ATTACHMENT 3.—EXPOSURE COMPLIANT RATE (THE NUMBER OF COMPLAINTS PER 100K VEHICLES PER YEAR) OF AN ALLEGED THERMAL EVENT OCCURRED IN THE STEERING COLUMN AND/OR IGNITION SWITCH AREAS—Continued

Vehicle make	Vehicle line	MY 91	MY 92	MY 93	MY 94	MY 95	MY 96	MY 97	MY 98	MY 99	MY 2000
Plymouth	Sundance	0.00	0.37	0.18	0.00						
Dodge	Shadow	0.00	0.00	0.00	0.00						
Dodge	Viper		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Plymouth	Prowler							0.00	n/a	0.00	0.00
Plymouth	Neon					n/a	n/a	n/a	n/a	n/a	n/a
Dodge	Neon					n/a	n/a	n/a	n/a	n/a	n/a
Plymouth	Breeze						0.00	0.00	n/a	n/a	n/a
Dodge	Stratus					0.00	0.00	0.00	n/a	n/a	n/a
Chrysler	Cirrus					0.60	0.00	0.00	n/a	n/a	n/a
Chrysler	Sebring Convertible.							0.00	0.00	0.00	0.00
Dodge	Intrepid			0.00	0.00	0.00	0.00	0.00	n/a	n/a	n/a
Eagle	Vision			0.00	0.00	0.00	0.00	0.00	n/a	n/a	n/a
Chrysler	Concorde, LHS, NY, 300M.	0.00	0.00	0.28	0.18	0.00	0.00	0.00	n/a	n/a	n/a
Plymouth	Voyager	0.07	0.06	0.00	0.00	0.00	0.12	0.00	0.00	0.00	0.00
Dodge	Caravan	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Chrysler	Town and Country.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Dodge	Ram Wagon	0.56	0.52	0.00	0.00	0.00	0.27	0.00	n/a	n/a	n/a
Dodge	Dakota	0.00	0.19	0.00	0.15	0.00	0.00	0.00	0.00	0.00	n/a
Dodge	Ram Pickup	0.12	0.32	0.00	1.68	1.26	0.06	0.00	0.00	0.00	n/a
Dodge	Durango								0.00	0.00	n/a
Jeep	Commanche	n/a	n/a								
Jeep	Wrangler	n/a	n/a	n/a	n/a	n/a	n/a	0.00	0.00	0.00	0.00
Jeep	Cherokee	n/a	n/a	n/a	n/a	n/a	0.25	n/a	n/a	n/a	n/a
Jeep	Grand Cherokee.			0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00

'n/a'—model/model year vehicle not equipped with an ignition switch characterized by having a lighted plastic ring around the key cylinder assembly.
Empty cell block—model/model year vehicle not produced.

[FR Doc. 00–10630 Filed 4–27–00; 8:45 am]

BILLING CODE 4910–59–M

DEPARTMENT OF TRANSPORTATION

National Highway Traffic Safety Administration

Denial of Motor Vehicle Defect Petition, DP99–004

AGENCY: National Highway Traffic Safety Administration (NHTSA); DOT.

ACTION: Denial of petition for a defect investigation.

SUMMARY: This notice describes the reasons for denying a petition (DP99–004) submitted to NHTSA under 49 U.S.C. 30162, requesting that the agency ''institute a new investigation into the cause or causes of sudden acceleration.''

FOR FURTHER INFORMATION CONTACT: Bob Young, Office of Defects Investigation (ODI), NHTSA, 400 Seventh Street, SW, Washington, DC 20590. Telephone: 202–366–4806.

SUPPLEMENTARY INFORMATION: On July 19, 1999, attorney Sandy S. McMath, 711 West Third Street; Little Rock, AK 72201; petitioned the NHTSA requesting that it ''reopen its investigation into the phenomenon known as ''sudden acceleration.'''

The petitioner contends the agency's comprehensive study to identify and evaluate factors which could potentially cause or contribute to the occurrence of Sudden Acceleration Incidents (SAI), conducted from October, 1987 through December, 1988, should be reopened because:

(1) To date, NHTSA has neglected to consider the mechanisms that can cause sudden acceleration by bypassing the control logic of the cruise control system and thus can induce sudden acceleration in a stationary vehicle;

(2) NHTSA has apparently failed to consider the data collected by Ford Motor Company in its investigation of 2,800 incidents of sudden acceleration during 1989–1992; and

(3) NHTSA has not addressed the fact that there is no true failsafe mechanism to overcome sudden acceleration.

NHTSA has reviewed the petitioner's information as it relates to the referenced study. The results of this review and our analysis of the petition's merit is set forth in the DP99–004 Petition Analysis Report, published in its entirety as an appendix to this notice.

For the reasons presented in the petition analysis report, there is no reasonable possibility that an order concerning the notification and remedy of a safety-related defect would be issued as a result of reopening the study. Therefore, in view of the need to allocate and prioritize NHTSA's limited resources to best accomplish the agency's safety mission, the petition is denied.

Authority: 49 U.S.C. 30162(d); delegations of authority at CFR 1.50 and 501.8.

Kenneth N. Weinstein,

Associate Administrator for Safety Assurance.

Appendix

Petition ANALYSIS—DP99–004

1.0 Introduction

On July 19, 1999 Mr. Sandy S. McMath (petitioner) petitioned the National Highway Traffic Safety Administration (NHTSA) requesting that it ''reopen its investigation [i.e., Study] into the phenomenon known as 'sudden acceleration [SA].''' Mr. McMath is a Little Rock, Arkansas lawyer representing the parents of two boys injured (one fatally) in an alleged sudden acceleration incident (SAI) occurring in Mountain Home, Arkansas on June 7, 1995. This incident is currently the subject of civil litigation. [1]

The petitioner contends the agency's comprehensive study, conducted to identify and evaluate factors which could potentially cause or contribute to the occurrence of SAI's, should be reopened because:

[1] Chapman v. Fett et al., Civ-97–144, C.C. of Baxter County, Arkansas. No trial date has been set yet.

(1) To date, NHTSA has neglected to consider the mechanisms that can cause sudden acceleration by bypassing the control logic of the cruise control system and thus can induce sudden acceleration in a stationary vehicle;

(2) NHTSA has apparently failed to consider the data collected by Ford Motor Company in its investigation of 2,800 incidents of sudden acceleration during 1989–1992; and

(3) NHTSA has not addressed the fact that there is no true failsafe mechanism to overcome sudden acceleration.

In analyzing the petitioner's allegations and preparing a response, we:

- Reviewed the petitioner's July 19, 1999 petition.
- Reviewed the two sets of exhibits, provided as an attachment to the petition. [2]
- Reviewed the Study's findings and discussed its methodology with the Transportation Systems Center (TSC) and Vehicle Research and Test Center (VRTC) personnel involved.
- Reviewed our consumer complaint database for sudden acceleration reports received through December 1, 1999.
- Reviewed vehicle manufacturer information provided to us during various sudden acceleration investigations.
- Reviewed various ODI safety defect investigations related to sudden acceleration.
- Gathered information related to electrical current, circuits, transistors, switches, and solenoids.
- Inspected various Ford vehicles to understand cruise control operation and the location and function of certain brake pedal-related cruise control dump valves and switches.
- Reviewed the transcript, video tape and other material related to a February 10, 1999 ''Dateline NBC'' broadcast concerning alleged cruise control failures as a cause of sudden acceleration incidents.
- Reviewed various transcripts and orders from the Manigault [3] and Jarvis [4] civil litigation cases.
- Reviewed a U.S. Supreme Court case concerning the admissibility of certain scientific evidence.[5]
- Analyzed the ''data collected by Ford Motor Company in its investigation of 2,800 incidents of sudden acceleration during 1989–1992.''
- Obtained vehicle production quantity information from Ford.
- Reviewed various Ford vehicle service manuals.
- Viewed a video tape, prepared by the plaintiffs in Manigault, allegedly demonstrating vehicle acceleration due to an induced cruise control malfunction.
- Reviewed a NHTSA paper concerning transmission shift-lock effectiveness at reducing occurrences of sudden acceleration.[6]
- Reviewed an essay concerning the role of human factors in sudden acceleration incidents.[7]
- Obtained, from Ford, vehicle specifications for a 1984 Mercury Grand Marquis, VIN 1MEBP95F6EZ612727. This vehicle was tested by VRTC on October 14, 1988 as part of the Study.
- Disassembled a Mechanical Vacuum Dump Valve (MVDV), Ford part number E9AZ–9C727–B, to learn more about its operation. This valve is sold by Ford as a service part for 1982–2000 Ford Crown Victoria, Mercury Grand Marquis, and Lincoln Town Car vehicles.
- In an effort to learn more about the petitioner's theory, ODI also gathered information concerning an alleged SAI occurring in Mountain Home, Arkansas on June 7, 1995 (the subject crash), generally, and the involved 1988 Lincoln Town Car (the subject vehicle), specifically. During this effort, ODI did the following:
- Obtained a copy of the Mountain Home, AK Police incident report concerning the subject crash and interviewed its author, Sergeant Jeff Lewis.
- Obtained a copy of the ''Dateline NBC'' (''Dateline'') video tape provided by Mr. McMath to Sergeant Lewis.
- Obtained, from Ford, subject vehicle (VIN 1LNBM81F9JY844065) specifications.
- Reviewed the subject vehicle's warranty service history.
- Reviewed the subject vehicle's title history.
- Interviewed the salesman who sold the subject vehicle to the involved owner/driver.[8]
- Obtained the subject vehicle's odometer statement verifying its mileage when sold to the Fetts.
- Interviewed the Ford dealership service manager and mechanic who inspected the subject vehicle the day after the alleged SAI.
- Obtained, from the National Oceanographic and Atmospheric Administration (NOAA), the Mountain Home weather observation report for June 7, 1995.
- Reviewed the docket, complaints, and various deposition transcripts from the Chapman civil litigation.
- Interviewed other owners of the subject vehicle.
- Interviewed mechanics who worked on the subject vehicle.
- Examined a cruise control electrical dump switch (EDS, p/n E9AZ–13480–A) for a 1988 Lincoln Town Car.
- Traveled to Mountain Home, Arkansas on December 2, 1999 and did the following:

—Obtained copies of the police photos.
—Inspected the crash site with Mountain Home Police Sergeant Nevin Barnes, the subject crash reconstructionist.
—Discussed the crash with a witness at the crash site.
—While at the crash site, measured the total distance traveled by the subject vehicle during the alleged SAI.
—Obtained copies of related news media reports.
—Met with the current owner of the subject vehicle.
—Inspected the subject vehicle.
—Test drove the subject vehicle.

The information gathered during this comprehensive effort does not support the petitioner's allegations. Consequently, his petition that ''NHTSA reopen its investigation into the phenomenon known as ''sudden acceleration''' is denied.

This petition denial will (1) discuss sudden acceleration and the Study, generally; (2) provide a general description of electrical circuit and cruise control operation, (3) assess each of the petitioner's three allegations, and (4) evaluate the alleged sudden acceleration incident occurring in Mountain Home, Arkansas on June 7, 1995.

