ''vehicle speed indicated'' data element.

7. Whether Additional Data Elements Should Be Included

Public Citizen noted that the number of required data elements in the final rule was reduced from the number in the NPRM, and reiterated its position stated in its comments to the NPRM that NHTSA should include more required data elements for EDRs. Specifically, Public Citizen requested that NHTSA reconsider data elements listed by the NHTSA-sponsored EDR working group and an IEEE EDR case report. It also cited VIN, crash location, and a date/time stamp data element as elements missing from the agency's final rule.

Agency response: We are denying this petition. We note that the agency discussed at length in the final rule the reasons for its inclusion/exclusion of various data elements, including the ones cited by Public Citizen. See 71 FR at 51011–51016. We continue to believe that the additional elements cited by Public Citizen are not needed for the agency's basic goals for this rulemaking, including crash reconstruction purposes.

We note that the vehicle VIN does not need to be a required data element, since that information is already required to download data from the EDR.[25] The crash location, date and time need not be required elements, since they are included in accident investigation reports. Also, if crash location was required, installation of global positioning sensors would be needed, drastically increasing the costs of EDRs contrary to the agency's intent in this rulemaking. As for our denial of Public Citizen's petition to include all of the data elements listed in the IEEE report, Public Citizen provided no new information or arguments on this subject in its petition for reconsideration than it provided in its comments to the NPRM. In the final rule, we explained that the IEEE data element list was more like a ''data dictionary'' than a list of actually recommended data elements to be recorded. Requiring all of the IEEE-listed data elements would result in redundancy and the unnecessary standardization of many data elements that are unrelated to the purposes of this rulemaking.

F. Lead Time

The Alliance petitioned NHTSA to change the compliance date set of the final rule. It argued that the final rule will likely require manufacturers to redesign EDRs and electrical architectures in virtually all vehicles covered by the regulation, and that it is impractical to implement these product changes across the entire fleet of vehicles by the September 1, 2010 compliance date. The Alliance instead recommended that the agency either delay the effective date or implement a phase-in schedule. It recommended a phase-in schedule of 25% for MY 2011, 50% for MY 2012, 75% for MY 2013, and 100% compliance thereafter.

AIAM also argued that significant redesigns may be required for manufacturers to comply with the final rule, and requested a later compliance date. It recommended a phase-in schedule of 50% for MY 2011, 80% for MY 2012, and 100% for MY 2013, with advance credits for early adoption.

Agency response: At the time of the final rule, we believed that the September 1, 2010 effective date would have little impact on the manufacturers. We note that much of the EDR data available to the agency has been from GM vehicles, and that there are few differences between the data sets collected from those vehicles and the minimum requirements of the final rule.

However, in connection with the petitions for reconsideration, manufacturers have submitted information that even with the reduced number of required data elements included in the final rule, industry will still need to make architecture changes that will extend the lead time beyond September 1, 2010 for new EDRs that comply with the final rule.[26] Because of supply chain constraints, and the three to four year development times needed to install EDRs in a vehicle model production run,[27] the EDRs for vehicle model years 2007 through 2010 have already been finalized and cannot be changed without incurring major redevelopment costs. Specifically, significant changes will be needed to EDR data bus architecture for the industry to be able to comply with the final rule. Some manufacturers reported that they may need to redesign the air bag control module, while some reported that new EDR hardware architectures needed to be developed. We believe that these changes, if necessary, would require manufacturers to recertify their air bag systems, which would require them to invest in development and testing outside of the normal vehicle model run.

We agree that a delay in the rule is needed to prevent manufacturers from incurring significant redesign costs for EDRs. We do not want the final rule to inhibit manufacturers from continuing to include EDRs (in whatever form) in their vehicles between now and the effective date of the final rule. Therefore, we are granting the petitions to delay the effective date until September 1, 2012. We are not granting the petitions with respect to the requests for a phase-in, because we believe that a fixed date of 2012 will be sufficient for manufacturers' needs. For the same reason, and because manufacturers indicated that 2012 would be sufficient,

[25] Similar EDR architecture may be used for different models in a manufacturer's line of vehicles. The VIN must be inputted so that the EDR software can know what vehicle model it is installed in, so that it can interpret the data it has recorded in light of the specific parameters of the vehicle model.

[26] Specifically, AORC, the Alliance, Toyota, and GM.

[27] During the May 15, 2007 SAE Government/Industry Workshop, Ford representatives indicated that development times for EDRs precede vehicle model introductions by at least 3 years.

we are not granting the petition for an effective date of September 1, 2013.

NHTSA believes that the additional two years will both allow the manufacturers time to implement the necessary EDR and air bag architecture changes during the normal model development cycles, and the agency to continue to collect data from vehicles with EDRs that do not meet the full requirements of the final rule, specifically, from manufacturers who are farther from meeting the rule than GM. Moreover, by delaying the effective date of the final rule, the agency will have a better chance of collecting more complete data from EDRs installed in vehicles, since manufacturers can implement some minor changes to the EDR functions in preparation for compliance with the final rule.

G. Whether NHTSA Should Mandate EDRs

Public Citizen reiterated its position from its comments to the NPRM and petitioned NHTSA to mandate EDR installation for all vehicles instead of establishing requirements for voluntarily installed EDRs. It argued that the safety benefits of EDRs far outweigh the financial burden manufacturers would incur with a fleet-wide mandate, and that manufacturers will seek relief from the requirements by not equipping their vehicles with EDRs. Public Citizen further stated that gaps in accident reconstruction knowledge would compromise the agency's ability to draw conclusions from EDR data, and that a mandate for EDRs on all vehicles would avoid those gaps.

Agency Response: NHTSA carefully considered Public Citizen's petition that we mandate installation of EDRs. Public Citizen provided no new information in their petition for reconsideration of the final rule that had not already been provided in their comments to the NPRM. We did not mandate installation of EDRs in new motor vehicles in the final rule, and discussed extensively our reasoning for our decision not to mandate the installation of EDRs in motor vehicles at this time. See 71 FR 51010–11 (Aug. 28, 2006) for a complete discussion of this issue. In summary, although we chose not to mandate EDRs, we recognize the benefits of EDRs in vehicles, and the final rule intends to capture those benefits by helping the agency gather EDR information and building the foundation for ACN. As explained in the final rule, given the current level of voluntary EDR installation, and the expected increases in the extent of voluntary installation, we continue to believe that EDRs will yield data of statistical significance even without being mandated.

Further, manufacturers benefit from having EDRs in their vehicles as well—they collect information on how their vehicles and equipment are performing just as NHTSA does. We believe that this benefit to manufacturers will help keep EDRs in vehicles, as evidenced by the fact that the marketplace appears to be adopting more, not fewer, EDRs. Therefore, we are denying Public Citizen's petition to mandate installation of EDRs in all new vehicles.

H. Public Privacy and Consumer Notification of EDRs

1. Whether NHTSA Should Require a Mechanical Lockout on EDRs

Mr. Thomas Kowalick petitioned NHTSA to require a mechanical lockout on the on-board diagnostic (OBD2) port [28] for the sole use/control of the owner or operator of the vehicle equipped with an EDR. Mr. Kowalick argued that it is possible to protect consumer privacy rights by use of a mechanical lockout system on this port, which is used to download EDR data. In a March 1, 2007 meeting with NHTSA, Mr. Kowalick expressed an additional concern that aftermarket devices are being developed to erase or tamper with EDR data.[29] He noted that the preamble to the final rule stated that if tampering became apparent, NHTSA would reconsider its position on this issue.

Agency response: We are denying this petition. Mr. Kowalick provided information that devices may exist to erase or tamper with EDR data, but he did not provide information that they were actually being used. There are several other ways that EDR tampering will be prevented. First, the EDR download port is installed inside the vehicle, on which the door locks act as a first line of defense to prevent access to the data port. Second, if the vehicle glazing is missing, either due to an accident or forceful entry (assuming a person wants to tamper with someone else's EDR data), the vehicle key is needed to power the vehicle to access the EDR data through the diagnostic port. And third, the final rule requires that event data from crashes in which an air bag has been deployed must be locked and cannot be overwritten. As stated in the final rule, the agency may revisit the issue if EDR tampering indeed becomes a problem.

2. Whether NHTSA Should Require EDR Download Tools To Be Standardized at This Time

Public Citizen petitioned NHTSA to require manufacturers to produce a standardized tool for downloading of EDR data by first responders. It argued that requiring a standardized download tool, rather than simply making a tool available within 90 days of the first sale of vehicles equipped with EDRs, will help reduce costs for emergency personnel and law enforcement officials and prevent manufacturers from providing tools that only download the bare minimum of EDR data. It further argued that without a standardized download tool, manufacturers will be able to maintain sole ownership of the only tools that gain access to all of an EDR's recorded data and ''cover up'' data on defect trends by preventing NHTSA, first responders, crash investigators, and other safety researchers from gaining access to valuable safety data.

