EA02-025

FORD 10/27/03

APPENDIX N

BOOK 32 OF 61

PART 6 OF 6

crimping using either a manual or an automated line. We have those similarities. And to the extent we have those similarities, we can call that an evolution, can't we?

A. Yeah, there are similarities to those designs. There are many similarities in many of the pressure switches we produce.

(Exhibit Nos. 10 and 11 marked.)

Q. Let me go ahead and hand you what I'll mark as Deposition Exhibit No. 11. And it appears to be some of marketing material. But see if you can identify this particular document for me.

A. I've seen this document before. I'm not sure who wrote this specific page.

Q. Fair to say that that's a Texas Instruments generated or created document; is that correct?

A. Yes, that's correct.

Q. Do you know approximately what time period that document was created?

A. No, I do not.

Q. If I could see the document for just a moment. Can you give me the approximate range as to when this might've been created, whether it be 1999 or 1991?

A. The -- The -- That specific page itself in its -- in that final form -- Okay -- was dated 1999 on that page. I don't know if there were other versions of it and it was cut and pasted and pasted to another presentation of 1999.

Q. I see on here that one of the key features includes that it's designed for the underhood environment. What are you trying to -- What is Texas Instruments trying to imply by this statement that it's designed for the underhood environment?

A. That this switch has been used in applications where the switch has been applied underhood in an automotive vehicle.

Q. And it also says that one of the key features includes automotive temperature range of negative 30 degrees to a hundred and 25 degrees celsius. First of all, what's the farenheit equivalent to a hundred and twenty-five degrees celsius, approximately?

A. I'm not sure exactly. Probably upper 200s --

Q. Pretty hot?

A. -- degrees farenheit. It's -- It's hot, to above the boiling point of water.

Q. And what is Texas Instruments trying to imply when it uses as a marketing statement that one of the key features of this part includes that automotive temperature range can go as high as in excess of 200 degrees farenheit?

MS. ALVAREZ: Objection, form.

A. TI is trying to show that the switch has been used in applications where customers have -- have specified temperature range environments of minus 30 to a hundred and twenty-five degrees C.

Q. Let me go ahead and hand you what's been marked as deposition Exhibit No. 10 and see if you can identify that document.

A. I have seen this document before. Again, I don't know exactly who put this document together.

Q. Is it --

A. It is a Texas Instruments document.

Q. And what's the Texas Instrument document number on that, if you can?

A. It's difficult to read. I could guess at what it says.

Q. Okay.

A. TI 000625 and either a 2 or a 3, it looks like.

Q. Do you know the approximate time period when this document was created?

A. No, I do not.

Q. Now, Deposition Exhibits No. 10 and 11, these aren't materials that were just circulated to Ford Motor Company. I assume that they were circulated to all potential customers or buyers of Texas Instruments' products who might be interested in a hydraulic pressure switch; is that correct?

A. I don't know who these documents were provided to.

Q. Who can tell me at Texas Instruments for whom -- to whom these documents were provided?

A. I'm not sure. Some people in the marketing department may have -- know some customers that these documents were provided to.

Q. Who's the director of marketing at Texas Instruments fo hydraulic pressure switches?

A. Our marketing manager at -- in our automotive group at Texas Instruments is Gary Baker.

Q. And how long has he been the marketing manager.

A. Approximately one year, I believe.

Q. And who prior to Gary baker?

A. Gary Snider.

Q. And how long was Gary Snider a marketing director?

A. A marketing manager --
Q. Marketing manager.
A. -- I would say, approximately three years.
Q. On the back of this particular document it talks about technical specifications. And before I ask you any questions about that, does Deposition Exhibit No. 10 refer to parts like the brake pressure switch that we have at issue in this particular case?
A. I would need to relook at the document to answer that.
Q. (Counsel hands documents to witness.)
A. The construction of the switch is consistent with switches used in -- in --in brake systems.
Q. So it's going to be fair to say that any representations contained on that particular document, in all likelihood, are applicable to the brake pressure switch that we have at issue here, the construction of the part appears to be the same?
A. The -- What's trying to be -- You need to understand what this documents means. We're trying to convey in the document some of the types of specifications different switches have been tested to. Every switch designed by TI is a custom design

for a specific customer specification. This document is not intended to define the exact specification that every TI pressure switch can meet. It's intended to provide some general information about the types of specifications that certain TI pressure switches can meet.

Q. But I assume, as a responsible component supplier and product manufacturer, you're not going to permit an automotive manufacturer to put a component part in a vehicle at a test specification that's not going to be safe for the ultimate user of that product, were you?

A. We don't know what the specifications are that requires a product to be safe for the ultimate user. We can only guarantee that our part meets the specifications provided to us for our customer. It's our customer's responsibility to understand the full system, how that switch is used in the system to make sure that the vehicle provided to their customer is a safe vehicle.

Q. Do you feel, as a responsible component supplier and manufacturer, that it's important to determine what a potential safe specification for use of a particular product might be? Or is that something that the component supplier should not be concerned about?

A. I think it's responsibility of the -- the system integrator, the vehicle manufacturer, to make sure that the specification provided to their suppliers is representative of the application.

Q. Okay. So TI is saying to the jury and to the automotive manufacturers of the world out here, we're going to build whatever you tell us to build; is that correct?

A. TI is going to provide a part that meets the customer's specifications.

Q. If I come to you as an automotive manufacturer and I tell you that I want to build the brake pressure switch out of balsa wood or some other type of inferior material that's likely to -- to burn or obviously not going to be suitable for the application, are you going to go ahead and build it and provide it to me, knowing that I'm going to distribute it in my vehicles to the con -- to the public?

A. Can -- Can you repeat that question?

Q. Sure. Assume I'm going to make a particular component out of like balsa wood or cardboard or some type of material like that and you know that my ultimate use for this particular component is going to be selling it to a consumer in Texas who's going to buy my vehicle. Are you going to go ahead and permit me to utilize your product, knowing my ultimate use for this particular component as a responsible component supplier?

A. If there are any obvious issues with the specification that TI is aware of, they would present to the customer that -- a request to look at a specification, then ask if that specicate (sic.) -- specification does accurately represent the environment the switch will see.

Q. So if it's an obvious problem with my potential specification, you're going to bring that to my attention. Is that fair enough to say?

A. If -- If there's anything that TI knows based on its experience, it will forward that information to our customers.

Q. Fair enough. And has that been TI's history and practice throughout the design and manufacture of hydraulic pressure switches from 1983 to the present time period?

A. Yes, it is.

Q. Let me go ahead and turn to the back of Deposition Exhibit No. 10. And under Technical Specifications it says: Supply voltage, 6-16 V.

Can you tell the ladies and gentlemen of the jury to what that's referring?

A. That's referring to -- that there are switches that have been in applications for the supply voltages range from 6 to 16 volts.

Q. Such as the brake pressure switch?

A. The brake pressure switch was an application where it was seeing roughly 14 volts.

Q. And you reference on your specifications that the supply voltage for your pressure switches can be in that range?

A. Those aren't device specifications. That is a summary of different types of applications that the switch has been exposed to; that we have switches in the field operating in. So there are examples where the switch is in applications where the supply voltage range is in that 6 volt to 16 volt range.

Q. I see on the right-hand column of the back of the page, it says Durability. And then underneath Durability, it says Cycle Life. And it says Low/Mid press -- pressure range, up to 1 x 10 -- And I assume, to the 6th power above the 10 -- cycles. If my math is good, that's one million cycles. Is that correct?

A. Can I see the document?

Q. Certainly.

A. Yes. One times -- I can't tell what that -- what that is. I can't tell whether that's 10 to the 6th or not.

Q. Assume with me that it is 10 to the 6th. If it is 10 to the 6th, would that equal one million cycles?

A. That would equal one million cycles.

Q. It's fair to say that Texas Instruments' generic marketing information with respect to hydraulic pressure switches states that one of the technical specifications of this particular product, in a generic sense, is that it can have a durability cycle of up to a million cycles; is that correct?

A. For a low and mid pressure range under certain conditions. That is not intended to define all conditions that the pressure switch would -- would meet that number of cycles.

Q. I understand. And you were trying to make a difference earlier when you were talking about the Volvo specification and the Ford specifications and we'll get into that later. And that's the type of point you're making right here; is that right?

A. I don't understand your question. Could you rephrase your question?

Q. Sure. I'll go ahead and drop it and I'll move on to -- to something else and I'll come back to it. What is your understanding of what a low or mid pressure range is as for terms of -- I assume that's something that we'd measure in terms of pounds per square inch; is that correct?

A. Pressure is measured in pounds per square inch.

Q. Right. So what's a low to mid pressure range?

A. I'm not sure if it's defined on that document. Do you want to take a look?

Q. Well, let's take a look.

A. The documents says that low pressure range would be zero to 300 psi and mid pressure range would be zero to 800 psi.

Q. And what's a high pressure range?

A. High pressure range defined here is zero to 1600 psi.

Q. So 1450 that's utilized in the Ford specification, that falls in somewhere between the mid and high; is that correct?

A. No. That would be determined as a high pressure range device.

Q. Okay. Fair enough. But according to this particular document, on low to mid pressure range you can get up to one million cycles. And that would be a constant, I assume, low to mid pressure range; is that right?

A. What do you mean, a constant low to mid pressure range?

Q. Well, in the Ford test it goes up to 1450 and back down again. This would be something that would be in the -- the ranges that you're talking about of zero to 800 psi; is that correct?

A. That document is not specific in terms of what that cycle specification means.

Q. Fair enough. I understand that. It's a generic advertising specification; is that correct?

A. It's general information.

Q. Let me go ahead and hand you what I'll mark Deposition Exhibit No. 12 and see if you can tell me how this particular -- There's an E-mail on the front of it. But contained on the back of it are four pages, Document range: TI 4948 through 4952. See if you can identify 494 -- 4949 and the pages that follow.

(Exhibit NO. 12 marked.)

A. I have not seen this document be --

before.

Q. Now that you've had an opportunity to look at the particular document, can you identify that document? You've not seen it at all in your entire existence? Is that what you're telling me?

A. I -- I don't recall seeing this document ever until you've handed it to me today.

Q. Is that a Texas Instrument document, created or generated? Do you know?

A. I would assume so, based on the -- the sender and receiver on the document.

Q. What does the document represent itself to be?

A. List of Texas Instruments and Texas Instruments customer part numbers and who those parts were shipped to. And I would guess, the quantity of parts shipped during different months.

Q. For what type of part?

A. Looks like these are all brake pressure switches.

Q. Are they all brake pressure switches of the type that we have in this case or are they brake pressure switches of a somewhat different design?

A. There's a combination here of the families, 57PS and the family, 77PS.

Q. Are the families, 57PS and 77PS essentially the same or are there pronounced differences between the two?

A. There are differences in the base configurations that we discussed earlier.

Q. Okay. Let me ask you a couple of specific questions about this particular document and your part numbers in general just so I can understand when I review these. When you have a PSL2-1 like we have in this case that's a 77 PSL2-1, that's right? That's what we have here, correct?

A. 77PSL2-1.

Q. What's the difference between a 77PSL2-1 and a 3-1 that you do for Pitts Industries?

A. I'm not sure of the specific differences between those parts. If they're both 77PSL devices, typically, the difference may be around a mating connector tab, a calibration set point. Those are all -- Those are both switches that go on Ford vehicles.

Q. What about the parts, if I see a 77PSL2-1 and you're selling it to Pitts Industry, does that mean that this is a part intended for use on a Ford vehicle, but you just happen to be selling it to Pitts Industries as opposed to Highlight?

A. Pitts would be one of the Tier 1s that would be doing something with the part. I'm not specific in this example. They would be mounting the part, most likely, to something and then selling another sub-assembly to Ford. I'm not sure exactly in this case what -- what Pitts was providing to Ford.

Q. Okay. Who is Tokito?

A. Tokito, again, would be another -- another supplier. They're commonly referred to in the automotive industry, as you probably know, as a Tier 1 supplier.

Q. And is Tokito purchasing brake pressure switches of a somewhat different design from Texas Instruments to later be supplied to Ford or for -- to some other type of replacement market or after market?

A. I believe it's to supply to Ford.

Q. Let's assume that I'm a pretty good mechanic and I realize that my cruise control has broken down on my 1992 Town Car and I take a look at it and I realize that the reason my cruise control has failed is because I have a problem with my brake pressure switch, its developed a leak. That's a foreseeable failure of a brake pressure switch leak.

Is -- Is that fair to say, that my cruise control might be inoperable?

A. I don't know whether your cruise control would be inoperable or not.

Q. Okay. Well, let's just assume for the purposes of the hyco -- hypothetical that that is a potential failure as a result of the leakage in the brake pressure switch. If I wanted to go down to -- not the Ford dealership -- but some auto supply store, am I going to be able to find a brake pressure switch that I can utilize on my Ford vehicle?

A. I don't know.

Q. Do you know at all that -- whether or not Texas Instruments sells this part for use on Ford vehicles to the after market?

A. TI sells service parts to Ford --

Q. And --

A. -- for use of dealers.

Q. And I consider that the replacement market. And by after market I'm talking about to third parties outside the Ford distribution chain, you know, like Chief Auto Parts that he have here in Texas and the PepBoys and places like that. Can I go in there and buy a Texas Instruments manufactured brake pressure switch to use on my vehicle?

A. TI has not sold any pressure switches to the after market that I'm aware of.

Q. What I'd like you to do, I'm going to hand you a little bag and let me represent to you that in this particular bag that I'm going to hand you are the broken down components of a brake pressure switch that could be utilized on a 1992 or 1993 Panther platform vehicle, so go ahead and let you take a look at this particular brake pressure switch and see if you can identify it as such.

A. This is a -- This looks like a TI brake pressure switch.

Q. Let me go ahead and hand you the little bag and let you take a look at it and see if you can determine if that has essentially all of the major components that make up this particular brake pressure switch.

A. No, it does not.

Q. What's missing?

A. The elastomer seal.

Q. Which goes --

A. Which goes from this groove right here (Indicating).

Q. Other than that particular component, is essentially everything else there?

A. There's nothing I see that's missing at this time.

Q. Okay. What I'd like you to be able to do -- And I'd like the camera to be able to pick it up if you could clear a space away, but go ahead and put the parts out where they can be picked up by the camera -- what I'd like you to is, I'd like you to begin using the hex port and if you could see identify the hex port for us --

A. This -- This part (Indicating) is the hex port.

Q. -- and then start with that piece with the hex port down, see if you can construct that component for us and then identify the various pieces that you're utilizing to construct that part. I know it's going to be kind of loose and unstable, but if you can, try and do that for us.

THE VIDEOGRAPHER: Do you have a white sheet of paper you can put that on?

MS. KENNAMER: Jeff, if you move that little pile of paper right there, it might be better.

MR. MANSKE: Sure.

A. Okay. I'm putting the Kapton --

Q. Okay. First of all, let's go ahead and identify the part and then if you could show it to the camera, what it is --

A. There's a --

Q. -- and then let's show where it is on this particular fully assembled piece.

A. This (Indicating) is the hex port.

THE VIDEOGRAPHER: Wait a minute. Excuse me. Steve, if you can see the monitor there, you can see better if you have time to look at it. Move your tie out of the way just a little bit. Okay.

Q. Let me ask you some questions about the hex port. I assume that that's a part that Texas Instruments designed, that particular base component for the brake pressure switch; is that correct?

A. This hex port was designed by TI.

Q. And from whom did they purchase the hex port?

A. This hex port's from Elco.

Q. From whom?

A. Elco.

Q. Can you spell that?

A. E-l-c-o.

Q. And I assume Elco certified that that particular component would comply with any and all material and design specifications that TI might have had for that particular part; is that correct?

A. Yes, that's correct.

Q. Okay. Have you produced to us any design drawings that show the changes that might have been made to that particular component from the time it was initially designed up through, say, December, 1993?

A. I'm not sure what prints may or may not have been produced.

Q. Okay. And we have prints that you have produced and we'll go over those in a moment. What's the next part that you --

A. The Kapton diaphragm.

Q. Okay. Can you show that to the jury so they can understand what a piece of Kapton looks like?

A. There's a Kapton diaphragm. There are three diaphragms in this design.

Q. Okay. And essentially, a piece of Kapton is kind of like, to -- to put it in simple terms, is kind of something like an Oreo cookie that we use here. The black cookie parts are the teflon and the inside white is the -- the Kapton or the poly -- the polymer; is that correct?