2.0 The Issue of Sudden Acceleration

2.1 ''Sudden Acceleration (SA)''

The term ''sudden acceleration (SA)'' has been used (and misused) to describe vehicle events involving any unintended speed increase. However, the term properly refers to an ''unintended, unexpected, high-power accelerations from a *stationary position* [emphasis added] or a very low initial speed accompanied by an apparent loss of braking effectiveness.'' [9] The definition includes ''braking effectiveness'' because operators experiencing a SAI typically allege they were pressing on the brake pedal and the vehicle would not stop. ''Sudden acceleration'' does not describe unintended events which begin after vehicles have reached intended roadway speeds.

2.2 The NHTSA Study

On March 7, 1989, NHTSA released a Report, authored by John Pollard and E. Donald Sussman, titled ''An Examination of Sudden Acceleration,'' documenting the agency's efforts (the ''Study'') to determine what was causing a relatively large number of crashes in certain model vehicles due to apparent unintended (and substantial) engine power increase and simultaneous loss of braking effectiveness. Typically, these events began while the vehicle was stationary, shortly after the driver had first entered it. They frequently ended in a crash. While the phenomenon affected all automatic transmission-equipped cars sold in the U.S., some had notably higher occurrence rates, with the Audi 5000 eclipsing them all.[10] The issue of ''runaway''Audi 5000's had been the

[2] The second set of exhibits were provided by the petitioner, who characterized them as ''corrected.''

[3] *Manigault* v. *Ford Motor Co.,* Case No. 286862, Court of Common Pleas, Cuyahoga County, Ohio.

[4] *Jarvis* v. *Ford Motor Co.,* 92 Civ. 2900 (NRB), U.S. D.C., S.D. N.Y.

[5] *Daubert* v. *Merrell Dow Pharmaceuticals, Inc.,* 509 U.S. 579 (1993).

[6] U.S. Department of Transportation. National Highway Traffic Safety Administration, Office of Defects Investigation. ''The Effect of Countermeasures to Reduce the Incidence of Unintended Acceleration Accidents' by Wolfgang Reinhart. Paper (No. 94 S5 O 07) delivered to the Fourteenth International Technical Conference on Enhanced Safety of Vehicles, Munich, Germany, May 23–26, 1994. This conference was sponsored by the U.S. Department of Transportation.

[7] Schmidt, Richard A. ''Unintended Acceleration: A Review of Human Factors Contributions,'' Human Factors Society, Inc., 1989, 31(3), 345–364.

[8] The subject vehicle was owned by William and Marlene Fett. Mrs. Fett was the involved driver.

[9] John Pollard and E. Donald Sussman, *An Examination of Sudden Acceleration* (Cambridge, MA.: NHTSA, 1989, DOT-HS–807–367), v.

[10] The sudden acceleration report rate for 1978 through 1987 Audi 5000's was 586/100,000.

subject of NHTSA defect investigations and safety recalls, class action lawsuits, considerable media coverage,[11] and public controversy. Internationally, the phenomenon was investigated by other governments during roughly the same time period.[12]

To help resolve the issue and thoroughly explore topics not fully investigated previously, NHTSA Administrator Diane Steed ordered an independent review of SA in October, 1987 (the ''Study''). The Transportation Systems Center (TSC) of Cambridge, Massachusetts was commissioned by NHTSA to study SA and identify the factors which cause and/or contribute to its occurrence. Ten different make/model/year vehicles—all with cruise control—were selected for particular scrutiny. Included among these was a 1984 Mercury Grand Marquis. Not all of the vehicles had unusually high SAI rates; some were chosen based on their use of certain design approaches seen throughout the industry. In this way, the Study's sample was reasonably representative of the United States' automatic transmission-equipped vehicle population as a whole.

TSC collected literature, individual case documentation, and data for each of the selected vehicles. Many drivers involved in an alleged sudden acceleration incident were interviewed. TSC studied and tested the vehicles' fuel, cruise control, and braking systems.[13] The vehicles' driving controls were evaluated for both location within the cabin and operation. After gathering the information, TSC convened a panel (the ''Panel'') of independent experts in various disciplines [14] to review the data and make recommendations. The findings and conclusions were to be published in a final report (*i.e.,* Pollard and Sussman—Ed.).

NHTSA specifically directed that TSC and the Panel consider all potentially viable SAI causal hypotheses. Contributing factors were to be considered, as well. They were to develop tests for each of these hypotheses, through both engineering analyses and experimentation, wherever feasible. In developing various hypotheses, the following logical assumptions were used:

- SA could be the result of a single primary causal factor or could result from the action of a number of factors which contribute to or increase the likelihood of a SAI.
- Factors related to a SAI could include power-train design, brake system design, and vehicle ergonomics (particularly pedal configuration.).
- A SAI must involve a significant increase in engine power, which could be caused by a failure in an engine-control system or a pedal misapplication (inadvertent depression of the accelerator instead of, or in addition to, the brake).
- If the SAI begins with a vehicle-system malfunction, loss of control could occur through braking system failure or the driver's failure to press the brake with sufficient force and/or the driver inadvertently pressing on the accelerator.
- If the SAI is initiated by a pedal misapplication of which the driver is unaware, loss of control can occur.
- The location, orientation, and force-deflection (how far the pedals move for a given amount of force) characteristics of pedals can influence the probability that the driver will mistake the accelerator for the brake.
- If the cause of the SAI is an electro-mechanical or mechanical anomaly, there should be evidence of the failure.
- If the SAI was caused by an intermittent electronic failure (such as short-circuits, electromagnetic and/or radio-frequency interference, etc), physical evidence may be very difficult to find, but the failure mode should be reproducible either through in-vehicle or laboratory bench tests.
- The vehicles studied may or may not share the same causal and contributing factors.

While applying these guiding principles, the Study covered:

- Engines and their controls (including cruise control systems), as well as transmissions, to determine whether and how they might produce unwanted power;
- The role of electromagnetic and radio-frequency interference (EMI/RFI) and other environmental variables in stimulating malfunctions in critical engine controls (including cruise control systems);
- Braking systems were examined in an attempt to determine how they could fail momentarily but spontaneously recover normal function; and
- The role of human factors and ergonomic control design considerations which might lead to pedal misapplications.

At the conclusion of TSC's effort, comprising thousands of person-hours gathering data; comprehensively testing vehicles including their systems and equipment; interviewing owners and drivers; and inspecting crash scenes and the vehicles involved; a report was released with the following conclusion: ''For a sudden acceleration incident in which there is no evidence of throttle sticking or cruise control malfunction, the inescapable conclusion is that these definitely involve the driver inadvertently pressing the accelerator instead of, or in addition to, the brake pedal.'' [15]

3.0 Electrical Circuits & Cruise Control

3.1 Electrical ''Power''

An electrical circuit may be defined generally as a system or part of a system of conducting parts and their interconnectors through which an electrical current is intended to flow.[16] Electrical devices located within a circuit can only operate when the circuit is closed (i.e., the loop is ''continuous'') allowing electrical current to flow from its source, through the device, and back to the source. Switches are used to control whether the circuit is open (the device is off) or closed (the device is on). Switches may be mechanical (*e.g.,* a wall mounted light switch) or electronic. The later includes transistors which respond to signals from other electronic components. Typically, switches are located in the positive (non-grounded) side of the circuit. ''Ground-switched'' or ''low side switched'' circuits refer to those where voltage (+) is always available at the device and the switch is located on the ground side of the circuit.

Power exists only when circuits are closed (by a switch) thereby allowing electrical current to ''flow.'' Typically, if an electrical device is operating even though its circuit is open (the switch is off), a ''fault'' bypassing the switch exists. These ''faults'' are sometimes generically referred to as ''short circuits'' or ''shorts.''

Even if an electrical circuit is closed, electrical devices only operate when sufficient power is available. In electrical engineering, ''power'' is defined as $P = EI$ where P = Power in watts, E = Electro-motive force (emf) in volts, and I = Current in amperes. All electrical devices require a specified amount of ''power'' to operate properly. In the absence of adequate power, electric motors, for example, may ''run'' but will not be able to achieve their design speed. Other devices, such as solenoids, will not perform their function if there is insufficient power available.

3.2 Automotive Electronics

Motor vehicle electrical circuit and component operation conforms with the general description provided in the previous section. Until the early 1970's, there was very little use of electronics in motor vehicles. Prior to that time, automobile ''electronics'' comprised mostly auto radios, turn signals, and a few ignition systems. Then, with the advent of government-mandated fuel economy and emission regulations—as well as certain safety-requirements—the use of electronics became more widespread and

[11] Both print and electronic media reported on the phenomenon. Perhaps the most notable media event occurred on November 23, 1986 when CBS News' ''60 Minutes'' broadcast a segment entitled ''Out of Control,'' focusing on SA and the Audi 5000. The piece included a demonstration of an Audi 5000, extensively modified by a plaintiff's consultant. In an effort to demonstrate how, theoretically, Audi's were suddenly, and inadvertently, accelerating, he had drilled a hole in the vehicle's transmission and then, with the flip of a switch injected compressed air into it. Thus pressurized, the transmission linkage would open the throttle. In the 60 Minutes segment, produced by Allan Maraynes, the switch is positioned out of camera range and the accelerator is shown going to the floor on its own. Other than the modified Audi 5000 (which had been demonstrated to ODI engineers months before the broadcast), NHTSA has never found any production vehicle, of any type, with this sort of configuration.

[12] Transport Canada issued a report entitled ''Investigation of Sudden Acceleration Incidents'' in December 1988, concluding driver error caused the phenomenon. The Japanese Ministry of Transport released their report, ''An Investigation on Sudden Starting and/or Acceleration of Vehicles with Automatic Transmissions,'' in April 1989, which concluded that there was no common mechanical cause for sudden acceleration.

[13] In some instances, the testing was performed by NHTSA's Vehicle Research and Test Center (VRTC).

[14] The curriculum vitae of all the panelists is included in Appendix A to the Report. The panel was highly credentialed, including Dr. John B. Haywood, professor of Mechanical Engineering at M.I.T. and Director of its Sloan Automotive Laboratory, and Dr. Phillip B. Sampson, Hunt Professor of Psychology, Tufts University.

[15] Pollard and Sussman, 49.

[16] McGraw-Hill, Encyclopedia of Electronics and Computers, 1988, 128.

most all were of ''solid-state'' design.[17] Solid-state electrical devices use transistors to, among other functions, control current without resorting to heated filaments, vacuum gaps, or moving parts (e.g., relays). Most of the cruise control systems in use since the early 1980's use solid-state circuitry.

3.3 Cruise Control Operation

Cruise controls are the only automotive devices, other than the driver's feet, which can substantially affect engine power. However, unlike ''flooring'' the accelerator, which rapidly opens the throttle fully (wide-open throttle, or ''WOT''), most cruise controls (including those in Ford vehicles) require a few seconds to open the throttle, and most systems (including Ford's) are mechanically limited to only open the throttle approximately 80% of WOT. While this is a relatively large throttle opening, which may produce substantial amounts of engine power, rarely is the power produced enough to leave tire skid marks on dry pavement while accelerating from a standing start.

The following will focus primarily on certain ground-switched, electro-vacuum cruise controls because the petitioner's theory involves these types of systems.