Agency response: We are denying this petition. NHTSA has carefully considered the petitioner's comments, and believes that there is not a need to require a single standardized tool at this time. As we stated in the final rule, we expect that tools would be available for several years after the vehicle has been sold, and that newer versions of the download tools would be ''backward-compatible.'' We note that this trend has held true, but believe that the download tools required to read EDRs will become more complex for a period of time as manufacturers increasingly offer EDRs in their vehicle fleets, and develop existing EDRs to meet this rule.

We are continuing to monitor the progress of voluntarily installed EDRs and note that the manufacturers are already working toward a standardized set of downloading tools. We believe that once this standard becomes effective, the downloading process for EDRs will become less complex, and the tools will become easier to use and less expensive. Thus far EDR downloads have provided the information necessary for the agency to accomplish our research and enforcement objectives without the requirement of a standardized download tool. However, if this trend does not continue and download tools become so expensive that the collection of EDR data by NHTSA, first responders, crash investigators, and other safety researchers is hampered by the cost of the tools, the agency will consider taking appropriate action to address the

[28] *See* 61 FR 40940. The OBD2 port standard specifies the type of diagnostic connector and its output pin locations used for monitoring vehicle parameters measured by the on-board computer(s) such as emissions controls. It is typically located on the driver's side of the passenger compartment near the center console.

[29] Docket No. NHTSA–2006–25666–457.

problem. Since there is no evidence that the absence of a standardized download tool is hampering the usefulness of current EDRs, we are denying the petitioner's request.

3. Whether NHTSA Should Require Additional Consumer Notification

Public Citizen petitioned NHTSA to require vehicles equipped with EDRs to have window stickers or labels at the point of sale. It argued that the final rule's requirement for an owner's manual statement regarding the presence and functioning of the EDR is insufficient, because many people do not read the owner's manual before purchasing the vehicle. Additionally, Public Citizen petitioned NHTSA to require consumers to be handed a one-page document with a message similar to the statement in the owner's manual before purchasing the vehicle that notifies them of the presence of the EDR and describes its purpose and capabilities.

Agency response: We are denying these requests. The purpose of the specified statement in the owner's manual is to make the operator aware of the presence, function, and capabilities of the EDR. We believe that a statement in the owner's manual is sufficient for that purpose. The owner's manual is used to provide operators with a variety of types of important information concerning the vehicle, and we believe that there is nothing about the nature of EDRs to necessitate such information to be provided in other locations. We also note that putting this information on a window sticker would tend to dilute the effect of the other information that is already there, such as NHTSA's vehicle safety ratings.

4. Whether EDR Data Should Be Included in the FARS System

Public Citizen asked in its petition that NHTSA include EDR data in the Fatality Analysis Reporting System (FARS), and ensure that a system is in place for all first responders to download and forward data to NHTSA for analysis and inclusion in research databases. It stated that data analysis and presentation are critical to reaping the maximum benefit from EDR data. Public Citizen also recommended that NHTSA should additionally create a new database solely for EDR data to help corroborate conclusions drawn from other databases, and a system in partnership with law enforcement officials to ensure that all available EDR data is retrieved following a crash and sent to the agency for analysis.

Agency response: We appreciate Public Citizen's suggestions but note that the specific ways in which NHTSA may utilize EDR data in its programs is not within the scope of this rulemaking. The current system that NHTSA has been utilizing to integrate EDR data into research and analysis efforts has proven to be most adequate thus far. As the agency maintains and further develops its various safety programs, it will continue to consider ways in which EDR data may be able to be used to improve them.

I. Other Technical Revisions

On April 6, 2007, the agency published a final rule establishing FMVSS No. 126, ''Electronic stability control systems,'' which set performance and equipment requirements for electronic stability control (ESC) systems. As a technical correction, we are amending the definition of ''stability control'' in § 563.5 to read ''means any device that complies with FMVSS No. 126, ''Electronic stability control systems.''

J. Summary of Other Letters to the Docket

The American Automobile Association (AAA) stated that although some states are requiring manufacturers to notify consumers in the vehicle's owner's manual of the presence and functioning of the EDR, under the final rule it may take as long as four years for the notice requirements to transition to the remaining states. It urged the agency to work with manufacturers to include the owner's manual notice as part of the routine schedule of updating and revising the owner's manual.

In response, we note that we have reviewed many owners' manuals as part of this rulemaking. We have found that many have been updated to reflect the fact that EDRs are included on vehicles.

NHTSA also received and reviewed submissions from more than 400 private citizens expressing various concerns, including a belief in some cases that the agency was mandating EDRs and that consumer privacy would not be protected. However, the letters did not generally address the discussions provided by the agency in the final rule concerning privacy and other relevant issues. Moreover, the final rule does not mandate the installation of EDRs but instead standardizes the format of data collected from EDRs voluntarily installed in vehicles.

IV. Rulemaking Analyses and Notices

This rule makes several technical changes to the regulatory text of 49 CFR Part 563, and does not increase the regulatory burden of manufacturers. The agency has discussed the relevant requirements of the Vehicle Safety Act, Executive Order 12866, the Department of Transportation's regulatory policies and procedures, the Regulatory Flexibility Act, Executive Order 13132 (Federalism), Executive Order 12988 (Civil Justice Reform), Executive Order 13045 (Protection of Children from Health and Safety Risks), the Paperwork Reduction Act, the National Technology Transfer and Advancement Act, Unfunded Mandates Reform Act, and the National Environmental Policy Act in the August 2006 final rule cited above. Those discussions are not affected by these technical changes.

Privacy Act

Please note that anyone is able to search the electronic form of all documents received into any of our dockets by the name of the individual submitting the document (or signing the document, if submitted on behalf of an association, business, labor union, etc.). You may review DOT's complete Privacy Act Statement in the **Federal Register** published on April 11, 2000 (Volume 65, Number 70; Pages 19477–78), or you may visit *http://www.dot.gov/privacy.html.*

V. Regulatory Text

List of Subjects in 49 CFR Part 563

Motor vehicle safety, Motor vehicles, Reporting and recordkeeping requirements.

■ In consideration of the foregoing, Part 563 is amended as follows:

PART 563—EVENT DATA RECORDERS

■ 1. The authority citation for Part 563 continues to read as follows:

Authority: 49 U.S.C. 322, 30101, 30111, 30115, 30117, 30166, 30168; delegation of authority at 49 CFR 1.50.

■ 2. Revise § 563.3 to read as follows:

§ 563.3 Application.

This part applies to the following vehicles manufactured on or after September 1, 2012, if they are equipped with an event data recorder: passenger cars, multipurpose passenger vehicles, trucks, and buses with a GVWR of 3,855 kg (8,500 pounds) or less and an unloaded vehicle weight of 2,495 kg (5,500 pounds) or less, except for walk-in van-type trucks or vehicles designed to be sold exclusively to the U.S. Postal Service. This part also applies to manufacturers of those vehicles. However, vehicles manufactured before September 1, 2013 that are manufactured in two or more stages or that are altered (within the meaning of

49 CFR 567.7) after having been previously certified to the Federal motor vehicle safety standards in accordance with Part 567 of this chapter need not meet the requirements of this part.

§ 563.4 [Removed]

■ 3. Remove and reserve § 563.4 to read as follows:

■ 4. Revise § 563.5 to read as follows:

§ 563.5 Definitions.

(a) *Motor vehicle safety standard definitions.* Unless otherwise indicated, all terms that are used in this part and are defined in the Motor Vehicle Safety Standards, Part 571 of this subchapter, are used as defined therein.

(b) *Other definitions.*

ABS activity means the anti-lock brake system (ABS) is actively controlling the vehicle's brakes.

Air bag warning lamp status means whether the warning lamp required by FMVSS No. 208 is on or off.

Capture means the process of buffering EDR data in a temporary, volatile storage medium where it is continuously updated at regular time intervals.

Delta–V, lateral means the cumulative change in velocity, as recorded by the EDR of the vehicle, along the lateral axis, starting from crash time zero and ending at 0.25 seconds, recorded every 0.01 seconds.

Delta–V, longitudinal means the cumulative change in velocity, as recorded by the EDR of the vehicle, along the longitudinal axis, starting from crash time zero and ending at 0.25 seconds, recorded every 0.01 seconds.

Deployment time, frontal air bag means (for both driver and right front passenger) the elapsed time from crash time zero to the deployment command, or for multi-staged air bag systems, the deployment command for the first stage.

Disposal means the deployment command of the second (or higher, if present) stage of a frontal air bag for the purpose of disposing the propellant from the air bag device.

End of event time means the moment at which the cumulative delta–V within a 20 ms time period becomes 0.8 km/h (0.5 mph) or less, or the moment at which the crash detection algorithm of the air bag control unit resets.