A. This is -- This device is a three-layer sandwich, one -- one layer of polyimide and laminated to one layer of teflon on each side.

Q. Okay. So in the creation of this particular device, you'd put the Kapton on top of the hex port; is that correct, when you're -- when you're building the assembly right now for us, that's what you were fixing to do?

A. What I'm building right now, yes --

Q. Right.

A. -- on the top of the hex port.

Q. TI's been using this Kapton since 1981, Ford didn't design, develop or create Kapton; is that correct?

A. Ford did not design, develop, create Kapton. TI has presented to Ford how we're using Kapton in our design and TI has approved -- and Ford has approved that design.

Q. If Ford wanted to use something other than Kapton -- And I think you've told us that TI's used Kapton on all hydraulic automotive pressure switches -- did TI having anything designed and developed that they have tested and utilized that Ford could've selected other than Kapton?

A. TI has gone off and looked at other potential materials other than Kapton. There's not material that TI found that has worked properly in -- in the system --

Q. So --

A. -- in the pressure switch.

Q. So your recommendation as a responsible component supplier to Ford would be, Ford, we've checked and we looked and the best thing that we can find to put in this pressure switch is going to be this Kapton; we've used it since 1981 and, you know, we stand by it. Is that fair so say?

A. It's fair to say that based on TI's experience, tens of millions of parts in the field, that the Kapton had been operating properly; that information would be available to Ford. I don't know how much of that information was -- was given to Ford or not.

Q. Okay. So essentially, if Ford was going to purchase a brake pressure switch for use in its vehicles from Texas Instruments, Kapton was going to be in that switch. Is -- That's a fair assumption, right?

A. Assuming that the switch with Kapton in the switch met all specifications that Ford had defined and that Ford approved that design.

Q. I understand. Go ahead and continue. One piece of Kapton, is that all that goes there or are there more?

A. There are three pieces of Kapton that -- that are inside TI's brake pressure switches.

Q. And are they placed on there just kind of willy-nilly or they're specifically -- or is there a specific rhyme or reason as to how the three layers of Kapton are placed in the brake pressure switch?

A. The three layers are displayed at angles.

Q. And that's so that every edge or every four point to each individual piece, its particular angle is showing if you were to look at it from above; is that correct? You'd see 12 points if you were looking at it from above?

A. Yes, you'd see 12 points.

Q. Okay. After you put those three pieces on there, what would you do next?

A. This is a -- This is not how it's assembled in the -- in the --

Q. I understand. We're going to go over that later, but --

A. The -- The washer would go on next and then the converter.

Q. Okay. Let's -- Let's slow down here. I understand. And now, the washer, that again is a component of the brake pressure switch that was not designed by Ford Motor Company, but by Texas Instruments; is that correct?

A. The washer was designed by Texas Instruments as part of the entire pressure switch design, approved by Ford.

Q. And who supplied the washer?

A. I'm not sure who the supplier is of the washer.

Q. Will we be able to tell when we take a look at the component drawing at a later date; is that correct?

A. I don't know if the supplier's name is on the component drawing or not.

Q. Okay. And any changes to the washer, if there are any over time, would be contained on the component drawing; is that correct?

A. Yes.

Q. Okay. What goes next?

A. The -- The converter.

Q. Is that also called the cup?

A. No, it's not.

Q. Okay. And I see -- Hold -- Hold on. Let's -- Let's look at the converter. I know it's hard to -- to maintain in your hand there. But that looks like it has a little button device on one end of it; is that right?

A. That's correct.

Q. It's kind of a -- a dime size silver circle with a the button protruding off one end; is that right?

A. I'd say, more like a nickel or a quarter --

Q. Okay.

A. -- size.

Q. Who made the converter?

A. I don't know who supplies TI the converter.

Q. And again, the converter was a TI design and not a Ford design; is that correct? I know the ultimate design was eventually approved by Ford Motor Company, but this was --

A. The --

Q. -- a TI design; is that correct?

A. TI designed the converter.

Q. Okay. Great. Go ahead and show me the next piece that would go on there.

A. Another piece of Kapton would sit inside the -- the converter and then the disk.

Q. Okay. The disk, let's go ahead and show us the disk and how that's -- how that's different if you can.

A. Parts of the disk.

Q. Again, Texas Instruments designed the disk; Ford didn't design the disk; is that correct?

A. That's correct.

Q. Okay.

A. Then the cup is placed on top of the assembly.

Q. Ford didn't design the cup; that's a Texas Instrument designed cup; is that correct?

A. Again, it's a Texas Instruments designed cup, part of the entire design approved by Ford.

Q. I understand that. And then what would go next?

A. The -- The cup would be crimped.

Q. And that would either be crimped by an automated device or a manual device and we'll cover that when we go over the process. Is that correct?

A. That's correct.

Q. All right.

A. The -- The gasket would sit on top of the cup.

Q. Okay. And Ford didn't design the gasket; that was a TI design; isn't that correct?

A. TI designed the gasket.

Q. Fair enough.

A. Then the base.

Q. Right.

A. This is a ceramic base. I may have lost the ceramic pin.

Q. Yeah. There was a little white transfer pin --

A. Yes.

Q. -- that looks like the end of a -- an eraser on a pencil; is that right?

A. Yes. I don't know where that part has gone, but there was a ceramic pin that would sit inside the hole on the cup.

Q. Okay. Well, we'll look for that. That transfer pin, that was a part that was designed by Texas Instruments and had no design input from Ford; is that correct?

A. TI designed that pin as part of the entire pressure switch design that was approved by Ford.

Q. I understand. What's the next part?

A. Is the base to be placed on top of the cup and then the -- It'll drop if I try and put it in, but the -- this crimp ring would go around the outside of the part. It's impossible without this crimp here for me to drop it into the crimp ring when you go around the outside and crimp over the top of the base.

Q. And the brown plastic base that you're holding there, that was a part that was designed by Texas Instruments and Ford didn't have any design input into that; is that correct?

A. Ford provided the dimensional details of what this end (Indicating) of the base needed to look like.

Q. That's right. That's just like Ford goes out and buys a radio for one of its vehicles, it tells the supplier, here's the space where it's got to go in, a similar type of concept; is that correct?

A. Ford's -- The -- The dimensions for this side of the -- of the base need to be to Ford's specifications that Ford defines are required so that the mating connector will seal adequately to the switch.

Q. I understand that. With that caveat though, that particular component -- sub-component of that part was designed by TI?

A. Designed by TI to -- met Ford's dimensional specification --

Q. And -- And --

A. -- at the top end of the base.

Q. And the final part that we have there, the little silver thing, the crimp ring, again, that was designed by Texas Instruments; is that correct?

A. Yes. This crimp ring was designed by Texas Instruments as part of the entire switch design that was approved by Ford.

Q. Every component that we've just discussed -- or sub-component that makes up this particular assembly was designed by Texas Instruments and not Ford Motor Company; is that correct?

A. The component was designed by TI. That design was presented to Ford and approved by Ford.

Q. It's 4:30 now. What we'll go ahead and do is, we'll go ahead and recess at this time with the agreement and understanding that we're going to resume with this line of questioning at a later date when it's convenient with both your schedule and the schedule of all counsel.

MS. ALVAREZ: All right. And just --

just to clarify, the -- the -- our -- the agreement, I guess, is that we will schedule according to the convenience of the witness and the parties because we did offer to continue this evening and to continue tomorrow.

MR. MANSKE: Oh, you wanted to continue this evening?

MS. ALVAREZ: If we could continue tomorrow, I'd like --

MR. MANSKE: Oh, okay.

MS. ALVAREZ: -- that.

MR. MANSKE: Only if we can continue tomorrow?

MS. ALVAREZ: Right.

MR. MANSKE: Okay. I understand.

I'd like to thank you very much and we'll look forward to continuing this at a later day.

THE VIDEOGRAPHER: Going off the record now. The time now is 4:34.

(Deposition to be continued.)

(Proceedings concluded.)

CHANGES AND SIGNATURE

PAGE LINE CHANGE REASON

I, STEVEN BERINGHAUSE, have read the foregoing deposition and hereby affix my signature that same is true and correct, except as noted above.

____
STEVEN BERINGHAUSE

THE STATE OF ______________)

COUNTY OF _________________)

Before me, ______________________, on this day personally appeared STEVEN BERINGHAUSE, known to me (or proved to me on the oath of _________________ or through _________________________ (description of identity card or other document)) to be the person whose name is subscribed to the foregoing instrument and acknowledged to me that he executed the same for the purposes and consideration therein expressed.

(Seal) Given under my hand and seal of office this ____ day of ______________, ______.

____
NOTARY PUBLIC IN AND FOR
THE STATE OF ________________

EXHIBIT 1 - Does "legalize" in motion allow us to ask for damages to our reputation caused by need to recall veh's due to TI negligence?

EA02-025-A 13045

EXHIBITS

DEPOSITION EXHIBIT 1

CAUSE NO. C-4178-98-F

PAULINE G. GONZALEZ and JOSE NOE GONZALEZ, SR.	*	IN THE DISTRICT COURT
VS.	*	OF HIDALGO COUNTY, TEXAS
VAN BURKLEO MOTORS, INC.; FORD MOTOR COMPANY; and UNITED TECHNOLOGIES AUTOMOTIVE, INC.	*	332nd JUDICIAL DISTRICT

[redacted]

COMES NOW, FORD MOTOR COMPANY, a Defendant in the above-entitled and numbered cause, and files this Cross-Claim Against Texas Instruments, Inc., and in support thereof would respectfully show unto the Court as follows:

I.
JURISDICTION, PARTIES AND VENUE

1.01. This Court has jurisdiction over the parties and the subject matter of the underlying suit and of this Cross-Claim; the amount in controversy exceeds the minimum jurisdictional requirements of this Court, and all conditions precedent to the filing of this suit have been satisfied.

1.02 Defendant/Cross-Plaintiff Ford Motor Company ("Ford") sues herein Cross-Defendant Texas Instruments, Inc. ("Texas Instruments"), a Delaware Corporation doing business in Texas. Texas Instruments, having already appeared and answered herein, may be served by service upon its counsel of record in this cause: Mr. Johnny Carter and Mr. Eric Mayer, Susman & Godfrey, 1000 Louisiana, Suite 5100, Houston, Texas 77002; and Michaela Alvarez , Hole & Alvarez, L.L.P., 612 West Nolana, McAllen, Texas 78504. By copy of this Cross-claim, service is being accomplished on Texas Instruments at this time.

1.03 Venue of this Cross-claim will follow venue over the primary action.

II.
FACTUAL BACKGROUND

2.01. Plaintiffs Pauline and Joe Noe Gonzalez filed this action on or about August 6, 1998, and filed an Amended Petition adding Texas Instruments as a party on or about May 20, 1999. In this suit, they allege that they purchased a 1993 Lincoln Town Car manufactured by Ford, which they allege caught fire on or about December 28, 1997, allegedly causing extensive property damage to Plaintiffs' home and personal property. In their most recent amended Petition, Plaintiffs specifically contend that the vehicle's speed control deactivation switch was the ignition source for the fire and the cause of Plaintiffs' alleged injuries and damages.

2.02. While Ford does not agree and expressly disputes Plaintiffs' claim that the speed control deactivation switch (or any other alleged defect in the vehicle) caused the fire at issue, to the extent that the trier of fact may determine such to be the cause of the fire, such a cause would be the responsibility of Texas Instruments as the manufacturer of the speed control deactivation switch, for the reasons set out below.

2.03. [redacted]. To the extent that the trier of fact may determine the switch to be the cause of the fire, then, Ford alleges [redacted] injuries and damages were [redacted]facturing defect and/or such negligence by Texas Instruments rather than by any act, omission, or product for which Ford is responsible.

2.04 Ford purchased the speed control deactivation switch at issue from Texas Instruments relying upon express warranties and the Uniform Commercial Code's implied warranties of merchantability and of fitness for a particular purpose. With regard to the warranty of fitness for a particular purpose, Texas Instruments had reason to know that Ford was purchasing the switch specifically for use as a speed control deactivation switch in a 1992 Ford vehicle which would need to perform as such during all of the functions performed by a passenger vehicle purchased by a United States consumer/driver of such a vehicle. Ford relied upon Texas Instruments' skill and judgment as a manufacturer of electrical switches for automotive applications to select and furnish a suitable switch for this purpose.

2.05 To the extent that the trier of fact may find that the fire at issue was caused by the speed control deactivation switch, [redacted] relied upon these warranties and would not have purchased the switch without them. Ford would also show that injuries and damages such as those claimed by Plaintiffs are foreseeable consequential damages of the breaches of the above warranties committed by Texas Instruments.

2.06 In addition, Ford purchased the speed control deactivation switch from Texas Instruments pursuant to a written purchase order, which constituted a written contract and which contained language by which Texas Instruments agreed to indemnify Ford for damages caused by claims such as that of Plaintiffs herein.

2.07 Ford has requested that Texas Instruments fulfill its responsibilities to indemnify Ford in this matter; however, to date, Texas Instruments has failed and refused to do so, requiring Ford to bring this Cross-Claim against Texas Instruments in order to protect its rights in this matter.

III.
FIRST CAUSE OF ACTION
COMMON-LAW CONTRIBUTION AND/OR INDEMNIFICATION

3.01 While Ford does not agree and expressly disputes Plaintiffs' claim that the speed control deactivation switch (or any other alleged defect in the vehicle) caused the fire at issue, to the extent that the trier of fact may determine such to be the cause of the fire, Ford relies upon its rights in such a case under Tex. Civ. Prac. & Rem. Code §32.001, et seq. In such case, Ford asks that the trier of fact be asked to determine the percentage of causation attributable as between Ford and Texas Instruments, and alleges that [redacted]

3.02 Ford thus sues for common law contribution and/or indemnity herein.

IV.
SECOND CAUSE OF ACTION
BREACH OF WARRANTIES

4.01 Ford purchased the speed control deactivation switches from Texas Instruments relying upon express warranties and the Uniform Commercial Code's implied warranties of merchant ability and of fitness for a particular purpose, found in Michigan law at M.C.L.A. 440.2313, 440.2314 & 440.2315 and alternatively in Texas law at Tex. Busi & Com. Code § 2.313, 2.314 and 2.315. To the extent that the trier of fact may determine the switch to be the cause of the fire at issue, Ford alleges that the above warranties were breached and that foreseeable consequential damages of such breaches are the damages caused to Ford by the claims of Plaintiffs herein, including any expenses incurred by Ford in investigating, defending itself from and/or resolving such claims.

4.02 All conditions precedent to the bringing of this cause of action have occurred or are waived.

4.03 Ford thus sues for its damages, as stated above, in excess of the minimum jurisdictional limits of this Court, for these breaches of warranties.

V.
THIRD CAUSE OF ACTION
BREACH OF CONTRACT OF INDEMNIFICATION

5.01 Ford purchased the speed control deactivation switch at issue pursuant to a purchase order which constituted a written contract, which included a provision by which Texas Instruments agreed to indemnify Ford for any claims of the type brought by Plaintiffs herein. Ford has requested that Texas Instruments fulfill its responsibilities to indemnify Ford in this matter; however, to date, Texas Instruments has failed and refused to do so. Ford thus alleges that Texas Instruments has breached its written contractual agreement to indemnify Ford in this matter and that foreseeable consequential damages of such breach are the damages caused to Ford by the claims of Plaintiffs herein, including any expenses incurred by Ford in investigating, defending itself from and/or resolving such claims.

5.02 All conditions precedent to the bringing of this cause of action have occurred or are waived.

5.03 Ford thus sues for its damages, as stated above, in excess of the minimum jurisdictional limits of this Court, for this breach of the indemnification agreement in the purchase order.

VI.
FOURTH CAUSE OF ACTION
RECOVERY OF ATTORNEYS' FEES

6.01 Ford has made written demand upon Texas Instruments that it fulfill its obligations under the purchase order/contract for the speed control deactivation switch at issue. As stated herein, then, Ford has a claim for breach of a written contract, and thus for its attorneys' fees herein pursuant to Tex. Civ. Prac. & Rem. Code §38.001 (8).