A typical ground-switched, electro-vacuum cruise control is designed to operate as follows:

When drivers reach a speed they want to maintain with the cruise control, they press the ''on'' and then the ''set'' button. Pressing and then releasing the ''on'' button simply prepares the cruise control system to receive a signal from the ''set'' button (like pressing a VCR's ''on'' button prior to pressing ''play''). When the set button (a ''switch'') is pressed, a cruise control electrical circuit is closed. In some vehicles (including some built by Ford, GM, and Volvo), the cruise control system is ''ground-switched'' and pressing the button completes the circuit to ground. Only if: (1) The system is turned on and there is sufficient power to activate it; (2) the vehicle is traveling above a pre-determined minimum speed (usually 25 to 30 mph); and (3) the driver's foot is not pressing the brake pedal; will the cruise control then engage to maintain the desired speed by holding the throttle open an appropriate amount. The throttle's position is modulated by a vacuum servo—a bellows-like device. Typically, there are two electro-magnetic valves (known as ''solenoids'') which maintain a vacuum within the servo. Vacuum is provided to the servo by the ''vac'' solenoid. The ''vent'' solenoid—as its name implies'depletes servo vacuum. As long as the three conditions described previously are met, and when operating as intended, the solenoids activate only when the ''set'' button is pressed, closing the circuit.[18] When the solenoids' circuit is closed, electrical power—sufficient to activate the solenoids'causes the ''vac'' solenoid to open and the ''vent'' solenoid to close thereby maintaining vacuum within the servo sufficient to hold the throttle open only enough to maintain vehicle ''set speed.'' Other than through an electrical fault affecting the solenoids, the only way vacuum is maintained within the servo—thus holding the throttle open—is by pressing the ''set'' or ''resume'' buttons (again, assuming all three pre-conditions are met).

To ''turn off'' the cruise control (i.e., release servo vacuum), the driver either presses the ''off'' button which erases the speed memory in the cruise control module (''amplifier'') and opens the vent solenoid, or steps on the brake pedal. Applying the brake does two things: first it sends an electrical signal from an electronic dump switch (EDS) through the amplifier to the vent and vac solenoids which open and close (respectively) depleting servo vacuum. This electrical signal is normally sent to the cruise control system whenever the brake pedal is initially depressed about 1⁄16 inch. Second, there is also a mechanical vacuum dump valve (MVDV) that opens every time the pedal is pressed (usually at least 1⁄8 inch but rarely more than 3⁄4 inches). The MVDV is a mechanical device designed to completely deplete servo vacuum should an electrical fault occur in the solenoid system that would prevent the EDS from functioning properly. Both the EDS and MVDV are designed to activate well before the brake pedal has been depressed enough to effectively engage the brakes. According to the Report (page 8–9) ''In virtually all recent designs for factory-designed cruise controls [including Ford's], where digital circuitry is now the norm, two or more component failures are required to cause an unintended throttle opening.'' Faults affecting cruise control operation, and consequent vehicle movement from a stationary position while the brakes are applied, must involve simultaneous electrical (the solenoids) and mechanical (the MVDV and brake system) failures.

4.0 The Petitioner's Allegations

The petitioner claims that (1) NHTSA has failed to consider cruise control-related failures that ''bypass'' the cruise control ''control logic'' thus inducing SA in stationary vehicles; (2) NHTSA has never considered SAI-related data gathered by the Ford Motor Company (Ford) involving ''2,800 incidents of sudden acceleration during 1989–1992;'' and (3) ''NHTSA has not addressed the fact that there is no true failsafe mechanism to overcome sudden acceleration.''[19]

This analysis will address each of these allegations in the order they were listed by the petitioner.

4.1 The Petitioner's First Allegation

The petitioner claims NHTSA should institute a new investigation into the cause or causes of sudden acceleration because it ''neglected to consider the mechanisms that can cause sudden acceleration by bypassing the control logic of the cruise control system'' and thus ''induce sudden acceleration in a stationary vehicle.''

4.1.1 The Cruise Control ''Bypass'' Theory

Since NHTSA completed its Study, SAIs and subsequent litigation have continued. Consultants for various plaintiffs have speculated that the SAI's were initiated by simultaneous, undetectable, electrical and mechanical failures of the cruise control system. This theory is based on their observation that some vehicles (including those produced in whole, or in part, by Volvo, Ford, GM, and Mercedes) are equipped with ground-switched cruise control systems and, consequently, the vent and vac solenoid circuits receive voltage whenever the vehicle's ignition is turned on. In their opinion, the SAI occurs when there is an unintended engine power increase due to a series of ground faults in the solenoid circuitry. According to the theory's proponents, these ground faults cause an inappropriate activation of the servo solenoids, opening the throttle.

The petitioner, presently representing the parents of two brothers injured in an alleged SAI,[20] has retained Samuel J. Sero, a plaintiff's consultant.[21] Mr. Sero has testified for plaintiffs in previous SAI lawsuits.[22] Mr. Sero, and others, have testified that vehicles are prone to SAI where, by design, voltage is present at the cruise control servo solenoid circuits whenever the ignition is turned on. They have theorized that the subject SAI may have occurred because the vehicle's cruise servo may have inadvertently activated due to randomly occurring faults. The petitioner outlines the theory as follows:

''Mr. Sero has determined that the source of uncontrolled accelerations in Ford vehicles is the fact that voltage is supplied to the servo the moment the ignition is turned on. Under this condition all that is necessary to induce wide-open throttle [WOT] is a completion of the circuit to the servo. This can be affected by several discrete [separate] events and conditions that are completely foreseeable: (a) The ground connection to the printed circuit board [cruise control electronic control mechanism, or amplifier] is opened or removed and either the vent wire or vacuum servo is grounded; or (b) both the vent [solenoid] wire and vacuum [solenoid wire] are grounded at the same time; or (c) a transient fault condition injects a signal across the output section of

[17] The consumer electronics industry likewise was transformed with the advent of transistors. Today, most every radio, computer, cellular telephone, television, etc. is of solid-state design.

[18] This also applies to circumstances where the ''resume'' button is pressed if the cruise control had previously been ''set'' and then deactivated by pressing the brake.

[19] Letter from Sandy S. McMath to NHTSA, July 19, 1999, 6.

[20] See Section 5.0 for more details about this incident.

[21] Mr. Sero worked for the Allegheny Power Company for twelve years as a planning engineer, a standards engineer, and a transmission lines engineer, investigating and maintaining the flow of electricity through the company's system. He is a licensed electrical engineer with a bachelor of science degree in electrical engineering from Carnegie Institute of Technology (now Carnegie Mellon University) in Pittsburgh. Mr. Sero has no professional experience in the auto industry and no human factors training. The theory propounded by Mr. Sero, and others, has never been published nor is there any literature in the automotive engineering field supporting it.

[22] See Manigault and Jarvis.

the electronic control unit inducing an effect similar to (a) or (b).'' [23]

Scenarios (a) and (b) involve multiple ''hard'' electrical faults while (c) relates to an injected signal generated by strong electro-magnetic fields.

ODI notes that Mr. Sero's theory involves only one aspect of sudden acceleration, i.e., an unintended engine power increase. None of Mr. Sero's scenarios, on their own, would result in a SAI which, by definition, involve high power acceleration and an apparent loss of braking effectiveness.

Mr. Sero's theory, as it relates to SA, involves simultaneous, undetectable electrical and mechanical failures. He has taken exception to the use of the term ''theory'' to describe his hypothesis, claiming:

It's not a theory. It's a reality. It will happen. If they [the solenoid circuits] both complete a circuit to ground, you go to wide open throttle.'' [24]

There are two problems with Mr. Sero's claim: first, as we've described earlier, the servo is mechanically limited so that it will only open the throttle approximately 80% of ''wide open throttle;'' and, secondly, Mr. Sero's theory ignores two key elements of an alleged cruise-control related SAI—mechanical failures of both the MVDV and vehicle brake system. To conclude that his theory adequately explains a SAI, an assumption must be made that not only did a simultaneous electrical failure occur involving the servo solenoid ground circuits but mechanical failure of the MVDV and brake system occurred as well. Therefore, Mr. Sero's belief that inadvertent cruise control servo solenoid activation explains SAIs is, at best, theoretical, where ''theory'' is defined as ''a proposed explanation whose status is still conjectural, in contrast to well-established propositions that are regarded as reporting matters of actual fact.'' [25]

Mr. Sero goes on to claim these faults would be undetectable.[26] As of May 18, 1999 Mr. Sero himself had not been able to verify that the types of failures underlying his theory were actually occurring. While testifying as a plaintiff's witness in litigation involving the alleged sudden acceleration of a 1991 Ford Aerostar, the following exchange took place:

Q: Sir, you are holding yourself out as an expert on this theory and basing your testimony on your theory that this is what occurred, isn't that so?

Sero: Yes.

Q: And you have never been able to verify it?

Sero; So far, no.[27]

However, Mr. Sero has an explanation for this conundrum. During the same hearing, held to determine the relevance and reliability of his theory, [28] he was questioned by Judge Naomi Reice Buchwald.

Q: ''I'm just asking whether it's possible, if you had a mind-set to learn this information, to find physical evidence of the conditions that you are talking about.''

Sero: ''The only thing I can tell you, your honor, is that you may. In reality, you probably won't. You'll find loose grounds, they're easy to find. But the other conditions, I doubt that you will ever find them. Will they exist? They may, yeah. ....but if they're happening from contamination or moisture or gas, they would go away.'' [29]

To date, no one known to NHTSA (including the petitioner and Mr. Sero) has found any credible evidence that SAIs are occurring as a result of simultaneous, undetectable, electrical and mechanical failures, in any vehicle (including Fords).

4.1.2 What the NHTSA Study Found Regarding Simultaneous, Undetectable Failures.

The petitioner says, ''to date, NHTSA has neglected to consider the mechanisms that can cause sudden acceleration by bypassing the control logic of the cruise control system . . . '' [30] He goes on to claim that ''Mr. Sero's findings make it clear that NHTSA was mistaken and misinformed as to the nature of sudden acceleration.'' [31] However, a review of the Study demonstrates that this claim is without foundation. Clearly, the Study considered the possibility that viable cruise control malfunctions could cause a SAI. But it found no evidence that faults ''bypassing the control logic of the cruise control system'' were a viable explanation for SAI.

Under the petitioner's theory, a vehicle involved in a cruise control related SAI would have had to experience the following simultaneous failures: (1) at least two electrical failures of the vacuum servo solenoid system; (2) a mechanical failure of the MVDV, and (3) a mechanical failure of the brake system.[32] Moreover, according to Mr. Sero, a post-SAI vehicle inspection would find no physical evidence that any of these systems failed. Thus, Mr. Sero's theory is based on simultaneous electrical and mechanical faults, involving more than one element of the vehicle's control system, which would be undetectable after the incident has occurred.

Here's what the Study found regarding multiple cruise control malfunctions:

''Extensive laboratory testing of the operation of cruise controls under stress from temperature extremes, power supply variations, EMI/RFI and high-voltage discharges has demonstrated no failure modes of any relevance to SAI. Analysis of their circuitry shows that for nearly all controls designed in the past few years [''all'' in the case of Ford], two or more independent, intermittent failures would have to occur simultaneously to cause throttle opening in a way that would be difficult to detect after the incident. The occurrence of such simultaneous, undetectable failures is virtually impossible.'' [33]

Thus, Mr. Sero's theory was addressed, and rebutted, during NHTSA's Study.

4.1.3 ''Stand-alone'' vs. ''Integrated'' Cruise Control Systems

To examine Mr. Sero's theory further, ODI analyzed its data to compare the SAI rate for different Ford cruise control systems.

