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BOOK 27 OF 61

PART 3 OF 5

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971007

Improved Methods for Testing the Durability of Corrosion Protection in Brake Fluids

Fresh Brake Fluids will not simulate corrosion of brake systems, because their corrosion inhibitor additions prevent it. Copper in low field mileage vehicles is the highest ion concentrate?

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How does the high Copper ion contribute to the corrosion of other metals when under a B+ field? DOE experimental aged fluids.

ABSTRACT

Present corrosion testing procedures for brake fluids assess the properties of fresh fluids under some forms of environmental stress (e.g., water content, elevated temperature). These tests may not accurately predict corrosion protection properties of fluid after the years of continuous service typical of North American practice. This paper describes the development of laboratory accelerated aging procedures which reproduce the chemical changes occurring in brake fluids during long-term service. Short-duration vehicular tests with these lab-aged fluids have reproduced specific modes of corrosion previously observed only after long-term customer use.

INTRODUCTION

Brake fluid reliably transmits full boosted pedal pressure throughout the braking system. Brake fluid also serves to protect against corrosion the brake system materials it contacts. While in Europe the brake fluid in a vehicle is typically changed every few years, in North America brake fluids are not routinely changed. Therefore, it is important to assess the long-term corrosion protection of brake fluid used in cars and trucks sold in North America.

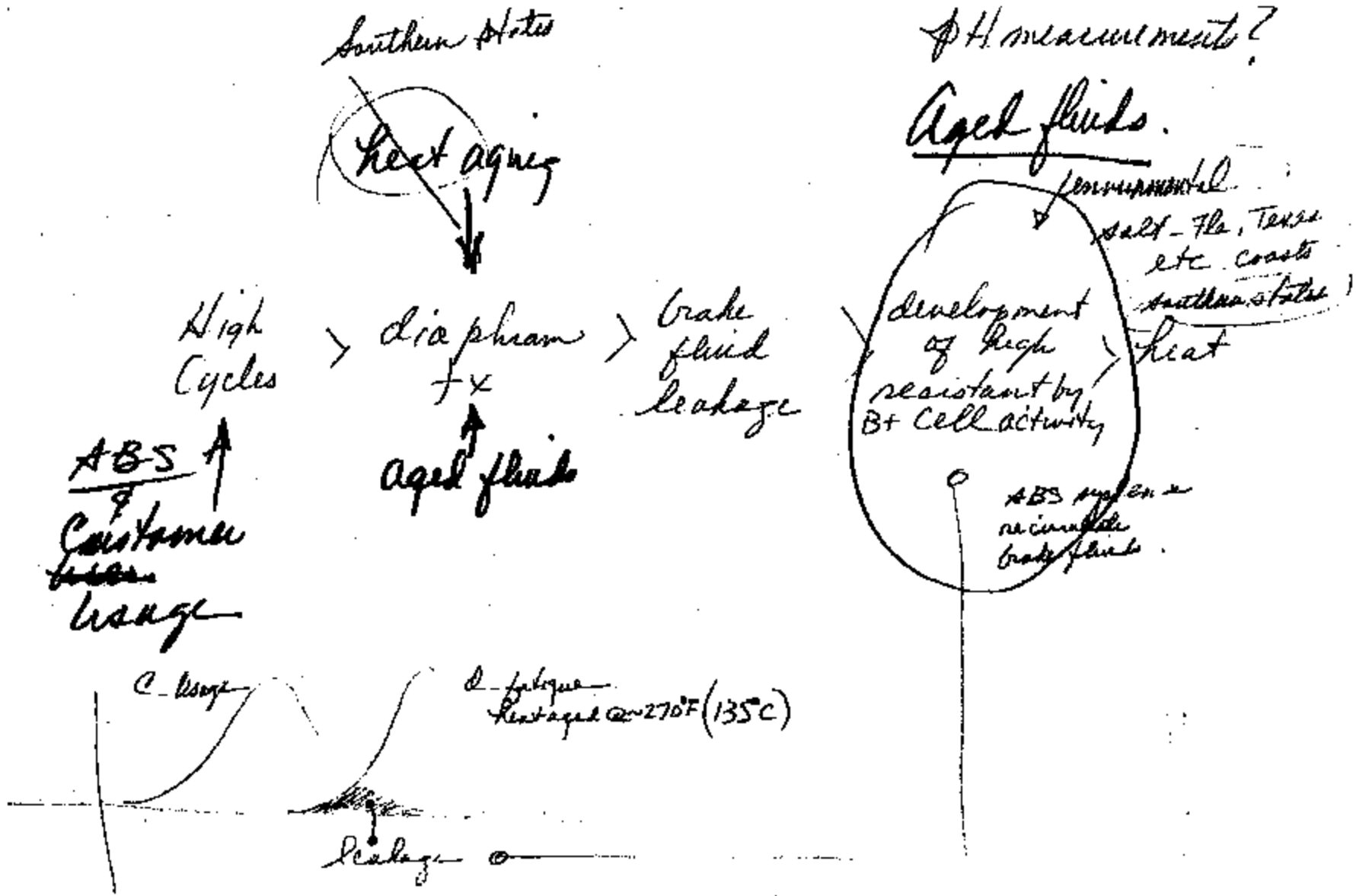
The minimum levels of corrosion protection required for brake fluids are set by laboratory test procedures embodied in FMVSS 116[1], a regulation based on the primary brake fluid standard for the automotive industry, SAE J1703[2]. The corrosion tests required by these standards are performed on fresh samples of brake fluid and may not be a reliable indicator of the level of corrosion protection afforded by the fluid after several years in a vehicle. A fluid compounded from high-quality base materials, but containing no corrosion inhibitors whatsoever, can pass the weight change requirements (see Table 1). Corrosion is on occasion still observed within brake systems filled with fluids which were fully compliant with SAE J1703 and FMVSS 116 when fresh. Chemical analysis of used brake fluids suggests reasons why corrosion could occur in these circumstances.

Table 1: J1703 corrosion test (section 4.6) weight changes for an uninhibited brake fluid base.

metal	J1703 max. wt. change (mg/cm²)	measured wt. change (mg/cm²)
Tinned iron	±0.2	-0.04
Steel	±0.2	-0.04
Aluminum	±0.1	+0.01
Cast Iron	±0.2	+0.00
Brass	±0.4	-0.02
Copper	±0.4	+0.00
Zinc	±0.4	+0.06

Note: J1703 4.6 requirements on coupon and fluid appearance, sediment, and rubber interactions also passed

This paper first characterizes, through chemical analysis, the changes which can occur in brake fluids during vehicular use. Then, building upon this database, we develop new aging and testing procedures which can measure the durability of the corrosion protection provided by a fully-formulated fluid. The primary corrosion inhibitors used in most brake fluids are amines, organic bases which both provide general buffering



pH measurements?

Aged fluids.

Environmental salt-Fla, Texas etc coasts southern states

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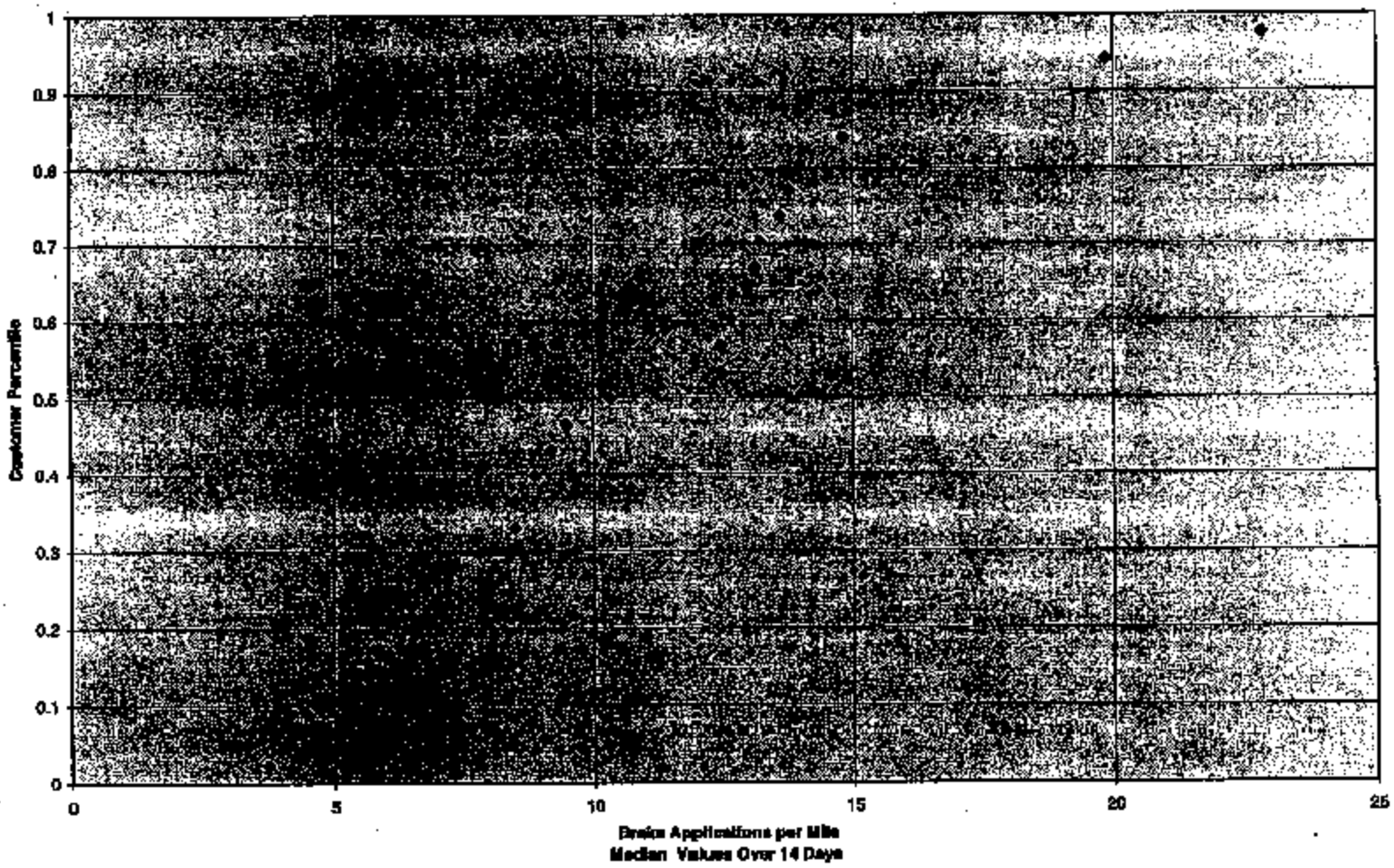
Data from 1996 Brake Key Life Test Customer Data Acquisition Study
TO: Q20001

Brake Key Life Test - 1995 C.V., G.M. & T.C.



Data from 29 customers total, in cities of Boston, Atlanta Tampa

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capacity against the deleterious effects of acidic breakdown products and provide specific protection of particular metals, presumably through adsorption. Amines both work well as inhibitors and fulfill the extended solubility constraints imposed by the need for the brake fluid to remain a single phase system over wide ranges of temperature and water content. This paper will therefore concentrate upon the amine components of the total inhibitor package.

SPECIAL STRESSES AND REQUIREMENTS OF ANTILOCK BRAKE SYSTEMS - Modern antilock brake systems pose new challenges to the proper integration of formulated brake fluids into total brake system design for durable performance. The increased circulation of brake fluid associated with ABS (e.g., through low-pressure return lines to the master cylinder reservoir) may increase the chances of loss of brake fluid components from the fluid, either by direct evaporation, permeation through polymers, or sorption into polymers. The forced circulation can also facilitate the transport of corrosion products and/or thermal degradation products, if they are present, from one point in the brake system to another.

CHANGES IN BRAKE FLUID CHEMISTRY DURING VEHICULAR SERVICE

DROP IN RESERVE ALKALINITY - The amine inhibitors which provide the primary corrosion protection in most brake fluids are organic bases. A simple *approximate* measurement of their total concentration (and the stability thereof) in a formulated brake fluid can be obtained by acid-base titrations similar to those called out for engine coolants by ASTM standard *D 1121*[3]. The Reserve Alkalinity (RA) of a brake fluid is defined as the number of milliliters of 0.100 M hydrochloric acid needed to titrate 50 ml of brake fluid down to a pH of *5.5*[4] (in contrast, the D 1121 definition of RA for engine coolant is ml HCl / *10 ml* coolant concentrate). In an attempt to keep all brake fluid components in solution during the titration, the brake fluid is prediluted with a solution of 80% denatured alcohol and 20% deionized water (in this work, ~2ml of brake fluid (quantified by weight) was diluted to 60 ml total volume before starting titration with 0.100 M HCl). RA's of fresh brake fluids in recent commercial production range from about 3 to about 120.

Figure 1 shows the residual RA (as % of initial value) of a brake fluid in matched vehicles 0-3.5 years old, plotted as a function of the age of the fluid. By 30 months (about 50,000 km) the RA has dropped to as *low* as 9% of its initial value, and about half of this small residual RA arises from components *other* than the amines. The titration data therefore suggest a 20-fold reduction in primary inhibitor concentration *over* 2-3 years of service.

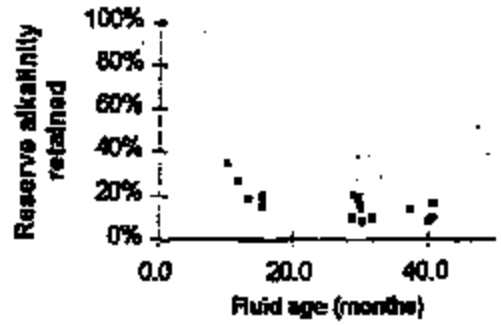

Figure 1 : Decrease in reserve alkalinity of a brake fluid during vehicular use.

Table 2 shows %RA (vs. fresh values for appropriate OEM brake fluids) for a number of fluid samples taken from randomly-selected vehicles produced by a range of manufacturers. Some loss of RA during vehicular service is universally observed, but the % retained varies widely for different fluids. In the absence of further data, no conclusions about the quality of corrosion protection afforded by a fluid should be drawn from absolute RA values, since it may be possible to formulate effective fluids with a wide range of initial RA's. However, the evolution of the RA over time of use gives a general picture of the stability of the inhibitor package. If the material retains a smaller percentage of its initial RA over time, one can have less confidence that the initial level of corrosion protection implied by J1703 compliance will be continued through the service life of the vehicle.

Table 2: Retained reserve alkalinities for a number of ORM fluids after vehicular use.

ORM fluid	Kilometers	Months (approx.)	% initial RA retained
i	73830	36	9%
ii	71667	36	21%
iii	47618	na	33%
iv	117762	36	49%
v	60780	na	52%

DROP IN AMINE INHIBITOR CONCENTRATIONS, BUILDUP OF INHIBITOR REACTION PRODUCTS, AND LOSS OF TOTAL NITROGEN - Determination of RA, while simple, actually measures only general buffering capacity, not the concentrations of particular inhibitors. To properly characterize the chemical evolution of brake fluids in use and to prevent misinterpretation of RA data, it is necessary to be able to quantify the concentrations of individual inhibitors. The capillary gas chromatographic (GC) techniques employing flame ionization detectors (FID's) commonly used in quality control of the glycol ether and polyglycol components of brake fluid base oils, if carried out with unusually high resolution, quantify the presence of at least some of the common amine inhibitors. However, since the

amines constitute only a small fraction of the total fluid and the chromatographic properties of some important amines are less than optimal for clean separation, full characterization of amines content requires methods which are more selective for nitrogen compounds.

One successful approach has been to use capillary GC with a thermionic emission detector (or nitrogen-phosphorus detector [NPD]) which has a sensitivity for nitrogen atoms in molecules which is over 5000-fold greater than its sensitivity for carbon atoms[3,4]. This high selectivity for N allows not only ready identification of the chromatographic peaks due to the original amines but also allows one to determine the fate of nitrogen atoms as the original amines react to form new nitrogen-containing compounds during vehicular use. This ability to monitor nitrogen in the fluid even after it has been incorporated into reaction products which may no longer provide buffering capacity has proven particularly useful in tuning laboratory aging procedures to accurately reproduce the effects of extended vehicular use.

Total nitrogen in the brake fluid was also measured with a standard N/S elemental analyzer. Since this technique is sensitive to nitrogen in any relevant form, the drop of total nitrogen as seen by this method allows determination of what fraction of initial nitrogen completely left the fluid. In the primary fluids under study here, the overwhelming preponderance of original nitrogen in the fluid was in the form of the amine inhibitor(s).

Capillary electrophoresis was found to be another successful analytical approach for the amines in most of the inhibitor packages[7,8]. The technique relies on the fact that ions move with different velocities through a capillary tube filled with buffer solution when an electric field is applied across the length of the tube. Amines in aqueous solutions of brake fluid were separated and detected as their ammonium cations in a pyridinium sulfate buffer at pH 4.4. When they passed through the UV absorbance detector on the Capillary Ion Analysis (CIA) instrument, amine cations were detected as a decrease in absorbance at 254 nm because they displaced some of the pyridinium cations which absorb light at that wavelength[9]. For many fluids, this procedure detects all of the original amines and any reaction products thereof which retain basicity. However, it will not detect other nitrogen-containing reaction products which do not still contribute to the buffering capacity of the used fluid. The limited aqueous solubilities of the ammonium ions derived from the inhibitors in some fluids can lead to irreproducible CIA results. Consequently, the NPD GC and CIA methods were used together to generate corroborative and complementary data.

The mechanisms by which the amines content decreases over time can be inferred by comparison of several metrics of a fluid after vehicular use: the % RA retained, the % retained of total original amine species (by NPD GC), the % of total nitrogen retained (by N/S), and the % buildup of known N-containing reaction products which do not provide buffering capacity (by NPD GC). While the RA and the concentrations of the original amines drop away after approximately 75000 km to <10% of their initial values, more than a third of the original total nitrogen remains in the fluid. Essentially all of this residual N is in a form other than the original amines, and most of the residual N is in a form which does not provide significant buffering against addition of acid. Of this inactivated but still-present portion of the N, approximately half can be identified as a particular reaction product, the formamide of an inhibitor originally present in the fluid. Cast iron readily rusted when placed in contact with uninhibited brake fluid base to which an appropriate level of this formamide, 5% water, and 50 ppm chloride were added. When the original amines replaced the formamide in control experiments, no rusting was observed at all. The formamide reaction product thus serves neither as a buffer nor as a corrosion inhibitor. However, it does provide a readily-analyzed signature for the severity of thermal oxidation to which a fluid has been subjected while being used in a vehicle.

INCREASE IN DISSOLVED METALS - Measurements of dissolved metals in brake fluid (here, done by inductively-coupled plasma atomic emission spectroscopy) provide an indirect indicator of corrosion activity within the brake system. If such measurements are to be a useful guide to the functional durability of the fluid, they must both be interpreted with some care and be accompanied by detailed inspection of brake system components to establish whether the presence of the dissolved metals in the fluid is in fact indicative of a condition which could eventually decrease brake system performance. A low rate of general corrosion over a large surface area of a metal may lead to apparently significant levels of that metal dissolved in the fluid but may pose no threat to system performance. Conversely, a very high rate of localized corrosion of a metal could produce only a small dissolved metal content in the fluid but eventually lead to significant loss of brake system function. A case of correlation between metals uptake in the fluid and component corrosion with a potential for functional significance over an extended service life will be given in later sections of this paper.

Figure 2 shows the pickup of metals by a fluid in vehicular service as a function of fluid age, corresponding to distances traveled of 0-100,000 km. In all vehicles in this figure and for all fluid ages, the metal at highest concentration in solution is copper. This is in part due to the (perhaps surprisingly) large preponderance of the system surface area exposed to the brake fluid which is copper. The interior of typical 2-layer steel brake pipe is completely covered by the copper brazing alloy. A typical light-duty vehicle uses 14 m of such pipe, with an internal diameter of ~2.5 mm, giving an internal geometric surface area of 1200 cm^2. Atomic force microscopy scans of the interior copper surface of the pipe yield a roughness factor of 1.5, so that the ~900 ml of brake fluid in a vehicle (including that in the master cylinder reservoir) is exposed to 1800 cm^2 of copper. The approximately 300 ppm of Cu seen in the brake fluid after ~36 months corresponds to dissolution of ~0.1 mg/cm^2 copper in 3 years of service, compared with the 0.4 mg/cm^2 copper allowed in a 5 day laboratory test to comply with J1703. The copper corrosion, which appears to be general (rather than localized) in morphology, poses no direct threat to system integrity.

The significance of Figure 2 lies not in the relatively large dissolved copper levels but in the more subtle levels of dissolved iron. No dissolved iron at all is seen until around 30 months, after which 50-100 ppm of dissolved iron becomes typical. Cast iron components removed from some vehicles after such times show some level of pitting of the iron, with pits typically surrounded by metallic copper.

Dissolved iron appears in the brake fluid after the initial amine corrosion inhibitors are significantly depleted and dissolved copper levels rise to around 200 ppm. The apparent induction period for iron corrosion has presented difficulties in testing technological changes designed to minimize this effect; no test protocol employing fresh brake fluid had succeeded in reproducing the iron corrosion observed at times in vehicles after several years' service. Later sections of this paper will show that attention to the chemical changes in brake fluid during use has led to test procedures which reproduce the field vehicular effects within 6 months.

The dissolved zinc levels in Figure 2 show no evidence of the induction time seen for iron. Since testing for corrosion protection of zinc in brake fluid is known to be problematic even in fresh brake fluids[9] (it is not yet a requirement of FMVSS116), it would not be entirely surprising if some Zn corrosion is occurring even after relatively short service. Another possible source of the observed zinc is extraction of Zn compounds from hoses.

Table 3 shows dissolved metal data for different fluids after extended use in vehicles built by a number of manufacturers. Analytically significant levels of dissolved metals are a common, but not completely universal, characteristic of brake fluids in vehicular service. Between different vehicles, the metals dissolved in brake fluid can be expected to vary with the metals exposed to brake fluid and the service conditions, as well as with the properties of the brake fluids used.

Table 3: Dissolved metals for a number of OEM fluids after use in vehicles.

Fluid	km	months (approx)	Cu (ppm)	Fe (ppm)	Zn (ppm)
α	45911	28	30	<10	10
α	57785	28	150	10	0
α	77371	40	220	110	50
β	6154	12	30	<10	10
β	80717	na	800	<10	130
β	na	60	550	30	200
γ	47619	na	260	30	140
δ	71004	36	18	2	49
ε	106612	24	16	3	33

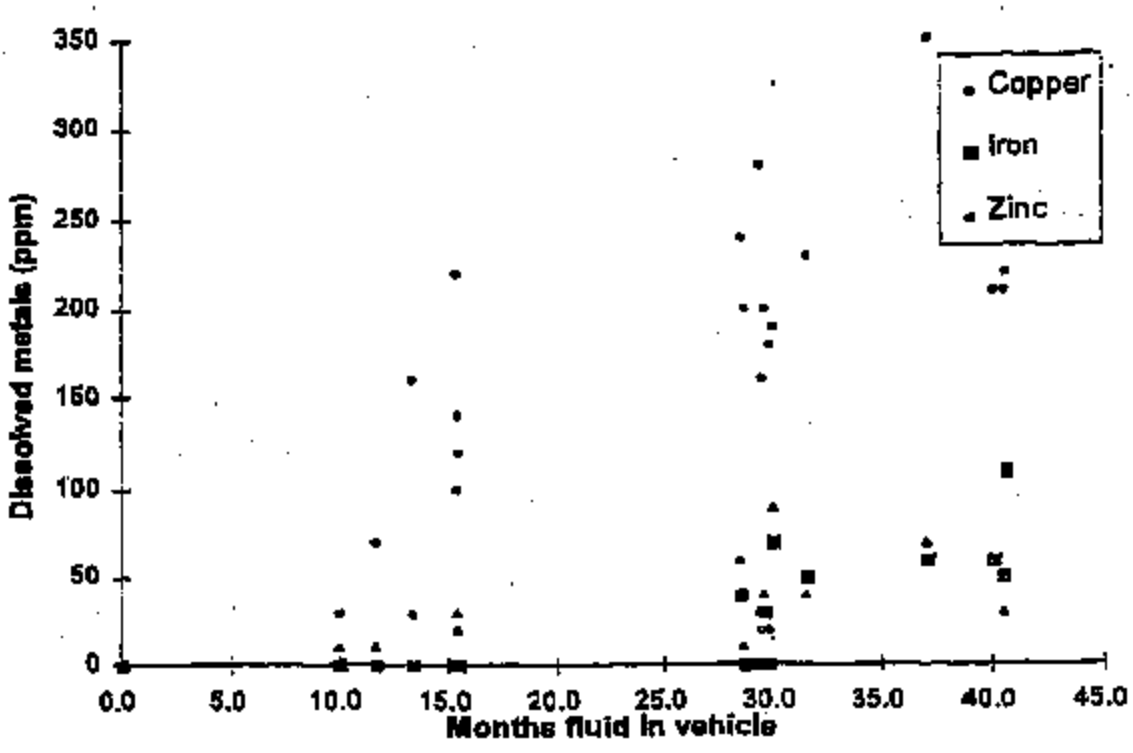

Figure 2: Dissolved metals in a fluid as function of time of use.

LABORATORY AGING PROCEDURES

Analysis of changes in reserve alkalinity, concentrations of initial amines, concentrations of identifiable nitrogen-containing reaction products, and total nitrogen with vehicular use point to at least two pathways for loss of buffering capacity and amine inhibitor action in brake fluids over time. Under conditions where the buffering capacity is almost completely lost, total nitrogen measurements show retention of 35-45% of the original nitrogen in the fluid (in a formulation for which the vast majority of initial nitrogen is in the amine inhibitors). Thus 1/3-1/2 of the initial nitrogen remains in the fluid but has been converted to non-buffering compounds which are also not good inhibitors. About half of this now-inactive nitrogen can be accounted for by the growth of the formamide derived from an initial amine inhibitor. The chemical path to a formamide is reasonably clear. One end of a glycol ether base fluid molecule can dissociatively oxidize, breaking off one carbon atom to yield formate, a common oxidation product of glycols and glycol ethers. The formate can then react with amine molecules to form inactive formamide molecules. The large concentrations of formamide products which develop during vehicular service thus point to thermal oxidation as one significant cause of the changes of brake fluid chemistry seen in vehicles.

The other significant change in fluid amine chemistry involved not conversion of nitrogen to an inactive form, but loss of nitrogen (in any form) from the brake fluid. The selective loss of various amines from brake systems suggested that volatility, either directly from the fluid surface in the master cylinder reservoir or indirectly via permeation through hoses, could be the second major pathway to the loss of amine inhibitor activity in vehicles. These two pathways to amine loss were incorporated into a laboratory aging procedure designed to mimic vehicular behavior.

THERMAL OXIDATION - The thermal oxidation aspect of brake fluid aging was emulated in the laboratory by an 18 hour air-sparged reflux of the fluid at 132° C in the presence of copper powder. To gain maximum acceleration of the aging process, it was desirable to run at the highest temperature which fluid was likely to see anywhere in vehicular brake systems under conditions occurring during normal driving. The chosen 132° C is the highest temperature allowed for fluid during a standard vehicular service test. Copper powder (at >2 cm^2 Cu per ml brake fluid) was incorporated into the procedure because of the similarity high Cu surface / brake fluid volume ratio in real brake systems, the observed dissolution of Cu into fluids during use, and the known behavior of Cu as a catalyst for the oxidation of organic compounds[11]. The duration of the laboratory oxidation treatment was sufficient to approximate the levels of formamide reaction products seen in vehicular brake fluid samples after 3 years' service.