6.02 All conditions precedent to the bringing of this cause of action have occurred or are waived.

6.03 Ford thus sues for its attorneys' fees incurred in bringing this Third Party Complaint.

VII.
PRAYER

WHEREFORE, PREMISES CONSIDERED, Defendant/Cross-Plaintiff Ford Motor Company prays that it be afforded the following relief:

(1) Judgment for common law contribution and/or indemnity as determined by the findings as to percentages of responsibility made by the trier of fact herein;

(2) Judgment in its favor for damages caused by breaches of warranties and/or breach of contract in an amount to be determined by the trier of fact;

(3) Judgment in its favor for reasonable and necessary attorneys' fees;

(4) Costs of Court;

(5) Prejudgment and post judgment interest at the maximum legal rate; and,

(6) For any and all further relief, at law or in equity, to which Plaintiff may show themselves justly entitled to receive.

Respectfully submitted,

RODRIGUEZ, COLVIN & CHANEY, L.L.P.

By: [signature]

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ATTORNEYS FOR DEFENDANT,
FORD MOTOR COMPANY

CERTIFICATE OF SERVICE

I hereby certify that a true and correct copy of the above and foregoing was served upon all counsel of record, to-wit:

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by certified mail, return receipt requested, facsimile transmission, and/or hand delivery, pursuant to the Texas Rules of Civil Procedure, on this the 6th day of December, 1999.

Alison Kennamer

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*BOARD CERTIFIED IN PERSONAL INJURY TRIAL LAW TEXAS BOARD OF LEGAL SPECIALIZATION

†BOARD CERTIFIED IN LABOR AND EMPLOYMENT LAW TEXAS BOARD OF LEGAL SPECIALIZATION

December 6, 1999

Via Hand Delivery

[redacted]
Hidalgo County District Clerk
Hidalgo County Courthouse
100 North Closner
Edinburg, Texas 78539

Re: Cause No. [redacted] vs. Van Burkleo Motors, Inc.; Ford Motor Company, and United Technologies Automotive, Inc.
Our File: 17,110

Dea[redacted]

Enclosed for filing in the above-referenced matter, please find the following original documents to be filed with the Court:

1. Ford Motor Company's Cross-Claim Against Texas Instruments, Inc.

By copy hereof, I am serving a copy of said documents on all counsel of record.

Please file stamp our copy for our records. Thank you for your courtesy.

Very truly yours,

RODRIGUEZ, COLVIN & CHANEY, L.L.P.

Alison Kennamer

ADK/pg
w/enclosures

cc: Mr. Norman Jolly
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E002-025-R 13854

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EXHIBITS

Epstein, Sally

From: McGuirk, Andy [a-mcguirk@email.mc.ti.com]
Sent: Tuesday, June 01, 1999 9:39 AM
To: Pechonis, John; Dague, Bryan; Proia, Stephen; Weil, Jim
Cc: Baumann, Russ
Subject: FW: Ford Core team update

FredPortCore.doc   synopsil.doc   TESTLOG9.xls   77PSL2_1.xls

for your background info as we host Steve reimers weds

a

AUTOMOTIVE SENSORS AND CONTROLS QRA MANAGER
34 FOREST ST M/S 23-05
ATTLEBORO, MA 02703
TEL : (508) 236-3080
FAX : (508) 236-3745
MOBILE: (508) 208-6119
PAGE: (800) 467-3700 PIN 604-2044

From: McGuirk, Andy
Sent: Friday, May 28, 1999 3:22 PM
To: 'Frederick J. Porter'
Cc: Beringhause, Steven; Sharpe, Robert
Subject: Ford Core team update

Fred, per our discussions and Rob Sharpe's visit enclosed is our updates...

<<FredPortCore.doc>> <<synopsil.doc>> <<TESTLOG9.xls>>
<<77PSL2_1.xls>>

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DEPOSITION EXHIBIT 2

TI-000026

May 26, 1999

Mr. Frederick J. Porter, Supervisor
E/E Systems Engineering
Building 5, Mail Drop 5011
20000 Rotunda Drive, Rm 3E004
Dearborn MI 48121-2053

Dear Fred:

I want to review our recent support of the Ford core team to assure we do not have any misunderstandings regarding our pressure switch performance, our continued contribution to the 'core' team, and our commitment to a quick conclusion.

For six months the Texas Instruments Automotive Sensors & Controls Team has been supporting the Ford Core Diagnostic Team with technical facts, data, and analysis regarding our brake pressure switch product applied in the Ford cruise control deactivation circuit.

A senior TI pressure switch engineer was in residence at Ford for three weeks to assist with switch related issues in the system-diagnostic process. Senior TI leadership participation has also been involved in virtually every Ford Core Team meeting delivering facts, data, and technical support year-to-date '99.

We also investigated switch capability, and using agreed upon accelerated simulation life testing techniques, demonstrated the ability of the model year '92 & '93, Town Car speed control deactivation switches to consistently exceed "cycle life specification" of 500,000 pressure cycles. TI Weibull reports of pressure switches tested in 1999 conservatively demonstrate 95% reliability to 1 million cycles (with confidence intervals greater than 50%).

Additionally "success testing records" of some 665 ES units that were tested during the 1991 - 1992 (11/91 - 12/92) showed zero leakage at 500,000 cycles.

Conclusion to date: 1992 period switches met specification. 1999 switch meets or exceeds specification

We have developed and delivered a laboratory model of accelerated plastic base ignition of the switch resulting from fluid in the switch cavity coupled with application of constant power as designed in the speed control circuit. Theories from the model suggest that fluids in the switch cavity in the presence of uninterrupted power could lead to a corrosion product formation which might create a plastic base ignition path.

TI-000027

Conclusion to date: Constant speed control power allows long term corrosion

In light of this laboratory model and the need for cruise system power only during vehicle operation, we suggest the system architecture of "key-on/off" based power be considered.

We have been open and forthright in our communications and delivery of information and we believe we have been instrumental in helping Ford address the underhood fire concern issue.

In this regard, we think it is appropriate at this point that our active participation in the diagnostic journey of the vintage 1992 product move towards a timely conclusion. Toward this end, we will continue to support the "core" team review of 1992 product history with targeted completion in July 1999.

We are preparing to fulfill your request for hosting a site visit, supporting campaign field return device analysis, and participating in robust system brainstorming sessions moving toward conclusion in July, as well as reviewing the optimization of our product line process controls.

Our prime focus at this time is in rapidly supplying Ford with 225,000 units in support of the field actions.

Regards,

Andrew C. McGuirk
QRA Manager
Texas Instruments

attachments: 1992 Testing History
TI 77PS Test synopsis
TI 77PS Investigation Flow Diagram

TI 77PS Test Synopsis

This document is a synopsis of tests conducted by Texas Instruments during the 77PS investigation. The intent of this document is to highlight test findings which drove the investigation to its current state. Throughout the investigation, several tests were conducted with the same objective. When each objective was met, efforts were refocused to obtain a new level of understanding and to establish a new set of objectives. As such, tests have been categorized into (5) levels, representing the level of knowledge obtained from the group of tests conducted. Each level is listed below with a short description of the objective:

Level 1: Create a laboratory switch ignition without any restrictions on methods.
Level 2: Create a laboratory switch ignition using only conditions found in the switch operating environment.
Level 3: Understand the laboratory ignition mechanism.
Level 4: Compare factors contributing to laboratory ignition.
Level 5: Evaluate recommendations.

Refer to Brake Pressure Switch Test Log.

Level 1 Objective: Determine if a switch ignition can be created in the laboratory.

- Test 1

Objective: Determine if switch ignition can occur under the following laboratory conditions:

Switch contact cavity flooded with brake fluid mixed with varying amounts of % H_20.
14 volts applied to one terminal, second terminal electrically floating. (No electrical load across switch terminals).
Switch hexport electrically grounded.

Results: (8) samples were tested total:
(2) with 4% H_20 in brake fluid.
(2) with 6% H_20 in brake fluid.
(2) with 10% H_20 in brake fluid.
(2) with 75% H_20 in brake fluid.

No ignition occurred. No significant temperature rise observed in all samples. Current draw ranged from 0.5 mAmps to 5 mAmps over a period greater than (250) hours.

TI-000029

- Test 2

Objective: Determine if switch ignition can occur under the following laboratory conditions:

> Switch contact flooded with brake fluid.
> 14 volts applied to one terminal, second terminal connected to a 14 Ω resistor which is tied to ground. (1 Amp load across switch terminals).
> Switch hexport electrically grounded.

Results: (2) samples were tested. No ignition occurred. No significant temperature rise observed for a period over (250) hours.

Conclusion: A (1) Amp load through switch terminals did not ignite brake fluid in the contact cavity of switches.

- Test 6

Objective: Determine if switch ignition can occur under the following laboratory conditions:

> Heater element installed in contact cavity of the switch.
> Power applied to the heater element until plastic base melts.
> Spark generated in contact cavity of switch.
> Brake fluid present in the contact cavity (wet device) and absent in the contact cavity (dry device).

Results: (2) dry devices were tested and (1) wet device was tested. Ignition occurred in all devices.
Wet device: The internal temperature of a wet device reached 660°F. A hole burned through the base of the switch (close to the heating element). The applied spark ignited the fumes in the contact cavity of the switch and engulfed the base material of the switch.
Dry device: The internal temperature of a dry switch reached over 1000°F. The switch base flopped over. The applied spark ignited the fumes in the contact cavity of the switch and engulfed the base material of the switch.

Conclusion: A switch ignition can occur under the following laboratory conditions:

> Heater element installed in the switch contact cavity.
> 5 watts of power dissipated in heating element.
> Spark generated in the contact cavity of the switch.

Brake fluid did not contribute to the ignition process.

TI-000030

Level 2: Objective: Determine if a laboratory ignition can occur using only switch components and elements found in the switch environment.

- Test 6a

Objective: Determine if corrosive degradation of switch electrical components can cause an increase in electrical resistance (and thus a source of heat) in the switch, which may lead to an ignition.

Results: (1) out of (15) samples tested increased resistance to 5 Ωs. A solution of 5 wt. % NaCl in H_2O can corrode the electrical components of the switch and cause an increase in electrical resistance. Repeated injections of the solution of 5 wt. % NaCl in H_2O into the contact cavity of a switch, with the switch continuously powered at 14 Volts, can cause an ignition.

Conclusion: A switch ignition can occur under the following laboratory conditions:

A solution of 5% NaCl in H_2O is injected into contact cavity of a switch.
Continuous 14 Volt power applied to the switch.
Hexport is grounded.
Current is limited at 15 Amps.

- Test 6c

Objective: Determine if brake fluid with metal shavings is conductive enough to create an ignition.

Results: (3) devices with various size metal particles were tested. No significant current increase detected.

Conclusion: Metal shavings did not significantly increase conductivity brake fluid. Current levels measured were well below levels necessary to create an ignition.

- Test 7

Objective: Determine if switch meets cycle life specification.

Results: Tests conducted during the first quarter of 1999 show that switches exceed cycle life specification.
In the first quarter of 1999, a total of (42) 77PSL2-1 snap switches were impulse tested to over 1,000,000 cycles with only (1) leak below 1,000,000 cycles, which

TI-000031

occurred at 728,000 cycles. A Weibull analysis showed 99.9% reliability at 500,000 cycles at 95% confidence level.

Conclusions: Switches meet cycle life specification. First quarter, 1999 tests confirm impulse test findings made during the period between 1991 and 1992. During that period, (6) impulse tests on 144 devices of 57PS and 77PS construction, had no leaks when tested to 500,000 cycles. A Weibull analysis of first quarter, 1999 tests, showed 99.9% reliability at 500,000 cycles at 95% confidence level.

- Test 15a

Objective: Determine the long term corrosive effects of brake fluid on the electrical components of switches which are continuously powered at 14 Volts.

Results: Test was suspended after 550 hours of testing. (6) samples were tested with continuous 14 Volts power. The contact cavity of (4) switches contained new brake fluid and (2) switches contained old brake fluid. Switches with old brake fluid drew very little hexport current and showed a decrease in hexport current over time to less than 1/10 mAmp. Samples with new brake fluid showed an increase in hexport current to over 20 mAmps toward the end of the 550 hours of testing. Analyses of (1) sample with new brake fluid and (1) sample with old brake fluid revealed electrolytic corrosion of the contact arm of both switches. There was a much lower level of corrosion in the sample with used brake fluid than the sample with new brake fluid.

Conclusion: Brake fluid in the contact cavity of switches, which are at 14 Volts continuous power for over 500 hours, can cause electrolytic corrosion of the switch contact arm and an increase in hexport current.

- Test 17.

Objective: Quantify the long term corrosive effects of new brake fluid on the electrical components of switches under the following laboratory conditions:

Contact cavity of switch flooded with new brake fluid.
Switches at continuous 14 Volts power.
Switches subjected to vibration for (1) hour per day.
Switches subjected to 100°C for (1) hour per day.

Results: Test suspended after (312) hours. (50) samples tested. The average hexport current draw after (312) hours is 1.9 mAmps with a standard deviation of 1.8 mAmps. These results are consistent with results previously found in Test 15a at the 300 hour point.

TI-000032

Conclusion: New brake fluid in the contact cavity of switches, has not caused an increase in hexport current after (312) hours at continuous 14 Volts power.

Level 3: **Objective:** Understand the laboratory ignition process, determine the current path and establish a repeatable ignition method.

- Test 6b

Objective: Understand the ignition process, determine the current path and establish a repeatable ignition method.

Results: Multiple attempts at laboratory ignition, via injection of a solution of 5 wt. % NaCl in H_20 into the contact cavity of switches, has resulted in a repeatability rate of approximately 50%. Plots of hexport current verses time show an increase in current until the point of ignition.

Conclusion: A repeatable laboratory method for switch ignition was established. Based on hexport current measurements, the current path is from switch terminals to hexport body.
When a solution of 5 wt. % NaCl in H_20 is repeatedly injected into the contact cavity of powered switches, electrolytic corrosion of the switch terminal results in an increase in terminal resistance. When sufficient power is drawn through the corrosive resistance, switch elements heat up and begin to glow red hot. A hole burns through the switch base and ignition occurs. There is arcing visible throughout the corrosion process which may provide the spark necessary for ignition.

Level 4: **Objective:** Compare and contrast variables influencing ignition using the established laboratory ignition method.

- Test 13a

Objective: Compare various fluids in the established ignition method.

Results: The following fluids were tested.
(1) NaCl in H_20.
(1) tap water
(1) rain water
(1) used brake fluid
(1) used brake fluid with 5 wt. % H_20
(1) new brake fluid
(1) new brake fluid with 5 wt. % H_20
The switch filled with 5 wt. % NaCl in H_20 resulted in an ignition when average hexport current exceeded 2.5 Amps. Switches that were filled with tap water and rain water drew less than 10 mAmps over a (3) hour test and showed little signs of

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ER02-025-A 13865

corrosion. Switches filled with a matrix of new and used brake fluids, with water and without water, all drew less than 3 mAmps hexport current draw and showed no signs of corrosion over the (24) hour test.

Conclusion: Brake fluid is not conductive enough to cause the electrolytic corrosion and necessary current draw to create an ignition within a 3 hour lab test. Because of its' significantly higher conductivity, an ionic rich fluid such as NaCl in H_20 can cause an ignition in a 3 hour lab test exposure..

- Test 15

Objective: Compare the ignition characteristics of various plastics as switch base material.

Results: When 5 wt. % NaCl in H_20 was injected into switches with different base materials, the following results were obtained: Cellanex 4300 ignited 3 out of 5 attempts. Noryl ignited 2 out of 5 attempts. Zytel ignited 1 out of 5 attempts.

Conclusions: All plastics tested can ignite using the established laboratory ignition method.

- Test 15b

Objective: Determine if switch ignition can occur in the vertical position and 45° orientation. Determine if switch ignition can occur and at different rotational angles in the 45° orientation.

Results: Switch ignitions can occur in both the vertical and 45° orientation using the established laboratory ignition method.

Conclusion: Switch ignition does not appear to be sensitive to vertical orientation verses 45° orientation nor to rotational angle in the 45° orientation.

Level 5 Objective:

Test 16

- Objective: Test proposed relay circuit.

Results: (1) switch was injected with a solution of 5 wt. % Nacl in H_20 and placed in the proposed current limiting circuit for (48) hours. The current draw remained constant at 180 mAmps throughout the test. There was no activity observed and the contact arm remained mostly intact.
(1) switch was brought to an impending burn condition using the established burn method. An impending burn is a condition where a corrosive resistance has built

up in the switch and an ignition is imminent. The switch was then placed in the proposed relay circuit for(18) hours where it drew 160 mAmps, showed no visible activity and did not result in an ignition.
Because the proposed relay circuit acts as a resistor which limits current to the switch, the maximum power to the switch is limited to .75 Watts. A resistive wire was wrapped around the base of (1) switch and 0.75 Watts of power was dissipated in the wire. The wire became warm to the touch but had no effect on the switch.