With the introduction of the Taurus/Sable models in December, 1985, Ford began using an ''integrated'' cruise control system. In such a system, the cruise control amplifier (a solid-state device containing the ''control logic'') was no longer a separate (''stand-alone'') component. Instead, its functions were incorporated (''integrated'') into the Electronic Engine Control module (EEC). This was done to simplify the system and reduce cost. It is noteworthy that the system was also designed so that the servo solenoids could not receive sufficient power for activation when the vehicle was stationary and the ignition was in the ''run'' position, even if faults in the ground-side circuitry occurred. Only when both the positive and negative (''ground'') circuits are closed is there enough power available to activate the solenoids in the integrated system unless it has been modified in some manner inconsistent with Ford's design.

Between 1986 and 1992, Ford built a number of model lines with integrated cruise control systems. After the 1992 model year, only the Taurus SHO was so equipped. Ford has stated that it returned to a stand-alone cruise control amplifier because it needed to use the limited EEC connector capacity for other functions such as electronically controlled automatic transmissions and additional, emissions-related inputs. Those models returning to the stand-alone system retained the earlier circuitry, which provided full electrical power to reach the servo solenoids when the vehicle was stationary with the ignition in ''run.'' Also, beginning in 1992, Ford began phasing in a fully electronic cruise control system, doing away with the vacuum servo completely. In some cases, then, certain identical models were initially equipped with stand-alone cruise controls; then were built with integrated systems; then returned to the stand-alone system; and finally were built without vacuum servos at all. These changes provide an excellent opportunity to assess Mr. Sero's theory. If the rate of SAIs for vehicles equipped with the stand-alone system were significantly greater than for those without, it would support the theory.

One such vehicle is the Lincoln Town Car, which has an added advantage (for purposes of assessing cruise control's role in SAI): every 1985 through 1996 Town Car was built with a cruise control system of one type or

[23] McMath letter, 1.

[24] Jarvis, May 18, 1999 Daubert Hearing Tr. 28.

[25] The Random House College Dictionary (New York: Random House, Inc.), 1362.

[26] For example, during ''Dateline NBC's'' February 10, 1999 broadcast, Mr. Sero claimed that cruise control electrical faults may occur ''if there is water in the wiring,'' and ''if water does play a role, proving it would almost be impossible.''

[27] Jarvis, Daubert Hearing Tr. 129.

[28] Judge Buchwald, in her October 27, 1999 Directed Verdict and Order, explains, ''The admission of Sero's . . . theories into evidence was based on plaintiff's representation that they would be connected by direct and circumstantial evidence to the incident at issue. As the discussion *infra* will demonstrate, that promise was illusory.''

[29] Jarvis, Daubert Hearing Tr. 66.

[30] McMath letter, 6.

[31] Ibid., 2.

[32] Most SAI-involved drivers claim the vehicle would not respond when the brakes were applied.

[33] Pollard and Sussman, viii.

another. Thus, rate variations could not be alleged to result from the ''mix'' of Town Cars with and without cruise controls. The following cruise control systems were used in the 1985 through 1996 Town Cars:

TABLE 1.—TOWN CAR CRUISE CONTROL TYPE BY MODEL YEAR

1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
VacSA	VacSA	VacSA	VacEC	VacEC	VacEC	VacSA	NGSC	NGSC	NGSC	NGSC	NGSC

VacSA = Vacuum system with stand alone amplifier.
VacEC = Vacuum system with amplifier function in EEC.
NGSC = Electronic speed control—no vacuum.

Initially, the Town Car was equipped with the stand-alone system (''VacSA''). Then, with the 1988 model year, they were built with the integrated system (''VacEC''), i.e., there was insufficient power available to activate the solenoids when the vehicle was stationary even if the ignition was in ''run.'' For the 1991 model year, Ford returned to the stand-alone system (and, consequently, the solenoids received full electrical power whenever the ignition was in ''run''). For the 1992 model year, Ford changed engines from the 5.0 Liter V8 to the 4.6 Liter single overhead cam (SOHC) version. Beginning November 4, 1991, all 1992 Town Cars were built with a fully electronic cruise control system, eliminating the vacuum servo altogether and, as of November 14, 1991, all were built with shift-lock.[34] By comparing the 1985 through early 1992 model years, Town Car offers a unique opportunity to evaluate the effect vacuum controlled cruise controls have on SAI rates by allowing us to compare identical vehicles with one variable—i.e., whether or not the servo solenoids can receive full power any time the ignition is in ''run.''

ODI searched its complaint database for 1985 through 1991 model year (MY) Town Car complaints that have been categorized as ''sudden acceleration.'' If Mr. Sero's theory were valid, the SAI rate for Town Cars built with the integrated system (MY 1988 through 1990) should be significantly lower than for those with a ''stand-alone'' system. This is because there is insufficient power to activate the servo solenoids in this system even if ground faults occur while the vehicle is stationary. However, the rate is about the same for both the stand-alone and integrated systems: 13.7 (stand-alone) vs. 15.1 (integrated)—both very low rates, particularly compared to the 1978 through 1987 Audi 5000s, which had a SAI rate of 586/100K. The relatively constant SAI rate when comparing both Ford cruise control systems is a strong indicator that cruise control ground circuit faults are not contributing to SAIs.

4.2 The Petitioner's Second Allegation

The petitioner claims NHTSA ''apparently failed to consider the data collected by Ford Motor Company in its investigation of 2,800 incidents of sudden acceleration during 1989–1992.'' [35]

[34] ''Shift-lock'' will be explained in Section 4.2.1.

[35] McMath letter, 6.

4.2.1 The ''Updegrove Study,'' Shift-locks, and Driver Behavior

Beginning in early 1987, Ford's Service Engineering Office (organizationally located within its Parts and Service Division) began gathering information about incidents where an alleged unintended engine power increase occurred in Ford vehicles. Previously, this information had been gathered by Ford's district representatives (typically engineers). In 1989, Ford noted a substantial increase in the number of these incidents. In response, it organized a ''Special Projects Team,'' headed by Alan Updegrove, a Ford engineer. Ultimately, Ford gathered and analyzed information about 2,877 incidents (approximately), many from Hertz and Budget Rent-a-Car outlets. This effort has become known as the ''Updegrove Study'' (Updegrove).

Sixty percent of the incidents reviewed by Updegrove involved sudden acceleration (as defined in Section 2.1, previously). The team focused on determining whether the alleged unintended engine power increase could be verified by physical evidence. In December 1992, the project was discontinued without identifying a root cause, although there were indications that drivers were mistakenly pressing the gas pedal instead of the brake pedal (*e.g.,* ''pedal misapplication'').[36] In 1990, Ford began building some of its vehicles with shift-lock devices and by the 1992 model year all new Ford vehicles had them. With shift-lock, the automatic transmission may not be shifted out of ''Park'' without the driver simultaneously stepping on the brake. According to Mr. Updegrove, the SA rate for the shift-lock equipped vehicles was substantially lower than it was for those without shift-lock.[37] This trend provided credible evidence that pedal misapplications were the major cause of SAIs since shift-locks influence driver behavior alone.[38] Since SA first began to be studied, some individuals have doubted that driver error or pedal misapplication explains SAIs. For example, Mr. Sero has stated, ''Mysteriously, we have all these people who are slamming down the throttle pedals, but I can't buy it.''[39] However, compelling evidence exists supporting the pedal misapplicaiton finding.

In a 1989 study, Richard A. Schmidt reviewed evidence ''for a human factors explanation of the phenomenon of unintended acceleration, whereby at the start of a driving cycle an operator experiences full, unexpected acceleration for as long as 12 seconds with an apparently complete failure of the brake system, often leading to an accident.'' [40] Schmidt then posed the following questions, echoing those who doubt SAIs result from unintended driver errors in pedal application:

''However, as logical and simple as this viewpoint [that SAIs are the result of a pedal error] may sound, a number of other aspects of this phenomenon at first glance make such simple human factors accounts difficult to believe. First, what is the source of such foot placement errors? Why would experienced drivers, often with hundreds of thousands of miles of experience throughout their lifetimes, suddenly make such errors, and what are the physiological and psychological processes that precipitate them? Second, even if the wrong pedal were contacted, why would the driver not perceive this error immediately? The brake and accelerator pedals are in different places with respect to the driver's body, and the dynamic ''feel'' of these two pedals is considerably different, make it difficult to understand how such an error would not be detected easily. Third—and perhaps most puzzling—why would the driver persist in pressing the wrong pedal for sufficient time that an accident could occur, in some cases for as long as 12 seconds? Usually ample time for corrective action (to turn off the ignition or shift to Neutral or Park) is available, and yet drivers typically report no attempts to take such action until

[36] Ford Motor Company, Profs Field Bulletin No. 92182DB60005, June 30, 1992.

[37] June 22, 1999 deposition of Alan Updegrove in *Jarvis* v. *Ford*, Tr. 149.

[38] NHTSA data show that some alleged SAIs continue to occur, even in vehicles equipped with shift-locks, whether they had cruise control or not. Most of these involve events which began when the transmission was not being shifted, i.e., it was already in ''Drive'' or ''Reverse.'' In other cases, SAIs involved drivers who became confused and disoriented by the rapid, frightening events occurring during the incident. Consequently, their best recollections of the precise event sequence may be faulty. Finally, some involve vehicles where the shift-lock had been disabled. For example, ODI investigated a Minneapolis double-fatality crash in which a stationary 1997 Ford Econoline police van, without cruise control, suddenly accelerated into a parade crowd. The vehicle's shift-lock had been inadvertently disabled by the Minneapolis Public Works garage. For more information on this incident, refer to NHTSA Report MF99–002, dated 1/12/99, and Supplemental Report, MF99–002, dated 3/18/99.

[39] NBC News, ''Dateline NBC,'' Not So Fast, February 10, 1999.

[40] Schmidt, 345.

the accident occurs, bolstering their belief in a mechanical cause.'' [41]

Schmidt concluded that pedal placement errors rarely involve ''conscious choice,'' and drivers involved in a sudden acceleration crash are therefore frequently not aware of their errors in foot placement.

Once unintended acceleration is initiated, a serious contributing factor is the failure to detect and correct the foot placement error, mainly because of lack of effective feedback from the well-learned, essentially automatic foot movements. The onset of the unintended acceleration may produce a startle reaction compounded by severe time stress, placing the individual in a state of hyper vigilance [panic] in which information-processing activities necessary to take effective action are seriously disrupted.'' [42]

SAIs typically involve vehicles that are relatively unfamiliar to the driver [43] and occur much more frequently as driver age increases: there is a 100–600% over-involvement of drivers older than 60 years (normalized for miles driven per year) and under-involvement for drivers 15–40 years of age.[44] The petitioner's own case, currently in litigation, is consistent with this finding. There, the SAI involved a vehicle driven by a 61 year-old female which she and her husband had owned for 93 days.

4.2.2 Updegrove and NHTSA SAI Data

The aforementioned NHTSA studies and reports were conducted and published prior to the conclusion of the Updegrove effort. Thus, none of the Updegrove material was—or could have been—included in NHTSA's Study because it was concluded just as the Updegrove effort began. To assess whether the Updegrove study contains information undermining NHTSA's findings, ODI examined the Updegrove data.