Engine RPM means

(1) For vehicles powered by internal combustion engines, the number of revolutions per minute of the main crankshaft of the vehicle's engine; and

(2) For vehicles not entirely powered by internal combustion engines, the number of revolutions per minute of the motor shaft at the point at which it enters the vehicle transmission gearbox.

Engine throttle, percent full means the driver-requested acceleration as measured by the throttle position sensor on the accelerator pedal compared to the fully-depressed position.

Event means a crash or other physical occurrence that causes the trigger threshold to be met or exceeded, or an air bag to be deployed, whichever occurs first.

Event data recorder (EDR) means a device or function in a vehicle that records the vehicle's dynamic time-series data during the time period just prior to a crash event (e.g., vehicle speed vs. time) or during a crash event (e.g., delta–V vs. time), intended for retrieval after the crash event. For the purposes of this definition, the event data do not include audio and video data.

Frontal air bag means an inflatable restraint system that requires no action by vehicle occupants and is used to meet the applicable frontal crash protection requirements of FMVSS No. 208.

Ignition cycle, crash means the number (count) of power cycles applied to the recording device at the time when the crash event occurred since the first use of the EDR.

Ignition cycle download means the number (count) of power cycles applied to the recording device at the time when the data was downloaded since the first use of the EDR.

Lateral acceleration means the component of the vector acceleration of a point in the vehicle in the y-direction. The lateral acceleration is positive from left to right, from the perspective of the driver when seated in the vehicle facing the direction of forward vehicle travel.

Longitudinal acceleration means the component of the vector acceleration of a point in the vehicle in the x-direction. The longitudinal acceleration is positive in the direction of forward vehicle travel.

Maximum delta–V, lateral means the maximum value of the cumulative change in velocity, as recorded by the EDR, of the vehicle along the lateral axis, starting from crash time zero and ending at 0.3 seconds.

Maximum delta–V, longitudinal means the maximum value of the cumulative change in velocity, as recorded by the EDR, of the vehicle along the longitudinal axis, starting from crash time zero and ending at 0.3 seconds.

Maximum delta–V, resultant means the time-correlated maximum value of the cumulative change in velocity, as recorded by the EDR or processed during data download, along the vector-added longitudinal and lateral axes.

Multi-event crash means the occurrence of 2 events, the first and last of which begin not more than 5 seconds apart.

Non-volatile memory means the memory reserved for maintaining recorded EDR data in a semi-permanent fashion. Data recorded in non-volatile memory is retained after loss of power and can be retrieved with EDR data extraction tools and methods.

Normal acceleration means the component of the vector acceleration of a point in the vehicle in the z-direction. The normal acceleration is positive in a downward direction and is zero when the accelerometer is at rest.

Occupant position classification means the classification indicating that the seating posture of a front outboard occupant (both driver and right front passenger) is determined as being out-of-position.

Occupant size classification means, for the right front passenger, the classification of the occupant as an adult and not as a child, and for the driver, the classification of the driver as not being of small stature.

Pretensioner means a device that is activated by a vehicle's crash sensing system and removes slack from a vehicle safety belt system.

Record means the process of saving captured EDR data into a non-volatile device for subsequent retrieval.

Safety belt status means the feedback from the safety system that is used to determine that an occupant's safety belt (for both driver and right front passenger) is fastened or unfastened.

Seat track position switch, foremost, status means the status of the switch that is installed to detect whether the seat is moved to a forward position.

Service brake, on and off means the status of the device that is installed in or connected to the brake pedal system to detect whether the pedal was pressed. The device can include the brake pedal switch or other driver-operated service brake control.

Side air bag means any inflatable occupant restraint device that is mounted to the seat or side structure of the vehicle interior, and that is designed to deploy in a side impact crash to help mitigate occupant injury and/or ejection.

Side curtain/tube air bag means any inflatable occupant restraint device that is mounted to the side structure of the vehicle interior, and that is designed to deploy in a side impact crash or rollover and to help mitigate occupant injury and/or ejection.

Speed, vehicle indicated means the vehicle speed indicated by a manufacturer-designated subsystem

designed to indicate the vehicle's ground travel speed during vehicle operation.

Stability control means any device that complies with FMVSS No. 126, ''Electronic stability control systems.''

Steering input means the angular displacement of the steering wheel measured from the straight-ahead position (position corresponding to zero average steer angle of a pair of steered wheels).

Suppression switch status means the status of the switch indicating whether an air bag suppression system is on or off.

Time from event 1 to 2 means the elapsed time from time zero of the first event to time zero of the second event.

Time, maximum delta–V, lateral means the time from crash time zero to the point where the maximum value of the cumulative change in velocity is found, as recorded by the EDR, along the lateral axis.

Time, maximum delta–V, longitudinal means the time from crash time zero to the point where the maximum value of the cumulative change in velocity is found, as recorded by the EDR, along the longitudinal axis.

Time, maximum delta–V, resultant means the time from crash time zero to the point where the maximum delta–V resultant occurs, as recorded by the EDR or processed during data download.

Time to deploy, pretensioner means the elapsed time from crash time zero to the deployment command for the safety belt pretensioner (for both driver and right front passenger).

Time to deploy, side air bag/curtain means the elapsed time from crash time zero to the deployment command for a side air bag or a side curtain/tube air bag (for both driver and right front passenger).

Time to first stage means the elapsed time between time zero and the time when the first stage of a frontal air bag is commanded to fire.

Time to n^{th} stage means the elapsed time from crash time zero to the deployment command for the nth stage of a frontal air bag (for both driver and right front passenger).

Time zero means whichever of the following occurs first:

(1) For systems with ''wake-up'' air bag control systems, the time at which the occupant restraint control algorithm is activated; or

(2) For continuously running algorithms,

(i) The first point in the interval where a longitudinal cumulative delta–V of over 0.8 km/h (0.5 mph) is reached within a 20 ms time period; or

(ii) For vehicles that record ''delta–V, lateral,'' the first point in the interval where a lateral cumulative delta–V of over 0.8 km/h (0.5 mph) is reached within a 5 ms time period; or

(3) An air bag deployment.

Trigger threshold means a change in vehicle velocity, in the longitudinal direction, that equals or exceeds 8 km/h within a 150 ms interval. For vehicles that record ''delta–V, lateral,'' trigger threshold means a change in vehicle velocity in either the longitudinal or lateral direction that equals or exceeds 8 km/h within a 150 ms interval.

Vehicle roll angle means the angle between the vehicle's y-axis and the ground plane.

Volatile memory means the memory reserved for buffering of captured EDR data. The memory is not capable of retaining data in a semi-permanent fashion. Data captured in volatile memory is continuously overwritten and is not retained in the event of a power loss or retrievable with EDR data extraction tools.

X-direction means in the direction of the vehicle's X-axis, which is parallel to the vehicle's longitudinal centerline. The X-direction is positive in the direction of forward vehicle travel.

Y-direction means in the direction of the vehicle's Y-axis, which is perpendicular to its X-axis and in the same horizontal plane as that axis. The Y-direction is positive from left to right, from the perspective of the driver when seated in the vehicle facing the direction of forward vehicle travel.

Z-direction means in the direction of the vehicle's Z-axis, which is perpendicular to the X- and Y-axes. The Z-direction is positive in a downward direction.

■ 5. Revise § 563.7 to read as follows:

§ 563.7 Data elements.

(a) *Data elements required for all vehicles.* Each vehicle equipped with an EDR must record all of the data elements listed in Table I, during the interval/time and at the sample rate specified in that table.

TABLE I.—DATA ELEMENTS REQUIRED FOR ALL VEHICLES EQUIPPED WITH AN EDR

Data element	Recording interval/time[1] (relative to time zero)	Data sample rate (samples per second)
Delta–V, longitudinal	0 to 250 ms, or 0 to End of Event Time plus 30 ms, whichever is shorter.	100
Maximum delta–V, longitudinal	0 to 300 ms, or 0 to End of Event Time plus 30 ms, whichever is shorter.	N/A
Time, maximum delta–V	0 to 300 ms, or 0 to End of Event Time plus 30 ms, whichever is shorter.	N/A
Speed, vehicle indicated	−5.0 to 0 sec	2
Engine throttle, % full (or accelerator pedal, % full)	−5.0 to 0 sec	2
Service brake, on/off	−5.0 to 0 sec	2
Ignition cycle, crash	−1.0 sec	N/A
Ignition cycle, download	At time of download[3]	N/A
Safety belt status, driver	−1.0 sec	N/A
Frontal air bag warning lamp, on/off[2]	−1.0 sec	N/A
Frontal air bag deployment, time to deploy, in the case of a single stage air bag, or time to first stage deployment, in the case of a multi-stage air bag, driver.	Event	N/A
Frontal air bag deployment, time to deploy, in the case of a single stage air bag, or time to first stage deployment, in the case of a multi-stage air bag, right front passenger.	Event	N/A
Multi-event, number of events (1, 2)	Event	N/A
Time from event 1 to 2	As needed	N/A

TABLE I.—DATA ELEMENTS REQUIRED FOR ALL VEHICLES EQUIPPED WITH AN EDR—Continued

Data element	Recording interval/time[1] (relative to time zero)	Data sample rate (samples per second)
Complete file recorded (yes, no)	Following other data	N/A

[1]Pre-crash data and crash data are asynchronous. The sample time accuracy requirement for pre-crash time is −0.1 to 1.0 sec (e.g., T = −1 would need to occur between −1.1 and 0 seconds).
[2]The frontal air bag warning lamp is the readiness indicator specified in S4.5.2 of FMVSS No. 208.
[3]The ignition cycle at the time of download is not required to be recorded at the time of the crash, but shall be reported during the download process.