Refluxing of 2 liter quantities of fluid was carried out in a 5000 ml round-bottomed flask with three 24/40 tapered glass joints (two fixed and one adapted), warmed with a heating mantle. A water-cooled 300 ml - long Graham (coil) condenser in series with a 300 mm - long Allihn (bulb) condenser (the latter on top) proved adequate to keep total weight losses for the fluids below 0.5% during this procedure. Air (free of carbon dioxide and hydrocarbons) was sparged through the fluid at 10 ml/s through a fluorinated ethylene-propylene (FEP) tube drawn out in the hot air of a heat gun to give a ca. 1 mm opening. Temperature was measured by a 0.15 mm thermocouple within the fluid and was controlled with an Omega BSS001 temperature controller switching the power to a variable transformer set at 70 V (for steady-state operation) which in turn supplied power to the heating mantle. The fluid and 80 g of copper powder (Baker 1728-01) were continuously stirred with a magnetic stirrer directly below the heating mantle. A 10-20 cm^2 piece of cast iron brake cylinder was used as a stir bar and provided a quick visual check of any corrosive effects generated during the thermal oxidation; a second standard polytetrafluoroethylene-coated stir bar was also put in the flask to improve stirring. The fluid was refluxed in the flow of air for 18 hr at 132° C in this apparatus. Then the fluid was decanted from above the copper powder and transferred to a 4 liter borosilicate glass beaker for the next step of the laboratory aging process.

The white columns of Figure 3 show the % RA retained after SAE compatibility fluid RM-66-04 and a number of commercially available brake fluids were subjected to this thermal oxidation procedure. Results range from >90% retention of buffering capacity to complete destruction of buffering capacity (pH below 5.5 after thermal oxidation [not shown]). While DOT 4 fluids taken as a class were more resistant to loss of amines and buffering capacity by thermal oxidation, some DOT 4 fluids showed some of the lowest levels of thermal stability seen in any fluids.

Significantly smaller RA losses were observed when argon was substituted for air in this procedure or when fluid was simply sealed into brake pipe and heated. Nitrogen analysis of fluids subjected to this air-sparged reflux procedure showed very little loss of total nitrogen. The primary mechanism of loss of buffering capacity tested by this procedure therefore appears to in fact be thermal oxidation.

VOLATILIZATION - The simplest process which could explain the observed 55-65% loss of total nitrogen from some brake fluids during vehicular service is volatilization of amines either from the free surface in the master cylinder reservoir or after permeation through hoses. Another possibility is simple absorption into hose materials without evaporation off of the hose outer surface. Since simple vaporization of the amines off of the free fluid surface can be performed more reproducibly in the laboratory, direct evaporation was chosen as the initial laboratory procedure to emulate the observed vehicular loss of total nitrogen from the fluid.

The tendency of fresh fluids towards loss of amine inhibitors through volatilization can be quickly measured largely in isolation of other effects by placing 100 ml of fluid into a standard SAE corrosion test jar which is then placed, uncovered, in an oven at 100° C for 16 hours (temperature chosen for convenience to a lab running standard corrosion tests). Figure 4 shows how the RA drops for various fluids as a function of time under these conditions. However, this simple volatilization experiment alone does not accurately

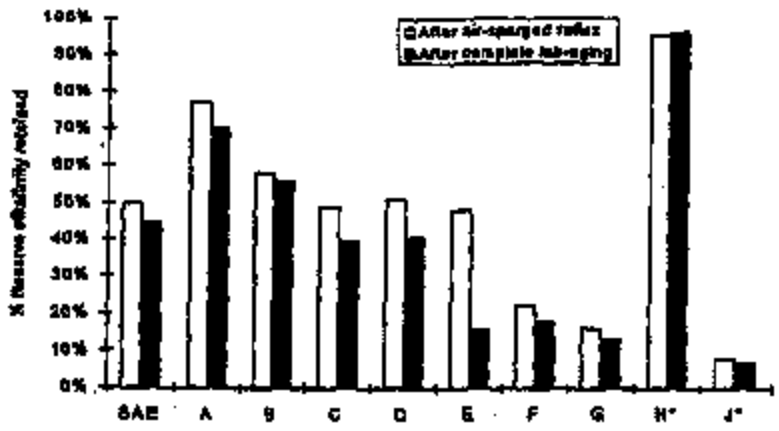

Figure 3: % Reserve alkalinity retained after thermal oxidation and after complete lab-aging procedure were applied to SAE compatibility fluid RM-66-04 and commercially available fluids (* indicates DOT 4 fluid).

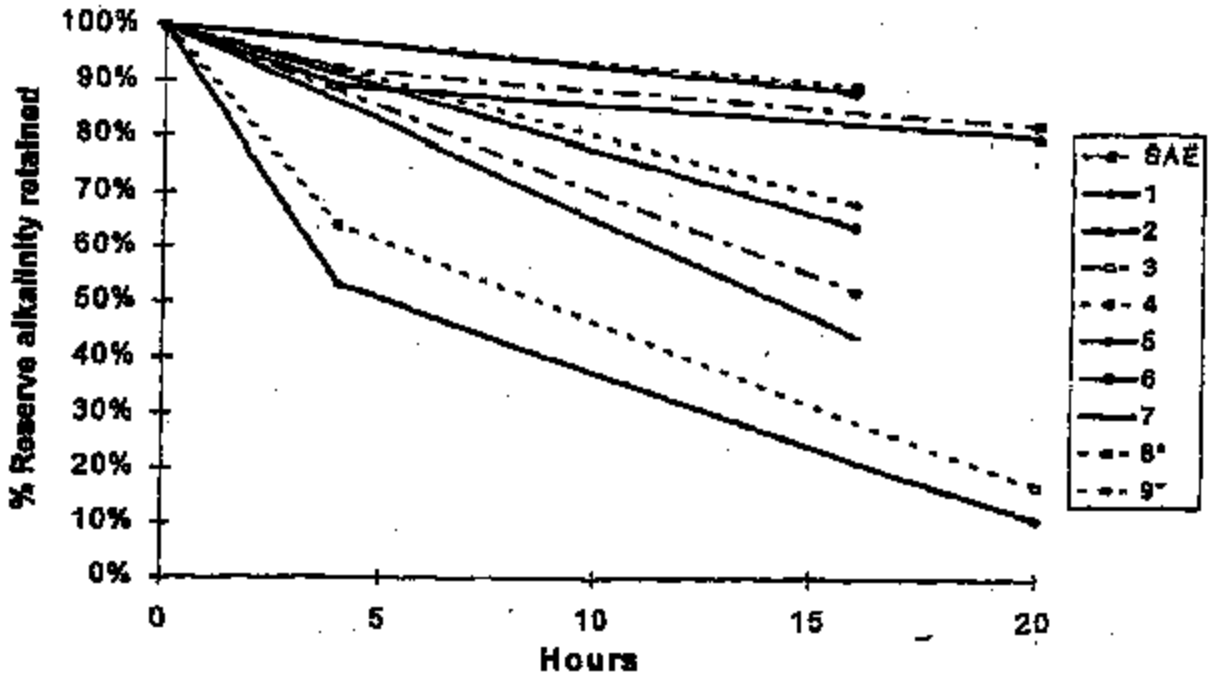

Figure 4: Reserve alkalinity retention as function of heating time (uncovered) at 100° C for SAE compatibility fluid RM-66-04 and various commercially available fluids (* indicates DOT 4 fluid).

reproduce the chemical changes observed during vehicle use, particularly the production of formamide oxidation products.

OVERALL AGING: COMBINED PROCESSES - The best fit of lab-treated fluid composition to vehicle-aged fluids has been obtained if the volatilization step is performed after the air-sparged refluxing procedure previously described. A lower temperature is used for volatilization in this combined procedure because (1) fluid temperatures at the location of volatilization (reservoir or hose) will be lower than the maximum system temperature used for the thermal oxidation step and (2) volatilization at higher temperatures could cause changes in the relative concentrations of base fluid components which have not been observed in vehicles.

The 2 liters of previously refluxed fluid are decanted into a 4 liter beaker, which is then held, uncovered, at 80° C (thermocouple in the fluid 2.5 cm above the bottom) for 64 hours on a hotplate regulated by a temperature controller. The fluid is then cooled and filtered through 2.5 µm paper (Whatman 42) to remove suspended copper powder, taking care in pouring to capture any condensate on the sides of the beaker along with the liquid. Weight losses from the fluid during this volatilization step range from about 2 to 5%.

The black columns of Figure 3 show the %RA (vs. fresh fluid) retained after both the thermal oxidation and volatilization steps for a number of fluids. For most, but not all, fluids, almost all of the loss of buffering capacity occurs during the thermal oxidation step of the laboratory aging procedure.

Table 4 compares chemical parameters for fresh, laboratory-aged and vehicle-aged fluids. By design, the dissolved metals contents of lab-aged fluids are significantly lower than those of fluids used in vehicular service. The low metals contents in the lab-aged fluids simplify detection of corrosion when lab-aged fluid is put into the brake systems of new vehicles.

Table 4 : Comparison of chemical properties of a fluid in vehicular-aged and laboratory-aged forms.

km	% RA	% amines	form-amide % of amines	Cu ppm	Fe ppm	Zn ppm
77371	17 %	5%	17%	220	110	50
85245	9%	3%	17%	210	60	60
77180	12 %	<3%	20%	320	160	120
lab-aged	13 %	8%	10%	82	3	<5

BEHAVIOR OF LABORATORY-AGED FLUIDS IN VEHICLES

DISSOLVED METALS - To test the correlation of expectations from laboratory work with true vehicular behavior, an experiment was run in matched new vehicles using two brake fluid formulations (I and II), each in both fresh and lab-aged conditions. Table 5 shows dissolved metals content after 6 months fluid use for the individual vehicles, grouped by fluid type. The clear difference between the four groups is that the lab-aged fluid I led to significantly higher dissolved iron levels than seen in the other three groups. Since repeat analysis confirmed an essentially null iron content for the lab-aged fluids at the time they were put into vehicles, it was clear that the laboratory-aged form of fluid I had initiated some form of iron corrosion during 6 months vehicular exposure. No iron corrosion was detected during this brief vehicular exposure for the new-aged form of I or for either the fresh or lab-aged forms of II. Comparison of the results of Table 5 with the new-fluid dissolved metals timeline of Figure 2 suggests that the laboratory aging procedure appears to have accelerated the relevant fluid about 30 months down the timeline. In contrast, fluid II showed no increase in 6 month vehicular dissolved iron after the same laboratory stress prior to installation in new matched vehicles, suggesting improved durability of iron corrosion protection.

CORROSION OF COMPONENTS - Figure 5 compares the interior surfaces of cast iron wheel cylinders which ran 6 months (top) and 12 months (bottom) with lab-aged fluids I (left) and II (right) in the vehicular experiment. The non-corroded appearances on the right duplicates all previous testing experience with fresh brake fluids -- no corrosion of cast iron components occurs before several years of vehicular exposure. The rusting seen on the left with lab-aged I is similar to corrosion sometimes seen in wheel cylinders of vehicles after several years in the field - a patch of rust builds at the bottom of the cylinder. Electron microscopy of the rust patch shows, again in agreement with long-term vehicular experience, deposition of significant levels of copper in the corroded region. The appearance of this corrosion correlates with the elevated dissolved iron levels seen in laboratory-aged fluid I within 6 months of the start of service. No corrosion was seen in wheel cylinders running fresh fluids I or II or lab-aged fluid II, again in agreement with the dissolved iron data. It should be noted that the difference in dissolved Fe and observed cylinder corrosion was observed despite the similar levels of dissolved copper in all four groups of vehicles. While copper is implicated in the iron corrosion by its deposition in the rusted areas, the data suggest that it is necessary to have severely depleted the iron corrosion inhibitors (amines) before the dissolved copper can accelerate the corrosion of iron.

Table 5: Dissolved metals for fresh and lab-aged fluids I and II, before and after 6 months service in matched vehicles.

fluid	fresh / lab-aged	km	Cu ppm	Fe ppm	Zn ppm
I	fresh	0	0	0	0
II	fresh	0	0	0	0
I	aged	0	82	3	<5
II	aged	0	69	3	<5
I	fresh	16261	130	<2	11
I	fresh	30910	320	<3	27
I	fresh	18465	460	3	26
I	fresh	9746	150	<3	16
I	aged	35385	210	50	20
I	aged	11350	240	33	49
I	aged	24975	260	57	61
I	aged	20080	270	50	23
II	fresh	13384	110	2	12
II	fresh	26333	180	<3	16
II	fresh	7501	54	<3	5
II	fresh	34128	160	11	13
II	aged	17260	240	5	64
II	aged	19742	250	5	74
II	aged	12613	230	3	42
II	aged	11779	360	3	81

BEHAVIOR OF LAB-AGED COMMERCIAL BRAKE FLUIDS IN SAE J1703 LABORATORY CORROSION TESTS

Internal corrosion of brake system components has been observed in some vehicles after several years' service in brake fluids which easily pass the corrosion tests in the J1703 standard. One cannot, therefore, have confidence that the standard corrosion tests performed on fresh fluids adequately predict the durability of corrosion protection for the life of the vehicle. Laboratory-aging of fluids prior to vehicle fill has reproduced long-term vehicular effects after much shorter vehicular exposure. In an attempt to develop a laboratory corrosion test which does have predictive power for the durability of corrosion protection, standard corrosion tests were run on a number of commercial brake fluids in both fresh and laboratory-aged (thermal oxidation + volatilization) conditions. In this application, the ca. 100 ppm copper level in some lab-aged fluids complicates the interpretation of weight-loss measurements. Copper deposition can accompany corrosion, (most noticeably on zinc, iron, and aluminum coupons) and decrease the magnitude (or even invert the apparent sign) of real corrosive weight losses. Lab-aged fluids were therefore analyzed for metals after being used in the corrosion test, and the dissolved metals contents were cross-checked against the measured weight losses to ensure that the latter were not grossly misleading.

Table 6 shows standard J1703 corrosion test weight changes for SAE compatibility fluid RM-66-04 and for 9 commercially available fluids tested both in fresh and laboratory-aged conditions. A number of fluids showed significant zinc weight losses and/or etching when tested in lab-aged form. Otherwise no weight losses or gains outside the SAE limits were induced by lab-aging prior to the standard J1703 corrosion test. It should be noted that used fluid from vehicles can also show no objectionable weight losses in the standard J1703 corrosion tests, even when the used fluid is drawn from vehicles after service intervals which sometimes produce visible corrosion of components. It appears that the conditions of the corrosion test in J1703 are not severe enough to produce visible corrosion even from aged fluids which do allow visible internal brake system corrosion in severe vehicular service.

Table 7 shows preliminary results on weight changes for metals tested in lab-aged fluids by the J1703 method modified by addition of 50 ppm chloride to the test fluid. With the addition of chloride, not only zinc but also tinned iron, steel and/or aluminum showed pitting or etching with some lab-aged fluids.

Modifying the J1703 corrosion test both by lab-aged fluid and by addition of 50 ppm chloride clearly increases its severity and its ability to distinguish between fluids, at least in regards to coupon appearance. However, even this doubly-modified version of the SAE corrosion test does not reproduce the effect on cast iron observed in vehicles.

To minimize the future necessity of vehicular testing, even with lab-aged fluids, more stringent laboratory corrosion tests must be developed. Additional factors which may contribute to the more aggressive corrosion environment in vehicles compared to the standard J1703 corrosion test include details of the time/temperature history of the fluid and further changes in brake fluid chemistry induced by interactions with elastomers in the system (particularly hose materials). Further modifications to the standard J1703 corrosion test procedures, as applied to lab-aged fluids, are being investigated to determine the simplest possible laboratory corrosion test conditions which better reproduce the worst-case behavior of fluids in severe vehicular service.

SUMMARY AND CONCLUSIONS

Constantly increasing expectations for durability of automotive components on the part of both consumers and manufacturers suggests the desirability of improved methods to ensure the durability of corrosion protection in brake fluids. Chemical analysis of used brake fluids has shown that the amines which are often the primary corrosion inhibitors can be lost over time both through thermal oxidation and by another process which completely removes nitrogen from the fluid. A two-step laboratory aging procedure was developed to reproduce these vehicular changes in brake fluid chemistry. Fluids subjected to this laboratory aging process typically still passed all of the corrosion weight change requirements of the standard SAE J1703 corrosion test (except, in some cases, that

for zinc). However, when lab-aged fluid was used in controlled vehicular tests of less than one year's duration, increased levels of dissolved iron appeared in the fluid and inspection of cast iron wheel cylinders showed visible internal corrosion. Such corrosion, with a morphology never before reproduced in laboratory or vehicular testing but seen in some vehicles after multiple years' actual service, suggests that the lab-aging procedure does reproduce corrosion properties representative of old fluid in severe service. Short-term vehicular testing with lab-aged fluids therefore provides the first feasible accelerated means of determining the long-term durability of both fluids and brake system components against internal corrosion.

J1703 corrosion test results with fresh, vehicle-aged, and laboratory-aged fluids show that the standard laboratory corrosion test procedures do not reproduce worst-case conditions, after long term vehicle use, even when the appropriate aged fluid chemistry is used. Appropriate additions of chloride increase the severity of the lab test conducted with lab aged fluids, but the fit to extreme vehicular conditions remains incomplete. Further development of laboratory corrosion tests, in conjunction with fluid-aging procedures, is needed if facile, as well as reliable, prediction of the long-term corrosion durability of brake fluids and system components is to become possible.

ACKNOWLEDGMENTS

The authors owe thanks to many people for essential collaboration: W.A. Neil of Delphi Chassis contributed essential insight and support. M.S. Harrington, V. Gilliam, J. Lamerd, D. Lester, and D. Park of UCC performed analytical work and/or testing. T.E. Moylan of GMR&D performed much of the laboratory-aging work. K. L. Olson of GMR&D developed and ran the new NPD gas chromatographic and capillary electrophoresis techniques for analyzing brake fluid. T.J. Chapston, D.F. Esch, P.M. Hanley, and N.M. Potter of GMR&D provided metals analysis and other analytical efforts.

REFERENCES

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3. "Standard Test Method for Reserve Alkalinity of Engine Coolants and Antifreeze", 1996 Annual Book of ASTM Standards, V. 15.05, D 1121-93, pp. 10-12, ASTM, W. Conshohocken, PA.
4. The 50 ml comparison volume is set by no standard but arises from common practice of titrating pH test fluid defined by section 4.3 of SAE J1703 prepared with 50 ml of brake fluid.
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Figure 5: Cast iron wheel cylinders after 6 (top) and 12 (bottom) months vehicular service in lab-aged fluids I (left) and II (right).

Table 6: J1703 weight changes for metals (mg/cm²) in fresh and lab-aged fluids (reported fresh/lab-aged). Results outside J1703 requirements established for fresh fluids printed in boldface (* indicates DOT 4 fluid).

fluid	tinned iron	steel	aluminum	cast iron	brass	copper	zinc
SAE max. allowed	±0.2	±0.2	±0.1	±0.2	±0.4	±0.4	±0.4
SAE RM-66-04	-0.00 / +0.04	-0.01 / +0.04	-0.00 / +0.04	+0.06 / +0.05	-0.02 / +0.02	-0.01 / +0.07	-0.02 / -0.32
a	-0.01 / +0.02	+0.01 / -0.00	-0.00 / -0.02	+0.04 / +0.00	-0.07 / -0.01	-0.06 / +0.02	-0.00 / -1.22
b	-0.01 / +0.04	-0.00 / +0.06	+0.03 / +0.02	+0.10 / +0.07	-0.02 / +0.24	+0.02 / +0.23	-0.35 / -3.84
c	+0.02 / +0.01	-0.01 / +0.00	+0.03 / +0.04	+0.00 / +0.03	-0.02 / +0.07	-0.04 / +0.09	-0.12 et / -3.04
d	+0.01 / +0.01	+0.03 / +0.02	+0.02 / +0.05	+0.03 / +0.06	-0.02 / -0.02	+0.01 / +0.01	+0.02 / +0.02
e	-0.00 / -0.01	-0.00 / +0.04	-0.01 / +0.03	-0.09 / +0.12	-0.07 / +0.09	-0.10 / +0.25	+0.02 / -1.01
f	+0.00 / +0.00	+0.03 / +0.04	+0.03 / +0.02	+0.08 / +0.03	-0.08 / -0.10	-0.06 / -0.00	+0.02 / -0.73 et
g	-0.01 / +0.03	+0.05 / +0.02	-0.00 / +0.02	+0.06 / +0.05	-0.05 / +0.05	-0.06 / +0.06	+0.01/ -0.32 et
h*	-0.00 / +0.03	-0.00 / +0.03	-0.00 / +0.01	+0.04 / +0.08	-0.06 / -0.03	+0.01 / +0.03	+0.02 / +0.04
j*	+0.06 / +0.01	+0.05 / +0.02	+0.03 / +0.01	+0.10 / +0.03	+0.02 / -0.14	+0.04 / -0.17	+0.12 / +0.07

et = etching (failure according to SAE J1703 requirement 4.6)

Table 7: Weight changes for metals (mg/cm²) in lab-aged fluids subjected to J1703 corrosion test procedure modified by addition of 50 ppm chloride to the test fluid. Results outside J1703 requirements (established for fresh fluids without chlorides) printed in boldface (* indicates DOT 4 fluid).

fluid	tinned iron	steel	aluminum	cast iron	brass	copper	zinc
SAE max. allowed	±0.2	±0.2	±0.1	±0.2	±0.4	±0.4	±0.4
SAE RM-66-04	-0.00	+0.02	-0.00 et	+0.03	-0.04	+0.01	-0.04
a	+0.01	+0.02	+0.13et	+0.06	-0.17	+0.21	**-1.84**
b	-0.01 pt	-0.04	-0.00	-0.00	+0.17	+0.25	**-4.51 et**
c	+0.03	+0.03	+0.02	+0.05	-0.02	+0.08	**-1.34**
d	-0.01	-0.00	+0.06 pt	-0.00	-0.13	-0.05	**-0.61**
e	-0.00	-0.03	+0.02 et	+0.04	-0.10	-0.02	**-1.03 et**
f	+0.02 pt	-0.00 pt	-0.02	+0.02	-0.01	+0.04	**-1.42 et**
g	+0.02	+0.03	-0.00 et	+0.10	-0.07	-0.00	**-0.36 et**
h*	-0.04 et	-0.01	-0.02	+0.04	-0.23	-0.15	+0.03
j*	-0.00 et	-0.00	+0.01 et	+0.03	-0.26	-0.20	+0.06

et = etching pe=pits (failure according to SAE J1703 requirement 4.6)

FACSIMILE COVER SHEET

TO:

Name: Greg Stevens / Noreen LaPointe

Company: Ford Motor

Phone No.: _____ Fax: 313 323-6686 / 313 337 8256

Routine: _____ Rush: X

Comments: SAE Paper we discussed during Meeting on 2/24/99

FROM:

Name: M K KITT

Phone No.: 225 355-6343 Fax No.: _____

Date: 2/25/99 Time: _____

TOTAL NUMBER OF PAGES 11 (including this cover page)

TEXAS INSTRUMENTS INC. ! MATERIALS & CONTROLS GROUP ! SITE

PARTS LIST ! PROJECT !PART NUMBER: 77PSL2-1 !REV LTR: L CLS: 650
EXPLOSION ! NUM: 3423 !DWG PFX: NUM:77PSL2-1 !ECN INC.DT: 98/02/24

TITLE: PRESSURE SWITCH (CUST P/N F2VC-9F924-AB)

LV	CNT	QTY/UM	BITM	PART/DRAWING NUMBER	RV	NOMENCLATURE/PARM DATA
01	1	REF		36952-1		FINAL ASSEMBLY
				36952-1	A	
01	2	1	27	27759-10		BASE ASSEMBLY
				27759SH1	L	
02	3	1	2	46515-2		BASE (BROWN)
				46515	N	
02	4	1	3	36888-1		STATIONARY TERMINAL
				36888	D	
02	5	1	4	36897-2		MOVABLE TERMINAL ASM
				36897SH1	H	
03	6	1	2	36887-1		MOVABLE TERMINAL
				36887	D	
03	7	1	3	74916-1		RIVET
				74916	G	
03	8	1	4	36889-1		SPRING ARM
				36889	B	
04	9	AR	2	27716-1		SPR MAT'L STR SPEC(.216 LBS/K)
				27716SH1	D	
03	10	1	5	28744-1		MOVABLE CONTACT
				28744	D	
01	11	1	24	27293-13		SENSOR ASSEMBLY
				27293SH2	W	
02	12	1	2	36900-1		MOD SAE J512 HEXPORT
				36900	H	
02	13	1	3	74353-1		GASKET
				74353	H	
02	14	1	4	27713-1		CUP
				27713	F	
02	15	3	5	74176-1		SEAL
				74176	C	
03	16	AR		27225-1		KAPTON STRIP SPEC (.175 LBS/K)
				27225	AB	
02	17	1	6	27639-1		WASHER
				27639	F	
02	18	1	7	27406-1		CONVERTER
				27406	F	
02	19	1	8	73958-2		SPACER
				73958	J	
02	20	OR	8	73958-3		SPACER
				73958	J	
03	21	AR		74224-1		KAPTON TAPE (.100 LBS/K)
				74224	F	
02	22	1	9	36656-27		3/4" FORMED DISC
				36656SH1	BM	
02	23	OR	9	36656-28		3/4" FORMED DISC
				36656SH1	BM	
01	24	1	14	74797-1		CRIMP RING

D3C Temp

Amps on IDMS reference 75755

3713 7630

				74727	B	
01	25	1	18	74078-143 74078	B	TRANSFER PIN
01	26	1	21	74247-4 74247	L	ENVIRONMENTAL SEAL
01	27	1	22	74888-1 74888	A	THREAD CAP
01	28	AR		27318-1 27318	D	CARTON ASM.
02	29	1	2	74219-1 74219	D	CARTON
02	30	3	3	74218-1 74218	D	ROW SEPARATOR
02	31	2	4	27317-1 27317	D	DEVICE SEPARATOR
02	32	AR	5	13608-4 13608-4		CLOSURE TAPE

! NOTES, REV.DATA,DISTRIBUTION,OPERATING CHARACTERISTICS,SPECIAL REQUIREMENTS !

REV DESC: CHG 74408-1 TO 28744-1 ! CCB APPROVAL DATE: 98/02/24

DFTG WORK GROUP: PRECISION CONTROLS ! ECN ORIGINATOR: DI T HA

NOTES:

1 - ACTUATION PRESSURE ---------- 90 -160 PSIG

2 - RELEASE PRESSURE---------- 20 PSIG MIN.

3 - DEVICE TO BE MARKED PER CODING SPECIFICATION 75871-1

DETAILED REVISION DESCRIPTION:

99 CR M39209, 28744-1 CONTACT (MOV) WAS 74408-1
STOCK DISPOSITION
FINISHED DEVICES - USE
PARTS & SUB ASMS - USE SUBS, HOLD PARTS

DEVICE # 55PS PROJ.# 3371	TITLE MATERIAL SPECIFICATION AISI #301 STAINLESS STEEL	REV G	75525 SH.1

75525 SH.1

1. MATERIAL TEST REPORTS AND THICKNESS TRACE MUST BE SUPPLIED WITH EACH LOT OF MATERIAL.

2. CHEMICAL COMPOSITION OF MATERIAL:

C	Mn	P	S	Si	Cr	Ni
.09/.12	.90/1.30	.04 MAX.	.010 MAX.	.35/.75	17/17.8	7/7.5

3. MATERIAL:
THE MATERIAL SHALL BE VACUUM MELTED. INCLUSION DETERMINATION SHALL BE MADE ON STARTING STOCK FOLLOWING THE RATING PROCEDURES OF ASTM E-45. INCLUSIONS SHALL BE 2 MAXIMUM PER METHOD A.

8 Ra MAX. SURFACE FINISH (TARGET 4 Ra)

MAX. ALLOWABLE BURR .0008"

4. MECHANICAL PROPERTIES: (SEE TABLE SHEET 3)

AS A REFERANCE TENSILE STRENGTH - NOMINALLY 7 KSI GREATER THAN THE YIELD STRENGTH.

5. STRIP STRESS RELIEF:
STRIP STRESS RELIEVE AT A TEMPERATURE IN THE RANGE OF 1000°/1200°F. AND AT A SPEED NECESSARY TO ACHIEVE SPECIFIED MECHANICAL PROPERTIES. NO PASSIVATION PERMITTED. APPLY GULF STAINLESS METAL 13 OR EQUIVALENT AFTER STRESS RELIEF.

