KLINE, ET AL v. MORGAN-ALCALA, ET AL

OWEN VIERGUTZ

June 15, 2011

Prepared for you by

Bingham Farms/Southfield • Grand Rapids
Ann Arbor • Detroit • Flint • Jackson • Lansing • Mt. Clemens

SUPERIOR COURT OF NEW JERSEY
LAW DIVISION, MORRIS COUNTY

THOMAS KLINE, AS ADMINISTRATOR AD PROSEQUENDUM OF THE HEIRS AT LAW OF SUSAN MORRIS KLINE, (DECEASED), AS ADMINISTRATOR OF THE ESTATE OF SUSAN MORRIS KLINE, and THOMAS KLINE, INDIVIDUALLY,

Plaintiffs,

vs. Docket No. MRS-L-3575-08

VICTORIA MORGAN-ALCALA, CARLOS ALCALA, NATALIE RAWLS, DAIMLERCHRYSLER CORPORATION, A/K/A CHRYSLER CORPORATION, LOMAN AUTO GROUP, CHRYSLER GROUP LLC (For Discovery Purposes), JOHN DOES A THROUGH Z, (Names Being Fictitious), ABC CORPORATIONS, 1 THROUGH 100, (Names Being Fictitious),

Defendants.

_____

THE DEPOSITION OF OWEN VIERGUTZ, JUNE 15, 2011

The Deposition of OWEN VIERGUTZ,
Taken at 30800 Telegraph Road, Suite 2925,
Bingham Farms, Michigan,
Commencing at 2:31 p.m.,
Wednesday, June 15, 2011,
Before Lezlie A. Setchell, CSR-2404, RPR, CRR.

APPEARANCES:

ANGEL M. DeFILIPPO
Grieco, Oates & DeFilippo, L.L.C.
414 Eagle Rock Avenue
West Orange, New Jersey 07052
973.243.2099
Appearing on behalf of the Plaintiffs.

RUSSELL J. SACCO, JR.
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Appearing on behalf of the Plaintiffs.

JAMES T. GILL
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7 Ridgedale Avenue
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973.539.2090
Appearing telephonically on behalf of
Defendants Alcala.

CHRISTOPHER G. FUSCO
Callahan & Fusco, L.L.C.
72 Eagle Rock Avenue
Suite 320
East Hanover, New Jersey 07936
973.618.9770
Appearing on behalf of Defendant Loman Auto Group.

SHEILA JEFFREY
Miller, Canfield, Paddock and Stone, P.L.C.
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Ann Arbor, Michigan 48104-1400
734.668.7797
Appearing on behalf of the witness.

ALSO PRESENT:
Antonio C. Irizarry

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EXHIBITS

Bingham Farms, Michigan
Wednesday, June 15, 2011
2:31 p.m.

OWEN VIERGUTZ,

was thereupon called as a witness herein, and after having first been duly sworn to testify to the truth, the whole truth and nothing but the truth, was examined and testified as follows:

EXAMINATION

BY MS. DeFILIPPO:

Q. Hi. My name is Angel DeFilippo. I'm an attorney. I represent the Estate of Susan Kline in an action that has been brought against Loman Auto Group as a defendant concerning a Jeep, 1996 Grand Cherokee ZJ vehicle. We're here to take your deposition. Have you ever had your deposition taken before?

A. No, not on this type of matter. I have had a civil deposition taken once.

Q. It's probably going to be very similar to that, although the subject matter will be different. When was the time you were deposed?

A. Mid '90s sometime.

Q. And because it was so long ago, let me give you some instructions about depositions.

First of all, the court reporter seated to my right and your left is taking down everything that's going to be said in this room by anybody in this room, and it will be typed up in a booklet form and can be used for reference at any time after this.

A. Okay.

Q. As a result of that, I have to give you the instruction, keep your answers verbal because the court reporter can't take down gestures or a shrug or a grunt.

A. Okay.

Q. So when you want to say yes or no, you have to say yes or no, okay?

A. Okay.

Q. I also ask you to listen to every question that I ask you and only answer what I ask you, and also, that if you answer a question -- if I ask you a question and you don't understand it or it's unclear to you or it needs some type of clarification, I would ask that you tell me because if you answer it, I'm going to assume you understood it and it was clear to you, okay?

A. Okay.

Q. And finally, the last instruction I'm going to give you is a very simple one. We all have a tendency to anticipate a question or even I have a tendency to

anticipate your answer. I would just ask that we try to do the best we can to wait until each of us is done speaking so that the court reporter can get down the full question and the full answer, okay?

A. Okay.

Q. All right. Do you have any questions before we begin?

A. No, I do not.

MS. DeFILIPPO: Okay. We've been provided with your CV and we're marking it as Exhibit 1.

MARKED FOR IDENTIFICATION:

DEPOSITION EXHIBIT 1

2:34 p.m.

BY MS. DeFILIPPO:

Q. Can you just look at your CV and tell me if it's accurate and up-to-date?

A. To the best of my knowledge it's accurate. It indicates the last assignment was 2001 to present. I retired from DaimlerChrysler in December, 2005, and so this really ends at that period. I have not updated it since that point in time.

Q. Okay. So are you currently employed?

A. No.

Q. From 2005 to the present time did you hold any other employment?

A. No.

Q. So what would you update it with from 2005 until now?
A. That's why I didn't update it.
Q. Okay. So it is up-to-date to today, correct?
A. No, it's not because --
Q. Because "present" should be "2005" and then it would be up-to-date?
A. Correct.
Q. Okay. So you retired in 2005 as director at Chrysler of --
A. DaimlerChrysler.
Q. DaimlerChrysler of hybrid and electric vehicles and Government applications?
A. Correct.
Q. Does anything about your position from 2001 to 2005 include any duties, responsibilities, or any involvement with the Jeep cars?
A. No, it did not.
Q. So is it fair to say that the last time that you had any involvement with Jeeps was in 2000?
A. No.
Q. Okay.
A. It was the previous assignment. 1994 was the last involvement I had with Jeep vehicles.
Q. Okay. So then let me take you back to Page 1. I'm sorry to make you turn the page, but the next

generation vehicles, what are they?
A. The Partnership for Next Generation Vehicle or New Generation Vehicle, PNGV, was a joint Government/industry collaborative effort to redesign the automobile and achieve a breakthrough fuel economy performance for the vehicle. It was participated in by many Government agencies, as well as the three Detroit-based OEMs as a research activity.
Q. But you did it in your capacity as director at Chrysler?
A. I was the director for Chrysler to the program. There were similar individuals at Ford and at GM that served their role for their company.
Q. So, and correct me if I'm wrong, in that position as director of the next generation vehicles for a program that was not just including Chrysler, did that mean that you didn't have any duties at Chrysler, per se, with respect to any cars?
A. The purpose of the program was really to identify breakthrough technology in principally the Government research laboratories, university research laboratories, and other Government-sponsored research activities that could be brought into the industry to enhance the fuel economy performance of U.S. vehicles, be it GM, Ford, or Chrysler, and my role was to

function as the, I don't know, go-between, if you will, between the collaborative efforts of the partnership program and our company to try and bring those technologies into the company.

I would periodically expose breakthrough technologies or new technologies to individuals within Chrysler as we, you know, attempted to achieve improved fuel economy and targets for our vehicle.

Q. Did any of your duties or responsibilities in your capacity as director of next generation vehicles have anything to do with safety issues on the vehicles?

A. In the broadest possible sense it did because we were looking at every possible technology from liquid hydrogen fuel sources that had one set of safety concerns through to lightweight composite materials that had another, to different powertrain configurations, different structural considerations, different types of energy storage systems, be they battery, flywheel, ultra capacitor.

Each sort of had their own safety concerns, and we were sort of trying to maintain a high-level awareness of what potential safety issues could come with that technology, to be aware of them to evaluate if and whenever the technology became of production interest downstream, but none of this technology, at

least to my recollection during my tenure, ever really transitioned from the program into Chrysler or the other automotive companies. It was still all on a research basis.

Q. Can you tell me before coming here today if you reviewed any documents or anything written?

A. No, I did not.

Q. Did you review any tapes or anything that was spoken or on video or anything?

A. The only thing that I came across that was remotely associated with this was last week on television there was a news article concerning a Jeep fuel tank.

Q. What news article was that?

A. I don't recall specifically. It was on one of the nightly news report, you know, programs. I just happened to notice it in passing as I was walking through that it was talking about Jeep fuel tanks.

Q. Did it say anything in particular that you recall?

A. Other than what I've just related, no, it didn't, because I sort of caught it in the middle.

Q. It was in Michigan, correct?

A. Yes.

Q. Do you know what --

A. Well, I saw it in Michigan. Whether it was the local news station or the network news, I don't really

recall.
Q. Do you know what network it would have been?
A. No.
Q. And do you remember anything about it other than that it was a fuel tank issue in the Jeep?
A. Not really.
Q. Okay. So that doesn't really qualify as something that you went out purposely and reviewed?
A. Absolutely not.
Q. Did you know anything about this case before you came here today?
A. No -- well, other than what I discussed with my attorney a few weeks ago.
Q. You don't have to tell me anything about your discussions with your attorney, but you received a subpoena to come here today, correct?
A. Correct.
Q. And when you received the subpoena, did you know anything about the case?
A. No.
Q. Can you give me the benefit of your educational background? I see on this CV, it indicates here that you have a bachelor of science in mechanical engineering?
A. Uh-huh, that's correct, from Illinois Institute of

Technology, and I have a master's of science in public administration from DePaul University.

Q. Do you have a physics degree?

A. No.

Q. What happened between 1969 and 1972?

A. In 1969, I began full-time employment.

Q. Where did you begin employment?

A. In 1969 through 1973, I was employed by the City of Chicago.

Q. In the Department of Transportation?

A. Uh-huh.

Q. What did you do for them?

A. I was -- you know, I began as an entry-level engineer and essentially worked on a variety of traffic-related studies primarily, again, it ended up being a federally-sponsored program on traffic-flow efficiency, and we did a lot of analytic studies of traffic-flow performance at intersections to identify potential improvements the city could make at intersections, widening lanes, changing traffic control devices and so on to improve traffic flow and efficiency.

Q. So is it fair to say that while you were still an engineer for the City of Chicago, Department of Transportation, that you started your master's program

in business administration?
A. Exactly. It was a part-time evening program.
MS. JEFFREY: Just make sure she's done asking her question because the two of you were talking at once basically.
MS. DeFILIPPO: I'll do the same thing.
BY MS. DeFILIPPO:
Q. I understand what you're saying, but unfortunately, we've got to have respect for the court reporter.
A. Certainly.
Q. So you started the master's program. What was the reason for that; did the Department of Transportation require it or did you just do it on your own, or what was your thought at that time?
A. Well, it essentially was a career enhancement. It was really public service administration is the actual title of the program at DePaul, and it was furtherance of my education with respect to my assignments with the City of Chicago.
Q. And then you left the City of Chicago and went to Illinois Institute of Technology?
A. Research Institute, correct.
Q. And you did some work in mechanical engineering?
A. Uh-huh.
MS. JEFFREY: Yes or no.

BY MS. DeFILIPPO:

Q. You have to say yes.

A. Yes.

Q. And from there, you went to American Motors?

A. Yes.

Q. Okay. So you started with American Motors in 1984 as chief engineer. Was there any particular vehicle that you worked with?

A. Well, at AMC at that point in time, it was all of the American Motors passenger cars, which were Renault cars at that point in time and the Jeep line of vehicles, and my responsibility was supporting the product with, as it indicates there, various testing activities throughout American Motors.

Q. So in 1984 when you first started with American Motors, what were the Jeeps?

A. In 1984, Jeep product line consisted of the XJ Cherokee, the SJ Grand Wagoneer, the derivative pickup truck off the SJ. I believe those were the three Jeep vehicles.

Q. What was the derivative pickup off the SJ?

A. It was a full-size pickup. I don't remember what it was called, J8 or some such thing. I really don't remember. It was a full-size pickup truck off of the full-size Jeep.

Q. Did it have -- did it resemble in any way the full-size Grand Wagoneer?
A. The front portion of the vehicle was similar up to the B-pillar. Certainly the exterior was similar. Behind that it was different.
Q. It was a pickup?
A. Right.
Q. Was it open bed?
A. Yes.
Q. Was there a pickup off the XJ in 1984 and '5 when you were at American Motors?
A. There was in I believe it was '85 or '86, the derivative pickup off the XJ platform was the Comanche pickup truck. I believe it was '86 but I'm not 100% certain as to the date.
Q. Did you have any involvement with the Comanche, also?
A. Well, again, at that point I was responsible, depending on what part of the development program you're looking at, for not only doing some of the testing of the vehicle but for some of the analytic calculation work that was done for it as well.
Q. Could you tell me where the SJ, the Grand Wagoneer's fuel tank was located in 1984 to 1985?
A. I really don't know.
Q. How about the XJ Cherokee; do you know where the

location of the fuel tank was in 1984 and '85?
A. I have no recollection of that.
Q. And the Comanche, do you recall where the location of the fuel tank was in those years?
A. No.
Q. At any time do you recall the location of the fuel tank of any of those vehicles, the Comanche, the Cherokee XJ or the SJ or the pickup off the SJ?
MS. JEFFREY: Object to form.
A. Could you please repeat it?
BY MS. DeFILIPPO:
Q. After 1985.
A. Oh, after 1985.
Q. I asked you about the time period from '84 to '85, and I'm asking you now at any time after 1985, did you become aware of the location of the fuel tanks of any of those four vehicles?
A. I'm sure at the time I was aware of where it was located. At this point I have no recollection of where specifically it was located.
Q. Okay. And did you have any involvement in design or development of any of those four Jeep models?
A. No, I did not.
Q. It's fair to say most of your involvement was in testing?

A. Correct.
Q. And when you say testing, are you testing, doing crash tests?
A. No. The area of crash testing and fuel economy testing was done within a separate group at American Motors.
Q. What was that group called if you recall?
A. I really don't. I really don't recall.
Q. So your tests were aerodynamic tests and noise and vibration tests and the kinds of things that you mention here?
A. Uh-huh, exactly.
Q. Okay. Now how is it that you went from or transitioned from American Motors to DaimlerChrysler or to Chrysler?
A. Well, they chose to buy American Motors.
Q. So you went with them?
A. Yes.
Q. But you had to be asked to go, is it fair to say; I mean, you didn't just go?
A. That's correct, every professional individual was asked -- well, those that were selected were invited or were asked whether they wanted to assume a position with Chrysler at that point in time.
Q. Were some not asked?

A. I believe so.
Q. Do you know who they were?
A. No.
Q. Did you work with any people that were not asked, any titles you remember if you don't remember names?
A. I don't really remember, I really don't.
Q. Is it fair to say that the people that you worked with all moved over as far as you're concerned?
A. I don't really know because my -- in addition to moving corporation, my assignment changed. So I had some responsibility for trying to integrate the functional capabilities as well as the staffing of the American Motors side of the organization with the Chrysler side of the organization to try and place the people or place the facilities within the Chrysler umbrella at that point in time. Specifically I really don't have a recollection on the individuals or facilities for that matter.
Q. I want to just take you back to the American Motors reference from '85 to '87 where you say that you were responsible for providing all technical support services for vehicle development and engineering within AMC on all Jeep platforms, right?
A. On Jeep and AMC passenger car platforms.
Q. With specific reference to the Jeep, what does that

mean; what exactly did you do?

A. Well, again, it meant all of the family of Jeep vehicles as we previously discussed, the XJ vehicle, the MJ vehicle, the SJ vehicle, all of the productionized Jeep vehicles and the AMC car platforms which at that time was -- well, at the time of the merger, it was the Medallion vehicle and the Premier vehicle were the two AMC passenger cars as I recall.

Q. But my question is: What does it mean when you say you provided all technical support services for vehicle development and engineering? Can you be more specific or give me an idea because I don't really understand what that means.

A. Okay. The position I had in '85 through '87 incorporated the function of the position I had from '84 to '85. So functionally those were the test laboratories, were the same laboratories. There was at that point in time a different chief -- or there was a different set of managing engineers that reported to me as the director. In addition, there were the proving ground facilities in Wisconsin and Yuma, Arizona, and the analytic modeling group that was located in Detroit.

Q. Did the tests that you're describing in 1985 or '87 include crash tests?

A. Again, not as part of my responsibility. That was still part of a separate department at American Motors. The crash test facilities were housed within the proving ground facilities at Wisconsin, and we sort of, you know, were the landlord for the facilities, if you will, but I had no responsibility for any of the crashworthiness or safety testing.

Q. So with respect to the vehicle development and engineering, what exactly did you do in terms of the Jeep vehicles for development and engineering?

A. Again, it was essentially the same functions of aerodynamic, thermodynamic testing, vehicle dynamic performance, noise and vibration, stress analysis on componentry for the vehicles, looking at material standards for the vehicles, as well as doing the durability testing for the vehicles, driving them over certain types of road features, cobblestone, dirt road, paved road and so on for X amount of miles to ensure the durability/reliability of the vehicles, looking at the corrosion performance of the vehicles, looking at the on-road dynamics of the vehicles.

Q. And in that capacity, did you make any engineering changes which were put into production with these vehicles?

A. No, that was not my responsibility. My responsibility

was the testing portion of it, and the responsible design engineer would be the one who would interpret the data we were providing.

Q. So you didn't actually make a recommendation based on that data?

A. No, no.

Q. You just did the testing and forwarded the data?

A. Correct.

Q. Now transitioning into Chrysler, did you transition into the Jeep division of Chrysler with your cars?

A. Well, at the time of that merger, the company was organized into a Jeep and Truck group which I was part of that handled the Jeep vehicles and the truck vehicles, including the Dodge truck line. The passenger car functions were transferred to the Chrysler passenger car group, I believe, at the time.

Q. So you didn't work in the passenger cars anymore after that?

A. Correct.

Q. No more passenger cars for you?

A. Correct.

Q. It was all Jeeps and all trucks, correct?

A. Correct, all the time, correct.

Q. And was that going forward now?

A. That was going forward through '94, yes.

Q. Okay. That's the timeframe I want to focus on. Was that good in your opinion; did you want that, did you like that idea of not having to deal with the passenger cars?
A. Well, certainly we were part of a much larger company, and the product line was getting to be very broad. Even within the Jeep and Truck group, the product line was quite extensive. I believe there were six or seven individual platforms that I did have responsibility for just on the Jeep and Truck side.
Q. And when you say you had responsibility for these product lines, can you tell me hands-on what did you actually do in, let's say, the timeframe of '87 to '90 when you were director of Chassis Drivetrain Engineering of Jeep/Truck?
A. Well, as director, I was responsible for the group that had component design release responsibility for all of the various chassis components, brakes, wheels, tires, exhaust system, control system, fuel system of the vehicle, as well as the drivetrain side which included axles, transmissions, four-wheel drive systems, everything that was under the vehicle basically.
Q. And was this the same type of testing that you had been doing at AMC?

A. No, it wasn't testing at all.

MS. JEFFREY: Object to form.

MS. DeFILIPPO: He can answer.

MS. JEFFREY: I object to the form of that but go ahead. He answered it.

A. It wasn't testing at all. At that point in time, I was responsible for component design and release of the production components. I no longer was responsible for any of the testing of those components.

BY MS. DeFILIPPO:

Q. Okay. So is a fuel system a component?

A. Well, it consists of a number of components, yes.

Q. But as a component group, let's say, you were responsible for the design of the fuel systems in the 1987 to 1990 timeframe?

A. Correct.

Q. Who did you report to directly?

A. I believe for a portion of it I reported directly to Francois Castaing, and for another portion of it, I reported to Bernard Robertson. Somewhere in the late '80s, and I don't remember the exact date, Bernard Robertson came in as, I don't know, I think it was general manager of Jeep and Truck, and I believe at that point in time I reported to him. Prior to that,

the group reported directly to Francois Castaing but the dates are -- I'm not 100% certain on the dates.

Q. And I think you said that the chassis included the fuel systems, correct?

A. Correct.

Q. So when we look at the schematics of the hierarchy of the company in the chassis section, that would include the fuel systems?

MS. JEFFREY: Do you understand that?

BY MS. DeFILIPPO:

Q. Do you understand what I'm saying?

A. Not exactly.

Q. I'm going to have to get you a document.

I'm going to show you what was marked yesterday as Castaing Exhibit 1, and can you look at the exhibit and tell me if you can identify what it is?

A. It is an organization chart of Jeep and Truck Engineering in December of 1987, and therein it shows my position as director of Drivetrain and Chassis Engineering reporting to Castaing.

Q. Okay. Where do you see that -- I see it, okay. So you're looking at the first page actually after the cover page, and the cover page indicates Jeep and Truck Engineering Organization Charts?

A. Uh-huh.

MS. JEFFREY: It's a yes?

A. Yes, yes, yes.

BY MS. DeFILIPPO:

Q. Have you ever seen this document before, these documents?

A. I'm sure I have.

Q. Okay. And if you'll look at the rest of the charts, do you know if you are indicated anywhere else?

A. Yes, about, I don't know, three pages in or so there's a detailed chart.

Q. Of the Drivetrain and Chassis and you're at the head of that, correct?

A. Correct.

Q. The director. Anywhere else?

MS. JEFFREY: Take your time to look through it.

A. I haven't seen these in years.

BY MS. DeFILIPPO:

Q. They all have headings, and maybe that will help you out more than it will me.

A. No, I don't believe I'm referenced anywhere else in this document.

Q. So at least in 1987, we know that you reported directly to Francois Castaing?

A. Correct.

MS. DeFILIPPO: I'm going to mark this as Exhibit 2.

MARKED FOR IDENTIFICATION:

DEPOSITION EXHIBIT 2

3:04 p.m.

BY MS. DeFILIPPO:

Q. I'm going to mark Viergutz 2. Do you recognize -- just briefly do you recognize that document?

A. No.

Q. Okay. Can I have it back for a minute and I'll direct you where I want you to look. For the record, the Viergutz 2 indicates it's an N-Body Truck Program Chrysler Motors Engineering Program Review Meeting book dated February 11th, 1988 at 1 p.m.

In looking at just the cover of this book, and it's bound in like a spiral binding, have you ever seen this book before?

A. Not to my recollection. I know what the N-body program was, but I don't recall a document that looks like that.

Q. What was the N-body program?

A. That was the program for the Dakota pickup truck vehicle.

Q. And did it have anything to do with the Jeeps that you

worked on, or did you have anything to do with the N-body program?

A. Well, it was a truck vehicle. Therefore, in the timeframe we referenced of '87 to '90, I would have had responsibility for the production chassis components of that vehicle.

Q. And that would include the fuel system?

A. Could have. One of the issues I believe I recall with the N-body program is I believe it had begun prior to the merger with American Motors and, therefore, some of it was being handled by the Chrysler side of the corporation and some of it was being handled by the Jeep/Truck portion of the corporation. So it's conceivable that I had component responsibility for the fuel system of that vehicle, but I don't really recall.

Q. Okay. Was there a design of the Jeep Grand Cherokee ZJ which was being done at American Motors before the merger?

A. What do you mean by design?

Q. Had that vehicle begun its design phase while it was at American Motors Company?

A. I believe the production -- I don't know I guess is the simple answer.

Q. The production of the ZJ was begun in '92, correct?

A. Correct.
Q. Okay. And it came out as a '93 vehicle, correct?
A. Uh-huh.
Q. You have to say yes.
A. Yes.
Q. Okay. So what I'm really asking you is did the actual engineering design, did that begin at Chrysler, or did that begin at American Motors?
A. I don't know. I believe it would have begun at American Motors.
Q. And what leads you to believe that?
A. That before it went into a production program, it would have had to go through advanced engineering or pre-production program not within the design groups but within the advanced engineering group prior to the program being approved, and that was actually ahead of the normal design cycle wherein the various production groups would have gotten involved with the vehicle. In order for it to be a '92 launch vehicle, it would have had to begin more than four years ahead of product launch.
Q. Why is that?
A. Because a vehicle is a complicated thing.
Q. I understand that, but run me through the design process, if you would, in a general sense.

MS. JEFFREY: Object as to form. If you can.

A. Well, initially a concept design is done within an advanced group, and therein a lot of alternatives are looked at to try and define the parameters of what the vehicle should ultimately look like. The size, performance, component placement, basic layout of the vehicle are all done and iterated numerous times in the production phase. That may take a year or longer to go through that phase of the vehicle.

Then once an advanced design is approved and handed off to the component design groups, each design group then has to go through transferring those product definitions, concept definitions, specifications through to actual detailed designs of hardware, engineer it, do the analytic work, do the detailed design work necessary and begin a manufacturing prove-out or feasibility study of the componentry that goes into the vehicle, then integrate the individual components into systems or vehicles to do vehicle level evaluations of performance of the components and then ultimately get into a design freeze stage of it where that is the way it's going to look with the production vehicle, make the prototype components and go into the durability and reliability

testing of the vehicle. Each of those steps takes approximately six to eight months to complete.

BY MS. DeFILIPPO:

Q. Now did you have any part in any of those steps with respect to the ZJ?

A. Some of the component design work for the ZJ would have been done within my group in Chassis Drivetrain Engineering during that '87/'90 timeframe of the vehicle.

Q. Do you know who Paul Sheridan is?

A. I've heard the name. I believe at one point in time he worked in one of my groups, actually in the '91 to '94 timeframe within Engine Engineering, I believe, but I would have to refer to something to see if that, in fact, is the case.

Q. Do you recall him in any way as he was working either with you or within the company?

A. As I recall, he was something like an assistant program manager, and I didn't have a lot of direct contact with him.

Q. Do you know if he headed a safety committee within the company Chrysler?

A. Not to my knowledge.

Q. Do you know of a committee called the safety leadership team?

A. I don't recognize that term.
Q. This document that we've marked as Viergutz 2 is a document that comes out of a Jeep and Truck Engineering N-Body Truck Program, and what looks to me like it's a meeting minute page for prior meeting on January 14th of 1988, there is an indication that you were an attendee of this particular meeting. Is that fair to say? You can look at the document.
A. Yes, my name is there and it's likely I was in attendance at the program review. There were monthly reviews on each of the product lines, so there were some six or seven of those types of reviews conducted every month.
Q. Okay. And I'm going to represent to you that this document was put together by Paul Sheridan and he, I believe, authored the minutes of the prior meeting that was on January 14th. This one is for an agenda for a meeting on February 11th of 1988, and I see that in attendance with you was Mr. Castaing who you reported to at the time, correct?
A. If the date reflects that, yes.
MR. FUSCO: Counsel, before you continue, has that document been produced in discovery?
MS. DeFILIPPO: I don't know.
MR. FUSCO: You don't know?

MS. DeFILIPPO: I don't know offhand. It might have been part of our expert's -- it might have been part of his report.

MR. FUSCO: That document, itself?

MS. DeFILIPPO: Yeah. He might have made it part of the first report. He's done two.

MR. FUSCO: I'll check.

MS. DeFILIPPO: You can check.

MS. JEFFREY: Has the second report been produced?

MS. DeFILIPPO: Yes.

MS. JEFFREY: I haven't seen it, not that I would get it necessarily.

MS. DeFILIPPO: Yes, it has. You should get it because I think you're on the list to get everything.

MS. JEFFREY: Okay.

MR. FUSCO: You're telling us it's been produced?

MS. DeFILIPPO: I'm telling you that it probably was an addendum to one of his two reports but I'm not positive. I can't be positive.

BY MS. DeFILIPPO:

Q. Also in attendance in these meetings was a person named SW Crater. Do you know who he is?

A. No recollection.
Q. It doesn't ring a bell at all, right?
A. No.
Q. I'm going to ask you to look at Page 20 and just ask, does that document refresh your recollection as to who Mr. Crater is?
A. No.
Q. Do you know who DE Dawkins is?
A. I'm familiar with Dale Dawkins.
Q. And who is he?
A. My recollection of Dale was he was head of program management for some portion of the company. Whether it was on the Jeep/Truck side or Chrysler side, I don't really recall at this point.
Q. Was there any relationship between the Jeeps and the N-body truck?
A. Well, the -- I don't know what you mean by relationship I guess is the problem.
Q. Was there ever a situation where there was discussions about developing the N-body into an SUV?
A. None that I'm aware of. It's conceivable there were but certainly none that I was aware of.
Q. Was there a Dodge vehicle that was being developed as an SUV at the same time that the Grand Cherokee was being considered for production or development?

A. I believe there was an SUV Ram vehicle based off the larger pickup truck, the A-275 pickup truck that was in production at the time, Ram Charger something I think may have been the product name of it, but I don't remember any new SUV being developed in that timeframe, no, part of it because the corporation was leaning to simplifying the product offerings, reducing the number of different platforms that were being offered and trying to simplify it around a certain number of Jeep vehicles and truck vehicles and passenger car vehicles.

Q. What is a buck?

A. A buck is a mock-up of a portion of a vehicle product, whether it's an interior, interior could consist of a seat or instrument panel. Exterior could consist of a suspension buck where you would have one corner of the vehicle mocked up showing the geometry of various componentry, placement of various componentry, the way the components interact with each other, and there were multiple bucks that were done as part of a vehicle design program for everything from bodies to interiors to chassis components, drivetrain components.

Q. Was there a buck for fuel systems?

A. Typically the bucks were done within the packaging

group that was sort of responsible for the overall interrelationship of the components on the vehicle. Where one component fit with another component was the responsibility of the packaging group, and they typically maintained most of the bucks. The only bucks that were done within the component design groups were pretty specific to looking at resolving a particular issue that came up as part of a design and study.

Q. So the buck, itself, is it a tangible thing?

A. Yes, it's hardware. It's an attempt to show the relationship of one hardware component to another as it would be in the vehicle.

Q. But is it actual size and shape?

A. Yes.

Q. It is?

A. It often -- it's a meld of carry-over production hardware with new proposed production hardware to see if the geometry allows the two to work together, to function together.

Q. Did the ZJ replace the Grand Wagoneer as a vehicle at Chrysler?

A. Not to my knowledge, no.

Q. Did anything replace the Grand Wagoneer?

A. No.

Q. Was that an SJ vehicle?
A. Yes.
Q. And would you consider that an SUV?
A. Yes.
Q. Was it the first SUV that Chrysler made?
A. Well, it's a bit of a mixed metaphor because it existed long before Jeep was part of Chrysler, long before. It was a vehicle that went back probably 10 years prior to the merger with Chrysler and was an American Motors SUV at that point in time. Again, I believe Chrysler had the Ram based SUV also about that same point in time.
Q. So when you merged, when AMC merged with Chrysler, Chrysler had an SUV?
A. Yes.
Q. In production?
A. I believe it did. I believe it had the Ram Charger at the time.
Q. The Ram Charger?
A. Uh-huh.
Q. And was that built on any specific body?
A. I believe -- well, it used componentry, some common componentry with the full-size pickup truck, the Ram pickup truck.
Q. And that was already in production when the Grand

Wagoneer was brought over from AMC?
A. I believe so.
Q. And they were being produced at the same time?
A. Yes.
Q. And were they both unibody constructions?
MS. JEFFREY: Object to form.
A. I don't know is the answer. I truly don't know.
BY MS. DeFILIPPO:
Q. Do you know if either was or any of them, either the Ram Charger or the Grand Wagoneer were unibody construction?
A. No. I've lost any recollection of that.
Q. Do you know where the location of the fuel tank was on the Ram Charger?
A. No.
Q. Do you know what FMEA stands for?
A. I know one version of it, yes.
Q. What is it?
A. Failure Modes and Effects Analysis.
Q. And what is that?
A. It's a fairly formal analytic process for looking at the way an individual component failure may affect overall subsystem, system, and vehicle level functionality.
Q. And was there an FMEA done for the fuel system of the

Jeep ZJ?

MS. JEFFREY: Fuel system? Object to form. Go ahead.

BY MS. DeFILIPPO:

Q. You can answer.

A. I don't know.

MS. DeFILIPPO: What's your objection to the form of that?

MS. JEFFREY: Well, he said it was looking at how a component failure affected, so I don't know that --

MS. DeFILIPPO: I think he defined the fuel system as a component.

MS. JEFFREY: I withdraw the objection.

BY MS. DeFILIPPO:

Q. So you don't know if an FMEA was done with respect to the fuel system or any of its individual components?

A. I don't know with certainty whether it was done, correct.

Q. At any time?

A. At any time.

Q. Would you expect that it would have been done?

A. I would have thought it would have been done.

Q. And why?

A. As part of an overall engineering program, it is one

of the steps that is normally taken.
Q. Is the FMEA done prior to production or during production or both or something else?
A. It can be done both. Typically it's done prior to production.
Q. And where would you find the FMEA of the fuel system and any of its components as a document; where would that be located?
MS. JEFFREY: And are you talking about the ZJ?
MS. DeFILIPPO: Yeah.
A. The simple version is I don't know. I would expect that if it were done, the component responsible engineer would be the one responsible for doing the FMEA and having the associated documentation.
MS. DeFILIPPO: Would you repeat that?
(The requested portion of the record was read by the reporter at 3:28 p.m. as follows:
"Answer: The simple version is I don't know. I would expect that if it were done, the component responsible engineer would be the one responsible for doing the FMEA and having the associated documentation.")
BY MS. DeFILIPPO:

Q. Were you the component responsible engineer for the fuel systems on the ZJ?
A. No. That would be the individual engineer three or four levels below my function at the corporation.
Q. Would you also get a copy of what that engineer had done in your capacity?
A. No.
Q. Why not?
A. It is part of one of the engineering steps and analyses that are done on any component, and I would never receive those as part of routine business. Frankly, it's -- the detail is of no relevance to me. It resides with the engineer who makes the decision on that component.
Q. So correct me if I'm wrong. If the FMEA is done on a portion of, let's say, any component of the fuel system or the entire fuel system and there's failure noted, would you expect that that engineer who conducted the FMEA would fix it and you would never know that it ever failed in your capacity?
A. Well, I would not use the term "fix it". It would be part of an engineering analysis, just as I would assume that if the engineer did a calculation that said the stress level for this component were too great, that the engineer would take steps to modify

the design so that the stress level was within the appropriate performance parameters. I would similarly assume that based on what the results of an FMEA were, the engineer would take steps to avoid the failure pathway that that would indicate existed or potential failure pathway that existed.

MS. DeFILIPPO: I'm going to show you a document which I'm going to mark Viergutz 3. Take a look at it and take your time.

MARKED FOR IDENTIFICATION:

DEPOSITION EXHIBIT 3

3:30 p.m.

(Recess taken at 3:30 p.m.)

(Back on the record at 3:45 p.m.)

BY MS. DeFILIPPO:

Q. Mr. Viergutz, would you tell me if you can identify the document we have marked Exhibit 3?

A. I've never seen this particular document before. It references an equivalent SAE spec that it was derived from, I guess, and also the date of it is after the timeframe we're talking about. So I don't have -- I don't specifically recall this document now.