(b) *Data elements required for vehicles under specified conditions.* Each vehicle equipped with an EDR must record each of the data elements listed in column 1 of Table II for which the vehicle meets the condition specified in column 2 of that table, during the interval/time and at the sample rate specified in that table.

TABLE II.—DATA ELEMENTS REQUIRED FOR VEHICLES UNDER SPECIFIED MINIMUM CONDITIONS

Data element name	Condition for requirement	Recording interval/time [1] (relative to time zero)	Data sample rate (per second)
Lateral acceleration	If recorded [2]	0 to 250 ms	100
Longitudinal acceleration	If recorded	0 to 250 ms	100
Normal acceleration	If recorded	0 to 250 ms	100
Delta–V, lateral	If recorded	0 to 250 ms, or 0 to End of Event Time plus 30 ms, whichever is shorter.	100
Maximum delta–V, lateral	If recorded	0 to 300 ms, or 0 to End of Event Time plus 30 ms, whichever is shorter.	N/A
Time, maximum delta–V, lateral	If recorded	0 to 300 ms, or 0 to End of Event Time plus 30 ms, whichever is shorter.	N/A
Time, maximum delta–V, resultant	If recorded	0 to 300 ms, or 0 to End of Event Time plus 30 ms, whichever is shorter.	N/A
Engine RPM	If recorded	–50 to 0 sec	2
Vehicle roll angle	If recorded	–10 up to 50 sec [3]	10
ABS activity (engaged, non-engaged)	If recorded	–50 to 0 sec	2
Stability control (on, off, engaged)	If recorded	–50 to 0 sec	2
Steering input	If recorded	–50 to 0 sec	2
Safety belt status, right front passenger (buckled, not buckled).	If recorded	–10 sec	N/A
Frontal air bag suppression switch status, right front passenger (on, off, or auto).	If recorded	–10 sec	N/A
Frontal air bag deployment, time to nth stage, driver [4].	If equipped with a driver's frontal air bag with a multi-stage inflator.	Event	N/A
Frontal air bag deployment, time to nth stage, right front passenger [4].	If equipped with a right front passenger's frontal air bag with a multi-stage inflator.	Event	N/A
Frontal air bag deployment, nth stage disposal, driver, Y/N (whether the nth stage deployment was for occupant restraint or propellant disposal purposes).	If recorded	Event	N/A
Frontal air bag deployment, nth stage disposal, right front passenger, Y/N (whether the nth stage deployment was for occupant restraint or propellant disposal purposes).	If recorded	Event	N/A
Side air bag deployment, time to deploy, driver.	If recorded	Event	N/A
Side air bag deployment, time to deploy, right front passenger.	If recorded	Event	N/A
Side curtain/tube air bag deployment, time to deploy, driver side.	If recorded	Event	N/A
Side curtain/tube air bag deployment, time to deploy, right side.	If recorded	Event	N/A
Pretensioner deployment, time to fire, driver.	If recorded	Event	N/A
Pretensioner deployment, time to fire, right front passenger.	If recorded	Event	N/A
Seat track position switch, foremost, status, driver.	If recorded	–10 sec	N/A

TABLE II.—DATA ELEMENTS REQUIRED FOR VEHICLES UNDER SPECIFIED MINIMUM CONDITIONS—Continued

Data element name	Condition for requirement	Recording interval/time [1] (relative to time zero)	Data sample rate (per second)
Seat track position switch, foremost, right front passenger.	If recorded	–10 sec	N/A
Occupant size classification, driver	If recorded	–10 sec	N/A
Occupant size classification, right front passenger.	If recorded	–10 sec	N/A
Occupant position classification, driver	If recorded	–10 sec	N/A
Occupant position classification, right front passenger.	If recorded	–10 sec	N/A

[1] Pre-crash data and crash data are asynchronous The sample time accuracy requirement for pre-crash time is –01 to 10 sec (e.g., T = –1 would need to occur between –11 and 0 seconds)
[2] "If recorded" means if the data is recorded in non-volatile memory for the purpose of subsequent downloading
[3] "Vehicle roll angle" may be recorded in any time duration –10 to 50 seconds is suggested
[4] List this element n—1 times, once for each stage of a multi-stage air bag system

■ 6. Revise § 5638 to read as follows:

§ 563.8 Data format

(a) The data elements listed in Tables I and II, as applicable, must be reported in accordance with the range, accuracy, and resolution specified in Table III

TABLE III.—REPORTED DATA ELEMENT FORMAT

Data element	Minimum range	Accuracy	Resolution
Lateral acceleration	−5 g to +5 g	±10%	0.5 g.
Longitudinal acceleration	−50 g to +50 g	±10%	0.5 g.
Normal acceleration	−5 g to +5 g	±10%	0.5 g.
Longitudinal delta–V	−100 km/h to + 100 km/h	±10%	1 km/h.
Lateral delta–V	−100 km/h to + 100 km/h	±10%	1 km/h.
Maximum delta–V, longitudinal	−100 km/h to + 100 km/h	±10%	1 km/h.
Maximum delta–V, lateral	−100 km/h to + 100 km/h	±10%	1 km/h.
Time, maximum delta–V, longitudinal.	0—300 ms, or 0—End of Event Time plus 30 ms, whichever is shorter.	±3 ms	2.5 ms.
Time, maximum delta–V, lateral	0—300 ms, or 0—End of Event Time plus 30 ms, whichever is shorter.	±3 ms	2.5 ms.
Time, maximum delta–V, resultant	0—300 ms, or 0—End of Event Time plus 30 ms, whichever is shorter.	±3 ms	2.5 ms.
Vehicle roll angle	−1080 deg to + 1080 deg	±10%	10 deg.
Speed, vehicle indicated	0 km/h to 200 km/h	±1 km/h	1 km/h.
Engine throttle, percent full (accelerator pedal percent full).	0 to 100%	±5%	1%.
Engine RPM	0 to 10,000 rpm	± 100 rpm.	100 rpm.
Service brake (on, off)	On and Off	N/A	On and Off.
ABS activity	On and Off	N/A	On and Off.
Stability control (on, off, engaged)	On, Off, Engaged	N/A	On, Off, Engaged.
Steering input	−250 deg CW to + 250 deg CCW.	±5%	1%.
Ignition cycle, crash	0 to 60,000	±1 cycle	1 cycle.
Ignition cycle, download	0 to 60,000	±1 cycle	1 cycle.
Safety belt status, driver	On or Off	N/A	On or Off.
Safety belt status, right front passenger.	On or Off	N/A	On or Off.
Frontal air bag warning lamp (on, off).	On or Off	N/A	On or Off.
Frontal air bag suppression switch status.	On, Off, or Auto	N/A	On, Off, or Auto.
Frontal air bag deployment, time to deploy/first stage, driver.	0 to 250 ms	±2 ms	1 ms.
Frontal air bag deployment, time to deploy/first stage, right front passenger.	0 to 250 ms	±2 ms	1 ms.
Frontal air bag deployment, time to n^{th} stage, driver.	0 to 250 ms	±2 ms	1 ms.
Frontal air bag deployment, time to n^{th} stage, right front passenger.	0 to 250 ms	±2 ms	1 ms.
Frontal air bag deployment, n^{th} stage disposal, driver (y/n).	Yes or No	N/A	Yes or No.