6. STOCK CURVATURE:
NATURAL STOCK CURVATURE OF THE STRIP SHALL NOT EXCEED 3/4 INCH PER FT. OF LENGTH PER FIG. 3 AND SHALL BE MEASURED WITH A 12 INCH LENGTH OF STRIP LAID UNRESTRAINED, ON EDGE, ON A SMOOTH SURFACE.

7. CUT SIZE:

18" I.D. 25" MAX. O.D.
MAX. CUT WEIGHT 60#

8. PROCESS CHANGES:
THE SUPPLIER SHALL IDENTIFY THE DISCRETE, STEP-BY-STEP PROCESS TO MAKE EACH TEXAS INSTRUMENTS PART NUMBER ORDERED. THESE PROCESSES SHALL BE DOCUMENTED, REVISION CONTROLLED, AND MAINTAINED BY THE SUPPLIER. ALL PROCESSING MUST BE ACCOMPLISHED IN ACCORDANCE WITH THE APPROVED DOCUMENTATION. DOCUMENTATION SHOULD INCLUDE BUT NOT BE LIMITED TO:

A. ALL MAJOR EQUIPMENT TO BE USED DURING MATERIAL PROCESSING. THIS SHOULD INCLUDE ANY ALTERNATE EQUIPMENT THAT IS USED.
B. THE CRITICAL OPERATING PARAMETERS TO BE SET ON EACH MACHINE.
C. THE QUALITY AND LAB CHECKS TO ENSURE QUALITY COMPLIANCE.

COMPLETED PROCESS TRAVELERS MUST BE MAINTAINED ON FILE AT THE SUPPLIER'S LOCATION FOR A PERIOD NOT LESS THAN 3 YEARS AFTER MATERIAL SHIPMENT AND MUST INCLUDE INFORMATION TO ENABLE TRACEABILITY FROM ANY MATERIAL LOT BACK TO THE CORRESPONDING COMPLETED TRAVELER. WHERE ALTERNATE EQUIPMENT IS PERMITTED, THE COMPLETED PROCESS TRAVELERS MUST INDICATE WHICH SPECIFIC EQUIPMENT WAS USED.

ANY CHANGES TO THE PROCESS DOCUMENTATION AFTER QUALIFICATION MAY NOT BE MADE WITHOUT THE WRITTEN APPROVAL OF T.I. AND MAY REQUIRE RE-QUALIFICATION.

9. PACKAGING:
SHALL INCLUDE VAPOR BARRIER RUST INHIBITOR EQUIVALENT TO CORTEC VCI 132.

1: NOTE 5, "NECESSARY" WAS "IN A RANGE OF 36 TO 60...THICKNESS". 2: NOTE 8, "3/4" WAS "1/2" 5-22-97 CHG5103

G

SUPERSEDES DWG. 75525 SH.1 REV."F", DATED 10-29-96

REV>											M4-2#	038#	027-4	01	013

BY CHAS.FLEURANT 8-5-98
CH.
ENG.

TEXAS INSTRUMENTS
ATTLEBORO, MASSACHUSETTS 02703

KLIXON
CONTROL PRODUCTS

SIZE A

DWG. NO. 75525 SH.1

PAGE.05

FEB 24 '99 12:22 5082363153

3713 7632

75525 SH. #2

TITLE: COIL IDENTIFICATION

REV. A

75525 SH. #2

- LOT CONTROL CODING FOR FINAL SLIT COIL (MARK CLEARLY ON INNER SURFACE OF EACH COIL)

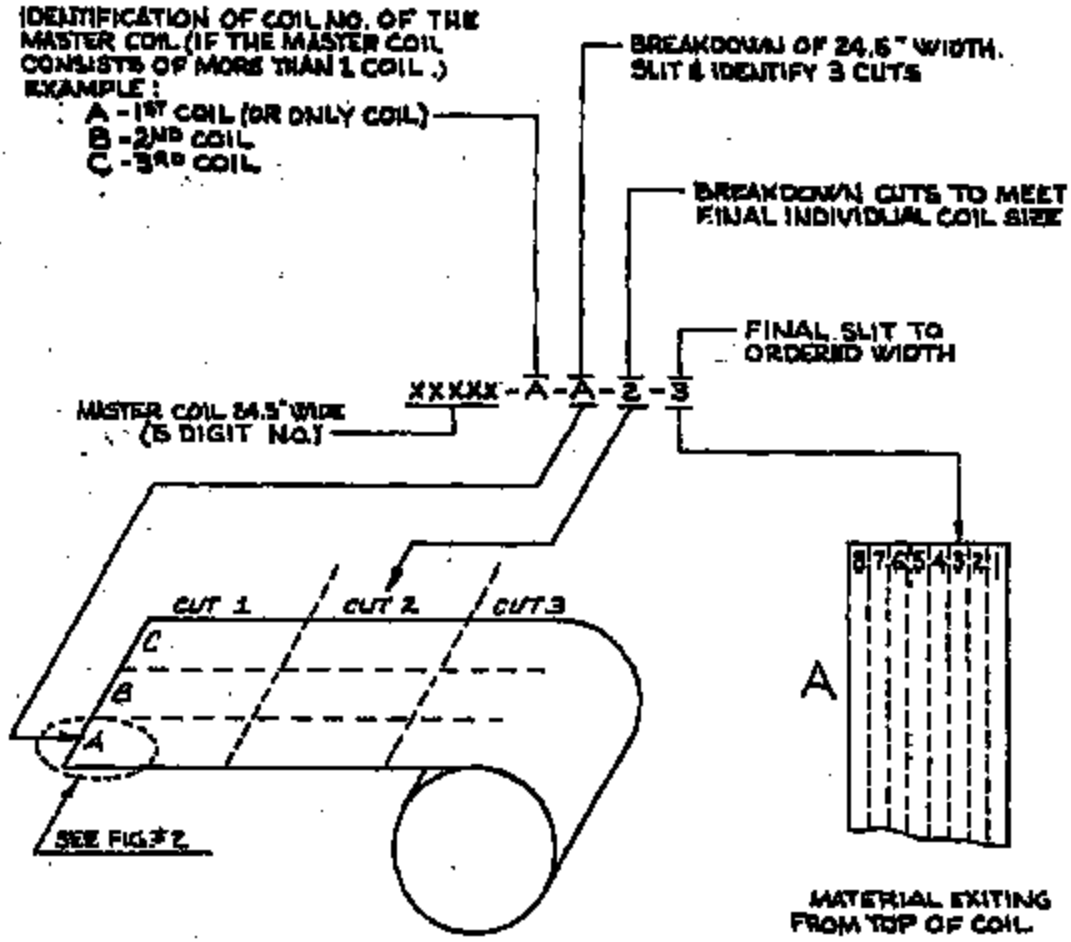


FIG. #1

FIG. #2

BY	T. Dail 3-14-85
CK.	B. Hale 3/25/85
ENG.	C. Sanford 3/26/85

TEXAS INSTRUMENTS INCORPORATED
ATTLEBORO, MASS., U.S.A.

KLIXON CONTROL PRODUCTS DIVISION

REV. A

PART NO. 75525 SH. #2

3713 7633

DEVICE # 5SPS
PROJ.# 3371

TITLE: MATERIAL SPECIFICATION

REV V

75525 SH.3

75525 SH.3

V ADD -13 IDENTICAL TO -3 EXCEPT SLIT WIDTH WILL BE .873-.877 04/27/98 ECN#440329 MF A.G.A.

U ADD -11,-12 (9-30-97) O.T.H. ON -1,-8,-10, CHANGES "54" TO "30-60" J.G.

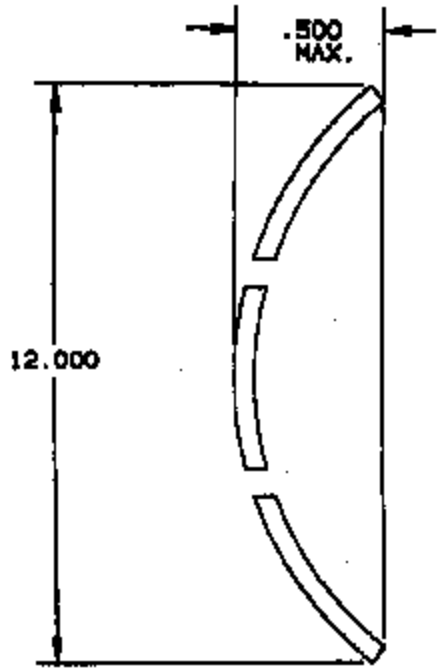


FIG. 3

* MAX. VARIATION WITHIN ANY FINISHED CUT. TOTAL COIL VARIATION SHALL NOT EXCEED .0003".

PART NO.	SLIT WIDTH	◈ THICKNESS	COLD WORK %	0.2% OFFSET YIELD STRENGTH (KSI)	MAX. EDGE CAMBER FOR 3 FT OF LENGTH	LBS /K
75525-13	.873 - .877	.0105 ±.00015*	50-80	200/230	5/32	2.2
75525-12	.498 - .502	.0085 ±.00015	50-80	200/230	5/32	.53
75525-11	.498 - .502	.007 ±.00015	50-80	200/230	5/32	.44
75525-10	.498 - .502	.0055 ±.00015	50-80	200/230	5/32	.34
75525-9	24" REF.	.072 REF.	N/A	N/A	N/A	N/A
75525-8	.873 - .877	.014 ±.00015*	50-80	200/230	5/32	2.98
75525-7	.648 - .652	.007 ±.00015*	50-80	200/230	5/32	.79
75525-6	.648 - .652	.0055 ±.00015*	50-80	200/230	5/32	.60
75525-5	.873 - .877	.013 ±.00015*	50-80	200/230	5/32	2.7
75525-4	.648 - .652	.005 ±.00015	50-80	200/230	5/32	.54
75525-3	.748 - .752	.0105 ±.00015*	50-80	200/230	5/32	1.9
75525-2	.873 - .877	.0122 ±.00015*	50-80	200/230	5/32	2.5
75525-1	OBSOLETE PER CR185280 9-14-90					

REV												038	01	N48	N4-2	013
V																

BY CHAS. PLEURANT 8-2-92
CH. C WAGNER 8-2-92
ENG.

TEXAS INSTRUMENTS ATTLEBORO, MASSACHUSETTS 02703

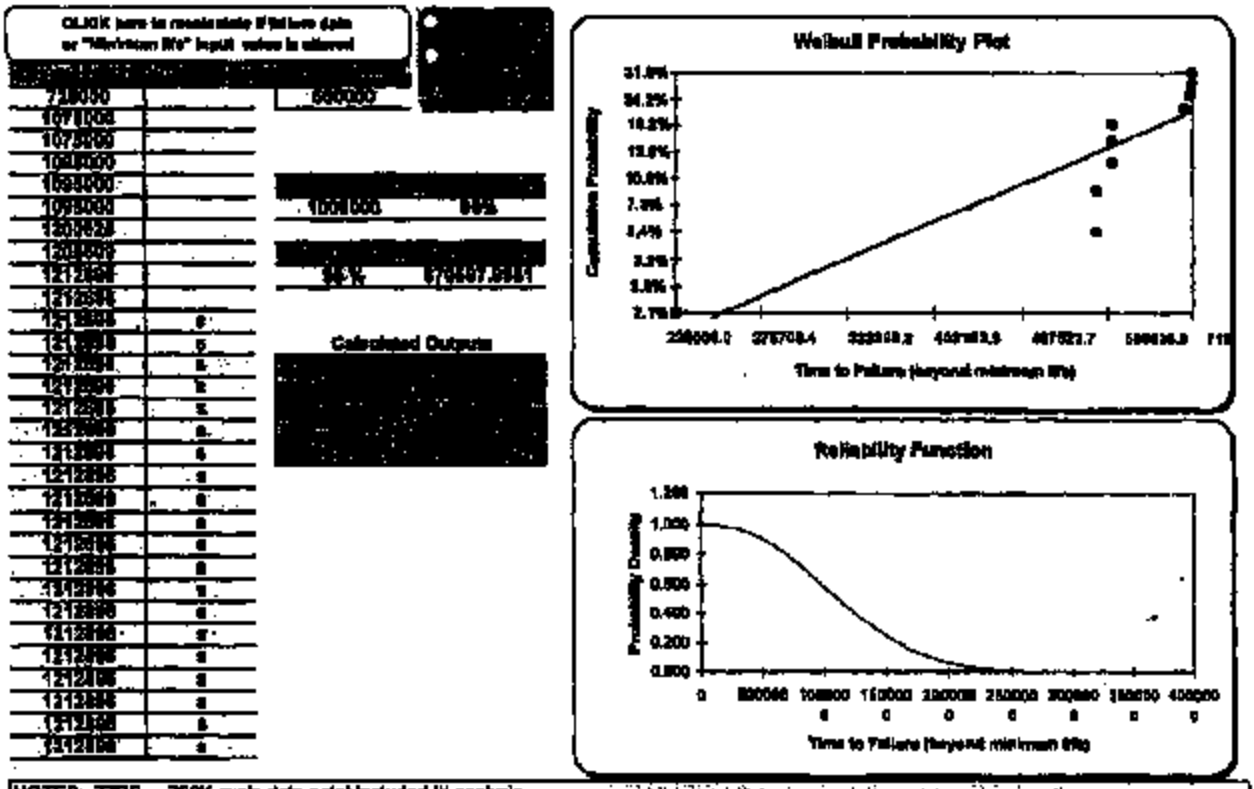
KLIXON CONTROL PRODUCTS DIVISION

SIZE A

DWG. NO. 75525 SH.3

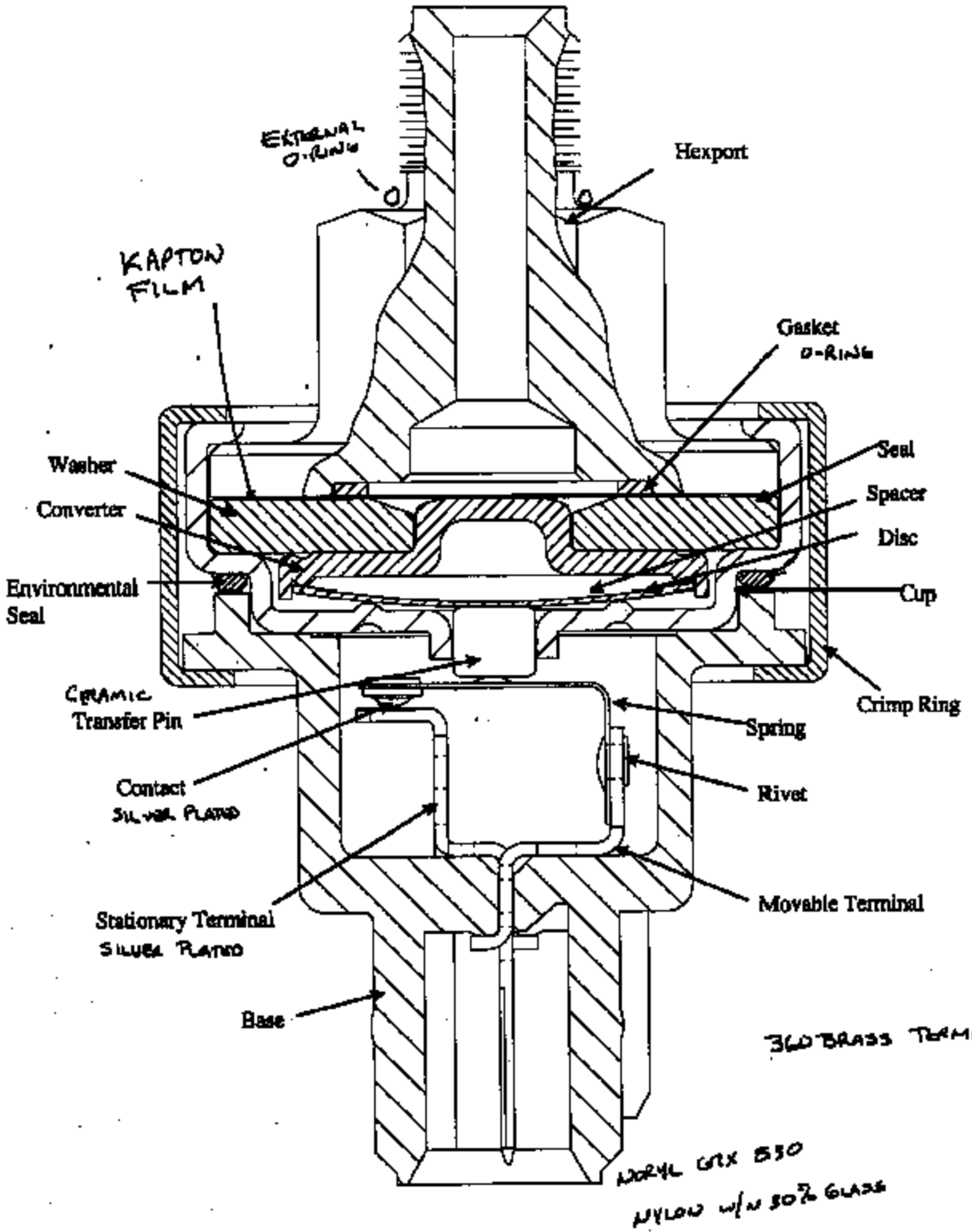
Figure 1.

2 and 3 parameter WEIBULL FAILURE ANALYSIS



NOTES: 77PB 728K cycle data point included in analysis

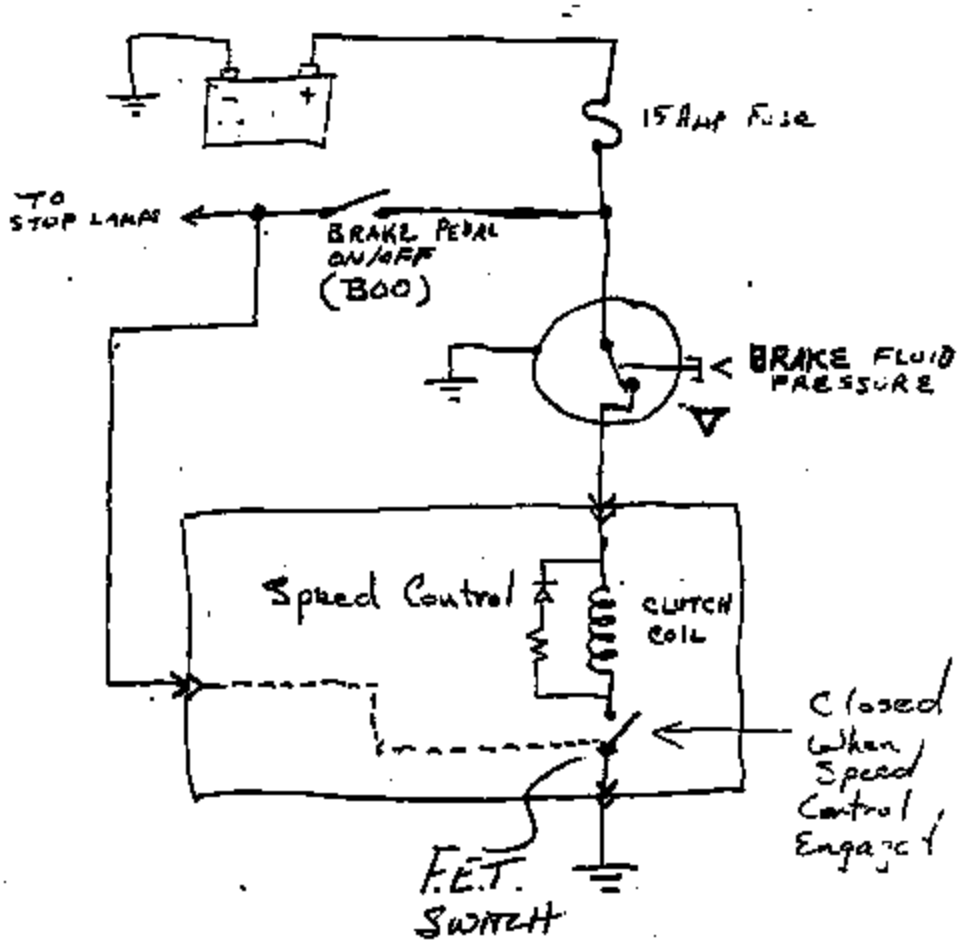
Hydraulic Pressure Switch Cross Section



Brake Pressure Switch Function-

- **Provide power to Speed Control Clutch circuit. Clutch engages servo-motor to pull throttle cable.**

- **Provide redundant sensing of brake application independent of the primary system deactivation mode by disconnecting power to clutch circuit causing servo-motor to release throttle cable.**
  - **Under Hard Braking only**
  - **Stop lamp signal is primary (normal braking)**



3713 7637

Brake Pressure Switch
F2VC-9F924-AB
Material List for MY 92/93

2nd Q 92
quiet disc introduced
• just snap Bass in deflection

Gasket	Elastomer Ethylene Propylene	JBL Compound # E-7104-70
Diaphragm	Kapton, Polyimide	Dupont 500 FN131L, 3 Diaphragms per switch
Base	PBT, Plastic	Grade Celanex 4300
Crimp Ring	Aluminum	Grade # 5052
Spacer	Kapton, Polyimide	Dupont #200H,Friction Reducer on Disc
Rivet	Brass	CDA 260
Transfer Pin	Ceramic	Steatite , L-3 Grade
Environmental Seal	Silicone	JBL Compound # S7519
Converter	Cold Rolled Steel	Grade # 1008
Washer	Cold Rolled Steel, Zinc Plated	Grade # 1050
Cup	Cold Rolled Steel	Grade 1010
Spring Arm	Beryllium Copper	Grade # C17200
Movable Contact	Silver Plated Copper	Oxygen Free Cu, Fine Silver
Stationary Terminal	Brass + Silver Inlay	CDA 260
Movable Terminal	Brass	CDA 260
Disc	Stainless Steel	Grade 302 ?? former disc matl.
Hexport	Cold Rolled Steel, Zinc Plated	C10L10
Thread Cap	LDPE, Plastic	

****
* Note printed by NLAPOINT on 17 Feb 1999 at 16:14:08 *
****

From: FPORTER --DRBN007 Date and time 01/26/99 17:25:48
To: NLAPOINT--DRBN005 SLAROUCH--FORDNA1

FROM: F. J. Porter USART(UTC -05:00)
Subject: (U) Brake Pressure Switch Material

The following is from TI drawings

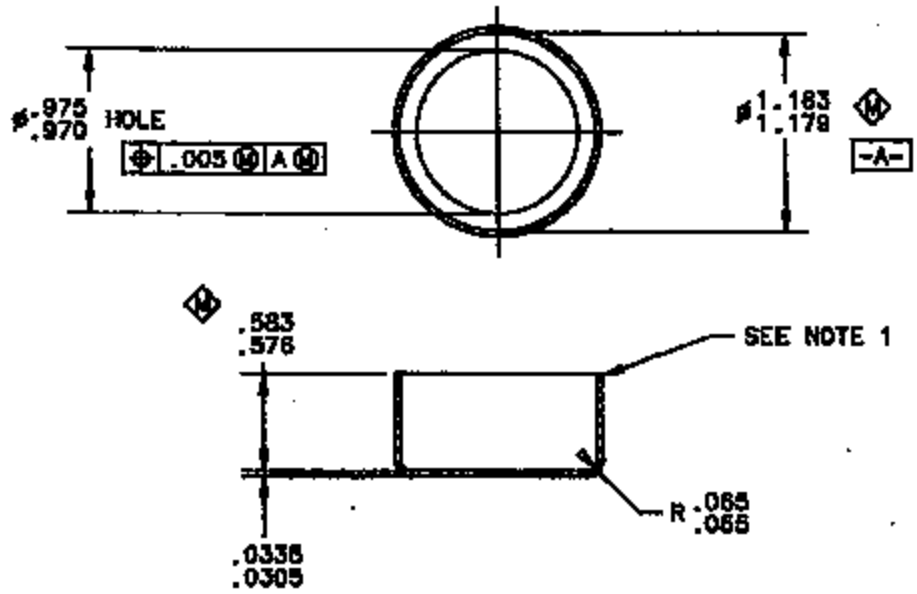
Part	Material	Comments
Modified SAE J512 Hexport	C10L10 Steel	Zinc Plating .0003 min thk w/yellow dichromate
Converter	1008 or 1010 C.R. Steel	Zinc Plating .0002-.0004 thk may have rust inhibitor
Washer	1050 CRS	Zinc Plate .0002-.0006 thk Heat treat austemper Rockwell 40-60
Cup	1010 or 1006 C.R.S.	Zinc Plating w/yellow chromate .0002-.0004 thk
Spring	Beryllium copper C17200	Mill hardened (Brush Wellman alloy 190 hm)
Kapton	Dupont 500 FN1313L	1 mil Teflon FEP 3 mil Kapton Type H 1 mil teflon FEP
Moveable Contact	Copper	Finish: DMC-133 OFHC Silver DMC-10 fine silver
Environmental Seal	Silicon JBL 87519	
Transfer Pin	L-3 Grade Steatite (DC-16ES) or L-3 Grade Steatite (DC-144E)	
Switch Rivet	CDA 260 Brass	
Gaskat	Ethylene Propylene JBL Compound E-7104-70 JBL Part No. 6197E	
Spacer	Dupont Kapton 200H	.0017-.0023 thk
Crimp Ring	Aluminum 5052	
Thread Cap	LDPE	

Regards,
Fred Porter OV - fporter fporter@ford.com
Chassis E/E Systems Applications (313)845-3722
Bldg 5 - Mail Drop 5030 - Cubicle 3E004 fax: 390-4145

Disc 302 S.S.

TITLE	REV.	
CRIMP RING	B	74797

74797



NOTES:
1. PINCH OFF RADIUS ALLOWED.
2. .002 MAX. BURR ALLOWED.
3. PARTS TO BE SHIPPED, ISSUED, AND STORED IN SEALED PLASTIC BAGS.
4. MATERIAL CERTIFICATION REQUIRED WITH EACH SHIPMENT.

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Date JAN 7 1999
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SUPERSEDES DWG. 74797 REV. A DATED 11-2-90

74797-1	ALUMINUM 5052	
PART NO.	MATERIAL	FINISH

B . .0305 - .0335 WAS .0310 - [illegible] OF 1-24-91

REV | TCSK | 013 | 01 | MA1 | P57-3 | P35

BY ~~CHAS FLEURANT 11-2-90~~
CH. 1-30-91
ENG. 9/1/28
MAKEPEACE

TEXAS INSTRUMENTS
ATTLEBORO, MASSACHUSETTS 02703

KLIXON
CONTROL PRODUCTS DIVISION

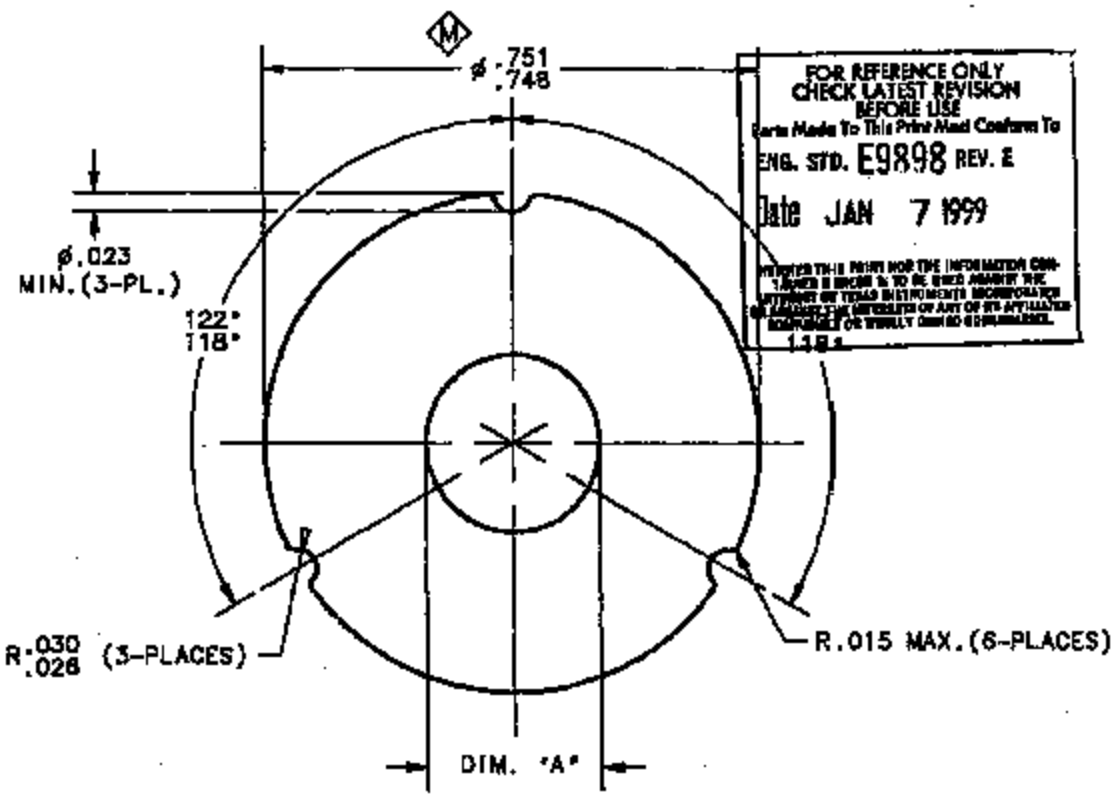
DWG. SIZE A
DWG. NO. 74797

CODE IDENT NO. 82647

3713 7640

DEVICE # 51PS PROJ.# 3355	TITLE SPACER	REV J	73958

73958



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Date JAN 7 1999

NOTES:

Ⓜ 1. .001 MAX. BURR ALLOWABLE.
2. PARTS TO BE SHIPPED, ISSUED, AND STORED IN SEALED PLASTIC BAGS.
3. ALL CONTAINERS OF PARTS MUST BE DATE CODED, DATE CODE IS TO REFLECT ANY MATERIAL LOT, TOOL OR PROCESS CHANGE.
4. MATERIAL CERTIFICATION REQUIRED WITH EACH LOT.