Q. Is there anything in the document as you have reviewed it that references the Jeeps, the ZJ, the WJ?

A. Nothing in my brief review of the document.

Q. Is that a document that you would expect to see if an FMEA was done with respect to the fuel system of the Jeep?
A. My view is this is one form of an FMEA presentation, and it shows examples and samples of various types of analyses. I don't believe that's the only type, and I don't believe that all of them are necessarily this formal, no.
Q. But it is at least one type of way of reporting?
A. Absolutely.

MS. DeFILIPPO: I'm going to mark Viergutz 4.

MARKED FOR IDENTIFICATION:
DEPOSITION EXHIBIT 4
3:48 p.m.

BY MS. DeFILIPPO:
Q. I'd ask you to look at This Corporate Organization Directory, Chrysler Corporation. Can you identify that document?
A. Again, I don't recall ever seeing this document. I recognize some of the officers cited in it, but I don't ever recall seeing this type of organization directory before, no.
Q. Okay. I would direct your attention to Page 14-5, they're listed at the top.

A. Yes.
Q. And on that page, it starts out with sales and service, and it lists individuals on the left-hand side and then their titles on the right; is that fair to say?
A. Yes.
Q. And the individuals on the left-hand side, are they Chrysler or were they Chrysler employees?
A. I recognize the name at the top. None of the other names are familiar to me.
Q. Okay. But based on your review of the document, would you expect that there would be a list of the Chrysler employees and their positions?
A. I guess, yeah, I would expect that.
Q. And underneath that, it says dealer operations, correct?
A. Uh-huh.
Q. And then it has a list of names, and to the right of it their positions, correct?
A. Yes.
Q. And is it fair to say from looking at this document that there were at least 20 or more positions which dealt with dealer operations?
A. That's what this would indicate, yes.
Q. Did you have any duties or responsibilities or contact

with any dealers during your time at Chrysler?
A. No.
Q. Did you interface in any way with either dealer operations, business management of dealers, dealer real estate, franchise planning or administration, dealer identities, dealer placement, market representation, etcetera?
A. No.
Q. Can you tell me what hands-on job you did with respect to designing the fuel system of the Jeep ZJ or WJ?
MS. JEFFREY: Object to form. What do you mean by "hands-on"?
BY MS. DeFILIPPO:
Q. Hands-on. Do you understand what I mean?
A. Well, I understand what I mean by hands-on.
Q. Okay. What do you mean?
A. And in that context nothing. I did nothing hands-on with regards to the ZJ or any other vehicle. That was what my staff several levels removed was responsible for.
Q. Were you responsible for approving what your staff did?
A. In general, no.
Q. Did you in any way make suggestions about corrections, changes, additions to the fuel system of the Jeep ZJ

or WJ?

A. We would have periodic design reviews within our department, and various engineers, managers, chief engineers could bring up whatever subject they felt they wanted to or would be of interest to the group to discuss and review to get additional insight into, and opinions were freely shared within those meetings. I cannot recall a specific review on the ZJ fuel system, however.

Q. Do you have any documents which would evidence your meetings or reviews of the ZJ fuel system or the WJ fuel system?

A. I do not. I didn't take any documents when I retired from the corporation.

Q. But they do exist or they did exist?

MS. JEFFREY: Object to form. You can answer if you can.

A. Can you please repeat it?

MS. JEFFREY: She's saying they existed.

BY MS. DeFILIPPO:

Q. Documents exist that memorialize those design meetings and reviews?

A. Within our department, the meetings were more informal than that. The documentation was typically working-level design analyses or drawings or something

of that sort, and typically minutes were not produced as a result of those reviews.

Q. Were there any documents, however, that memorialized the design of the fuel system of the ZJ or the WJ that you were aware of that you didn't take?

A. Well, certainly there are design drawings of the system that existed at the time. Beyond that, I really don't know.

Q. Were there any memos intracompany review documents or any type of booklets similar to the N-body booklet, anything in the nature of documentation that you did not take that existed at the time?

MS. JEFFREY: He said he didn't take anything. I don't understand the "did not take" preface.

MS. DeFILIPPO: Because he said he did not take any of them.

MS. JEFFREY: You're asking him if there were any?

MS. DeFILIPPO: Yeah.

MS. JEFFREY: Okay.

A. None that I'm aware of. Again, they may or may not exist, but I don't remember any documents calling out the ZJ fuel system specifically.

BY MS. DeFILIPPO:

Q. Do you know where the tank was located in the Jeep ZJ, the fuel tank?
A. As of seeing the show on TV a week ago, I'm aware of where it's located. Prior to that, no, I'm not. Certainly I was 20 years ago when the design was done but subsequently lost any recollection of it until I happened to see the show a week or so ago.
Q. So the show refreshed your recollection as to what you knew 20 years ago?
A. Well, I would say it showed me where the tank was. It didn't strike a recollection, per se, no.
Q. Okay. So 20 years ago when you knew where the tank was located, can you tell me where it was located?
A. No.

MR. FUSCO: I object to the form.

MS. JEFFREY: Yeah, I do, too.

BY MS. DeFILIPPO:

Q. And today where was the tank located can you tell me?
A. I believe in the news show I saw, it was located on the rear underbody of the vehicle.
Q. Rear underbody. Where in relation to the rear axle was the tank located?
A. I believe it was behind the rear axle.
Q. Okay. And do you know why the tank was located in that particular position on the Jeep ZJ and WJ?

A. No.
Q. Do you know if the tank was -- where the tank was located on the WK?
MS. JEFFREY: You might want to start by asking if he knows what that is.
A. Even though I've driven many of them, no, I don't.
BY MS. DeFILIPPO:
Q. So you know what a WK is then, correct?
A. Yes.
Q. It's the Jeep Grand Cherokee --
A. Yes.
Q. -- which replaced the WJ, correct?
MS. JEFFREY: I just did that so you would wait until she's finished.
A. And I lost track of the nomenclature at that point, so if you would please repeat.
BY MS. DeFILIPPO:
Q. Well, tell me what the WK is.
A. The WK was the Grand Cherokee vehicle from approximately 2003 to 2009 model years.
Q. Okay. And you said you've driven them, correct?
A. Yes.
Q. Do you have one now?
A. No. We traded my wife's vehicle in last December. She has had probably five of them.

Q. Five WKs?
A. Yes.
MS. JEFFREY: WKs?
THE WITNESS: Yes. She loves Jeeps.
BY MS. DeFILIPPO:
Q. Has the WK been replaced by the WL?
MS. JEFFREY: I object to form. It's not accurate.
BY MS. DeFILIPPO:
Q. If you know?
A. What I believe it's been replaced by is something called the WK2 but I don't really know.
Q. Did you say you did not know where the tank was located on the WK?
A. Yes, I said no.
Q. In your capacity as executive engineer or as director of the Chassis Drivetrain Engineering from 1987 to 1994, did you have any responsibility for crash testing?
A. No.
Q. Did you get involved in any way in preparing the crash test analysis directions, or were you viewing the crash test results?
A. No.
Q. Did you know about the crash tests that were done

during that timeframe on the Jeep ZJs and the WJs?
A. I knew tests were done.
Q. And did you know that there was testing done to comply with the Federal 301 requirement?
A. What is 301, please?
Q. It's the rear-end crash test, barrier test.
MS. JEFFREY: Along with other tests, the 301. It's not just rear testing.
MS. DeFILIPPO: I understand that.
A. Again, could you please repeat?
BY MS. DeFILIPPO:
Q. Relative to rear-end collision testing, it is Government entitled FMVSS 301.
A. And the question is?
Q. So are you familiar with that testing?
A. I'm not familiar with the testing. I'm conceptually aware there is FMVSS testing of some ilk that is conducted.
Q. Do you know who designed the fuel tank to be behind the rear axle in the ZJ and the WJ?
A. I believe the location of the tank for the ZJ was the responsibility of the advanced packaging group.
Q. And who would that be?
A. I don't really recall who it would have been -- who it was at that point in time.

Q. Would that document that we originally looked at give you an idea of who it would be?
A. Well, the document we previously looked at had John Kent there and that would have been --
Q. Would this document that we looked at previously, Castaing 1, be able to help you indicate who was responsible for the location of the fuel tank in the ZJ and the WJ?
MS. JEFFREY: I'm just going object to form as to the WJ. This is a 1987 document. It's a 1999 vehicle.
A. Okay. Could we try the question again?
MS. JEFFREY: She can read it back if you'd like.
(The requested portion of the record was read by the reporter at 4:02 p.m. as follows:
"Question: Would this document that we looked at previously, Castaing 1, be able to help you indicate who was responsible for the location of the fuel tank in the ZJ and the WJ?")
A. Okay. I have no idea who it would have been for the WJ because that would have occurred after I had moved on. The ZJ would have been done within the timeframe

that it could either be the individual shown here, John Kent, as of December of '87 or his predecessor, and I'm not sure who his predecessor was.

BY MS. DeFILIPPO:

Q. Okay. I don't want you to guess, but do you have an educated idea about who his predecessor was? Do you mean predecessor or do you mean successor?

A. Pardon?

Q. Do you mean predecessor or successor?

A. Predecessor.

Q. That's a 1987 document?

A. Yes.

Q. I just want to make sure that it didn't go forward, that's all.

A. No, the advanced packaging work of the ZJ could have been done prior to December of '87. This document refers to that timeframe and shows John Kent as the person responsible for the group at that time, which was essentially the post AMC/Chrysler merger organization. The ZJ could have -- the advanced work for the ZJ could have been done as part of the American Motors advanced group prior to or during the formative stages of the merger, and the individual who was responsible for the advanced group at that point in time is the individual I don't have clear

recollection of. Anything other than that would be truly a guess.

Q. My recollection, and I could be wrong, but my recollection yesterday with Mr. Castaing and my notes reflect that he indicated that the person responsible for the fuel system was you and that you were chiefly responsible for the fuel system engineering in the ZJ. Would he be wrong in that?

A. No. As you've just stated it, that would be correct, my group would be responsible for the fuel system. The caveat I would add is the production design therein that, as I tried to describe earlier, the design process has an advanced stage before the vehicle goes to production engineering wherein the geometry of the vehicle is decided upon, and that's where the location of all of the componentry, the major componentry of the vehicle would be decided upon, including things such as the fuel tank location, and so yes, I was responsible for engineering of the production system, but that did not include the location thereof.

Q. Really?

A. Really.

Q. Is the location an engineering concept or is that something else?

A. One of the more difficult problems associated with vehicle engineering is getting all of the componentry to fit within the envelope of a vehicle, and typically that could lead to more of the contentious discussions between individuals of: I want to put my component here. No, I want to put my component there.

And so a way to deal with that is to take the responsibility away from those individuals that have such a highly-vested interest in it and put it with an advanced group that is responsible for the overall packaging layout of the vehicle, which sort of resolves those conflicts early on and says, okay, here's the space we have for the rear seat, here's the space we have for the tire, here's the space we have for the spare tire, whatever, and those are where they're going to be so they don't interfere with each other, and then each of the design groups has that envelope to work within and doesn't have to deal with another design group.

Q. With each other, to argue with each other, it's an advanced group that makes the decision of where the components go?

A. Pretty much, yes.

Q. Okay. So it would be the head of that advanced group that would decide the location of the fuel tank?

A. That's my belief, yes.
Q. And in the context of the ZJ, who was that?
A. Again --
Q. You think it was Kent?
A. It could have been a couple of individuals. John Kent certainly is one person it could have been. I don't have a clear recollection of who his predecessor was. There are a couple of names that come to mind.
Q. Just tell me who they are. I'm not going to hold you to them as definitely the ones but if you tell me who they are at least as a starting point.
A. One name I believe is Chris Theodore.
Q. And did his name jump out at you from that Castaing 1?
A. His name is on that chart in a different capacity. Well, I don't know.

On this chart he is shown as head of Engine Engineering.

Q. Anyone else who it could have been?
A. I'm too fuzzy on the other individuals.
Q. Do you know personally either John Kent or Chris Theodore?
A. You know, certainly we were compatriots, we were associates in engineering. We got to know each other pretty well.
Q. Do you still have contact with either of them?

A. No, no.
Q. And do you know if John Kent or Chris Theodore are still with Chrysler?
A. I don't know about John Kent. I know Chris Theodore is not.
Q. Do you know of any specific testing that was done to test for crashworthiness of the Jeep ZJ?
A. I have no specific recollection of any testing done on the vehicle. I have to believe it was done.
Q. Did you in your capacity as executive engineer of Jeep Dodge and Truck or as the director of Chassis Drivetrain Engineering have to sign off on the vehicles as being either crashworthy or roadworthy or ready to go to the public?
MS. JEFFREY: Object to form.
BY MS. DeFILIPPO:
Q. You can answer it.
MS. JEFFREY: If you can.
A. I have a recollection of -- well, no, in this timeframe, I do not recall signing off on any vehicles.
BY MS. DeFILIPPO:
Q. What vehicles were the ZJ's competition upon its introduction to the public?
A. The number one was the Ford Explorer, and I forgot the

GM equivalent vehicle. It was a Blazer something but I don't --

Q. Was the Mercedes-Benz a vehicle that was in competition with the ZJ, the Mercedes SUV?

A. I don't know that Mercedes had an SUV in this timeframe.

Q. Do you know where the fuel tank was located in the Ford Explorer?

A. No.

Q. Which GM vehicle did you say was the competition for the ZJ when it was introduced?

A. I believe it was a Blazer, but I believe they also used that name on several different platforms, so I don't specifically remember which one.

Q. Before 1992 when the ZJ went into production, were you and the people that you worked with or under you at Chrysler aware of problems that occurred with the Ford Pinto in rear-end collisions resulting in post collision fuel-fed fires?

MR. FUSCO: Object to form.

A. Certainly there was a high degree of awareness of the Ford problem throughout the industry. Whether a given individual was aware of it or not, I don't know. I sort of had an anecdotal awareness. I knew such a concern was there.

BY MS. DeFILIPPO:
Q. And were you aware that the fuel tank in the Pinto was in the rear crush zone where it could be impacted and cause a post collision fuel-fed fire?
MR. FUSCO: Object to the form.
A. No, I didn't know it was there. I certainly would have suspected it, but no, I didn't know.
BY MS. DeFILIPPO:
Q. When you say no, you didn't know but you suspected it, you mean you didn't actually physically view it there; is that what you mean when you say that?
A. I have no direct knowledge of either seeing a vehicle or seeing a drawing of a vehicle that would show where the fuel tank is.
Q. And that's what you term direct knowledge as opposed to knowledge from something you've read or that someone told you?
A. Exactly.
Q. But you knew from either something you had read or something that was put in front of you in the media that that's where the fuel tank was located in the Pinto, correct, in the crush zone?
MS. JEFFREY: Object to form.
BY MS. DeFILIPPO:
Q. You can answer it.

A. I knew the fuel tank was located in the rear of the vehicle, or let's say I assumed the fuel tank was located in the rear of the vehicle just because that was common practice at that point in time in the industry. What one defines as a crush zone, particularly on that vehicle, I really don't know.
Q. How would you define a crush zone in general?
MS. JEFFREY: Object to form.
A. I wouldn't.
BY MS. DeFILIPPO:
Q. Okay.
A. I don't know how to define it.
Q. Is there a crush zone located in the Jeep ZJ?
A. I don't know.
Q. While you were the head of Engineering, did you believe that there was a rear crush zone in the ZJ?
MS. JEFFREY: Object to form. He answered that.
A. Yeah, the problem is I don't know what a crush zone is, so I don't know whether it had one or it didn't have one.
BY MS. DeFILIPPO:
Q. So are you saying that crush zone is a term that you never used?
A. I'm saying it's not one that I'm familiar with at this

point in time.
Q. You might have used it back when you were working at Chrysler?
A. I guess it's possible.
Q. Was there a shield provided in the ZJ to protect the fuel tank on impact?
A. I don't know.
MR. FUSCO: Object to the form.
BY MS. DeFILIPPO:
Q. Is your answer "I don't know"?
A. I don't know, yes.
Q. Was there a shield available to mount around the fuel tank of the ZJ?
MR. FUSCO: Object to form.
MS. JEFFREY: Object. I didn't know if your question was done yet.
A. I don't know, either.
BY MS. DeFILIPPO:
Q. Did you say "I don't know"?
A. Yeah.
Q. Do you know what the term "skid plate" means?
A. Yes.
Q. What is it?
A. It's a -- I'm trying to define it without getting too jargon-ish. It's a structure placed under a vehicle

to provide enhanced off-road capability for said vehicle.

Q. Where is it placed under the vehicle?

A. It can be placed a number of locations depending upon what you're -- what the specific design of the vehicle is and what the performance of that vehicle is off road. There are vehicles where they're placed on the front of the vehicle, around the engine compartment to prevent intrusion of rocks and such type obstacles from intruding into the engine compartment of the vehicle. There are skid plates placed under the transmission drivetrain system of the vehicle for the same reason, and skid plates can be placed under the rear area of the vehicle, fuel tank, spare tire well of the vehicle to prevent intrusion into that area, also.

Q. Which, if any, of the skid plates that you've just described were standard on every ZJ?

MS. JEFFREY: Object to form.

MS. DeFILIPPO: What are you objecting to?

MS. JEFFREY: It implies that they are standard.

MS. DeFILIPPO: I said, Which, if any.

MS. JEFFREY: All right.

BY MS. DeFILIPPO:

Q. Which, if any, were standard on the ZJ?
A. I don't believe any were standard.
Q. So how would a customer know about a skid plate for any of those areas?
A. That it would be offered with all of the other optional features of the vehicle, and the customer would have the choice of selecting it or not.
Q. How would the skid plates be offered; would a customer be told that you can get a skid plate or would it come in some other way, the offer?
MR. FUSCO: Object to the form.
MS. JEFFREY: Object to the word "offer", form.
MS. DeFILIPPO: That's fine.
A. I believe they were both offered individually as well as part of an off-road package for said vehicle where skid plates, suspension upgrades were often combined.
BY MS. DeFILIPPO:
Q. Do you know whether or not the transfer case protector or skid plate was standard on the ZJ for every ZJ?
A. I don't know if it was standard or not. I don't even know whether there was one or not. It wouldn't surprise me if there was, but I don't know whether there was or not.
Q. By standard I mean without asking for an off-road

package or without a customer being told you can get a skid plate. Do you know whether the transfer case had a covering or skid plate that was standard?

A. I don't believe there was any skid plate standard on the vehicle.

Q. Do you know whether Chrysler tested, did 301 testing of the ZJ both with and without a skid plate?

A. I don't know, no.

Q. Do you know whether Chrysler did any testing for the ZJ in 301 testing with or without a tow package?

A. I don't know, either.

Q. Did you know that the tow package was always an option in the ZJ?

A. Did I know it was always an option, no.

Q. Do you believe at any time it was standard with the ZJ, the tow package?

A. I don't believe it was standard.

Q. So then is it fair to say that it would have been an option if it was offered at all?

A. It's fair to say I don't know whether it was standard or option is what I'm implying.

Q. Okay. Do you know of any problem that might occur in vehicles where there are vertical height differences between a vehicle such as the Jeep ZJ and a passenger car?

MS. JEFFREY: Object to form.

A. I don't specifically know any problems, no.

BY MS. DeFILIPPO:

Q. Do you understand that Chrysler had a duty to make their car crashworthy?

MR. FUSCO: Object to the form.

MS. JEFFREY: Join.

A. I really don't quite understand what that means, duty to make something crashworthy.

BY MS. DeFILIPPO:

Q. Do you understand what the term "crashworthy" means?

A. Not really.

Q. Did you ever use the term "crashworthy" in any of your meetings or in your job capacity at Chrysler?

A. I'm sure it has been used. I don't know if I've ever used it or not.

Q. Has anyone ever discussed with you the requirements of crashworthiness in designing and manufacturing a vehicle during the time when you were executive engineer of Jeep, Dodge and Truck and also director of Chassis and Drivetrain Engineering?

MS. JEFFREY: Object to form.

A. In those terms I don't know. I have no recollection, no.

BY MS. DeFILIPPO:

Q. If I tell you that the crashworthiness is based on the duty of a manufacturer to make a vehicle safe to protect its passengers from enhanced injuries after a collision --

MS. JEFFREY: Object to form.

MR. FUSCO: Object to the form.

BY MS. DeFILIPPO:

Q. -- do you recognize that as a definition of crashworthiness?

MR. FUSCO: Object to the form.

MS. JEFFREY: Join.

A. Not at all. I don't have a better one necessarily, but I don't understand what that one says.

BY MS. DeFILIPPO:

Q. Do you understand that there could be a situation where a vehicle could be involved in a collision and basically nothing occur other than the passengers being jostled but that as a result of that collision, for example, a rear-end hit, the fuel tank ruptures and gas leaks and a fire occurs which burns a passenger who would otherwise be only jostled and is now dead, do you understand that to be enhanced injuries, the death?

MS. JEFFREY: I object to the form of that.

BY MS. DeFILIPPO:

Q. Can you answer that?
A. Again, I really don't -- I don't understand it, no, in that way, no.
Q. So let me just ask you so that I'm clear. During the time when you were Chassis Drivetrain Engineering director and executive engineer in the Engine Engineering of Jeep, Dodge and Truck, you never discussed or knew what the term "crashworthiness" meant?

MS. JEFFREY: Object to form.

MR. FUSCO: Object to the form.

A. I'm saying now sitting at this point in time, I don't have any recollection of it, no. Whether I did 20 years ago, I don't know.
BY MS. DeFILIPPO:
Q. What don't you have a recollection of, what the term meant, or do you have a recollection of talking to someone about it?

MS. JEFFREY: Just a minute. Object to the form of that because you're asking him if he discussed it and if the term was used in the past, and he's saying he doesn't have a recollection.

BY MS. DeFILIPPO:
Q. Did you have an understanding of your own idea of what the meaning of crashworthiness was when you were

executive engineer of Jeep, Dodge and Truck or director of Chassis Drivetrain Engineering?

A. The difficulty I'm having is with the term "crashworthiness". To me that's somewhat like a term "goodness", that it is too unspecific, too amorphous to really get a handle on what it means. You know, I understand the need to have a vehicle perform in certain adverse conditions, but the term I'm struggling with is the term "crashworthiness". To me it has no specifics behind it. I'm not saying it doesn't; I'm saying to me it doesn't.

Q. And was that your understanding of how you approached the term "crashworthiness" back in the years from 1987 to '94; you also felt it didn't have any meaning?

MR. FUSCO: Object to the form.

A. I don't -- I'm saying I don't have a way of defining crashworthiness today. I don't know what I thought 20 years ago on the subject.

BY MS. DeFILIPPO:

Q. Do you know what the fuel tank in the ZJ was composed of in terms of materials?

A. I don't specifically know, no.

Q. Did you ever at any time in your capacity from 1987 to 1994 have knowledge of a rear-end crash that could result in an underride; in other words, the height of

the Jeep being higher than a passenger car and underride occurring?

MS. JEFFREY: I object to the form. What do you mean, "could result"?

MS. DeFILIPPO: Could result, maybe, could.

MS. JEFFREY: Does he know of an incident where it could result?

MS. DeFILIPPO: No.

BY MS. DeFILIPPO:

Q. Do you have knowledge of that concept as a concept?

A. I understand the concept of rear underride, yes.

Q. Can you tell me what a rear underride is?

A. It's a condition where one vehicle has a projection on the front of it that goes underneath the vehicle in front of it in some dynamic event.

Q. And would you agree with me that because of the height difference between the Jeep and some passenger cars, that underride could occur in a rear-end collision where the Jeep is rear-ended by a passenger vehicle of a lower height?

MS. JEFFREY: Object to form.

A. I don't know. It would be my belief that there was a standardization of vehicle heights by that point in time that was an attempt to preclude that from happening. Could there be a vehicle out there that

didn't meet that requirement? Sure. Specifically I don't know of where that would occur.

BY MS. DeFILIPPO:

Q. What timeframe was there a standardization of vehicle heights; what are we talking about?

A. I believe there was an FMVSS regarding bumper height associated with a vehicle, and an attempt was made to mitigate the rear underride issue of a vehicle.

Q. Okay. But what timeframe are we talking about?

A. Well, the only timeframe I think I'm discussing in any of this is the 1987 to 1990 timeframe.

Q. To '90?

A. 1987 to 1990.

Q. To '90?

A. Yes.

Q. You're not including to '94?

A. Well, I believe going forward, it also existed, yes.

Q. So sometime in the timeframe of 1987 to 1990, you believe that all vehicles were subject to the standardization requirement of the Federal Government; is that a fair statement?

MS. JEFFREY: He used the term FMVSS, not Federal Government.

MS. DeFILIPPO: Is there a difference? You can answer the question. Just answer

the question. Read my question back.

(The requested portion of the record was read by the reporter at 4:30 p.m. as follows:

"Question: So sometime in the timeframe of 1987 to 1990, you believe that all vehicles were subject to the standardization requirement of the Federal Government; is that a fair statement?")

A. And to the specific, I believe that there was a standard FMVSS compliance for vehicle height, yes.

BY MS. DeFILIPPO:

Q. Did Chrysler do crash tests to test for vehicle underride at any time that you're aware of?

A. I don't know.

Q. So let me just make sure I understand you. So are you saying that after 1990, the concept of underride should have, based on the FMVSS standard, be taken care of so that there would no longer be underride?

MS. JEFFREY: Object to the form.

MR. FUSCO: Object to the form.

A. I'm saying that in that timeframe, the vehicle should have complied with the appropriate height requirement, yes.

BY MS. DeFILIPPO:

Q. To eliminate underride, that's what we're talking about, right?
A. Well, you can never eliminate underride. There are always conditions of underride. You can go out on the street today and you can see a condition where a passenger car will underride a large over-the-road truck, a semi-truck. Certainly you can find a modified vehicle, they were more popular a few years ago, that were lowered that could underride any vehicle out there, but as far as a production vehicle was concerned, I believe that the compliance issue was there in that timeframe, yes.
Q. Do you know if Chrysler ever did testing on their vehicles that involved vehicle-to-vehicle testing as opposed to barrier testing for rear-end collisions?
A. I don't recall ever seeing anything like that, no.
Q. Did you have any responsibility to ensure that the design of the ZJ met Government standards in your capacity from 1987 to 1994?
A. Certainly there were some aspects where my group had responsibility, but those were in many cases reinterpreted into Chrysler requirements for one or other specification of the vehicle as coming out of the advanced design group that laid out the overall design specifications for the vehicle but, you know,

certain component specifications, certain performance specifications, yes, my group was responsible for ensuring -- for designing to compliance for those vehicles.

Q. And did the ZJ have a designed protection system for the fuel tank?

MS. JEFFREY: Object to form.

A. I don't know.

BY MS. DeFILIPPO:

Q. Do you know what an impact deflecting device is?

MS. JEFFREY: Object to form.

A. I don't know, no, I don't know. I mean, I can provide my own definition for one but I don't know.

BY MS. DeFILIPPO:

Q. What would your definition be?

A. Well, it's a device that deflects another object in a collision event.

Q. Do you think or did you think when you were head of Engineering in those capacities from '87 to '94 that there was any safety advantage to a skid plate, a fuel tank skid plate?

A. There certainly were advantages in an off-road setting for a skid plate. In an on-road setting, I don't know.

Q. Did you ever interface with NHTSA at any time that you

were employed by Chrysler?
A. I probably interfaced with NHTSA in my position with the PNGV group a decade or so after this specific timeframe we're talking about, and it was, again, it was more in a research capacity, but in the 1987 to '94 timeframe, I had no interaction with NHTSA.
Q. Did you ever see any studies, any documents, anything written at all regarding the safe location of fuel tanks?
MS. JEFFREY: I'll object to the form on that.
A. Not that I recall.
BY MS. DeFILIPPO:
Q. Do you believe that the fuel tanks should be located in an area that is protected by the frame rails on the side?
MS. JEFFREY: Object to form.
A. I certainly believe the fuel tank should be protected in whatever location it's placed.
BY MS. DeFILIPPO:
Q. In the ZJ, what protects the fuel tank?
A. At this point I don't know.
Q. What did?
A. I don't know.
Q. Can you tell me what could have protected the fuel

tank in the ZJ?

MS. JEFFREY: Object to form and foundation.

BY MS. DeFILIPPO:

Q. What are the possible structural items that could have protected the fuel tank?

MS. JEFFREY: Object to form. I don't know how he can answer that.

MR. FUSCO: Objection, asked and answered.

MS. DeFILIPPO: He didn't say he didn't know that. He said he didn't know today what actually protected it, and I'm asking him now what all the potential protections are.

MS. JEFFREY: I object to form on that. He doesn't know what protected it.

MS. DeFILIPPO: He said he didn't know what protected it. He didn't say what the potential protectors were.

MS. JEFFREY: I object to form. If you can answer it, go ahead.

A. What was the question, please?

BY MS. DeFILIPPO:

Q. What potentially could protect the fuel tank in the ZJ, what structural items?

MS. JEFFREY: If you know of the structural

items that are there.
A. That's the issue. I don't have a clear recollection of what the structure of a ZJ surrounding the fuel tank looks like to be able to answer the question. The answer to the question or the answer to how one designs protection for a fuel tank or the location of the fuel tank is very dependent upon what is around it, and that's what I -- at this point in time, I don't know what is around the fuel tank.
BY MS. DeFILIPPO:
Q. And you don't recall?
A. Exactly, that's what I'm saying is I don't recall. I don't know.
Q. So do you think that the side rail frame rails were on either side of the fuel tank in the ZJ?
MR. FUSCO: Objection.
BY MS. DeFILIPPO:
Q. You don't know that?
A. I don't know that for a fact. Certainly I would believe they were, but I don't know that for a fact.
Q. And do you believe that if the side rails were on either side of the fuel tank, they would provide protection to the fuel tank in a motor vehicle crash from the side?
A. That's one way of protecting the fuel tank certainly.

Q. Do you think that a skid plate would protect the fuel tank?
A. That's certainly one way of protecting it.
Q. Do you think that a tow package with the tow brackets would protect, you know, the way the tow package is designed would protect the fuel tank?
A. I would personally be concerned that was more of a hazard than a protection.
Q. And why do you say that?
A. That in the event of a crash, the bracketry as described would push into the fuel tank.
Q. Do you know anything about a bracket that was designed to be installed in the '97 ZJ and going forward?
A. No, again, I don't know -- I don't have any specific recollection of the structure or bracketry at all.
Q. Do you know if there was a bracket that was to strengthen the structures in the rear of the ZJ going forward of '97?
A. I don't know, and if there was -- if there was such a piece, component, it wouldn't have been -- I wouldn't have been in the group responsible for designing it at that point in time.
Q. Who would?
A. I believe it was John Kent.
Q. So that would be the group that would have?

A. In '90 as shown, I moved on to Engine Engineering, and I believe my successor in Chassis Engineering was John Kent.
Q. I'm talking about in 1987.
A. You said '97.
Q. I'm sorry, I am. I'm talking about '97. You're right.
MS. JEFFREY: You think it would be Kent in '97?
THE WITNESS: I don't know in '97. I'm saying between '90 and '94, I think it was John Kent. After that I don't know.
MS. DeFILIPPO: We can probably take a break now.
(Recess taken at 4:41 p.m.)
(Back on the record at 4:50 p.m.)
BY MS. DeFILIPPO:
Q. I might have asked you this, but I don't remember if I did. Did I ask you if you had any interfacing with any dealers?
A. You did and the answer was no.
Q. And did you know or do you know about a thing called DealerCONNECT?
A. I've heard the term. I knew a program existed. The specifics of the program I don't recall at this point

in time.
Q. And when you say program, you mean a computer program?
A. No, no, no. A program within the corporation to -- I believe it had something to do -- well, no, I don't know what it had to do with. There were so many of them. There was a, for want of a better definition I guess, a communications channel, vehicle process between the corporation and individual dealers to have some discussion is the best way I can think to define DealerCONNECT or a program involving DealerCONNECT. Beyond that -- that may or may not be correct, and beyond that, I really don't recall what it was.
Q. And do you know whether or not it was a computerized communication process that they used?
A. I don't know.
Q. I'm going to show you a document that was marked 5 in Robertson this morning. Have you ever seen a document like that?
A. No.
Q. Do you know if there was any discussions at any time during your time at Chrysler regarding relocation of fuel tanks from the rear of a vehicle to midship of any vehicle?
A. No, I don't know of any discussion like that.
Q. Do you know if there was any memos, studies, or

anything done along the lines of tank relocation from the rear of any vehicle to midship?

A. Absolutely not.

Q. "Not" that you don't know?

A. That I don't know.

Q. Okay. Do you know what the Chrysler Book of Knowledge is?

A. Again, I recognize the term. To me it's not a single entity. It's a process by which Chrysler was trying to document its various design practices across the vehicle, and each group was charged with committing to document, paper or computer, the design practices that were being employed or the best practices that could be employed in designing a vehicle.

Q. Do you believe it was good design practice to locate the fuel tank for its protection from rear or side impacts?

MR. FUSCO: Object to the form.

MS. JEFFREY: Object to form.

THE WITNESS: Could you restate it? I'm a little confused on the question.

MS. DeFILIPPO: Read it again.

(The requested portion of the record was read by the reporter at 4:54 p.m. as follows:

"Question: Do you believe it was good design practice to locate the fuel tank for its protection from rear or side impacts?")

A. I don't know that it was not good design practice. I have no specifics that would say that is not a thing that could be done. Certainly it's one of a number of different locations one can place the fuel tank.

BY MS. DeFILIPPO:

Q. Do you agree that from the ZJ --

MS. JEFFREY: Can you keep your voice up, Angel.

THE WITNESS: The blower has kicked in and I'm having a little trouble hearing you over on this side of the table.

BY MS. DeFILIPPO:

Q. Do you agree from the ZJ to the WJ, the fuel tank location was changed to allow relocation of the spare tire from the rear interior of the ZJ to below the rear floor pan in the WJ?

A. I wouldn't know since I really didn't have any design input on the WJ, and again, at this point in time, I don't really know where the fuel tank is.

Q. Do you believe that the ZJ was designed to reduce the likelihood of fuel leakage in rear impact collisions?

MS. JEFFREY: Object to form. "Designed to

reduce the likelihood"?

MS. DeFILIPPO: Yeah.

A. Reduce from what?

MR. FUSCO: Angel, just again for housekeeping, our stipulations from the deposition of Robertson also apply to Mr. Viergutz.

MS. DeFILIPPO: I don't know what you're talking about right now.

MR. FUSCO: For de bene esse purposes on objections and that type of thing.

MS. DeFILIPPO: Why don't you go ahead and ask your questions and then I'll continue.

MR. SACCO: I have just a couple questions for you.