TABLE III.—REPORTED DATA ELEMENT FORMAT—Continued

Data element	Minimum range	Accuracy	Resolution
Frontal air bag deployment, nth stage disposal, right front passenger (y/n).	Yes or No	N/A	Yes or No.
Side air bag deployment, time to deploy, driver.	0 to 250 ms	±2 ms	1 ms.
Side air bag deployment, time to deploy, right front passenger.	0 to 250 ms	±2 ms	1 ms.
Side curtain/tube air bag deployment, time to deploy, driver side.	0 to 250 ms	±2 ms	1 ms.
Side curtain/tube air bag deployment, time to deploy, right side.	0 to 250 ms	±2 ms	1 ms.
Pretensioner deployment, time to fire, driver.	0 to 250 ms	±2 ms	1 ms.
Pretensioner deployment, time to fire, right front passenger.	0 to 250 ms	±2 ms	1 ms.
Seat track position switch, foremost, status, driver.	Yes or No	N/A	Yes or No.
Seat track position switch, foremost, status, right front passenger.	Yes or No	N/A	Yes or No.
Occupant size driver occupant 5th female size (y/n).	Yes or No	N/A	Yes or No.
Occupant position size right front passenger child (y/n).	Yes or No	N/A	Yes or No.
Occupant position classification, driver oop (y/n).	Yes or No	N/A	Yes or No.
Occupant position classification, right front passenger oop (y/n).	Yes or No	N/A	Yes or No.
Multi-event, number of events (1, 2).	1 or 2	N/A	1 or 2.
Time from event 1 to 2	0 to 5.0 sec	0.1 sec	0.1 sec.
Complete file recorded (y/n)	Yes or No	N/A	Yes or No.

(b) Acceleration Time-History data and format: the longitudinal, lateral, and normal acceleration time-history data, as applicable, must be filtered either during the recording phase or during the data downloading phase to include:

(1) The Time Step (TS) that is the inverse of the sampling frequency of the acceleration data and which has units of seconds;

(2) The number of the first point (NFP), which is an integer that when multiplied by the TS equals the time relative to time zero of the first acceleration data point;

(3) The number of the last point (NLP), which is an integer that when multiplied by the TS equals the time relative to time zero of the last acceleration data point; and

(4) NLP—NFP + 1 acceleration values sequentially beginning with the acceleration at time NFP * TS and continue sampling the acceleration at TS increments in time until the time NLP * TS is reached.

■ 7. Revise § 563.9 to read as follows:

§ 563.9 Data capture.

The EDR must capture and record the data elements for events in accordance with the following conditions and circumstances:

(a) In a frontal or side air bag deployment crash, capture and record the current deployment data, up to two events. The memory for each air bag deployment event must be locked to prevent any future overwriting of these data.

(b) In a deployment event that involves another type of deployable restraint (e.g., pretensioners, knee bolsters, pedestrian protection, etc.), or in a non-deployment event that meets the trigger threshold, capture and record the current non-deployment data, up to two events, subject to the following conditions:

(1) If an EDR non-volatile memory buffer void of previous-event data is available, the current non-deployment event data is recorded in the buffer.

(2) If an EDR non-volatile memory buffer void of previous-event data is not available, the manufacturer may choose either to overwrite the previous non-deployment event data with the current non-deployment event data, or not to record the current non-deployment event data.

(3) EDR buffers containing previous deployment-event data must not be overwritten by the current non-deployment event data.

Issued: January 8, 2008.

Nicole R. Nason,

Administrator.

[FR Doc. E8–407 Filed 1–11–08; 8:45 am]

BILLING CODE 4910–59–P

DEPARTMENT OF COMMERCE

National Oceanic and Atmospheric Administration

50 CFR Part 648

[Docket No. 070227048–7091–02]

RIN 0648–XE82

Magnuson-Stevens Fishery Conservation and Management Act Provisions; Fisheries of the Northeastern United States; Northeast Multispecies Fishery; Modification of the Yellowtail Flounder Landing Limit for the U.S./Canada Management Area

AGENCY: National Marine Fisheries Service (NMFS), National Oceanic and Atmospheric Administration (NOAA), Commerce.

ACTION: Temporary rule; trip limit change.

SUMMARY: NMFS announces that the Administrator, Northeast (NE) Region,

CDR Vehicle List — Version 3.0.1

Important Information about Vehicle Coverage

BOSCH

Bosch takes all reasonable actions to ensure the CDR System supports production vehicles (US and Canada) as listed in the CDR product documentation. However, due to (but not limited to) the availability of information at the time the product is developed, Bosch cannot guarantee 100% coverage of the supported vehicles listed in the documentation.

In the event that a vehicle coverage exception is found, Bosch Tech support will document the issue and Bosch will attempt to resolve it in a future release.

If you are experiencing trouble retrieving event data from any of the vehicles listed in this help file please contact technical support for further assistance.

Chrysler Vehicles

2004

Make	Model
Dodge	Durango[2,4]

2005

Make	Model
Dodge	Durango[2,4]

2006

Make	Model
Chrysler	300[5]
Dodge	Charger[5]
Dodge	Durango[2, 4]
Dodge	Magnum[5]
Dodge	Ram Cab Chassis[4]
Dodge	Ram Pickup Heavy Duty[4]
Dodge	Ram Pickup Light Duty[4]
Jeep	Commander[5]
Jeep	Grand Cherokee[5]

2007

Make	Model
Chrysler	300[5]
Chrysler	Aspen[4]
Chrysler	Pacifica[5]
Chrysler	PT Cruiser[5]
Chrysler	Sebring[4]
Dodge	Caliber[4]
Dodge	Charger[5]
Dodge	Dakota[5]
Dodge	Durango[2, 4]
Dodge	Magnum[5]
Dodge	Nitro[4]
Dodge	Ram Cab Chassis Heavy Duty[4]

1. For console mounted shifter, center tunnel before or aft of shifter. For column mounter shifter, center stack.
2. Only vehicles equipped with side airbags can be read out by the CDR tool.
3. For 2005–2006, some Chrylser 300, Dodge Magnum, Dodge Charger, Dodge Dakota, Jeep Grand Cherokee, and Jeep Commander models may contain EDR data that cannot be read by the CDR tool.
4. Crash data is recorded for ***frontal depoloyments only*** on these vehicles.
5. When downloading these modules using the provided CDR cable, plug the cable into the CDR interface module, apply power and wait at least 1 minute after power is applied before collecting data. Failure to do so may cause an error during download.

2007 (cont.)

Make	Model
Dodge	Ram Cab Chassis Medium Duty[4]
Dodge	Ram Pickup Heavy Duty[4]
Dodge	Ram Pickup Light Duty[4]
Jeep	Commander[5]
Jeep	Compass[4]
Jeep	Grand Cherokee[5]
Jeep	Patriot[4]
Jeep	Wrangler[4]

2008

Make	Model
Chrysler	Aspen
Chrysler	Pacifica[5]
Chrysler	PT Cruiser[5]
Chrysler	Sebring
Dodge	Avenger
Dodge	Caliber
Dodge	Durango[2, 4]
Dodge	Nitro
Dodge	Ram Cab Chassis Heavy Duty
Dodge	Ram Cab Chassis Medium Duty
Dodge	Ram Pickup Heavy Duty
Dodge	Ram Pickup Light Duty
Jeep	Compass
Jeep	Liberty/Cherokee
Jeep	Patriot
Jeep	Wrangler

Ford Vehicles

2001

Make	Model
Ford	Crown Victoria
Ford	Escape
Ford	Escort
Ford	Excursion
Ford	Expedition
Ford	Explorer Sport (2 door)
Ford	Explorer Sport Trac (pickup)
Ford	F150
Ford	F250 Super Duty

2001 (cont.)

Make	Model
Ford	F350 Super Duty
Ford	F450 Super Duty
Ford	F550 Super Duty
Ford	Mustang
Ford	Ranger
Ford	Taurus
Ford	Windstar
Lincoln	Continental
Lincoln	LS
Lincoln	Navigator
Lincoln	Town Car
Mercury	Grand Marquis
Mercury	Sable

2002

Make	Model
Ford	Crown Victoria
Ford	Escape
Ford	Escort
Ford	Excursion
Ford	Expedition
Ford	Explorer Sport (2 door)
Ford	Explorer Sport Trac (pickup)
Ford	F150
Ford	F250 Super Duty
Ford	F350 Super Duty
Ford	F450 Super Duty
Ford	F550 Super Duty
Ford	Mustang
Ford	Ranger
Ford	Thunderbird
Ford	Windstar
Lincoln	Continental
Lincoln	LS
Lincoln	Navigator
Lincoln	Town Car
Mercury	Grand Marquis

1. For console mounted shifter, center tunnel before or aft of shifter. For column mounter shifter, center stack.
2. Only vehicles equipped with side airbags can be read out by the CDR tool.
3. For 2005–2006, some Chrylser 300, Dodge Magnum, Dodge Charger, Dodge Dakota, Jeep Grand Cherokee, and Jeep Commander models may contain EDR data that cannot be read by the CDR tool.
4. Crash data is recorded for ***frontal depoloyments only*** on these vehicles.
5. When downloading these modules using the provided CDR cable, plug the cable into the CDR interface module, apply power and wait at least 1 minute after power is applied before collecting data. Failure to do so may cause an error during download.