We first reviewed the 472 SAI reports for the Ford Thunderbird/Mercury Cougar. We chose these models because, according to Ford, the 1989 Thunderbird/Cougar had a disproportionate number of SAI reports, which prompted the company to undertake the Updegrove investigation.[45]

With the 1990 model year, Ford began installing brake/start interlocks in the Thunderbird/Cougar models. Unlike ''shift-locks''—where the driver may not shift the automatic transmission out of ''Park'' without simultaneously pressing on the brake pedal—a brake/start interlock system requires that the driver simultaneously press on the brake pedal and rotate the ignition key to start the engine. If the brake pedal is not pressed, the starter will not engage. Brake/start interlocks do not affect the driver's ability to shift the transmission out of ''Park'' and consequently are not as effective at reducing SAIs as shift-locks, which do.

In analyzing Updegrove's data, ODI found it supports Ford's claim that its study was initiated because the sudden acceleration report rate increased for the 1989 MY Thunderbird/Cougar vehicles. The data also confirms that the brake/start interlock system installed in the 1990 MY Thunderbird/Cougar vehicles was not as effective at reducing the rate of SAI's as was the shift-lock system installed in the later model years.[46] Updegrove documented 466 SAI reports involving 1985–1991 Thunderbird/Cougar without shift-lock and 6 involving the subsequent model years equipped with the devices. This equates to a SAI report rate of 30.2 per 100,000 vehicles vs.1.8 per 100,000 vehicles, respectively.[47]

To verify the trend observed in the Updegrove data, ODI analyzed the sudden acceleration reports stored in its complaint database for the same model/model years (1985 through 1993).

ODI reviewed 243 SAI reports for the non-shift-lock equipped Thunderbird/Cougar and 14 reports for the 1991–1993 model years equipped with the device. The report rate for each is 17.3 and 2.9 per 100,000 vehicles, respectively. While the overall ODI data counts are lower than those identified by Updegrove (primarily because vehicle owners are more likely to report a vehicle problem to the manufacturer than to the U.S. Government), the ODI data confirm the trend observed during the Updegrove study—that shift-locks dramatically reduced the sudden acceleration report rate.

ODI also analyzed both Updegrove and ODI data for the Ford Aerostar because, according to Updegrove, ''we began to see the Aerostar numbers rising and in our discussion with both Hertz and Budget, they asked us to get involved with those.'' [48] Updegrove documented a total of 519 SAI reports involving Aerostars, which were introduced by Ford in MY 1986.

The Updegrove data indicate that the addition of a shift-lock in MY 1992 dramatically reduced the number of Aerostar SAI reports—518 involving Aerostars without a shift-lock and one with the device. However, these data may be misleading because the Updegrove study was concluded in December, 1992, conceivably before any trends related to shift-lock-equipped Aerostars would fully develop. So, to verify the trend observed in Updegrove, ODI also analyzed its complaint database for sudden acceleration reports from Aerostar owners for model years 1986 through 1993, with the adjustment for exposure described in footnote 47.

There were 168 SAI reports for Aerostars without shift-lock and 7 SAI reports involving those with the device in the ODI complaint database. This results in a report rate of 16.6/100,000 vs. 1.7/100,000 Aerostars, respectively. This substantial rate decrease confirms that shift-lock devices are extremely effective at reducing the probability a SAI will occur. Shift-locks, however, cannot eliminate SAI altogether because they do not address all types of pedal-misapplications, including those where the incident was not immediately preceded by a transmission shift out of ''Park'' (see footnote 38—Ed.).

Finally, ODI examined the data from both its database and the Updegrove study for the Lincoln Town Car. We chose this model because the petitioner's letter refers to a SAI involving a 1988 Lincoln Town Car. Updegrove documents a total of 204 SAI reports concerning 1985–1993 Town Cars. ODI reviewed 123 SAI reports in its complaint database for the same model years.

The report frequency trends observed in both the Updegrove and ODI Town Car data are consistent with those discussed earlier—the SAI report rate is sharply reduced for vehicles equipped with shift-lock. Using the Updegrove data, the rate for Town Cars without shift-lock is about 26/100,000. Updegrove documented no SAIs involving Town Cars equipped with shift-lock; however, this is not determinative because Ford was just introducing shift-lock into these models as the Updegrove study was concluding. The ODI analysis does not have this shortcoming and reveals a SAI complaint rate of about 4.1/100,000 vs. 15/100,000 for Town Cars with and without shift-lock, respectively. The following table documents our findings:

TABLE 2.—UPDEGROVE/ODI SAI RATE COMPARISON FOR SELECTED VEHICLES WITH/WITHOUT SHIFT-LOCK

Models	No shift-lock (Ford)	No shift-lock (ODI)	Shift-lock (Ford)	Shift-lock (ODI)
T-Bird/Cougar	30.2/100,000	17.3/100,000	1.8/100,000	2.9/100,000
Aerostar	51.2/100,000	16.6/100,000	0.25/100,000	1.7/100,000
TownCar	26.3/100,000	14.8/100,000	0	4.1/100,000

[41] Ibid., 346–347.

[42] Ibid., 363.

[43] Perel, M. (1983). Vehicle Familiarity and Safety (Tech. Report DOT HS–806–509). Washington, DC: U.S. Department of Transportation.

[44] National Highway Traffic Safety Administration, Engineering Analysis Action Report, EA78–110, August 5, 1986, 11.

[45] Ford Motor Co., Alleged Unintended Acceleration Investigative Effort Summary, 1.

[46] For example, based on the Updegrove date, the SAI report rate for the 1989 Cougar/Thunderbird was 154/100,000 vehicles. The rate for the 1990 model year (with brake/start interlocks) was 54.6/100,000 vehicles and the rate for the 1991 model year (with shift-lock) was 10.8/100,000.

[47] The Updegrove data was not normalized for exposure time and some older models may have higher report counts because they have been on the road longer. To avoid this problem, the ODI data is limited to sudden acceleration reports received within a consistent 4-year ''window'' based on the model year being analyzed. For example, the 1989 MY report count is comprised of all SAI reports received by ODI between January 1, 1988 and December 31, 1991.

[48] Ibid.

In summarizing the Updegrove study's results, J.P. King (Manager, Ford Parts and Service Engineering Office) wrote:

''Overall, the results of the investigation confirm the suggested cause stated in the NHTSA study, published in January 1989 (''An Examination of Sudden Acceleration''). This report on the subject, identified operator pedal misapplication as the most likely cause of these events.'' [49]

Mr. King was referring to the NHTSA Report, which stated,

''For a sudden acceleration incident (SAI) in which there is no evidence of a vehicle malfunction, the inescapable conclusion is that the driver inadvertently pressed the accelerator instead of, or in addition to, the brake pedal.'' [50]

The suggestion that the Updegrove data undermines this finding is erroneous.

4.3 The Petitioner's Third Allegation

According to the petitioner, ''NHTSA has not addressed the fact that there is no true failsafe mechanism to overcome sudden acceleration.'' Before addressing this allegation, this document will discuss the brake pedal-activated cruise control disconnect system on Ford vehicles (since the petition focuses on them). The following relates only to those Fords with ground-switched, vacuum activated cruise controls.

4.3.1 The Mechanical Vacuum Dump Valve (MVDV)

Whenever the cruise control system is set to maintain a desired vehicle speed, it can be easily disengaged by pressing lightly on the brake pedal. When the brake pedal is pressed, two cruise control-related events occur: first, the electric dump switch (EDS)—positioned immediately adjacent to the brake pedal arm—closes, sending an electrical signal to the cruise control amplifier (stand-alone) or EEC (integrated), which activates the servo's vent solenoid. When this happens, the throttle is no longer influenced by the cruise control even if the brake pedal is subsequently released. Only by pressing the ''set'' or ''resume'' button again—assuming the system is ''on;'' the vehicle is traveling above the minimum set speed; and the brakes are not applied—will the cruise control reactivate to maintain vehicle speed. The EDS normally closes when the brake pedal is depressed as little as 1/16 inch. In the 1988 Town Car involved in the petitioner's litigation, the EDS closes when the brake pedal is depressed 1/16 inch, which occurs whenever 2 lb. of force is applied to the pedal, whether the brakes are ''boosted'' [51] or not. Second, to provide an independent means of isolating the servo from the throttle in the event of electrical failure (thus rendering the EDS inoperative), the vehicles are also equipped with an extremely simple mechanical pneumatic valve (mechanical vacuum dump valve, ''MVDV'') which, like the EDS, is located immediately adjacent to the brake pedal arm. The MVDV opens whenever the brake pedal is pressed at least 3/4 inch. In the aforementioned Town Car, this occurs at about 3.5 lb. with boosted brakes and 12 lb. without. All servo vacuum is immediately depleted at that point. By maintaining relatively little force on the brake pedal, the MVDV will continue to release the throttle independently of the vent solenoid. Only a mechanical failure of the MVDV or a pinched MVDV vacuum line would keep this from occurring. Either of these circumstances would not be self-correcting and would be easily detected during a vehicle inspection.

The MVDV is comprised of five parts. Its housing is a plastic cylinder with a nipple at one end. A spring-loaded plunger is positioned inside the housing. A rubber o-ring seals the plunger within the nipple whenever the brake pedal is not being depressed. In this way, the o-ring maintains vacuum within the servo unless the brake pedal is pressed. When the brake pedal is pressed, the plunger moves forward, the o-ring no longer seals the nipple, and servo vacuum is immediately depleted. If the o-ring fails and a vacuum leak results, the cruise control will not open the throttle at any time.

The MVDV is installed in the vehicle so that it is closed (i.e., maintaining servo vacuum) when the brake pedal is not depressed. Mechanics are instructed to adjust the MVDV so that there is a gap of .05 inch between its housing and the ''adapter'' [brake pedal arm—Ed.] [52] By design, the cruise control will not function if this gap is not maintained. Here's why: If the gap is substantially greater than .05 inch, the MVDV would always be open (regardless of brake pedal position). Thus, vacuum could not be maintained within the servo. If the gap is fractionally less than .05 inch, the MVDV would press on the brake pedal, activating the EDS.[53] The MVDV is securely mounted in a substantial bracket so that its adjustment is unaffected by normal vehicle operation and most crash forces. Any MVDV misadjustment would not be self-correcting and would be easily noted during a vehicle inspection.

In the following testimony, Mr. Sero confirms a vehicle will stop if the brakes and MVDV are functioning properly:

Q: ''So, if everything you said occurs, and the vehicle has a properly functioning brake system and a properly functioning dump valve, all they need to do to correct the condition is to put their foot on the brake, isn't that so?

Sero: To correct the condition? All——

Q: To stop the vehicle.

Sero: To stop the vehicle, yes.'' [54]

However, he has also claimed Ford MVDV's are prone to failure and describes one failure mode as:

''First of all, this is a threaded piece on the end. Plus, it's mounted in a bracket on the brake pedal. Brackets come loose and move, you won't engage the dump valve. If the dump valve itself is not threaded to the proper position, you won't engage the dump valve.'' [55]

This description is inconsistent with MVDV design and mounting and is not supported by any field data.