MR. FUSCO: Our stipulations for Robertson also apply?

MR. SACCO: Yes, they're still in effect.

MR. FUSCO: Thanks.

EXAMINATION

BY MR. SACCO:

Q. Mr. Viergutz, would you look at your summary of professional activities which you provided us with earlier this afternoon, please?

A. Yes.

Q. You retired from Chrysler in December of 2005,

correct?

A. Correct.

Q. And from 2001 through 2005, you were a director with the corporation?

A. I was a director -- could you repeat the timeframe again?

Q. 2001 to 2005. I'm following your CV, sir.

A. Yes, and the question was?

Q. You were a director, were you not; that's what you said, correct?

A. Yes.

Q. Okay. In that capacity, were you responsible for any budget?

A. Yes.

Q. What was the budget that you were responsible for, the quantum of money, if you remember?

A. It was highly variable because of the nature of the job dealing with a totally new vehicle concept. I believe it went up to a peak of a $20 million program budget at one point in time, but as I say, it was highly variable.

Q. Okay. And correct me if I'm wrong -- strike that.

Were there goals that your department from 2001 to 2005 necessarily wished to accomplish or were charged with accomplishing?

A. Certainly there were responsibilities the group had that we were expected to discharge within that timeframe which I view as a little more binding than goals.
Q. Okay. And in the discharging of those responsibilities were budgetary issues necessarily considered?
A. Yes.
Q. And in discharging those goals, were safety issues necessarily considered?
A. Yes.
Q. Okay. Let's move down Page 1 of your summary of professional activities. From 1995 through 2000, you were also a director, correct?
A. Correct.
Q. And in that capacity, did you have a budget?
A. No.
Q. Did you co-manage a budget?
A. We co-managed a collaborative budget between Chrysler, Ford, GM, Federal Government and the university partners, yes.
Q. Okay. And that was a technical budget, correct?
A. Yes.
Q. And in that capacity as a director, did you also have responsibilities which you hoped to discharge?

A. Yes.
Q. And in the discharge of those responsibilities, were there budgetary issues that were necessarily considered?
A. Yes.
Q. And in the discharge of those responsibilities, were there safety issues that were necessarily considered?
A. Yes.
Q. Turn to Page 2 of your summary of professional activities, please.
A. Yes.
Q. From 1991 through 1994, you were an executive engineer, correct?
A. Yes.
Q. And in that capacity, did you have budgetary responsibilities?
A. Yes.
Q. And did your group or your department have responsibilities which they necessarily had to or hoped to discharge?
A. Yes.
Q. And were budgetary issues necessarily considered in the discharging of those responsibilities?
A. Yes.
Q. Were safety issues necessarily considered in the

discharge of those responsibilities?
A. Yes.
Q. Let's look at your next item on Page 2. From 1987 until 1990, you were also a director, correct?
A. Yes.
Q. And as a director, did you have budgetary responsibilities?
A. Yes.
Q. And did your group or department have a responsibility that necessarily needed to be discharged?
A. Yes.
Q. In the discharge of that responsibility, were budgetary issues necessarily considered?
A. Yes.
Q. And in the discharge of the responsibilities of that group, were safety issues necessarily considered?
A. Yes.
Q. Now let's look down to the next item on Page 2, and that goes back to your career with American Motors Corporation, correct?
A. Yes.
Q. From 1985 until 1987, you also held the title as director, correct?
A. Yes.
Q. And you say right in there that you had a budget which

you managed in that capacity, correct?
A. Correct.
Q. And in that capacity, did you have responsibilities which you wanted or had to discharge?
A. Yes.
Q. And in the discharge of those responsibilities, were there budgetary issues that were necessarily considered?
A. Yes.
Q. And in the discharge of those responsibilities, were there safety issues that were necessarily considered?
A. Yes.
Q. And from 1984, sir, until 1985, you were a chief engineer, correct?
A. Yes.
Q. And you say right in here, and I'm directing you to the bottom of Page 2 of your summary of professional activities, that you managed an annual budget, correct?
A. Yes.
Q. As well as a capital budget, right?
A. Yes.
Q. And in that capacity as chief engineer of Engineering Laboratories, you had responsibilities which you necessarily had to discharge, correct?

A. Yes.
Q. And in the discharge of those responsibilities, were budgetary issues necessarily considered?
A. Yes.
Q. And in the discharge of those responsibilities, were safety issues necessarily considered?
A. Yes.
Q. Sir, as an engineer who held the title of director and executive engineer with various automotive manufacturing organizations or corporations, would a reasonable expenditure of money to make a product safe or safer be prudent behavior?

MR. FUSCO: Object to the form.

MS. JEFFREY: Join. What's "reasonable expenditure" mean?

A. Yeah, I'm struggling with what's reasonable. I don't know what that means.

BY MR. SACCO:

Q. So you can't answer the question; is that what you're telling me?
A. First of all, I'd like to hear the question repeated.

MS. JEFFREY: She can repeat it.

(The requested portion of the record was read by the reporter at 5:04 p.m. as follows:

"Question: Sir, as an engineer who held the title of director and executive engineer with various automotive manufacturing organizations or corporations, would a reasonable expenditure of money to make a product safe or safer be prudent behavior?")

A. The struggle I'm having is it's a very generic question. The answer is yes.

MR. SACCO: Thank you. I have nothing more.

MS. DeFILIPPO: I just want to go back to where I was.

MS. JEFFREY: Okay.

EXAMINATION CONTINUING

BY MS. DeFILIPPO:

Q. My last question to you, Mr. Viergutz, was whether or not the ZJ was designed to reduce the likelihood of fuel leakage in rear impact collisions. Do you know the answer to that question?

MS. JEFFREY: Object to form. Reduced as compared to what?

A. Yeah, that's where I thought we were ten minutes ago.

BY MS. DeFILIPPO:

Q. I'm reading from an interrogatory answer of Chrysler

to a question which basically is submitted as a supplemental response to Number 3. It might be a document request. And in supplemental response Number 3 from Chrysler, there is a statement that Chrysler makes. These are sworn statements from Chrysler in which Chrysler says --

MS. JEFFREY: I object -- never mind.

BY MS. DeFILIPPO:

Q. Chrysler says that the design location of the fuel tank behind the rear axle is a reasonable design for the safe and effective storage of fuel, and they talk about that, and then there is a sentence that says: The fuel system of the 1996 Jeep Grand Cherokee ZJ was designed to reduce the likelihood of fuel leakage or fuel system damage in rear impact collisions.

Do you agree with that statement?

MS. JEFFREY: I'd like him to have the context of the entire paragraph.

MS. DeFILIPPO: He can read the paragraph.

MS. JEFFREY: Go ahead, this paragraph that she's quoting.

A. Okay. Now that I've read the question, please -- now that I've read the paragraph, please repeat the question.

BY MS. DeFILIPPO:

Q. The question is: Do you agree that the ZJ was designed to reduce the likelihood of fuel leakage in rear impact collisions?
A. I have no personal knowledge of how the -- excuse me -- of how the '96 ZJ was designed. I have no reason --
Q. I'm asking you about the ZJ prior to '96. I used the terminology used by Chrysler's own lawyers, and I used their terminology out of context, and I want to know whether or not the Jeep ZJ was designed to, the fuel system of the Jeep ZJ was designed to reduce the likelihood of fuel leakage or fuel system damage in rear impact collisions?
A. As I was going to finish the answer, I have no reason to disagree with the statement here. So yes, I believe it's accurate.
Q. Now having looked at it from your attorney, correct?
A. No.

MS. JEFFREY: I object to form.

MS. DeFILIPPO: You objected to form and it was your own form. So I'm just saying I gave him the opportunity to look at it because you insisted on it. At first you said that you objected to form because you didn't understand it. It was your own terminology. That's one of the reasons why we have

the rule.

MS. JEFFREY: Okay. The prior sentences give it context.

MS. DeFILIPPO: It didn't need context. I took it out of context, and I asked the question based on your -- you objected to the terminology. I only asked the question based on your terminology out of context.

MS. JEFFREY: You selected one sentence out of a ten-sentence paragraph.

MS. DeFILIPPO: Yes, that's right.

MS. JEFFREY: The context made no sense.

MS. DeFILIPPO: The sentence made sense. The sentence as I gave it made sense, and if he didn't think it made sense, he could have said it, and now you're testifying for him, and that's what the rule is meant to avoid. That's all I'm saying. But I allowed you to show it to him.

MS. JEFFREY: Can I respond? What I'm saying is you took one sentence out of a paragraph --

MS. DeFILIPPO: That's right, I did.

MS. JEFFREY: -- and I gave him the paragraph to read because of the context of the response, surrounding sentences. It's not fair to take one sentence out of a paragraph.

MS. DeFILIPPO: He just says now he agrees with it because he got to read it as your language. So what are we talking about? There was no problem as to form, but we'll move on.

BY MS. DeFILIPPO:

Q. Now having read that, what was the specific design that the ZJ incorporated to reduce the likelihood of fuel leakage in rear impact collisions?

A. I don't know.

Q. And are you saying you don't know today but you did know when you were an employee of Chrysler?

A. I'm certainly saying I don't know today. I presume I did know when I had responsibility for that position, yes.

Q. And when you did know when you had responsibility for that position, did you reduce anything to writing in case you might forget?

A. No, not to my recollection, no.

Q. Was there any writing regarding the designing of the ZJ to reduce the likelihood of fuel leakage in rear impact collisions?

A. Not that I know of.

Q. Do you know during the time that you were with Chrysler, were you aware of any claims or lawsuits which were filed involving rear-end collisions and

fuel-fed fires?
A. I have no personal knowledge of that, no.
Q. As you sit here today, do you have any knowledge of any rear-end collisions resulting in fire involving the Jeeps; do you have any personal knowledge?
A. No.
Q. Do you know a Judson Estes, Judson B. Estes, E-S-T-E-S?
A. No, I have no recollection of that name.
MS. DeFILIPPO: I don't have any other questions.
MS. JEFFREY: I have some questions.
MR. SACCO: That's okay. We're not done on Direct yet.

RE-EXAMINATION

BY MR. SACCO:
Q. When's the last time you saw Francois Castaing?
A. Probably around the end of 2005.
Q. When's the last time you spoke with him?
A. End of 2005.
MR. SACCO: Thank you.
MS. JEFFREY: Okay. I just have a few follow-ups.

EXAMINATION

BY MS. JEFFREY:

Q. You testified that the term "crashworthiness" was amorphous to you; is that correct?

MS. DeFILIPPO: I object to the term. I don't think he used the term "amorphous".

MS. JEFFREY: He used the term "amorphous".

MS. DeFILIPPO: Okay.

BY MS. JEFFREY:

Q. Do you recall the term "amorphous"?

A. Yes.

Q. You and the company were concerned about crash performance of your vehicles; isn't that true?

A. Yes.

Q. And, in fact, you tested your vehicles to Federal Motor Vehicle Safety Standards to make sure they met applicable standards, correct?

A. The company did, yes.

Q. And those requirements are related to crash performance in accidents; is that true?

A. I believe they are.

Q. And is it possible to test -- is it possible for a vehicle to not suffer damage in all types of accidents? Let me rephrase that.

Aren't there some accidents when any vehicle would suffer damage and when individuals would be killed?

A. Yes.

MS. DeFILIPPO: Objection to form.

A. I don't know about the killed part, but certainly there are accidents that any vehicle would be damaged in.

BY MS. JEFFREY:

Q. You can't prevent injury in all accidents; isn't that true?

MS. DeFILIPPO: Object to the form.

A. You certainly cannot prevent damage in all accidents. I don't know about injury.

BY MS. JEFFREY:

Q. And the purpose of testing to the Federal Motor Vehicle Standards is to ensure that the vehicles perform reasonably safely in accidents that occur in the real world; is that true?

MR. SACCO: Form.

A. Yes.

MS. JEFFREY: That's all I have.

MS. DeFILIPPO: No other questions.

MR. FUSCO: Thank you, sir. We're done.

MR. SACCO: Thank you, sir.

MS. JEFFREY: Do you have any questions, Mr. Gill?

MR. GILL: No questions.

MS. JEFFREY: Thank you. We're hanging up now.

(The deposition was concluded at 5:14 p.m. Signature of the witness was not requested by counsel for the respective parties hereto.)

CERTIFICATE OF NOTARY

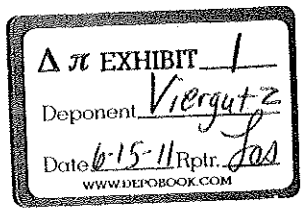
STATE OF MICHIGAN)
) SS
COUNTY OF MACOMB)

I, LEZLIE A. SETCHELL, certify that this deposition was taken before me on the date hereinbefore set forth; that the foregoing questions and answers were recorded by me stenographically and reduced to computer transcription; that this is a true, full and correct transcript of my stenographic notes so taken; and that I am not related to, nor of counsel to, either party nor interested in the event of this cause.

LEZLIE A. SETCHELL, CSR-2404
Notary Public,
Macomb County, Michigan.
My Commission expires: April 17, 2012

OWEN J. VIERGUTZ

Summary of Professional Activities



Summary of Career at DaimlerChrysler Corporation

(Through Daimler / Chrysler and Chrysler / AMC Mergers)

2001 – Present

Director – Hybrid and Electric Vehicles and Government Applications

In this position, Mr. Viergutz is responsible for all activities associated with the design, development and production of integrated hybrid electric propulsion systems within the Chrysler Group. This includes program conception and approval through the design/development and production follow up. The electric machine and power electronics designs are conceived as building block modules for hybrid, electric and fuel cell vehicles. The initial program is uniquely structured to yield a positive business case from its initial corporate launch in a 2005 light truck application.

As a derivative of this effort I am also responsible for the leadership and direction of DaimlerChrysler's effort to regain its position as a major supplier of vehicles to the Military. The first effort is through a US Army sponsored program for a Dodge Ram Truck derivative incorporating a Hydro-Pneumatic suspension system and a hybrid propulsion system. This program has allowed DaimlerChrysler to leverage technology developed for the commercial sector into a specific military role. This market expansion will increase group revenues by $225M over a 5 year business cycle. The second military dual use application under development is a Jeep derivative for special use applications adding an additional $120M in revenue.

1995-2000

Director - Next Generation Vehicles

Define and guide technical activity associated with the industry / government program - *Partnership for a New Generation Vehicle* (PNGV). Facilitate and direct the team activity for this joint OEM-Government activity in identifying and addressing the challenges associated with breakthrough automotive propulsion, energy storage, materials, manufacturing processes and electronics technology. Establish a framework for leveraging the resources of DaimlerChrysler and several Federal agencies.

Interface with Senior Executives at General Motors and Ford as well as the principal Government Partner Agencies; Department of Energy, Department of Defense, Department of Transportation, National Aeronautical and Space Administration, Environment Protection Agency and the National Institute of Standards and Technology. Work with European consortia to establish complimentary technical programs. Co-manage a technical budget averaging $100M annually in the area of Fuel Cells, Internal Combustion Engines, Battery Technology, Power Electronics, Lightweight Materials, and Vehicle Architecture.

1991-1994

Executive Engineer, Engine Engineering - Jeep/Dodge Truck

Responsible for all Jeep, Dodge Truck and Viper production engine programs. This included responsibly for the design, development and production release of all engine and related componentry including fixed and rotating components, fuel systems, intake and exhaust systems, accessory drive systems and calibration activities. Launched the industries first two successful V10 engine lines. Initiated Diesel applications in both Dodge and Jeep platforms. Launched an average of two new engine platforms annually. Provided the technology base for alternative fuel applications in both liquid and gaseous fuel alternatives. Responsible for all production testing and certification activity supporting EPA, CARB, and EEC acceptance. Provide powertrain support for International programs in Europe, Middle East, Asia and South America. Responsible for managing product content representing $1.05B in annual revenue.

1987-1990

Director, Chassis/Drive Train Engineering - Jeep/Truck

Responsible for all Jeep and Dodge Truck/Van chassis and drive train systems. The department was responsible for the design, adaptation, development and warranty support for all components in the vehicle suspension systems, brake systems (including ABS), cooling and fuel systems, as well as axles, manual and automatic transmissions, 4WD and All-Wheel-Drive systems. Launched first successful application of an ABS system in 4WD applications. Developed strong partnership relationships with key component suppliers in Germany and Japan. Responsible for managing product content representing $710M in annual revenue.

Summary of Career at American Motors Corporation

1985-1987

Director, Engineering/Scientific Laboratories

Responsible for providing all technical support services for vehicle development and engineering within AMC on all Jeep and AMC passenger car platforms. Activities include the engineering laboratories, scientific calculation services, Wisconsin Proving Grounds, and the Arizona Test Center. Provided coordination of technical activities with Renault facilities throughout Europe and the Middle East. Managed a physical plant with a book value of $145M, an annual services budget of $35M and a $17M capital budget.

1984-1985

Chief Engineer, Engineering Laboratories

Provide technical direction for all of AMC's development laboratory functions including: Aerodynamic/Thermodynamic labs, Vehicle Dynamics and Performance labs, Noise and Vibration labs, Experimental Stress lab, Material Standards lab, and Advanced Material Development group. Managed an annual services budget of $27M and $15M capital budget.

Summary of Career at IIT (Illinois Institute of Technology) Research Institute

1973-1984

Manager, Mechanics and Mechanical Engineering

Manager of the Mechanical Engineering department of five technical sections and laboratories including Structural Analysis, Experimental Stress Analysis, Fluid Dynamics, Acoustics and Mechanical Design. Worked with most governmental agencies and many fortune 100 companies. Group was responsible for identifying, developing and applying leading edge technology to support the national defense and industrial competitiveness. As the research arm for a major technical university, responsibility included development of funding sources and client development. Created International Research Consortia with Fiat and Governmental agencies to extend the field of hybrid electric vehicle propulsion. Initiated first hybrid automotive concept with Department of Energy. Co-developed an industrial-government accreditation program and oversight body for the certification and quality assurance of commercial testing laboratories.

EDUCATION

1972-1976	DePaul University - Master Sciences, Business Administration
1964-1969	Illinois Institute of Technology, Bachelor of Science, Mechanical Engineering

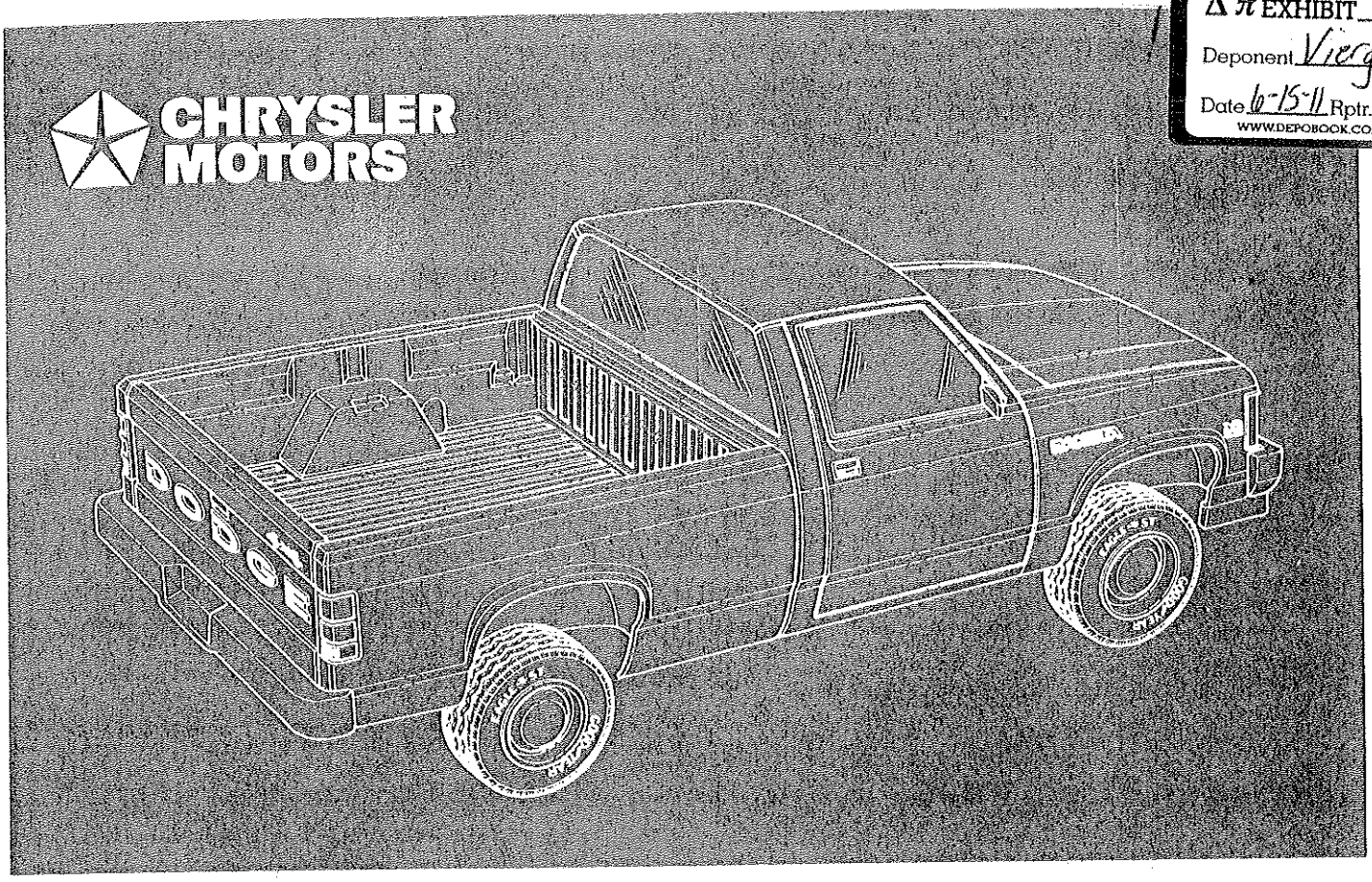
RELATED DATA

1969-1973 Served as Engineer for City of Chicago Department of Transportation

Registered Professional Engineer Illinois and Michigan
Member Society of Automotive Engineers
Member SAE National Teetor Educational Committee
Member American Society of Mechanical Engineers

25 Jul 2003

CHRYSLER MOTORS



N-BODY TRUCK PROGRAMS

RAM TOUGH Dodge Truck

7/70

ENGINEERING PROGRAM REVIEW MEETING

Thursday, February 11, 1988, 1:00 PM
Executive Conference Room

CONFIDENTIAL

JEEP AND TRUCK ENGINEERING

AGENDA
N-BODY DAKOTA TRUCK
ENGINEERING PROGRAM REVIEW

Thursday, February 11, 1988 - 1:00 P.M.
Executive Conference Room - Chrysler West

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2.	- General Timing Review	J. J. Serritella	5-8
3.	- LRP Update	D. E. Dawkins	9
4.	- Manufacturing Issues		10
	. Timing	T. G. Tomezak	
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	. Complexity	T. G. Tomezak	
	. Open Items Review	P. C. Pellerito	11-18
5.	- Design Office Issues	T. M. Creed	19
	. Approval/Release Timing Review		
6.	- Critical Components Timing & Sourcing Review		
	. Body	D. N. Renneker	20
	. Chassis/Drivetrain	O. J. Viergutz	21
	. Engine	C. P. Theodore	22-23
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	. Purchasing Status	R. J. Matton	25-26
7.	- Prototype Vehicle Development Plan	D. C. Winn	27-33
8.	- Buck/Packaging Status	J. E. Kent	34
9.	- Cost Review		
	. V-8 Vehicle	E. R. Schneider	35-39
	. Non V-8 Vehicle	E. R. Schneider	
	. Average Vehicle Definition	T. E. Johnson	40
	• Other Programs Status		
10.	- 2.5L I-4 (1989)		
	. Ride & Drive Review/Recommendation	D. C. Winn	41-45
	. Development Issues	C. P. Theodore/D. C. Winn	46-48
	. Marketing/Planning Issues Review	G. A. House	49-50
11.	- RWAL (1989)		
	. Ride & Drive Review/Recommendation	D. C. Winn/	51-52
	. Development Issues	O. J. Viergutz	
	. Manufacturing Open Items Review	P. C. Pellerito	53
12.	- A500 (1988 1/2)		
	. Ride & Drive Review/Recommendation	D. C. Winn/	54
	. Development Issues	O. J. Viergutz	
13.	- Extended Cab (1989 3/4)		
	. Development Issues	D. C. Winn/Directors	55-56
	. Manufacturing Open Items Review	P. C. Pellerito	57-62
	. Purchasing Issues Review	R. J. Matton	63-64
14.	- Dual Rear Wheel Chassis-Cab (1991)	G. A. House	65-66
	• Other N-Body Program Issues	All	-

2/9/88; 0013S

MEETING MINUTES

N-BODY DAKOTA
ENGINEERING PROGRAM REVIEW

JANUARY 14, 1988

Attendees:

C. R. Acker	R. S. Anderson	R. F. Bauer
F. J. Castaing	G. J. Cilibraise	S. W. Crater
T. M. Creed	T. deBoer	J. R. Dickerson
L. C. Dong	C. W. Ewing	G. A. House
T. E. Johnson	J. C. Miller	K. A. Miller
D. A. Nelson	P. C. Pellerito	D. D. Perrine
D. N. Renneker	L. D. Schmidt	E. R. Schneider
I. P. Shadko	P. V. Sheridan	J. J. Serritella
G. W. Smith	C. P. Theodore	G. R. Thorley
O. J. Viergutz	D. C. Winn	

5.2L V8 Program

	Responsibility
Timing	
Component timing for a 1990 1/2 and a 1990 3/4 launch was reviewed. Timing to standard MTS remains late. JTE will continue to review timing compression opportunities and is presently supporting a 1990 3/4 launch.	Engrg. Directors
Sourcing status for critical components including an analysis of timing compression opportunities vs. standard MTS timing was requested for presentation by next meeting.	Engrg. Directors
Director-by-Director meetings with Purchasing to determine opportunities on critical components is required.	P. V. Sheridan/ Engrg. Directors
Design/Development Status	
Body	
- Bumper and exterior surfaces release to JTE Body Engineering will commence 1/29/88. EMD release to Die Modeling to be on an ongoing basis. Firm commitments need to be confirmed.	P. Sawchuk/ S. W. Crater
- Management of die models for 1990 3/4 N-Body will be handled by Highland Park engineering (joint JTE/Manufacturing die model management begins with ZJ program). Typical timing for die model construction, duplication (for die maker) and inspection: 13 weeks.	R. M. Cooper

Design/Development Status	Responsibility
Body (Cont'd)	
- Radiator enclosure panel is critical part. Presently sourced to Budd. Testing will be conducted on pre-program vehicles.	D. N. Renneker/ D. C. Winn
- Manufacturing to report on stamping and enclosure panel assembly and new welding line timing for radiator enclosure panel by next meeting.	T. G. Tomezak
- Meetings to conduct ongoing reviews of front end buck packaging studies was requested. Stamping & Assembly involvement also requested.	J. E. Kent/ P. C. Pellerito
- Outside rearview mirrors not considered critical to 1990 3/4 timing; mirror mechanicals could be carryover. Other styling revisions that may need PDM approval should be resolved.	T. M. Creed
- Present direction is not to use a counter balance for longer hood. Resulting lift efforts above corporate standard.	D. N. Renneker
Drivetrain/Chassis	
- Data analysis for front axle decision (8 1/4 vs. 7 1/4) not yet finalized. Review of tooling timing between Purchasing/ Detroit Axle requested. (Required for C1 pilot).	O. J. Viergutz/ R. J. Matton
- Remaining chassis components are on time to support a 1990 3/4 launch.	O. J. Viergutz
- Representative upgraded brakes will be available for a June 1988 vehicle build.	O. J. Viergutz
- Brake system will be upgraded to accomodate V-8 and V-6 extended cab 4x4 applications. An analysis of upgraded system commonization with I-4/other V-6 vehicles and associated complexity issues to be presented at next meeting.	T. G. Tomezak/ O. J. Viergutz
- A 1990 3/4 launch would require the use of a manual shift transfer case for a production period of three months until the electric shift transfer case becomes available in 1991. An analysis of pullahead of the electric shift transfer case, overhead console and required cowl side inner panel was requested.	D. N. Renneker/ O. J. Viergutz/ R. S. Moser/ J. J. Serritella

	Responsibility
Engine	
- Engine with representative/new accessory drive will not be available until June, 1989 (vs. December, 1988). Confirmation/durability testing will be compressed for 1990 3/4 launch. (Early pre-program vehicles will be supported with engines that do not have representative accessory drive).	C. P. Theodore
Electrical	
New underhood mounting brackets may be required. Other components require minor modifications or are carryover. Underhood temperature increases due to V-8 and the impact on ECU will be analyzed.	R. S. Moser
Development	
A detailed prototype vehicle development plan will be presented at the next meeting.	D. C. Winn
Technical Cost	
The vehicle cost estimates for the items being changed to accomodate the V8 were reviewed. An updated V8 program cost (including trim package, electric transfer case, etc.) is requested for next meeting. An update of V8 cost impact on non-V8 vehicles also requested.	E. R. Schneider/ Engrg. Directors
- The definition of a "base vehicle" is required in view of the LAI request to reduce the vehicle line cost by 10%. A volume weighted average Dakota was proposed.	E. R. Schneider/ P. V. Sheridan

OTHER N-BODY PROGRAMS

A500 Launch Readiness (1988 1/2)	
- Vehicle is ready for February launch. Ongoing efforts to resolve hardshifting, etc. requested.	D. C. Winn
- The 3.90 axle ratio with the 14 inch tire has unacceptable highway engine speed and resultant NVH. Proposed launch restrictions to be defined by 1/21/88. 3.90 axle ratio restricted to the 15 inch tire under evaluation.	O. J. Viergutz/ G. A. House/ D. C. Winn
- Development issues including axle complexity (3.2, 3.5, 3.9) to be addressed at the next meeting.	D. C. Winn

RWAL Brakes (1989)

- No design/timing problem identified. Reliability mileage accumulation not complete. Some axle failures noted. In process of comparing data to those of non-RWAL vehicles. Need to summarize development issues by next meeting.	O. J. Viergutz/ D. C. Winn

2.5L TBI Launch Readiness (1989)

- Testing is on schedule; no major launch issues identified to date.	C. P. Theodore
- A management Ride & Drive is scheduled for Tuesday, 1/26/88.	D. C. Winn
- JTE requested that need for 2.5L I4 powertrain be clarified. Proposed that 3.9L V6 be made the base powertrain with 5.2L V8 the option. Program Management/Product Planning to present at next meeting.	T. deBoer/ G. A. House
- An update of all development issues to be presented at the next meeting.	C. P. Theodore/ D. C. Winn

Extended Cab (1989 3/4)

- All program vehicles are completed. No major durability problems identified after 5,000 miles of testing. Rear seat and access ease awaiting parts for evaluation. Development issues to be summarized at the next meeting.	D. C. Winn

The next N-Body Program Review is scheduled for 1:00 p.m. on Thursday, February 11, 1988 in the JTE Executive Conference Room.

cc:
D. F. Buser
R. M. Cooper
D. E. Dawkins
G. F. Ingram
J. E. Kent
J. E. MacAfee
R. J. Matton
M. J. McGrane
R. S. Moser
E. C. Pearson
P. Sawchuck
T. G. Tomezak
J. F. Wurster
H. C. von Rusten

Paul V. Sheridan
Engrg. Program Control
January 20, 1988

0005S

TODAY	80113	117 WBVP
F LOT	90807	35 WBVP
P. LOT	90925	28 WBVP
C1 PILOT	91106	22 WBVP
VOL PROD	00409	

COMPONENT TIMING FORECAST

1990 3/4 'N' BODY PICK-UP (PROPOSAL) (1Q) DODGE CITY

		THEME SELECTION PDM		THEME APPROVAL PDM		START PROD DESIGN		EMD COMPLETE		DIE MODEL COMPLETE		PROD SAMPLE AVAILABLE		WEEKS + OR - TO MTS**
FRAME ASSY OKMON510	FCST WBVP	NA		NA		70626A 140	44	80429 101		NIR	60	90629 41		+0
KNUCKLE & KNUCKLE ARM OKMON505	FCST WBVP	NA		NA		70626A 145	51	80617 94		NIR	60	90811 34		+7
FRONT AXLE OKMON500	FCST WBVP	NA		NA		80315 107	28	80930 79		NA	60	91124C 19		-8
HEADLAMP ASSY-AERO OKMON301	FCST WBVP	70619 146	8	70813A 138	26	80212 112	43	81209 69	12	90303 57	28	90915C 29		-14
PARK/TURN LAMP OKMON303	FCST WBVP	70619 146	8	70813A 138	26	80212 112	44	81216 68	13	90317 55	32	91027C 23		-11
BUMPER - FRONT OKMON200	FCST WBVP	70619 146	8	70813A 138	24	80129 114	30	80826 84	13	81125 71	41	90908C 30		-11
GRILLE OKMON304	FCST WBVP	70619 146	8	70813A 138	26	80212 112	34	81007 78	13	90106 65	36	90915C 29		-5
MIRROR - O/S DOOR LT OKMON400	FCST WBVP	70717 142	22	71218A 120	22	80520 98	30	81216 68	12	90310 56	29	90929C 27		-7
MOLDING - FENDER OKMON404	FCST WBVP	NR		71218A 120	12	80314 108	40	81219 68	8	90213 60	27	90821C 33		-1

** NOTE: ALL + OR - WEEKS ARE TO LAST SAMPLE SUBMISSION FOR ENGINEERING FUNCTIONAL TESTING, OR CLEAN-UP REQUIREMENT FOR PURCHASED PARTS, OR TO LAST MTS PERMISSIBLE SHIP CODE DATE FOR CERTIFIED CORPORATE PARTS.

PROGRAM TIMING OFFICE

TODAY	80113	117 WBVP
P1 PILOT	90807	35 WBVP
P2 PILOT	90925	28 WBVP
C1 PILOT	91106	22 WBVP
VOL PROD	00409	

COMPONENT TIMING FORECAST

1990 3/4 'N' BODY PICK-UP (PROPOSAL) (1Q) DODGE CITY

		THEME SELECTION PDM	THEME APPROVAL PDM		START PROD DESIGN		EMD COMPLETE		DIE MODEL COMPLETE		PROD SAMPLE AVAILABLE	WEEKS + OR - TO MTS**
AIR DAM-FRT BMPR (PREM)	FCST	NA	70813A	38	80506	34	81230	13	90331	21	90825C	-2
OKMON204	WBVP		138		100		66		53		32	
HOOD - OUTER			70813A	17	71207A	25	80403	11	80819	43	90616	
			138		121		96		85		42	+8

** NOTE: ALL + OR - WEEKS ARE TO LAST SAMPLE SUBMISSION FOR ENGINEERING FUNCTIONAL TESTING, OR CLEAN-UP REQUIREMENT FOR PURCHASED PARTS, OR TO LAST MTS PERMISSIBLE SHIP CODE DATE FOR CERTIFIED CORPORATE PARTS.