PART NO.	MATERIAL	DIM "A"
73958-4	KAPTON .0017 - .0023 THICK (FORD RCS)	.260/.270
73958-3	MADE FROM 74224-1 (KAPTON TAPE)	NO HOLE
73958-2	DUPONTS, KAPTON 200H, .0017 - .0023 THICK	NO HOLE
73958-1	KAPTON .0017 - .0023 THICK	.260/.270

THIS DWG. SUPERSEDES 73958 REV. "H" DATED 3-02-93.

J CHANGED THE SECOND NOTE THREE TO NOTE FOUR. 3-30-93 CR#12792, D.P.

REV		RS#	TS#	Q13	Q1	M21	P37-3	P35

BY	TON DAIL 10-10-88
CH.	
	3.17.93

TEXAS INSTRUMENTS
ATTLEBORO, MASSACHUSETTS 02703

KLIXON
CONTROL PRODUCTS DIVISION

SIZE A

DWG. NO. 73958

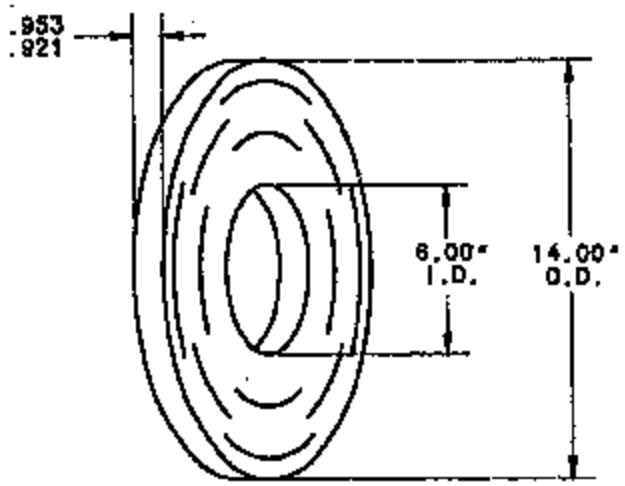
3713 7641

TITLE	REV.	
KAPTON TAPE	F	74224

74224

NOTES:

1. ROLLS SLITTED FROM ENDS OF MASTER COIL NOT ACCEPTABLE.
2. BUCKLING OF THE CORE ALLOWED UP TO 1/4" MEASURED RADIALLY AWAY FROM THE CORE.
3. DENTS, RIPS, OR JAGGED EDGES ON MATERIAL NOT ALLOWED.
4. ROLLS ARE TO BE SHIPPED WITH PROTECTIVE INSERT CORES IN THE PACKING BOX.



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Date JAN 7 1999

74224-1	DUPONTS, KAPTON 200H	.0017/.0023	
PART NUMBER	MATERIAL	THICKNESS	

THIS DWG. SUPERSEDES 74224 REV. "E" DATED 10-14-88

ADDED MATERIAL, ECR 19537, 10-19-90 GF

F

REVISIONS: R5 R3 R3 D13 R2 M21 R5

BY TOM DAIL 10-14-88
CH.
ENG. Steve Hummel 10-16-90

TEXAS INSTRUMENTS
ATTLEBORO, MASSACHUSETTS 02703

XIDEX
CENTRAL PRODUCTS DIVISION

DWG. SIZE A

DWG. NO. 74224

MAKEPEACE

CORP. ISSUE No.

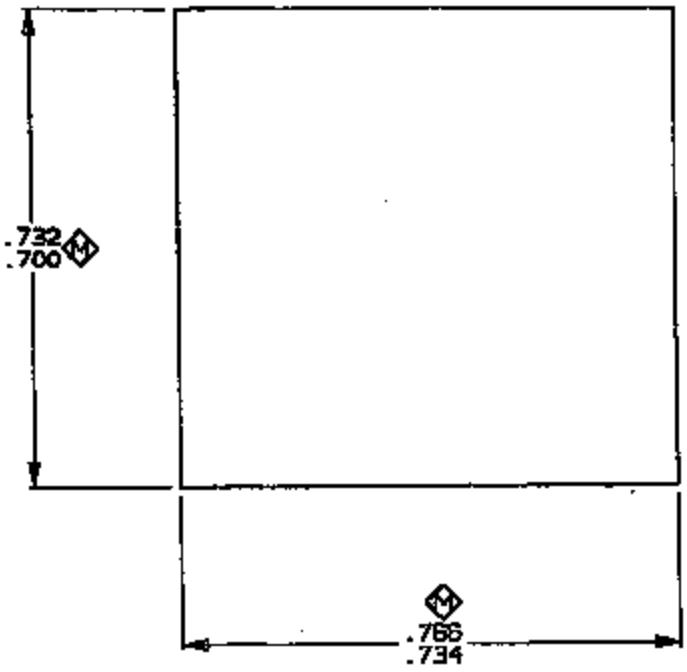
3713 7642

DEV.# 52PSL
PROJ.# 3355

TITLE
SEAL

REV C

74176



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ENG. STD. E9898 REV. E
Date JAN 7 1999

NOTES:
1. .001 MAX. BURR ALLOWED.
2. ALL CONTAINERS OF PARTS MUST BE DATE CODED. DATE CODE IS TO REFLECT ANY MATERIAL LOT, TOOL OR PROCESS CHANGE.
3. MATERIAL CERTIFICATION REQUIRED WITH EACH SHIPMENT.

PART NO.	MATERIAL
74176-1	MAKE FROM 27225-1 (STRIP)

SIGNATURES ON FILE. REFER TO ELECTRONIC CHANGE NOTICE.

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REV														
											734	03	01	M31	P25	RS*

DRAWN	H.H.	02/01/84
ENGINEER	D.STRAT	02/13/84
APPROVED	C.H. WERNER	02/13/84
APPROVED		

TEXAS INSTRUMENTS
ATTLEBORO, MASSACHUSETTS 02703

KLIXON
CONTROL PRODUCTS DIVISION

SIZE A

DWG. NO. 74176

74176

ADD SAME NOTE AS ON 74075 03/17/98 MF EC#N35730 D.H.

C

27225 HAS 27287 04/24/85 H.H. CR82252 S.L.

B

1ST ISSUE 37PSL1 02/01/84 H.H. CR82798 D.S.

A

REV

3713 7643

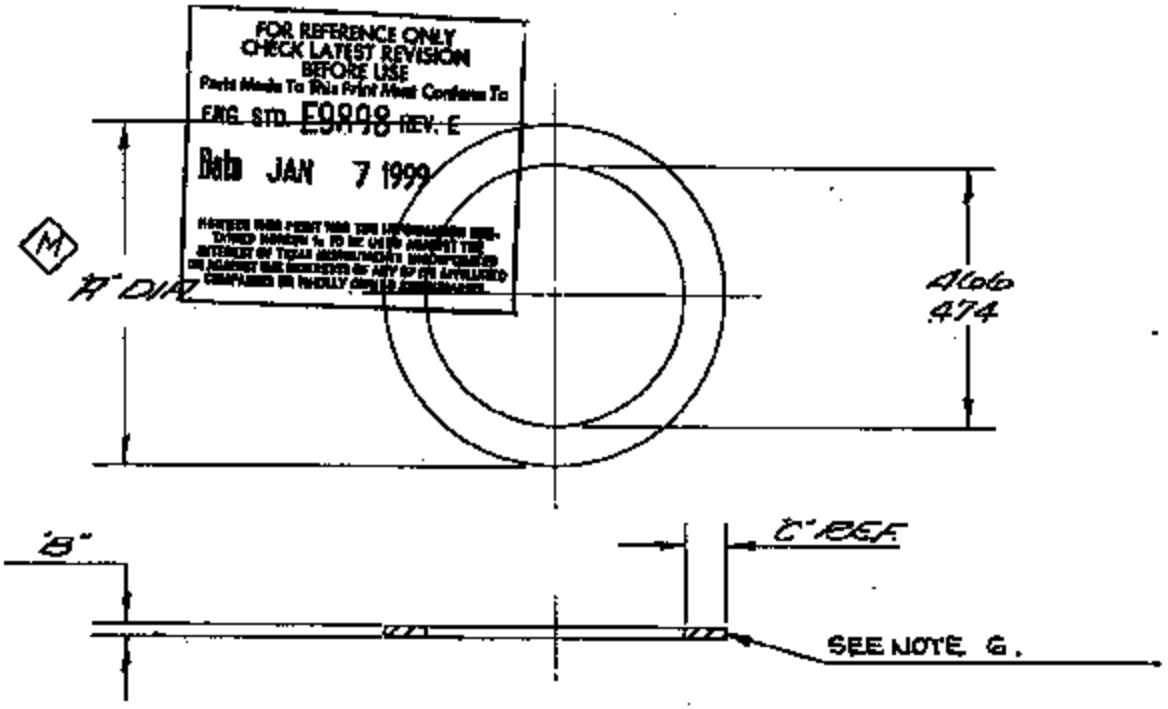
REV.						
A	1ST ISSUE CR 95017, TJ 3/18/85	C	ADDED -3 CR96269 [illegible] 85	E	SEE C.I.I. 5-30-86 CR 9/873	G	CHG. NOTE 6 [illegible] 91 CRM05365
B	ADDED -2 & NOTE #6 CR 95890 [illegible] 85	D	ADDED -4 CR96519 [illegible] 85	F	PER DCN CR 97678, 7-23-86	H	CHG. NOTE 4 SEE DCN CRM01699 [illegible] 91

74353

TITLE GASKET

REV. H

74353



FOR REFERENCE ONLY
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Parts Made To This Print Must Conform To
ENG. STD. E9998 REV. E
Date JAN 7 1999

NOTES:

1. PARTS MUST BE PURCHASED FROM T.I. ENGINEERING APPROVED VENDORS, LISTED BELOW.
2. MATERIAL CERTIFICATION REQUIRED WITH EACH SHIPMENT.
3. MATERIAL TO BE COMPATIBLE WITH FREON-12 & REFRIGERANT OIL.
4. PARTS TO BE SHIPPED, ISSUED, AND STORED ON 4 FOOT +/- 6 INCH MANDRELS, SEALED IN PLASTIC BAGS AND SHIPPED IN CARDBOARD TUBES.
5. ALL CONTAINERS OF PARTS MUST BE MARKED TO REFLECT ANY MATERIAL LOT, TOOL OR PROCESS CHANGE.
6. Ⓜ DASH 1 (-1) AND DASH 4 (-4) GASKET MUST HAVE FOUR (4) WHITE STRIPING INK MARKS, EQUALLY SPACED AROUND THE CIRCUMFERENCE, AND NOT LESS THAN 1/8 INCH WIDE. NO INK IS ALLOWED ON ANY OTHER SURFACE.

PART NO.	MATERIAL	DUROMETER	COLOR	A Ⓜ	B Ⓜ	C
74353-4	ETYLENE PROPYLENE JBL COMPOUND E-7104-70 JBL PART NO. G197E	70	BLACK	.670-.662	.030-.036	.063
74353-3	ETHYLENE PROPYLENE JBL COMPOUND E-7054	70	WHITE	.670-.662	.030-.036	.063
74353-2	ETHYLENE PROPYLENE JBL COMPOUND E-7054	70	WHITE	.599-.591	.030-.036	.063
74353-1	ETHYLENE PROPYLENE JBL COMPOUND E-7104-70 JBL PART NO. G197E	70	BLACK	.599-.591	.030-.036	.063

5-7-85

REV.							DS	Q131	Q1-1	MJI-		TSV	P3/-7	P35-1	[illegible]

BY T. Dail 3-18-85
CH. [illegible] 3-20-85
ENG. [illegible] 3-11-85

TEXAS INSTRUMENTS
INCORPORATED
ATTLEBORO, MASS., U.S.A.

KLIXON
CONTROL PRODUCTS DIVISION

DWG. SIZE A

PARTS LIST
74353

3713 7644

DEVICE # 77PSL PROJ.# 3355	TITLE THREAD CAP	REV A	74888

74888

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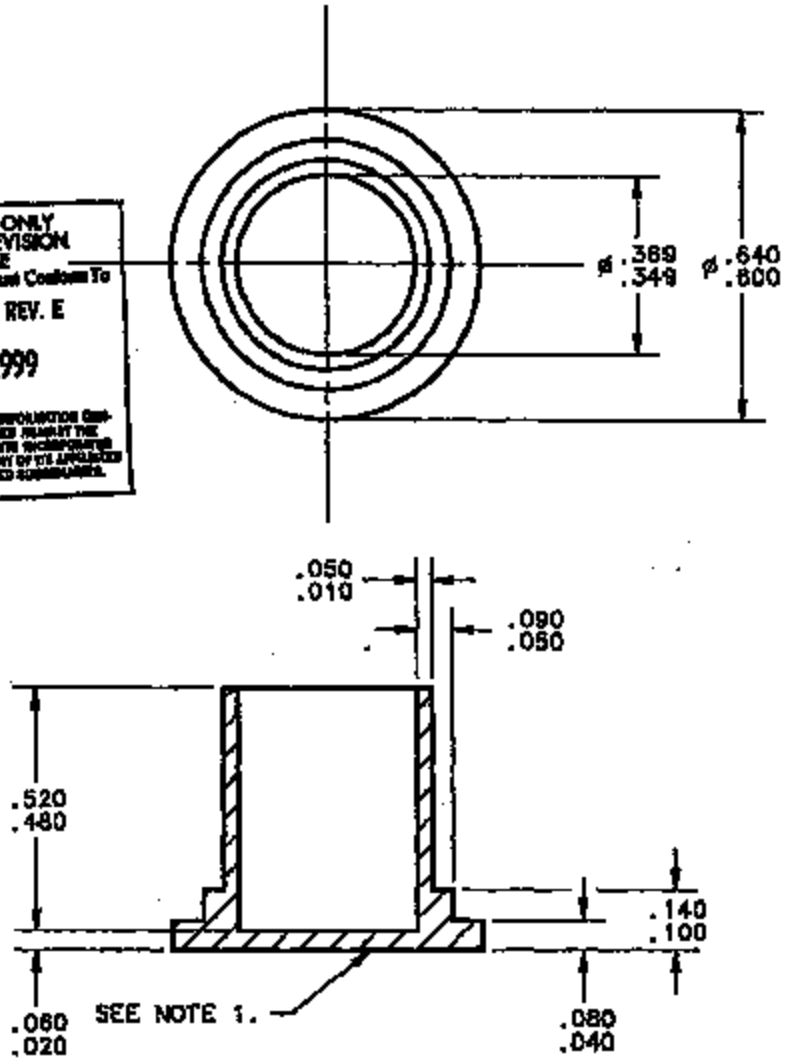
Date JAN 7 1999



NOTE:
1. GATE MARK AND MANUFACTURER IDENTIFICATION IN RAISED LETTERS ON THIS SURFACE.

PART NO.	VENDOR	STOCK NO.	MATERIAL	COLOR	
74888-1	CAPLUGS	EC-6	LDPE	RED	

REV											RS* 013	038* M21 P37-3 035
A	1ST ISSUE 1-30-92. CR#07857											

DR. CHAS. FLEURANT 1-30-92	TEXAS INSTRUMENTS ATTLEBORO, MASSACHUSETTS 02703	KLIXON CONTROL PRODUCTS DIVISION	SIZE A	DWG. NO. 74888
CH. 2-13-92				
ENG. 920206				

CODE IDENT NO. 82647

3713 7645

PROJ.# 3500	TITLE ATPS-DISC PROCEDURE	REV A	75755 SH.1

75755 SH.1

INITIAL SYSTEM LOGON:

FROM A BLANK IMS SCREEN TYPE IN

TSSON ATPSDA <USERID> <PASSWORD>
WHERE <USERID> IS YOUR IMS USERID
AND <PASSWORD> IS YOUR IMS PASSWORD.

EX. TSSON ATPSDA A99999 PPPP

THEN PRESS THE ENTER KEY

THE RETURN SCREEN SHOULD BE THE ROUTE CARD SYSTEM MENU

AFTER INITIAL LOGON, YOU MAY ACCESS THE MENU FROM A BLANK IMS SCREEN BY TYPING IN

ATPS000

THEN HIT ENTER

OPTION 20:
OPTION 20 OF THE MENU (OR ATPS020 FROM A BLANK SCREEN) WILL ALLOW YOU TO DISPLAY A LIST OF DISC PARTS FOR A GIVEN DRAWING NUMBER.

FOR QUICK ACCESS TO THIS INFORMATION YOU MAY ENTER THE FOLLOWING ON A BLANK IMS SCREEN:

ATPS020 <DRAWING_NUMBER>
WHERE <DRAWING_NUMBER> IS THE PART II DRAWING THAT YOU WANT TO DISPLAY.

EX. ATPS020 9769SH245

THEN HIT ENTER

OPTION 30:
OPTION 30 OF THE MENU (OR ATP030 FROM A BLANK SCREEN) WILL ALLOW YOU TO ACCESS CHARACTERISTIC DATA FOR A SPECIFIED DISC PART NUMBER.

FOR QUICK ACCESS TO THIS INFORMATION YOU MAY ENTER THE FOLLOWING ON A BLANK IMS SCREEN:

ATPS030 <PART_NUMBER>
WHERE <PART_NUMBER> IS THE DISC PART THAT YOU WANT TO DISPLAY

EX. ATPS030 9769-6-900

THEN HIT ENTER

IF YOU HAVE ANY QUESTIONS OR PROBLEMS, PLEASE CONTACT DRAFTING

A LISTING OF PEOPLE TO CONTACT FOR HELP OR INFORMATION ON THIS SYSTEM WILL BE MAINTAINED ON TIOLR AND CAN BE ACCESSED AS FOLLOWS:

T DA;RCS.USERDOC.CONTACTS

REV												P31	Q3	Q4	MAI	P1
A	1ST ISSUE 9-13-93, CPF 0084 CRM14298, J.H.G.															

BY CHAS. FLEURANT 9-13-93
QA J.H.Gale 9-14-93
ENG. [illegible] 9-13-93

TEXAS INSTRUMENTS
ATTLEBORO, MASSACHUSETTS 02703

KLIXON
CONTROL PRODUCTS DIVISION

DWG. SIZE A

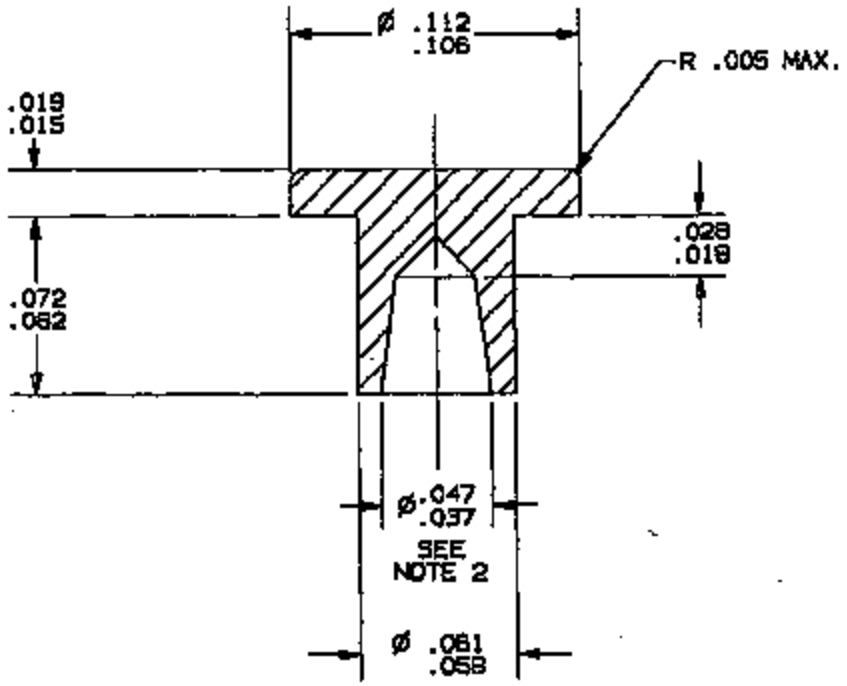
DWG. NO. 75755 SH.1

CODE IDENT NO. 82647

3713 7646

DEVICE # 77/87PS PROJ.# 3423	TITLE SWITCH RIVET	REV G	74916

74916



NOTES:
1. MATERIAL CERTIFICATION REQUIRED, TO BE KEPT BY SUPPLIER AND PROVIDED UPON TI'S REQUEST.
2. TAPERED HOLE IS ALLOWED.
3. PARTS MUST BE PACKAGED CLEAN AND DRY.

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PART NO.	MATERIAL	FINISH
74916-2	OBSOLETE PER CRM15079	
74916-1	CDA 280 BRASS	NONE

SUPERSEDES DWG. 74916 REV."F", DATED 9-30-99

SEE ECN # MARK UP FOR CHG.
8/21/98 L.B.H.
CRM42191 J.G.

G

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REV									D2-3	M5-3	013	D38*	M21	P37	P35

DRAWN	CHAS. FLEURANT	9-30-99
DESIGNED	JOANNE MAREK	9-30-99
APPROVED	MATT SELLERS	9-30-99
APPROVED		

TEXAS INSTRUMENTS
ATTLEBORO, MASSACHUSETTS 02703

KLIXON
CONTROL PRODUCTS DIVISION

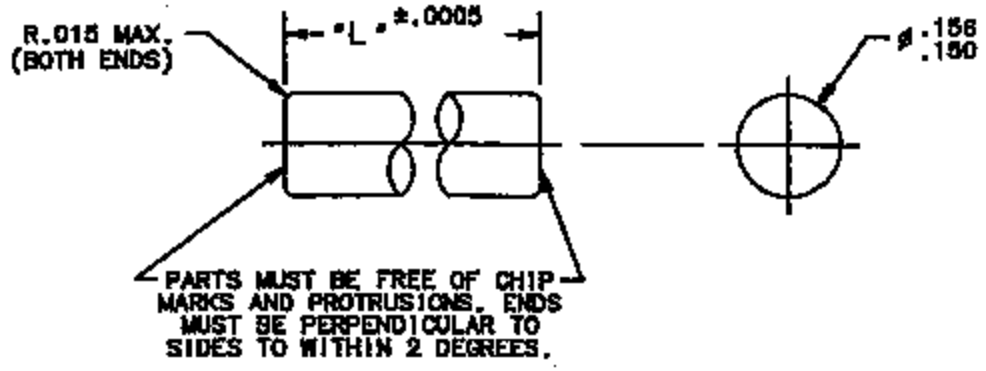
SIZE A

DWG. NO. 74916

3713 7647

TITLE	REV.	
TRANSFER PIN	G	74078

74078



"L" LENGTH IS DETERMINED BY THE SUFFIX OF THE PART NUMBER IN THOUSANDTHS OF AN INCH. I.E.)

PART NO.	"L"
74078-155	.155
74078-210	.210

VENDOR WILL BE PREPARED TO FURNISH PINS .130 - .250 LONG.

NOTES:

1. FINISHED PARTS TO BE SHIPPED, ISSUED AND STORED IN SEALED PLASTIC BAGS. SEALED PLASTIC BAGS TO CONTAIN 20,000 PINS(OR LESS FOR PARTIAL BAGS). BAGS MUST BE CLEARLY LABELED WITH THE PART NO. AND THE QUANTITY OF PARTS IDENTIFIED ON THE OUTSIDE OF EACH BAG.
2. MATERIAL CERTIFICATION REQUIRED WITH EACH SHIPMENT.

MATERIAL: L-3 GRADE STEATITE (DC-18E5) OR
L-3 GRADE STEATITE (DC-144E)

CURE PER SPEC.----- 50502-2

SHRINKAGE SPEC.---- 50501-1

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THIS DWG. SUPERSEDES 74078 REV. "E" DATED 8-4-88

DRAWN												T6*	013	Q	MR/P37-1/P35

BY TOM DAIL 10-17-88
CH.
ENG. Hans Hansen 10-20-91
MAKEPEACE

TEXAS INSTRUMENTS
ATTLEBORO, MASSACHUSETTS 02703

KLIXON
CONTROL PRODUCTS DIVISION

DWG. SIZE A

DWG. NO. 74078

CODE IDENT NO. 82647

3713 7648

13608-4

CLOSURE TAPE

REV. 13608-4

3" 60# TAPE

COLOR NATURAL

WATER ACTIVATED ADHESIVE

NON-ASPHALTIC

REVISIONS	DRTI		H.S*	VS-1	WI-S	VS-1	VS	WI-S	VS-1	V-1	V-1	P-1	P-1	P-1	P-1

BY BOARDMAN 2-15-72
CH.
ENG. JJA 2-21-72

TEXAS INSTRUMENTS INCORPORATED
ATTLEBORO, MASS. U.S.A.

KLIXON CONTROL PRODUCTS DIVISION

SIZE A

DWG. NO. 13608-4

K-E

CODE IDENT NO. 82647

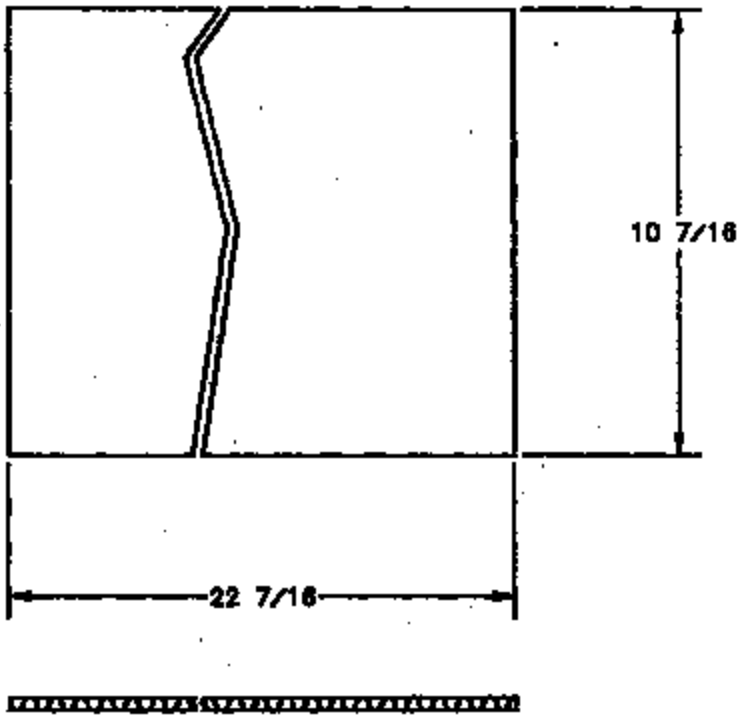
3713 7649

DEV. # 52/57PS
PROJ. # 3355

TITLE: ROW SEPARATOR

REV. D

74218



MATERIAL: 200 LB. CORRUGATED CARDBOARD

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Date JAN 7 1999

THIS DWG. SUPERSEDES 74218 REV. "C" DATED 10-16-90

REV.													
												03	01

P37-3P12

ST
CN. TDR DATE 10-16-90
ENG. Steve Hammond 4/1/91
MAKEPEACE

TEXAS INSTRUMENTS
ATTLEBORO, MASSACHUSETTS 02703

KLIXON
CONTROL PRODUCTS DIVISION

DWG. SIZE A

DWG. NO. 74218

CODE IDENT NO. 02447

3713 7650

DEV. # 52/57PS PROJ. # 3365	TITLE CARTON	REV. D	74219

74219

CONSTRUCTION TO BE RSC FROM 275 LB. CORRUGATED CARDBOARD WITH TAPE CLOSURE, TAPE OTHER THAN ASPHALTIC TYPE.