4.3.2 A Cruise Control ''Fail-safe?''

The petitioner has claimed that, ''NHTSA was misled into believing that the *electrical* [emphasis added] cruise control disengage mechanism activated by the brake pedal is always available to save the driver should a malfunction of the cruise control system induce sudden acceleration'' and then quotes from the Report:

''All cruise controls incorporate one or more fail-safe devices designed to disable the control whenever the brake pedal is depressed. Unlike the cruise control itself, these simple switches and valves are not subject to complex, intermittent failure modes which would permit the cruise control to remain engaged during the SA incident, but which would be difficult to recognize after the fact. Intermittent failure modes for such devices result in deactivation of the cruise control.'' [56]

However, the petitioner did not include the entire quote from the NHTSA Report (the omitted portion is in bold print):

''All cruise controls incorporate one or more fail-safe devices designed to disable the control whenever the brake pedal is depressed. Unlike the cruise control itself, these simple switches and valves are not subject to complex, intermittent failure modes which would permit the cruise control to remain engaged during the SA incident, but which would be difficult to recognize after the fact. Intermittent failure modes for such devices result in deactivation of the cruise control. In most factory-installed cruise controls [including those in Ford vehicles], redundant electrical and pneumatic [emphasis added] brake-pedal defeats are employed. Chapter 4 of Appendix H describes in detail the functioning of the cruise control in the Audi 5000, which is typical of all modern, micro-processor designs.'' [57]

The referenced ''pneumatic'' defeats, in Ford vehicles, are MVDV's. NHTSA recognized that there was a separate ''failsafe'' mechanism to disable the cruise control in the event the ''electrical'' defeats were inoperative due to random and isolated electrical failures. The agency has always recognized that random and isolated electrical failures could occur, but noted that the probability this could cause a SAI was extremely small.'' [58] However, apart from

[49] Ford Motor Company, Profs Field Bulletin No. 92182DB60005, June 30, 1992.

[50] Pollard and Sussman, 49.

[51] ''Boosted'' means power-assisted (i.e., ''power'') brakes.

[52] Ford Motor Co., 1988 Lincoln Town Car Shop Manual, 37–05–4.

[53] In fact, this gap is so critical to cruise control operation that Ford cautions mechanics as follows: ''CAUTION: Black dump valve housing in contact with adapter can cause stoplamps to activate with temperature change.'' Ibid.

[54] Jarvis v. Ford, Daubert Hearing Tr. 133.

[55] Ibid., 84.

[56] McMath letter, 4.

[57] Pollard and Sussman, page 9, third full paragraph.

[58] The Pollard and Sussman Report states, at page 9, ''While it is not extremely rare for an electronic part or solder joint to fail intermittently in a manner that is difficult to recognize or diagnose, the probability is extremely small for two or more parts or connections to fail simultaneously at exactly the right moment to cause an SAI, but then fail to do so during subsequent diagnostic tests.''

these general electrical failures, the NHTSA Report also addressed the potential role of the MVDV in SAIs by stating:

''Multiple simultaneous failures in [the cruise control system] would be required to produce SAIs from a stopped or low-speed condition. In addition to these [electrical] failures, a simultaneous mechanical failure in the vacuum breaker [MVDV] attached to the brake pedal would be required to prevent the driver from defeating the cruise control by braking. No evidence of such failures was found in vehicles exhibiting SAIs by TSC or ODI investigators.'' [59]

No evidence has been produced to date indicating that this finding, published in 1989, was erroneous.

It is an essential part of Mr. Sero's theory that the SAI-involved vehicles either are not equipped with a MVDV (not likely in vacuum activated cruise control systems) or, if they are, it failed. However, to date, Mr. Sero has found no evidence that a MVDV malfunction occurred in any of the SAI-involved vehicles that he inspected. [60]

The petitioner's claim that ''NHTSA has not addressed the fact that there is no true failsafe mechanism to overcome sudden acceleration'' is simply wrong. NHTSA explicitly noted that in the event of unintended throttle opening due to a cruise control malfunction, the MVDV is designed to immediately deplete cruise control servo vacuum, and thus release the throttle, if the driver applies the brakes even lightly'a reasonable scenario. However, the petitioner posits that this is unreasonable:

''By maintaining that the brake system and the devices activated by the brake pedal (the dump valve and the electrical cruise control shut-off) provide adequate failsafe protection, NHTSA in effect makes the driver the throttle's failsafe mechanism, since he or she is responsible for affirmatively taking corrective action to eliminate the peril.'' [61]

This position is echoed by his consultant (Mr. Sero) who testified that:

''The dump valve [MVDV] is not an inherently good safety mechanism. The reason it isn't is it depends on the operator pushing the brake pedal.'' [62]

Sero went even further by claiming that applying the brakes, in the event of a cruise control malfunction, will only stop the vehicle:

''If you know enough to keep your foot on the brake and keep doing it'' [63]

Thus, the petitioner and his consultant take the position that drivers are not responsible for the safe operation of their vehicle. This concept is contrary to the motor vehicle laws in each of the 50 states which hold the driver ultimately responsible for safe vehicle operation.

4.3.3 The VRTC Braking Tests

To evaluate vehicles' braking effectiveness in overcoming vehicle acceleration due to a potential cruise control malfunction, TSC contracted with the VRTC to conduct the series of braking tests documented in Appendix E of the NHTSA Report. In addition to demonstrating that vehicle brakes are capable of stopping such accelerations with relatively low brake pedal efforts, these tests also undermine the petitioner's claim that NHTSA never considered cruise control system failures that would ''entirely bypass the system's control logic.'' [64]

According to a Memorandum Report within Appendix E, the purpose of the test program was to ''determine vehicle performance (acceleration and stopping) with simulated cruise control failures'' including a ''direct short of the vacuum solenoid and regulator valve [sic] to ground'' [65] [emphasis added]—precisely the scenario envisioned by the petitioner's theory. According to VRTC, ''the primary purpose of this part of the test was to determine how rapidly the subject vehicles can accelerate from a stationary position if the cruise control system was to malfunction and begin to open the throttle as soon as the driver shifted the transmission into 'Drive.' ''[66] Ten vehicles—representing a broad spectrum of drive-line and cruise control configurations—were tested, including a 1984 Mercury Grand Marquis and 1985 Cadillac DeVille. Both the Mercury and Cadillac are equipped with vacuum servos and ground-switched solenoids. VRTC's use of the term ''vacuum solenoid and regulator valve,'' is a holdover from the Audi testing they had conducted earlier and should have read ''vent and vacuum solenoids.'' [67]

While preparing this petition response, ODI contacted the personnel involved in the subject testing and verified its purpose and methodology, particularly Test Series 6. This Series' primary purpose was to evaluate acceleration and braking performance if, for some reason, the cruise control servo inadvertently activates while a vehicle is stationary with its engine running. They accomplished this by modifying the cruise control system, isolating its servo from the controlling mechanism (e.g., an amplifier, for instance), and disabling the MVDV. Then, by flipping switches in a control box (part of their modifications), they could apply vacuum to the servo independently of the solenoids. In this way, they created a ''worst-case'' situation where every cruise control engagement threshold (i.e., the system is not ''on,'' minimum set speed, transmission selector position, and brake application, etc.) was intentionally bypassed. With vacuum applied in this way, the servo would open the throttle as far it could even though the vehicle was stationary. [68] After accelerating forward for two seconds, [69] the vehicle was stopped by applying the brakes with a variety of pedal forces. The throttle was not released until the vehicle had come to a stop. The total distance traveled, at each brake apply force, was then measured. In this way, the brakes' ability to stop the vehicle, should the throttle be held open by a malfunctioning cruise control system, was evaluated.

These tests revealed that brake pedal application forces of 60 lb.[70] would have stopped all but one of the ten tested cars in about 45 feet or less. The exception was the 5.0 liter Camaro Z–28, which had the highest power-to-weight ratio among those tested and required as much as 79 feet. Higher brake forces generally reduced these distances. Here are the test results as they appear in the Report: [71]

[59] Pollard and Sussman, Appendix H, ''Introduction and Summary,'' 1–4.

[60] For example, in Jarvis (Trial Tr. 948), Mr. Sero, when asked whether he had any evidence that the MVDV was improperly installed, calibrated, or operating, answered ''No.''

[61] McMath letter, 6.

[62] Jarvis v. Ford, Daubert Hearing Tr. 83.

[63] Ibid., 133. Later in the same hearing (Tr. 171), the Court asked Mr. Sero (who had again testified that the dump valve would only work if the driver continued to press the brake pedal), ''Well, why in heaven's name, if your car was shooting out from under you and you put your foot on the brake and it was effective, would you take your foot off the brake?'' [emphasis added]

[64] Ibid., 5.

[65] Pollard and Sussman, E–31.

[66] Ibid., E–32.

[67] Pollard and Sussman, on page 9, provide a clearer description of this testing by stating, ''the maximum accelerations produced by simulated cruise control failures, which were associated with faults that drove the highest possible current through the vacuum solenoids or actuators [emphasis added] were significantly less than those generated by drivers pressing their gas pedals to the floor.''

[68] The cruise control servo on Ford vehicles is mechanically limited so it can only open throttle about 80%. The servo cannot fully open the throttle (wide open throttle or WOT), as happens when flooring the accelerator.

[69] Pollard and Sussman, page 10, explain the delay as follows: ''because an unexpected increase in engine power may produce a slower-than-normal reaction time (normal braking reaction time is about one second), a series of tests was conducted in which braking was not initiated until two seconds after a simulated cruise control fault.''

[70] In a study by R.G. Mortimer, L. Segal, H. Dugoff, J.D. Campbell, C.M. Jorgeson, and R.W. Murphy entitled ''Brake Force Requirements: Driver-vehicle braking performance as a function of brake system design variables,'' it was found that 99% of all subjects (male and female) were able to generate brake pedal forces of at least 60 lbs.

[71] Pollard and Sussman, 11.

[72] Because of its mechanical cruise control, the Chrysler unit could not be connected to the electrically operated test recorder. However, worst-case faults for this unit were simulated by plugging the vacuum release ports and applying available manifold vacuum. The peak speeds achieved in two seconds were less than 5 mph, and the stopping distances after brake application were less than 5 feet. Thus the total distances traveled were substantially less than those of any of the other cars tested.

TABLE 3.1.2–2: TOTAL DISTANCE TRAVELED (FEET) BY VARIOUS VEHICLES AFTER SIMULATED WORST-CASE CRUISE CONTROL-INDUCED ACCELERATION LASTING TWO SECONDS, FOLLOWED BY BRAKE PEDAL APPLICATION. DATA SHOWN ARE THE HIGHEST VALUES MEASURED IN THE SERIES 6 TESTS DESCRIBED IN APPENDIX E. EXPERIMENTAL VARIATION ACCOUNTS FOR LONGER STOPS AT HIGHER PEDAL FORCES IN SOME RUNS.

Make	Total distance traveled (feet) for given brake-pedal Force		
	60#	100#	150#
Audi 5000, 1982	17.1	14.2	16.4
Audi 5000, 1984	18.6	13.9	12.5
Buick Electra, 1986	27.3	31.7	26.9
Cadillac DeVille, 1985	42.1	38.2	37.1
Chevrolet Camaro, 1984	78.8	74.4	50.1
Chrysler New Yorker [72]	N/A	N/A	N/A
Mercedes 300E, 1988	22.3	25.8	23.7
Mercury Marquis, 1984	31.5	32.5	29.7
Nissan 300ZX	45.7	*	*
Toyota Cressida, 1982	29.4	25.5	26.4

*Brake pedal forces greater than 60 pounds caused wheel lockup.