PROGRAM TIMING OFFICE

TODAY	80208	127 WBVP
P1 PILOT	91113	35 WBVP
P2 PILOT	00102	28 WBVP
C1 PILOT	00212	22 WBVP
VOL PROD	00716	

COMPONENT TIMING FORECAST

1991 'N' BODY PICK-UP — DODGE CITY

		THEME SELECTION PDM		THEME APPROVAL PDM		START PROD DESIGN		EMD COMPLETE		DIE MODEL COMPLETE		PROD SAMPLE AVAILABLE	WEEKS + OR - TO MTS**
FRAME ASSY OKM1N510	FCST WBVP	NA		NA		70626A 159	44	80429 115	0	80429 115	60	90623C 55	+14
FRONT AXLE OKM1N500	FCST WBVP	NA		NA		80315 121	28	80930 93		NA	60	91124C 33	+11
KNUCKLE & KNUCKLE ARM OKM1N505	FCST WBVP	NA		NA		70626A 159	51	80617 108	0	80617 108	60	90811C 48	+20
HEADLAMP ASSY-AERO OKM1N301	FCST WBVP	70619 160	8	70813A 152	26	80212 126	17	80613 109	38	90303 71	28	90915C 43	+0
PARK/TURN LAMP OKM1N303	FCST WBVP	70619 160	8	70813A 152	26	80212 126	44	81216 82	13	90317 69	32	91027C 37	+3
BUMPER - FRONT OKM1N200	FCST WBVP	70619 160	8	70813A 152	24	80129 128	30	80826 98	13	81125 85	41	90908C 44	+3
GRILLE OKM1N304	FCST WBVP	70619 160	8	70813A 152	26	80212 126	34	81007 92	13	90106 79	36	90915C 43	+9
MIRROR - O/S DOOR LT OKM1N400	FCST WBVP	70717 156	22	71218A 134	22	80520 112	30	81216 82	12	90310 70	29	90929C 41	+7
MOLDING - FENDER OKM1N404	FCST WBVP	NR		71218A 134	12	80314 122	40	81219 82	8	90213 74	27	90821C 47	+13

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PROGRAM TIMING OFFICE

2

TODAY	80208	127 WBVP
P1 PILOT	91113	35 WBVP
P2 PILOT	00102	28 WBVP
C1 PILOT	00212	22 WBVP
VOL PROD	00716	

COMPONENT TIMING FORECAST

1991 'N' BODY PICK-UP — DODGE CITY

		THEME SELECTION PDM	THEME APPROVAL PDM		START PROD DESIGN		EMD COMPLETE		DIE MODEL COMPLETE		PROD SAMPLE AVAILABLE	WEEKS + OR - TO MTS**
RADIATOR CLOSURE OKM1N100	FCST	NA	70813A	17	71211	39	80909	12	81202	35	90804C	+14
	WBVP		152		135		96		84		49	
AERO HEADLAMP ASSY - L.D.D. KM91N305	FCST		70813A	26	80212	25	80808		NA	48	90710	+10
	WBVP		152		126		101				53	
HOOD OUTER - PNL	FCST		70813A	17	71207A	25	80603	12	80826	43	90623	+21
	WBVP		152		135		110		98		56	

** NOTE: ALL + OR - WEEKS ARE TO LAST SAMPLE SUBMISSION FOR ENGINEERING FUNCTIONAL TESTING, OR CLEAN-UP REQUIREMENT FOR PURCHASED PARTS, OR TO LAST MTS PERMISSIBLE SHIP CODE DATE FOR CERTIFIED CORPORATE PARTS.

PROGRAM TIMING OFFICE

N-BODY TRUCK LRP

LRP OVERVIEW

1989 M.Y.	- Add 2.5L TBI & A/T, Drop 2.2L - Add RWAL Brake System - Add Dodge Convertible (89-1/2) - Add 4 x 2 Dodge Club Cab (89-3/4)
1990 M.Y.	- Add Split Bench and High Back Bucket Seats Plus Sport Model to Club Cab
1991 M.Y.	- Add V-8, GLO, Front Corner Strengthening, Wheels - Add 4 x 4 Dodge Club Cab - Add 4 x 2 Dodge Dual Rear Wheel Chassis - Cab - Add Electric Shift Transfer Case Option - Add Full Line Jeep Comanche Regular and Extended Cabs (91-1/2)
1992 M.Y.	- Add New I/P, Interior Trim
1993 M.Y.	- C/O
1994 M.Y.	- Major Reskin

OPEN ISSUES

- M.Y. designation (1990 vs. 1989) for 89-3/4 extended cab & launch timing
- 89-1/2 convertible Program Approval (3/7/88 PPC)
- 91-1/2 Jeep derivatives Program Approval (3/28/88 PPC) & sourcing implications
- 94 major reskin definition

N - BODY DAKOTA TRUCK

ENGINEERING PROGRAM REVIEW

5.2L V-8/FESM PROGRAM

MANUFACTURING ISSUES

- TIMING
- ASSEMBLY/LAUNCH
- COMPLEXITY

- INFORMATION TO BE PROVIDED AT MEETING

RESPONSIBILITY: T. G. TOMEZAK

MANUFACTURING FEASIBILITY DEPARTMENT

N-TRUCK 5.21 V8 - OPEN ITEMS

SUMMARY SHEET

AREA	ITEMS		
	OPEN	CLOSED	TOTAL
STAMPING	1	2	3
B.I.W.	3	3	6
PAINT	-	-	-
EXTERIOR TRIM	4	2	6
INTERIOR TRIM	5	4	9
CHASSIS/ENGINE	16	4	20
TOTAL	29	15	44

February 2, 1988

MANUFACTURING FEASIBILITY

1991 N-BODY OPEN ITEMS
RENEWAL PROGRAM

ITEM NO. AREA	COMPONENT	ISSUE/DATE	MFG. POSITION/DATE	STATUS/DATE	ASSNG'D TO
1. CHASSIS	Front Axle Pinion Brkt. 7 1/4 & 8 1/4	10/9/87 Mfg. hole for alignment to trans. support is too small.	10/9/87 Mfg. requests that hole be increased to .375 to improve tool life in plant.	10/9/87 OPEN	Nelson/ Winde
2. CHASSIS	Front Axle Disconnect Hsg. 7 1/4 & 8 1/4	10/9/87 Alignment of right side trans. strut to disc. Hsg.	10/9/87 Mfg. request that Engr'g. provide hole in Hsg. strut for alignment purpose.	10/9/87 OPEN	Nelson/ Winde
3. CHASSIS	Axle Isolator R/L	10/9/87 Engr'g. indicates isolators will be unique to axle size, but similar in appearance.	10/9/87 Mfg. request that brackets be color coded to prevent mis-build	10/9/87 OPEN 11/2/87 Eng. indicates bolt ctr. will be unique on lt. isolator. Rt. side under development.	Diwan/ Nelson/ Winde
4. CHASSIS	Axle Vent Fitting	10/9/87 Fitting to be relocated from disconnect Hsg. to axle tube. Hose routing undefined.	10/9/87 Mfg. requires routing to be similar to present process to prevent entrapment at engine deck.	10/9/87 OPEN	Nelson/ Winde
5. CHASSIS	Axle Shaft Flange Joint	10/9/87 Tool access to fasteners. Current design requires universal drive.	10/9/87 Mfg. requires increased access for direct sockets engagement.	10/9/87 OPEN 10/22/87 Engr'g. indicates (1/2) shafts are currently used by G.M. Mfg. req. Engr'g. to identify current G.M. tooling.	Nelson/ Johnson/ Winde

(1133c/0030c)

ISSUED: 01/30/88
REVISED: 02/05/88

MANUFACTURING FEASIBILITY

1991 N-BODY OPEN ITEMS
RENEWAL PROGRAM

ITEM NO. AREA	COMPONENT	ISSUE/DATE	MFG. POSITION/DATE	STATUS/DATE	ASSNG'D TO
6. FINAL	Fasteners Front Bumper Mtg. to Frame	11/30/87 Nut & Bolt application requires special tools for securing.	11/30/87 MFg. wants tapping plate to assembly front bumper. This will eliminate the need for special tooling.	11/30/87 OPEN Engr'g. investigating.	Stewart/ Parkenson/ Winde
7. FINAL	Premium Air Dam	11/30/87 Air Dam vertical attaching bolts are inaccessible for direct air tool securing.	11/30/87 Mfg. considers use of universal extension wrench unacceptable.	11/30/87 OPEN	Stewart/ Parkenson/ Winde
8. TRIM	Aero Head Lamp	11/30/87 Proposed design does not allow for sufficient clearance for adjustment.	11/30/87 Mfg. requires adjustment on common plane with direct tool access.	11/30/87 OPEN	L. Wu/ Winde

MANUFACTURING FEASIBILITY

1991 N-BODY OPEN ITEMS
RENEWAL PROGRAM

ITEM NO. AREA	COMPONENT	ISSUE/DATE	MFG. POSITION/DATE	STATUS/DATE	ASSNG'D TO
9. CHASSIS	Frame	10/28/87 Access to Mfg. hole regarding chassis o/head carrier.	10/28/87 Mfg. withholds feas. until tryout at Dodge City is complete.	10/28/87 OPEN 11/11/87 Engr'g. mock up of frame at Carron to be delivered at Dodge City week 11/16/87. 1/11/88 HOLD N-4x2 Mocked up frame was rec. by plant. Changes to trim edge of frt. sec. will be req. Reviewing with O.D.M.T.C. 1/19/88 HOLD N-4x4 pending shipment of frame from plant to Carron.	Pruett/ Groszewski/ Gottschalk/ Simmons/ Wreford
10. CHASSIS	Front Axle Half Shaft	11/10/87 8 1/4" axle may require unique half shafts-added complexity.	11/10/87 Mfg. request common half shafts between 7 1/4" and 8 1/4" axles.	11/10/87 OPEN	Johnson/ Groszewski
11. TRIM	Wire Harness (Electronic Transfer Case Shift)	10/15/87 Wire routing in area of sun visor - possible entrapment with visor and/or screw.	10/15/87 Mfg. withholds feasibility until tryout on buck.	10/15/87 OPEN	Shen/ Groszewski
12. TRIM	Shift Overhead Console Mtg. Brkt. (Electronic Transfer Case Shift) (1133c/0030c)	11/4/87 Fastener quantity.	11/4/87 Mfg. request reduction of attaching screws.	11/4/87 OPEN Engr'g. investigating	Ahmed/ Groszewski

ISSUED: 01/30/88
REVISED: 02/05/88

MANUFACTURING FEASIBILITY

1991 N-BODY OPEN ITEMS
RENEWAL PROGRAM

ITEM NO. AREA	COMPONENT	ISSUE/DATE	MFG. POSITION/DATE	STATUS/DATE	ASSNG'D TO
13. TRIM	Electronic Transfer Case Shift Switch	11/4/87 Switch as shown requires sub-assembly.	11/4/87 Mfg. requests snap-in design eliminating the necessity of sub-assembly.	11/4/87 OPEN	Ahmed/ Groszewski
14. TRIM	Electronic Transfer Case Trim Bezel for Header Switch	10/8/87 Preliminary design shows only 2 mm overlap between bezel & headliner. This is not acceptable to Mfg.	10/8/87 Mfg. requires a minimum 7 mm overlap.	10/8/87 OPEN Design office indicates final design should improve fit condition. HOLD pending review. 1/5/88 CLOSED. This is direction.	Brown/ Winde
15. TRIM	Electronic Transfer Case Switch	10/8/87 Attachment of switch to bezel is threaded fastener.	10/8/87 Mfg. requests that switch be designed for snap-in assy. to eliminate off-line sub-assembly.	10/8/87 OPEN 2/5/88 CLOSED. Duplication of Item 13.	Palmgren/ Winde
16. TRIM	Electronic Transfer Case Module	10/8/87 Design location undefined.	10/8/87 Mfg. withholds feasibility until design is disclosed.	10/8/87 OPEN 1/28/88 Design reflects 2 mm clearance between upr. mtg. tab and dash panel upr. Mfg. requires 5 mm for build variation.	Aglamishian/ Winde

(1133c/0030c)

ISSUED: 01/30/88
REVISED: 02/05/88

MANUFACTURING FEASIBILITY

1991 N-BODY OPEN ITEMS
RENEWAL PROGRAM

ITEM NO. AREA	COMPONENT	ISSUE/DATE	MFG. POSITION/DATE	STATUS/DATE	ASSNG'D TO
17. TRIM	Headliner	10/8/87 Headliner surface compatibility to Overhead	10/8/87 Mfg. requires common surface for headliner to prevent increased assy. plant complexity when consoles are scheduled.	10/8/87 OPEN	Brown/ Knight/ Groszewski
18. TRIM	Aero Headlamp	11/13/87 Design indicates use of "J" nuts for attachment to closure panel.	11/13/87 Mfg. requests use of conical extrusion in closure panel to reduce cost and complexity.	11/13/87 OPEN	Pruett/ Winde/ L. Wu
19. TRIM	Aero Headlamp	11/13/87 Lamp assy. upr. attachment design indicates assy. will be loose until grill is installed. Vulnerable to damage.	11/13/87 Mfg. requests toy tab be added to lamp assy., creating interference fit.	11/13/87 OPEN	Pruett/ Winde/ L. Wu
20. TRIM	Fuse Link/Relay Module	11/5/87 Currently design has cost penalty.	11/5/87 Mfg. supports modular relay vs. separate modular assemblies. Reduce plant labor and warranty reduction.	11/5/87 OPEN 12/7/87 CLOSED Plant labor cost study reflects labor cost reduction. This is design direction.	Groszewski/ Aglamishian
21. TRIM	Door Wiring	11/5/87 Routing feasibility.	11/5/87 Mfg. requires mock-up review.	12/7/87 OPEN 1/26/88 Drawing received. Mfg. investigation.	Groszewski/ Rudinski

(1133c/0030c)

ISSUED: 01/30/8
REVISED: 02/05/8

MANUFACTURING FEASIBILITY

1991 N-BODY OPEN ITEMS
RENEWAL PROGRAM

ITEM NO. AREA	COMPONENT	ISSUE/DATE	MFG. POSITION/DATE	STATUS/DATE	ASSNG'D TO
22. B.I.W.	Front Closure	11/5/87 Timing of automation changes. Downtime.	11/5/87 Mfg. requires timing Timing plan.	11/5/87 OPEN	Jensen/ Lang/ Giangrande
23. STAMP	Front Closure	11/5/87 Drawibility.	11/5/87	11/5/87 OPEN	Istenes/ Pruitt
24. B.I.W. PAINT	Carrier Changes	11/5/87 Front closure moves aaprox. 2" forward.	11/5/87 Interfers with A-275 details.	11/5/87 OPEN	Kleppert/ Giangrande
25. CHASSIS	Heater Hose V-8 (5.2)	2/2/88 Attachment of heater hose to water pump.	2/2/88 Mfg. requires that hose attachment be common with current hose routing use on V-6 (3.9) engine.	2/2/88 OPEN	Gardner/ Groszewski
26. CHASSIS	Accessory Drive Mtd. Brkt. V-8 (5.2)	2/2/88 Attachment of brkt. utilizes existing water pump bolts. Unacceptable to Mfg.	2/2/88 Mfg. wants brkt. to have its own unique mtg. surface (bossies) Reason: reduce labor burden & warranty on water pump leaks.	2/2/88 OPEN	Gardner/ Groszewski
27. CHASSIS	Temp Sensor	2/2/88 Temp. sensor is located under A/C compressor. Service of sensor would require removal of compressor.	2/2/88 Mfg. wants sensor re-located to improve service and eliminate sensor dictating sequence of assy.	2/2/88 OPEN	Gardner/ Groszewski

(1133c/0030c)

ISSUED: 01/30/
REVISED: 02/05/

MANUFACTURING FEASIBILITY

1991 N-BODY OPEN ITEMS
RENEWAL PROGRAM

ITEM NO. AREA	COMPONENT	ISSUE/DATE	MFG. POSITION/DATE	STATUS/DATE	ASSNG'D TO
28. CHASSIS	Oil Dip Stick Tube V-8 (5.2)	2/2/88 Access for installing tube is unacceptable to Mfg.	2/2/88 Current design requires tube be installed first and all bracketry to follow. Mfg. wants tube to be assembled after brkts. are installed. Reason: reduce damage and prevention of oil leaks.	2/2/88 OPEN	Gardner/ Groszewski
29. CHASSIS	Alternator Pivot Bolt V-8 (5.2)	2/2/88 No power tool access for securing bolt.	2/2/88 Mfg. wants direct power tool access without use of swivel socket.	2/2/88 OPEN	Gardner/ Groszewski
30. CHASSIS	Front Crossmember V-8 (5.2)	2/5/88 Design undefined.	2/5/88 Mfg. wants crossmember to be bolt in design. Reduced frame complexity.	2/5/88 OPEN	Wolf/ Wreford/ Winde

(1133c/0030c)

ISSUED: 01/30/88
REVISED: 02/05/88

1991 N-BODY DESIGN OFFICE APPROVAL/RELEASE SCHEDULE				February 8, 1988
MAJOR COMPONENTS	PDM APPROVAL	STUDIO RELEASE	LEAD BODY RELEASE	+/- WEEKS TO PILOT
EXTERIOR				
FRONT END SHEET METAL	08/13/87 (A)	09/11/87 (A)	12/04/87 (A)	+18
FRONT BUMPER	08/13/87 (A)	09/11/87 (A)	01/29/88 (A)	+ 3
AERO HEADLAMP	08/13/87 (A)	12/04/87 (A)	02/12/88	+ 2
GRILLE	08/13/87 (A)	12/04/87 (A)	02/12/88	+11
O/S REAR VIEW MIRROR	12/18/87 (A)	02/01/88 (A)	RELEASE DIRECT TO SUPPLIER	+ 7
ORNAMENTATION				
WHEEL LIP MOLDINGS	12/18/87 (A)	01/19/88 (A)	03/25/88	+17
OTHER MOLDINGS	12/18/87 (A)	01/19/88 (A)	03/14/88	+13
ALUMINUM WHEEL	04/01/88	04/15/88	NOT REQUIRED	+25
MODIFIED STEEL WHEEL	04/01/88	04/15/88	NOT REQUIRED	+ 0
INTERIOR				
O/HEAD TRANSFER CASE MODULE	12/11/87 (A)	01/19/88 (A)	03/25/88	+ 5
HEADLINER (MODIFIED)	12/11/87 (A)	02/05/88 (A)	03/25/88	+27
COWL TRIM PANEL & A-PILLAR COVER	12/11/87 (A)	01/22/88 (A)	03/25/88	+10

(relsched)

1991 N-BODY V-8 ENGINE - BODY ISSUES

All major components in the body area are plus to the MTS. The Design Office has handed off the hood and front bumper surface and we are now proceeding with the final production design layouts. The front closure panel has 90% stamping feasibility and should be 100% by next week with the concesstions that have been granted. These concessions have been incorporated into the soft tool program to allow us to start using drawn panels in the preproto vehicles in mid-March. The battery location still needs to be finalized.

S. W. Crater
2-8-88

N - BODY DAKOTA TRUCK

ENGINEERING PROGRAM REVIEW

5.2L V-8/FESM PROGRAM

DRIVETRAIN/CHASSIS

CRITICAL COMPONENT TIMING/SOURCING REVIEW

- INFORMATION TO BE PROVIDED AT MEETING

RESPONSIBILITY: O. J. VIERGUTZ

1991, 5.2L, V-8

DAKOTA

ENGINE ENGINEERING
CRITICAL COMPONENTS

Front Accessory Drive (Serpentine)

- A/C Bracket - New source for A/C compressor needs to be identified.
  Design proceeding with current Dayton A590 compressor.
  - Correct hood dimension for clearance to bracket required.
  - Design complete target 2/29/88
- Belt - Presource in process,
  AC belt is Daco
  Non A/C belt is Goodyear
- Auto Tensioner - Need source identified
- Non A/C Bracket- To follow A/C bracket target complete 4/1/88.

Water Pump - Source is ACECO
Finalization of design enhancement dependant on A/C bracket.

Chain Case Cover - Source is ACECO for castings and UNIBORING for machining (prototype).
Enhanced design for improved assembly processing and service dependant on A/C bracket.

Cam Shaft - Use current source
Dependant on chain case cover for finalization.

Dodge Truck
Engine Program Management
D. D. Perrine

1991 5.2L V-8

DAKOTA

ENGINE ENGINEERING
COMMONIZATION EFFORTS

Air Cleaners	-	Common metal air cleaner 3.9L & 5.2L
Oil Pan -	-	Common rear seal radius on all 'V' engines. New pan for Dakota
Oil Filter	-	SAE thread for all Jeep and Truck engines.

OTHER ITEMS

Exhaust System	-	Less restrictive, common V-6 and V-8 'N' truck exhaust except for catalyst loading and muffler tuning.
Catalytic Convertor	-	Packaging study for 212 cu. in. cat. on 4 X 4 extended cab continues. Packaging is feasible, next to xfer case. Temperature impact needs to be assessed. New location also applicable to V-6, 4 X 4, extended cab.
Engine Mounts	-	New design. 4 X 2 will use flat mount, 4 X 4 will use spool mount. Engine angle of V-8 in N truck effect to fuel/air distribution needs to be assessed.

Dodge Truck
Engine Program Management
D. D. Perrine

N - BODY DAKOTA TRUCK

ENGINEERING PROGRAM REVIEW

5.2L V-8/FESM PROGRAM

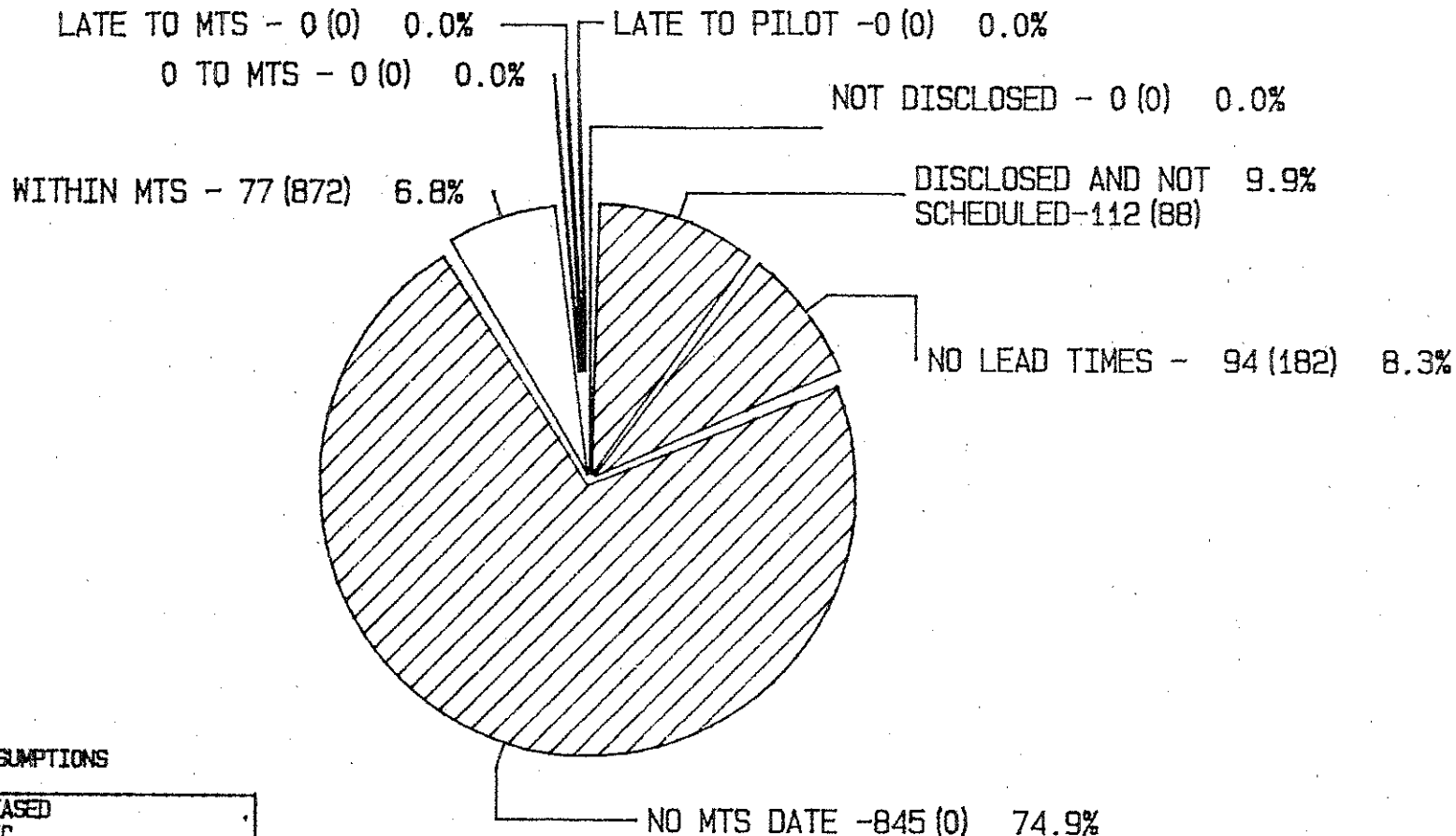
ELECTRICAL/ELECTRONICS

CRITICAL COMPONENT TIMING/SOURCING REVIEW

- INFORMATION TO BE PROVIDED AT MEETING

RESPONSIBILITY: R. S. MOSER

1991 MODEL YEAR REPORT
PURCHASED PARTS PROGRAM STATUS
ALL TRUCK AND JEEP LINES



DATA ASSUMPTIONS

- 0-1, AE, A1, RELEASED
- 00VAA0, 32A0, PEI, PIC
- EXCLUDES COLOR EXPLOSION
- CORPORATE LEAD TIME TRACKING REPORT FOR THE PERIOD 02/08/88
- PROGRAM FORECAST: N/A-E VS 1128A
- PRIOR REPORT 02/03/88 -TOTAL IN PARENTHESES ( )
- PREPARED BY B. L. HENDRIETH (6-2134)

FORWARD MODEL TIMING
PURCHASING PLANNING
FEBRUARY 10, 1988

1991 MY - VEHICLE FAMILY SUMMARY
ALL TRUCK AND JEEP LINES

BODY STYLE DESIGNATOR		AB	AD	AN	AT	MJ	SJ	XJ	YJ	ZJ		TOTAL
ENGINEERING ESTIMATED PROGRAM (actual, in lieu of estimated)		15	57	76	0	0	0	0	0	# 980	0	1128
NOT DISCLOSED	/	0	0	0	0	0	0	0	0	0	0	0
	/ PCT	0%	0%	0%	***	***	***	***	***	0%	***	0%
DISCLOSED BUT NOT SCHEDULED/ (NDA'S)	/	1	46	11	0	0	0	0	0	54	0	112
	/ PCT	7%	81%	14%	***	***	***	***	***	6%	***	10%
LEAD TIME NOT ASSESSED (NLT'S)	/	0	2	11	0	0	0	0	0	81	0	94
	/ PCT	0%	4%	14%	***	***	***	***	***	8%	***	8%
NO MTS DATE	/	0	0	0	0	0	0	0	0	845	0	845
	/ PCT	0%	0%	0%	***	***	***	***	***	86%	***	75%
WITHIN MTS	/	14	9	54	0	0	0	0	0	0	0	77
	/ PCT	93%	16%	71%	***	***	***	***	***	0%	***	7%
ZERO CRITICALITY	/	0	0	0	0	0	0	0	0	0	0	0
	/ PCT	0%	0%	0%	***	***	***	***	***	0%	***	0%
LATE TO MTS	/	0	0	0	0	0	0	0	0	0	0	0
	/ PCT	0%	0%	0%	***	***	***	***	***	0%	***	0%
* TOTAL (PIE CHART)		15	57	76	0	0	0	0	0	980	0	1128
PROGRAM AT RISK	/	1	48	22	0	0	0	0	0	980	0	1051
	/ PCT	7%	84%	29%	***	***	***	***	***	***	***	93%
OVER DISCLOSED	/	0	0	0	0	0	0	0	0	0	0	0
	/ PCT	0%	0%	0%	***	***	***	***	***	0%	***	0%

LONG LEAD DISCLOSURES HISTORICALLY REPRESENTS 45% OF TOTAL NEW PART REQUIREMENTS
117 WBVP = 4/18/88 FOR AB,AD,AN; 4/25/88 FOR AN (EXT CAB),XJ,YJ; 7/18/88 FOR ZJ
* SUM OF PERCENTAGES MAY NOT EXACTLY = 100% , DUE TO ROUNDING.
# THESE DISCLOSURES ARE 98.8% IN THE 1990 ESDS/AMC AND HAVE NOT BEEN LOADED IN THE 1991 CMC APIS SYSTEM WHERE THEY WILL BE TIMED WITHIN 5 DAYS BY THE APPROPRIATE SUPPLY ACTIVITY.

FORWARD MODEL TIMING
PURCHASING PLANNING
DATE: 02/09/88

N - BODY DAKOTA TRUCK

ENGINEERING PROGRAM REVIEW

5.2L V-8/FESM PROGRAM

PROTOTYPE VEHICLE DEVELOPMENT PLAN

- INFORMATION TO BE PROVIDED AT MEETING

RESPONSIBILITY: D. C. WINN

ACTION LETTER NO. 7163

BULLETIN NO. 1-88-91N

DATE February 2, 1988

FROM Paul V. Sheridan

CONFIDENTIAL

JTE PROGRAM DESCRIPTION BULLETIN/ ENGINEERING OFFICE ACTION LETTER

PROGRAM TITLE: 1991 N-Body 5.2L V-8/FESM Program (PPCT 15300-700)

MCIS NUMBER: 0A1SJ38, 1A1SJ39, 1A1SJ40, 1A15P11

Review for effect on compliance with ( ) Safety Standards, ( ) Emission Standards, ( ) Consumer Information, ( ) State Regulations, ( ) Canadian Regulations

QUALIFICATIONS/REMARKS:

This Action Letter documents the tentative timing and specifications for the preprototype vehicle builds previously approved by the Highland Park Vehicle Planning Committee on May 11, 1987 for the 1991 N-Body 5.2L V8/FESM Program. The complete build program consists of 42 vehicles; 32 during 1988 CY and 10 Emissions Certification in 1989 CY. The 32 vehicle builds for 1988 CY are detailed below; the 10 Certification builds in 1989 will be administered by a subsequent Action Letter.

1. General Vehicle Descriptions

Regular (three-man) cab preprototypes on 112" or 124" WB will initially use 1988 MY production vehicles as the base unit; 4K builds will use 1989 MY base units. Regular production bodies and trim will be mounted on modified frames. Regular cab units are shown as N1 (4x2) and N5 (4x4) on Attachment I.

Club Cab (131" WB extended body) preprototypes must be built from "the ground up" with prototype frames and program level cabs/trim. Production vehicles will be used for C/O parts. Club Cab units are shown as N1E (4x2) and N5E (4x4) on Attachment I.

BIW modifications include a new front closure panel and extended hood. Grille, bumper and air dam are new and modified production parts will suffice for preprototypes. Carryover headlamps will be used until the new conventional headlamp/bezel or aerodynamic lamps are available.

N-body 5.2L V8 TBI engines will have new serpentine accessory drive, new water pump, chain case cover, exhaust manifolds, oil pan and other new components required for the N-Body installation. Transmission will be A500 4-speed automatic - Phase II or PTR/production level. Overdrive lock-out switch will be in the instrument panel; shift levers with OD switches for the presently planned 1990 corporate programs should not be used in these preprototypes, except as specified below.

(continued)

Until deemed otherwise by Transmission and Final Drive Engineering (J.E. MacAfee, tieline 733-2568), all 4x4 preprototypes will have modified 7 1/4 front axles and C/O 8 1/4 rear axles (pending data acquisition analysis). Transfer case will be NPG 231 or NPG 231 H.D. with electric actuated shift system including overhead push-button controls.

Front corner upgrade will be installed on all 4x4s. This upgrade includes brakes, knuckle, hub unit bearing, halfshafts, modified control arms and 6 stud wheels. All 4x2 units will include new front brakes and 6 stud wheels.

RWAL brake systems are planned for all vehicles using 1989 pilot rear axles with modified shafts for 6 stud wheels.

Fuel system and vapor recovery will be C/O 1988 level for initial builds. Changing specification to "On-Board" is subject to Emissions policy and planning. Fuel tanks will be C/O 15 and 22 gallon capacity. Fuel line routing will be revised at rear of engine to eliminate front cross-over lines.

Exhaust "Wye" pipe will be C/O 3.9L V6 except for 2.5 inch diameter collector and clearanced for 4x4 prop shaft. Catalyst assemblies will be D-Body type 212 inch C/O 5.2L V8 with 2.5 inch diameter inlet/outlet including the N1E and N5E (4x4 Club Cab). The primary muffler is the E89-201 Walker with reduced back pressure. (Low cost Arvin design as secondary source will be package protected.) Muffler inlet is 2.5 inches, outlet is 2.5 inches, tailpipe is 2.5 inches. (Vehicles 779NS and 785NS were deemed not required by Engine Engineering - D.D. Perrine, tieline 733-3008 - due to the recent 212 inch catalyst usage decision.)

Engine front supports on 4x2 models will initially be C/O 3.9L brackets and insulator. The production intent system will consist of an added crossmember improved insulator that is targeted for initial build on Vehicle 770NS. The NVH development vehicle 764NS is moved from January to March so that the intended engine mounts can be installed.

Cooling System components for the 5.2L V8 will include the C/O N-Body 26" radiator with modified top tank and new hoses. Fan and shroud will initially be C/O 18" components. Engine cooling tests will determine need for 20" fan/shroud and preprototypes will be selectively updated as necessary. Vehicle 777NS is the target for initial build with updated cooling system prior to running durability.

(continued)

Future MY features to be selectively incorporated on the 1991 preprototypes are as follows:

- Electronic Speed Control to 1989 level on all vehicles so specified. This requires new servos, speedometer cables, and appropriate wiring for compatibility with EFI engine controller.

- Toledo Machining Plant 1990 level tilt steering columns on selected units. 1990 level steering wheel with speed control buttons in the wheel go with TMP columns. Impact vehicles will have the 90 degree fully articulated U-joints.

- Gas Shocks - 1989; selective vehicle usage.