INSIDE DIMENSIONS

LENGTH	22 9/16" MIN.
WIDTH	10 9/16" MIN.
HEIGHT	6 5/16" MIN.

OUTSIDE DIMENSIONS

LENGTH	23" MAX.
WIDTH	11" MAX.
HEIGHT	7 1/2" MAX.

THIS DWG. SUPERSEDES 74219 REV. "C" DATED 10-16-90

REV.														
												01 3 01		937-3672

BY TGM-DAIL 10-14-90 CH. ENG. [signature] 4/2/91	TEXAS INSTRUMENTS ATTLEBORO, MASSACHUSETTS 02703	KIDDON CONTROL PRODUCTS DIVISION	DWG. SIZE A	PART NO. 74219

MATERIAL:

FOR INSPECTION NO. 026647

3713 7651

EA02-025

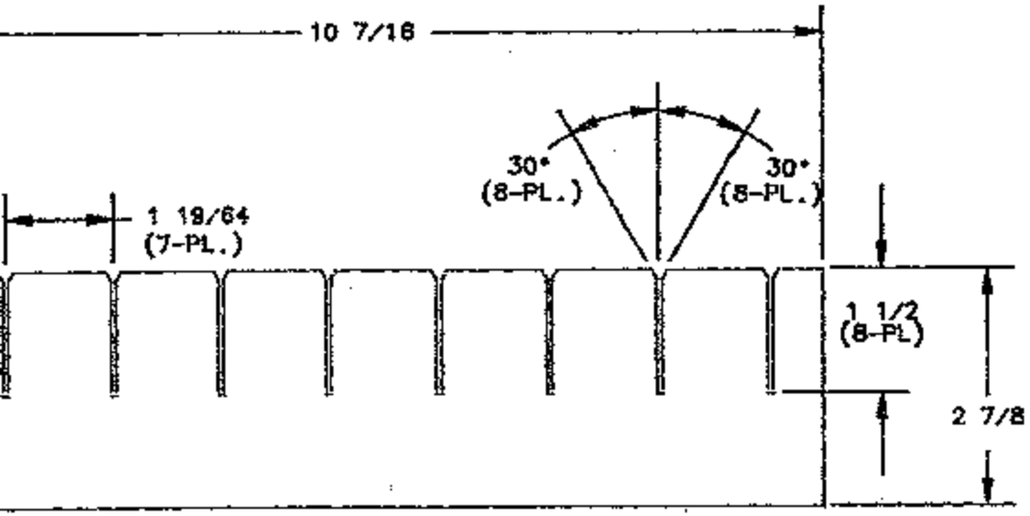
FORD

10/27/03

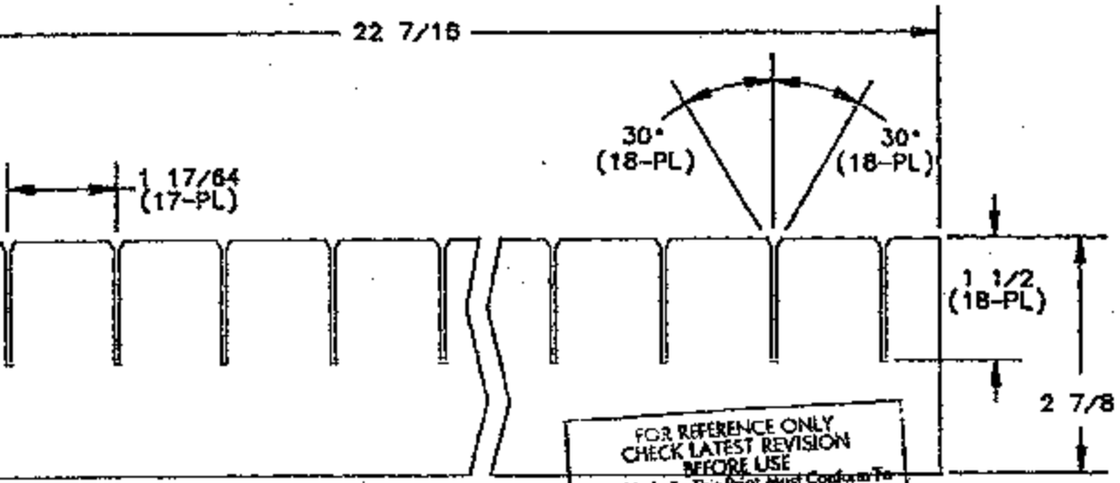
BOOK 27

DRAWING

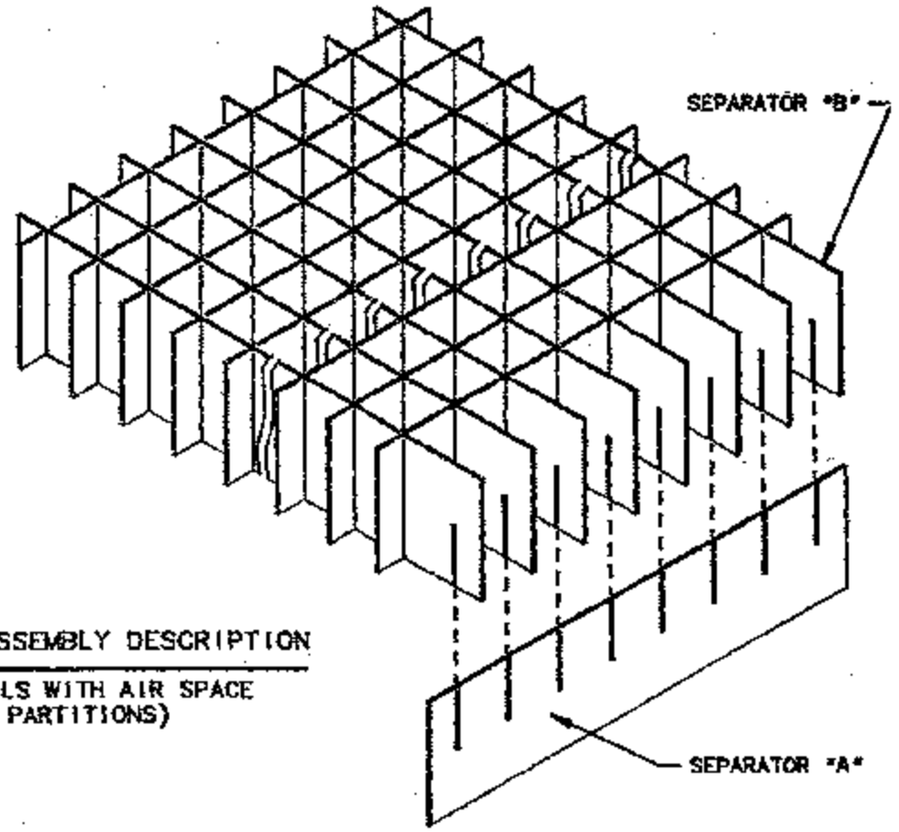
REVISIONS				
ZONE	LTR	52/57PS DESCRIPTION PROJ.# 3355	DATE	A
	D	REDRAWN WITH GENERAL REVISIONS CR.155858, CF	3-19-91	



SEPARATOR "A"



SEPARATOR "B"

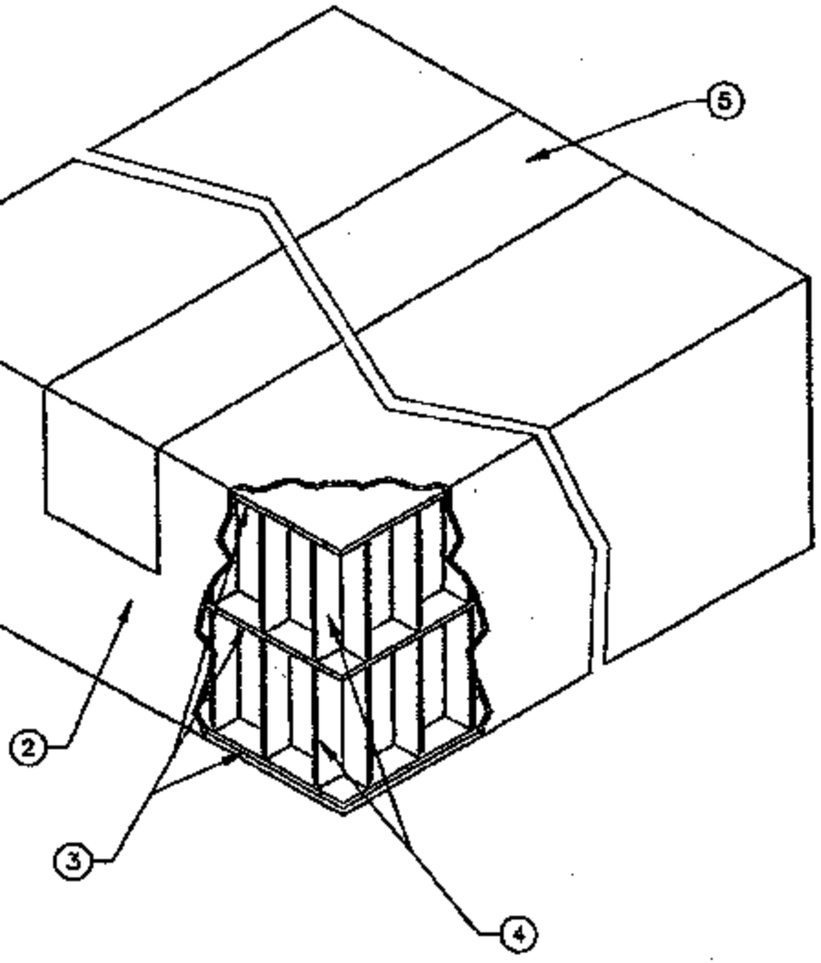


SEPARATOR ASSEMBLY DESCRIPTION

7 x 17 CELLS WITH AIR SPACE
(171 PARTITIONS)

27317-1	18 SEPARATOR A'S & 8 SEPARATOR B'S	.031 CHIPBOARD
PART NO	DESCRIPTION	MATERIAL

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES	BY CHAS FLEURANT	DATE 3-19-91	TEXAS INSTRUMENTS ATTLEBORO, MASSACHUSETTS 02703	KLD CONTROL DIVIS
TOLERANCE ON FRACTIONS DECIMALS ANGLES	CH.			
	ENG.		TITLE	



B-3 B-4	D	DELETED ITEM 6 27317-2 DEVICE SEPARATOR DELETED BALLOON #4 BALLOON #4 WAS #6 CR.155858, CF	3-19-01

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AS REQD	5	13608-4	TAPE
2	4	27317-1	DEVICE SEPARATOR
3	3	74218-1	ROW SEPARATOR
1	2	74219-1	CARTON
	1		ASSEMBLY

QUANTITY / DASH NO	ITEM NO	PART NO	DESCRIPTION

01/3/01 0273 P12

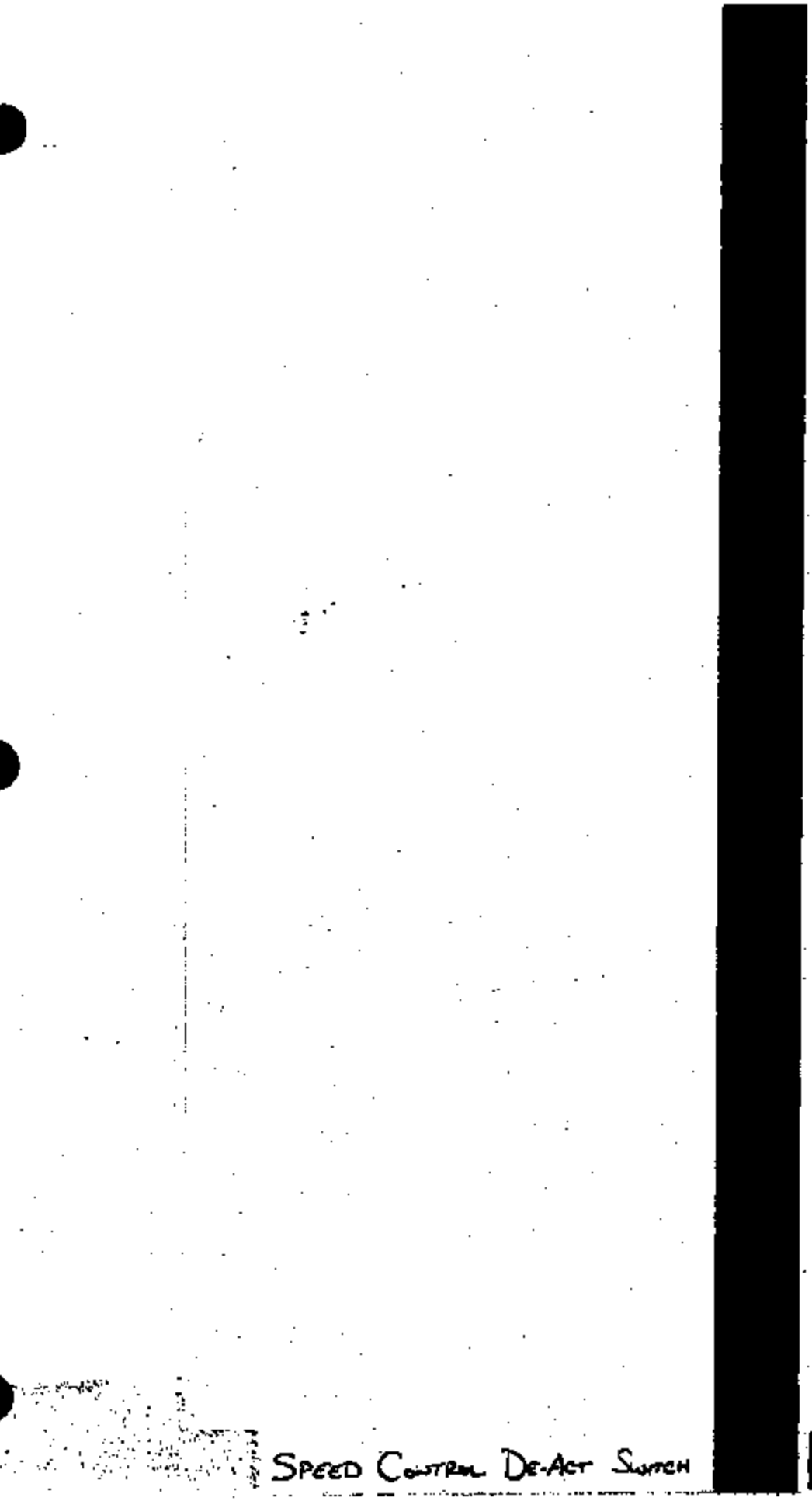
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCE ON FRACTIONS DECIMALS ANGLES
MATERIAL

BY TOM DAIL — DATE 11-2-88
CK.
ENG. Stan Hamol

TEXAS INSTRUMENTS
ATTLEBORO, MASSACHUSETTS 02703

KLIXON
CONTROL PRODUCTS DIVISION

TITLE
CARTON ASSEMBLY


SPEED CONTROL DE-ACT SWITCH
3713 7691

****
* Note printed by TBAZIL on 8 Mar 1999 at 08:53:19 *
****

From: MREESE --DRBN005 Date and time 03/05/99 14:27:15
To: SREIMERS--DRBN007
cc: TBAZIL --DRBN005 LSMITH9 --DRBN005
DSYLVEST--DRBN006 WLIVINGS--DRBN005

FROM: M. P. REESE USART(UTC -05:00)
Subject: Brake Deac Switch Re-location - DESIGN ORDER RESULTS

STEVE, THERE IS A PLACE FOR A SWITCH TO BE LOCATED ON THE 1992/1993/1994 TOWN CAR BRAKE PEDAL ASSEMBLY. IT IS THE "KEYHOLE" IN THE PEDAL ASSEMBLY'S BRACKET, WORKING WITH THE FLAT SURFACE ON THE PLASTIC ADAPTER (ON THE PEDAL ASSEMBLY'S ARM). THESE FEATURES WERE USED TO MOUNT THE VALVE ASSEMBLY - SPEED CONTROL (-9C727-) AND THE CLIP - SPEED CONTROL VACUUM VALVE (-9C966-) ON OTHER MODEL YEAR/CARLINE PANTHER CARS. SWITCH AND WIRING CLEARANCE TO STEERING COLUMN CRUSH ZONE WILL DEPEND ON DIMENSIONS OF SWITCH TO BE USED, AND WIRING ROUTING. (THE 1999 MODEL SWITCH, AT THIS LOCATION, DOES INTERFERE WITH THE CRUSH ZONE.) A DIFFERENT/NEW SWITCH WILL BE NEEDED.

IT IS TIME FOR THE CHECK TO VERIFY THESE RESULTS, THAT I REQUESTED DURING THE 1999 MAR 03 MEETING. THE CHECK IS NEEDED, BECAUSE REFERENCES (DESIGN LAYOUTS, WERS, DOCMAN, ETC.) THAT WE HAVE AVAILABLE (AND RECOVERED FROM ARCHIVES) ARE NOT PERFECT. I REQUEST REVIEW BY THE APPROPRIATE DESIGN AND RELEASE (SWITCH AND WIRING) ENGINEER. PLEASE RELAY THIS REQUEST.

IF THIS SOLUTION DOES NOT HOLD UP TO THE CHECK, THEN WE WILL NOT BE ABLE TO ADD A SWITCH ON THE BRAKE PEDAL AND BRACKET ASSEMBLY.

Regards,
M. P. Reese 313-317-7142 (313-621-6675 FAX)
OPD LVC - Brakes Mail Drop 1229 BUILDING 2 24M31
*** Forwarding note from MREESE --DRBN005 03/01/99 12:24 ***
To: SREIMERS--DRBN007 FPORTER --DRBN007
cc: TBAZIL --DRBN005 JNEME --DRBN005

FROM: M. P. REESE USART(UTC -05:00)
Subject: Brake Deac Switch Re-location - DESIGN ORDER

STEVE, THE RESULT OF THE MEETING THIS MORNING IS THAT WE WILL HAVE A FEASIBLE, CLEAR SOLUTION (FOR SWITCH MOUNTED TO BRAKE PEDAL ASSEMBLY, ON 1992/1993/1994 TOWN CAR) BY NOON FRIDAY 1999 MAR 05.
IN MAKING THIS SOLUTION, WE ARE BEING VERY CAREFUL SO THAT WE DO NOT MAKE SOMETHING ELSE WORSE. THE HISTORY IS VAGUE.
ANY GOOD NEWS, ABOUT OTHER SOLUTIONS?

Regards,
M. P. Reese 313-317-7142 (313-621-6675 FAX)
OPD LVC - Brakes Mail Drop 1229 BUILDING 2 24M31
*** Forwarding note from SREIMERS--DRBN007 02/27/99 16:19 ***
To: MREESE --DRBN005
cc: FPORTER --DRBN007 Porter, F.J.

FROM: Steve Reimers USART(UTC -05:00)
Subject: Brake Deac Switch Re-location
Marty, Please call Fred Porter with the update from your meeting. I will be at MPG most of the day.

Steve Reimers building 5 3E008
AVT Chassis E/E System Applications mail drop 5011
39-03286 SREIMERS sreimers@ford.com fax 39-03286 ;>
*** Forwarding note from MREESE --DRBN005 02/27/99 16:13 ***
To: SREIMERS--DRBN007
cc: TBAZIL --DRBN005 LSMITH9 --DRBN005

FROM: M. P. REESE USAET(UTC -05:00)
Subject: Brake Deac Switch Re-location

I AM OPTIMISTIC ABOUT ABILITY TO PACKAGE THE CURRENT PRODUCTION SWITCH ON THE BRAKE PEDAL AND BRACKET ASSEMBLY IN 1992/1993/1994 TOWN CARS. I WILL KNOW MORE (BUT NOT EVERYTHING) ABOUT TIMING AT THE CONCLUSION OF A 9:00 AM MEETING WITH CHASSIS DESIGNERS. GENERAL OPTIMISM COMES FROM THE BRAKE PEDAL AND BRACKET ASSEMBLY DRAWINGS; THEY (SO FAR) SHOW EVOLUTION OVER THE MODEL YEARS, AND INVOLVE ONLY ONE SUPPLIER.

WERS AND DOCMAN ARE NOT IN GOOD SHAPE FOR THIS 1992/1993/1994 MODEL TASK. THAT SLOWS THE ADVANCE. FACILITATES AMBUSH.

ALWAYS, I MUST CONSIDER EFFECTS ON FMVSS 105. VEHICLE TEST, BRAKE SYSTEM.

I INTEND T CALL YOU, ABOUT NOON ON MONDAY 1999 MAR 01.

Regards,
M. P. Reese 313-317-7142 (313-621-6675 FAX)
OPD LVC - Brakes Mail Drop 1229 BUILDING 2 24M31
*** Forwarding note from SREIMERS--DRBN007 02/25/99 15:39 ***
To: MREESE --DRBN005

FROM: Steve Reimers USAET(UTC -05:00)
Subject: Brake Deac Switch Re-location
Marty, I was asked what the status of this design work. Have you got any good words I can pass on to my manager? I would like to give Jack Paskus a sense of where we are on this task, what the next step(s) are and when they are targett ed to complete. My meeting with Paskus is monday at 3:30.
thanks,

Steve Reimers building 5 3C043
AVT Chassis E/E System Applications mail drop 5011
39-03286 SREIMERS sreimers@ford.com fax 39-03286 ;>

****
* Note printed by MREESE on 3 May 1999 at 15:07:49 *
****

From: MREESE --DRBN005 Date and time 05/03/99 13:18:30
To: SREIMERS--DRBN007
cc: TBAZIL --DRBN005 JNEME --DRBN005

FROM: M. P. REESE USART(UTC -04:00)
Subject: Prop Valve Service Part

STEVE, FCSD DAVE SMITH HAS REPLIED. (I WILL BUY SERVICE PARTS, ANYWAY; ONE PRESSURE SWITCH, AND ONE PROPORTIONING VALVE.)

Regards,
M. P. Reese 313-317-7142 (313-621-6675 FAX)
OPD LVC - Brakes Mail Drop 1229 BUILDING 2 24M31
*** Forwarding note from DSMITH22--DRBN006 05/03/99 12:12 ***
To: MREESE --DRBN005
cc: TBAZIL --DRBN005

FROM: Dave Smith USART(UTC -04:00)
Subject: Prop Valve Service Part
Marty, the prop valves I looked at all come with the brake pressure switch. Brake pressure switch is available separately but prop valve cannot be purchased without the brake pressure switch.
I am concurring with Tom.

Best Regards,
Dave Smith - FCSD North American Parts Analysis - Car Brakes
Room 1103B NPDC- Livonia, MI.
Ph. 734-523-5471 Fax 458-0059 - email: dsmith22@ford.com
*** Forwarding note from MREESE --DRBN005 05/03/99 10:41 ***
To: DSMITH22--DRBN006 SREIMERS--DRBN007
cc: TBAZIL --DRBN005 JNEME --DRBN005

FROM: M. P. REESE USART(UTC -04:00)
Subject: Prop Valve Service Part

DAVE, HELP, PLEASE. I ASK THAT YOU CHECK SERVICE INFORMATION, AND CONFIRM THE REPLY THAT TOM BAZIL FORWARDED TO STEVE REIMERS.
(I THINK THAT A SERVICE USAGE CHART (FOR PROPORTIONING VALVE -2B091-, AND FOR BRAKE PRESSURE SWITCH -9F924-; FOR 1992 THROUGH 1994 MODEL TOWN CAR/CROWN VICTORIA/GRAND MARQUIS) WOULD BE A HELPFUL PART OF THE ANSWER.)
STEVE REIMERS' MAIN QUESTION IS CONTAINED IN HIS NOTE, FORWARDED HERE.

STEVE, I AM BUYING A BRAKE PRESSURE SWITCH FOR A 1992 TOWN CAR AT VILLAGE FORD. VILLAGE FORD ADVISES THAT A F2VY-9F924-A WILL BE AVAILABLE FOR PICKUP TUESDAY. PRICE IS ABOUT $13.00. I THINK THAT THIS ANSWERS PART OF YOUR QUESTION. IF MORE PARTS ACQUIRED FROM SERVICE WILL HELP US, LET ME KNOW WHAT YOU WOULD LIKE TO SEE AND I WILL TRY.

Regards,
M. P. Reese 313-317-7142 (313-621-6675 FAX)
OPD LVC - Brakes Mail Drop 1229 BUILDING 2 24M31
*** Forwarding note from TBAZIL --DRBN005 04/30/99 18:40 ***
To: SREIMERS--DRBN007
cc: MREESE --DRBN005 TBAZIL --DRBN005

FROM: Tom Bazil USART(UTC -04:00)

Subject: Prop Valve Service Part
Prop valves F2VC-2B091-BA and F2AZ-2B091-BA include the switch and indicate service parts F2VY-2B091-B and F2AZ-2B091-BA as respective service numbers.

F2VC-2B091-BA shows component switch F2VC-9F924-BB which has its own service number F2VY-9F924-B. The valve block F2VC-2B382-AA/AB does not show that it is servicable separately in the WERS screens.

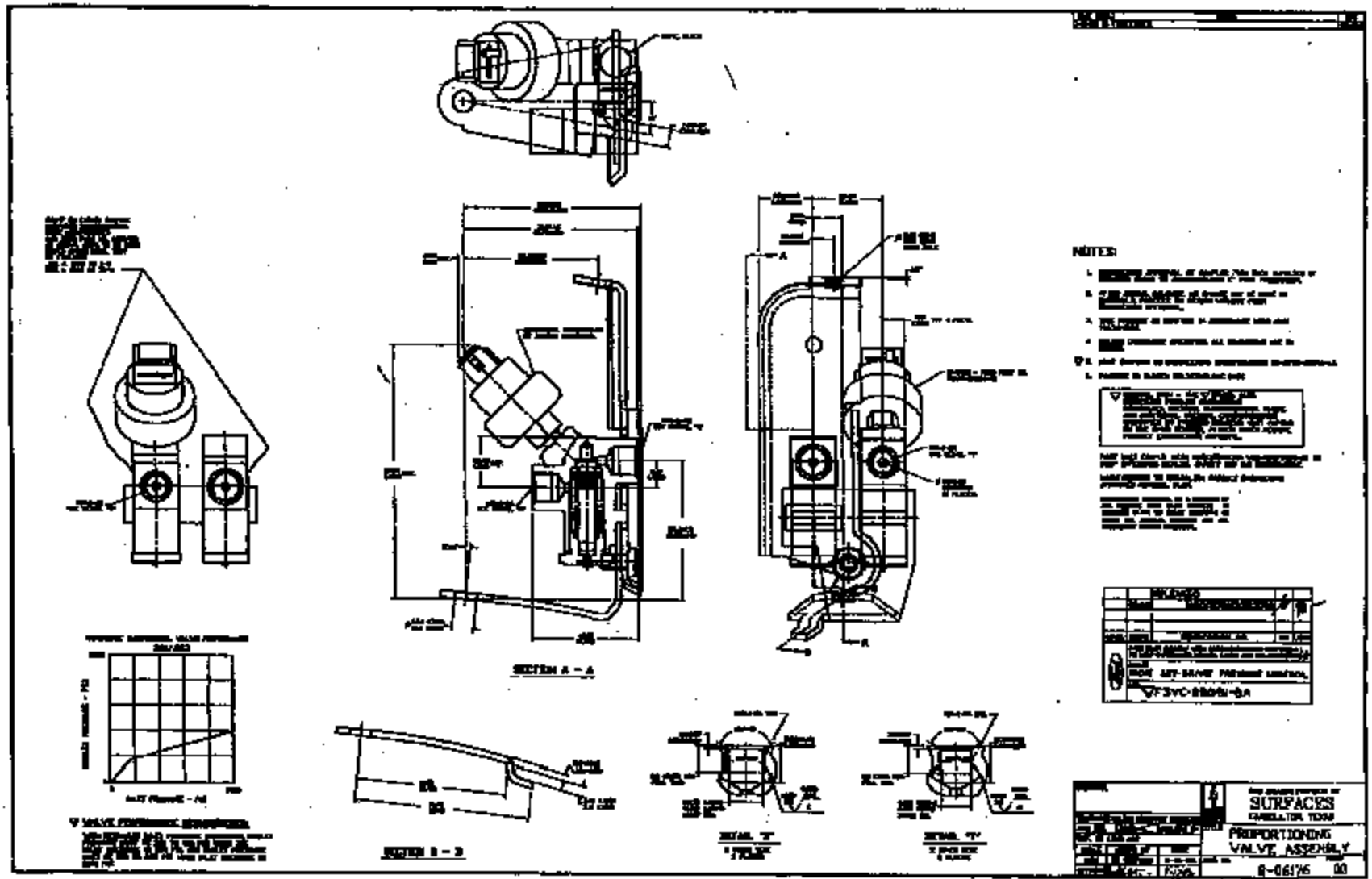
Does this answer? If not, Marty Reese has volunteered to try to buy parts at a dealer? Please respond to Marty.