Based on this testing, the Report concludes:

''For SAIs where a cruise control failure has been alleged, but the brake system was found to be in good working order, and the vehicle traveled a substantially greater distance than those shown in Table 3.1.2–2, it must be concluded that either the brake pedal was not appropriately applied or that cruise control failure was not a factor in the SAI.'' [73]

4.3.4 Mr. Sero's Testing

Modifying a stationary vehicle's cruise control so that it may be energized and the throttle opened while the engine is running (as in the VRTC tests) is not unknown to Mr. Sero. In a segment entitled ''Not So Fast,'' broadcast by NBC News ''Dateline'' program on February 10, 1999,[74] portions of a video tape identified by ''Dateline'' as ''a demonstration, played in an Ohio court'' [75] were shown. The video tape, in its entirety, was recently obtained by ODI and placed in the public file for this petition. A little over ten minutes in length, it shows a MY 1987 Ford Crown Victoria (VIN 2FABP74F4HX183403, built on March 12, 1987 at the St. Thomas, Canada, assembly plant) which, according to the ''Dateline'' host, ''Sero [had] deliberately rewired, adding switches an assistant could flip to produce the two wiring problems.''

The video tape, including those portions shown by ''Dateline,'' shows the Crown Victoria being ''tested'' a number of times. All occur in the same section of a dead-end two lane road in Pennsylvania. At 5:40 into the video, the driver (''assistant'') can be heard describing the test procedure:

''What I'm going to do is, the car is stopped, the engine is off, and the gearshift is in Park. I'm going to put my foot on the brake, start the engine, drop the gearshift into drive, and when I release the brake, I'm going to throw a switch [installed as part of the test modifications] and this switch will automatically engage the cruise control so you would get maximum acceleration. My foot will always be off the accelerator. I will leave it on maximum acceleration until I reach the second cone and then I'll throw a switch to disengage the accelerator and I will brake to bring the vehicle to a stop.''

Earlier in the video (at 3:45) he says that ''throwing'' the switch will ''short-out the cruise control.''

There are a number of troubling aspects to the video-taped demonstration. First, according to the driver, when the switch is ''thrown,'' ''maximum acceleration'' will occur, presumably similar to what would happen if the accelerator pedal had been floored. However, at 6:32 the driver is clearly shown ''throwing'' the switch yet the engine speed does not increase immediately—as would happen if the gas pedal were pressed and held to the floor—but, instead, it builds gradually. The reason for this is never clarified in the video tape or by ''Dateline.'' The NHTSA Report, however, explains why this happens:

''The credibility of cruise control faults as an explanation for SAI is further reduced by the fact that in most designs, the actuator [servo] requires a few seconds to open the throttle fully and in some designs, can never reach or maintain the wide-open (WOT) condition.'' [76]

Second, the driver's claim that they are demonstrating ''maximum acceleration'' is misleading. ''Maximum acceleration'' only occurs at WOT. The cruise control servo is mechanically limited so the throttle will open no more than 80% of WOT, no matter if it's operating normally or has been modified to demonstrate certain failure modes (as in the VRTC and Sero tests).

Third, in most of the video taped test runs, the vehicle is accelerating for a period between 5.5 and 7 seconds before the brakes are applied. This delay time is completely inconsistent with real-world driver behavior where reaction times of less than 2 seconds are the norm. While viewing the video tape, ODI observed that, in the first two seconds after the switch had been ''thrown,'' the vehicle traveled less than a car length. Had the driver applied the brake at that moment, the total travel distance would have been much shorter—consistent with the VRTC testing results documented on page E–50 of the NHTSA Report.

Fourth, the video tape never clarifies whether the MVDV had been intentionally disabled. Based on the driver's stated operational sequence (''I will leave it on maximum acceleration until I reach the second cone and *then I'll throw a switch to disengage the accelerator and I will brake to bring the vehicle to a stop.''* [emphasis added]) it would appear it had not been. Otherwise, there would have been no need to ''disengage the accelerator'' before braking to a stop because the MVDV would have ''disengage[d] the accelerator'' when the brakes were applied. By not disabling the MVDV, the ''test'' gave the misleading impression that, should the electrical dump switch (EDS) fail, nothing could be done—short of turning off the engine—to isolate the throttle from the cruise control servo.[77]

The final, and most troubling, aspect of the video tape is that there are no tests demonstrating the vehicle will stop with relatively low brake pedal force even if the cruise control servo is holding the throttle open as far as it can (80% of WOT). Instead, ''Dateline'' used portions of a video-taped Ford test. This video tape, produced during the Manigault litigation, shows Ford testing a Crown Victoria/Grand Marquis with the brakes applied while the throttle is held at WOT. ''Dateline'' erroneously implies that the Ford test represents what would happen if the cruise control servo were holding the throttle open. Since the servo can only open the throttle 80% of WOT, the vehicle would have accelerated slower and stopped quicker with less pedal force (''pressure'') than ''Dateline'' implies, even assuming the MVDV did not disable the cruise control. Mr. Sero, and ''Dateline,'' never address this aspect of cruise control design. But, VRTC's testing did. The NHTSA Report shows, on page E–50, that a virtually identical vehicle (the 1984 Mercury Grand Marquis) stopped after traveling a total of 31.5 feet by pressing on the brake pedal with 60 lb. of force even though the servo was still holding the throttle open as far as it could. According to NHTSA's Report:

For most vehicles tested [including the 1984 Mercury Grand Marquis], the maximum accelerations produced by simulated cruise control failures . . . were significantly less than those generated by drivers pressing their gas pedals to the floor.'' [78]

The petitioner's allegation that ''NHTSA has not addressed the fact that there is no true failsafe mechanism to overcome sudden acceleration'' is simply wrong. The NHTSA

[73] Pollard and Sussman, 11.

[74] This segment focused on the issue of sudden acceleration and discussed the Sero theory at length. Its senior producer was Allan Maraynes, who had produced the ''60 Minutes'' Audi sudden acceleration story (Footnote 11) 13 years earlier.

[75] Manigualt v. Ford, Court of Common Pleas for Cuyahoga County, Ohio, case number 286862. Originally, the jury found Ford was not liable. In April, 1998, the jury's verdict was overturned by a lower court judge (but not the original trial judge). On June 17, 1999 the Ohio Eighth District Court of Appeals reversed the second judge's decision and mandated that the original verdict be enforced. Manigualt then appealed to the Ohio Supreme court which, on October 27, 1999, declined to hear the case.

[76] Pollard and Sussman, 9.

[77] ''Dateline'' discusses and shows a MVDV. However, they never demonstrate that the throttle will return to idle—even if the servo solenoids have been inadvertently activated—simply by pressing lightly on the brake pedal to open the MVDV.

[78] Pollard and Sussman, 9.

Study shows conclusively that, should a SAI be initiated by simultaneous electrical and mechanical cruise control failures (a failure mode which the Study found to be ''virtually impossible''), the brakes will still stop the vehicle with a relatively low brake pedal force, even if the MVDV were inoperative.

5.0 The Mountain Home SAI

In the petitioner's July 19, 1999 letter, he stated:

''I am the attorney for the family of two young boys who were in the path of a 1988 Lincoln Town Car that suddenly accelerated in a parking lot in Mountain Home, Arkansas on June 7, 1995. This event, that resulted in the death of one of the boys and the amputation of the other child's leg, occurred when the vehicle suddenly accelerated from a stationary position, despite the fact the driver had not touched the accelerator pedal. In conjunction with my preparation of this case, I retained a professional engineer, Samuel Sero of Pittsburgh, Pennsylvania, to determine the cause or causes of this tragic event.[79]

To learn more about the petitioner's allegations, ODI gathered information about the crash to determine whether it was consistent with Mr. Sero's theory. It was not.

On May 14, 1988, a 1988 Lincoln Town Car, VIN 1LNBM81F9JY844065, was built at Ford's Wixom, Michigan assembly plant. On May 25, 1988, it was delivered to the Los Angeles International Airport branch of Budget Rent-a-Car (BRC). Between May, 1988 and May, 1992, it accumulated approximately 51,000 miles during its use by four different owners (including BRC).[80] On May 8, 1992, it was purchased by Ms. Edith Theander for her personal use in, and around, Mountain Home, Arkansas. At the time, it had 51,279 miles registered on the odometer. According to Ms. Theander, she had all her service work done by Maplewood Garage and never had a problem with the cruise control. Maplewood Garage confirmed this and provided the following service history:

1. Check for P/S fluid leak—NPF on 3–4–93/mileage not on repair order;
2. Air conditioner service—re-charge on 6–28–93 @ 53,695 miles;
3. Oil change and transmission service on 2–3–94 @ 54,942 miles; and
4. Replace leaking power steering switch on 3–4–94 @ 54,992 miles.

On January 24, 1995, Ms. Theander traded in the Town Car at McDermott Pontiac-Buick-GMC in Mountain Home. The Town Car had now gone a total of 56,721 miles.

McDermott placed the car for sale and demonstrated it to prospective buyers. On March 7, 1995, William and Marlene Fett purchased the Town Car. At the time it had registered 57,099 miles.

Between March 7 and June 7, 1995, the Fetts experienced no cruise control related problems with the Town Car.[81]

On June 7, 1995 at about 8:00 PM in Mountain Home, Arkansas, 61 year-old Marlene Fett stopped at the Wal-Mart briefly. After returning to her parked car, she backed out of the parking space[82] and then stopped as though she was shifting into ''Drive.'' The car suddenly accelerated forward through the parking lot. Witnesses, startled by the sound of the high-revving engine and the vehicle's seemingly inappropriate parking lot speed, watched helplessly as the Town Car traveled about 160 feet before striking a group of vending machines along the right front wall of the store. It then struck a small carousel after traveling an additional 13 feet. After striking the carousel, it finally came to a stop after traveling another 45 feet (approximately).

Riding the carousel was Jonathan Chapman, age two years, nine months. His six month old brother, Nathaniel, was in a child safety seat nearby. Both were struck by the Town Car. As a result, Nathaniel was fatally injured and Jonathan's right foot later had to be amputated due to the severity of its injury.

According to the Mountain Home Police report, and confirmed by ODI in a subsequent interview with its author, Mrs. Fett said that ''either the accelerator on her vehicle stuck or her foot got wedged and stuck on the accelerator.'' According to the officer, Mrs. Fett was quite upset and could not clearly remember what had happened. Subsequently, while being deposed in this case on March 10, 1999, Mrs. Fett claimed that the vehicle continued to accelerate even though she ''was pushing the brake [pedal] as hard as [she] could.''[83]

Immediately after the crash, the car was impounded and towed to Norcross Ford in Mountain Home. The following day it was inspected by the Service Manager and a mechanic for any mechanical anomaly that could explain the occurrence. None was found.

Subsequently, the Chapmans retained attorney Sandy McMath (the petitioner). On June 27, 1997, the Chapmans filed suit. Initially, the named defendants were Marlene Fett and Wal-Mart, Inc. On March 16, 1998, the complaint was amended to include defendant Ford Motor Company. In April, 1999, the Fetts' automobile liability carrier, Farm Bureau Insurance, settled for $50,000.00 with the Chapmans.