It should be emphasized that the information presented here is general and is meant to accommodate the "transition" aspects of this program. Exceptions and details, including the total vehicles planned for build-up and the responsible individuals, are hereby subject to the ongoing review process provided by the Prototype Build meetings which are coordinated by JTE Vehicle Development (R. F. Bauer, tie line 733-2305). Final approval of the recommendations formulated by the Prototype Build meeting is the responsibility of JTE Engineering Program Control (Paul V. Sheridan, tie line 733-2404), and will be officially documented by subsequent Action Letter issuance.

2. Prototype Vehicle Specifications/Build Schedule

   See Attachment I.

3. Prototype Vehicle Usage Summary (Primary Supporting Departments/Custodians and previous Highland Park References

   See Attachment II.

4. Prototype Components Summary

   See Attachment III.

5. Vehicle Funding

   Funding for the build program should be provided in the revised 1987 CY and initial 1988 CY JTE Engineering Departments' budgets. The vehicle list was initially documented in the May 15, 1987, Engineering Work Plan which was the original basis for the JTE budget submissions.

Paul V. Sheridan

Paul V. Sheridan, Program Manager
JTE Engineering Program Control
February 2, 1988

1991 N-BODY 5.2L TBI ENGINE & 4X4/4X2 EXTENDED CAB

PROTOTYPE VEHICLE SPECIFICATIONS/BUILD SCHEDULE

VEHICLE NUMBER	USAGE	BODY STYLE	ENG	TRANS	MATL DUE	VEH COMP	WHEEL BASE	PAY-LD PKG	TIRE SIZE	AXLE RATIO	TRIM LEVEL	COLOR	A/C	F/T	S/C
GENERAL DEVELOPMENT															
759NS	BRAKE SYSTEM DEV.	N5E	EHB	DGG	80120	80210	131	2000	P235	3.90	STD		YES	22	YES
760NS	BRAKE SYS. DEV.	N1	ELG	DGN	80127	80217	112	2550	LT215	3.90	SE		YES	22	YES
767NS	COOLING DEV.	N1	ELG	DGN	80203	80224	124	2550	LT215	3.90	LE		YES	22	NO
765NS	SUSP/STEERING	N1E	ELG	DGN	80210	80302	131	2000	LT215	3.90	LE		YES	22	YES
768NS	A/C DEVELOPMENT	N1E	ELG	DGN	80217	80309	131	2000	LT215	3.55	LE	WHITE	YES	15	NO
770NS	FINAL DRIVE DEV.	N1E	ELG	DGN	80224	80316	131	2000	LT215	3.90	LE		YES	22	YES
764NS	NVH DEV.	N1	ELG	DGN	80309	80330	124	1800	P205	3.90	LE		YES	22	YES
777NS	K2-ENDURANCE	N5E	ELG	DGN	80316	80406	131	1800	P235	3.90	STD	WHITE	YES	22	YES
766NS	FINAL DRIVE DEV.	N5E	ELG	DGN	80323	80413	131	1800	P235 M/S	3.90	LE		YES	22	YES
783NS	K1-ENDURANCE	N1E	ELG	DGN	80330	80420	131	2000	LT215	3.90	SE	SILVER	NO	15	NO
769NS	FINAL DRIVE DEV.	NS	ELG	DGN	80413	80504	124	2000	P235	3.90	LE		YES	22	YES
772NS	STRUCTURAL EVAL	N5E	ELG	DGN	80420	80511	131	1800	P235	3.55	STD	WHITE	YES	22	YES
782NS	ENGINE SYS DEV.	N1	ELG	DGN	80427	80518	112	1800	P215	3.90	STD		YES	15	NO
774NS	180 CAT DEV.	N1	ELG	DGN	80511	80601	112	1800	P215	3.55	LE		YES	22	YES
776NS	90/90 CAT DEV.	N5	ELG	DGN	80518	80608	112	2000	P235	3.55	LE		YES	22	YES
789NS	90/90 CAT DEV.	N5	ELG	DGN	80525	80615	112	1450	P195	3.90	SE		YES	22	YES
784NS	FUEL & EXHAUST	N5E	ELG	DGN	80601	80622	131	1450	P215	3.55	STD		YES	22	YES
778NS	90/90 CAT DEV.	N5	ELG	DGN	80615	80706	112	2000	P235	3.90	LE		YES	22	YES
~~779NS~~	~~180 CAT DEV.~~	~~N1~~	~~ELG~~	~~DGN~~	~~80622~~	~~80713~~	~~112~~	~~1800~~	~~P205~~	~~3.55~~	~~SE~~		~~YES~~	~~22~~	~~YES~~
~~785NS~~	~~180 CAT DEV.~~	~~N1~~	~~ELG~~	~~DGN~~	~~80629~~	~~80720~~	~~112~~	~~2550~~	~~LT215~~	~~3.90~~	~~STD~~		~~YES~~	~~22~~	~~YES~~
780NS	GENERAL DEV.	N1	ELG	DGN	80720	80810	112	1800	P205	3.55	SE		YES	15	YES
781NS	ELECTRONIC DEV.	N5	ELG	DGN	80803	80824	124	2000	P235 M/S	3.90	LE	RED	YES	22	YES
771NS	ENDURANCE PTE	N1E	ELG	DGN	80817	80907	131	2000	LT215	3.90	STD		NO	22	YES
775NS	ENDURANCE PTE	N5E	ELG	DGN	80831	80921	131	1800	P235	3.55	SE		YES	15	YES
786NS	K2-ENDURANCE	N5E	ELG	DGN	80907	80928	131	1800	P235 M/S	3.55	LE	CREAM	YES	22	YES
773NS	ENDURANCE PTE	N5	ELG	DGN	80921	81012	124	2000	P235	3.90	SE		YES	22	YES
787NS	ENDURANCE PTE	N1	ELG	DGN	80928	81019	112	1800	P205	3.55	LE		YES	15	YES
788NS	AIR FUEL & EMISS.	N5	ELG	DGN	81005	81026	112	1450	P205	3.55	STD		YES	15	YES
790NS	GENERAL DEV.	N1	EDA	DGN	81012	81102	124	1250	P195	3.90	STD		YES	22	YES
791NS	FINAL DRIVE DEV.	N5E	EHB	DDE	81019	81109	131	1800	P235	3.90	LE		YES	22	YES
792NS	AIR FUEL & EMISS.	N5E	EHB	DGN	81026	81116	131	1800	P235	3.90	STD		YES	22	YES
IMPACT DEVELOPMENT															
D62NS	IMPACT TEST	N1	ELG	DGN	80302	80323	124	2550	LT215	3.55	STD	ORANGE	YES	22	YES
D61NS	IMPACT TEST	N5E	ELG	DGN	80406	80427	131	1800	P235	3.55	STD	ORANGE	YES	22	NO
D63NS	IMPACT TEST	N1	ELG	DGN	80504	80525	112	1800	P205	3.55	STD	LIGHT BLUE	YES	22	YES

Notes:

1. All vehicles to have RWAL.
2. All vehicles to have 6 stud/15" wheels (4 1/2" B.C.).
3. All vehicles to have 1991 program FESM except 759NS.
4. All 4x4's to have upgraded front corner.
5. All club cabs to have program level bodies.
6. All 4x4's to have elec. shift t/case except 759NS.
7. All vehicles have power steering and power brakes.
8. All speed control - 1989 electronic except 759NS.

Codes:

1. Models:
   - N1 = 4x2 (112 or 124 WB)
   - N5 = 4x4 (112 or 124 WB)
   - N5E = 4x4 Club Cab (131 WB)
   - N1E = 4x2 Club Cab (131 WB)
2. Engine:
   - EHB = 3.9L V6 TBI
   - ELG = 5.2L V8 TBI
   - EDA = 2.5L 4 cylinder TBI
3. Transmission:
   - DGG = A999 3-speed automatic
   - DGN = A500 4-speed automatic
   - DDE = A535 5-speed manual
4. Options:
   - A/C = Air conditioning
   - F/T = Fuel tank capacity
   - S/C = Speed control

Jeep & Truck Engineering
Engineering Program Control
02-Feb-88

PROTOTYPE VEHICLE USAGE SUMMARY

VEHICLE NUMBER	VEHICLE PRIMARY USAGE	JTE TEST RESPONSIBILITY (PRIMARY SOURCE) DEPT. #	NAME	PHONE	HIGHLAND PARK ENGINEERING (REFERENCE ONLY) DEPT. #	NAME	PHONE
759NS	BRAKE SYSTEM DEV.	1660	P. B. HELLENS	733-8531	5720	B. E. SWANSON	876-3125
760NS	BRAKE SYS. DEV.	1660	P. B. HELLENS	733-8531	5720	B. E. SWANSON	876-3125
767NS	COOLING DEV.	1670	T. F. FLYNN	733-3902	3760	R. C. SHULZE	876-3332
765NS	SUSP/STEERING	1700	C. R. WREFORD	733-8762	5710	D. R. HANNUM	876-6733
768NS	A/C DEVELOPMENT	1250	L. K. McDONALD	733-2075	3740	R. J. RYSZIEWSKI	876-4686
770NS	FINAL DRIVE DEV.	1600	J. E. MACAFEE	733-2568	1720	R. N. HAIKIO	733-2199
764NS	NVH DEV.	1130	D. H. MOOTHART	733-3363	5420	F. P. MCINTEE	876-4888
777NS	K2-ENDURANCE	1100	R. F. BAUER	733-2305	5340	C. K. SESTOK	836-3421
766NS	FINAL DRIVE DEV.	1600	J. E. MACAFEE	733-2568	1720	R. N. HAIKIO	733-2199
783NS	K1-ENDURANCE	1100	R. F. BAUER	733-2305	5340	C. K. SESTOK	836-3421
769NS	FINAL DRIVE DEV.	1600	J. E. MACAFEE	733-2568	1720	R. N. HAIKIO	733-2199
772NS	STRUCTURAL EVAL	1260	S. W. CRATER	880-5300	3560	R. J. NOWINSKI	876-6286
782NS	ENGINE SYS DEV.	1490	R. J. GREEN	733-2408	7750	J. D. WEHRLY	876-3850
774NS	180 CAT DEV.	1440	J. A SANTIAGO	733-2065	7870	R. O. GEISS	836-3591
776NS	90/90 CAT DEV.	1440	J. A SANTIAGO	733-2065	7870	R. O. GEISS	836-3591
789NS	90/90 CAT DEV.	1440	J. A SANTIAGO	733-2065	7870	R. O. GEISS	836-3591
784NS	FUEL & EXHAUST	1680	L. C. MILLER	733-3450	7890	G. E. LEWANDOWSKI	876-2622
778NS	90/90 CAT DEV.	1440	J. A. SANTIAGO	733-2065	7870	R. O. GEISS	836-3591
~~779NS~~	~~180 CAT DEV.~~	~~1440~~	~~J. A. SANTIAGO~~	~~733-2065~~	~~7870~~	~~R. O. GEISS~~	~~836-3591~~
~~785NS~~	~~180 CAT DEV.~~	~~1440~~	~~J. A. SANTIAGO~~	~~733-2065~~	~~7870~~	~~R. O. GEISS~~	~~836-3591~~
780NS	GENERAL DEV.	1100	R. F. BAUER	733-2305	1260	D. A. NELSON	733-3186
781NS	ELECTRONIC DEV.	1910	W. W. BUSHMAN	733-3269	9120	W. R. KISSEL	876-1934
771NS	ENDURANCE PTE	1100	R. F. BAUER	733-2305	5340	C. K. SESTOK	836-3421
775NS	ENDURANCE PTE	1100	R. F. BAUER	733-2305	5340	C. K. SESTOK	836-3421
786NS	K2-ENDURANCE	1100	R. F. BAUER	733-2305	5340	C. K. SESTOK	836-3421
773NS	ENDURANCE PTE	1100	R. F. BAUER	733-2305	5340	C. K. SESTOK	836-3421
787NS	ENDURANCE PTE	1100	R. F. BAUER	733-2305	5340	C. K. SESTOK	836-3421
788NS	AIR FUEL & EMISS.	1420	S. R. BRUECKNER	733-8737	7850	J. T. RILLY	876-4077
790NS	GENERAL DEV.	1100	R. F. BAUER	733-2305	1260	D. A. NELSON	733-3186
791NS	FINAL DRIVE DEV.	1600	J. E. MACAFEE	733-2568	1720	R. N. HAIKIO	733-2199
792NS	AIR FUEL & EMISS.	1420	S. R. BRUECKNER	733-8737	7850	J. T. RILLY	876-4077
D62NS	IMPACT TEST	1140	E. A. ZYLIK	733-2074	5320	W. L. SHOLLENBERGER	836-2621
D61NS	IMPACT TEST	1140	E. A. ZYLIK	733-2074	5320	W. L. SHOLLENBERGER	836-2621
D63NS	IMPACT TEST	1140	E. A. ZYLIK	733-2074	5320	W. L. SHOLLENBERGER	836-2621

JTE/Engineering Program Control
February 2, 1988

1991 N-BODY 5.2L TBI ENGINE & 4X4/4X2 EXTENDED CAB

Prototype Components Summary

COMPONENT GROUP	DEPT #	RESPONSIBLE JTE DESIGN ENGINEER	TIELINE	REQUIRED PROTOTYPE PARTS
Truck Body Engrg	1260	S. W. Crater	880-5300	Modifed front bumper, air dam and grille, Club Cab bodies, extended hood, new closure panel
Climate Control	1250	L. K. MacDonald	733-2075	A/C compressor assembly, A/C & Heater Lines
Cooling Systems	1670	T. F. Flynn	733-3902	Radiator cores, fans, shrouds, hoses, trans. cooler tubes
Suspension & Chassis Structure	1700	C. R. Wreford	733-8762	Frames, control arms, springs, knuckles, gas shocks
Brake Systems	1660	P. B. Hellens	733-8531	Twin piston caliper, rotors, M/cyl., boosters, rear drums, brake lines, RWAL valve, parking brake cables
Steering/Wheels/Tires	1690	D. R. Helebrant	733-3814	Wheels (6-stud), steering linkage, P/steering pumps, steering gears, steering column & wheels
Auto Trans Engrg	1620	W. J. Greening	733-2939	A500 trans., torque converter
Final Drive	1600	J. E. MacAfee	733-2568	Front and rear axles (RWAL/6-stud), elec. shift transfer cases, hub unit brg., driveshafts, CV joints, propshafts
Engine Design/Dev.	1490	R. J. Green D. E. Gardner	733-2408 733-3356	5.2L TBI engines, new accessory drive brackets/belts
Air, Fuel, Emission	1420	S. R. Brueckner	733-8737	Air cleaners, intake ducting, throttle bodies, throttle linkage, speed control, canister bracket, vacuum harness, air injection pumping, air pump, EGR valves
Fuel & Exhaust/Engine Mounts	1680	L. C. Miller	733-3450	Fuel lines, exhaust pipes, catalyst/engine support brackets, insulators, mufflers
Motors, Charging & Cranking	1910 1910	D. Gardner W. W. Bushman	733-3356 733-2369	Starters, alternators, batteries
Powertrain & Chassis Controls	1600 1910	J. E. MacAfee W. W. Bushman	733-2568 733-2369	SMEC (5.2 TBI w/A500), RWAL control module, elec. shift T/case control module
Sensors, Actuators, Ignition	1920	G. Wist	733-7703	Elec. shift T/case switch assy. & I/P A500 overdrive switch
Wiring Systems	1920	G. Wist	733-7703	Engine, body and chassis wiring harnesses for 5.2L, A500, RWAL, elec. shift T/case, electronic speed control

1991 N BODY V-8

PACKAGING ISSUES

As a result of several Buck Reviews, 14 major packaging issues have been identified and resolution is in process. These items will be resolved via the bi-weekly "N" Body Packaging Issues Buck Meeting".

No major issues require Executive action at this time.

L. D. Schmidt

Design Aids
LDS00

ANTCE366
TECHNICAL COST PLANNING
CONTROLLER'S OFFICE
9 FEBRUARY, 1988

****
318 CID V-8 IN 1991 N-BODY TRUCK PIECE COST ESTIMATES
VERSUS
1988 239 CID V-6 EQUIPPED N-BODY TRUCK
****
//////////SUMMARY SHEET\\\\\\\\\\

DATA BASED ON 1988 (10/'87) ECONOMICS BRACKETED DATA, (XXXX), DENOTES "WORSE THAN"

UPG	DESCRIPTION	BASE COST 1988 PCS 4X2 RWD 2.2L I-4	COST DELTA 4X2 RWD 1991 VS 1988 3.9L V-6	COST DELTA 4X2 RWD 1991 VS 1988 5.2L V-8	COST DELTA 4X4 AWD 1991 VS 1988 3.9L V-6	COST DELTA 4X4 AWD 1991 VS 1988 5.2L V-8	REMARKS
11	BODY IN WHITE(BIW)$728 PLUS $38 OTHER	$762	($5)	($5)	($5)	($5)	AFFECTS ALL VEHICLES
30,31,32, 33,34,35,36	DRIVETRAIN/CHASSIS	$917	($30)	($59)	($69)	($114)	BRAKE,FRAME & AXLE CHANGES.
30A	ENGINE, INCL CLTCH,FLYWHL/TORQ CONV	$464	BASE	($57) #	$0	($57) #	V-8 ENGINE OPTION COST.
30C	ELECTRICAL, ENGINE COMP. WIRING	$59	$0	TBD	$0	TBD	POTENTIAL WIRING COMMONIZATION PENALTY TO BE DETERMINED
	@ TOTAL	$2,202	($35)	($121) #	($74)	($176) #	
MEMORANDUM: POTENTIAL COST REDUCTION BY NOT COMMONIZING MAJOR COMPONENTS ON THE V-6 EQUIPPED VEHICLES							
FRONT BRAKES (TWIN PISTON)		$45	$28		$28		RELEASE UNIQUE SINGLE PISTON FOR V-6
FRONT DRIVESHAFTS (HIGH CAPACITY)		-	NOT APP		$10		RELEASE LOWER CAPACITY FOR V-6
FRONT BEARING HUB (HIGH CAPACITY)		-	NOT APP		$18		RELEASE UNIQUE FOR V-6
	@ TOTAL OPPORTUNITIES		$28		$56		
	@@ NET COST WITH ALL OPPORTUNITIES		($7)	($121) #	($18)	($176) #	

NOTE: 1) A V-8 COST DELTA REPRESENTS THE COST INCREASE TO PLACE A V-8 ENGINE IN THE N-BODY VEHICLE.
2) A V-6 COST DELTA REPRESENTS INCREASED COST TO A V-6 EQUIPPED N-BODY VEHICLE DUE TO V-8 ACCOMMODATION.
3) AMOUNTS LESS THAN $0.50 ROUND TO 0, AMOUNTS $0.50 OR GREATER ROUND TO $1.00
4) ESTIMATES ARE BASED ON HARDWARE CHANGES ONLY. ASSEMBLY LABOR AND VARIABLE BURDEN COSTS ARE NOT INCLUDED.
5) CHGS TO 11 JAN. ARE: ADDED REF. COL. 2.2L COSTS, -$2 FOR PLASTIC TO STEEL AIRCLEANER & RETOOLED EXH MAN LINE(MARKED BY #).

****
1991 5.2L TBI V-8 POWERTRAIN COST COMPARISON VS 1988 3.9L TBI V-6
****
DATA AT 1988 (10/'87) ECONOMICS BRACKETED DATA, (XXXX), DENOTES "WORSE THAN"

UPG	BODY CHANGES	BASE COST 1988 PCS 4X2 RWD 2.2L I-4	COST DELTA 4X2 RWD 1991 VS 1988 3.9L V-6	COST DELTA 4X2 RWD 1991 VS 1988 5.2L V-8	COST DELTA 4X4 AWD 1991 VS 1988 3.9L V-6	COST DELTA 4X4 AWD 1991 VS 1988 5.2L V-8	REMARKS
11A11	HOOD ASSEMBLY	INCL IN	($2)	($2)	($2)	($2)	ADDS 2.8", $1.50, 29 #
11A13	RADIATOR CLOSURE PANEL ASSY	INCL IN	($1)	($1)	($1)	($1)	ADDS STRUCTURAL MATERIAL
11A02B	COWL TOP PANEL	INCL IN	$0	$0	$0	$0	CENTER SHAPE CHANGE ONLY
11A12	GRILLE - BASE	INCL IN	$2	$2	$2	$2	MOLD IN COLOR, ONE PAINT SAVES MNEY
18A12	BEZEL: NON-AERO HEADLAMP (INCLUDES SIDE MARKER, PARK AND TURN)	NOT AVAIL	($2)	($2)	($2)	($2)	PAINTED LIGHT ARGENT
36H	BUMPER: FRONT	$26	($2)	($2)	($2)	($2)	STMPD HSLA, CUP ENDS, PAINT BLACK
36H	BUMPER: REINFORCEMENT	$5	($1)	($1)	($1)	($1)	SIMILAR BUT LARGER
36H	BRACKETS: BUMPER SIDE SUPPORT	$2	($0)	($0)	($0)	($0)	SIMILAR EXCEPT LGTH & END FORM
36H	AIR DAM	$4	$0	$0	$0	$0	SHP,COLR CHG, MOLD GRAY VS BLACK
	SEAL, AIR DAM TO RADIATOR	$1	($0)	($0)	($0)	($0)	LONGER AND WIDER
	$724 BIW PLUS	$38	($5)	($5)	($5)	($5)	

****

1991 5.2L TBI V-8 POWERTRAIN COST COMPARISON VS 1988 3.9L TBI V-6

****

DATA AT 1988 (10/'87) ECONOMICS BRACKETED DATA, (XXXX), DENOTES "WORSE THAN"

	DRIVETRAIN/CHASSIS	BASE COST 1988 PCS 4X2 RWD 2.2L I-4	COST DELTA 1991 VS 1988 4X2 RWD 3.9L V-6	5.2L V-8	COST DELTA 1991 VS 1988 4X4 AWD 3.9L V-6	5.2L V-8	REMARKS
	DRIVETRAIN:						
31C	FRONT AXLE	-				($12)	8 1/4 VS. 7 1/4 ON V6
31B	REAR AXLE	$317			$0	$0	C/O 8 1/4, IF 9 1/4 NEEDED,(32)
31C01	FRONT DRIVE SHAFTS	-			($10)	($10)	UPGRADED HIGHER CAPACITY.
33A01C	FRONT BEARING HUB	$41			($18)	($18)	DUE TO 6 BOLT WHEEL
30F03	TRANSFER CASE	-				($15)	231 PART TIME - HEAVY DUTY
	@ SUBTOTAL	$358	$0	$0	($28)	($55)	PROD PLN/ELEC SHIFT SEPARATE
	CHASSIS:						
36A	WHEELS	$204	$0	$0	$0	$0	NEW TOOLING FOR 6 BOLT ONLY.
34B	STEERING LINKAGE	$45		($5)		($5)	PROVISION FOR HEAVY DUTY TIE RODS.
35B01	FRONT BRAKES	$45	($28)	($28)	($28)	($28)	TWIN VS. SINGLE PISTON. COMMONIZE TO REDUCE COMPLEXITY.
35B02	REAR BRAKES		($1)	($1)	($1)	($1)	6 BOLT ADAPTATION.
35C02	MASTER CYLINDER	$12	($1)	($1)	($1)	($1)	INCREASED CAPACITY.
32A02	FRAME: FRT ENGINE MTG XMBR.	$4	$0	($15)			ADD BOLT IN CROSSMBR. TO ACCOMODATE THE V-8. 4X2 ONLY.
	SWAY BAR MTG BRKT	INCL IN *		$2			ELIMINATE.
	AXLE MOUNTING BRACKETS	INCL IN				($2)	UPGRADED FOR 8 1/4 AXLES
	SWAY BAR XMBR.	INCL IN			($2)	($2)	REVISE FOR 8 1/4 AXLE.
	SIDE ENG. MTG. BRKTS.	$17	$0	$0	($3)	($3)	REVISED FOR SPOOL MOUNTS.
	SUSPENSION:						
33A01A	LOWER CONTROL ARM	$40			($1)	($1)	REVISED FOR LARGER CV JOINTS AND BEARINGS FOR ADDED WEIGHT.
33A02,33B03	SWAY BAR				($1)	($1)	LOWER 1 INCH FOR 8 1/4 AXLE.
	SWAY BAR OUTER CLAMP	INCL IN			($2)	($2)	REV FOR LCA AND CALIPER CLEARANCE
33A01C	KNUCKLES	$77			($2)	($2)	LARGER FOR ADDED WEIGHT.
36F02	FUEL LINES	$5	$1	$1	$1	$1	PLASTIC
36E01A	EXHAUST PIPES	$26		($4)		($4)	LARGER PIPE DIAMETER.
36E01C	MUFFLER	$18		$5		$5	LOWER COST NEW DESIGN.
30B04A	RADIATOR, INCLUDES SHROUD	$41		($8)		($8)	LARGER 26 VS. 22 INCH.
	FAN SHROUD	-	($1)	($1)	($1)	($1)	LARGER DUE TO RELOC RADIATOR
30B04B	RADIATOR HOSES	$5	($0)	($0)	($0)	($0)	LONGER DUE TO RADIATOR POSITION.
80J02B	HEATER HOSES	$6		($3)		($3)	REVISED DUE TO A/C BRKT & WATERPUMP.
30B05A	FAN	$14		($1)		($1)	20 VS. 18 INCH.
	@ SUBTOTAL	$559	($30)	($59)	($41)	($59)	
	@@ TOTAL	$917	($30)	($59)	($69)	($114)	

NOTE: 1) * INCL IN = COST INCLUDED IN AN ASSEMBLY

****
1991 5.2L TBI V-8 POWERTRAIN COST COMPARISON VS 1988 3.9L TBI V-6
****
DATA AT 1988 (10/'87) ECONOMICS BRACKETED DATA, (XXXX), DENOTES "WORSE THAN"

	BASE COST 1988 PCS 4X2 RWD 2.2L I-4	COST DELTA 1991 VS 1988 4X2 RWD 3.9L V-6	5.2L V-8	COST DELTA 1991 VS 1988 4X4 AWD 3.9L V-6	5.2L V-8	REMARKS
ENGINE AS SHIPPED - MOUND ROAD ENGINE	$405	$560	($18)	$560	($18)	
o INTAKE MANIFOLD	EAS *	EAS	$0 #	EAS	$0 #	UNIQUE-ADD 2 BOSSES, RELOC T'STAT
o EXHAUST MANIFOLD	EAS	EAS	($1)	EAS	($1)	UNIQUE-REV TO 3.9 TYPE OUTLET. RETOOLED MACHINING LINE NEGATES OFFLINE COST.
o CHAIN CASE COVER	EAS	EAS	($3)	EAS	($3)	UNIQUE-REDUCES OVERALL LENGTH
o TIMING INDICATOR	EAS	EAS	($1)	EAS	($1)	UNIQUE
o CAMSHAFT	EAS	EAS	($5)	EAS	($5)	UNIQUE- SHORT NOSE, ASSUMES MRE MOD
o WATER PUMP	EAS	EAS	($5)	EAS	($5)	UNIQUE- SHORTER
o OIL LEVEL INDICATOR TUBE	EAS	EAS	($1)	EAS	($1)	UNIQUE
o OIL PAN	EAS	EAS	($5)	EAS	($5)	UNIQUE
o WATER OUT ELBOW	EAS	EAS	($1)	EAS	($1)	UNIQUE
o CYLINDER BLOCK	EAS	EAS	$0	EAS	$0	ADD 3 BOSS, MAY BE COMMON CASTING
@ SUB-TOTAL	$405	$560	($40)	$560	($40)	
ENGINE ACCESSORIES						
o SERPENTINE DRIVE SYSTEM	-	BASE	($8)	BASE	($8)	WEIGHTED AVERAGE OF HIGH VOLUME USE
o HEAT RISER VALVE	$2	BASE	($1)	BASE	($1)	
o ENGINE ELECTRONIC CONTROLS	$39	BASE	($10)	BASE	($10)	SAME AS 5.2L IN D-TRUCK
o AIR CLEANER	$18	BASE	# $2	BASE	# $2	METAL VS PLASTIC ON V-6
@ SUB-TOTAL	$59	BASE	($17) #	BASE	($17) #	
@@ ENGINE AND ACCESSORIES TOTAL	$464	$560	# ($57)	$560	# ($57)	

NOTE: 1) FUTURE UPGRADES TO THE V-6 ENGINE HAVE NOT BEEN INCLUDED IN THIS ANALYSIS.
2) * EAS = COST IN ENGINE AS SHIPPED

****
1991 5.2L TBI V-8 POWERTRAIN COST COMPARISON VS 1988 3.9L TBI V-6
****
DATA AT 1988 (10/'87) ECONOMICS BRACKETED DATA, (XXXX), DENOTES "WORSE THAN"

UPG	ENGINE ELECTRICAL	BASE COST 1988 PCS 4X2 RWD 2.2L I-4	COST DELTA 1991 VS 1988 4X2 RWD 3.9L V-6	5.2L V-8	COST DELTA 1991 VS 1988 4X4 AWD 3.9L V-6	5.2L V-8	REMARKS
79A	ENGINE COMPARTMENT WIRING HARNESS	$59	$75	TBD	$76	TBD	THE POTENTIAL EXISTS FOR ASSEMBLY PLANT SIMPLIFICATION THROUGH V-6 / V-8 COMMONIZATION.

N - BODY DAKOTA TRUCK

ENGINEERING PROGRAM REVIEW

5.2L V-8/FESM PROGRAM

COST REVIEW

- AVERAGE VEHICLE DEFINITION

- INFORMATION TO BE PROVIDED AT MEETING

RESPONSIBILITY: T. E. JOHNSON

Inter Company Correspondence

41

Telephone

Date February 10, 1988

To — Name & Department

CIMS Number

J. B. York

From — Name & Department

CIMS Number

F. J. Castaing

Subject: 1989 MODEL N TRUCK-APPLICATION OF 2.5L ENGINE

Assessments have been conducted on the subject program with manual five speed and A500 automatic transmissions (reference attachments).

It has been concluded that the manual transmission combination would be satisfactory for launch if significant improvement for noise/vibration can be developed.

Regarding the automatic transmission combination, major improvements are necessary to improve performance, to reduce the constant upshift/downshift necessary to reasonably maintain cruising speed, and to address the noise/vibration disturbance. Jeep and Truck Engineering position on this program is to aggressively pursue noise/vibration improvements for the manual transmission package for planned 89 MY launch, and to withdraw the automatic transmission package, since major improvements in the above-noted area would require long-term actions.

This position will enhance development of the manual transmission package by focusing available resources, and will maintain our policy of providing customers with very satisfying products.

F. J. Castaing

/mcl
Attachments

cc: Messrs. M. A. Cumo
R. E. Dauch
D. E. Dawkins
R. A. Lutz
J. C. Miller
D. R. Platt
D. C. Winn

PROGRAM ASSESSMENT

PROGRAM: 1989 2.5L N-BODY

LAUNCH DATE: Job 1, 1989

COMPONENT TEST SUMMARY: (Bench Test, etc.)

- Battery of standard dynamometer tests to be completed by 5/88
- Engine is identical to passenger car 2.5L except for lack of balance shaft, and manifolding and accessory drive differences for packaging. Warranty for passenger car engine is 13 C/100, which ranks third out of seven.

VEHICLE TEST SUMMARY: (Endurance, Cold Tests, etc.)

- 2 K1, 20K complete
  1 PTE 50K complete (did not have improved piston design; no customer issue resulted).
- Cold/altitude evaluation completed week of 2/1/88

VEHICLE EVALUATION SUMMARY: (NVH, Ride/Handling, Mgt. Ride/Drive, etc.)

- Adequate performance, good driveability with manual transmission
- Acceptable driveability with automatic transmission, however performance is marginal and transmission shifts too frequently up/down to maintain cruising speeds.
- Various NVH disturbances (see attached report/work plan)
  - Idle boom is unacceptable, idle shake objectionable
  - Noise at WOT is unacceptable
  - Intake noise is marginal, particularly on grades
  - Objectionable boom at 3000-3500 RPM
  - Power steering pump heat shield buzz over wide engine speed range is unacceptable

JTE ASSESSMENT:

- Currently non-commercial from NVH view point, based on limited preprototype exposure.
- Automatic transmission package expected to result in customer annoyance/dissatisfaction.

JTE WORK PLAN & TIMING:

- 2 50K PTE complete 6/88
  1 20K K1 complete 4/88
- NVH testing/development 6-8 weeks, start estimated later 2/88.

JTE RECOMMENDATION:

- Release 2.5L with manual transmission only to preclude customer dissatisfaction (drop automatic)
- Reassess launch date in view of NVH test/development timing.

(2/8/88)

Inter Company Correspondence

43

Telephone 493-2943 Date December 10, 1987

To — Name & Department | CIMS Number

R. F. Bauer - N-Truck Development/JTE | 514-00-00

From — Name & Department | CIMS Number

L. J. Achram - Ride/Handling/NVH Development-JTE | 514-00-00

Subject: Preliminary Review of 1989 2.5L N-Truck with A-500 Transmission

A 2.5L N-Truck with an A-500 transmission was made available for subjective review on November 24, 1987. Several significant NVH concerns contribute to making this vehicle unacceptable at its current level. Attached is a list of observations recorded by L. Achram, J. DeGroot and D. Moothart.

Since this powertrain combination is a 1989 program, development should begin immediately to address these concerns. However, current effort is being directed toward evaluation of the 3.9L/A500 system for the 1988-1/2 launch. After completion of the 3.9L issues, the 2.5L can be more aggressively addressed. A proposed development plan for the 2.5L implementation is attached.

L. J. Achram

/js

Attachment

cc: K. S. Bagga
D. F. Buser
J. E. MacAfee
F. P. McIntee
D. H. Moothart
L. W. Neal
P. R. Shefferly
C. P. Theodore
O. J. Viergutz
D. C. Winn

LJA08.

Ride Date: November 24 & 25, 1987
Vehicle No.: -004
Engine: 2.5L Transmission: A500

General NVH

* Idle boom is unacceptable
* W.O.T. interior noise is unacceptable
  - Potential "bottoming" in engine mounting
  - Heat shield resonances
* Marginal intake noise (particularly on grades)
* High dash transparency
* Objectionable idle shake
* Poor impact boom performance
* Objectionable low frequency shake (due to engine mounts?)
* Loud water splash noise (wet weather)
* Moderate-occasional brake squeal (front/rear undetermined)
* Front jounce can be felt during ride motion regularly
* Several small and one major 'boom' peaks during NERU

Specific Items

* Power steering pump heat shield buzzes wildly across a wide RPM range culminating into a very loud peak. (Unacceptable for noise and durability)
* Drive belts have extremely active resonances with large displacements on the longer spans. (The A/C belt contacts the transverse engine mounting bracket.) This is a durability and noise issue.
* The air cleaner was not attached to the body and did not appear to have a planned mounting. (Potential rattle)
* Accessory brackets do not appear to meet the JTE target of >200 Hz. Data required.
* O/D button difficult to find. Also, does not remember shut off setting for restart.
* Outside mirrors are excellent. Little or no vibrations distortion was observed. (Should be reviewed as replacement for XJ style "low-rider" mirrors.
* Shift schedule was exceedingly busy. Particularly at freeway speeds. Slight throttle position change causes downshift.
* Shifting into O/D causes objectionable jerk.