2003 Ford

Make	Model	Module
Ford	Crown Victoria	ACM
Ford	Escape	ACM
Ford	Excursion	ACM
Ford	F150	ACM
Ford	F250 Super Duty	ACM
Ford	F350 Super Duty	ACM
Ford	F450 Super Duty	ACM
Ford	F550 Super Duty	ACM
Ford	Mustang	ACM
Ford	Ranger	ACM
Ford	Thunderbird	ACM
		PCM
Ford	Windstar	ACM
Lincoln	LS	PCM
Lincoln	Town Car	ACM
Mercury	Grand Marquis	ACM
Mercury	Marauder	ACM

2004

Make	Model	Module
Ford	Crown Victoria	ACM
Ford	Escape	ACM
Ford	Excursion	ACM
Ford	Explorer	PCM
Ford	F150 (Heritage)	ACM
Ford	F150 (except Heritage)	PCM
Ford	F250 Super Duty	ACM
Ford	F350 Super Duty	ACM
Ford	F450 Super Duty	ACM
Ford	F550 Super Duty	ACM
Ford	Mustang	ACM
Ford	Ranger	ACM
Ford	Thunderbird	ACM
		PCM
Lincoln	LS	PCM
Lincoln	Town Car	ACM
Mercury	Grand Marquis	ACM
Mercury	Marauder	ACM
Mercury	Mountaineer	PCM

2005

Make	Model	Module
Ford	500	PCM
Ford	Crown Victoria	ACM
		PCM
Ford	Econoline	PCM
Ford	Excursion	ACM
Ford	Expedition	PCM
Ford	Explorer	PCM
Ford	F150	PCM
Ford	F250 Super Duty	ACM
		PCM
Ford	F350 Super Duty	ACM
		PCM
Ford	F450 Super Duty	ACM
		PCM
Ford	F550 Super Duty	ACM
		PCM
Ford	Freestyle	PCM
Ford	Mustang	PCM
Ford	Ranger	ACM
Ford	Thunderbird	ACM
		PCM
Lincoln	LS	PCM
Lincoln	Navigator	PCM
Lincoln	Town Car	ACM
		PCM
Mercury	Grand Marquis	ACM
		PCM
Mercury	Montego	PCM
Mercury	Mountaineer	PCM

2006

Make	Model	Module
Ford	500	PCM
Ford	Crown Victoria	ACM
		PCM
Ford	Econoline	PCM
Ford	Expedition	PCM
Ford	Explorer	PCM
Ford	F150	PCM

2006 Ford (cont.)

Make	Model	Module
Ford	F250 Super Duty	ACM
		PCM
Ford	F350 Super Duty	ACM
		PCM
Ford	F450 Super Duty	ACM
		PCM
Ford	F550 Super Duty	ACM
		PCM
Ford	Freestyle	PCM
Ford	Fusion	PCM
Ford	Mark LT	PCM
Ford	Mustang	PCM
Ford	Ranger	ACM
Lincoln	LS	PCM
Lincoln	Navigator	PCM
Lincoln	Town Car	ACM
		PCM
Lincoln	Zephyr	PCM
Mercury	Grand Marquis	ACM
		PCM
Mercury	Milan	PCM
Mercury	Montego	PCM
Mercury	Mountaineer	PCM

2007

Make	Model	
Ford	500	PCM
Ford	Crown Victoria	ACM
		PCM
Ford	Econoline	PCM
Ford	Edge	PCM
Ford	Expedition	PCM
Ford	Explorer	PCM
Ford	Explorer Sport Trac	PCM
Ford	F150	PCM
Ford	F250 Super Duty	PCM
Ford	F350 Super Duty	PCM
Ford	F450 Super Duty	PCM
Ford	F550 Super Duty	PCM
Ford	Freestyle	PCM
Ford	Fusion	PCM
Ford	Mustang	PCM

2007 (cont.)

Make	Model	
Lincoln	MKX	PCM
Lincoln	MKZ 07	PCM
Lincoln	Navigator	PCM
Lincoln	Town Car	ACM
		PCM
Mercury	Grand Marquis	ACM
		PCM
Mercury	Milan	PCM
Mercury	Montego	PCM
Mercury	Mountaineer	PCM

GM Vehicles

1994

Make	Model
Buick	Commercial
Buick	Roadmaster
Cadillac	Commercial
Cadillac	Fleetwood
Chevrolet	Caprice
Chevrolet	Commercial
Pontiac	Grand Prix

1995

Make	Model
Buick	Commercial
Buick	Le Sabre
Buick	Park Avenue
Buick	Regal
Buick	Roadmaster
Cadillac	Commercial
Cadillac	Concours
Cadillac	Deville
Cadillac	Eldorado
Cadillac	Fleetwood
Cadillac	Seville
Chevrolet	Caprice
Chevrolet	Impala
Chevrolet	Lumina
Chevrolet	Metro
Chevrolet	Monte Carlo
Oldsmobile	Cutlass Supreme
Oldsmobile	Eighty Eight
Oldsmobile	Ninety Eight

1995 GM (cont.)

Make	Model
Pontiac	Bonneville
Pontiac	Grand Prix
Pontiac	Firefly
Saturn	All Models

1996

Make	Model
Buick	Commercial
Buick	Le Sabre
Buick	Park Avenue
Buick	Regal
Buick	Riviera
Buick	Roadmaster
Buick	Skylark
Cadillac	Commercial
Cadillac	Concours
Cadillac	Deville
Cadillac	Eldorado
Cadillac	Fleetwood
Cadillac	Seville
Chevrolet	Astro
Chevrolet	Camaro
Chevrolet	Caprice
Chevrolet	Cavalier
Chevrolet	Express
Chevrolet	Impala
Chevrolet	Lumina
Chevrolet	Metro
Chevrolet	Monte Carlo
Geo	Tracker
GMC	Safari
GMC	Savana
Oldsmobile	Achieva
Oldsmobile	Aurora
Oldsmobile	Cutlass Supreme
Oldsmobile	Eighty Eight
Oldsmobile	Ninety Eight
Pontiac	Bonneville
Pontiac	Firebird
Pontiac	Firefly
Pontiac	Grand AM
Pontiac	Grand Prix

1996 (cont.)

Make	Model
Pontiac	Sunfire
Saturn	All models

1997

Make	Model
Buick	Century
Buick	LeSabre
Buick	Park Avenue
Buick	Regal
Buick	Riviera
Buick	Skylark
Cadillac	Commercial
Cadillac	Concours
Cadillac	Deville
Cadillac	Eldorado
Cadillac	Seville
Chevrolet	Astro
Chevrolet	Camaro
Chevrolet	Cavalier
Chevrolet	Corvette
Chevrolet	Express
Chevrolet	Lumina
Chevrolet	Malibu
Chevrolet	Metro
Chevrolet	Monte Carlo
Chevrolet	Silverado
Chevrolet	Suburban
Chevrolet	Tahoe
Chevrolet	Venture
Geo	Tracker
GM1	EV1
GMC	Safari
GMC	Savana
GMC	Sierra
GMC	Suburban
GMC	Yukon
Oldsmobile	Achieva
Oldsmobile	Aurora
Oldsmobile	Cutlass Supreme
Oldsmobile	Eighty Eight
Oldsmobile	Regency
Oldsmobile	Silhouette

1997 GM (cont.)

Make	Model
Pontiac	Bonneville
Pontiac	Firebird
Pontiac	Firefly
Pontiac	Grand AM
Pontiac	Grand Prix
Pontiac	Sunfire
Pontiac	Trans Sport
Saturn	All models

1998

Make	Model
Buick	Century
Buick	LeSabre
Buick	Park Avenue
Buick	Regal
Buick	Riviera
Buick	Skylark
Cadillac	Commercial
Cadillac	Deville
Cadillac	Eldorado
Cadillac	Seville
Chevrolet	Astro
Chevrolet	Blazer
Chevrolet	Camaro
Chevrolet	Cavalier
Chevrolet	Corvette
Chevrolet	Express
Chevrolet	Lumina
Chevrolet	Malibu
Chevrolet	Metro
Chevrolet	Monte Carlo
Chevrolet	S10
Chevrolet	S10 electric
Chevrolet	Silverado
Chevrolet	Suburban
Chevrolet	Tahoe
Chevrolet	Tracker
Chevrolet	Venture
GMC	Jimmy
GMC	Safari
GMC	Savana
GMC	Sierra
GMC	Sonoma

1998 (cont.)