Conclusion: 0.75 Watts, the maximum power in the proposed circuit design, is insufficient to cause substantial electrolytic corrosion or significant switch terminal heating, which is necessary to create an ignition. In previous tests, using a resistor as the heating element (see Test 6), approximately 5 Watts of power was necessary to create an ignition.

TI-000035

EA02-025-A 13887

Brake Pressure Switch Test Log, Updated 8/22/99

Category	Test	Location	Test Parameters	Results Update
Lab Simulation	1	TI	Vary water concentrations in 'new' Brake Fluid	250+ hours, Current draw in the 0.5mA to 5mA range
of Potential ignition			14Vdc to one terminal, hexport grounded	Fluid has discolored.
in Switch			Water Conc: 4%, 6%, 10%, 75%	No Significant Temperature Rise. Test Suspended.
				Internal Analysis suspended.
	2	TI	New Brake Fluid	250+ hours. Constant temperature.
			1 Amp through switch terminals	No significant temperature rise with time
			14Vdc to one terminal, hexport grounded	Test Suspended.
	3	AVT	new' Brake Fluid in Switch, 24 VDC to one	> 300 hours into test, max current 7mA
			terminal. Hexport Grounded	No significant change with time. Test suspended
	4	AVT	new' Brake Fluid in Switch, 24 VDC to one	18 hours into test max current 5mA
			terminal. Hexport Grounded, Ambient at 100 C	No significant temperature rise with time. Test suspended.
	5	AVT	new' Brake Fluid in Switch, 18 Amps	Temperature rise of 20 C above room temp
			Through switch terminals	Delta T reached steady state at 20 C. Test suspended.
	5a	AVT	new' Brake Fluid in Switch approx. 50 Amps	Temperature rose to approx. 270 F. No smoke. No ignition
			through Switch Terminals	Test suspended.
	6	TI	Build heater elements into Switch.	3 tested. Smoke observed, ignition observed on part w/heater
			Heat till failure, include sparking.	See attachment
			(1) w/ solution of Brake Fluid and 6 wt. % H_2O	Test complete
				Brake fluid in cavity slows down heat build-up
				Smoke observed at 675 F, Base melts and falls off at 800 F
	6a	TI	Create heater by corroding spring arm	One out of 15 devices increased resistance to 5 ohms.
			Salt water solution, 14V between spring	Others either very low resistance or megaohms
			and hexport	It took about 100 hours to reach the 5 ohm stage.
				The 5 ohm device ignited under conditions similar to test 6.
	6b	TI	Re-run ignition test to understand	Switch ignition with repeated 5% water solution into switch
			repeatability and current path.	Current path is through hexport.
				See plots and video.
				Additional test include tap water, old BF, new BF and other.
	6c	TI	Pure 'new' brake fluid with metal shavings	Metal shavings do not contribute significantly to brake fluid

TI-000036

EP02-025-Q 13466

Brake Pressure Switch Test Log, Updated 6/22/99

				coductivity
[redacted]				
Life Cycle Reliability	7	TI	0-1400 psig pressure pulses at 135C	First leak observed at 728,000 cycles.
of Pressure Switch			per ES	Test Completed. See attached Weibull Chart.
[redacted]				
Diaphragm Wear	8	TI	0-1400 psig pressure pulses at 135C.	Parts withdrawn every 200k cycles, characterized for wear
[redacted]				
Field vs Lab Correlation	9	Central Labs	Field returns, from dealer lots, junkyards	Parts in Central Labs, see Ford spreadsheet
[redacted]				
Design Of Experiments (1)	10	TI	Vary water concentrations in 'new' Brake Fluid	Test Report being written investigation continues.
Evaluating Factors			12 snap + 12 quiet switches w/ 0 % water in BF	Suspended at 1.3 million cycles with no leaks observed.
Effecting Diaphragm Wear			12 snap + 12 quiet switches w/ 5 % water in BF	Snap samples suspended at 1.3 million cycles with 2 leaks
Impulse test				observed at 1.3M. Quiet samples suspended at 500K cycles to
				assess fixturing anomalies.
[redacted]				
On-Vehicle Characterization	11	AVT	Monitor Pressure and Temperature	Test at AVT.....see Ford charts...>500k in car?
of Pressure & Temperature			at Switch Location for ABS and non-ABS	
Profile in Town Car			braking events.	
[redacted]				
Brake fluid analysis	11a	TI	Analyze used brake fluid at the master cylinder	Test complete.
Used fluid at master cylinder.			(UMC), used brake fluid at the caliper (UCA)	UMC: Cu = 416 (ug/ml), Fe = 8.8 (ug/ml), Cr = 0.08 (ug/ml), 1.1 %H20.
			and new brake fluid (NEW) for metal and water	UCA: Cu = 692 (ug/ml), Fe = 5.5 (ug/ml), Cr = 1.9 (ug/ml), 1.1 %H20.
			content.	NEW: Cu = <0.01 (ug/ml), Fe = 0.92 (ug/ml), Cr = <.01 (ug/ml), 0.3 %H20.
[redacted]				
Spark /Arc Study	12	Central Labs	Determine if arc/spark forms in switch	Equipment set-up in progress at Central Labs.
			using clutch loads and high speed video.	TI Experimented with no 'significant' sparks observed
			Use dry switches as well as switches with	
			various brake fluid water mixes.	
[redacted]				
Characterization of	13	Central Labs	Characterize electrical, mechanical	Data log and analysis procedure set up complete.
switches retrieved from field			and chemical aspects of returned switches	Analysis of switches in progress.
junkyards & other sources				
[redacted]				
Fluid Ingress Tests	13a	TI	Repeat ignition simulation with different fluids.	Test complete.
			(3) hour tests:	5% NaCl sample resulted in an ignition.
			5% NaCl in tap water	All brake fluid samples drew less than 3 mAmps. No corrosion
			rain water	visible on brake fluid samples.
			(24) hour tests:	Rain water and tap water samples drew <10 mAmps and showed
			tap water	some signes of corrosion.

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TI-000037

			used brake fluid	Chemical anlysis in process.
			used brake fluid w/ 5% H_2O	
			new brake fluid	
			new brake fluid w/ 5% H_2O	
Design Of Experiments (2)	13b	TI	Vary water concentrations in 'new' Brake Fluid	Test suspended. Analysis in process to assess test fixturing.
Repeat of test 10			10 snap + 20 quiet switches w/ 0 % water in BF	
			10 snap + 20 quiet switches w/ 5 % water in BF	
Compatibility of Kapton	14	Dupont	Characterize change in properties of Kapton	Test in progress (100) hours completed. Oxalic acid shows
with Oxalic Acid			with various % oxalic acid in brake fluid.	similar effects that water has on Kapton proerties.
Evaluation of Plastic	15	TI	Assess properties and moldability of different	Test suspended.
Materials with Improved			grades of plastic resin with additives	Celanese and Noryl ignited 3/5 and 2/5 trials
Parameters			to improve plastic part performance	ZYTEL samples tested 1/5 ignitions
Long duration brake fluid	15a	TI	(4) samples with new brake fluid	Test suspended (550) hours completed.
ingress test.			(2) samples with used brake fluid	Used brake fluid current dropped off to <1/10 mAmp.
				New BF hexport current can increases w/ time under cont. power.
Evaluation of Switch	15b	TI	Assess ignition sensitivity to switch orientation.	Test complete. Ignition is independent of switch orientation,
Orientation			Test vertical verses 45 degree.	simulated switch ignition can occur in vertical or 45 degree angle.
			Test rotational sensitivity in 45 deg. orientation.	Ignition appears not sensitive to switch rotational alignment.
Relay Circuit	16	TI	Repeat test 13a in Ford relay circuit for (48) hrs.	Test complete. No ignition. Corrosion rate drastically reduced.
Test			Bring switch to impending ignition in (15) Amp	Insufficient power in circuit to create or move toward ignition in lab
			circuit then place in relay circuit for (16) hrs.	Heater element was warm to the touch.
			Input max. circuit power into heater on switch.	
Long duration brake fluid	17	TI	(60) samples filled with new brake fluid	Test suspended. (312) hours completed.
ingress test number 2.			(1) hour of vibration per day	Average hexport current is 1.9 mAmp (stdeviation = 1.8 mAmps)
			(1) hour soak at 100 deg C per day	

E962-825-A 13679

TI-000038

preliminary draft summary of TI record search findings of May 14-17 1999

summary by Steve Beringhause & Andy McGuirk May 19th 1999
TI P/N: 77PSL2-1
Ford P/N: F2VC-9F924-AB
Tested at 'room temp' per manufacturing ES requirements

Date	Lot Size	Qty Impulse Tested	Qty Leak
26-Nov-91	4,000	10	-
26-Nov-91	4,000	10	-
5-Dec-91	4,000	10	-
5-Dec-91	4,000	10	-
9-Dec-91	4,000	10	-
9-Dec-91	2,000	5	-
11-Dec-91	4,000	10	-
11-Dec-91	4,000	10	-
13-Dec-91	4,000	10	-
14-Dec-91	4,000	10	-
16-Dec-91	4,000	10	-
16-Dec-91	4,000	10	-
2-Jan-92	4,000	10	-
6-Jan-92	4,000	10	-
7-Jan-92	2,000	5	-
8-Jan-92	4,000	10	-
8-Jan-92	4,000	10	-
14-Jan-92	4,000	10	-
14-Jan-92	4,000	10	-
15-Jan-92	4,000	10	-
28-Jan-92	2,000	5	-
31-Jan-92	4,000	10	-
2-Feb-92	1,650	5	-
4-Feb-92	4,000	10	-
5-Feb-92	4,000	10	-
6-Feb-92	4,000	10	-
10-Feb-92	4,000	10	-
11-Feb-92	4,000	10	-
12-Feb-92	4,000	10	-
12-Feb-92	4,000	10	-
14-Feb-92	4,000	10	-
14-Feb-92	4,000	10	-
14-Feb-92	4,000	10	-
15-Feb-92	4,000	10	-
24-Feb-92	4,000	10	-
26-Feb-92	4,000	10	-
26-Feb-92	4,000	10	-
28-Feb-92	4,000	10	-
28-Feb-92	4,000	10	-
28-Feb-92	4,000	10	-
6-Mar-92	4,000	10	-
10-Mar-92	4,000	10	-
11-Mar-92	4,000	10	-
12-Mar-92	4,000	10	-

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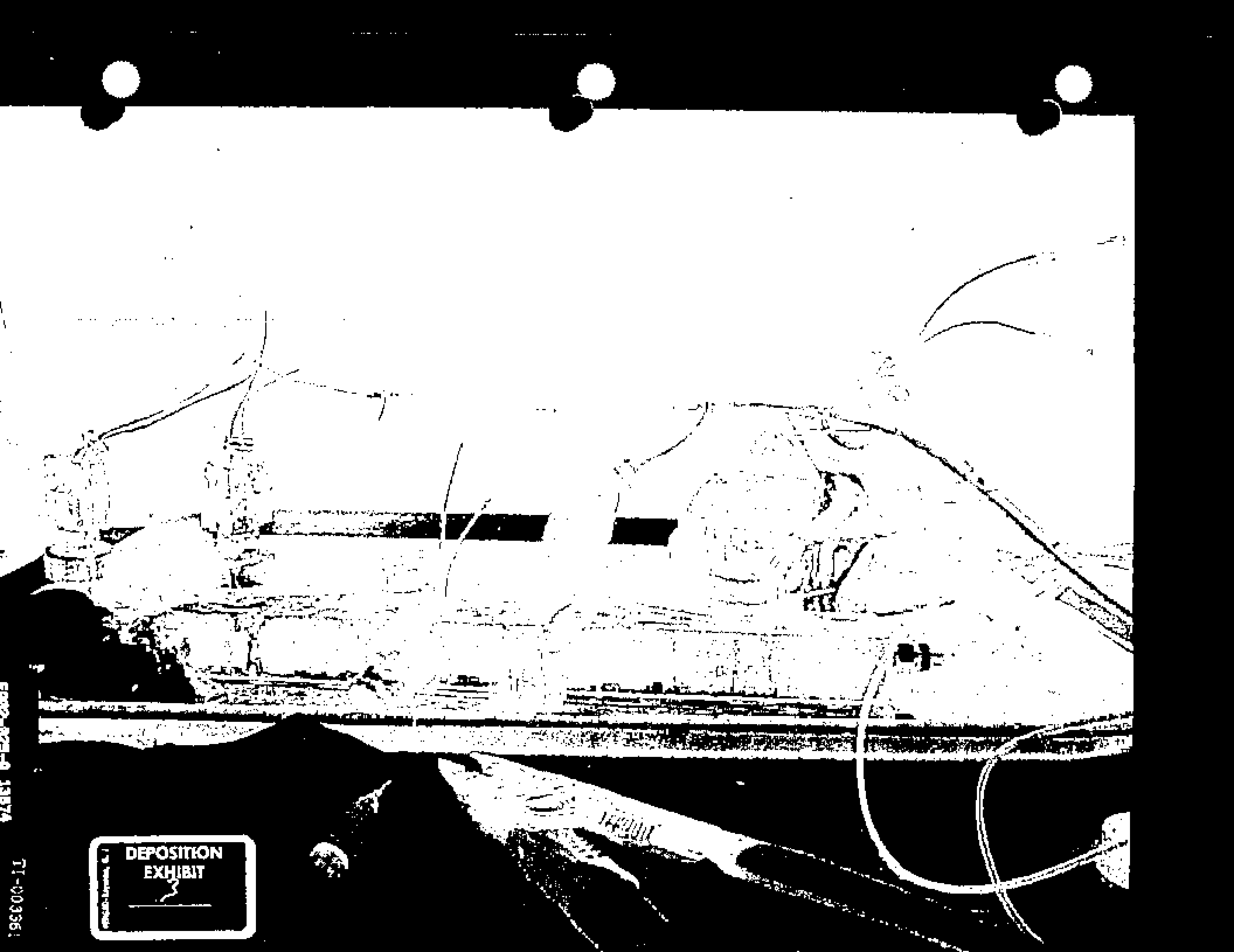
18-Mar-92	4,000	10	-
23-Apr-92	2,000	5	-
2-May-92	2,000	5	-
5-May-92	2,000	5	-
6-May-92	2,000	5	-
14-Sep-92	2,000	5	-
22-Sep-92	4,000	10	-
30-Sep-92	4,000	10	-
7-Oct-92	4,000	10	-
7-Oct-92	4,000	10	-
16-Oct-92	4,000	10	-
21-Oct-92	2,000	5	-
28-Oct-92	4,000	10	-
29-Oct-92	4,000	10	-
29-Oct-92	4,000	10	-
30-Oct-92	4,000	10	-
4-Nov-92	4,000	10	-
10-Nov-92	4,000	10	-
10-Nov-92	4,000	10	-
12-Nov-92	4,000	10	-
17-Nov-92	2,000	5	-
20-Nov-92	4,000	10	-
4-Dec-92	2,000	5	-
9-Dec-92	2,000	5	-
14-Dec-92	2,000	5	-
16-Dec-92	4,000	10	-
16-Dec-92	4,000	10	-
16-Dec-92	4,000	10	-
21-Dec-92	2,000	5	-
21-Dec-92	4,000	10	-
Totals units	**265,650**	**665**	**-**