PROPOSED NVH DEVELOPMENT PLAN FOR 2.5L/A500

(Several items in the list can be handled concurrently.)

Note: JTE/NVH Project Management will initialize this work with the cooperation of the Sound and Vibration Lab and the related design activities.

1.) Develop/redesign the power steering pump heat shield.

2.) Belt Study:

- Investigate additional idler pulleys
- Investigate options to move resonances out of potential steady speed RPM ranges

3.) Evaluate natural frequencies of accessory drive mounting system. (JTE design criteria is >200 Hz.) This study should include acceleration loading and critical speeds for engine dyno durability testing.

4.) Determine cause of idle boom and develop 'fix'.

5.) Evaluate dash insulation/sealing to improve transparency.

6.) Retune engine mounting to optimize bounce control and to soften W.O.T. entry.

7.) Based on S&V Lab problem log, optimize location and rates of exhaust hangers.

8.) Identify sources and possible reductions to peaks observed in NERU. Particularly the very broad band peak which appears to range between 3000-3500 RPM.

9.) Develop improvements to wheelhouses and body/box to reduce splash noise.

2.5L TBI I-4 (T)

1989 MODEL YEAR
DEVELOPMENT TESTING

- Vehicle Testing
  Three (3) vehicles with updated pistons & new oil pan in process.

- Dyno Testing
  One (1) engine complete (845 hrs), another scheduled for start mid February, scheduled for completion mid-April.

1989 2.5L N-S ENGINE DEVELOPMENT VERIFICATION TESTING STATUS

		TARGET
General durab. and wear		
Dyno testing	___	7/88
Vehicle testing	___	7/88
Cold weather operation	*	
Engine/vehicle NVH	___	3/88
Access belt	___	10/88
Crank	*	
Idle N&V	*	
Piston	*	
Timing belt	*	
Overall engine	___	3/88
Low ambient oil pmpablty.	*	
High temp tests	*	
Oil sump temperature	*	
Crankshaft torsion	*	
Crankshaft strength	*	
Thrust bearing load	*	
Cylinder block strength	___	6/88
Main bearing cap strength	___	6/88
Cylinder head strength	*	
Head & block core plug blowout	*	
Intake manifold end.	*	
Exhaust manifold end.	*	
Intake manifold sealing	*	
Soft gasket sealing	*	
Stamped comp. deflection	*	
Alum. parts - bolt brinnelling	*	
Fastener torque verif.	*	
Oil fill cap torque	*	
Gaskets	*	
Hose blow-off/ pull-off resis.	*	
Oil pan stress	___	8/88
Oil demand	*	
Oil pump performance	*	
Oil/water pump strength	___	8/88
Water pump performance	___	6/88
Engine cooling verif.	___	3/88
Cooling sys. malfunction	*	
Critical oil level	___	3/88

		TARGET
Oil aeration	___	3/88
Oil pullover	*	
Oil level verification	___	3/88
Oil pick-up durability	___	8/88
Oil seal leakage	*	
Oil pan curb impact	*	
Flywheel attachment	*	
Piston, pin scuff resis.	___	1/88
Piston structure	___	1/88
Piston contact pattern	*	
Piston ring performance	___	1/88
Blow-by testing	___	2/88
Cylinder bore lub.	*	
Oil economy	___	1/88
Conn rod/bolt strength	*	
Valve train lubrication	*	
Valve train dynamics	*	
Valve rotation	*	
Valve component strength	*	
Exhaust valve temp.	___	6/88
P.S. fluid test	*	
Timing belt perf.	*	
Hydraulic tappet char.	*	
Valve spring durability	*	
Valve spring surge	*	
Valve seal & shield perf.	*	
Hyd. tappet oil reqmts.	*	
Valve requirements	*	
Valve seat requirements	*	
Valve guide requirements	*	
Retainers & locks	*	
Valve train durability	*	
Combustion parameters	___	3/88
Accessory brackets verif.	___	10/88
Accessory belt durability	___	10/88
Accessory pulley dura.	___	10/88
Serviceability	*	
Engine compartment app.	*	
Weight to target	*	
Production validation	___	10/88

* = Testing completed

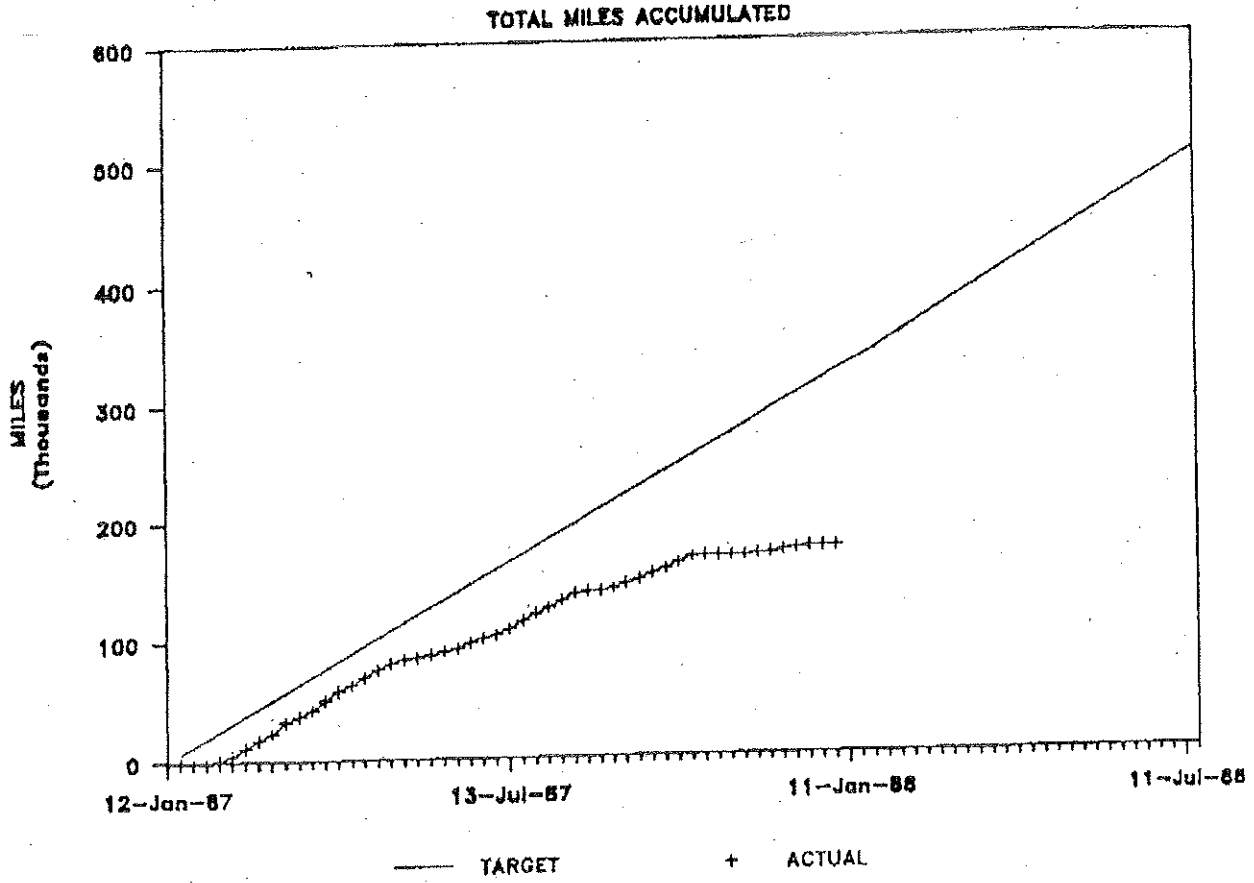
Casting sample date:	8/24/87
Purchased ISIR:	10/5/87
SHETF engines due:	11/30/87
C'1 Pilot:	2/15/88
PVP:	6/6/88
V-1:	7/5/88

J. D. Warner
February 2, 1988

kas

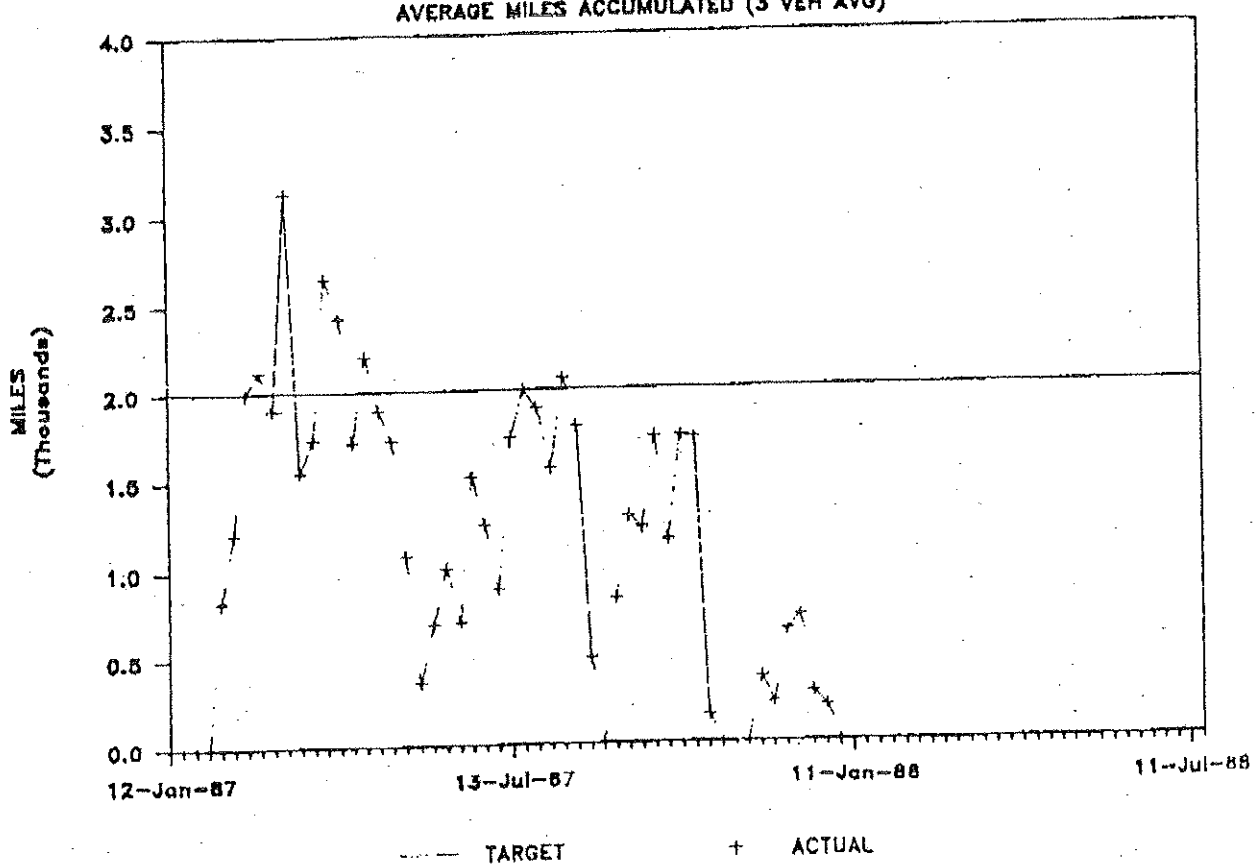
1989 2.5L LPTBI N-TRUCK ENDURANCE

TOTAL MILES ACCUMULATED



1989 2.5L LPTBI N-TRUCK ENDURANCE

AVERAGE MILES ACCUMULATED (3 VEH AVG)



DAKOTA 4-CYLINDER ENGINE

1987 M.Y. SMALL PICKUP 4-CYLINDER ENGINE RATES

	TOTAL 4 CYL. %	% M/T	% A/T
Chevy S-10	46	56	44
Ford Ranger	45	75	25
Jeep Comanche	48	73	27
Dodge Dakota	16 (1)	100	-
Nissan	87	90	10
Toyota	100	81	19

(1) Available only on 2WD, rate there is 21%.

PROJECTED 1989 M.Y. 2.5L DAKOTA RATES

2.5L Engine	23% (31% of 2WD)
. Manual Transmission	66%
. Automatic Transmission	34%

OTHER DETERMINATIONS

- 4 cylinder engine mandatory for price leader Dakota S model (13,000 units annually).
- 4 cylinder engine necessary to compete in the under $8500 purchase price segment (35%) of the small pickup market.
- 4 cylinder engine is specified on Dakota Government fleet bids ranging from 900 to 2,000 units annually.
- 4 cylinder powertrain required for protection of Dakota volumes in the event of a fuel supply or economic crisis.
- The Dodge Car and Truck Brand Management Division will not concur to any cancellation of the 4 cylinder powertrain from the Dakota product line-up.

Truck Product Planning
2/8/88 0037GH

DAKOTA 4-CYLINDER ENGINE

COMPETITIVE COMPARISON

	DISPL.	HP	CURB WEIGHT POUNDS	WEIGHT POWER LBS./HP	EPA F.E. MPG M5	0-60 SEC.	OWNER RATING % EX/V.C.
• Dakota							
- 2.2L T (Current)	2.2L	91	2910	32	23/28	17.0	42
- 2.5L T (1989)	2.5L	98	2910 E	30 E	-	14.9E	-
• Comanche							
- 2.5L K (Current)	2.5L	121	2912	24	21/24		75
- 2.5L K (1991 MPI)	2.5L	125	2912 E	23 E	-		-
• Ranger							
- 2.0L	2.0L	80	2688	34	22/26		
- 2.3L	2.3L	90	2688	30	24/28	14.9	76
• S10	2.5L	92	2568	28	24/30	14.2	68
• Toyota	2.4L	103	2760	27	21/25		85
	2.4L	116	2760	24	23/27		
• Nissan	2.4L	106	2715	26	22/26		83

Notes:

- Owner satisfaction based on 1987 Rogers First Quarter overall engine performance % excellent or very good. Where two four cylinder engines are available, it is a combined rating.
- EPA Fuel Economy are published numbers for base M5 versions.
- Vehicles Specifications are for 1988 Model Year.
- E = Estimated Values Pending Actual Weight Data.
- 0-60 Data is from Proving Ground Testing except 1989 Dakota is calculated.

#16/DE

N - BODY DAKOTA TRUCK

ENGINEERING PROGRAM REVIEW

1989 RWAL PROGRAM

RIDE & DRIVE REVIEW/RECOMMENDATION

- INFORMATION TO BE PROVIDED AT MEETING

RESPONSIBILITY: D. C. WINN

89 D AND N RWAL

PROGRAM REVIEW

TIMING

C1 PILOT - ALL PARTS AVAILABLE

AXLES, MODULE AND REAR HOSE

SPECIAL MEANS - LATE ISIR.

ALL PAPERWORK IN PLACE FOR

OPEN ISSUES

RELIABILITY

EMI/EMC TESTING COMPLETED SUCCESSFULLY

VEHICLE RELIABILITY PROGRAM AT
150K MILES, FAILURES TO DATE:

- HIGH TEMPERATURES 'GREEN AXLE'
- AXLE SIDE GEAR
- MODULE FUSE
- CONNECTOR WATER CONTAMINATION

ALL BUT AXLE ISSUE ARE COVERED BY
INCLUDED OR TO BE INCLUDED CHANGES

MANUFACTURING FEASIBILITY

1989 N-BODY OPEN ITEMS
Chassis

ITEM NO. AREA	COMPONENT	ISSUE/DATE	MFG. POSITION/DATE	STATUS/DATE	ASSNG'D TO
F-6. CHASSIS	R.W.A.L. Sensor Shield	6/17/87 New Shield design undefined.	6/17/87 Mfg. withholds feasibility. 8/31/87 Mfg. request to review drawing.	6/17/87 OPEN Engr'g. reviewing for a common design. 8/31/87 HOLD Engr'g. indicates there will be only one bracket. 1/18/88 CLOSED Direction is one bracket.	Mienko/ Winde
F-7. CHASSIS	R.W.A.L. Sensor Shield	9/4/87 Method used for anti-rotation.	9/4/87 Sample part does not provide for sufficient anti-rotation. Unable to make connector engagement at sensor. Mfg. requests increased part ingaugement.	9/4/87 OPEN Engr'g. to investigate. 9/8/87 HOLD Sample part not to print. Engr'g. drawings show sufficient clearance. Hold for review on axle. 2/2/88 CLOSED Review shows acceptable condition.	Mienko/ Winde
F-8. CHASSIS	Distance Sensor	8/31/87 Clearance between sensor and vac. switch on NP231 Transfer Case with 3.9 axle.	8/31/87 By design, clearance (min) between sensor and switch is 1.15M. Mfg. request verification that with production build no interference will exist.	8/31/87 OPEN 1/6/88 HOLD	A212/ Nowak/ Groszewski

(1141c/0030c)

ISSUED: 12/28/87
REVISED: 02/09/88

Inter Company Correspondence

54

Telephone | Date: 2/5/88

To — Name & Department: See List | CIMS Number:

From — Name & Department: F. J. Castaing | CIMS Number: 8-733-2617

Subject:

Launch Readiness - A500 Automatic Transmission for 88½ Model N-Body/B-Body

Assessments have been made for the application of the A500 four speed automatic transmission in the N-Body and B-Body vehicles for 1988 model mid-year release. The Jeep and Truck Engineering position regarding launch readiness is noted below.

N-Body

Required evaluations, design, development and testing work has been completed to a satisfactory level. The application of the A500 automatic transmission is acceptable for production launch as planned. Required improvements, targeted for 89 model year, include elimination of a mild beat disturbance in third gear and shift quality improvements. Engineering programs are being implemented to address these issues.

B-Body

Required evaluations, design, development and testing work will be completed within the next month. However, evaluations have identified unacceptable noise/vibration disturbance levels on the 3.9L A500 combination. The 3.9L application of the A500 transmission must be deferred from launch until corrective action can be identified and implemented. Engineering is aggressively pursuing this development. The 5.2L application of the A500 transmission is considered on track for planned launch, given successful completion of remaining tests.

F. J. Castaing

/plm

0010PS

1989-3/4 N-BODY EXTENDED CAB - BODY ISSUES

There are no open B.I.W. manufacturing issues on this vehicle. On 2-15-88 we are reviewing the B.I.W. and trim assembly for Brampton and Manufacturing representatives at Carron, Inkster. This will be an opportunity for them to see "hands-on" how this vehicle is assembled.

S. W. Crater
2-18-88

212 CUBIC IN. CATALYTIC CONVERTER PACKAGING

1991 N-BODY V8 4x4 CLUB CAB STATUS

The Design Study initially focused on the 4x4 extended cab with V8 and V6 engines since this frame/body combination is the most difficult packaging job.

Work to date has resulted in a high degree of feasibility by locating the 212 can between the engine support and torsion bar crossmembers just to the right of the transfer case.

Distance to engine for "Lite Off" is improved vs. today's 180 converter by approximately 21 inches.

The following concerns are in the process of being finalized:

- Pipe routing over the frame crossmembers; minimum radius bends with some local depressions will be required for clearance.
- Thermal protection; space for converter mounted heat shield and a body mounted shield is being provided for transfer case protection and passenger side front foot well protection.
- Air injection tube; design of a welded tube to the converter is in process.

No basic chassis or body changes are necessary for the 4x4 Club Cab. Tooling is anticipated for front and rear convertor pipes and U/Body heat shield. Basic 212 convertor can halves and environmental heat shield are c/o from "D" Truck.

Next priority will be 4x2 Club Cab packaging. Revisions to the perimeter park brake cable system are anticipated on 4x2 models.

Pre-Program Engineering and Chassis Engineering are coordinating design studies for regular and Club Cab.

D. A. Nelson

2/4/88
DAN008

MANUFACTURING FEASIBILITY DEPARTMENT

1989 3/4 "N" EXTENDED CAB

SUMMARY SHEET

AREA	ITEMS		
	OPEN	CLOSED	TOTAL
STAMPING	0	0	0
B.I.W.	0	4	4
PAINT	0	0	0
EXTERIOR TRIM	0	0	0
INTERIOR TRIM	3	14	17
CHASSIS/ENGINE	0	0	0
TOTAL	3	18	21

February 9, 1988

MANUFACTURING FEASIBILITY

1989 3/4 N-CLUB CAB OPEN ITEMS
Interior Trim

ITEM NO. AREA	COMPONENT	ISSUE/DATE	MFG. POSITION/DATE	STATUS/DATE	ASSNG'D TO
E-12. INT. TRIM	Seat Back	10/27/86 Alignment of seat back to back bolster.	10/27/86 Mfg. requires seat back interference to back bolster to prevent un-parallel condition between back bolster & seat back.	10/27/86 OPEN 11/20/86 Unchanged 1/15/87 Layout Prom. 3/87 HOLD 9/8/87 HOLD Eng. will provide for inter-ference fit. Layout prom. 9/87. 1/22/88 CLOSED Production layout shows line to line surface with 3/8" clearance between seat and bolster back board.	Draplin/ Winde/ Knight/ Cote

(1143c/0030c)

ISSUED: 12/28/87
REVISED: 02/09/88

MANUFACTURING FEASIBILITY

1989 3/4 N-CLUB CAB OPEN ITEMS
Interior Trim

ITEM NO. AREA	COMPONENT	ISSUE/DATE	MFG. POSITION/DATE	STATUS/DATE	ASSNG'D TO
E-13. INT.	Qtr. Trim Panel R/L	10/27/86 Qtr. panel pull away gap to A-Post.	10/27/86 Mfg. requires interference fit to prevent gap.	10/27/86 OPEN 11/20/86 Unchanged 1/15/87 OPEN Present "B" Post garnish mldg. on reg. cab is poly-propolene mat'l. and did require tune in after launch because of its flexibility. Both Club Cab Qtr. Inr. & present "A" Post garnish are ABS mat'l which is much stiffer and as such Trim Engr'g. feels separation will not occur. 6/5/87 HOLD Pending demonstration tryout 6/87. 9/10/87 Trim demonstration review T.B.D.	Knight/ Jones/ Winde

MANUFACTURING FEASIBILITY

1989 3/4 N-CLUB CAB OPEN ITEMS
Interior Trim

ITEM NO. AREA	COMPONENT	ISSUE/DATE	MFG. POSITION/DATE	STATUS/DATE	ASSNG'D TO
E-17. INT. TRIM	Qtr. Trim Panel	10/27/86 Clearance to qtr. window seal.	10/27/86 Mfg. recommends copying T-115 system due to build variations.	10/27/86 11/13/86 Trim Dept. pursuing P-Body Trim per PDM direction. 12/18/86 Trim Engr'g. presented build variation dwg's. to their management for possible acceptance of T-115 system. Decision was to follow PDM decision. 1/15/87 Mfg. requires that build variations of qtr. window seal to qtr. inner trim panel be called out on graphic as acceptable condition. 2/5/87 OPEN Review of qtr. pnl. table top model revealed gross misalignment of seal to qtr. pnl. trim. Meeting to be called to resolve. TBD 3/2/87 OPEN Chiefs' Review of qtr. trim to qtr. wdw. seal. Maintained Ergr'g. position not to carry trim pnl. over qtr. wdw. seal.	Knight/ Jones/ Winde

(1143c/0030c)

ISSUED: 12/28/8
REVISED: 02/09/8

60

MANUFACTURING FEASIBILITY

1989 3/4 N-CLUB CAB OPEN ITEMS
Interior Trim

ITEM NO. AREA	COMPONENT	ISSUE/DATE	MFG. POSITION/DATE	STATUS/DATE	ASSNG'D TO
E-17.	Qtr. Trim Panel (cont'd)			5/13/87 HOLD Pending receiving graphic showing trim panel tolerance. Disposition to window fret. 8/17/87 HOLD Tolerance stack indicates build variation will be +/- 4.5mm to 1/4 window seal. 1/22/88 HOLD Pending review of graphics.	
E-32. INT. TRIM	Speaker Cover	7/24/87 Complexity of "1/4" Trim Speaker Grille regarding APEI.	7/24/87 Mfg. request that speaker grille be received PIA in 1/4 trim panel.	7/24/87 OPEN 9/8/87 Unchanged. 1/22/88 HOLD Engr'g. issuing PCN #71013-197 to incorporate speaker grille in qtr. trim. Awaiting signatures.	Galasso/ Knight/ Winde
E-33. INT. TRIM	Carpet	8/26/87 Clearance holes for bucket seat attachment.	8/26/87 Mfg. request that carpet be gated. Eliminating	8/26/87 OPEN 1/22/88 CLOSED Clearance holes will be punched 100% in 89 1/2. Gating will occur in '90 when seat options change.	Knight/ Winde

(1143c/0030c)

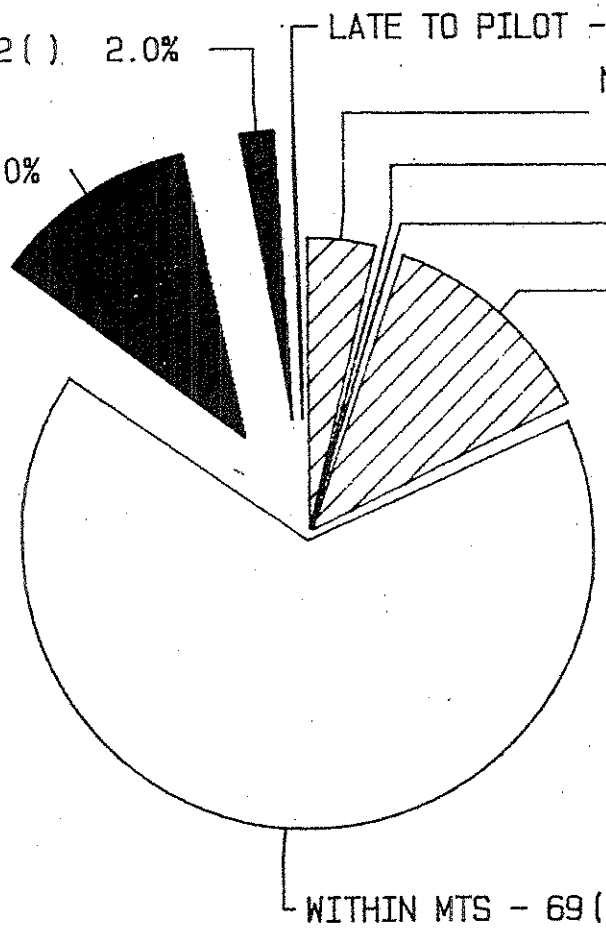
ISSUED: 12/28/8
REVISED: 02/09/8

MANUFACTURING FEASIBILITY

1989 3/4 N-CLUB CAB CLOSED ITEMS
Interior Trim

ITEM NO. AREA	COMPONENT	ISSUE/DATE	MFG. POSITION/DATE	STATUS/DATE	ASSNG'D TO
E-34. INT. TRIM	Body Wire Harness	9/8/87 Wire routing along roof for dome lamp.	9/8/87 Mfg. request clips be added to harness in area of coat hook protrusion to prevent entrapment by headliner.	9/8/87 OPEN 1/22/88 Unchanged. 2/9/88 CLOSED	Shen/ Kucharek/ Winde

1989 3/4 MODEL YEAR REPORT
PURCHASED PARTS PROGRAM STATUS
AN - BODY EXTENDED CAB



DATA ASSUMPTIONS

0-1, AE, A1, RELEASED
00VAA0, 32A0, PEI, PIC
EXCLUDES COLOR EXPLOSION
CORPORATE LEAD TIME TRACKING REPORT
FOR THE PERIOD 02/08/88
.PROGRAM FORECAST: 100E VS 98A
PRIOR REPORT / / -TOTAL IN PARENTHESES ( )
PREPARED BY B. L. HENDRIETH (6-2134)

FORWARD MODEL TIMING
PURCHASING PLANNING
FEBRUARY 10, 1988

...3 3/4 ... YEAR ... ...DY - ... ...AB
PURCHASED PARTS PROGRAM STATUS
PREPAREDNESS REPORT

PILOT
P1: 09/19/88
P2: 11/07/88
C1: 12/19/88
PVP: 04/10/89
LAUNCH: 05/22/89

GPA/ BUYER CODE	PART NUMBER	DESCRIPTION	SUPPLIER	DRAWING COMPLETION	PILOT BUILD DATE	DIM. SAMPLE PROMISE	TEMP TOOL CODE	REMARKS
		(NO PARTS LATE TO P1 PILOT)						
		(P2 PILOT)						
/	4522080	PKG-G/BOX, LOAD FLR LK CYC		03/14/88	11/07/88			LINE-UP WAS 02 A0
2/229	K834-5	PANEL ASSY-QTR TRM (4432908-9)		01/26/88A	11/07/88			ADV REQ 12/10/87
		(C1 PILOT)						
2/229	H829	BOLSTER ASSY-CAB BK (4432933)	DAVIDSON INT	02/15/88	12/19/88	10/10/88 S		
3/513	L458	CUSH COMP RR ST RT (4482192)	DOUGLAS&LOMASON	03/18/88	12/19/88	10/24/88 X		A1 PCN 71026-163, MCN 01/08/88; COMPONENT PARTS N/A
3/513	L457	CUSH COMP RR ST LT (4482189)	DOUGLAS&LOMASON	03/18/88	12/19/88	10/24/88 X		A1 PCN 71026-163, MCN 01/08/88; COMPONENT PARTS N/A
3/513	L440	ST COMP FRT BKT RT (4482174)	DOUGLAS&LOMASON	03/18/88	12/19/88	10/24/88 X		A1 PCN 70625-152, MCN 10/19/87; COMPONENT PARTS N/A
3/513	L455	BK COMP RR ST (4482191)	DOUGLAS&LOMASON	03/18/88	12/19/88	10/24/88 X		A1 PCN 71026-163, MCN 01/08/88; COMPONENT PARTS N/A
3/513	L456	CUSH COMP RR ST RT (4482188)	DOUGLAS&LOMASON	03/18/88	12/19/88	10/24/88 X		A1 PCN 71026-163, MCN 01/08/88; COMPONENT PARTS N/A
3/513	L447	ST COMP FRT BKT LT (4482183)	DOUGLAS&LOMASON	03/18/88	12/19/88	10/24/88 X		REL'D 01; COMPONENT PARTS N/A
3/513	L446	ST COMP FRT BKT RT (4482182)	DOUGLAS&LOMASON	03/18/88	12/19/88	10/24/88 X		A1 PCN 70625-152, MCN 10/19/87; COMPONENT PARTS N/A
3/513	L459	CUSH COMP RR ST LT (4482193)	DOUGLAS&LOMASON	03/18/88	12/19/88	10/24/88 X		A1 PCN 71026-163, MCN 01/08/88; COMPONENT PARTS N/A
3/513	L454	BK COMP RR ST (4482190)	DOUGLAS&LOMASON	03/18/88	12/19/88	10/24/88 X		A1 PCN 71026-163, MCN 01/08/88; COMPONENT PARTS N/A
3/513	L441	ST COMP FRT BKT LT (4482175)	DOUGLAS&LOMASON	03/18/88	12/19/88	10/24/88 X		A1 PCN 70625-152, MCN 10/19/87; COMPONENT PARTS N/A

---GPA CODES---
1- M.W. KERBY
2- M.P. CICCONE
3- G.N. ANDREWS
4- J.A. SORENSEN
5- D.D. MCDAVID

------DWG CODES-----
A-ACTUAL
F-FULLY COMPRESSED
M-ESTIMATED RWK
P-PRESOURCE
X-CONFIRMED
Z-ODD BOX

-TOOL TIME CODES-
S-STANDARD
N-NON STANDARD
ODD-ODD BOX

--------SAMPLE PROMISE CODES----------
AC-IN PROCESS
B-INTERIM PROCESS
E-ESTIMATE
F-FULLY COMPRESSED
09/09/99-S/P/D N/A
I-INITIAL
S-UNGRAINED
SF-UNGRAINED FULLY COMPRESSED
X-CONFIRMED

----------TEMP TOOL CODES----------
1-UNDER REVIEW
2-NO REQUIREMENT
3-P/C REC COST/TIME
4-T/TOOL PURCHASED
5-SHIP FUNC PRIOR S/P
6-SHIP WITH SAMPLE
7-ENGR. SUPPLIED
8-USE SUB TSA
9-NO T/T AVAIL
0-S/P MEETS PILOT BUILD

B. L. HENDRIETH (6-2134)
FORWARD MODEL TIMING
PURCHASING PLANNING
DATE: 02/09/88

1991 N-TRUCK DUAL REAR WHEEL CHASSIS-CAB

MAIN PURPOSE

- Develop a platform for sale to the body builders, and Mini/Micro Motor Home-Camper market.
- Opportunity for incremental vehicle sales.
- Total market segment is 12,000 units annually (Motor Home) with additional commercial cab usage.
- Toyota is presently the only other manufacturer of vehicles in this market.

GENERAL OUTLINE

- 142" wheelbase, fits within A. O. Smith tooling capability.
- 6500 lbs. GVW maximum
- 3.9L engine and automatic transmission standard
- 4x2 configuration at 2800 lbs. payload
- Optional 5.2L V-8 engine
- Product details on following page
- Brampton is the indicated assembly plant.

FINANCIALS

- Volume is at 3,000 units per 12/8/88 FPV, significant upscale potential is anticipated with a superior product to the Toyota chassis-cab.
- Cost projection is +$410 over N, LWB base unit
- Base unit variable profit increase is +$ 350 over base LWB, N-pickup (option profit not included).

Truck Product Planning
2/9/88 0028MJM

1991 N-TRUCK CAB CHASSIS (DRW) PRODUCT DESCRIPTION (PDTM)

Base Vehicle - Same as Regular Cab N-Truck with Content/Configuration Changes Noted Below:

o Model Designation	N1L66
o Wheelbase	142 inch
o Cab Back to Axle Centerline	69 inch
o Cab Style	3 man, regular cab
o Payload	2800 lbs.
o GVWR Max.	6500 lbs.
o Configuration	4 x 2
o Rear GAWR	3650 lbs.
o Frontal Area	42 ft.^{2} (certifiable to 54 ft.^{2})
o Rear Track	68.8 inch
o Front Track	58.5 inch
o Engine	3.9L, V-6 EFI; optional 5.2L, V-8 EFI
o Transmission	4-speed automatic (A500)
o Tires	Seven (7) LT 215/75 R15
o Axle/Hubs/Brake	8-1/2 Dana 44/new hubs/11-1/2 brake
o Brake System	Twin Piston front brake, larger master cylinder (V-8 program)
o Wheels	New dual rear wheels 15"; carryover front heavy duty wheels (6 bolt pattern per general front end upgrade.)
o Suspension	Front and rear carryover at 2550 payload level
o Frame	Modified regular cab LWB frame to accommodate 142" wheelbase flanged lip rail rear, with added crossmember.
o Fuel Systems	22 gallon tank std.; modify filler tube.
o Propshaft	Two-piece with center bearing; lengthened existing LWB components
o Rear Axle Ratio	3.55 (V-8), 3.90 (V-6)
o Documents	Incomplete vehicle documents
o Rear Lights	D-Model utiline rear brake lamps, existing
o Package(s)	Heavy duty package, maximum cooling, heavy duty battery--existing components
o Options	Offer existing options including: carpet, radio upgrades, premium front end ornamentation, etc.