Have a good day!

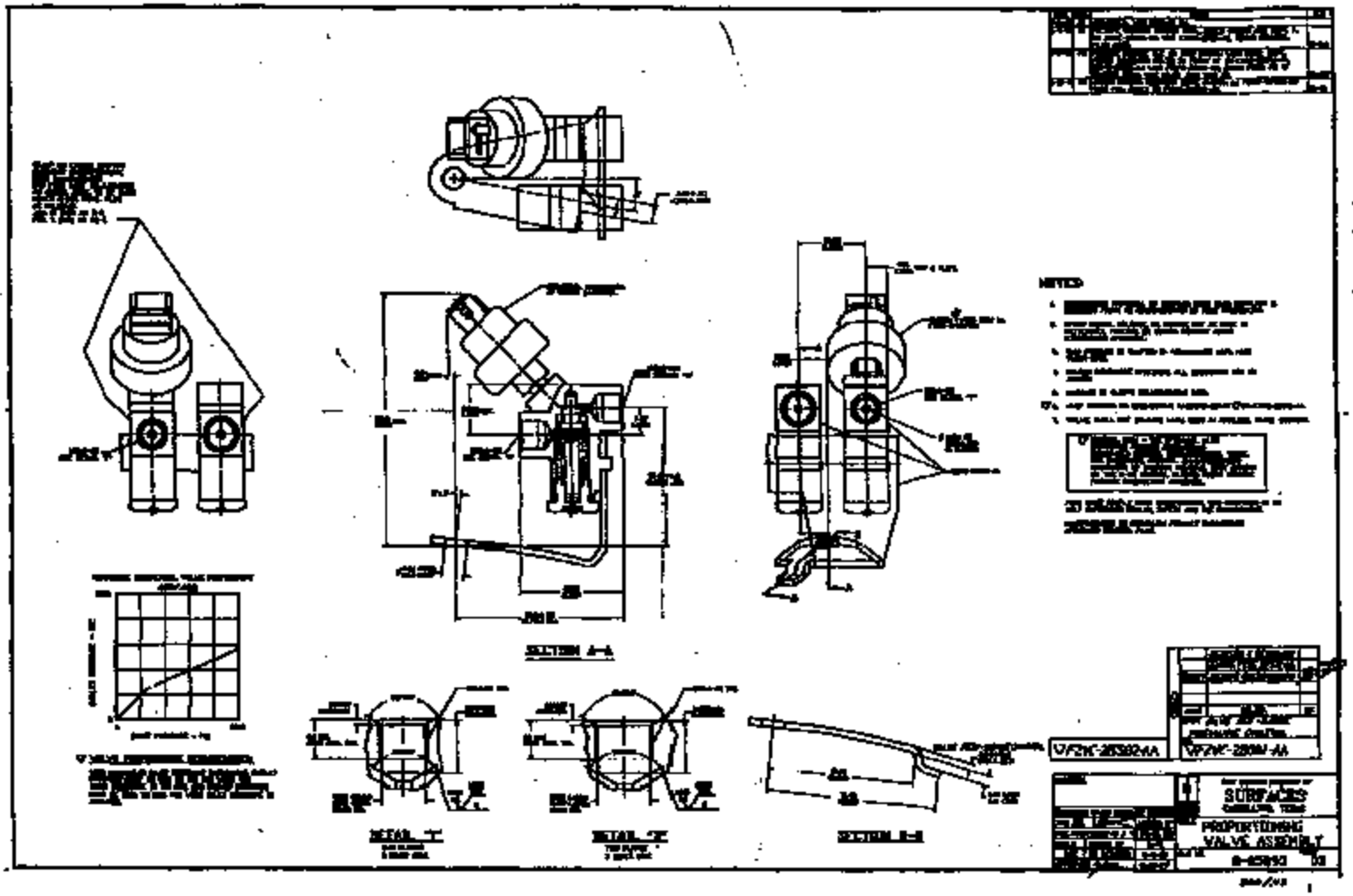
Thomas E. Bazil (313) 59-47547 Lrg & Lux Car OPD Brake/Veh Supv
Drop 1229-LVC, Cube 24-H36, fax 62-16675, pager (888) 375-6449
*** Forwarding note from SREIMERS--DRBN007 04/29/99 10:09 ***
To: TBAZIL --DRBN005

FROM: Steve Reimers USAET(UTC -04:00)
Subject: Prop Valve Service Part
Tom, Does the Prop valve service part include the Brake pressure switch for the 1992 and 1993 Town Car and Crown Vic and Grand Marquis?

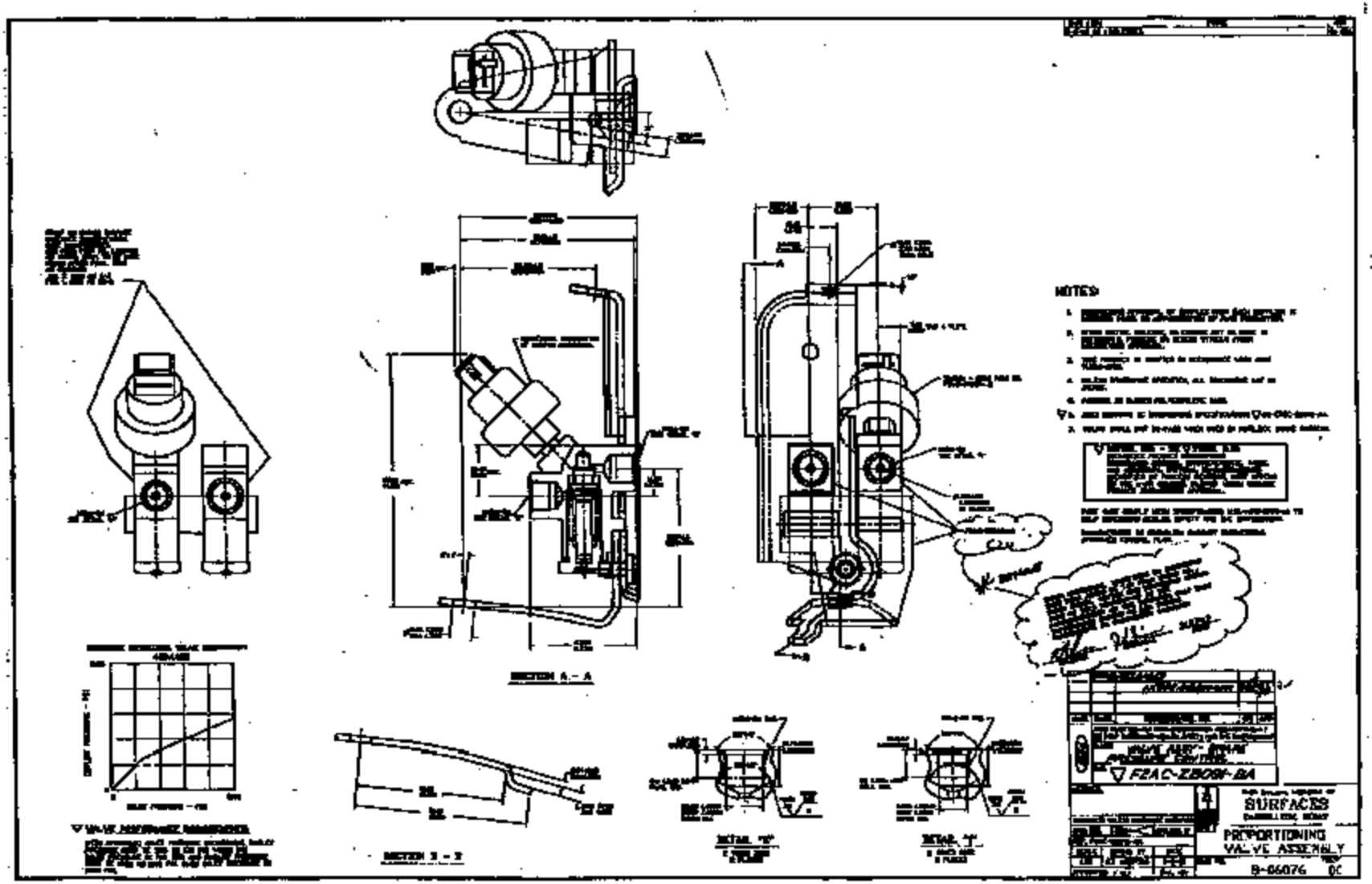
Steve Reimers building 5 3E008
RVT Chassis E/E System Applications mail drop 5011
39-03286 SREIMERS sreimers@ford.com fax 39-04145


NOTES:
SECTION A - A
SECTION B - B
SURFACES
PROPORTIONING
VALVE ASSEMBLY
8-06176 00

3713 7696



3713 7897


NOTES
SECTION A - A
SECTION B - B
DETAIL "A"
DETAIL "B"
F2AC-Z800F-BA
SURFACES
PROPORTIONING
VALVE ASSEMBLY
B-66076

3713 7698

1992 BRAKE CONTROL VALVES

CARLINE	BRAKE SYSTEM	PROPORTIONING VALVE -2B891-	PERFORMANCE	JUNCTION BLOCK -2C320-	IN	OUT
Crown Victoria/ Grand Marquis	ABS/TC	F1VC-AD	500/.43		M10 M12	M10 M12
	w/o ABS/TC			F2AC-BA	M10	M10 M10
Town Car	ABS ABS/TC	F2VC-BA F2VY-2A01-B	500/.43		M10 M12	M10 M12
	Limo w/o ABS/TC	F2VC-CB	500/.43		M10 M12	M10 M10 M12 M12

F1VC-2B382-AA
F2VC-[illegible]-AB
F2VC-9F924-BB — F2VY-9F924-B

1993 BRAKE CONTROL VALVES

CARLINE	BRAKE SYSTEM	PROPORTIONING VALVE -2B891-	PERFORMANCE	JUNCTION BLOCK -2C329-	IN	OUT
Crown Victoria/ Grand Marquis	ABS/TC w/o SPD CNTRL	F2AC-AA	500/.43		M10 M12	M10 M12
	ABS/TC w/SPD CNTRL	F2AC-BA F2AB-2B891-BA	500/.43		M10 M12	M10 M12
	w/o SPD CNTRL			F2AC-BB	M10	M10 M10
	w/o ABS/TC w/SPD CNTRL			F2AC-CC	M10	M10 M10
Town Car	ABS ABS/TC		500/.43		M10 M12	M10 M12
	Limo w/o ABS/TC	F3VC-AA	350/.27		M10 M12	M10 M10 M12 M12

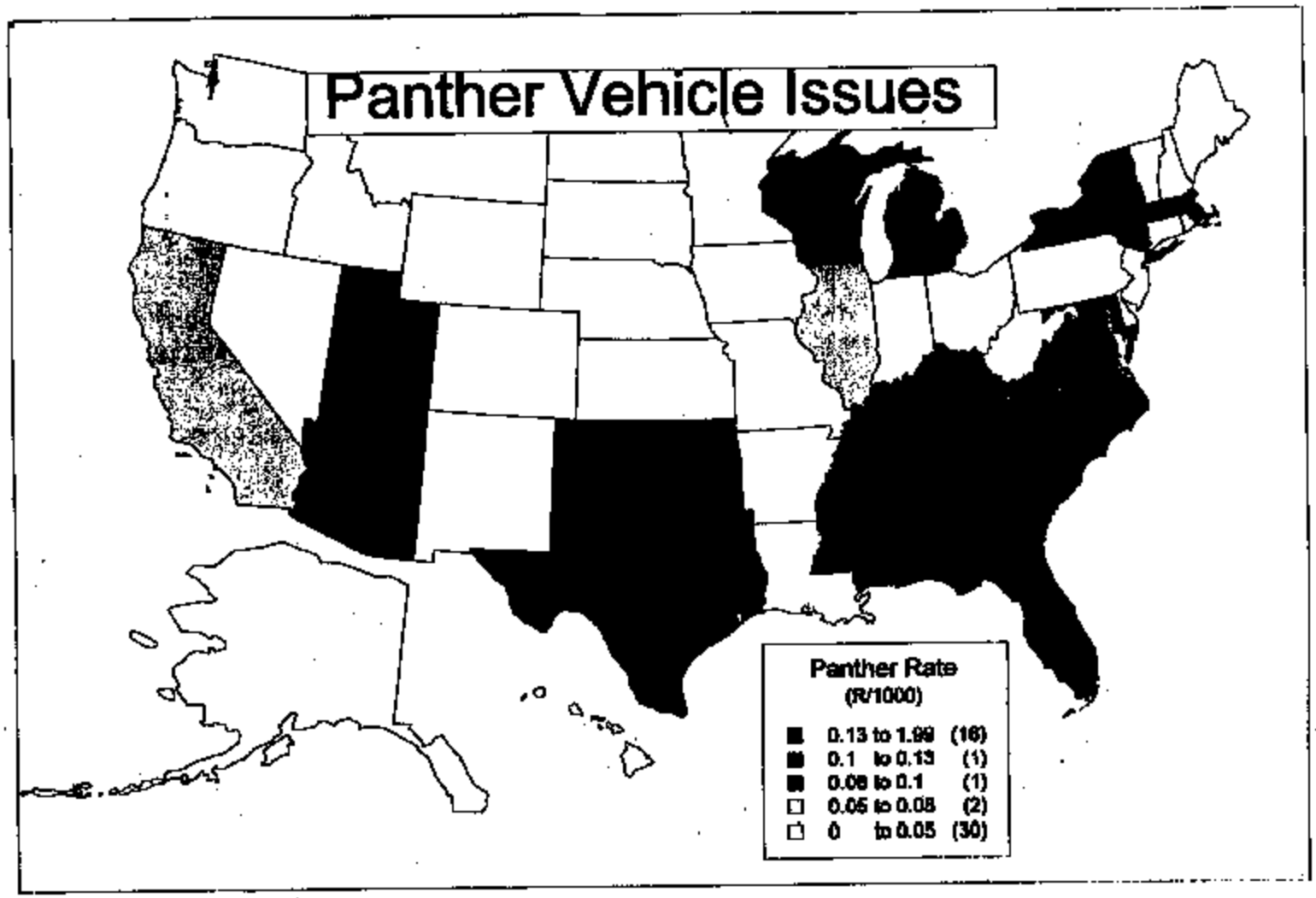
F2AC-9F924-AA F2AC-2C520-CC

1993 ANTI-LOCK/TCS FRAME CARS

CARLINE	HYDRAULIC CONTROL UNIT	ECM BRACKET	HCU BRACKET ATTACHING SCREW	ELECTRONIC CONTROL UNIT	ECU BRACKET	ECU ATTACHING SCREWS	PUMP MOTOR RELAY	HCU BRACKET TO FRAME THRU BOLT
Town Car	F1VC-2C285-CB	F1VC-9C304-BA	[illegible]	F1VC-9C219-AB	F9VC-9C214-AA	[illegible]	F6DC-9C219-AD	[illegible]

1993 ANTI-LOCK SENSORS

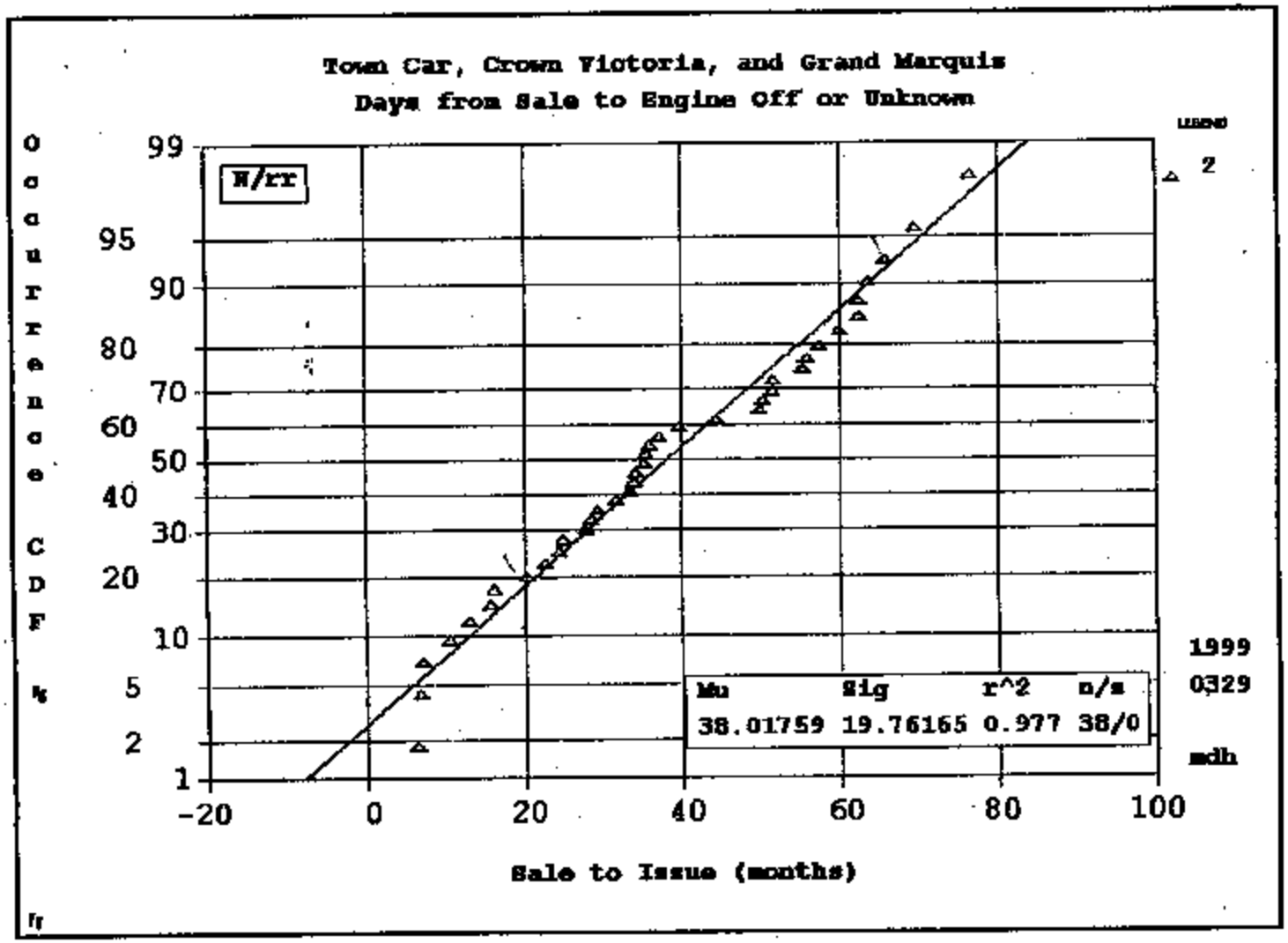
CARLINE	FRONT			REAR		
	SENSOR ASSEMBLY (NO COLOR CODE)	ATTACHING BRACKET/CLIP	ATTACHING BOLT/NUT/SCREW	SENSOR ASSEMBLY (NO COLOR CODE)	ATTACHING BRACKET/CLIP	ATTACHING BOLT/NUT/SCREW
Town Car	F9VC-9C204-AB	E9DC-2C224-BA W506169-S36 W506169-S36 E965401	[illegible] W502191-S36	F1VC-2D189-AC	E6LC-2C218-AB N804725-S100	N605320-S100 W502191-S36
Crown Victoria/ Grand Marquis	F9VC-9C204-AB	E9DC-2C224-BA W506169-S36 W506169-S36 E965401	[illegible] W502191-S36	F1VC-2D189-AC	E6LC-2C218-AB N804725-S100	N605320-S100 W506090-S3



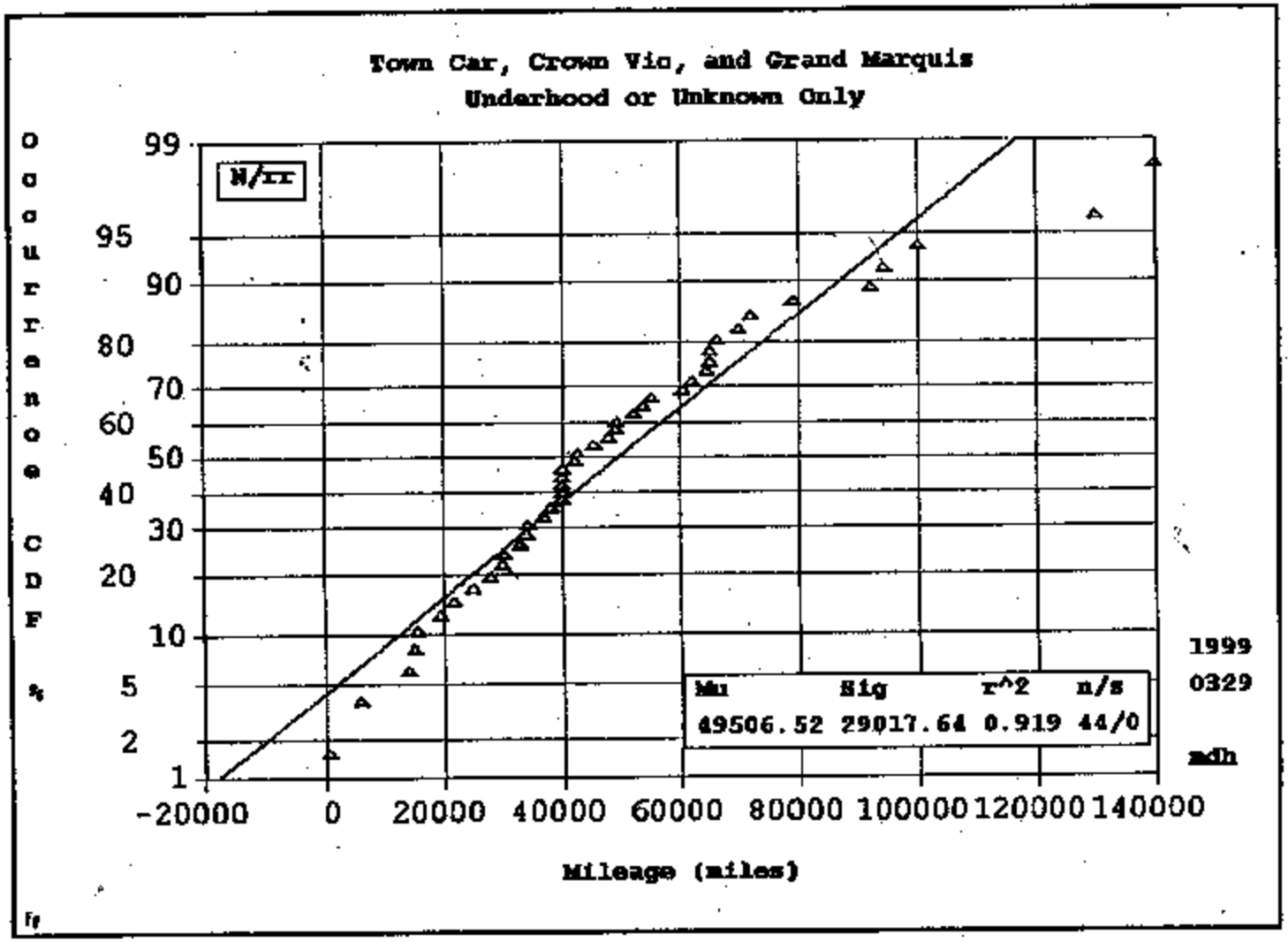
9713 7701

Originator: Mike Hardie/MHARDIE
92Panther.xls

Date Issued: 16 Mar 1999
Date Revised: 3/16/99

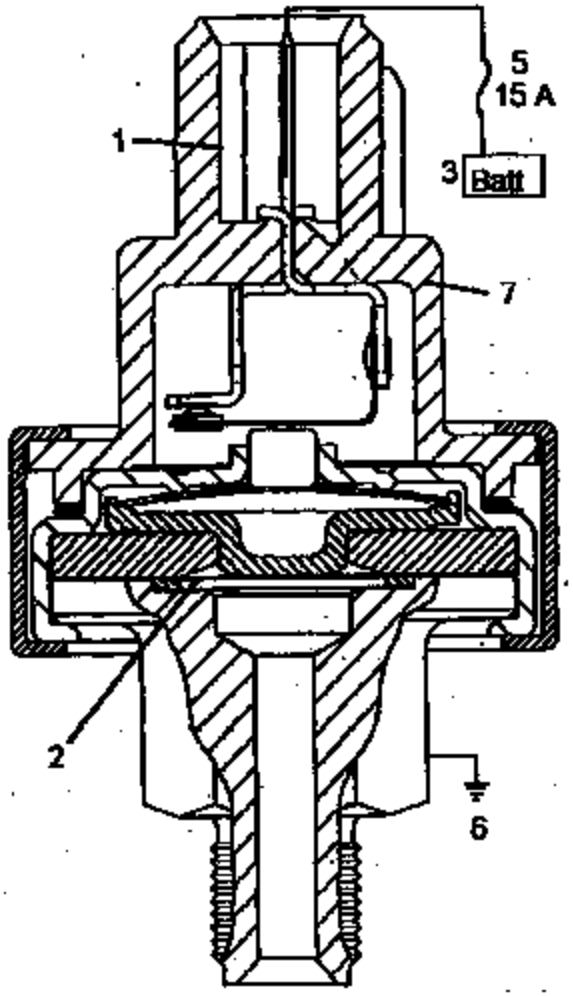

Town Car, Crown Victoria, and Grand Marquis
Days from Sale to Engine Off or Unknown
W/rr
Occurrence CDF %
99
95
90
80
70
60
50
40
30
20
10
5
2
1
-20
0
20
40
60
80
100
Sale to Issue (months)
Mu Sig r^2 n/s
38.01759 19.76165 0.977 38/0
LEGEND
2
1999
0329
mdh

3718 7702


Town Car, Crown Vic, and Grand Marquis
Underhood or Unknown Only
Occurrence CDF %
99
95
90
80
70
60
50
40
30
20
10
5
2
1
M/rr
Mu Sig r^2 n/s
49506.52 29017.64 0.919 44/0
1999
0329
mdh
-20000 0 20000 40000 60000 80000 100000 120000 140000
Mileage (miles)

3713 7708

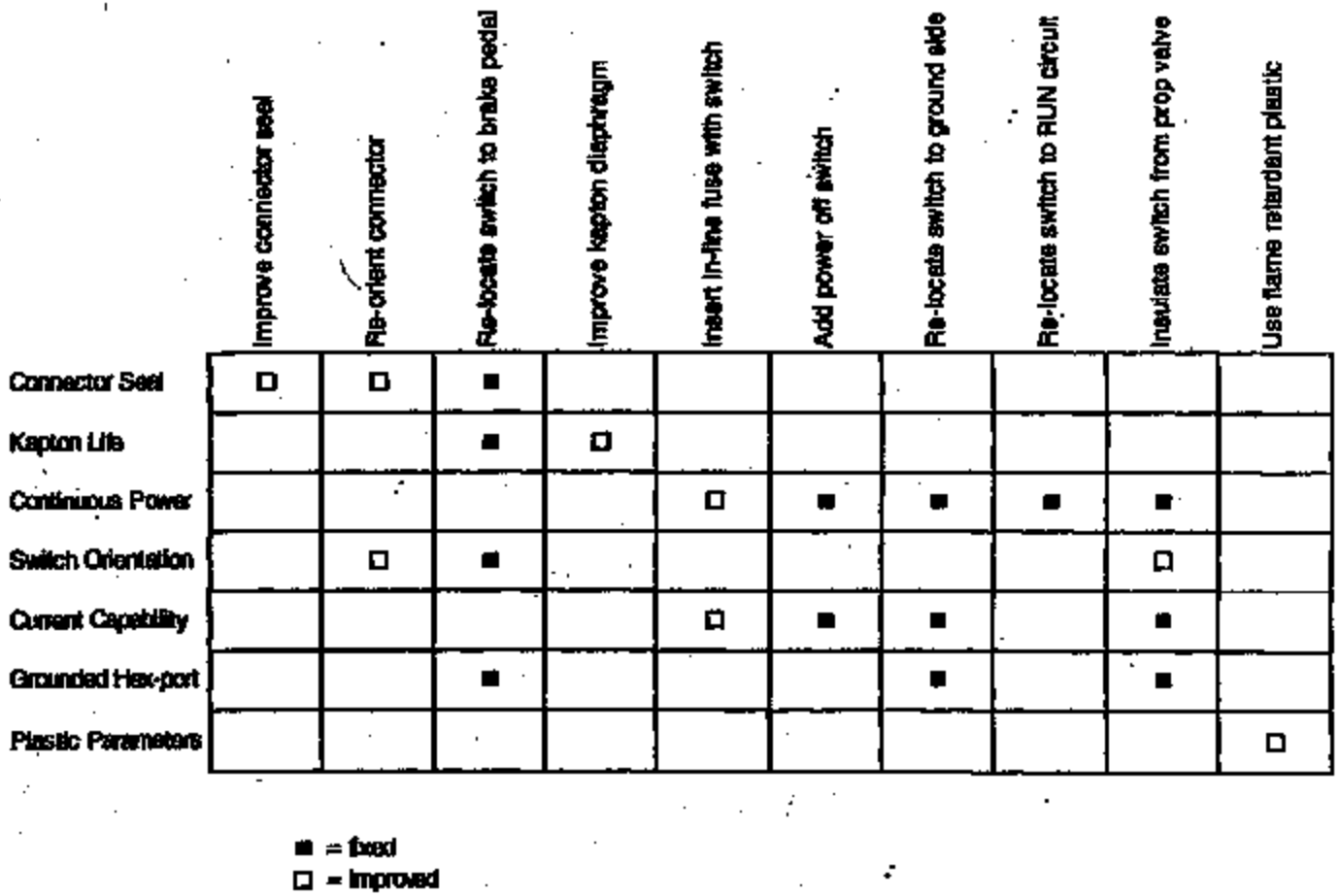
Contributing Factors



1. Connector Seal
2. Kapton Life
3. Continuous Power
4. Switch Orientation
5. Current Capability
6. Grounded Hex-Port
7. Plastic Parameters

3713 7704

Potential Actions



US Department of Transportation
National Highway Traffic Safety Administration

400 Seventh Street, S.W.
Washington, D.C. 20590

DEC 1 1998

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Schedule Number:	

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

L.W. Camp, Director
Automotive Safety and Engineering Standards Office
Ford Motor Company
330 Town Center Drive
Dearborn, MI 48126

NSA-12jfa
PE98-055

Dear Mr. Camp:

This letter is to revise the due date for the November 24, 1998 information request letter regarding investigation PE98-055. The correct due date is January 15, 1999.