TI-000040

ER02-025-R 13872

EXHIBITS

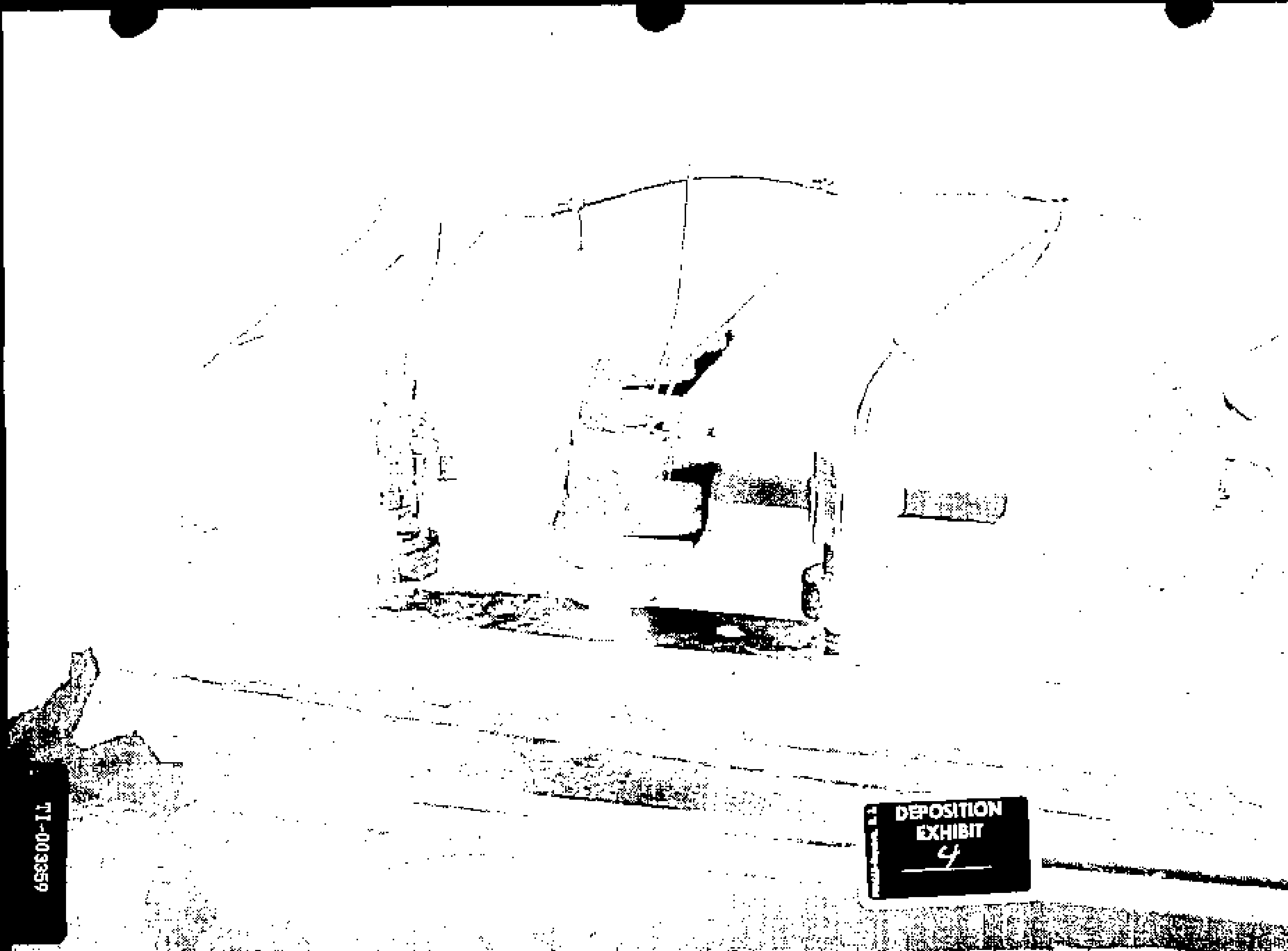
3



DEPOSITION
EXHIBIT
3

EXHIBITS

4



TI-003359

EXHIBITS

5

.001" teflon

500 FN 131

.005" thick

Teflon
Coated
Kapton

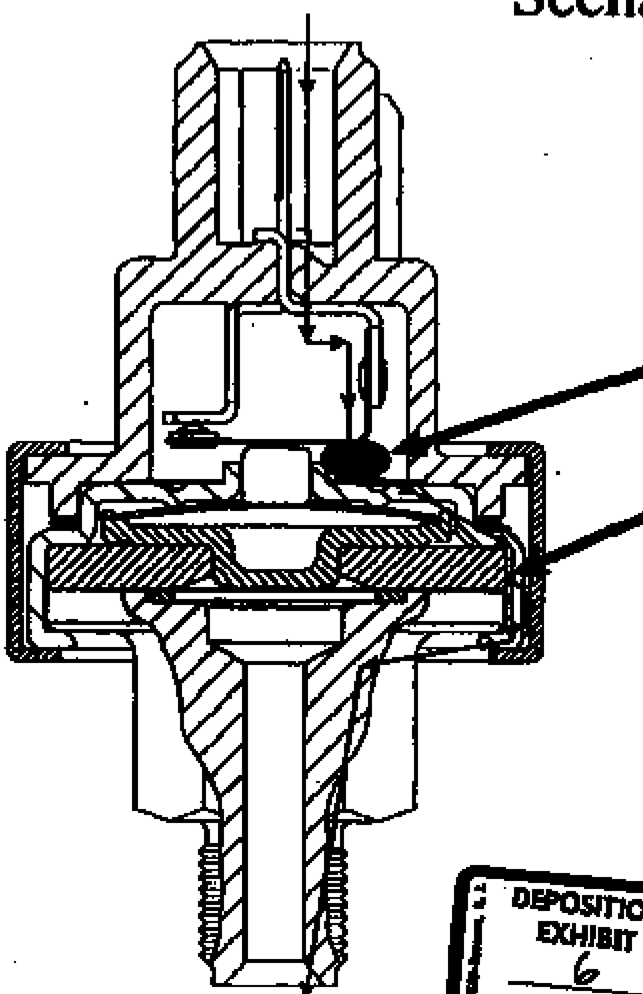
.003" polyimide

6

A
I
B
I
T
S

EA02-025-A 13870

Scenario



1. Contamination enters switch cavity through perforated kapton seal or connector seal.
2. Switch components and cup corrode with aid of electric field and contamination.
3. Current path forms between battery and ground.
4. Current increases as material builds until heat is generated to melt plastic.
5. When plastic melts enough to open the switch cavity to external air, the plastic ignites consuming the switch housing and connector.

7

EXHIBITS

Mead

DEPOSITION EXHIBIT 7

NEAT SHEET®
perforated paper

80 SHEETS
COLLEGE RULED
11 x 8½ in / 27.9 x 21.5 cm

1 SUBJECT
NEATBOOK® NOTEBOOK

TI 00011112A

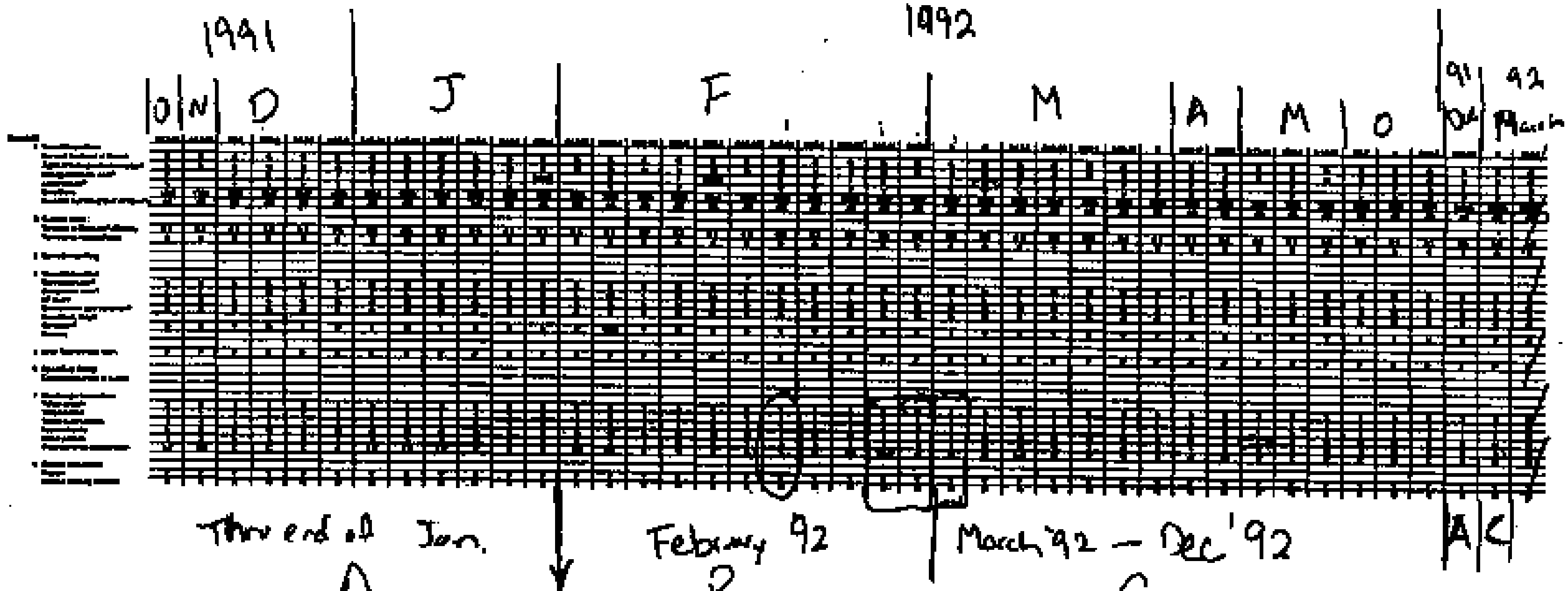
0 43100 06506 7

05802-925-A 13882

Steve Rivers

313-390-3286

TI 00011112B



Slan 9/13 = 69%   10/11 = 91%   5/16 = 31%   Total = 24/40 = 60

TI 00011112C

ER82-625-A 13584

Return Analysis on 77PSL2-1
10/8/99

Background:
25 switches were reported to have failed during the change-out procedure currently being conducted by Ford Dealers. These returns were all built in 1999 and supplied to Ford as part of the *Brake Repair Kit* (XW7Z-9O652-AA).

Objective:
Find any functional deficiencies with the 25 switches returned.

Visual Inspection:
Upon receipt of the 25 switches, TI did a visual inspection. Twenty-three of the switches appeared to be in like new condition. However, 2 of the switches showed obvious signs of abuse. These 2 switches appeared to have been installed or removed with pliers by applying torque to the crimp ring and base; not the hex flats. The results of this inspection are summarized below:

Indications of proper installation	17
No signs of installation	4
Improper installation techniques used	2
Damaged threads	1

Only 2 switches were returned with caps and still had brake fluid retained in the pressure cavity of the switches. We were able to obtain 2 small samples of this fluid.

It should be noted that the switches were returned with yellow tags containing information about why the switch was replaced. The tags listed the following reasons for returns:

No Description	9
Brake Fluid Leak	6
Administrative Parts Return	4
Engagement Troubles	2
Disengagement Troubles	2
ABS Warning Light	1
Other Electrical Accessory Trouble	1

Calibration and Electrical Testing:
All 25 switches were checked for actuation and release as defined by the specification. All were within specified limits.

In addition to the normal electrical parameters defined in the product specification, TI also measured current leakage from the terminal to the hexport. This test was done by applying a current limited 14 Vdc power supply to the terminals of the switch. While a voltage is applied to terminal and the hexport is held at ground, the current flow into the switch is measured. All switches measured 0.0 mA.

During the calibration check the switch is pressurized to 200psi with air. All switches sealed properly during this test.

Dissection:
Since no issues were discovered, it was determined that only a sub set would be dissected and internally inspected. Removing the crimp ring and the base would allow internal inspection and direct leak check of the sensor. Six switches were selected for dissection (2 from the brake Fluid Leak group, 1 from Administrative Parts, 1 from Disengagement Troubles, 1 from other Electrical Accessory Troubles, and 1 from Brake ABS Warning Light Troubles).

TI 00011112D

E002-026-A 13865

The internal inspections confirmed no fluid leakage into the connector cavity, no contamination, and good electrical contacts. Further leak testing of the sensor using refrigerant and a leak detector confirmed no leakage. It is possible that brake fluid leakage may occur on the vehicle due to insufficient installation torque, contaminated threads, contaminated sealing surface, or damaged components.

Summary:

- All switches were within specification.
- No current path to ground was detected.
- No leaks were discovered.
- 2 switches were mis-handled during the install/removal cycle.

End of Document.

DateCode	Bid date	Veh line	miles	location	prefix	suffix
2055	11/19/91	tc	49659			
2160	11/20/91	tc	64866			aa
1275	11/21/91	tc	65900	morgan city		bb
1123	12/4/91	tc	127011			
9142	12/11/91	tc	71900			
1275	12/16/91	tc	49299			
2008	12/16/91	tc	96015			ab
2450	12/20/91	tc	94390			
1291	1/16/92	tc	66253			bb
2114	1/23/92	tc	36756			
1352	2/6/92	tc	89673			ab
1291	2/7/92	tc	122816			bb
1312	2/10/92	tc	69329			
1312	2/12/92	tc	76795			bb
1269	2/13/92	tc	96966	alli, eureka		bb
none	2/13/92	tc	116151			
2014	2/16/92	tc	199012			
1347	2/26/92	tc	163069			
1347	2/28/92	tc	99115			
1275	3/2/92	tc	254369	l, ft. pierce		bb
1347	3/3/92	tc	96576			
3208	3/3/92	tc	116331			
1291	3/9/92	tc	69459			
1365	3/9/92	tc	79741			,ab
2153	3/11/92	tc	36210			
9141	3/11/92	tc	123094			
1345	3/12/92	tc	71665			
2056	3/12/92	tc	76900			
2055	3/13/92	tc	97469			
2147	3/17/92	tc	94091			
2030	4/2/92	tc	126651			
1331	4/7/92	tc	77732			
1260	4/10/92	tc	73627			
2154	4/13/92	tc	89689			
2008	4/21/92	tc	79662			ab
2031	4/27/92	tc	122574			
2036	4/28/92	tc	94972			
9142	4/29/92	tc	96952			
1864	5/8/92	tc	93346			
1291	5/20/92	tc	115064			
2054	5/28/92	tc	90000			
2052	5/28/92	tc	190000			
2079	6/4/92	tc	94616			
9133	6/8/92	tc	89675			
1338	7/14/92	tc	93007			ab
2080	7/15/92	tc	133345			
2137	7/21/92	tc	58236	, springfie	t2ac	aa
2052	7/23/92	tc	104341			

TI 00011112F

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2052	8/5/92	tc	104047			
1312	8/20/92	tc	52541			bb
2063	8/20/92	tc	48596			
2082	8/26/92	tc	77500	morgan city		ab
9128	8/27/92	tc	27292			
2266	8/28/92	tc	88164			
2042	9/3/92	tc	122230			
2057	9/4/92	tc	111005			
2079	9/9/92	tc	81648			
2063	9/10/92	tc	74000	morgan city		ab
1291	9/11/92	tc	44504			
2065	9/17/92	tc	59392	morgan city		ab
2057	9/18/92	tc	63426			
2065	9/24/92	tc	33402			
1140	9/25/92	tc	49909			
1338	9/25/92	tc	10728			ab
2065	9/28/92	tc	120111			
2042	9/30/92	tc	116493	, annandale		ab
2058	10/6/92	tc	140835			
1331	10/7/92	tc	99667			
2015	10/13/92	tc	51210			
2057	10/21/92	tc	116321			
9168	10/21/92	tc	124734			
2035	11/3/92	tc	101200	morgan city		ab
2031	11/6/92	tc	69452			
2108	11/17/92	tc	131003			
2267	11/17/92	tc	64307			
1364	11/18/92	tc	158225			
1364	11/24/92	tc	92168			ab
2079	11/24/92	tc	40647			
1312	11/30/92	tc	34239	a, anaheim		bb
2043	2/24/92	cv	89640			
2008	2/25/92	cv	48935			ab
1338	2/27/92	cv	172080			ab
2112	3/2/92	cv	97703			
1352	3/4/92	cv	51242			
1308	3/6/92	cv	34308			
2064	3/6/92	cv	55887			
3028	3/9/92	cv	53288			
1280	3/24/92	cv	120264			
2038	3/24/92	cv	73869			
2042	3/24/92	cv	76947			
2281	4/2/92	cv	98548	l,woodriver		ab
1140	4/6/92	cv	22645			bb
6197	4/28/92	cv	80237		f3ta	ca
9142	5/1/92	cv	91174			
2036	5/4/92	cv	78840			
2108	5/5/92	cv	75125			
2043	5/7/92	cv	96685			