Truck Product Planning
1/30/87 0029MJM
Revised: 2/9/88

Potential Failure Mode and Effects Analysis

FMEA

Ford

GM

POTENTIAL FAILURE MODE AND EFFECTS ANALYSIS (FMEA)

REFERENCE MANUAL

The content of this document is the technical equivalent of SAE J-1739. Potential Failure Mode and Effects Analysis (FMEA) should be used by suppliers to companies subscribing to QS-9000.

First Edition Issued February, 1993 • Second Edition, February, 1995

FOREWORD

This reference Manual and Reporting Format was developed by the Failure Mode and Effects Analysis (FMEA) teams at Chrysler, Ford and General Motors, working under the auspices of the Automotive Division of the American Society for Quality Control (ASQC) and the Automotive Industry Action Group (AIAG).

The ASQC/AIAG Task Force charter is to standardize the reference manuals, procedures, reporting formats and technical nomenclature used by Chrysler, Ford, and General Motors in their respective supplier quality systems. Accordingly, this manual and format, which is approved and endorsed by Chrysler, Ford and General Motors, should be used by suppliers implementing FMEA techniques into their design/ manufacturing processes.

In the past, Chrysler, Ford and General Motors each had their own guidelines and formats for insuring supplier FMEA compliance. Differences between these guidelines and formats resulted in additional demands on supplier resources. To improve upon this situation, Chrysler, Ford and General Motors agreed to develop, and, through AIAG, distribute this Manual. The work group responsible for the Manual was led be George Baumgartner of Ford Motor Company.

This Manual provides general guidelines for preparing an FMEA. It does not give specific instructions on how to arrive at each FMEA entry, a task best left to each FMEA team. This Manual also is not intended to be a comprehensive FMEA reference source or training document.

While these guidelines are intended to cover all situation normally occurring either in the design phase or process analysis, there will be questions that arise. These questions should be directed to your customer's Supplier Quality Assurance (SQA) activity. If you are uncertain as to how to contact the appropriate SQA activity, the buyer in your customer's Purchasing office can help.

The Task Force gratefully acknowledges: the leadership and commitment of Vice Presidents Thomas T. Stallkamp at Chrysler, Norman F. Ehlers at Ford, and J. Ignasio Lopez de Arriortua of General Motors; the assistance of the AIAG in the development, production, and distribution of the Procedure; the guidance of Task Force principals Russ Jacobs (Chrysler), Steve Walsh (Ford), Dan Reid (General Motors), and Rad Smith; and the assistance of the ASQC Automotive Division Reading Team. This team, led by Tripp Martin (Peterson Spring), reviewed the Manual for technical content and accuracy and made valuable contributions to form and content. Since the Manual was developed to meet specific needs of the automotive industry, the ASQC voluntary standards process defined by ASQC policies and procedures was not used in its development.

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GENERAL INFORMATION

Overview

This manual introduces the topic potential Failure Mode and Effects Analysis (FMEA) and gives general guidance in the application of the technique. An FMEA can be described as a systemized group of activities intended to: 1) recognize and evaluate the potential failure of a product/process and its effects, 2) identify actions which could eliminate or reduce the chance of the potential failure occurring, and 3) document the process. It is complementary to the design process of defining positively what a design must do to satisfy the customer.

History

Although engineers have always performed an FMEA type of analysis on their designs and manufacturing processes, the first formal application of the FMEA discipline was an innovation of the aerospace industry in the mid-1960s.

Manual Format

For ease of use, this reference manual retains the presentation of the FMEA preparation instructions in two distinct sections (design and process). However, having both sections in the same manual facilitates the comparison of techniques used to develop the different types of FMEAs, as a means to more clearly demonstrate their proper application and interrelation.

FMEA Implementation

Because of a company's commitment to continually improve its products whenever possible, the need for using the FMEA as a disciplined technique to identify and help eliminate potential concern is as important as ever. Studies of vehicle campaigns have shown that a fully implemented FMEA program could have prevented many of the campaigns.

Although responsibility for the "preparation" of the FMEA must, of necessity, be assigned to an individual, FMEA input should be a team effort. A team of knowledgeable individuals should be assembled; e.g., engineers with expertise in Design, Manufacturing, Assembly, Service, Quality, and Reliability.

One of the most important factors for the successful implementation of an FMEA program is timeliness. It is meant to be a "before-the-event" action, not an "after-the-fact" exercise. To achieve the greatest value, the FMEA must be done before a design or process failure mode has been unknowingly designed into the product. Up front time spent in doing a comprehensive FMEA well, when product/process changes can be most easily and inexpensively implemented, will alleviate late change crises. An FMEA can reduce or eliminate the chance of implementing a corrective change which could create an even larger concern. Properly applied, it is an interactive process which is never ending.

POTENTIAL

FAILURE MODE AND EFFECTS ANALYSIS

IN

DESIGN

(DESIGN FMEA)

REFERENCE MANUAL

INTRODUCTION

A Design potential FMEA is an analytical technique utilized primarily by a Design Responsible Engineer/Team as a means to assure that, to the extent possible, potential failure modes and their associated causes/mechanisms have been considered and addressed. End items, along with every related system, subassembly and component, should be evaluated. In its most rigorous form, an FMEA is a summary of an engineer's and the team's thoughts (including an analysis of items that could go wrong based on experience and past concerns) as a component, subsystem or system is designed. This systematic approach parallels, formalizes and documents the mental disciplines that an engineer normally goes through in any design process.

The Design potential FMEA supports the design process in reducing the risk of failures by:

- Aiding in the objective evaluation of design requirements and design alternatives.
- Aiding in the initial design for manufacturing and assembly requirements.
- Increasing the probability that potential failure modes and their effects on system and vehicle operation have been considered in the design/development process.
- Providing additional information to aid in the planning of thorough and efficient design test and development programs.
- Developing a list of potential failure modes ranked according to their effect on the "customer," thus establishing a priority system for design improvements and development testing.
- Providing an open issue format for recommending and tracking risk reducing actions.
- Providing future reference to aid in analyzing field concerns, evaluating design changes and developing advanced designs.

Customer Defined

The definition of "CUSTOMER" for a Design potential FMEA is not only the "END USER", but also the design responsible engineers/ teams of the vehicle or higher level assemblies, and/or the manufacturing process responsible engineers in activities such as Manufacturing, Assembly, and Service.

When fully implemented, the FMEA discipline requires a Design FMEA for all new parts, changed parts, and carryover parts in new applications or environments. It is initiated by an engineer from the responsible design activity, which for a proprietary design may be the supplier.

INTRODUCTION (Continued)

Team Effort

During the initial Design potential FMEA process, the responsible engineer is expected to directly and actively involve representatives from all affected areas. These areas should include, but are not limited to: assembly, manufacturing, materials, quality, service and suppliers, as well as the design area responsible for the next assembly. The FMEA should be a catalyst to stimulate the interchange of ideas between the functions affected and thus promote a team approach. In addition, for any (internal/external) supplier designed items, the responsible design engineer should be consulted.

The Design FMEA is a living document and should be initiated before or at design concept finalization, be continually updated as changes occur or additional information is obtained throughout the phases of product development, and be fundamentally completed before the production drawings are released for tooling.

Considering that manufacturing/assembly needs have been incorporated, the Design FMEA addresses the design intent and assumes the design will be manufactured/assembled to this intent. Potential failure modes and/or causes/mechanisms which can occur during the manufacturing or assembly process need not, but may be included in a Design FMEA, when their identification, effect and control are covered by the Process FMEA.

The Design FMEA does not rely on process controls to overcome potential weaknesses in the design, but it does take the technical/physical limits of a manufacturing/assembly process into consideration, e.g.:

- necessary mold drafts
- limited surface finish
- assembling space/access for tooling
- limited hardenability of steels
- process capability/performance

DEVELOPMENT OF A DESIGN FMEA

The design responsible engineer has at his or her disposal a number of documents that will be useful in preparing the Design potential FMEA. The process begins by developing a listing of what the design is expected to do, and what it is expected not to do, i.e., the design intent. Customer wants and needs, as may be determined from sources such as Quality Function Deployment (QFD), Vehicle Requirements Documents, known product requirements and/or manufacturing/assembly requirements should be incorporated. The better the definition of the desired characteristics, the easier it is to identify potential failure modes for corrective action.

POTENTIAL
FAILURE MODE AND EFFECTS ANALYSIS
(DESIGN FMEA)

FMEA Number 1234 (1)

Page 1 of 1

___ System
_X_ Subsystem
___ Component 01.03/Body Closures (2)

Design Responsibility Body Engineering (3)

Prepared By A. Tate - X6412- Body Engr (4)

Model Year(s)/Vehicle(s) 199X/Lion 4dr/Wagon (5)

Key Date 9X 03 01 ER (6)

FMEA Date (Orig.) 8X 03 22 (Rev.) 8X 07 14 (7)

Core Team T.Fender-Car Product Dev., Childers-Manufacturing, J. Ford-Assy Ops. (Dalton, Fraser, Henley Assembly Plants (8)

Item / Function (9)	Potential Failure Mode (10)	Potential Effect(s) of Failure (11) (12)	Sev	Class	Potential Cause(s)/ Mechanism(s) of Failure (13) (14)	Occur	Current Design Controls (15) (16)	Detec	R.P.N.	Recommended Action(s) (17) (18) (19)	Responsibility & Target Completion Date (20)	Action Results (22): Actions Taken (21)	Sev	Occ	Det	R.P.N.
Front Door L.H. H8HX-0000-A • Ingress to and egress from vehicle • Occupant protection from weather, noise, and side impact • Support anchorage for door hardware including mirror, hinges, latch and window regulator • Provide proper surface for appearance items • Paint and soft trim	Corroded interior lower door panels	Deteriorated life of door leading to: • Unsatisfactory appearance due to rust through paint over time • Impaired function of interior door hardware	7		Upper edge of protective wax application specified for inner door panels is too low	6	Vehicle general durability test veh. T-118 T-109 T-301	7	294	Add laboratory accelerated corrosion testing	A Tate-Body Engrg 8X 09 30	Based on test results (Test No. 1481) upper edge spec raised 125mm	7	2	2	28
					Insufficient wax thickness specified	4	Vehicle general durability testing- as above	7	196	Add laboratory accelerated corrosion testing Conduct Design of Experiments (DOE) on wax thickness	Combine w/test for wax upper edge verification A Tate Body Engrg 9X 01 15	Test results (Test No. 1481) show specified thickness is adequate. DOE shows 25% variation in specified thickness is acceptable.	7	2	2	28
					Inappropriate wax formulation specified	2	Physical and Chem Lab test- Report No.1265	2	28	None						
					Entrapped air prevents wax from entering corner/edge access	5	Design aid investigation with non-functioning spray head	8	280	Add team evaluation using production spray equipment and specified wax	Body Engrg & Assy Ops 8X 11 15		7	1	3	21
					Wax application plugs door drain holes	3	Laboratory test using "worst case" wax application and hole size	1	21	None		Based on test, 3 additional vent holes provided in affected areas				
					Insufficient room between panels for spray head access	4	Drawing evaluation of spray head access	4	112	Add team evaluation using design aid buck and spray head	Body Engrg & Assy Ops	Evaluation showed adequate access	7	1	1	7

SAMPLE

DESIGN FMEA

DEVELOPMENT OF A DESIGN FMEA (Continued)

A Design FMEA should begin with a block diagram for the system, subsystem, and/or component being analyzed. An example block diagram is shown in Appendix A. The block diagram can also indicate the flow of information, energy, force, fluid, etc. The object is to understand the deliverables (input) to the block, the process (function) performed in the block, and the deliverables (output) from the block.

The diagram illustrates the primary relationship between the items covered in the analysis and establishes a logical order to the analysis. Copies of the diagrams used in FMEA preparation should accompany the FMEA.

In order to facilitate documentation of the analysis of potential failures and their consequences, a form has been designed and is in Appendix F.

Application of the form is described below; points are numbered according to the numbers encircled on the form shown on the facing page. An example of a completed form is contained in Appendix B and on the facing pages of this section.

1) **FMEA Number**

Enter the FMEA document number, which may be used for tracking.

2) **System, Subsystem, or Component Name and Number**

Indicate the appropriate level of analysis and enter the name and number of the system, subsystem or component being analyzed.

3) **Design Responsibility**

Enter the OEM, department and group. Also include the supplier name if known.

4) **Prepared By**

Enter the name, telephone number, company of the engineer responsibile for preparing the FMEA.

5) **Model Year(s)/ Vehicle(s)**

Enter the intended model year(s) and vehicle line(s) that will utilize and/or be affected by the design being analyzed (if known).

6) **Key Date**

Enter the initial FMEA due date, which should not exceed the scheduled production design release date.

7) **FMEA Date**

Enter the date the original FMEA was compiled, and the latest revision date.

8) **Core Team**

List the names of the responsible individuals and departments which have the authority to identify and/or perform tasks. (It is recommended that all team members names, departments, telephone numbers, addresses, etc. be included on a distribution list.)

POTENTIAL
FAILURE MODE AND EFFECTS ANALYSIS
(DESIGN FMEA)

FMEA Number 1234 (1)

Page 1 of 1

___ System
_x_ Subsystem
___ Component 01.03/Body Closures (2)

Design Responsibility Body Engineering (3)

Prepared By A. Tate - X6412- Body Engr (4)

Model Years(s)/Vehicle(s) 199X/Lion 4dr/Wagon (5)

Key Date 9X 03 01 ER (6)

FMEA Date (Orig.) 8X 03 22 (Rev.) 8X 07 14 (7)

Core Team T.Fender-Car Product Dev., Childers-Manufacturing, J. Ford-Assy Ops (Dalton, Fraser, Henley Assembly Plants (8)

Item / Function (9)	Potential Failure Mode (10)	Potential Effect(s) of Failure (11) (12)	Sev	Class	Potential Cause(s)/ Mechanism(s) of Failure (13) (14)	Occur	Current Design Controls (15) (16) (17)	Detec	R.P.N.	Recommended Action(s) (18) (19)	Responsibility & Target Completion Date (20)	Action Results (22): Actions Taken (21)	Sev	Occ	Det	R.P.N.
Front Door L.H. HSHX-0000-A • Ingress to and egress from vehicle • Occupant protection from weather, noise, and side impact • Support anchorage for door hardware including mirror, hinges, latch and window regulator • Provide proper surface for appearance items • Paint and soft trim	Corroded interior lower door panels	Deteriorated life of door leading to: • Unsatisfactory appearance due to rust through paint over time • Impaired function of interior door hardware	7		Upper edge of protective wax application specified for inner door panels is too low	6	Vehicle general durability test veh. T-118 T-109 T-301	7	294	Add laboratory accelerated corrosion testing	A Tate-Body Engrg 8X 09 30	Based on test results (Test No. 1481) upper edge spec raised 125mm	7	2	2	28
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					Entrapped air prevents wax from entering corner/edge access	5	Design aid investigation with non-functioning spray head	8	280	Add team evaluation using production spray equipment and specified wax	Body Engrg & Assy Ops 8X 11 15		7	1	3	21
					Wax application plugs door drain holes	3	Laboratory test using "worst case" wax application and hole size	1	21	None		Based on test, 3 additional vent holes provided in affected areas				
					Insufficient room between panels for spray head access	4	Drawing evaluation of spray head access SAMPLE	4	112	Add team evaluation using design aid buck and spray head	Body Engrg & Assy Ops	Evaluation showed adequate access	7	1	1	7

DESIGN FMEA

DEVELOPMENT OF A DESIGN FMEA (Continued)

9) Item/Function

Enter the name and number of the item being analyzed. Use the nomenclature and show the design level as indicated on the engineering drawing. Prior to initial release, experimental numbers should be used.

Enter, as concisely as possible, the function of the item being analyzed to meet the design intent. Include information regarding the environment in which this system operates (e.g., define temperature, pressure, humidity ranges). If the item has more than one function with different potential modes of failure, list all the functions separately.

10) Potential Failure Mode

Potential Failure Mode is defined as the manner in which a component, subsystem, or system could potentially fail to meet the design intent. The potential failure mode may also be the cause of a potential failure mode in a higher level subsystem, or system, or be the effect of one in a lower level component.

List each potential failure mode for the particular item and item function. The assumption is made that the failure could occur, but may not necessarily occur. A recommended starting point is a review of past things-gone-wrong, concerns reports, and group "brainstorming".

Potential failure modes that could only occur under certain operating conditions (i.e. hot, cold, dry, dusty, etc.) and under certain usage conditions (i.e. above average mileage, rough terrain, only city driving, etc.) should be considered.

Typical failure modes could be, but are not limited to:

Cracked	Sticking
Deformed	Short circuited (electrical)
Loosened	Oxidized
Leaking	Fractured

Note: Potential failure modes should be described in "physical" or technical terms, not as a symptom noticeable by the customer.

11) Potential Effect(s) of Failure

Potential Effects of Failure are defined as the effects of the failure mode on the function, as perceived by the customer.

Describe the effects of the failure in terms of what the customer might notice or experience, remembering that the customer may be an internal customer as well as the ultimate end user. State clearly if the function could impact safety or noncompliance to regulations. The effects should always be stated in terms of the specific system, subsystem or component being analyzed. Remember that a hierarchial relationship exists between the component, subsystem, and system levels. For example, a part could fracture, which may cause the assembly to vibrate, resulting in an intermittent system operation. The intermittent system operation could cause performance to degrade, and ultimately lead to customer dissatisfaction. The intent is to forecast the failure effects to the Team's level of knowledge.

POTENTIAL
FAILURE MODE AND EFFECTS ANALYSIS
(DESIGN FMEA)

FMEA Number 1234 (1)

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____ System
_x__ Subsystem
____ Component 01.03/Body Closures (2)

Design Responsibility Body Engineering (3)

Prepared By A. Tate - X6412- Body Engr (4)

Model Years(s)/Vehicle(s) 199X/Lion 4dr/Wagon (5)

Key Date 9X 03 01 ER (6)

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DESIGN FMEA

DEVELOPMENT OF A DESIGN FMEA (Continued)

11) Potential Effect(s) of Failure (Continued)

Typical failure effects could be, but are not limited to:

Noise	Rough
Erratic Operation	Inoperative
Poor Appearance	Unpleasant Odor
Unstable	Operation Impaired
Intermittent Operation	

12) Severity (S)

Severity is an assessment of the seriousness of the effect (listed in the previous column) of the potential failure mode to the next component, subsystem, system or customer if it occurs. Severity applies to the effect only. A reduction in Severity Ranking index can be effected only through a design change. Severity should be estimated on a "1" to "10" scale.

Suggested Evaluation Criteria:
(The team should agree on an evaluation criteria and ranking system, which is consistent, even if modified for individual product analysis.)

Effect	Criteria: Severity of Effect	Ranking
Hazardous-without warning	Very high severity ranking when a potential failure mode affects safe vehicle operation and/or involves noncompliance with government regulation without warning.	10
Hazardous-with warning	Very high severity ranking when a potential failure mode affects safe vehicle operation and/or involves noncompliance with government regulation with warning	9
Very High	Vehicle/item inoperable, with loss of primary function.	8
High	Vehicle/item operable, but at reduced level of performance. Customer dissatisfied.	7
Moderate	Vehicle/item operable, but Comfort/Convenience item(s) inoperable. Customer experiences discomfort.	6
Low	Vehicle/item operable, but Comfort/Convenience item(s) operable at reduced level of performance. Customer experiences some dissatisfaction.	5
Very Low	Fit & Finish/Squeak & Rattle item does not conform. Defect noticed by most customers.	4
Minor	Fit & Finish/Squeak & Rattle item does not conform. Defect noticed by average customer.	3
Very Minor	Fit & Finish/Squeak & Rattle item does not conform. Defect noticed by discriminating customer.	2
None	No Effect.	1

13) Classification

This column may be used to classify any special product characteristics (e.g., critical, key, major, significant) for components, subsystems, or systems that may require additional process controls.

POTENTIAL
FAILURE MODE AND EFFECTS ANALYSIS
(DESIGN FMEA)

FMEA Number 1234 (1)

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___ System
_x_ Subsystem
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Key Date 9X 03 01 ER (6)

FMEA Date (Orig.) 8X 03 22 (Rev.) 8X 07 14 (7)

Core Team T.Fender-Car Product Dev., Childers-Manufacturing, J. Ford-Assy Ops (Dalton, Fraser, Henley Assembly Plants (8)

Item / Function (9)	Potential Failure Mode (10)	Potential Effect(s) of Failure (11)	Sev (12)	Class (12)	Potential Cause(s)/ Mechanism(s) of Failure (13)	Occur (13)	Current Design Controls (15)	Det (15)	R.P.N. (15)	Recommended Action(s) (18)	Responsibility & Target Completion Date (20)	Action Results (22) Actions Taken (21)	Sev	Occ	Det	R.P.N.
Front Door L.H. H8HX-0000-A • Ingress to and egress from vehicle • Occupant protection from weather, noise, and side impact • Support anchorage for door hardware including mirror, hinges, latch and window regulator • Provide proper surface for appearance items • Paint and soft trim	Corroded interior lower door panels	Deteriorated life of door leading to: • Unsatisfactory appearance due to rust through paint over time • Impaired function of interior door hardware	7		Upper edge of protective wax application specified for inner door panels is too low	6	Vehicle general durability test veh. T-118 T-109 T-301	7	294	Add laboratory accelerated corrosion testing	A Tate-Body Engrg 8X 09 30	Based on test results (Test No. 1481) upper edge spec raised 125mm	7	2	2	28
					Insufficient wax thickness specified	4	Vehicle general durability testing- as above	7	196	Add laboratory accelerated corrosion testing Conduct Design of Experiments (DOE) on wax thickness	Combine w/test for wax upper edge verification A Tate Body Engrg 9X 01 15	Test results (Test No. 1481) show specified thickness is adequate. DOE shows 25% variation in specified thickness is acceptable.	7	2	2	28
					Inappropriate wax formulation specified	2	Physical and Chem Lab test- Report No.1265	2	28	None						
					Entrapped air prevents wax from entering corner/edge access	5	Design aid investigation with non-functioning spray head	8	280	Add team evaluation using production spray equipment and specified wax	Body Engrg & Assy Ops 8X 11 15		7	1	3	21
					Wax application plugs door drain holes	3	Laboratory test using "worst case" wax application and hole size	1	21	None		Based on test, 3 additional vent holes provided in affected areas				
					Insufficient room between panels for spray head access	4	Drawing evaluation of spray head access	4	112	Add team evaluation using design aid buck and spray head	Body Engrg & Assy Ops	Evaluation showed adequate access	7	1	1	7

SAMPLE

DESIGN FMEA

DEVELOPMENT OF A DESIGN FMEA (Continued)

Any item deemed to require special process controls should be identified on the Design FMEA form with the appropriate character or symbol in the Classification column and should be addressed in the Recommended actions column.

Each item identified above in the Design FMEA should have the special process controls identified in the Process FMEA.

14) Potential Cause(s)/ Mechanism(s) of Failure

Potential Cause of Failure is defined as an indication of a design weakness, the consequence of which is the failure mode.

List, to the extent possible, every conceivable failure cause and/or failure mechanism for each failure mode. The cause/mechanism should be listed as concisely and completely as possible so that remedial efforts can be aimed at pertinent causes.

Typical failure causes may include, but are not limited to:

Incorrect Material Specified
Inadequate Design Life Assumption
Over-stressing
Insufficient Lubrication Capability
Inadequate Maintenance Instructions
Poor Environment Protection
Incorrect Algorithm

Typical failure mechanisms may include, but are not limited to:

Yield	Creep
Fatigue	Wear
Material Instability	Corrosion

15) Occurrence (O)

Occurrence is the likelihood that a specific cause/mechanism (listed in the previous column) will occur. The likelihood of occurrence ranking number has a meaning rather than a value. Removing or controlling one or more of the causes/mechanisms of the failure mode through a design change is the only way a reduction in the occurrence ranking can be effected.

Estimate the likelihood of occurrence of potential failure cause/ mechanism on a "1" to "10" scale. In determining this estimate, questions such as the following should be considered:

- What is the service history/field experience with similar components or subsystems?
- Is component carryover or similar to a previous level component or subsystem?
- How significant are changes from a previous level component or subsystem?
- Is component radically different from a previous level component?
- Is component completely new?

POTENTIAL
FAILURE MODE AND EFFECTS ANALYSIS
(DESIGN FMEA)

FMEA Number 1234 (1)

Page 1 of 1

___ System
_x_ Subsystem
___ Component 01.03/Body Closures (2)

Design Responsibility Body Engineering (3)

Prepared By A. Tate - X6412- Body Engr (4)

Model Years(s)/Vehicle(s) 199X/Lion 4dr/Wagon (5)

Key Date 9X 03 01 ER (6)

FMEA Date (Orig.) 8X 09 22 (Rev.) 8X 07 14 (7)

Core Team T.Fender-Car Product Dev., Childers-Manufacturing, J. Ford-Assy Ops (Dalton, Fraser, Henley Assembly Plants (8)

Item (9) Function	Potential Failure Mode (10)	Potential Effect(s) of Failure (11) (12)	Sev	Class	Potential Cause(s)/ Mechanism(s) of Failure (13) (14)	Occur	Current Design Controls (15) (16) (17)	Detec	R.P.N.	Recommended Action(s) (18) (19)	Responsibility & Target Completion Date (20)	Action Results (22) Actions Taken (21)	Sev	Occ	Det	R.P.N.
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					Insufficient wax thickness specified	4	Vehicle general durability testing- as above	7	196	Add laboratory accelerated corrosion testing Conduct Design of Experiments (DOE) on wax thickness	Combine w/test for wax upper edge verification A Tate Body Engrg 9X 01 15	Test results (Test No. 1481) show specified thickness is adequate. DOE shows 25% variation in specified thickness is acceptable.	7	2	2	28
					Inappropriate wax formulation specified	2	Physical and Chem Lab test- Report No.1265	2	28	None						
					Entrapped air prevents wax from entering corner/edge access	5	Design aid investigation with non-functioning spray head	8	280	Add team evaluation using production spray equipment and specified wax	Body Engrg & Assy Ops 8X 11 15		7	1	3	21
					Wax application plugs door drain holes	3	Laboratory test using "worst case" wax application and hole size	1	21	None		Based on test, 3 additional vent holes provided in affected areas				
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DESIGN FMEA

DEVELOPMENT OF A DESIGN FMEA (Continued)

- Has the component application changed?
- What are the environmental changes?
- Has an engineering analysis been used to estimate the expected comparable occurrence rate for the application?

A consistent occurrence ranking system should be used to ensure continuity. The "Design Life Possible Failure Rates" are based on the number of failures which are anticipated during the design life of the component, subsystem, or system. The occurrence ranking number is related to the rating scale and does not reflect the actual likelihood of occurrence.

15) Occurrence (O)

Suggested Evaluation Criteria:

(The team should agree on an evaluation criteria and ranking system, which is consistent, even if modified for individual product analysis.)

Probability of Failure	Possible Failure Rates	Ranking
Very High: Failure is almost inevitable	≥ 1 in 2	10
	1 in 3	9
High: Repeated failures	1 in 8	8
	1 in 20	7
Moderate: Occasional failures	1 in 80	6
	1 in 400	5
	1 in 2,000	4
Low: Relatively few failures	1 in 15,000	3
	1 in 150,000	2
Remote: Failure is unlikely	≤ 1 in 1,500,000	1

16) Current Design Controls

List the prevention, design validation/verification (DV), or other activities which will assure the design adequacy for the failure mode and/or cause/mechanism under consideration. Current controls (e.g., road testing, design reviews, fail/safe (pressure relief valve), mathematical studies, rig/lab testing, feasibility reviews, prototype tests, fleet testing) are those that have been or are being used with the same or similar designs.

There are three types of Design Controls/features to consider; those that : (1) Prevent the cause/mechanism or failure mode/ effect from occurring, or reduce their rate of occurrence,(2) detect the cause/mechanism and lead to corrective actions, and (3) detect the failure mode.

POTENTIAL
FAILURE MODE AND EFFECTS ANALYSIS
(DESIGN FMEA)

FMEA Number 1234 (1)

Page 1 of 1

___ System
_x_ Subsystem
___ Component 01.03/Body Closures (2)

Design Responsibility Body Engineering (3)

Prepared By A. Tate - X6412- Body Engr (4)

Model Years(s)/Vehicle(s) 199X/Lion 4dr/Wagon (5)

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Core Team T.Fender-Car Product Dev., Childers-Manufacturing, J. Ford-Assy Ops (Dalton, Fraser, Henley Assembly Plants (8)

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DESIGN FMEA

DEVELOPMENT OF DESIGN FMEA (Continued)

The preferred approach is to first use type (1) controls if possible; second, use the type (2) controls; and third, use the type (3) controls. The initial occurrence rankings will be affected by the type (1) controls provided they are integrated as part of the design intent. The initial detection rankings will be based upon the type (2) or type (3) current controls, provided the prototypes and models being used are representative of design intent.

17) Detection (D)

Detection is an assessment of the ability of the proposed type (2) current design controls, listed in column 16, to detect a potential cause/mechanism (design weakness), or the ability of the proposed type (3) current design controls to detect the subsequent failure mode, before the component, subsystem, or system is released for production. In order to achieve a lower ranking, generally the planned design control (e.g., preventative, validation, and/or verification activities) has to be improved.

Suggested Evaluation Criteria:

(The team should agree on an evaluation criteria and ranking system, which is consistent, even if modified for individual product analysis.)

Detection	Criteria: Likelihood of Detection by Design Control	Ranking
Absolute Uncertainty	Design Control will not and/or can not detect a potential cause/mechanism and subsequent failure mode; or there is no Design Control.	10
Very Remote	Very remote chance the Design Control will detect a potential cause/mechanism and subsequent failure mode	9
Remote	Remote chance the Design Control will detect a potential cause/mechanism and subsequent failure mode	8
Very Low	Very low chance the Design Control will detect a potential cause/mechanism and subsequent failure mode	7
Low	Low chance the Design Control will detect a potential cause/mechanism and subsequent failure mode	6
Moderate	Moderate chance the Design Control will detect a potential cause/mechanism and subsequent failure mode	5
Moderately High	Moderately high chance the Design Control will detect a potential cause/ mechanism and subsequent failure mode	4
High	High chance the Design Control will detect a potential cause/mechanism and subsequent failure mode	3
Very High	Very high chance the Design Control will detect a potential cause/mechanism and subsequent failure mode	2
Almost Certain	Design Control will almost certainly detect a potential cause/mechanism and subsequent failure mode	1

POTENTIAL
FAILURE MODE AND EFFECTS ANALYSIS
(DESIGN FMEA)

FMEA Number 1234 (1)

Page 1 of 1

___ System
_x_ Subsystem
___ Component 01.03/Body Closures (2)

Design Responsibility Body Engineering (3)

Prepared By A. Tate - X6412- Body Engr (4)

Model Years(s)/Vehicle(s) 199X/Lion 4dr/Wagon (5)

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					Insufficient wax thickness specified	4	Vehicle general durability testing- as above	7	196	Add laboratory accelerated corrosion testing Conduct Design of Experiments (DOE) on wax thickness	Combine w/test for wax upper edge verification A Tate Body Engrg 9X 01 15	Test results (Test No. 1481) show specified thickness is adequate. DOE shows 25% variation in specified thickness is acceptable.	7	2	2	28
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SAMPLE

DESIGN FMEA

DEVELOPMENT OF A DESIGN FMEA (Continued)

18) Risk Priority Number (RPN)

The Risk Priority Number is the product of the Severity (S), Occurrence (O), and Detection (D) ranking

$$RPN = (S) \times (O) \times (D)$$

The Risk Priority Number, as the product S X O X D, is a measure of design risk. This value should be used to rank order the concerns in the design (e.g., in Pareto fashion). The RPN will be between "1" and "1,000". For higher RPNs the team must undertake efforts to reduce this calculated risk through corrective action(s). In general practice, regardless of the resultant RPN, special attention should be given when severity is high.

19) Recommended Action(s)

When the failure modes have been rank ordered by RPN, corrective action should be first directed at the highest ranked concerns and critical items. The intent of any recommended action is to reduce any one or all of the occurrence, severity, and/or detection rankings. An increase in design validation/verification actions will result in a reduction in the detection ranking only. A reduction in the occurrence ranking can be effected only by removing or controlling one or more of the causes/mechanisms of the failure mode through a design revision. Only a design revision can bring about a reduction in the severity ranking. Actions such as the following should be considered, but are not limited to:

- Design of Experiments (particularly when multiple or interactive causes are present).
- Revised Test Plan.
- Revised Design.
- Revised Material Specification.

If no actions are recommended for a specific cause, indicate this by entering a "NONE" in this column.

20) Responsibility (for the Recommended Action)

Enter the Organization and individual responsible for the recommended action and the target completion date.

21) Actions Taken

After an action has been implemented, enter a brief description of the actual action and effective date.

22) Resulting RPN

After the corrective action have been identified, estimate and record the resulting severity, occurrence, and detection rankings. Calculate and record the resulting RPN. If no actions are taken, leave the "Resulting RPN" and related ranking columns blank.

All Resulting RPN(s) should be reviewed and if further action is considered necessary, repeat steps 19 through 22.

DEVELOPMENT OF A DESIGN FMEA (Continued)

Follow-Up

The design responsible engineer is responsible for assuring that all actions recommended have been implemented or adequately addressed. The FMEA is a living document and should always reflect the latest design level, as well as the latest relevant actions, including those occurring after start of production.

The design responsible engineer has several means of assuring that concerns are identified and that recommended actions are implemented. They include, but are not limited to the following:

- Assuring design requirements are achieved.
- Review of engineering drawings and specifications.
- Confirmation of incorporation to assembly/manufacturing documentation.
- Review of Process FMEAs and Control Plans.