The vehicle, which sustained damage to the left fender, doors, and quarter panel, was declared a total loss. The salvage was sold to Lynn's Auto, Inc. of Salem, Arkansas on June 19, 1995. On October 23, 1995, it was purchased by Garold Blair, also of Salem. Mr. Blair then repaired the vehicle himself by installing a used fender and straightening the bumpers, doors, and quarter panel. According to Mr. Blair, there was no damage to the interior (including the MVDV and mounting bracket) and no mechanical repairs were needed. He claims the vehicle—and its cruise control—has performed flawlessly during the 40,645 miles he and his wife have driven it. So well, in fact, that when Mr. McMath offered to buy the Town Car last summer, Mr. Blair refused to sell it.

ODI notes there are at least three aspects of the Mountain Home SAI that undermine the petitioner's theory that a cruise control malfunction was responsible for its occurrence. They are: total travel distance, cruise control dump valve operation, and cruise control type.

5.1 Total Travel Distance

The 1988 Town Car involved in the Mountain Home SAI is virtually identical, for purposes of comparing relative acceleration and braking performance, with the 1984 Mercury Grand Marquis evaluated in the VRTC testing documented in Appendix E of the Report. Both are ''Panther platform'' vehicles[84] equipped with a 302 cu.in. V8 engine. Both are rear wheel drive and have identical braking systems. The Mercury weighed about 3,760 lb. vs. 4,090 lb. for the Lincoln. Both have electro-vacuum cruise controls which cannot open the throttle more than 80% of WOT. Given these substantially similar specifications, it is reasonable to assume that VRTC's acceleration and braking data for the 1984 Mercury Grand Marquis apply to the 1988 Town Car.

While stationary, with the engine running, a worst-case cruise control failure was induced in the Grand Marquis. The vehicle then accelerated with the throttle at 80% of WOT. Two seconds after inducing the failure, the brake pedal was pressed with 60 pounds of force and held until the vehicle stopped. Throughout this sequence, the throttle remained open. For the Grand Marquis, the total distance traveled was 31.5 feet. This testing demonstrates that a driver would be able to stop a Ford Panther Platform vehicle in little more than 30 feet with relatively low brake pedal force, even if the throttle is held open by the cruise control servo.

In the June 7, 1995 incident, the 1988 Lincoln Town Car moved forward a total distance of more than 200 feet.

According to the NHTSA Report,

''For the numerous SAIs where cruise control failure has been alleged, but the braking system is found to be in good working order, and the vehicle traveled [a] substantially greater distance than [31.5 feet], it must be concluded that either the brake pedal was not appropriately applied or that cruise control failure was not a factor in the SAI.''

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[79] McMath letter, 1.

[80] During this time, the subject Town Car would have been within the scope of the Updegrove study. The study contains no information related to this vehicle's VIN, indicating it had not been involved in a reported SAI between May 14, 1988 and November 23, 1992.

[81] Chapman v. Fett. Marlene Fett deposition Tr. 17–18 and William Fett deposition Tr. 27.

[82] Mrs. Fett claimed later, during her March 10, 1999 deposition, that she ''drove out'' of the parking space rather than backed out (Tr. 32, line 24). However, an eyewitness claims that Mrs. Fett backed out of the space and ''after she stopped, her car . . . took off like a rocket'' (R. Graves deposition Tr. 7).

[83] Chapman v. Fett. Marlene Fett deposition Tr. 38.

[84] Introduced in 1979 (and currently in production), the ''Panther Platform'' includes Ford Crown Victoria, Mercury Grand Marquis, and Lincoln Town Car models. All are equipped with a front-mounted V–8 engine and rear wheel drive.

5.2 Cruise Control Mechanical Vacuum Dump Valve (MVDV) Operation

As described earlier in Section 4.3.1, as soon as the brakes were applied, a functional MVDV would have immediately depleted servo vacuum and allowed the engine to return to idle in the event a cruise control electrical malfunction occurred. There is no evidence that the MVDV has ever malfunctioned during the subject vehicle's life. ODI examined the MVDV and its mounting bracket and found both to be undamaged and adjustment of the MVDV was found to be within Ford's recommended specification.

Mr. Sero has alleged that certain drivers are unable to exert enough force on the brake pedal to activate the MVDV.[85] This assertion is plainly wrong. For example, the subject Town Car's MVDV opens (vents) whenever the brake pedal is depressed ¾ inch, which occurs at about 3.5 lb. of force with the power brakes functioning and 12 lb. without. To put those pedal forces in perspective, ninety-nine percent of the adult population in the United States is able to exert at least 60 lb. of force on the brake pedal.

5.3 Cruise Control Type

Mr. Sero's theory is based on his observation that ''voltage is supplied to the servo the moment the ignition is turned on'' and ''under this condition, all that is necessary to induce wide open [sic] throttle is a completion of a circuit to the servo.''[86] However, a failure consistent with the petitioner's multiple servo solenoid ground fault theory could not have contributed to the June 7, 1995 SAI in Mountain Home, Arkansas because the MY 1988 Town Car was equipped with an ''integrated'' cruise control system. As described in Section 4.1.3 of this document, in certain Ford vehicles beginning with MY 1986, the control-logic function has been integrated into the electronic engine control (EEC) module. Unlike Ford's ''stand-alone system,'' the integrated system does not allow full power to reach the servo solenoids unless appropriately signaled by the EEC even in the unlikely event that multiple servo solenoid ground faults occur—assuming the system's installation is consistent with Ford's design.

6.0 Conclusions

The petitioner, some plaintiff consultants, and a few in the news media have alleged that ''new'' information, developed since NHTSA's Study was conducted, justifies its reopening to ascertain the cause or causes of sudden acceleration. They view the Study's findings as flawed because it allegedly did not consider the possibility or consequences of cruise control failure modes involving inadvertent solenoid activation. However, the Study did consider these issues. Moreover, the petitioner's theory is contingent upon the occurrence of simultaneous, undetectable mechanical and electrical system failures. Absent these failures, no inadvertent servo solenoid activation could occur which would result in an unintended increase in engine power. The mere fact that some vehicles have been built with cruise control systems that may allow inadvertent servo solenoid activation does not sustain a conclusion that such an activation could lead to a SAI. Voluminous data indicates it does not. Indeed, the fact that the petitioner (and others) have never produced credible evidence that simultaneous, undetectable electrical and mechanical cruise control system failures have resulted in a single SAI—let alone frequently enough to justify a safety recall—supports the Study's original finding that ''the occurrence of such simultaneous, undetectable failures is virtually impossible.''

[85] Jarvis v. Ford, Daubert Hearing Tr. 85. ''You can't release it [the MVDV] because you can't move the [brake] pedal enough.''

[86] McMath letter, 1.

References

Bracket, Pezoldt, Sherrod, and Roush. September 1989. Human Factors Analysis of Automotive Foot Pedals. Texas Transportation Institute. DOT report HS–807–512.

Bosch, Robert. *Automotive Handbook.* Stuttgart: Robert Bosch GmbH, 1993.

Chapman v. Fett et al., Civ–97–144, Circuit Court of Baxter County, Arkansas.

Daubert v. Merrell Dow Pharmaceuticals, Inc., 509 U.S. Supreme Court 579 (1993).

Ford Motor Co., *Alleged Unintended Acceleration Investigative Effort Summary,* Ford Motor Co., January, 1993.

Ford Motor Company. *1998 Car Shop Manual, Vol. A. Lincoln Town Car, Ford Crown Victoria/Mercury Grand Marquis.* Dearborn, MI: Ford Parts and Service Division, 1997.

Ford Motor Company. *1998 Lincoln Town Car, Electrical and Vacuum Troubleshooting Manual.* Dearborn, MI: Ford Parts and Service Division, 1997.

Ford Motor Company, Profs Field Bulletin No. 92182DB60005, June 30, 1992.

General Motors, Inc. Cadillac Motor Car Division. *1985 Cadillac Service Information Final Edition.* Detroit, MI: General Motors, 1985.

Goodman, Richard M. and Center for Auto Safety. *Automobile Design Liability.* 3d, Volume 2, New York, NY: Clark, Boardman, Callaghan, 1991.

Jarvis v. Ford Motor Co., 92 Civ. 2900 (NRB), U.S. District Court, Southern District of New York.

Kowalke, Ron. *Standard Catalog of Ford, 1903–1998, 2nd Edition.* Iola, WI: Krause Publications, 1998.

Manigault v. Ford Motor Co., Case No. 286862, Court of Common Pleas, Cuyahoga County, Ohio.

McGraw-Hill, *Encyclopedia of Electronics and Computers,* 1988.

Mortimer, R.G., Segal, L., Dugoff, H., Campbell, J.D., Jorgeson, C.M., and Murphy, R.W. ''Brake force requirements study: Driver-vehicle braking performance as a function of brake system design variables.'' Highway Safety Research Institute (HSRI), Final Report contract FH–11–6952, National Highway Safety Bureau, 1970.

National Broadcasting Co. *Not So Fast.* New York, NY. NBC News Dateline NBC. February 10, 1999.

National Oceanographic and Atmospheric Administration (NOAA), National Climatic Data Center, *Daily Surface Data,* October 8, 1999.

Palmquist, Roland E. *Electrical Course for Apprentices and Journeymen.* New York, NY. Macmillan Publishing Co., 1988.

B. Peacock & W. Karwowski (Eds.), *Automotive Ergonomics: Human Factors in the Design and Use of Automobiles.* London: Taylor and Francis, 1991.

Perel, M. (1983). *Vehicle Familiarity and Safety* (Tech. Report DOT HS–806–509). Washington, DC: U.S. Department of Transportation.

Random House, Inc. *The Random House College Dictionary.* New York, NY: Random House, Inc. 1982.

Ribbens, William B. *Understanding Automotive Electronics.* Fifth Edition. Woburn, MA. Buterworth-Heinemann, 1998.

Schmidt, Richard A. ''Unintended Acceleration: A Review of Human Factors Contributions,'' *Human Factors Society, Inc.* 31(3), 345–364.

U.S. Department of Transportation. National Highway Traffic Safety Administration, Office of Defects Investigation. ''Engineering Analysis Closing Report, EA78–110,'' by Wolfgang Reinhart. Washington, DC: NHTSA, August 3, 1996.

U.S. Department of Transportation. National Highway Traffic Safety Administration, Office of Defects Investigation. ''The Effect of Countermeasures to Reduce the Incidence of Unintended Acceleration Accidents'' by Wolfgang Reinhart. Paper (No. 94 S5 O 07) delivered to the Fourteenth International Technical Conference on Enhanced Safety of Vehicles, Munich, Germany, May 23–26, 1994, a conference sponsored by the U.S. Department of Transportation.

U.S. Department of Transportation. National Highway Traffic Safety Administration, Office of Defects Investigation. *Investigation of Sudden Acceleration Incident in Minneapolis, MN,* by Bob Young. MF99–002, January 12, 1999.

U.S. Department of Transportation. National Highway Traffic Safety Administration, Office of Defects Investigation. *Investigation of Sudden Acceleration Incident in Minneapolis, MN, Supplemental Report,* by Bob Young. MF99–002, March 18, 1999.

U.S. Department of Transportation. Transportation Systems Center. *An Examination of Sudden Acceleration,* by John Pollard and E. Donald Sussman. DOT report HS–807–367. Cambridge, MA: TSC, January 1989.

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Surface Transportation Board

[STB Docket No. MC–F–20966]

Global Passenger Services, L.L.C., *et al.*—Control—Davis Bus Lines, Inc., *et al.*

AGENCY: Surface Transportation Board.