TI D0011112G

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2014	5/19/92	cv	87619			
1269	6/16/92	cv	125043			
1312	6/16/92	cv	99272			
2108	6/17/92	cv	40771			
2139	7/2/92	cv	116159			
2139	7/2/92	cv	114877			
2137	7/28/92	cv	79522			
2153	8/19/92	cv	61517			
2147	8/25/92	cv	75256	morgan ci	f2ac	aa
2071	8/26/92	cv	69807			
1280	8/27/92	cv	65224			
2055	9/21/92	cv	33068			
1354	9/22/92	cv	46773			
9133	9/29/92	cv	66046			
2027	10/2/92	cv	47341			
2055	10/21/92	cv	95779			
2114	10/22/92	cv	69184			
1347	10/26/92	cv	85161			ab
2042	10/30/92	cv	87971			
9142	11/10/92	cv	69396			
2039	11/17/92	cv	79617			
9166	2/24/92	gm	76828			
2069	2/25/92	gm	44216			
9138	2/25/92	gm	37766			
1312	3/3/92	gm	58565			
7317	3/13/92	gm	88797			
1343	3/17/92.	gm	83553			
2142	3/17/92	gm	60800			
2031	3/19/92	gm	106499			
1269	3/20/92	gm	17310			
1306	3/24/92	gm	55846			
2065	3/24/92	gm	55071			
1347	3/27/92	gm	33701			ab
1345	4/1/92	gm	68201			ab
1352	4/16/92	gm	75231			ab
2119	4/16/92	gm	78448			
1275	5/1/92	gm	45733			
2108	5/4/92	gm	137590			
2062	5/6/92	gm	91385	t, billings		ab
9142	5/7/92	gm	69338			
2052	5/20/92	gm	47551	base gone		
1291	6/21/92	gm	37061			
2113	5/22/92	gm	108007			
2015	6/8/92	gm	91612			
2031	6/8/92	gm	16261			
2120	6/9/92	gm	119320			
1364	6/10/92	gm	45875			
2115	6/11/92	gm	79002			aa
2119	6/12/92	gm	73796			

2136	6/16/92	gm	87344		
2119	6/18/92	gm	29720		
1291	6/24/92	gm	94586		bb
2137	6/26/92	gm	57547		
2054	7/1/92	gm	99752		
2056	7/1/92	gm	70523		
2137	7/7/92	gm	36001		
2137	7/10/92	gm	61456		
2154	7/29/92	gm	51076		
2150	7/30/92	gm	57136		
2197	7/31/92	gm	86104		
2069	8/10/92	gm	94000		
2115	8/11/92	gm	83484		
1331	8/14/92	gm	98579		
2063	8/14/92	gm	96893		
2059	8/19/92	gm	31627		
2060	8/19/92	gm	145869	a, spokane	ab
9126	8/20/92	gm	51742		
2155	8/21/92	gm	81252	y, kenmore f2ac	aa
9142	8/21/92	gm	71210		
2079	8/25/92	gm	58109		
2043	8/26/92	gm	108511		
1345	8/28/92	gm	58587		
2071	8/31/92	gm	68228	morgan city	ab
2038	9/1/92	gm	67550		
2113	9/3/92	gm	65094		
1345	9/8/92	gm	80400		ab
2045	9/8/92	gm	76160	l, ypsilanti	
2119	9/18/92	gm	49574		
2062	9/21/92	gm	43474	ariz, mesa	ab
2069	10/2/92	gm	71963	, port richie	ab
1260	10/15/92	gm	85285		bb
9132	10/16/92	gm	48180		
2255	10/20/92	gm	93456		aa
1343	10/22/92	gm	57468		
2120	10/22/92	gm	59141		
2069	11/9/92	gm	63101		
1269	11/20/92	gm	77092		bb
1338	11/25/92	gm	46521		ab
1140					
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1275					
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1291					
1306					

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9168
none

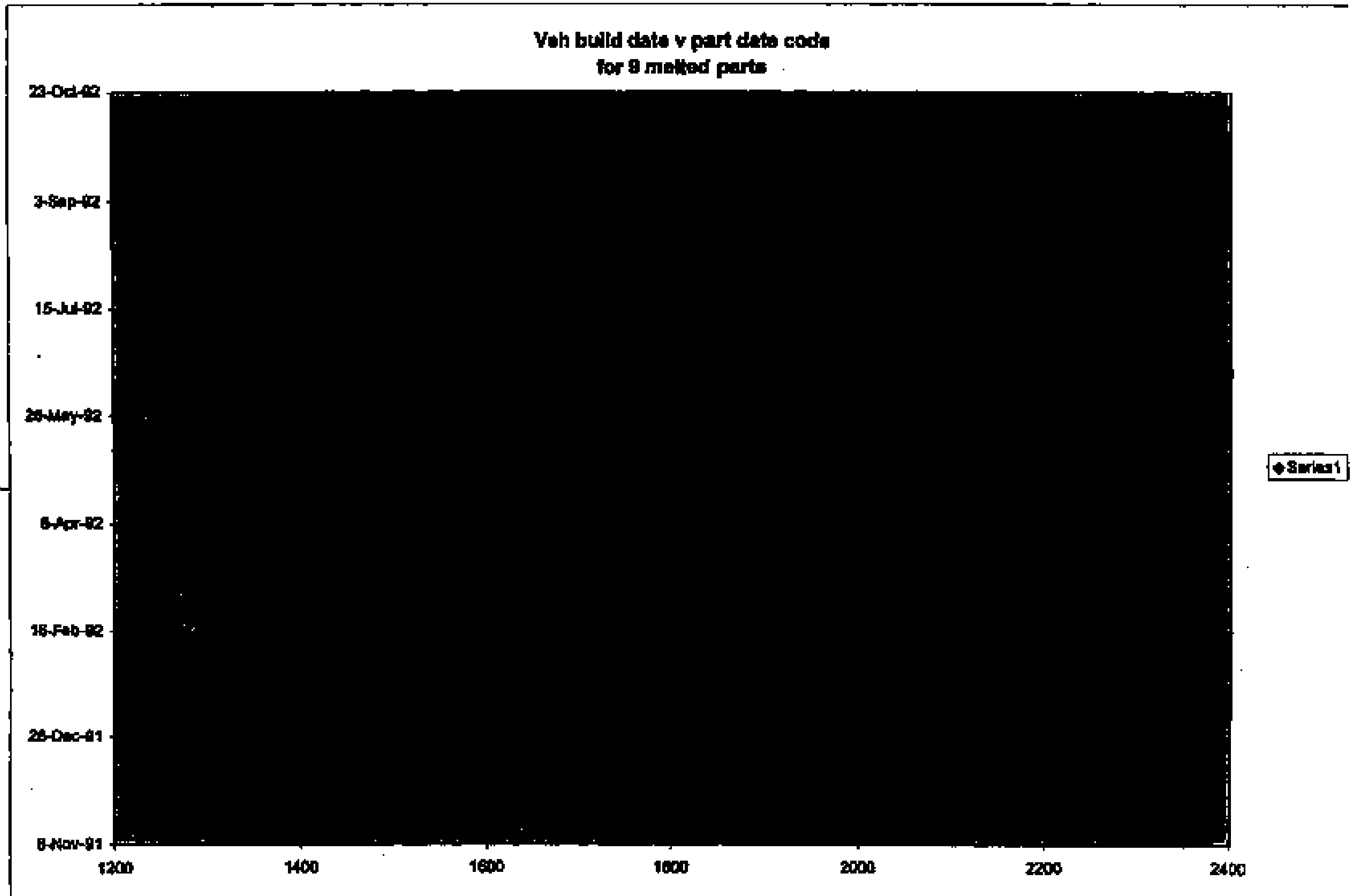
DateCode	Bld date	Veh line	miles	location	prefix	suffix
1269	2/13/92	tc	95065	alif, eureka		bb
2052	9/21/92	gm	43474	ariz, mesa		ab
1312	11/30/92	tc	34239	a, anaheim		bb
2137	7/21/92	tc	58236	, springfiel	f2ac	aa
2281	4/2/92	cv	90546	l,woodriver		ab
2080	8/19/92	gm	145859	a, spokane		ab
2062	5/5/92	gm	91395	mt, billings		ab
2155	8/21/92	gm	61252	y, kenmore	f2ac	aa
2069	10/2/92	gm	71863	l, port richie		ab
2042	9/30/92	tc	116483	, annandale		ab
2063	9/10/92	tc	74000	, morgan city		ab
1275	11/21/91	tc	65000	, morgan city		bb
2147	8/25/92	cv	75256	, morgan ci	f2ac	aa
2035	11/3/92	tc	101200	, morgan city		ab
2062	8/26/92	tc	77500	, morgan city		ab
2065	9/17/92	tc	59392	, morgan city		ab
2071	8/31/92	gm	65228	, morgan city		ab

From Steve Pleivers at Ford 9/23/99

TI 0011115

ER02-025-A 13604

Shee.. Chart 1 From Ford plot

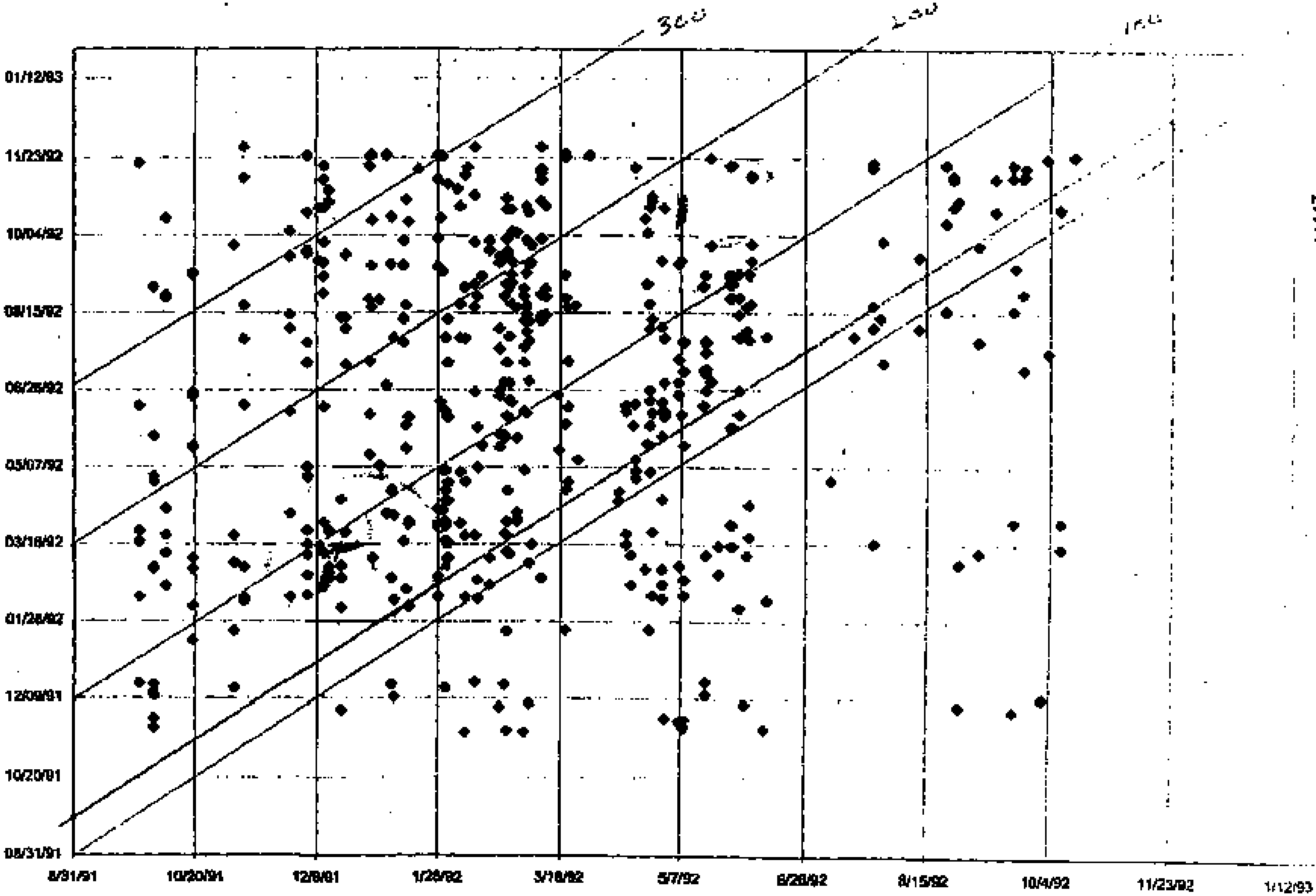


Vehicle

Switch

From Steve Reiners
10/13/99

Prod'n Date v Date Code



TI 0011117

Page 1

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ER02-025-A 13896

Beringhause, Steven

From: Steve Reimers[SMTP:sreimers@ford.com]
Sent: Friday, September 17, 1999 10:38 AM
To: sberinghause@email
Subject: Please forward to Beringhause

This is the same email I sent to andy to forward to you.

Steve Reimers   building 5 3E008
RVT Chassis E/E System Applications   mail drop 5011
39-03286 SREIMERS   sreimers@ford.com   fax 39-04145   ;>

*** Forwarding note from SREIMERS--DRBN007 09/17/99 08:18 ***
To: FIR43P4A--EXTERNAL A.McGuirk, a-mcgui
cc: SREIMERS--DRBN007 Reimers, S. J.   FPORTER --DRBN007 Porter, F.J.

FROM: Steve Reimers   USAET(UTC -04:00)
Subject: Please forward to Beringhause
Steve, This is a follow-up to my voice message of 9/17/99 AM. Did you get any -BB suffix parts from dealers? Analysis results on -BB parts? Were there any -BB parts in the 40 parts you gave me a preliminary report on? Have you completed any more testing on the 40? **** Of the 25 life tested parts...Do any show cracks in the terminal structure (fatigue, stress, ..etc) in particular the stationary terminal minimum cross-section at the thru hole? ANy more testing done on the 25 parts? Your tear drop occurrence numbers show a radical drop after Feb 1992... why? Info...we have x-rayed a -BB part and are amazed by the radical design differences compared to -AB. have a good weekend, thanks.

Steve Reimers   building 5 3E008
RVT Chassis E/E System Applications   mail drop 5011
39-03286 SREIMERS   sreimers@ford.com   fax 39-04145.   ;>

9/22/99 - phone call with Steve Reimers
- 390 parts
-> 5H wanting about 90

Cracks on two parts (terminals) one redditch parts in area
one recall part - crack -

Recall parts - 25 parts only
Build date vs. date code
Spread by 102 days
none less than 56 days
4 between 100 + 50 days
120 days out to 150 days

3BB - parts off, turn car
vehicle production 2/92
11/91 12/92

-> See Rebbie - Did they stop calibration station back?
Based on this data the correlation to the switch change may be falling by the way side.

TI 0011118

E982-02B-A 13697

Phone call with Steve Reimers (Ford) + Steve Beringhause (TI)
9/28/99

~1500 parts received from field campaign
200+ in spreadsheet – no correlation between switch date code + vehicle build date

200+ measured for terminal – terminal continuity + terminal to case resistance
– 2 open circuit terminal to terminal
– 1 w/ 27Ω resistance terminal to terminal

25 parts to be sent to TI for F/A
1999 datecodes – Ford dealers say leakers or do not write right

– Tentative meeting set up for 10/13 to review results

TI 0011119

EA02-025-A 13898

Conversation with Steve Reivers 10/7/99
by Steve Beringhause

- Believes data on switch date codes + vehicle build dates is 80-90% correct.

- Agrees that there is no correlation between switch datecodes + vehicle build dates

- Switches from vehicle fires datecodes do not correlate to vehicle build datecodes

- 11 parts with melted bases found to date.
  - Some have crud in the base, some do not.
  - One part has the base fully consumed.

- Up to 3000 parts in house to date.