Sincerely,

Thomas Z. Cooper, Chief
Vehicle Integrity Division
Office of Defects Investigation

SAFETY BELTS SAVE LIVES

AUTO SAFETY HOTLINE
(800) 424-9393
Wash. D.C. Area (202) 366-0123

3713 7706

U.S. Department of Transportation
National Highway Traffic Safety Administration

400 Seventh Street, S.W.
Washington, D.C. 20590

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Schedule Number:	27.03

NOV 24 1998

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

NSA-12jfa
PE98-055

L.W. Camp, Director
Automotive Safety and Engineering Standards Office
Ford Motor Company
330 Town Center Drive
Dearborn, MI 48126

Dear Mr. Camp:

This letter is to advise you that the Office of Defects Investigation (ODI) of the National Highway Traffic Safety Administration (NHTSA) is conducting a Preliminary Evaluation concerning engine compartment fires in certain Lincoln Town Car vehicles manufactured by the Ford Motor Company.

This office has received 21 reports of engine compartment fires in 1992 and 1993 Lincoln Town Cars. The fires in these vehicles are reported to have started while the vehicles were parked and the engines not running. Ten of the reports indicate a fire at the left front fender wheel well area (see photograph, page 6), two indicate a fire at the master cylinder, which is adjacent to the left front fender wheel well area, and the remaining nine reports indicate a fire in the engine compartment. Additionally, five of the reports indicate the vehicle owner's carport, garage, or home, was also damage as a result of the fire.

A copy of each of the reports is enclosed for your information.

Unless otherwise stated in the text, the following definitions apply to this information request:

- **Subject vehicles**: all 1992 and 1993 Lincoln Town Car vehicles.
- **Ford**: Ford Motor Company, all of its past and present officers, employees, whether assigned to its principal offices or to any of its field or other locations, including all of its divisions, subsidiaries (whether or not incorporated) and affiliated enterprises and all of their headquarters, regional, zone and other offices and their employees, and all agents, contractors, consultants, attorneys and law firms and other persons engaged by or under the control of Ford Motor Company (including all business units and persons previously referred to) who are or were involved in any way with (a) design, analysis, modification or production; (b) testing, assessment or evaluation; or (c) record-keeping, claims, or lawsuits relating to the alleged defect in the subject vehicles.

AUTO SAFETY HOTLINE
(800) 424-9393
Wash. D.C. Area (202) 366-0123

- Alleged defect: all under hood fires, or other thermal anomalies, from any source or origin, of any description, level, degree, or magnitude, occurring in the left, or drivers side, of the engine compartment. This would include fires in the area of the left front wheel, or left front fender.

- Documents: in the broadest sense of the word, shall mean all written, printed, typed, recorded or graphic matter whatsoever, however produced or reproduced, of every kind, nature, and description, including but not limited to, papers, records, letters, correspondence, memoranda, communications, electronic mail messages (existing in hard copy and/or in electronic storage), faxes, notes, annotations, working papers, drafts, minutes, records, resolutions, books, pleadings, response to discovery, administrative and judicial filings, all transcripts and other recordings of any kind, affidavits, materials and things produced in discovery, statements, summaries, interviews, opinions, reports, newspaper articles, studies, analysis, evaluations, interpretations, applications, agreements, jottings, agendas, bulletins, notices, announcements, instructions, designs, specifications, blueprints, as-builts, manuals, brochures, publications, schedules, journals, statistical data, lists, tabulations, computer printouts, data processing input, data in storage, and data output, microfilm, microfiche, data from optical scanning or recording, photographs, tangible things, and all records kept by electronic, photographic, or mechanical means, any drafts or revisions pertaining to any of the foregoing, and all other things similar to any of the foregoing however denominated and any other data compilations from which information can be obtained, translated if necessary, into reasonably usable form and any other documents.

In order for my staff to evaluate the alleged defect, certain information is required. Pursuant to 49 U.S.C. § 30166, please provide numbered responses to the following questions. Please repeat each question verbatim before the response. If you have previously furnished ODI with information that is responsive to any item(s) in this request, you need not resubmit that information, but your response must cross-reference (by date of response and question number) the earlier submission. If Ford cannot answer any specific question, please state the reason why it is unable to do so. If you claim that any information or material responsive to the following items need not be divulged to the NHTSA because it is privileged, or the work product of an attorney, state the nature of that information or material and identify any document in which it is found by, date, subject or title, name and position of person from and person to whom it was sent, and name and position of any other recipient. You must also describe any privilege that you claim, and explain why you believe it applies.

1. State the total number of subject vehicles sold in the United States by model year.

2. State the number incidents, known to Ford, in which the alleged defect has been reported to have occurred in the subject vehicles. Furnish copies of all documents, from any and all sources, including documents which may not originally have been submitted to Ford, which

are in Ford's possession or control, or of which it is otherwise aware, that pertain, in any way, to any of these incidents. This should include, but is not limited to, all documents possessed by Ford, or of which it is otherwise aware, pertaining to the reports included with this letter. Furnish all documents whether or not Ford has verified the validity of each document. For each incident in this response please provide the vehicle owner's name, address, and telephone number; and identify all vehicles by vehicle identification number, model year, date of manufacture, date of retail sale, date of incident, mileage at the time of the incident, and problem description. For all incidents involving lawsuits please identify the caption, court, docket number, and filing date of each lawsuit and a copy of the complaint document initiating the lawsuit. Sort all incidents by cause and area or component of origin.

3. State the total number vehicles sold in the United States by model name and model year that have engine compart configurations (i.e., components and component location, wiring harnesses and harness location) the same as the subject vehicles. Provide a response to question number two for all vehicles identified in your answer to this question.

4. State the number of all warranty claims, including extended warranty claims, and "goodwill," field or zone adjustments received by Ford that relate to the alleged defect in the subject vehicles by calendar year, calender month, and problem identification. Identify all owners by name, address, and telephone number, and all vehicles by vehicle identification number, model name, model year, date of manufacture, date of retail sale, date of incident, mileage at the time of the incident, and problem description.

5. Identify all electrical circuits by name, number, and wire color, located in the left side of the engine compartment that are, or remain, energized by the battery when the ignition key is in the off position. For all circuits identified, provide a schematic drawing which identifies the harness(es) in which they reside, the harness location(s), and the components to which power is supplied.

6. Identify and describe all inspections, tests or other analyses conducted by Ford, its contractors, suppliers, or by any other entities, regarding the inspection of any subject vehicles that relate to the alleged defect, to date. Identify, by name and address, the entity that conducted each such test or analysis. Furnish copies of all reports, surveys, notes, tables, graphs or other documents that pertain to each such test or analysis. State when each test or analysis was initiated and concluded, or whether it is still in progress. Include in your response a description of a worst case scenario.

7. If Ford has issued any bulletins, advisories, or other communications to distributors, retailers, consumers, or any other entity pertaining to the alleged defect in the subject vehicles, provide a copy of each such document. If no such documents have been issued, so state.

8. Identify and describe all significant modifications or changes made by or on behalf of Ford in the manufacture, design, or material composition of all components in the subject vehicles that may relate to the alleged defect. The following information must be included for each such modification or change:

   a. the approximate date on which the modification or change was incorporated into production;
   b. a description of the modification or change;
   c. the reason for the modification or change; and
   d. whether the modified or changed components can be interchanged with earlier production components.

9. Provide Ford's assessment of the alleged defect in the subject vehicles, including:

   a. all causal or contributory factors;
   b. the failure mode;
   c. the risk to occupant safety it poses; and
   d. whether there are any circumstances that would provide the vehicle owner or others with warning of its existence.

Your response to this letter, in duplicate, must be submitted to this office by January 6,1999. Please include in your response the identification codes referenced on page 1 of this letter. If you find that you are unable to provide all of the information requested within the time allotted, you must request an extension from Mr. Thomas Z. Cooper not later than five days from the due date. If you are unable to provide all of the information requested by the original deadline, you must submit a partial response by that date with whatever information you have available, even if you have received an extension.

This letter is being sent to your company pursuant to 49 U.S.C. § 30166, which authorizes NHTSA to conduct any investigation that may be necessary to enforce Chapter 301 of Title 49, U.S. Code. Your failure to respond promptly and fully to this letter could subject Ford to civil penalties pursuant to 49 U.S.C. § 30165 or lead to an action for injuctive relief pursuant to 49 U.S.C. § 30163.

If you consider any portion of your response to be confidential information, include that material in a separate enclosure marked "CONFIDENTIAL." In addition, you must submit a copy of all such material to the Office of Chief Counsel (NCC-30), National Highway Traffic Safety Administration, 400 Seventh Street, SW, Washington, DC 20590, and comply with all other requirements for the submission of confidential business information stated in 49 CFR Part 512.

If you have any technical questions concerning this matter, please contact Mr. John Abbott of my staff at (202) 366-5221.

Sincerely,

Thomas Z. Cooper, Chief
Vehicle Integrity Division
Office of Defects Investigation

Enclosures: 12 VOQ's: 813241, 824016, 808265, 821667, 979634, 521137, 804418, 541041 820316, 536206, 819621, 823462; 5 fire department reports; 2 internet reports; and 2 fire investigator reports

NHTSA:NSA:ODI
NSA-12:JABBOTT:drd:6-5221:11/17/98
cc:
NSA-01
NSA-12/Subj/Chron/
Document: I:/ABBOTT/Towncar.IR

1992 Lincoln Town Car (1LNLM81W2NY[redacted]

PE Opening Reports (PE98-055)
1992 Lincoln Town Car Engine Fires

NO.	Source	ST	VIN	M/Y
1	813241	FL	1LNLM82W5NY	92
2	824016	TX	1LNLM81W2NY	92
3	808265	FL	1LNLM82W7NY	92
4	821667	LA	1LNLM81W9NY	92
5	979634	TX	1LNLM82W5NY	92
6	521137	OK	1LNLM81W2NY	92
7	F.D.R.	GA	1LNLM82W3NY	92
8	804418	OH	1LNLM81W8NY	92
9	541041	FL	1LNLM81W3NY	92
10	F.D.R.	FL	1LNLM81W2NY	92
11	F.D.R.	FL	1LNLM82W7NY	92
12	A805260	FL	1LNLM81W0NY	92
13	820316	FL	1LNLM81W3NY	92
14	I/Net	FL	1LNLM81W8NY	92
15	536206	MS	1LNLM83W9NY	92
16	819621	LA	1LNLM82W5NY	92
17	I/Net	FL	1LNLM82W4NY	92
18	F.D.R.	GA	1LNLM82W1NY	92
19	A804221	FL	1LNLM81WP2Y	93
20	823462	MS	1LNLM81W5PY	93
21	F.D.R.	FL	1LNLM81WXPY	93

Page: 01 CQIS DETAIL REPORT 12/07/98 18:14:14

CQIS Report Number: WJIAA135 Program Type: Q Orig Rpt #: 225951-98
Report Source: MSS - FCSD - QSFS Report Date: 10/09/1998

REPORT SUMMARY

VEHICLE: 1993 TOWN CAR,SIGN ,SEDAN VIN : 1LNLM82W0P[redacted]
Engine : 4.6L ROMEO BASE EFI Odometer: 51,500 MILES
Operating Environ: WCC : SDG5
Vehicle Use : Rsp. Act:

SYMPTOM: 3 01 0 00 CHASSIS SERVICE BRAKE SYSTEM
OTHER (CODE NOT AVAILABLE) OTHER (CODE NOT AVAILABLE)
Additional Symptom:
Other Veh: With Concern: Severity Rating - Customer: Engineering:

Causal Component: 28264 SWITCH BRK PRES WRN L
Causal Factor: Feature: LOC:
Causal Condition: Photo: Images: 0
Component Test Status: ---- Return Loc:
Vehicle Fixed?: YES Customer satisfied?: Repair Effectiveness (%): 100

COMMENTS

--TYPE-- COMMENT TEXT

CONCER INITIALLY THE CUSTOMERS CONCERN WAS THAT THE VEHICLE WOULD NOT COME OUT OF PARK. WHILE IN THE DEALERSHIP, AN UNDERHOOD FIRE STARTED, CAUSED BY A LEAKING BRAKE FLUID THROUGH THE SWITCH INTO THE CONNECTOR.

REPAIR REPLACED THE SPEED CONTROL SWITCH AND CONNECTOR. REPLACED THE STOP LAMP SWITCH FOR THE ORIGINAL CUSTOMERS CONCERN. PER TECHNICIAN, THIS IS THE THIRD UNIT THAT HAD AN UNDERHOOD FIRE THAT APPEARED TO ORIGINATE FROM THIS AREA. THE OTHER TWO WERE TOO DAMAGED TO DETERMINE THE SPECIFIC LOCATION OF THE POINT OF THE ORIGIN. THE SWITCH AND CONNECTOR ARE PRESENTLY IN MY POSSESSION IN THE MEMPHIS REGIONAL OFFICE.

AUDIT 10/14/1998 09:56AM BRENDA WENDEL MSS - FCSD - QSFS
DEALER ID 66523 CHANGED TO 12098 BY BWENDEL

CONCERN DETAILS

DIAGNOSTIC INFORMATION

Symp. Verif?: Base of Diagnosis: Level of Assistance:
Comp. Timing: Base Timing : MIL Light on? :
Test Stand .: Road Test : OD Number:
Prior Repair Attempts: Repair Prior to Call: NO
DTCs KOEO: KOEC:
KOER: CB:

Equipment/Procedure Used	Effective?	Equipment/Procedure Used	Effective?

SERVICE ACTIONS

Repair Type	Component Number	Number Type	Description	Causal Comp.
RPL	28264	SERVICE	SWITCH BRK PRES WRN L	YES

VEHICLE DETAILS

Vehicle Build Date: 09/10/1992 Warranty Start Date: 02/08/1993
Date of Sale: 02/08/1993 Selling Dlr (Mkt,Dlr,Sub): 12098
Dealer Special Order: Gross Vehicle Weight:
LH/RH Drive:

ENGINE

Engine: 4.6L ROMEO BASE EFI Tag: 3G 812 AA
Bld Dt: Calb: 11&1R10 A Serial #: W

REDACTED

 CQIS DETAIL REPORT 12/07/98 18:14:14

CQIS Report Number: WJIAA135 Program Type: Q Orig Rpt #: 225951-98
Report Source: MSS - FCSD - QSFS Report Date: 10/09/1998

- - - T R A N S M I S S I O N - - -

Trans: A0D-E 45P ELEC O/D Part #:
Bld Dt: Serial #:
Model: Plt: Shft:

- - - A X L E - - -

Axle: 8.8 3.08 CONVENTIONAL Id Tag Code: Bld Dt:
Serial #: Plt:

- - - A D D I T I O N A L - - -

Tire : P215/70R15 98W Brand :
Radio : ELITE PREMIUM AM/FM STRO/CSTE A/C : ATC AIR CONDITIONER
Paint : BLUE EXTERIOR PAINT FAMILY ---------- AQUAMARINE FROST C/C

---------- A F T E R M A R K E T M O D I F I C A T I O N S ----------

NO AFTER MARKET MODIFICATIONS DATA AVAILABLE FOR THIS VEHICLE

--------- REPORT ORIGINATOR - REPAIR FACILITY - CUSTOMER INFORMATION ----------
Orig/Caller [redacted] Title: OTHER

Repair Dlr: 12098 - SCHILLING L-M/MENDENHALL INC Ph#:(901) 794-4000
City: Memphis State : Tennessee
Country: UNITED STATES Region : Memphis - 23

Claim #/Date : [redacted]/19/1998

Customer Name : [redacted] City :

---------- C Q I S V.I.N H I S T O R Y ----------

NO CQIS VIN HISTORY AVAILABLE FOR THIS VEHICLE

--- S U P P L E M E N T A L S U R V E Y: NONE ---

---------- VEHICLE'S WARRANTY HISTORY (365 days only) ----------

NO VEHICLE WARRANTY HISTORY AVAILABLE FOR THIS VEHICLE

Page: 01 CQIS DETAIL REPORT 12/07/98 18:14:12

CQIS Report Number: VDUAA322 Program Type: Q Orig Rpt #: 134596-97
Report Source: MSS - FCSD - QSFS Report Date: 04/21/1997

REPORT SUMMARY

VEHICLE: 1992 TOWN CAR,STAND ,SEDAN VIN : 1LNLM81W8NY[redacted]
Engine : 4.6L ROMEO BASE EFI Odometer: 56,802 MILES
Operating Environ: WCC : 5F07
Vehicle Use : Rsp. Act:

SYMPTOM: 7 04 2 45 UNKNOWN SOURCE CONCERNS FIRE/SMOKE
SMOKE UNDERHOOD
Additional Symptom:
Other Veh. With Concern: Severity Rating - Customer: Engineering:

Causal Component: 2A574 SWITCH ASY LOW AIR P
Causal Factor: Feature: Loc:
Causal Condition: Photo: Images: 0
Component Test Status: Return Loc:
Vehicle Fixed?: YES Customer satisfied?: Repair Effectiveness (%): 100

COMMENTS

--TYPE--	COMMENT TEXT
CONCER	THERE WAS SMOKE FROM UNDER THE HOOD.
REPAIR	THE BRAKE PRESSURE SWITCH CAUGHT ON FIRE AND BURNT THE WIRING WITH THE KEY OFF. PREVIOUS VEHICLES WITH FIRES STARTING IN THIS AREA WERE BURNT TO THE DEGREE THAT WE COULD ONLY GUESS WHAT CAUSED THE FIRE. THIS VEHICLE FIRE STOPPED SOON ENOUGH. WE REPLACED THE BRAKE PRESSURE SWITCH.
AUDIT	04/23/1997 10:25AM DATA ENTRY5 MSS - FCSD - QSFS
	SYMPTOM 3 01 0 00 CHANGED TO 7 04 2 45 BY WBAKER6

CONCERN DETAILS

DIAGNOSTIC INFORMATION

Symp. Verif?: Ease of Diagnosis: Level of Assistance:
Comp. Timing: Base Timing : MIL light on? :
Test Stand : Road Test : SD Number:
Prior Repair Attempts: Repair Prior to Call: NO
DTCs KOEO: KOEC:
KOER: CB:

Equipment/Procedure Used	Effective?	Equipment/Procedure Used	Effective?

SERVICE ACTIONS

Repair Type	Component Number	Number Type	Description	Causal Comp.
RPL	2A574	SERVICE	SWITCH ASY LOW AIR P	YES

VEHICLE DETAILS

Vehicle Build Date: 04/07/1992 Warranty Start Date: 10/01/1992
Date of Sale: 10/02/1992 Selling Dlr (Mkt,Dlr,Sub): 11627
Dealer Special Order: Gross Vehicle Weight:
LH/RH Drive:

- - - ENGINE - - -

Engine: 4.6L ROMEO BASE EFI Tag: 2G 812 BA
Bld Dt: Calb: 21A7B05 A Serial #: N

- - - TRANSMISSION - - -

Trans: AOD-E 4SP ELEC O/D Part #:
Bld Dt: Serial #:
Model: Plt: Shft:

Page: 02 CQIS DETAIL REPORT 12/07/98 18:14:12

CQIS Report Number: [redacted] Program Type: Q Orig Rpt #: 134596-97
Report Source: MSS - PCSD - QSPS Report Date: 04/21/1997

---AXLE---
Axle: 8.8 3.08 CONVENTIONAL Id Tag Code: Bld Dt:
Serial #: Plt:

---ADDITIONAL---
Tire : P215/70R15 WSW Brand :
Radio : ELETR PREMIUM AM/FM STRO/CSTE A/C : ATC AIR CONDITIONER
Paint : BLUE EXTERIOR PAINT FAMILY ---------- CLEAR CRYSTAL BLUE FROST C/C

---------- AFTER MARKET MODIFICATIONS ----------

NO AFTER MARKET MODIFICATIONS DATA AVAILABLE FOR THIS VEHICLE

--------- REPORT ORIGINATOR - REPAIR FACILITY - CUSTOMER INFORMATION ---------
Orig/Caller : GEORGE TAYLOR Title: OTHER

Rpair Dlr: 11627 - Ft Lauderdale L-M Inc Ph#:(954) 779-2060
City: Ft Lauderdale State : Florida
Country: UNITED STATES Region : Orlando - 24

Claim #/Date : L29844

Customer Name [redacted] City :

---------- CQIS VIN HISTORY ----------

Date	CQIS Report #	Prog Type	Symp Cat	Causal Part Description	Dealer Id
04/22/1997	VDVAA114	EDER	ELECT.	VALVE-PRT DISC BRK P	11627

--- SUPPLEMENTAL SURVEY: NONE ---

---------- VEHICLE'S WARRANTY HISTORY (365 days only) ----------

Dealer ID	Repair Date	Repair Order	Odometer (Miles)	Rpr Cond.	Causl Pfx	Service Base	Part Number Sfx	Labor Operation
11627	04/21/1997		58802					

3713 7717

** TOTAL PAGE.04 **
** TOTAL PAGE.05 **

BRAKE QUALITY IMPROVEMENT TASK FORCE
Meeting #164 - Monday, 08 February 1999

AGENDA

Discussion Item	Lead	Time
1. Brake Hose Material Change (EDM)	Ken Stransky (Dana)	10 min DEFERRED
2. Test Plan Status	Mike Beccaccio	5 min
3. Vehicle Operations Update	Calvin Skeen	10 min
4. FCSD Issues	Eric Alcock / John Coleman	10 min
5. RCD Update	George Thornton	10 min
6. Noise: Subjective vs. Objective Correlation	Greg Vylstel	10 min
7. Brake Pedal Feel: Metrics and Test Methods	Bruce Pease	10 min
8. Walk-Ins	All	5 min

Upcoming Agenda Items

Discussion Item	Lead	Assigned Date	Report Out
~~1. Noise: Subjective vs. Objective Correlation~~	~~Greg Vylstel~~	~~10/26/98~~	~~02/08/99~~
~~2. Brake Hose Material Change (EDM)~~	~~Ken Stransky (Dana)~~	~~1/25/99~~	~~02/08/99~~
~~3. Brake Pedal Feel: Metrics and Test Methods~~	~~Bruce Pease~~	~~N/A~~	~~02/08/99~~
4. Improved Brake Fluid Fill Process	Mike Vitek	N/A	02/08/99
5. DOT3 vs. DOT4 Water Absorption	Paul Hurley	N/A	02/15/99
6. Yaw Rate Sensor Lessons Learned	Gerry Davis	02/01/99	02/15/99
7. Proposed Heath Chart Revisions from PHN131 Roughness Lessons Learned	TBD	N/A	02/15/99
8. On-Vehicle LRO Data from Pilot Plant	Dave Mann	02/01/99	02/15/99
9. Brake Pad/Lining Replacement Policy	John Coleman	12/14/98	02/15/99
10. LRO Robustness to Wheel Bolt-up	Kelly Trost	01/11/99	02/15/99
11. Evac and Fill Modeling	George Vilec	08/03/98	02/22/99
12. Chassis Rolls Testing	John Coleman	08/10/98	03/01/99
13. Brake Design Cookbook	Bill Cowell	12/07/98	03/08/99
14. AMS Test Correlation	Peter Livingstone	12/07/98	03/15/99
15. Brake Pilot - Adequacy of High Mileage Requirements in the Ford Reliability Disciplines	Bill Cowell /Joe Schramek	02/01/99	03/29/99
16. DTV Generation: DST vs. Autobahn Comparison on Transit	Bob Knepper	12/07/98	3/29/99
17. Park Brake and Wheel Bearing Supplier Strategies	Monika Gablowski Paraj Bajaj	06/17/98	04/12/99
18. AMS Correlation (APG vs. Lommel) and Tire Study	Bill Faulk	12/07/98	04/12/99
19. Rotor Core Shifting Spec Analysis	Bill Cowell /J. Fash	12/14/98	04/19/99
20. Different Wheel Torque Specifications between Europe and N.A.	Steve Marulis	N/A	12/31/99

3713 7719

Other Discussion Items

****
* Note printed by TBAZIL on 1 Mar 1999 at 14:52:35 *
****

From: MREESE --DRBN005 Date and time 03/01/99 12:24:34
To: SREIMERS--DRBN007 FPORTER --DRBN007
cc: TBAZIL --DRBN005 JNEME --DRBN005

FROM: M. P. REESE USAET(UTC -05:00)
Subject: Brake Deac Switch Re-location - DESIGN ORDER

STEVE, THE RESULT OF THE MEETING THIS MORNING IS THAT WE WILL HAVE A FEASIBLE, CLEAR SOLUTION (FOR SWITCH MOUNTED TO BRAKE PEDAL ASSEMBLY, ON 1992/1993/1994 TOWN CAR) BY NOON FRIDAY 1999 MAR 05.
IN MAKING THIS SOLUTION, WE ARE BEING VERY CAREFUL SO THAT WE DO NOT MAKE SOMETHING ELSE WORSE. THE HISTORY IS VAGUE.
ANY GOOD NEWS, ABOUT OTHER SOLUTIONS?