Make	Model
GMC	Suburban
GMC	Yukon
Oldsmobile	Achieva
Oldsmobile	Aurora
Oldsmobile	Bravada
Oldsmobile	Cutlass
Oldsmobile	Eighty Eight
Oldsmobile	Intrigue
Oldsmobile	Regency
Oldsmobile	Silhouette
Pontiac	Bonneville
Pontiac	Firebird
Pontiac	Firefly
Pontiac	Grand AM
Pontiac	Grand Prix
Pontiac	Sunfire
Pontiac	Trans Sport
Saturn	All models

1999

Make	Model
Buick	Century
Buick	Le Sabre
Buick	Park Avenue
Buick	Regal
Buick	Riveria
Cadillac	Commercial
Cadillac	Deville
Cadillac	Eldorado
Cadillac	Escalade
Cadillac	Seville
Chevrolet	Astro
Chevrolet	Blazer
Chevrolet	C/K pickup
Chevrolet	Camaro
Chevrolet	Cavalier
Chevrolet	Corvette
Chevrolet	Express
Chevrolet	Lumina
Chevrolet	Malibu
Chevrolet	Metro
Chevrolet	Monte Carlo
Chevrolet	S10

1999 GM (cont.)

Make	Model
Chevrolet	S10 Electric
Chevrolet	Silverado
Chevrolet	Suburban
Chevrolet	Tahoe
Chevrolet	Tracker
Chevrolet	Venture
GM1	EV1
GMC	C/K pickup
GMC	Jimmy
GMC	Safari
GMC	Savana
GMC	Sierra
GMC	Sonoma
GMC	Suburban
GMC	Yukon
Oldsmobile	Alero
Oldsmobile	Aurora
Oldsmobile	Bravada
Oldsmobile	Cutlass
Oldsmobile	Eighty Eight
Oldsmobile	Intrigue
Oldsmobile	Silhouette
Pontiac	Bonneville
Pontiac	Firebird
Pontiac	Firefly
Pontiac	Grand AM
Pontiac	Grand Prix
Pontiac	Sunfire
Pontiac	Trans Sport
Saturn	All Models

2000

Make	Model
Buick	Century
Buick	LeSabre
Buick	Park Avenue
Buick	Regal
Cadillac	Commercial
Cadillac	Deville
Cadillac	Eldorado
Cadillac	Escalade

2000 (cont.)

Make	Model
Cadillac	Seville
Chevrolet	Astro
Chevrolet	Blazer
Chevrolet	C/K pickup
Chevrolet	Camaro
Chevrolet	Cavalier
Chevrolet	Corvette
Chevrolet	Express
Chevrolet	Impala
Chevrolet	Lumina
Chevrolet	Malibu
Chevrolet	Metro
Chevrolet	Monte Carlo
Chevrolet	S10
Chevrolet	Silverado
Chevrolet	Suburban
Chevrolet	Tahoe
Chevrolet	Tracker
Chevrolet	Venture
GMC	C/K pickup
GMC	Jimmy
GMC	Safari
GMC	Savana
GMC	Sierra
GMC	Sonoma
GMC	Suburban
GMC	Yukon
Oldsmobile	Alero
Oldsmobile	Bravada
Oldsmobile	Intrigue
Oldsmobile	Silhouette
Pontiac	Bonneville
Pontiac	Firebird
Pontiac	Firefly
Pontiac	Grand Am
Pontiac	Grand Prix
Pontiac	Montana
Pontiac	Sunfire
Saturn	All Models

2001 GM

Make	Model
Buick	Century
Buick	LeSabre
Buick	Park Avenue
Buick	Regal
Cadillac	Commercial
Cadillac	Deville
Cadillac	Eldorado
Cadillac	Seville
Chevrolet	Astro
Chevrolet	Blazer
Chevrolet	C/K pickup
Chevrolet	Camaro
Chevrolet	Cavalier
Chevrolet	Corvette
Chevrolet	Express
Chevrolet	Impala
Chevrolet	Lumina
Chevrolet	Malibu
Chevrolet	Metro
Chevrolet	Monte Carlo
Chevrolet	S10
Chevrolet	Silverado
Chevrolet	Suburban
Chevrolet	Tahoe
Chevrolet	Tracker
Chevrolet	Venture
GMC	C/K pickup
GMC	Jimmy
GMC	Safari
GMC	Savana
GMC	Sierra
GMC	Sonoma
GMC	Yukon
GMC	Yukon XL
Oldsmobile	Alero
Oldsmobile	Aurora
Oldsmobile	Bravada
Oldsmobile	Intrigue
Oldsmobile	Silhouette
Pontiac	Aztek
Pontiac	Bonneville
Pontiac	Firebird

2001 (cont.)

Make	Model
Pontiac	Firefly
Pontiac	Grand Am
Pontiac	Grand Prix
Pontiac	Montana
Pontiac	Sunfire
Saturn	All models

2002

Make	Model
Buick	Century
Buick	LeSabre
Buick	Park Avenue
Buick	Regal
Buick	Rendezvous
Cadillac	Commercial
Cadillac	Deville
Cadillac	Eldorado
Cadillac	Escalade
Cadillac	Seville
Chevrolet	Avalanche
Chevrolet	Astro
Chevrolet	Blazer
Chevrolet	Camaro
Chevrolet	Cavalier
Chevrolet	Corvette
Chevrolet	Express
Chevrolet	Impala
Chevrolet	Malibu
Chevrolet	Monte Carlo
Chevrolet	S10
Chevrolet	Silverado
Chevrolet	Suburban
Chevrolet	Tahoe
Chevrolet	Tracker
Chevrolet	TrailBlazer
Chevrolet	Venture
GMC	Envoy
GMC	Safari
GMC	Savana
GMC	Sierra
GMC	Sonoma
GMC	Yukon
GMC	Yukon XL

2002 GM (cont.)

Make	Model
Oldsmobile	Alero
Oldsmobile	Aurora
Oldsmobile	Bravada
Oldsmobile	Intrigue
Oldsmobile	Silhouette
Pontiac	Aztek
Pontiac	Bonneville
Pontiac	Firebird
Pontiac	Grand Am
Pontiac	Grand Prix
Pontiac	Montana
Pontiac	Sunfire
Saturn	All models

2003

Make	Model
Buick	Century
Buick	LeSabre
Buick	Park Avenue
Buick	Regal
Buick	Rendezvous
Cadillac	Commercial
Cadillac	CTS
Cadillac	Deville
Cadillac	Escalade
Cadillac	Seville
Cadillac	XLR Roadster
Chevrolet	Avalanche
Chevrolet	Astro
Chevrolet	Blazer
Chevrolet	Cavalier
Chevrolet	Corvette
Chevrolet	Express
Chevrolet	Impala
Chevrolet	Kodiak
Chevrolet	Malibu
Chevrolet	Monte Carlo
Chevrolet	S10
Chevrolet	Silverado
Chevrolet	SSR
Chevrolet	Suburban
Chevrolet	Tahoe
Chevrolet	Tracker

2003 (cont.)

Make	Model
Chevrolet	TrailBlazer
Chevrolet	Venture
GMC	Envoy
GMC	Safari
GMC	Savana
GMC	Sierra
GMC	Sonoma
GMC	Top Kick
GMC	Yukon
GMC	Yukon XL
Hummer	H2
Oldsmobile	Alero
Oldsmobile	Aurora
Oldsmobile	Bravada
Oldsmobile	Silhouette
Pontiac	Aztek
Pontiac	Bonneville
Pontiac	Grand Am
Pontiac	Grand Prix2
Pontiac	Montana
Pontiac	Sunfire
Saturn	All models

2004

Make	Model
Buick	Century
Buick	LeSabre
Buick	Park Avenue
Buick	Rainier
Buick	Regal
Buick	Rendezvous
Cadillac	Commercial
Cadillac	CTS
Cadillac	Deville
Cadillac	Escalade
Cadillac	EXT
Cadillac	Seville
Cadillac	SRX
Cadillac	XLR Roadster
Chevrolet	Avalanche
Chevrolet	Astro
Chevrolet	Blazer
Chevrolet	Colorado

2004 GM (cont.)

Make	Model
Chevrolet	Cavalier
Chevrolet	Classic
Chevrolet	Corvette
Chevrolet	Express
Chevrolet	Impala
Chevrolet	Kodiak
Chevrolet	Malibu
Chevrolet	Monte Carlo
Chevrolet	S10
Chevrolet	Silverado
Chevrolet	SSR
Chevrolet	Suburban
Chevrolet	Tahoe
Chevrolet	Tracker
Chevrolet	TrailBlazer
Chevrolet	Venture
GMC	Canyon
GMC	Envoy
GMC	Safari
GMC	Savana
GMC	Sierra
GMC	Sonoma
GMC	Top Kick
GMC	Yukon
GMC	Yukon XL
Hummer	H2
Oldsmobile	Alero
Oldsmobile	Bravada
Oldsmobile	Silhouette
Pontiac	Aztek
Pontiac	Bonneville
Pontiac	Grand Am
Pontiac	Grand Prix
Pontiac	Montana
Pontiac	Sunfire
Saturn	All models

2005

Make	Model
Buick	Allure
Buick	Century
Buick	Lacrosse
Buick	LeSabre

2005 (cont.)