TI 0011120

ER02-025-A 13806

248-305-5722
Rob
248-613-2722

Meeting at Ford 10/13/99
Steve Powers
Rob Park (Expert)
Steve Baughman

Component Drugs - BB & AB suffix
Requested by Steve late '91 - 92 drawing
each revision thru '93

→ 11 melted out of 1700 parts (visually inspected by Ford from recall)

#8 - AA suffix - truck part - came back w/ car recall 2030 F3TA -AA

No terminals in base - [illegible]

12/16/91 vehicle build date

- Truck part connector keyed differently - why was this on a Town Car?
- could result in poor connector seal

#4 - 1075B BB - suffix - lots of crud around Bay
Mating connector present & melted. 3/2/92 VIN 1LNLM81 W7NY691926

#5 - 9133C Looks melted - dropped on sandy lot 3/13/92 (when cut open - inside clean)

#1 - 2263 F2AC-AA 93 years - vic melted
9/14/92 veh. Build date

#2 - 2262 F2AC-AA 12/3/91 [illegible] - Build date melted

#3 - 2052 F2VL-AB most of the plastic consumed 5/20/92 VBD

#7 - F2VL-AB 2008 Not melted 4/23/92 - vehicle

#6 F2VL(2036) -AB 4/1/92 Bld date melted

#9 -BB (5TB) - Not melted 1280A - wet, no seal on connector 2/23/92 VBD

#10 - from F150 F3TA-CA 3298 Dealer saw smoke →
Melted Base - same stuff in bay at bottom

148,000 miles on the vehicle 1994 Meade Kansas
Unit # KA 65363

#11 partially melted base 2104 BLD 3/18/92 - 1LNLM81W1NY699241

TI 0011121

EA02-025-A 13980

	Sw Datecode	Vehicle build date		Res - Hot to case
(1)	2263	9/14/92	Melted	2Ω
2	2262	12/2/91	Melted Did not leak	100Ω
(3)	2052	5/20/92	Melted	
(4)	1275	3/2/92	Melted	91Ω
5	9133	3/13/92	Melted - different?	OL
(6)	2036	4/1/92	Melted	OL
7	2008	4/23/92	conductivity to GND?	3K
8	2032	12/16/91	Melted	
9	1290	2/20/92	conductivity to GND?	90kΩ
10	3299	1994	Melted - F150	4Ω or OL!
(11)	2104	3/18/92	Melted	20Ω

Std vs spring

7/1700 base melted with internal corrosion received from recall campaign.

base
1 - melted w/ corrosion from F150
2 - Not melted w/ high conductivity to ground

- Spring arm always powered - away from key per Ford

~~#10 - 1432 ... - ... key ... 2032~~

#2 - Split in foam seal.
- held pressure 500 psi for 1 minute.

#10 - Did not leak.
#4

- All parts had fluid in the switch cavity except for #5 (looks like it was dropped on something hot.

- Ford hired Exponent to help out with analysis (Rob Parek)

TI 0011122

EA02-025-A 13801

Phone call with
Steve Reiners 10/27/99 8:15AM.

- Finished opening melted parts
  - Chemical analysis not done yet
  - opened parts to teflon layers
  - all seem to have fluid between layers

- Did see on 4 or several washers
  - Top of chamfer - on flat facing hexport
    - discontinuity on edge aligned with crack
      - will scan - protrusion or pit?
  - Single straight line in washer as identifier
    one had two

- Sample from high mileage vehicle
  - No leakage - No moisture - good electrical function

- will send spreadsheet from melted parts

TI 0011123

- Switch Date codes from fires:
  2056, 2281, 2114, 2003, 2045, 2089,
  2080,

- Seven parts for analysis from an array of datecodes
  2 - Feb 92, 2 - Nov 92, 2 - 1995,
  1 - BB suffix

- About 6000 in house
  - 1100 logged - will send spreadsheet
- one more melted part - hole in base - from (7700 / 2064)

Ford AB sub.
'92 Town Car
98,972 mi

Phone call with Steve Reners 9:15AM
11/24/99

- Central Lab not yet completed chemical analysis
- Kapton cracked on all parts with melted bases
- outside company - logging & binning parts

~ Total of about 8000 parts back

- working to make sure first 1700 received is a representative population

→ Planning to run cycle life test

→ 100K miles - cycle life left
comparing early to late datecodes
will TI run test?

→ Five from each group

TI 0011124

EA02-025-A 13963

Phone call with Steve Peres 12/14/99 9 Am

Pressure Cycling of Used Switches
Started 12/6/99

Revised data

Switch ID	Date Code	# of Cycles	
3	2015	56566	56.6 K
→ 11	2008	77837	74 K
7	2014	254000	254 K
8	2013	260000	260 K
4	~~2281~~	294000	294 K
10	2013	345000	345 K
→ 9	2008	350683	350 K

380K - still going - 4 out/now.

Steve R's thoughts:

I don't know -

Big disparity on 2008

Tech review meeting - Director of Quality

Present actions

- get switch out of car

- replaced switch on brake pedal

- relays on two vehicle - getting mileage

- Do not have root cause yet

Asking about other platforms

- Still Town car sticks up

→ Generic term for an acid

Per Steve R. no evidence ~~that~~ exists that shows that switches do not meet spec

Only evidence is what TI provided that all switches meet spec

TI 0011125

E902-025-R 13004

LAST REVISED 5/27/99 by LM

Misc changes

TI INTERNAL DATA

PRESSURE SWITCH CROSS-REFERENCE LIST

TO BE USED FOR REFERENCE ONLY

Actuation / Release / DIFF: * = 105C calibration; ** = 125C calibration

TI P/N	CUSTOMER PART NO.	CUSTOMER	funct	Actuation (psig)	Release (psig)	DIFF (psig)	base color/ flag/contact	port fitting/hexcup details: type/PN/snubber	thread	hex	finish	OTHER	prod'n status
52PSL7-1	10216778	GM	pwr strg	**450-550	**350 min	**100 min	grey	o-ring/27290-3	3/8-24 M	9/16	Zn/clear	epoxy	P
52PSL8-1	09 21338	GM	pwr strg	**450-550	**350 min	**100 min	brown	o-ring/doggy/37087-1	M10x1.0 M	14 mm	Zn/clear		s
52PSF3-2	10041728	GM	pwr strg	**450-550	**350 min	**100 min	black	pipe/27360-1	1/8-27 M	9/16	Zn/clear	sealant	s
52PSF7-1	10238818	GM	pwr strg	**450-550	**350 min	**100 min	black	o-ring/27290-3	3/8-24 M	9/16	Zn/clear	epoxy	P
[redacted]													
55PSL3-1	6551843	Harrison	hpco	**410-450	**150-250		nat'l/135/LC	comp./36551-1	n/a	n/a	Zn/yellow	R12	s
55PSL6-1	6559741	Harrison	hpco	**410-450	**150-250		blue/135/LC	comp./36551-1	n/a	n/a	Zn/yellow	R134	P
55PSL6-2	6559772	Harrison	hpco	**410-450	**150-210		orange/135/HC	comp./36551-1	n/a	n/a	Zn/yellow	R134	s
55PSF2-2	6551999	Harrison	hslp	55 max	45 min	3 min	black/90/LC	comp./36732-1	n/a	n/a	Zn/yellow	R134	s
55PSF4-1	6559742	Harrison	hslp	40-47	37 min	3 min	brown/90/LC	comp./36732-1	n/a	n/a	Zn/yellow	R134	P
55PSF5-2	6551998	Harrison	fan	*281-305	*210 min	*43.5 min	purp/90/LC	comp./36551-1	n/a	n/a	Zn/yellow	R12	s
55PSF6-1	6559908	Harrison	fan	*281-305	*210 min	*43.5 min	red/90/LC	comp./36551-1	n/a	n/a	Zn/yellow	R134	s
[redacted]													
56PSL2-1	14676870	CPC	fan	*220-260	*170 min	*50 min	red/90/LC	1pc/36910-1	3/8-24 F	5/8	cad/clear	R12	s
56PSL2-2	10045778	CPC	fan	*170-210	*125 min	*30 min	black/90/LC	1pc/36910-1	3/8-24 F	5/8	cad/clear	R12	s
56PSL4-1	14103316	CPC	hpco	**410-450	**150-250		nat'l/135/LC	1pc/36910-1	3/8-24 F	5/8	cad/clear	R12	s
56PSL5-2	15663626	GM T&B	hpco	**410-450	**150-250		mush/135/LC	1 pc/36940-6	M10x1.25 F	14mm	Zn/olive	R134	P
56PSL5-3	309933	Fayette	hpco	**450-490	**270-330		e nat./135/LC	1 pc/36940-6	M10x1.25 F	14mm	Zn/olive	R134	P
56PSL5-4	10223909	CPC	fan	*220-260	*170 min	*50 min	red/90/LC	1 pc/36940-6	M10x1.25 F	14mm	Zn/olive	R134	s
56PSL5-5	10223569	U van	fan	*170-210	*125 min	*30 min	black/90/LC	1 pc/36940-6	M10x1.25 F	14mm	Zn/olive	R134	s
56PSL5-6	93231462	GM Brazil	hpco	410-450	200-300		pink/135/LC	1 pc/36940-6	M10x1.25 F	14mm	Zn/olive	R134	s
56PSL7-1		GM Truck	hpco	410-450	150-210		brown	1pc/36940-8	M10x1.25 F	14mm	Zn/yellow	R134	s
56PSL7-1A	36671	Aftermarket	hpco	410-450	150-210		brown	1pc/36940-8	M10x1.25 F	14mm	Zn/yellow	R134	s
56PSF4-1	15731514	GM T&B	fan	205-265	125 min	30 min	purp/90/LC	1 pc/36940-6	M10x1.25 F	14mm	Zn/olive	R134	s
56PSF4-2	93229657	GM Brazil	fan	280-310	195 min		grey/225/LC	1 pc/36940-6	M10x1.25 F	14mm	Zn/olive	R134	s
[redacted]													
57PSL2-2	E57A-3N824-AA	AS/PTG	pwr strg	300-400	120 min	50 min	dark grey	27290-3	3/8-24 M	9/16	Zn/clear	o-ring	s
57PSL3-1	E73C-3N824-AA	AS	pwr strg	400-500	200 min	150 min	green	snubr/27445-1	3/8-24 M	9/16	Zn/clear	o-ring	s
57PSL7-1	4606045	TRW (Chrysler)	pwr strg	560-700	200 min	100 min	black	o-ring/snubr/37166-1	3/8-24 M	9/16	Zn/yellow		P
57PSL8-1	92AB-3N824-AA	Ford-Europe	pwr strg	475-625	200 min	100 min	brown	o-ring/doggy/36817-1	3/8-24 M	9/16	Zn/yellow		s
57PSL11-2	93BB-3N824-AB	Ford-Europe	pwr strg	400-500	200 min	100 min	green	o-ring/doggy/36817-1	3/8-24 M	9/16	Zn/yellow		P
57PSL11-3	F3DC-3N824-AA	Ford	pwr strg	575-725	350 min	100 min	brown	o-ring/27290-3	3/8-24 M	9/16	Zn/clear		s

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57PSL11-4	F5FF-3N624-AB	Ford	pwr strg	575-725	350 min	100 min	brown	o-ring/27260-3	3/8-24 M	9/16	Zn/clear		s
57PSL12-1	96FP-3N624-BA	Ford-Europe	pwr strg	546-692	225 min	125 min	mushroom	o-ring/37240-1	3/8-24 M	9/16	Zn/yellow		P
57PSF3-3	E79C-3N624-AA	Ford/Surfcx.	brake	350-450	120 min	80 min	white	snubr/27372-1	3/8-24 M	9/16	Zn/yellow	o-ring	s (91)
57PSF3-5	E80C-2C283-CA	Ford	brake	350-400	120 min	50 min	blue	snubr/27372-1	3/8-24 M	9/16	Zn/yellow	o-ring	s
57PSF3-6	F3LC-3N624-AA	Ford RN10	brake	700-800	120 min	50 min	white	o-ring/snubr/27372-1	3/8-24 M	9/16	Zn/yellow		s
57PSF3-7	MSK 100070	Land Rover	clutch	200-300	40 min		natural	J512/38600-1, o-ring	3/8-24 M	9/16	Zn/yellow	quiet	MY99
57PSF6-1	91AB-3N624-AB	Ford-Europe	pwr strg	475-625	200 min	100 min	red	o-ring/dogpt/36917-1	3/8-24 M	9/16	Zn/yellow		s
57PSF6-2	LNA 1626AA	Jaguar	pwr strg	475-625	200 min	100 min	red	o-ring/dogpt/36917-1	3/8-24 M	9/16	Zn/yellow		s
57PSF6-3	46540150	Dayco (Fiat)	pwr strg	580-725		116-290	red	o-ring/dogpt/36917-1	3/8-24M	9/16	Zn/yellow		P
57PSF9-1	92AB-3N624-BA	Ford-Europe	pwr strg	550-700	200 min	100 min	purple	o-ring/dogpt/36917-1	3/8-24 M	9/16	Zn/yellow		s
[redacted]													
58PSF2-1	1631399	Cadillac	loc	15-25	7-13		black/90/LC	27517-2	7/16-20 F	5/8	Zn/black	R12	s
58PSF2-2	1638606	Cad./Allante	loc	15-25	9-15		black/90/LC	2 pc/27370-2	7/16-20 F	5/8	Zn/black	R12	s
58PSF3-1	10042669	CPC	hsfp	40-47	37 min		brown/90/LC	1pc/36910-3	3/8x24F	5/8	Zn/olive	R12	s
58PSF5-1	93228996	GM Brazil	hsfp	40-47	37 min	3 min	grey/135/LC	1 pc/37167-1	M10x1.25 F	14mm	Zn/olive	R134	s
[redacted]													
60PSD2-1	21030624	Saturn	hsfp/	51 max	37 min	1.5 min	brown/90/LC	1 pc/37124-1	3/8-24 F	5/8	Zn/olive	R12	P
			hpco	**360-420	**200-300								
[redacted]													
61PSF2-2	52456936	Harrison	loc		7-11	33.8-42.2	grey/90/LC	27517-1	7/16-20 F	5/8	white	R12	s
61PSF2-7	52457654	GM T&B	c/c	43-49	23-25	20-24	black/90/HC	27517-1	7/16-20 F	5/8	white	R12/ yellow band	s
61PSF2-4	52451436	GM T&B	c/c	43-49	24-26	19-23	black/90/HC	27517-1	7/16-20 F	5/8	white	R12/ white band	s
61PSF2-5	52451440	Harrison	c/c	43-49	22-24	21-25	black/90/HC	27517-1	7/16-20 F	5/8	white	R12/ green band	s
61PSF2-6	52457653	GM T&B	c/c	43-49	25-27	18-22^	black/90/HC	27517-1	7/16-20 F	5/8	white	R12	s
61PSF2-6A	735829 36654	Aftermarket	c/c	43-49	24-26	15-25	black/90/HC	27517-1	7/16-20 F	5/8	white	R12	s
61PSF3-2	52463555	U van	c/c	38-44	20-22	18-22^	black/90/HC	27517-1	7/16-20 F	5/8	white	R134/ purple band	s
61PSF5-2	52464975	U van	c/c	38-44	20-22	18-22^	black/90/HC	37060-7	M12x1.5 F	16mm	black	R134/ purple band	s
61PSF5-3	52464976	S/T truck	c/c	39-45	21-23	18-22^	black/90/HC	37060-7	M12x1.5 F	16mm	black	R134/ brown band	P
61PSF5-4	52463402		c/c	40-46	22-24	18-22^	black/90/HC	37060-7	M12x1.5 F	16mm	black	R134/ green band	s
61PSF5-5	52463561	Harrison	c/c	41-47	23-25	18-22^	black/90/HC	37060-7	M12x1.5 F	16mm	black	R134/ yellow band	s
61PSF5-6	309938	Chrysler	c/c	38-43	23-25	14-18	black/90/LC	37060-8	M12x1.5 F	16mm	natural	R134	s
61PSF5-7	10242579	C/K Truck	c/c	22-32	2-8		grey/90/HC	37060-7	M12x1.5 F	16mm	black	R134	P