APPENDIX A
Design FMEA Block Diagram Example

FAILURE MODE AND EFFECTS ANALYSIS (FMEA)
BLOCK DIAGRAM/ENVIRONMENTAL EXTREMES

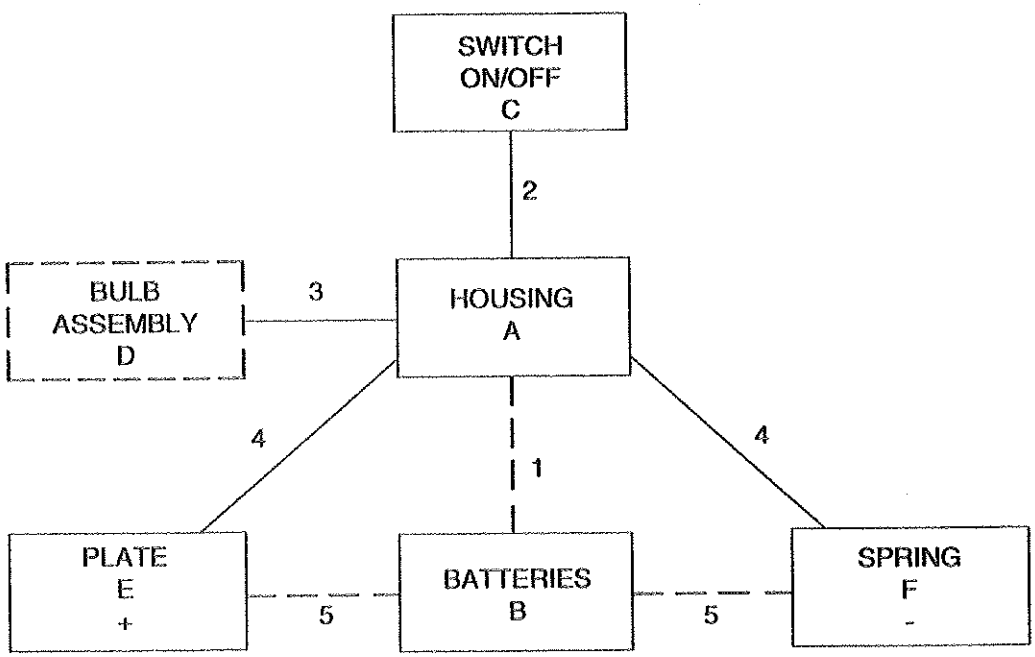
SYSTEM NAME: FLASHLIGHT
YEAR VEHICLE PLATFORM: 1994 NEW PRODUCT
FMEA I.D. NUMBER XXXI10D001

OPERATIONAL ENVIRONMENTAL EXTREMES

TEMPERATURE: -20 TO 160 F CORROSIVE: TEST SCHEDULE B VIBRATION: NOT APPLICABLE
SHOCK: 6 FOOT DROP FOREIGN MATERIAL: DUST HUMIDITY: 0 - 100 % RH
FLAMMABILITY: (WHAT COMPOINENT(S) ARE NEAR HEAT SOURCE(S)?
OTHER:

LETTERS = COMPONENTS NUMBERS = ATTACHING METHODS ——— = ATTACHED/JOINED ------ = INTERFACING, NOT JOINED ☐ = NOT INCLUDED IN THIS FMEA

The example below is a relational block diagram. Other types of block diagrams may be used by the FMEA Team to clarify the item(s) being considered in their analysis



COMPONENTS
A. HOUSING
B. BATTERIES (2 D CELL)
C. ON/OFF SWITCH
D. BULB ASSEMBLY
E. PLATE
F. SPRING

ATTACHING METHOD
1. SKIP FIT
2. RIVETS
3. THREAD
4. SNAP FIT
5. COMPRESSIVE FIT

POTENTIAL
FAILURE MODE AND EFFECTS ANALYSIS
(DESIGN FMEA)

FMEA Number 1234 (1)

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___ System
_x_ Subsystem
___ Component 01.03/Body Closures (2)

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SAMPLE

APPENDIX B
Design FMEA Example

APPENDIX C
Process FMEA Flow Chart/Risk Assessment Example

(Application of Wax to Inside of Door)

Process Step	Risk Assessment
1) Get wax applicator wand from holder	Low risk
2) Open vehicle door	Low risk
* 3) Insert wand and pull trigger for 12 seconds while making three passes	High risk
4) Release trigger wait 3 seconds	Medium risk
5) Remove wand	Medium risk
6) Close vehicle door	Low risk
7) Replace applicator wand in holder	Low risk

* FMEA Required (high risk)

APPENDIX E
Glossary

Control Plans	Written description of the system used for controlling the manufacturing/assembly process.
Design Intent	What a given component/subsystem/system is expected to do or not to do.
Design Life	The time period for which the design is intended to perform its requirements.
Design Validation/ Verification (DV)	A program intended to assure that the design meets its requirements.
Design of Experiments (DOE)	An efficient method of experimentation which identifies factors that affect the mean and variation with minimum testing.
Feature	A product characteristic (e.g., radius, hardness) or a process characteristic (e.g., insertion force, temperature).
Pareto	A simple tool for problem solving that involves ranking all potential problem areas.
Process	The combination of people, machines and equipment, raw materials, methods and environment that produces a given product or service.
Process Change	A change in processing concept which could alter the capability of the process to meet the design requirements or durability of the product.
Quality Function Deployment (QFD)	A structured method in which customer requirements are translated into appropriate technical requirements for each stage of product development and production.
Special Product Characteristic	A special product characteristic (e.g., critical, key, major, significant) is a product characteristic for which reasonably anticipated variation could significantly affect a product's safety or compliance with governmental standards or regulations, or is likely to significantly affect customer satisfaction with a product.

APPENDIX E
Glossary

Special Process Charateristic

A special process characteristic (e.g., critical, key, major, significant) is a process characteristic for which variation must be controlled to some target value to ensure that variation in a special product characteristic is maintained to its target value during manufacturing and assembly.

Vehicle Campaigns

Recall of vehicles for rework or safety inspection.

POTENTIAL
FAILURE MODE AND EFFECTS ANALYSIS
(DESIGN FMEA)

FMEA Number _____

Page _____ of _____

___ System
___ Subsystem
___ Component _____

Design Responsibility _____

Prepared By _____

Model Year(s)/Vehicle(s) _____

Key Date _____

FMEA Date (Orig.) _____ (Rev.) _____

Core Team _____

Item / Function	Potential Failure Mode	Potential Effect(s) of Failure	Sev	Class	Potential Cause(s)/ Mechanism(s) of Failure	Occur	Current Design Controls	Detec	R.P.N.	Recommended Action(s)	Responsibility & Target Completion Date	Action Results				
												Actions Taken	Sev	Occ	Det	R.P.N.

Corporate Organization Directory

CHRYSLER
CORPORATION

CHRYSLER CORPORATION OFFICERS

Eaton, R. J.	Chairman of the Board and Chief Executive Officer
Lutz, R. A.	President and Chief Operating Officer
Denomme, T. G.	Vice Chairman and Chief Administrative Officer
Valade, G. C.	Executive Vice President and Chief Financial Officer
Boltz, R. R.	Vice President - Product Strategy & Regulatory Affairs and General Manager - Small Car Operations
Capo, T. P.	Vice President and Treasurer
Cappy, J. E.	Vice President - Chrysler Technologies and Rental Car Operations
Castaing, F. J.	Vice President - Vehicle Engineering and General Manager - Power Train Operations
Cunningham, T. R.	Executive Vice President - Sales & Marketing and General Manager - Minivan Operations
Donlon III, J. D.	Vice President and Controller
Ewasyshyn, F. J.	Vice President - Advance Manufacturing Engineering
Fountain, W. F., Jr.	Vice President - Government Affairs
Gale, T. C.	Vice President - Product Design and International Operations
Gallagher, T.	Vice President - Employee Relations
Henson, G. L.	Vice President - Large & Small Car, Jeep & Truck Assembly and Stamping Opns
Herlitz, J. E.	Vice President - Product Design
Holden, J. P.	Vice President - Quality, Capacity and Process Management
Lewis, H. A.	Vice President - Finance Strategy and Planning
Liberatore, R. G.	Vice President - Washington Affairs
Liebler, A. C.	Vice President - Marketing and Communications
Lobo S., C.	Vice President and President & Managing Director - Chrysler de Mexico S.A.
O'Brien, W. J.	Vice President, General Counsel and Secretary
Oswald, K. M.	Vice President - Corporate Personnel
Pappert, E. T.	Vice President - Sales and Service
Pawley, D. K.	Executive Vice President - Manufacturing
Richie, L. C.	Vice President and General Counsel - Automotive Legal Affairs
Robertson, B. I.	Vice President - Engineering Technologies and General Manager - Jeep/Truck Operations
Rushwin, S. T.	Vice President - International Manufacturing & Minivan Assembly Opns
Sidlik, T. W.	Vice President and Chairman - Chrysler Financial Corporation
Stallkamp, T. T.	Vice President - Procurement & Supply and General Manager - Large Car Operations

SALES AND MARKETING AND MINIVAN OPERATIONS

Cunningham, T. R.	Executive Vice President - Sales and Marketing and General Manager - Minivan Operations
Winter, R. A.	General Product Manager - Minivan Operations
Dilts, G. E.	Director - Sales and Marketing Training
Osborn, T. J.	Director - Sales and Marketing Operations Planning
MacDonald, M. J.	General Manager - Fleet Operations
Baker, L. W.	General Manager - Mopar Parts
Liebler, A. C.	Vice President - Marketing and Communications
Pappert, E. T.	Vice President - Sales and Service
Landry, G. Y.	President - Chrysler Canada Ltd.

MINIVAN OPERATIONS

Winter, R. A.	General Product Manager - Minivan Operations
Malecki, D. C.	Chief - NS Body Program and Business Plans
Emmitt, T. J.	Manager - Vehicle Program
Nelson, Jr., K. R.	Minivan Business Operations Executive

SALES AND MARKETING TRAINING

Dilts, G. E.	Director - Sales and Marketing Training
Martinez, L. E.	Manager - Product Education
Bradfield, L. D.	Manager - Customer One
Donohue, W. P.	Manager - Program Implementation
Osann, F. R.	Manager - Planning and Administration

SALES AND MARKETING OPERATIONS PLANNING

Osborn, T. J.	Director - Sales and Marketing Operations Planning
Fisher, III, R. M.	Manager - Sales Planning, Product Prgms & Marketing Incentives
Brown, T. A.	Manager - Vehicle Programing
Greeley, J. W.	Manager - Advance Product Sales Planning
Hoenig, L. D.	Manager - Current Product Sales Planning
Berrigan, Jr., P. L.	Manager - Distribution and Scheduling
Wolenberg, D. M.	Dealer Inventory Management Executive
Hollinger, J. L.	Manager - Import Distribution
Stallard, S. I.	Manager - Distribution Services
Graham, S. M.	Manager - Car Allocation and Scheduling
Boughton, W. E.	Manager - Truck Allocation and Scheduling
Wise, J. D.	Manager - Distribution Planning
Nelem, J. J.	Manager - Special Programs Analysis
Williams III, W. R.	Manager - Sales Management Information
Depa, J. R.	Manager - Sales Reporting and Analysis
Lahoti, H. D.	Supervisor - Programming Systems
Coleman-Webb, B. K.	Manager - Consumer Strategy
Revoner, W. E.	Manager - Retail Process Development
Henning, R. J.	President and CEO - Van Pool Services, Inc.

SALES AND MARKETING AND MINIVAN OPERATIONS

FLEET OPERATIONS

MacDonald, M. J.	General Manager - Fleet Operations
Bergmoser, G. D.	Director - Government and Military Vehicle Sales
Tiahrt, W. C.	Manager - Special Vehicle Sales
Moss, J. A.	Manager - National Used Vehicle Sales
Clement, A. M.	Manager - Alternative Fuel Vehicles Sales and Marketing
Cole, M. W.	Staff Executive
Snyder, D. W.	Fleet General Marketing Manager
Pratt, F. J.	Manager - Programming and Systems Development
Ross, R. M.	Manager - Special Leasing Accounts
Bruno, H. J.	Manager - Scheduling, Bid and Special Equipment
Allen, P. W.	Manager - Fleet Opns Marketing and Company Car Programs
Elba, C. E.	Dealer DRAC Program Executive
Kastner, H. F.	Dealer Leasing Program Executive
Cindrich, S. M.	Supervisor - Car Programs Administration
Gray, E. M.	Supervisor - Company Car Management
Sczecienski, S.	Supervisor - Used Vehicle Marshalling Center
Delaney, J. T.	Manager - National Fleet Sales
Bolz, J. M.	National Accounts Administration Manager
Stephens, F. C.	National Accounts Executive - Rental
Lynch, J. E.	National Accounts Executive - Truck
Hallyburton, R. E.	Regional Fleet Sales Manager - West
Burke, J. M.	Regional Fleet Sales Manager - East
Gholston, J. R.	Regional Fleet Sales Manager - Central

MOPAR PARTS

Baker, L. W.	General Manager - Mopar Parts
Tomlanovich, A.	Manager - Materials
Williams, E. P.	Manager - Strategic Materials Project
Strange, R. W.	Manager - Inventory and Quality Control
Zygmontowicz, D. B.	Manager - Cataloging and Engineering Services
Zopfi, D. R.	Manager - Materials Operations Planning
Dimitry, G. R.	Manager - Field Distribution Operations
Mailloux, R. P.	Manager - Boston Parts Distribution Center
Radkewich, R. E.	Manager - Cleveland Parts Distribution Center
Moore, G. A.	Manager - Dallas Parts Distribution Center
Walker, J.	Manager - Denver Parts Distribution Center
Jenio, J. F.	Manager - Los Angeles Parts Distribution Center
Curry, R. J.	Manager - Newark Parts Distribution Center
Mathis, H. G.	Manager - Orlando Parts Distribution Center
Hamway, N. M.	Manager - Field Distribution Operations
Sanders, R. L.	Manager - Atlanta Parts Distribution Center
Michaud, G. J.	Manager - Chicago Parts Distribution Center
Marra, K. L.	Manager - Detroit Parts Distribution Center
Cardinale, R. J.	Manager - Memphis Parts Distribution Center
Haynes, R. A.	Manager - Minneapolis Parts Distribution Center
Masich, M. G.	Manager - New York Parts Distribution Center
Smith, S. L.	Manager - Portland Parts Distribution Center
Grundman, D. W.	Manager - St. Louis Parts Distribution Center

SALES AND MARKETING AND MINIVAN OPERATIONS

MOPAR PARTS (continued)

Graves, S. S.	Manager - National Distribution Centers and Intl Distribution
Broderdorf, R. S.	Manager - Center Line Parts Distribution Center
Campbell, G. R.	Manager - Marysville Parts Distribution Center
Baker, D. R.	Manager - Milwaukee Parts Distribution Center
Champagne, D. T.	Manager - Warren Parts Distribution Center
Wilson, J. E.	Manager - International Marketing and Supply
Konvisser, Z. L.	Manager - Distribution and Facilities Planning
Govern, T. M.	Q.I.P. Facilitation Executive
Rae, R. R.	Director - Mopar Parts Sales and Marketing
McDaniel, R. J.	Regional Parts Sales Manager - East
Bemko, K. L.	Area Sales Manager - Great Lakes
Basak, G. M.	Area Sales Manager - Southeast
Meals, J. T.	Area Sales Manager - Mid-Atlantic
Walker, D. F.	Area Sales Manager - Northeast
Killian, J. D.	Sales Operations Manager - Eastern Region
	Regional Parts Sales Manager - West
Hall, V.	Area Sales Manager - Midwest
Shaw, D. J.	Area Sales Manager - West Plains
Johnson, M. S.	Area Sales Manager - West Coast
Czech, J. E.	Area Sales Manager - Gulf States
Goodwin, J. E.	Sales Operations Manager - Western Region
Belleau, J. J.	Field Operations Executive
Kelly, Jr., P. D.	Parts Marketing Manager
Untiedt, J. H.	Manager - Inventory Concept Project
Mack, B. T.	Wholesale and Sales Support Manager
Mathis, J. C.	Service Marketing Manager
Ward, L. A.	Manager - Business Planning
Rollins, F. P.	Manager - Market Research and Sales Analysis
Bentzen, R. L.	Manager - Service Contracts Sales and Marketing
Boyd, J. R.	Manager - Service Contract Sales
Zima, G. A.	Service Contract Marketing Manager
Agrawal, G. L.	Manager - Service Contract Claims Operations
Zabkiewicz, C. J.	Manager - Service Contract Systems
Burgel, D. J.	Manager - Customer/Dealer Relations
Witkowski, D. W.	Manager - Service Contract Claims Processing

SALES AND MARKETING AND MINIVAN OPERATIONS

MARKETING AND COMMUNICATIONS *(Marketing)*

Liebler, A. C.	Vice President - Marketing and Communications
Szuba, R. D.	Budget Manager *(Page 2-2)*
Morrison, M. K.	Executive Director - Corporate Communications *(Page 2-2)*
Harris, S. J.	Executive Director - Public Relations *(Page 2-2)*
Bostwick, D. P.	Director - Corporate Market Research
Keegan, P. J.	Director - Corporate Merchandising and Special Events
Patane, L. P.	Executive Director - Brand Marketing

CORPORATE MARKET RESEARCH

Bostwick, D. P.	Director - Corporate Market Research
MacRae, D. F.	Market Measurement Research Manager
Taylor, R. C.	Product Development Research Manager

CORPORATE MERCHANDISING AND SPECIAL EVENTS

Keegan, P. J.	Director - Corporate Merchandising and Special Events
Fries, R. A.	Manager - Special Events
Jensen, R. E.	Manager - Prototype Programs
Hotchkiss, R. C.	Manager - Corporate Merchandising and Planning
Schmid, D. J.	Manager - Corporate Identity and Displays Planning

BRAND MARKETING

Patane, L. P.	Executive Director - Brand Marketing
Julow, J. R.	Director - Marketing Operations
Everett, R. W.	Manager - Mkg Technology and Interactive Communications
Jameson, J. F.	Manager - Advertising/Media Relations
Carrier, J. B.	Advertising and Media Relations Executive
Siringas, N. E.	Media Budget Specialist
MacKenzie, C. A.	Manager - Corporate Advertising
Tracy, W. H.	Manager - Motorsports Opns & Special Marketing Programs
Kelley, M. G.	Manager - Sales Promotions and Command Systems
Torok, S. A.	General Manager - Chrysler/Plymouth Division
Demers, D. L.	Staff Executive
Hein, R. L.	Manager - Chrysler National Marketing
Bruyn, S. D.	Manager - Plymouth National Marketing
Laurence, K. J.	Manager - Chrysler/Plymouth Advertising
Cherfoli, J. L.	Manager - Chrysler/Plymouth Merchandising
Levine, M. R.	General Manager - Dodge Car and Truck Division
Polce, C. T.	Staff Executive
Kuhnie, J. B.	Mgr - Dodge Advertising and Consumer Communications
Coughlin, E. M.	Manager - National Truck Field Marketing
Ranka, L. I.	Manager - Dodge Car Marketing
Hudson, C. D.	Manager - Dodge Truck Marketing
Brust, E. H.	General Manager - Jeep/Eagle Division
Kane, M. D.	Manager - Jeep Marketing
Rooney, D. R.	Manager - Eagle Marketing
Glenn, D. L	Manager - Merchandising
Wayman, G. A.	Manager - Jeep/Eagle Dealer Advertising

SALES AND MARKETING AND MINIVAN OPERATIONS

SALES AND SERVICE

Pappert, E. T.	Vice President - Sales and Service
Shady, J. J.	General Manager - Dealer Operations
Glaub, W. C.	General Sales Manager - Field Sales Operations
Marinelli, T. R.	General Sales Manager - Field Sales Operations
Casola, J. H.	General Service Manager - Field Service Operations
Jacobs, M. C.	General Service Manager - Field Service Operations
Krumboltz, D. R.	Staff Executive
Mahon, E. F.	Field Operations Executive
McRae, T. L.	Dealership Development Manager
Muldoon, R. M.	Program Development Manager
Yatsko, M. E.	National Process and Training Manager
Clark, R. S.	Manager - Customer Relations
Bryant, III, M. G.	Manager - Field Operations Planning and Support
Gomolski, G. E.	Manager - Sales Business Planning and Strategy
Williams, R. M.	Director - National Dealer Relations
Rhoads, S. L.	Customer Handling Manager

DEALER OPERATIONS

Shady, J. J.	General Manager - Dealer Operations
Filbin, E. J.	Manager - Business Management
Ward, C. M.	Minority Retail Development Programs Manager
Yocca, S. J.	Manager - Minority Retail Dealer Operations
Murphey, L. M.	Manager - Dealership Properties and Facilities
Kolkjen, M. J.	Manager - Eastern Area Dealership Real Estate
Green, D. F.	Manager - Central Area Dealership Real Estate
Noles, T. H.	Manager - Western Area Dealership Real Estate
	Manager - Realty Operations
Hurst, W. S.	Manager - Franchise Planning and Administration
Foster, T. G.	Manager - Dealer Agreement and Franchising
Gentelia, P. J.	Manager - Dealer Identity
Graham, C. J.	Manager - Dealer Placement - East
Votta, G. S.	Manager - Dealer Placement - West
Neych, T. J.	Manager - Market Representation
Coventry, D. A.	Manager - Marketing Investment Development
Jobst, P. V.	Manager - Operations
Rice, M. C.	Dealer and Marketing Investment Financial Dvlmt Executive
Yungbluth, L. A.	Branch Manager - Atlanta
Janis, R. F.	Branch Manager - Chicago
Bergsma, S. J.	Branch Manager - Detroit
Mock, Jr., G. E.	Branch Manager - Los Angeles
Woodward, M. L.	Branch Manager - Philadelphia
Rizzo, R. G.	Staff Executive

CUSTOMER RELATIONS

Clark, R. S.	Manager - Customer Relations
Edghill, P. A.	Customer Relations Group Supervisor
Janke, E. J.	Arbitration / Regulation Administration
Knight, E. W.	Training Development Manager
Velliky, W. J.	Customer Relations Business Planning Manager

SALES AND MARKETING AND MINIVAN OPERATIONS

SALES AND SERVICE (continued)

FIELD SALES AND FIELD SERVICE OPERATIONS

Glaub, W. C.	General Sales Manager - Field Sales Operations
Marinelli, T. R.	General Sales Manager - Field Sales Operations
Casola, J. H.	General Service Manager - Field Service Operations
Jacobs, M. C.	General Service Manager - Field Service Operations
Ciesla, R. D.	Zone Manager - Sales and Service - Atlanta
Dougherty, P. W.	Assistant Zone Manager
Cicora, T. F.	Assistant Zone Manager
Young, J. F.	Zone Manager - Sales and Service - Boston
Maddock, J. A.	Assistant Zone Manager
Rupp, R. P.	Assistant Zone Manager
Saddler, L. G.	Zone Manager - Sales and Service - Charlotte
Strickland, Jr., A. C.	Assistant Zone Manager
Broadbear, E. G.	Assistant Zone Manager
Licina, P. A.	Zone Manager - Sales and Service - Chicago
Campbell, D. M.	Assistant Zone Manager
Maxwell, D. E.	Assistant Zone Manager
Hurst, H. L.	Zone Manager - Sales and Service - Cincinnati
Johnson, M. M.	Assistant Zone Manager
Drozd, G.	Assistant Zone Manager
Park, J. W.	Zone Manager - Sales and Service - Dallas
Morton, H. M.	Assistant Zone Manager
Crawford, C. A.	Assistant Zone Manager
Hannan, Jr., J. S.	Zone Manager - Sales and Service - Denver
Greene, S. M.	Assistant Zone Manager
Woltjen, J. J.	Assistant Zone Manager
McAlear, T. C.	Zone Manager - Sales and Service - Detroit
Bartush, M. A.	Assistant Zone Manager
Foshe, D. A.	Assistant Zone Manager
Libby, T. T.	Zone Manager - Sales and Service - Houston
Lombardo, Jr., W. A.	Assistant Zone Manager
Therrien, E. P.	Assistant Zone Manager
Albert, F. W.	Zone Manager - Sales and Service - Kansas City
Shean, W. P.	Assistant Zone Manager
Gillespie, S. M.	Assistant Zone Manager
Verna, N. L.	Zone Manager - Sales and Service - Los Angeles
Lugger, H. S.	Assistant Zone Manager
Disney, G. K.	Assistant Zone Manager
Falke, J. T.	Zone Manager - Sales and Service - Memphis
Gee, J. D.	Assistant Zone Manager
Grady, P. M.	Assistant Zone Manager

SALES AND MARKETING AND MINIVAN OPERATIONS

SALES AND SERVICE (continued)

FIELD SALES AND FIELD SERVICE OPERATIONS

Engelsdorfer, M. F.	Zone Manager - Sales and Service - Milwaukee
White, S. D.	Assistant Zone Manager
Jeffries, C. J.	Assistant Zone Manager
Walker, B. A.	Zone Manager - Sales and Service - Minneapolis
Dibble, R. M.	Assistant Zone Manager
Albro, E. J.	Assistant Zone Manager
Peart, D. J.	Zone Manager, Sales and Service - New Orleans
Coleman, J. W.	Assistant Zone Manager
Hammond, E. B.	Assistant Zone Manager
Yaconis, F. C.	Zone Manager - Sales and Service - New York
Loveless, T. J.	Assistant Zone Manager
Newbrough, J. E.	Assistant Zone Manager
Smith, R. T.	Zone Manager - Sales and Service - Orlando
Kelleher, J. A.	Assistant Zone Manager
Young, C. L.	Assistant Zone Manager
Shugg, S. J.	Zone Manager - Sales and Service - Philadelphia
Doucette, W. J.	Assistant Zone Manager
Bartlett, L. W.	Assistant Zone Manager
Moore, W. E.	Zone Manager - Sales and Service - Phoenix
Mees, M. J.	Assistant Zone Manager
Horne, R. L.	Assistant Zone Manager
Agnew, P. C.	Zone Manager - Sales and Service - Pittsburgh
Serkes, M. J.	Assistant Zone Manager
Seat, D. L.	Assistant Zone Manager
Fleck, C. C.	Zone Manager - Sales and Service - Portland
Hughes, S. P.	Assistant Zone Manager
Denardo, W. D.	Assistant Zone Manager
Binder, T. J.	Zone Manager - Sales and Service - St. Louis
Schmitt, R. C.	Assistant Zone Manager
Eckert, C. E.	Assistant Zone Manager
Siegal, M. R.	Zone Manager - Sales and Service - San Francisco
Sherwood, F. J.	Assistant Zone Manager
Gaines, P. E.	Assistant Zone Manager
Wild, D. R.	Zone Manager - Sales and Service - Syracuse
Glymph, C. M.	Assistant Zone Manager
Wheeler, J. K.	Assistant Zone Manager
Gray, V. W.	Zone Manager - Sales and Service - Washington
Davis, D. S.	Assistant Zone Manager
Coffey, N. F.	Assistant Zone Manager

SALES AND MARKETING AND MINIVAN OPERATIONS

CHRYSLER CANADA LTD.

Landry, G. Y.	President - Chrysler Canada Ltd.
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	Manager - Internal Controls and Field Audit
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Petrozzi, A.	Manager - Financial Analysis
Towers, K. B.	Manager - Financial Control
Fenn, G. W.	Controller - Accounting and Tax Affairs
Cott, E. A.	Manager - Accounting
Davies, P. J.	Supervisor - Manufacturing Group Accounting
Cafe, J. F.	Supervisor - Manufacturing Group Accounting
Houde, D. J.	Supervisor - Accounts Payable
McInnis, K. A.	Supervisor - Tax
Schmid, M. A.	Treasurer
Macaddino, L.	Treasury Executive
Wolfram, A.	Manager - Banking
Rawlins, B. C.	Manager - Credit
Wright, R. A.	Supervisor - Salary Payroll
Dillon, D. E.	Supervisor - Hourly Payroll
Grant, T. J.	Vice President, General Counsel and Secretary
Rose, S. E. R.	Assistant General Counsel and Assistant Secretary
Arditti, E. R.	Assistant General Counsel
Francese, K. R.	Vice President - Human Resources
Dunn, J. I.	Manager - Benefits, Hourly Compensation and Employment
Thrasher, R. C.	Manager - Workers' Comp, Group Ins & Medical Plans
Russette, G. P.	Manager - Unemployment Benefits & Financial Planning
Carswell, P. K.	Supervisor - Pension Plans
McPherson, R. A.	Supervisor - Hourly Employment
Cross, T. E.	Manager - Industrial Security
Bezaire, P. J.	Manager - Labour Relations and Safety
MacKenzie, P. D.	Manager - Salary Administration and Employment
Latta, R. M.	Vice President and General Sales Manager
Manor, B. E.	Director - Market Investment and Dealer Relations
Lawrie, G. N.	Manager - Dealership Properties and Facilities
Bowey, R. J.	Manager - Dealer Relations
MacLean, D. W.	Manager - Market Investment Development
Hallet, G.	Supervisor - Business Management
Manor, M. W.	Manager - National Fleet and Lease
LeBlanc, R. M.	Manager - Sales Operations
MacDonald, J. H.	Supervisor - Distribution
Cecile, J. P.	Manager - Sales Planning
Simmons, G. N.	Manager - Sales Programming and Systems
Kaban, W. A.	Field Operations Manager
Kenney, J. G.	National Sales Development Manager
Spadotto, L.	Regional Manager - Atlantic Region
Lyle, N. S.	Assistant Zone Manager
Paterson, W. B.	Regional Manager - Ontario Region
Tuckey, K. W.	Assistant Zone Manager
Jenkins, G. F.	Regional Manager - Quebec Region
Clement, B. B.	Assistant Zone Manager
Landry, S. J.	Regional Manager - Western Region
Goslin, R. A.	Assistant Zone Manager

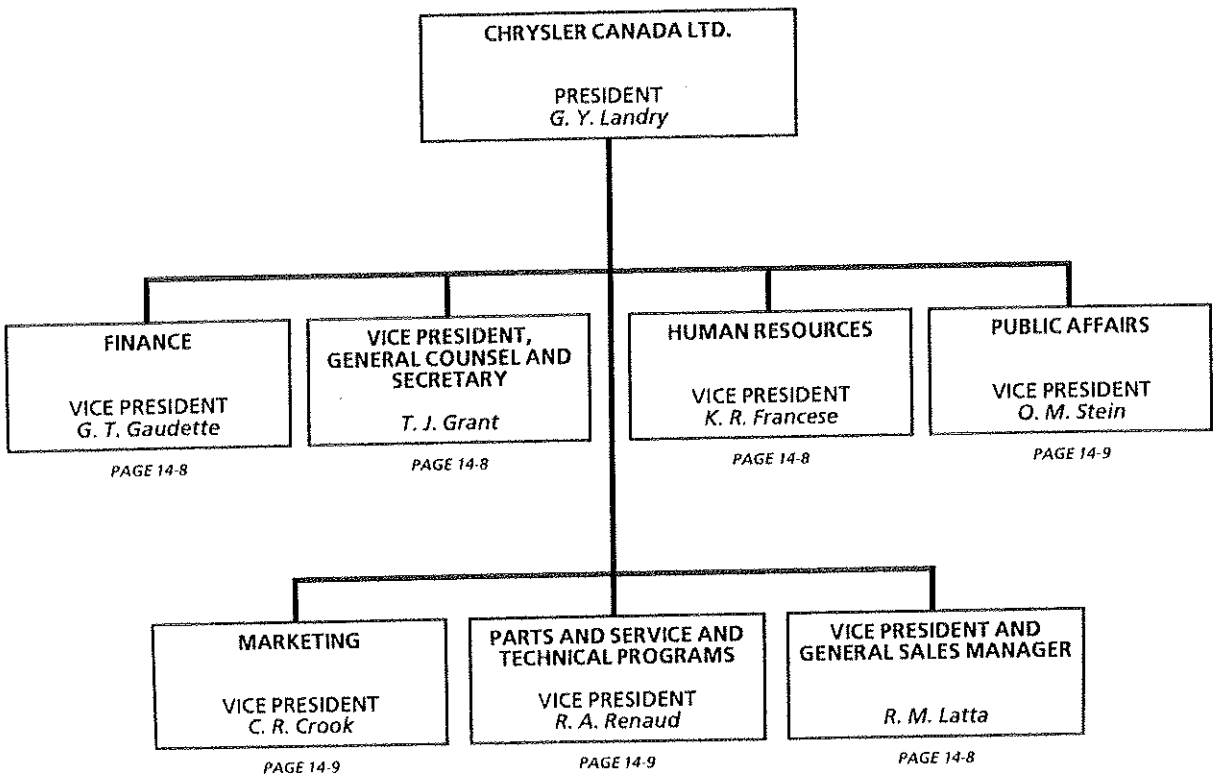
SALES AND MARKETING AND MINIVAN OPERATIONS

CHRYSLER CANADA LTD. (continued)

Stein, O. M.	Vice President - Public Affairs
Walker, M. J.	Director - Governmental Affairs
Crook, C. R.	Vice President - Marketing
Barone, P.	National Advertising Manager
Connor, W. D.	National Dealer Association Advertising Manager
Levasseur, J. C.	Manager - Marketing Operations and Planning
Marshall, D. A.	Manager - Marketing
Harling, D.	Manager - Product Planning
Lamothe, D.	National Training Manager
Baldwin, G. L.	Manager - Sales Promotion
Renaud, R. A.	Vice President - Parts and Service and Technical Programs
Perkins, S. R.	Director - Engineering
Mann, J. L.	Manager - Product Engineering
Meloche, G. A.	Manager - Plant/Facilities Engineering
Daws, F. J.	Manager - Product Engineering
MacKinnon, K. W.	Manager - National Parts Distribution Center
Williams, P. R.	Manager - National Parts Sales and Marketing
Pambrun, D. P.	Manager - Field Operations
Morgan, D. W.	Manager - Marketing
Westbrook, L. E.	Manager - National Service
Betteridge, R. D.	Manager - Customer Satisfaction
Blonde, P. M.	Customer Relations Supervisor
Markham, L. A.	Customer Relations Supervisor
Giswein, N.	Technical Training Design Supervisor
Mooney, T. J.	Manager - Parts Supply
McKee, J. D.	Manager - Parts Inventory Control
Knight, J. F.	Manager - Materials
Chatwood, A. R.	Inventory Operations General Supervisor
MacKinnon, K. W.	PDC Manager - Ontario
Czilok, R.	PDC Manager - Vancouver
Wilson, E. W.	PDC Manager - Red Deer
Luciani, M.	PDC Manager - Montreal
Whiklo, K. L.	PDC Manager - Winnipeg
Stewart, K. R.	PDC Manager - Moncton
Rutherford, R. E.	Manager - Strategic and Operations Planning

CHRYSLER CANADA LTD.

SALES AND MARKETING



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