Make	Model
Buick	Park Avenue
Buick	Rainier
Buick	Rendezvous
Buick	Terraza
Cadillac	Commercial
Cadillac	CTS
Cadillac	Deville
Cadillac	Escalade
Cadillac	EXT
Cadillac	SRX
Cadillac	STS
Cadillac	XLR Roadster
Chevrolet	Avalanche
Chevrolet	Astro
Chevrolet	Cavalier
Chevrolet	Cobalt
Chevrolet	Colorado
Chevrolet	Corvette
Chevrolet	Classic
Chevrolet	Equinox
Chevrolet	Express
Chevrolet	Impala
Chevrolet	Kodiak
Chevrolet	Malibu Classic
Chevrolet	Malibu
Chevrolet	Monte Carlo
Chevrolet	Silverado
Chevrolet	SSR
Chevrolet	Suburban
Chevrolet	Tahoe
Chevrolet	Uplander
Chevrolet	Trailblazer
Chevrolet	Venture
GMC	Canyon
GMC	Envoy
GMC	Safari
GMC	Savana
GMC	Sierra
GMC	Top Kick
GMC	Yukon
GMC	Yukon XL
Hummer	H2
Pontiac	Aztek

2005 GM (cont.)

Make	Model
Pontiac	Bonneville
Pontiac	G6
Pontiac	Grand Am
Pontiac	Grand Prix
Pontiac	Montana
Pontiac	Pursuit
Pontiac	Sunfire
Saab	9-7X
Saturn	All models

2006

Make	Model
Buick	Allure
Buick	Lacrosse
Buick	Lucerne
Buick	Rainer
Buick	Rendezvous
Buick	Terraza without RPO AW9
Buick	Terraza with RPO AW9
Cadillac	Commercial
Cadillac	CTS
Cadillac	DTS
Cadillac	Escalade
Cadillac	SRX
Cadillac	STS
Cadillac	XLR Roadster
Chevrolet	Corvette
Chevrolet	Equinox
Chevrolet	Express
Chevrolet	HHR
Chevrolet	Impala
Chevrolet	Kodiak
Chevrolet	Malibu Classic
Chevrolet	Malibu
Chevrolet	Monte Carlo
Chevrolet	Silverado
Chevrolet	SSR
Chevrolet	Suburban
Chevrolet	Tahoe
Chevrolet	Trailblazer
Chevrolet	Uplander without RPO AW9
Chevrolet	Uplander with RPO AW9
Chevrolet	Venture without RPO AW9

2006 (cont.)

Make	Model
Chevrolet	Venture with RPO AW9
GMC	Canyon
GMC	Envoy
GMC	Savana
GMC	Sierra
GMC	Sonoma
GMC	Top Kick
GMC	Yukon
Hummer	H2
Hummer	H3
Pontiac	G6
Pontiac	Grand Am
Pontiac	Grand Prix
Pontiac	Montana without RPO AW9
Pontiac	Montana with RPO AW9
Pontiac	Pursuit
Pontiac	Solstice
Pontiac	Torrent
Saab	9-7X
Saturn	ION
Saturn	Relay without RPO AW9
Saturn	Relay with RPO AW9
Saturn	VUE without RPO ASF
Saturn	VUE with RPO ASF

2007

Make	Model	Module
Buick	Allure	ACM
Buick	Enclave with RPO AW9out	ACM
		ROS
Buick	Enclave with RPO AW9	ACM
		ROS
Buick	Lacrosse	ACM
Buick	Lucerne	ACM
Buick	Rainer	ACM
Buick	Rendezvous	ACM
Buick	Terraza without RPO AW9	ACM
Buick	Terraza with RPO AW9	ACM
Cadillac	Commercial	ACM
Cadillac	CTS	ACM
Cadillac	DTS	ACM
Cadillac	Escalade	ACM
		ROS

2007 GM (cont.)

Make	Model	Module
Cadillac	SRX	ACM
		ROS
Cadillac	STS	ACM
Cadillac	XLR Roadster	ACM
Chevrolet	Avalanche	ACM
		ROS
Chevrolet	Cobalt	ACM
Chevrolet	Colorado	ACM
Chevrolet	Corvette	ACM
Chevrolet	Equinox	ACM
		ROS
Chevrolet	Express	ACM
Chevrolet	HHR	ACM
Chevrolet	Impala	ACM
Chevrolet	Kodiak	ACM
Chevrolet	Malibu	ACM
Chevrolet	Monte Carlo	ACM
Chevrolet	Silverado	ACM
		ROS
Chevrolet	SSR	ACM
Chevrolet	Suburban	ACM
		ROS
Chevrolet	Tahoe	ACM
		ROS
Chevrolet	Trailblazer	ACM
Chevrolet	Uplander without RPO AW9	ACM
Chevrolet	Uplander with RPO AW9	ACM
Chevrolet	Venture without RPO AW9	ACM
Chevrolet	Venture with RPO AW9	ACM
GMC	Acadia	ACM
		ROS
GMC	Canyon	ACM
GMC	Envoy	ACM
GMC	Savana	ACM
GMC	Sierra	ACM
		ROS
GMC	Sonoma	ACM
GMC	Top Kick	ACM
GMC	Yukon	ACM
		ROS
Hummer	H2	ACM
Hummer	H3	ACM

2007 (cont.)

Make	Model	Module
Pontiac	G5	ACM
Pontiac	G6	ACM
Pontiac	Grand Am	ACM
Pontiac	Grand Prix	ACM
Pontiac	Montana without RPO AW9	ACM
Pontiac	Montana with RPO AW9	ACM
Pontiac	Solstice	ACM
Pontiac	Torrent	ACM
		ROS
Saab	9-7X	ACM
Saturn	Aura	ACM
Saturn	ION	ACM
Saturn	Outlook with RPO AW9	ACM
		ROS
Saturn	Outlook without RPO AW9	ACM
		ROS
Saturn	Relay without RPO AW9	ACM
Saturn	Relay with RPO AW9	ACM
Saturn	Sky	ACM
Saturn	VUE without RPO ASF	ACM
Saturn	VUE with RPO ASF	ACM

2008

Make	Model	Module
Buick	Allure	ACM
Buick	Enclave	ACM
		ROS
Buick	Lacrosse	ACM
Buick	Lucerne	ACM
Buick	Rainer	ACM
Buick	Terraza without RPO AW9	ACM
Buick	Terraza with RPO AW9	ACM
Cadillac	CTS	ACM
Cadillac	DTS	ACM
Cadillac	Escalade	ACM
		ROS
Cadillac	Hearse (DTS)	ACM
Cadillac	Limousine (DTS)	ACM
Cadillac	SRX	ACM
		ROS
Cadillac	STS	ACM
Cadillac	XLR Roadster	ACM

2008 GM (cont.)

Make	Model	Module
Chevrolet	Avalanche (1500, 2500)	ACM
		ROS
Chevrolet	Cheyenne	ACM
Chevrolet	Cobalt	ACM
Chevrolet	Colorado	ACM
Chevrolet	Corvette	ACM
Chevrolet	Equinox	ACM
		ROS
Chevrolet	Express (1500, 2500, 3500)	ACM
		ROS
Chevrolet	HHR	ACM
Chevrolet	Impala	ACM
Chevrolet	Kodiak	ACM
Chevrolet	Malibu	ACM
Chevrolet	Silverado (1500, 2500, 3500)	ACM
		ROS
Chevrolet	Suburban (1500, 2500)	ACM
		ROS
Chevrolet	Tahoe	ACM
		ROS
Chevrolet	Trailblazer	ACM
Chevrolet	Uplander without RP AW9	ACM
Chevrolet	Uplander with RP AW9	ACM
GMC	Acadia	ACM
		ROS
GMC	Canyon	ACM
GMC	Envoy	ACM
GMC	Savana (1500, 2500, 3500)	ACM
		ROS
GMC	Sierra (1500, 2500, 3500)	ACM
		ROS
GMC	Top Kick	ACM
GMC	Yukon	ACM
		ROS
Hummer	H2	ACM
Hummer	H3	ACM
Pontiac	G5	ACM
Pontiac	G6	ACM
Pontiac	Grand Prix	ACM
Pontiac	Montana without RPO AW9	ACM
Pontiac	Montana with RPO AW9	ACM
Pontiac	Solstice	ACM

2008 (cont.)

Make	Model	Module
Pontiac	Torrent	ACM
		ROS
Saab	9-7X	ACM
Saturn	Aura	ACM
Saturn	Outlook	ACM
		ROS
Saturn	Sky	ACM
Saturn	VUE	ACM
		ROS

Isuzu Vehicles

1998-1999

Make	Model
Isuzu	Hombre

2000

Make	Model
Isuzu	Hombre

2003-2004

Make	Model
Isuzu	Ascender

2005-2006

Make	Model
Isuzu	Ascender

Mitsubishi Vehicles

2005-2007

Make	Model
Mitsubishi	Raider

Sterling Vehicles

2008

Make	Model
Sterling	Bullet Class 4/5 Cab & Chassis

Suzuki Vehicles

2007-2008

Make	Model	Module
Suzuki	XL7	ACM
		ROS