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TI 0011127

EA02-025-A 13986

61PSF5-8	309943	Chrysler	loc	15-25	7-13		black/90/LC	37060-9	M12x1.5 F	16mm	green	R134	s
61PSF5-9	5246835a	C/K truck	c/c	38.5-45.5	20.5-23.5	18-25	black/90/HC	37060-7	M12x1.5 F	16mm	black	R134	P
61PSF5-9A	735829 36659	Aftermarket	c/c	38.5-45.5	20.5-23.5	18-25	black/90/HC	37060-7	M12x1.5 F	16mm	black	R134	s
61PSF5-12	93.234.977	GM Brazil	c/c	44 max	20-22	16 min	black/90/HC	37060-7	M12x1.5 F	16mm	black	R134/Stanyl	s
61PSF6-1	b837	Bertetti/Fiat	c/c	47.14-54.4	22.48-25.38	24.88-28.0	black/90/LC	1 pc/37252-1	7/16-20 F	5/8	Zn/olive	R134	s
						^ = GM print allows differential to open to 24 psig max.							
[illegible]													
76PSL2-3	466944	Volvo Ned	hpco	442-486	275-363		brown/3/LC	1 pc/37239-2	7/16-20 F	5/8	Zn/olive	R134	P
76PSL2-2	F3XH-19D594-AA	Frd/Nis VX54	hpco	**385-425	**200-300	100 min	black/1/HC	1 pc/36810-7	3/8-24 F	5/8	Zn/olive	R12	s
76PSL6-1	6848534	Volvo (P80)	hpco	413-457	247-334	116 min	purple/4/LC	1 pc/36992-1	M12x1.5 F	16mm	Zn/olive	R134/sealed vented	
76PSF2-5	466943	Volvo Ned	fan	276-328	216-247	58 min	lt. grey/2/LC	1 pc/37239-2	7/16-20 F	5/8	Zn/olive	R134	P
76PSF2-6	6848564	Volvo(P20/90)	fan	203-248	131-174	58 min	dk. grey/2/LC	1 pc/37239-2	7/16-20 F	5/8	Zn/olive	R12	s
76PSF4-1	1343216	Volvo(P20/90)	c/c	42.8-47.1	21.8-24.8		black/1/HC	1 pc/37058-2	M12x1.5 F	16mm	Zn/yellow	R134/steel hexcup	P
76PSF4-2	1343215	Volvo (P80)	c/c	42.8-47.1	23.2-28.1		black/1/HC	1 pc/37058-1	M12x1.5 F	16mm	Zn/olive	R134/steel hexcup	P
76PSF6-1	6848532	Volvo (P80)	ls fan	247-290	174-216	58 min	dk. grey/2/LC	1 pc/36992-1	M12x1.5 F	16mm	Zn/olive	R134/sealed vented	P
76PSF6-2	6848533	Volvo (P80)	hs fan	319-363	246-290	58 min	lt. brwn/ 3/LC	1 pc/36992-1	M12x1.5 F	16mm	Zn/olive	R134/sealed vented	P
[illegible]													
77PSL2-1	F2VC-9F924-AB	Ford P/C	brake	90-160	20 min		brown/pos 2	J512/36900-1	3/8-24 M	9/16	Zn/yellow	snap, m-m	s
77PSL2-3	F6LC-9F924-AA	Hilite Ind.	brake	200-300	40 min		black/pos1	J512/36900-1	3/8-24 M	9/16	Zn/yellow	snap, m-m	s
77PSL3-1	F2AC-9F924-AA	P/C - EN53	brake	90-200	20 min		nat'l N/pos 2	J512/36900-1	3/8-24 M	9/16	Zn/yellow	snap, m-m	s (96)
77PSL3-2	F58A-9F924-AA	Ford WIN88	brake	90-160	20 min		grey N/pos 1	J512/36900-1	3/8-24 M	9/16	Zn/yellow	snap, m-m	P
77PSL3-3	F3TA-9F924-CA	L/T - F-series	brake	200-300	40 min		red N/pos 1	J512/36900-1	3/8-24 M	9/16	Zn/yellow	snap, m-m	P
77PSL3-4	MSK 100050	Land Rover	clutch	200-300	40 min		red N/pos 1	J512/36900-1, o-ring	3/8-24M	9/16	Zn/yellow	quiet	P
77PSL4-1	94DA-9F924-AA	Austr - Falcon	brake	90-160	20 min		nat'l N/pos 2	o-ring/37067-1	M10x1.0 M	14mm	Zn/clear	quiet	P
77PSL5-2	F3DC-9F924-AA	Taurus SHO	brake	90-160	20 min		nat'l N/pos 2	snubr/36997-1	3/8-24 M	9/16	Zn/clear	quiet	s (93)
77PSL6-1	94JA-9F924-AB	Austr - Capri	brake	90-160	20 min		dk gry N/pos 1	o-ring/36917-1	3/8-24 M	9/16	Zn/yellow	quiet	s
[illegible]													
78PSL2-1	F3AH-19D594-AA	Ford P/C	hpco	**415-445	**230-290		black/std./LC	1 pc/36999-1	M10x1.25 F	14mm	Zn/olive	R134	P
78PSL2-2	F3AH-19D594-BA	Ford L/T	hpco	**430-460	**230-290		black/std/LC	1 pc/36999-1	M10x1.25 F	14mm	Zn/olive	orange band	P
78PSL2-3	F42H-19D594-BA	Probe	hpco	**415-445	**180-240		nat'l/std/LC	1 pc/36999-1	M10x1.25 F	14mm	Zn/olive	R134	P
78PSL2-4	F3AH-19D594-CA	Ranger	hpco	**460-490	**230-290		black/std/LC	1 pc/36999-1	M10x1.25F	14mm	Zn/olive	yellow band	P
78PSL2-6	F5TH-19D594-AA	P/C & L/T	hpco	**430-470	**230-290		black/std./LC	1 pc/36999-1	M10x1.25 F	14mm	Zn/olive	R134	P
[illegible]													
79PSD2-1	114-5333	Caterpillar	halp/	40 max	16.8-32.7	4 min	red/HC	1 pc/37239-1	7/16-20 F	5/8	Zn/olive	R134	P
			hpco	380-420	221-279		cable asm 27888-3						

79PSD2-2	114-5394	Caterpillar	help/	40 max	16.6-32.7	4 min	red/HC	1 pc/37239-1	7/16-20 F	5/8	Zn/olive	R134	P
			hpco	380-420	221-279		cable a sm 27923-3						
79PSD3-1	1MR3550M	Mack	help/	23-37	20-33	1.5 min	grey/HC	1pc/37128-1	M10x1.25 F	14mm	Zn/olive	R134	P
			hpco	315-355	215-275		cable asm 27924-1 (not potted)						
79PSD3-2	2-37920	Signet	help/	23-37	20-33	1.5 min	grey/HC	1pc/37128-1	M10x1.25 F	14mm	Zn/olive	R134	P
			hpco	315-355	215-275		cable asm 28848-1 (not potted)						
79PSD4-1	K301-370	Kenworth	help/	40 max	26 min	1.5 min	brown/HC	1pc/37128-1	M10x1.25F	14mm	Zn/olive	R134	P
			hpco	380-420	200-300								
79PSD4-2	2-37281	Signet	help/	40 max	26 min	1.5 min	brown/HC	1pc/37128-1	M10x1.25F	14mm	Zn/olive	R134	P
			hpco	380-420	200-300								
79PSD5-1	GD4T61503	Mazda	help/	28.4-36.3	27-35	1.4 min	red/LC	1pc/37128-1	M10x1.25F	14mm	Zn/olive	R134	P
			hpco	426-483		97-153							
79PSD6-1	BJOE61503	Mazda	help/	28.4-36.3	27-35	1.4 min	purple/F8/LC	37409-2	M11x1.0M	24mm	Aluminum	R134	P
			hpco	426-483		97-153							
79PSF2-1	15938454	GM Truck	fan/r dr	320-380	240 min	30 min	dk green/F8/LC	1pc/38840-8	M10x1.25F	14mm	Zn/olive	R134	P
79PSF2-2	P93CAA-3606-01	Signet	fan	270-310	200 min	60 min	lt grey/LC	1pc/38840-6	M10x1.25F	14mm	Zn/olive	R134	P
79PSF2-3	GD4W61503	Mazda	fan	182-235		42-65	natural/LC	1pc/38840-6	M10x1.25F	14mm	Zn/olive	R134	P
79PSF3-1	P93CAA-3604-01	Signet	c/o	47 max	23-28	17-23	mushrm/HC	1 pc/37058-1	M12x1.5 F	16mm	Zn/olive	R134	P
79PSF5-1	52475933	m-van	c/c	40-46	22-24	18-24	green/MR/HC	37060-7	M12x1.5 F	16mm	black	R134/green ID	NP (conv to 79PSF5-4)
79PSF5-2	GD7A61504	Mazda	c/c	40-46	21.5-24.5		natural/LC	37060-7	M12x1.5 F	16mm	black	R134	P
79PSF5-3	F27-1002	Kenworth	loc	26-34	10-18		dk green/LC	37060-7	M12x1.5 F	16mm	black	R134	P
79PSF5-4	52475933	Harrison	c/c	40-46	22-24	18-22	black/MR/HC	37060-7	M12x1.5 F	16mm	black	R134/green band	P
79PSF5-5	52482605	Harrison	c/o	39-45	21-23	18-22	black/MR/HC	37060-7	M12x1.5 F	16mm	black	R134/brown band	P
79PSF5-6	15035084	GM Truck	c/c	41-47	23-25	18-22	black/MR/HC	37060-7	M12x1.5 F	16mm	black	R134/yellow band	
79PSL2-2	6558905	C/K Truck	hpco	**410-450	**180-210		orange/LC	1pc/37138-1	M10x1.25F	14mm	Zn/yellow	R134	s
79PSL2-3	P93CAA-3605-01	Signet	hpco	330-370	180-240		purple/LC	1pc/38840-6	M10x1.25F	14mm	Zn/olive	R134	P
79PSL2-4	2-37007	Signet	hpco	380-420	220-280		lt blue/LC	1pc/38840-6	M10x1.25F	14mm	Zn/olive	R134	P
79PSL2-5	GD7A61503	Mazda	hpco	483-427		153-97	dk blue/LC	1pc/38840-6	M10x1.25F	14mm	Zn/olive	R134	P
79PSL2-6	F27-1000	Kenworth	hpco	330-370	210-250		dk green/LC	1pc/37138-1	M10x1.25F	14mm	Zn/yellow	R134	P
79PSL3-1	F27-1001	Kenworth	fan	280-320	210-250		orng/LC(gold)	1pc/38840-6	M10x1.25F	14mm	Zn/olive	R134	P
79PSL3-2	16-04290	Signet	fan	270-310	200 min	60 min	lt grey/LC	1pc/38840-7	M10x1.25F	14mm	Zn/olive	R134	MY98/99
[redacted]													
80PSL2-1	56490-P0H-0030	Honda	pwr strg	313-388	170 min	71 min	gm 8umitomo	o-ring/snubr/37048-1	M10x1.25M	17mm	Zn/yellow		P
80PSL2-2	56490-P2C-A620-M2	Honda	pwr strg	242-327	114 min	67 min	natural	o-ring/snubr/37048-1	M10x1.25M	17mm	Zn/yellow		P
[redacted]													
82PSF2-1	309953	Chrys connctr	loc	15-25	7-13		brown/LC	37050-9	M12x1.5F	16mm	green	R134	P

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82PSF2-2	309952	Chrys connctr	c/c	38-43	23-26	14-16	brown/LC	37060-8	M12x1.5F	16mm	natural	R134	P
82PSF2-3	309951	Chrys connctr	c/o	38-34	21.5-19.5		brown/LC	37060-7	M12x1.5F	16mm	black	R134	P
82PSD2-1	5E10390C	Chrys connctr	hslp/	23-37	20-33	1.5 min	grey/HC	1pc/37126-1	M10x1.25F	14mm	Zn/olive	R134	P
			hpco	**450-490	**270-330								
82PSL2-1	4773190	Chrys connctr	hpco	**450-490	**270-330		black/LC	1pc/36940-6	M10x1.25F	14mm	Zn/olive	R134	P
[illegible]													
84PSF2-1	04897612AA	Chrysler	loc	15-25	7-13		dk grey/LC	37060-9	M12 X 1.5 F	16mm	green	R134/plastic	MY98
84PSF2-2	04897613AA	Chrysler	c/o	34-38	21-23		dk grey/LC	37060-7	M12 X 1.5 F	16mm	black	R134/brown	MY98
84PSF2-3	04897614AA	Chrysler	c/o	34-38	19.5-22		dk grey/LC	37060-7	M12 X 1.5 F	16mm	black	R134/white	MY98
84PSF2-4	04897615AA	Chrysler	c/o	35-39	22-24		dk grey/LC	37060-7	M12 X 1.5 F	16mm	black	R134/yellow	MY98
84PSF2-5	04897775AA	Chrysler	c/o	38-43	23-26		dk grey/LC	37060-7	M12 X 1.5 F	16mm	black	R134	MY98
84PSF2-6	05012330AA	Chrysler	loc	15-25	5-8.5		dk grey/LC	37060-9	M12 X 1.5 F	16mm	black	R134/green	P
84PSF3-1	04897616AA	Chrysler	fan	180-230	140 min		natural/HC	36940-6	M10 X 1.25F	14mm	Zn/olive	R134	MY98
84PSL2-1	04897617AA	Chrysler	hpco	450-490 **	270-330**		black/LC	36940-6	M10 X 1.25F	14mm	Zn/olive	R134	MY98
[illegible]													
87PSL2-2	F37A-3N824-AA	AS/PTG	pwr strg	300-400	120 min	50 min	grey	27290-3	3/8-24 M	9/16	Zn/clear	o-ring	P
87PSL2-3	F37A-3N824-AA		pwr strg	300-400	120 min	50 min	grey	27290-3	3/8-24 M	9/16	Zn/clear	o-ring	P
87PSL2-5	XW4S-3N824-AA	AS/PTG	pwr strg	300-400	120 min	50 min	brown	27290-3	3/8-24 M	9/16	Zn/clear	o-ring	sop12/98
87PSL2-6	A50520	PTG	pwr strg	300-400	120 min	50 min	white	27290-3	3/8-24 M	9/16	Zn/clear	o-ring	P
87PSL11-2	94BP-3N824-AA	Ford-Europe	pwr strg	400-500	200 min	100 min	green/pos 1	o-ring/dogpt/36917-1	3/8-24 M	9/16	Zn/yellow		P
87PSL11-4	TBD	Ford	pwr stg	250-350	120 min	50 min	TBD	dogpt/36917-1	3/8-24 M	9/16	Zn/yellow		
[illegible]													
89PSF2-1	LS9761-6120	ZUA (Mazda)	pwr strg	369.8-426.7		113.8 max	pps	o-ring/37101	M14x1.0 6g M	17 mm	Brass	35° crimp	P
89PSF2-2	LS9761-6680	ZUA (DSM)	pwr strg	256.0-327.1		113.8 max	pps	o-ring/37101	M14x1.0 6g M	17 mm	Brass		P
89PSF2-3	75422-4AE6R	TTA (DSM)	pwr strg	296.0-327.1		113.8 max	pps	o-ring/37101	M14x1.0 6g M	17 mm	Brass		s (99)
89PSF2-5	LS9761-3G70	ZUA (Mazda)	pwr strg	369.8-426.7		113.8 max	pps	o-ring/37101	M14x1.0 6g M	17 mm	Brass	short piston/ 35	P
89PSF2-6	LS9C791-0001	ZUA (DSM)	pwr strg	298.7-384.0		113.8 max	pps	o-ring/37101	M14x1.0 6g M	17 mm	Brass,	long terminal	P
89PSF3-1	LS9761-6C10	ZUA (Isuzu)	pwr strg	512.0-611.6		113.8 max	phenolic	o-ring/37101	M14x1.0 6g M	17 mm	Brass		s (98)
89PSF3-2	LS9761-7E61	ZUA (Nissan)	pwr strg	369.8-426.7		42.7-184.9	phenolic	o-ring/37474	M14x1.0 6g M	17 mm	Brass	35° crimp	P
89PSF3-3	LS9761-6F10	ZUA (Isuzu)	pwr strg	512.0-611.6		113.8 max	pps	o-ring/37101	M14x1.0 6g M	17 mm	Brass	small terminal	s (98)
[illegible]													
90PSL2-1	15961566	NATP	APS	1416-1700	963-1247		green	Oring/27290-3	3/8-24 M	9/16	Zn/clear	ATF	P
90PSL2-2	15034354	NATP	APS	1400-1600	800 min		brown	Oring/27290-3	3/8-24 M	9/16	Zn/clear	ATF	MY99
[illegible]													
91PSF2-1	26054374	Daewoo	pwr strg	217.5-290.0		50.8-113.1	black/pps	1pc/dogpt/37310-1/s	3/8-24 M	17 mm	Al	identifier = A	P
91PSF2-2	26064460	Delphi (Geo)	pwr strg	493.0-638.0		50.75-118.0	black/pps	1pc/dogpt/37310-1/s	3/8-24 M	17 mm	Al	identifier = B	NP
[illegible]													
92PSL2-1	4606269	Chrysler (LH)	pwr strg	350-460	175 min	50 min	black/pps	Oring/37441/n	M14x1.0 6g M	19 mm	Brass		s (99)
[illegible]													
93PSL2-1	96AB-3N824-AB	Ford	pwr stg	430-630	300 min	50 min	black/pps	Oring/28817/n	M12X1.75 6g M	19 mm	Brass	green cap	P

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