Regards,
M. P. Reese 313-317-7142 (313-621-6675 FAX)
OPD LVC - Brakes Mail Drop 1229 BUILDING 2 24M31
*** Forwarding note from SREIMERS--DRBN007 02/27/99 16:19 ***
To: MREESE --DRBN005
cc: FPORTER --DRBN007 Porter, F.J.

FROM: Steve Reimers USAET(UTC -05:00)
Subject: Brake Deac Switch Re-location
Marty, Please call Fred Porter with the update from your meeting. I will be at MPG most of the day.

Steve Reimers building 5 3E008
AVT Chassis E/E System Applications mail drop 5011
39-03286 SREIMERS sreimers@ford.com fax 39-03286 ;>
*** Forwarding note from MREESE --DRBN005 02/27/99 16:13 ***
To: SREIMERS--DRBN007
cc: TBAZIL --DRBN005 LSMITH9 --DRBN005

FROM: M. P. REESE USAET(UTC -05:00)
Subject: Brake Deac Switch Re-location

I AM OPTIMISTIC ABOUT ABILITY TO PACKAGE THE CURRENT PRODUCTION SWITCH ON THE BRAKE PEDAL AND BRACKET ASSEMBLY IN 1992/1993/1994 TOWN CARS. I WILL KNOW MORE (BUT NOT EVERYTHING) ABOUT TIMING AT THE CONCLUSION OF A 9:00 AM MEETING WITH CHASSIS DESIGNERS. GENERAL OPTIMISM COMES FROM THE BRAKE PEDAL AND BRACKET ASSEMBLY DRAWINGS, THEY (SO FAR) SHOW EVOLUTION OVER THE MODEL YEARS, AND INVOLVE ONLY ONE SUPPLIER.

WERS AND DOCMAN ARE NOT IN GOOD SHAPE FOR THIS 1992/1993/1994 MODEL TASK. THAT SLOWS THE ADVANCE. FACILITATES AMBUSH.

ALWAYS, I MUST CONSIDER EFFECTS ON FMVSS 105. VEHICLE TEST, BRAKE SYSTEM.

I INTEND T CALL YOU, ABOUT NOON ON MONDAY 1999 MAR 01.

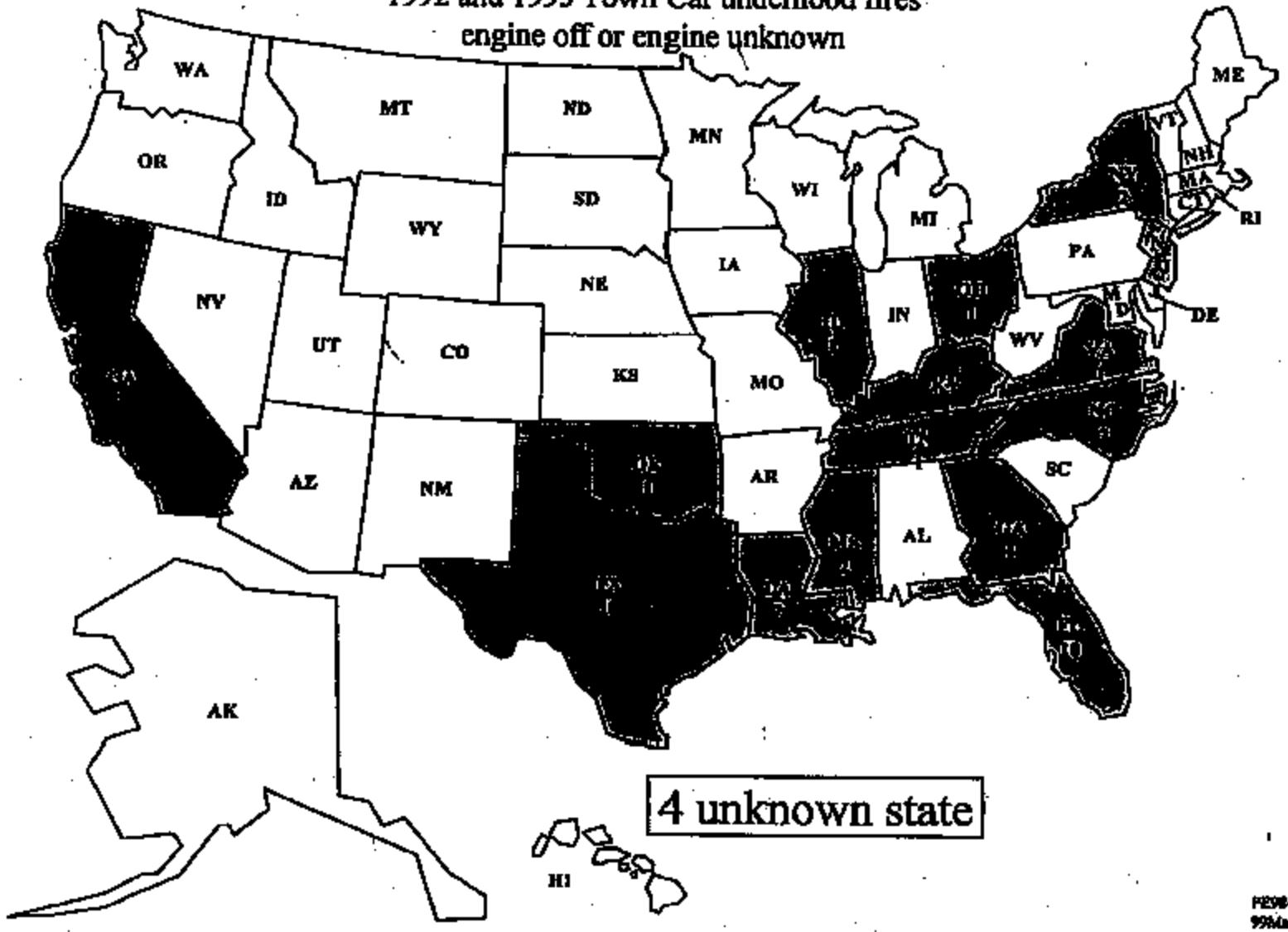
Regards,
M. P. Reese 313-317-7142 (313-621-6675 FAX)
OPD LVC - Brakes Mail Drop 1229 BUILDING 2 24M31
*** Forwarding note from SREIMERS--DRBN007 02/25/99 15:39 ***
To: MREESE --DRBN005

FROM: Steve Reimers USAET(UTC -05:00)
Subject: Brake Deac Switch Re-location
Marty, I was asked what the status of this design work. Have you got any good words I can pass on to my manager? I would like to give Jack Paskus a sense of where we are on this task, what the next step(s) are and when they are targett ed to complete. My meeting with Paskus is Monday at 3:30.
thanks,

Steve Reimers building 5 3C043
AVT Chassis E/E System Applications mail drop 5011
39-03286 SREIMERS sreimers@ford.com fax 39-03286 ;>

3713 7720

1992 and 1993 Town Car underhood fires
engine off or engine unknown

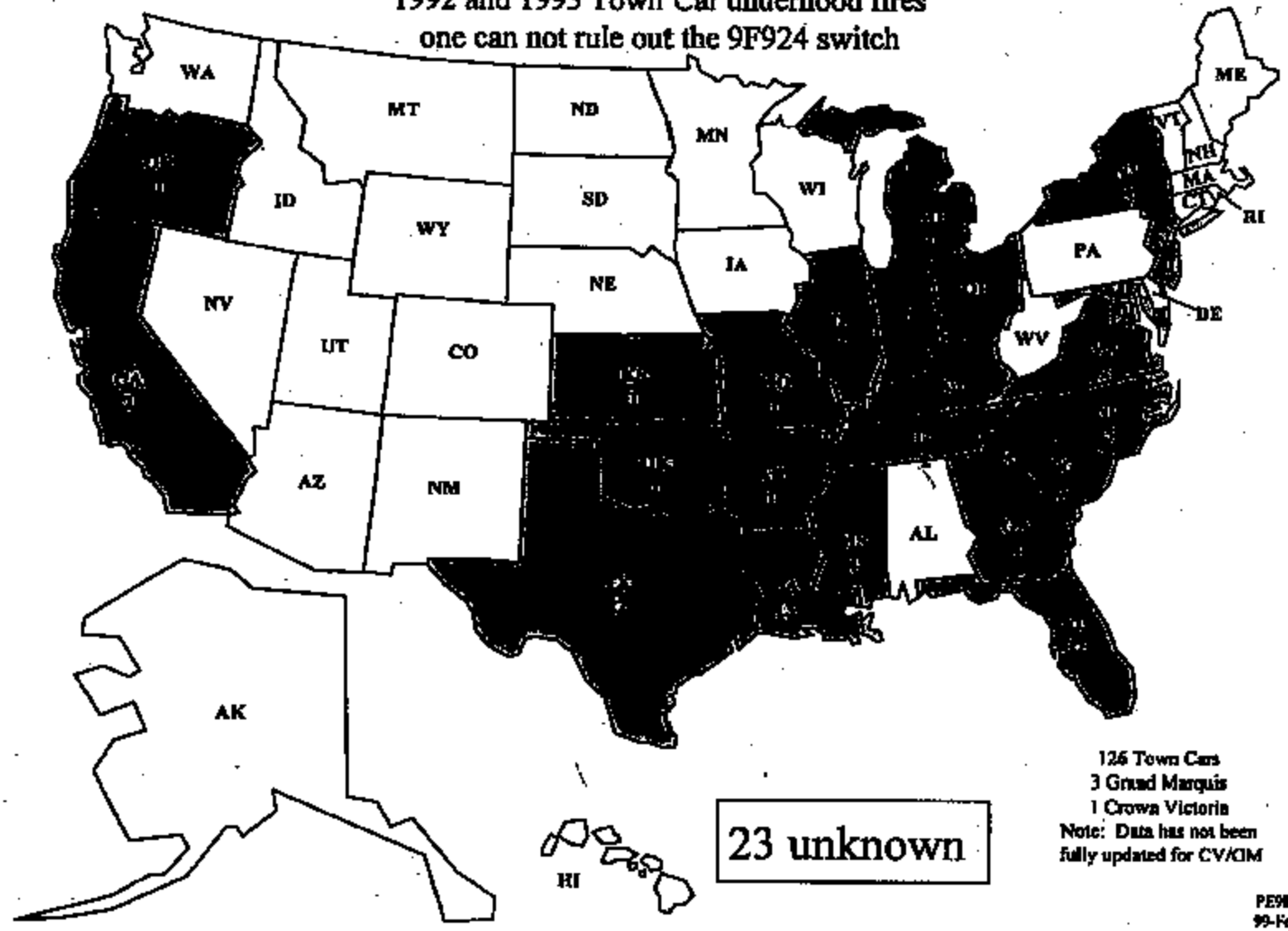


4 unknown state

3718 7721

PE98-035
99Mar-01
map engine off-unknown.ppt

1992 and 1993 Town Car underhood fires
one can not rule out the 9F924 switch



23 unknown

126 Town Cars
3 Grand Marquis
1 Crown Victoria
Note: Data has not been fully updated for CV/GM

PE98-055
99-Feb-09
rmp fires possible sw.ppt

3713 7722

SUMMARY

1) **Reviewed 156 92/93 Town Car reports which included:**
   Owner Reports (MORS)
   Field Reports (CQIS)
   Lawsuits and Claims Litigation Prevention Files
   NHTSA Reports

   There were 47 reports categorized **engine off/unknown** and **underhood** based on the information available.

   30 out of 47 are reported engine off.
   17 out of 47 are reported unknown.

   Of the 30 vehicles reported with the engine off:
   15 are reported to be unknown probable cause.
   7 are reported to be electrical as a probable cause.
   4 are reported as having started in the left front wheel area.
   4 are reported as the brake pressure switch probable cause.

   Of the 17 vehicles reported with the engine unknown:
   11 are reported to be unknown probable cause.
   3 are reported to be electrical as a probable cause.
   1 is reported as the brake pressure switch as a probable cause.
   1 is reported as spark plug wires as a probable cause.
   1 is reported as the celenoid pressure sensor as a probable cause.

   Specific cause reports were ruled out other than the four components as defined by NHTSA, including the brake pressure switch.

2) The file of the 47 vehicles were sent to FCSD for review of option content.

3) Provided the list of the 47 vehicles to Vehicle Safety Office for further investigation of these vehicles.

NEXT STEPS:
Review CV/GM CQIS reports for the same criteria as Town Car.
Reviewing Town Car underhood hot circuits, engine off with UTA on 3/2/99.

-DRAFT-

Chassis Brake Response to Investigation PE98-005 -1992 and 1993 Model Town Car Vehicles

8a) The approximate date on which the modification or change was incorporated into production...

- At the beginning of the 1992 model year (approximately August 1991) through the 1994 model year (approximately July 1994)

8b) A description of the modification or change...

- The brake pressure switch was packaged on the brake proportioning-valve block F2VC-2B091-BA, BA, CA). The prior package had a vacuum switch located on the brake pedal.

8c) The reason for the modification or change...

- The switch was new for 1992. The package was changed for the 1995 model year with the introduction of front-rear versus diagonal brake circuit splitting.

8d) Whether the modified or changed components can be interchanged with earlier production components...

- The 1992-1994 packages are not interchangeable with prior or later models.

LVC OPD Brake Engineering Section
January 27, 1999

3713 7726

U.S. Department of Transportation
National Highway Traffic Safety Administration

400 Seventh Street, S.W.
Washington, D.C. 20590

DEC 1 1998

DISPOSE of Copies (Black Stamped) by:	
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Schedule Number:	

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

L.W. Camp, Director
Automotive Safety and Engineering Standards Office
Ford Motor Company
330 Town Center Drive
Dearborn, MI 48126

NSA-12jfa
PE98-055

Dear Mr. Camp:

This letter is to revise the due date for the November 24, 1998 information request letter regarding investigation PE98-055. The correct due date is January 15, 1999.

Sincerely,

Thomas Z. Cooper, Chief
Vehicle Integrity Division
Office of Defects Investigation

SAFETY BELTS SAVE LIVES

AUTO SAFETY HOTLINE
1800) 424-9393
Wash. D.C. Area (202) 366-0123

3713 7727

U.S. Department
of Transportation
National Highway
Traffic Safety
Administration

400 Seventh Street, S.W.
Washington, D.C. 20590

V. J. BOHAN--

NOV 24 1998

10 NOV 98 5:3 IC

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Schedule Number:	27.03

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

NSA-12jfa
PE98-055

L.W. Camp, Director
Automotive Safety and Engineering Standards Office
Ford Motor Company
330 Town Center Drive
Dearborn, MI 48126

Dear Mr. Camp:

This letter is to advise you that the Office of Defects Investigation (ODI) of the National Highway Traffic Safety Administration (NHTSA) is conducting a Preliminary Evaluation concerning engine compartment fires in certain Lincoln Town Car vehicles manufactured by the Ford Motor Company.

This office has received 21 reports of engine compartment fires in 1992 and 1993 Lincoln Town Cars. The fires in these vehicles are reported to have started while the vehicles were parked and the engines not running. Ten of the reports indicate a fire at the left front fender wheel well area (see photograph, page 6), two indicate a fire at the master cylinder, which is adjacent to the left front fender wheel well area, and the remaining nine reports indicate a fire in the engine compartment. Additionally, five of the reports indicate the vehicle owner's carport, garage, or home, was also damage as a result of the fire.

A copy of each of the reports is enclosed for your information.

Unless otherwise stated in the text, the following definitions apply to this information request:

- **Subject vehicles:** all 1992 and 1993 Lincoln Town Car vehicles.
- **Ford:** Ford Motor Company, all of its past and present officers, employees, whether assigned to its principal offices or to any of its field or other locations, including all of its divisions, subsidiaries (whether or not incorporated) and affiliated enterprises and all of their headquarters, regional, zone and other offices and their employees, and all agents, contractors, consultants, attorneys and law firms and other persons engaged by or under the control of Ford Motor Company (including all business units and persons previously referred to) who are or were involved in any way with (a) design, analysis, modification or production; (b) testing, assessment or evaluation; or (c) record-keeping, claims, or lawsuits relating to the alleged defect in the subject vehicles.

- Alleged defect: all under hood fires, or other thermal anomalies, from any source or origin, of any description, level, degree, or magnitude, occurring in the left, or drivers side, of the engine compartment. This would include fires in the area of the left front wheel, or left front fender.

- Documents: in the broadest sense of the word, shall mean all written, printed, typed, recorded or graphic matter whatsoever, however produced or reproduced, of every kind, nature, and description, including but not limited to, papers, records, letters, correspondence, memoranda, communications, electronic mail messages (existing in hard copy and/or in electronic storage), faxes, notes, annotations, working papers, drafts, minutes, records, resolutions, books, pleadings, response to discovery, administrative and judicial filings, all transcripts and other recordings of any kind, affidavits, materials and things produced in discovery, statements, summaries, interviews, opinions, reports, newspaper articles, studies, analysis, evaluations, interpretations, applications, agreements, jottings, agendas, bulletins, notices, announcements, instructions, designs, specifications, blueprints, as-builts, manuals, brochures, publications, schedules, journals, statistical data, lists, tabulations, computer printouts, data processing input, data in storage, and data output, microfilm, microfiche, data from optical scanning or recording, photographs, tangible things, and all records kept by electronic, photographic, or mechanical means, any drafts or revisions pertaining to any of the foregoing, and all other things similar to any of the foregoing however denominated and any other data compilations from which information can be obtained, translated if necessary, into reasonably usable form and any other documents.

In order for my staff to evaluate the alleged defect, certain information is required. Pursuant to 49 U.S.C. § 30166, please provide numbered responses to the following questions. Please repeat each question verbatim before the response. If you have previously furnished ODI with information that is responsive to any item(s) in this request, you need not resubmit that information, but your response must cross-reference (by date of response and question number) the earlier submission. If Ford cannot answer any specific question, please state the reason why it is unable to do so. If you claim that any information or material responsive to the following items need not be divulged to the NHTSA because it is privileged, or the work product of an attorney, state the nature of that information or material and identify any document in which it is found by, date, subject or title, name and position of person from and person to whom it was sent, and name and position of any other recipient. You must also describe any privilege that you claim, and explain why you believe it applies.

1. State the total number of subject vehicles sold in the United States by model year.

2. State the number incidents, known to Ford, in which the alleged defect has been reported to have occurred in the subject vehicles. Furnish copies of all documents, from any and all sources, including documents which may not originally have been submitted to Ford, which

are in Ford's possession or control, or of which it is otherwise aware, that pertain, in any way, to any of these incidents. This should include, but is not limited to, all documents possessed by Ford, or of which it is otherwise aware, pertaining to the reports included with this letter. Furnish all documents whether or not Ford has verified the validity of each document. For each incident in this response please provide the vehicle owner's name, address, and telephone number; and identify all vehicles by vehicle identification number, model year, date of manufacture, date of retail sale, date of incident, mileage at the time of the incident, and problem description. For all incidents involving lawsuits please identify the caption, court, docket number, and filing date of each lawsuit and a copy of the complaint document initiating the lawsuit. Sort all incidents by cause and area or component of origin.

3. State the total number vehicles sold in the United States by model name and model year that have engine compart configurations (i.e., components and component location, wiring harnesses and harness location) the same as the subject vehicles. Provide a response to question number two for all vehicles identified in your answer to this question.

4. State the number of all warranty claims, including extended warranty claims, and "goodwill," field or zone adjustments received by Ford that relate to the alleged defect in the subject vehicles by calendar year, calender month, and problem identification. Identify all owners by name, address, and telephone number, and all vehicles by vehicle identification number, model name, model year, date of manufacture, date of retail sale, date of incident, mileage at the time of the incident, and problem description.

5. Identify all electrical circuits by name, number, and wire color, located in the left side of the engine compartment that are, or remain, energized by the battery when the ignition key is in the off position. For all circuits identified, provide a schematic drawing which identifies the harness(es) in which they reside, the harness location(s), and the components to which power is supplied.

6. Identify and describe all inspections, tests or other analyses conducted by Ford, its contractors, suppliers, or by any other entities, regarding the inspection of any subject vehicles that relate to the alleged defect, to date. Identify, by name and address, the entity that conducted each such test or analysis. Furnish copies of all reports, surveys, notes, tables, graphs or other documents that pertain to each such test or analysis. State when each test or analysis was initiated and concluded, or whether it is still in progress. Include in your response a description of a worst case scenario.

7. If Ford has issued any bulletins, advisories, or other communications to distributors, retailers, consumers, or any other entity pertaining to the alleged defect in the subject vehicles, provide a copy of each such document. If no such documents have been issued, so state.

8. Identify and describe all significant modifications or changes made by or on behalf of Ford in the manufacture, design, or material composition of all components in the subject vehicles that may relate to the alleged defect. The following information must be included for each such modification or change:

   a. the approximate date on which the modification or change was incorporated into production;
   b. a description of the modification or change;
   c. the reason for the modification or change; and
   d. whether the modified or changed components can be interchanged with earlier production components.

9. Provide Ford's assessment of the alleged defect in the subject vehicles, including:

   a. all causal or contributory factors;
   b. the failure mode;
   c. the risk to occupant safety it poses; and
   d. whether there are any circumstances that would provide the vehicle owner or others with warning of its existence.

Your response to this letter, in duplicate, must be submitted to this office by January 6, 1999. Please include in your response the identification codes referenced on page 1 of this letter. If you find that you are unable to provide all of the information requested within the time allotted, you must request an extension from Mr. Thomas Z. Cooper not later than five days from the due date. If you are unable to provide all of the information requested by the original deadline, you must submit a partial response by that date with whatever information you have available, even if you have received an extension.

This letter is being sent to your company pursuant to 49 U.S.C. § 30166, which authorizes NHTSA to conduct any investigation that may be necessary to enforce Chapter 301 of Title 49, U.S. Code. Your failure to respond promptly and fully to this letter could subject Ford to civil penalties pursuant to 49 U.S.C. § 30165 or lead to an action for injuctive relief pursuant to 49 U.S.C. § 30163.

If you consider any portion of your response to be confidential information, include that material in a separate enclosure marked "CONFIDENTIAL." In addition, you must submit a copy of all such material to the Office of Chief Counsel (NCC-30), National Highway Traffic Safety Administration, 400 Seventh Street, SW, Washington, DC 20590, and comply with all other requirements for the submission of confidential business information stated in 49 CFR Part 512.

If you have any technical questions concerning this matter, please contact Mr. John Abbott of my staff at (202) 366-5221.

Sincerely,

Thomas Z. Cooper, Chief
Vehicle Integrity Division
Office of Defects Investigation

Enclosures: 12 VOQ's: 813241, 824016, 808265, 821667, 979634, 521137, 804418, 541041 820316, 536206, 819621, 823462; 5 fire department reports; 2 internet reports; and 2 fire investigator reports

NHTSA:NSA:ODI
NSA-12:JABBOTT:drd:6-5221:11/17/98
cc:
NSA-01
NSA-12/Subj/Chron/
Document: I:/ABBOTT/Towncar.IR

1992 Lincoln Town Car (1LNLM81W2NY[redacted]

11/24/98

PE Opening Reports (PE98-055)
1992 Lincoln Town Car Engine Fires

NO.	Source	ST	VIN	M/Y
1	813241	FL	1LNLM82W5NY[redacted]	92
2	824016	TX	1LNLM81W2NY[redacted]	92
3	808265	FL	1LNLM82W7NY[redacted]	92
4	821867	LA	1LNLM81W9NY[redacted]	92
5	979634	TX	1LNLM82W5NY[redacted]	92
6	521137	OK	1LNLM81W2NY[redacted]	92
7	F.D.R.	GA	1LNLM82W3NY[redacted]	92
8	804418	OH	1LNLM81W8NY[redacted]	92
9	541041	FL	ILNLM81W3NY[redacted]	92
10	F.D.R.	FL	1LNLM81W2NY[redacted]	92
11	F.D.R.	FL	1LNLM82W7NY[redacted]	92
12	A805260	FL	1LNLM81W0NY[redacted]	92
13	820316	FL	1LNLM81W3NY[redacted]	92
14	I/Net	FL	1LNLM81W8NY[redacted]	92
15	536206	MS	1LNLM83W9NY[redacted]	92
16	819621	LA	1LNLM82W5NY[redacted]	92
17	I/Net	FL	1LNLM82W4NY[redacted]	92
18	F.D.R.	GA	1LNLM82W1NY[redacted]	92
19	A804221	FL	1LNLM81WP2Y[redacted]	93
20	823462	MS	1LNLM81W5PY[redacted]	93
21	F.D.R.	FL	1LNLM81WXPY[redacted]	93

3713 7734

-DRAFT-

To: Zandra Deering

From: Tom Bazil

Date: January 15, 1999

Subject: Significant Foundation Brake Design Changes under PE96-055

The basic package of the brake pressure switch as located with the proportioning valve block (F2VC-2B091-AA, BA, CA) continued with minor changes through the 1994 model year. No other apparently significant design changes have been identified at this time.

1995

(1) ABS w/o TC
NON ABS
-2B195- ROP PIA

(2) ABS/TC REMOTE VALVE PIA SPECIAL

(3) 1 1/16 VERSION FOR LIMA / POLICE
1A

1990 diagonal split

1994 Under Booster m/c

1pm LCR #1, Brkt #5

TEVES M/C Mark IV

Prop valve same spot w/ & w/o TC

Hot - normally closed
TC '91 on FN 1991 Vacuum switch?
TC '92 on EN53

Central Laboratory
15000 Century Drive
Dearborn, MI 48120-1287

January 15, 1999

Preliminary Findings:

(A) The cup is partially covered with a greenish residue. Residue appears to be primarily an oxide of the brass contact material with possibly a sulfur compound. This suggests transfer of oxide or corrosion product from the brass contacts to the cup.

(B) The stationary contact exhibits intergranular cracks which indicate stress corrosion cracking (SCC). SCC is caused by combination of a specific corrosive environment and a sustained tensile stress (can be localized). Ammonia, ammonia compounds, sulfur compounds, and moisture are known to cause SCC in brass. The contact material has been reported to be 360 brass, which is highly susceptible to SCC.

(C) The presence of brake fluid on the switch side of the diaphragm has been determined. Black residues in the hex port and on the cup, converter, and disc appear to be compounds which may have formed from a reaction between decomposition products (acids) of the polyester base, the brake fluid, and metals in the switch. This suggests that the brake fluid was present on both sides of the diaphragm during the thermal event.

All three diaphragms exhibit what appears to be mechanical damage. The damage does not match up with any mating parts of the switch. This suggests that damage may have occurred prior to assembly. The diaphragm has become brittle and cracked in the vicinity of the damage. Brake fluid has become entrained between the layers (Teflon and capton) of the diaphragms.

The post of the movable contact melted back into the bulkhead between the switch and terminal cavities of the base. There is also arc damage (localized melting) to one corner of the bridge of the stationary contact. This damage appears fresh (surfaces bright and shiny) which suggests that it may have occurred in the later stages of the thermal event.

The terminals exhibit deposits which appear to be primarily sulfur compounds of the terminal material (tin plated brass). Although these deposits appear visually similar to the deposit found on the cup, they appear to be of different composition.

The white residue found in the connector cavity contains elements found in dry chemical fire extinguishers (Muscovite and phosphorus)

Steve LaRouche

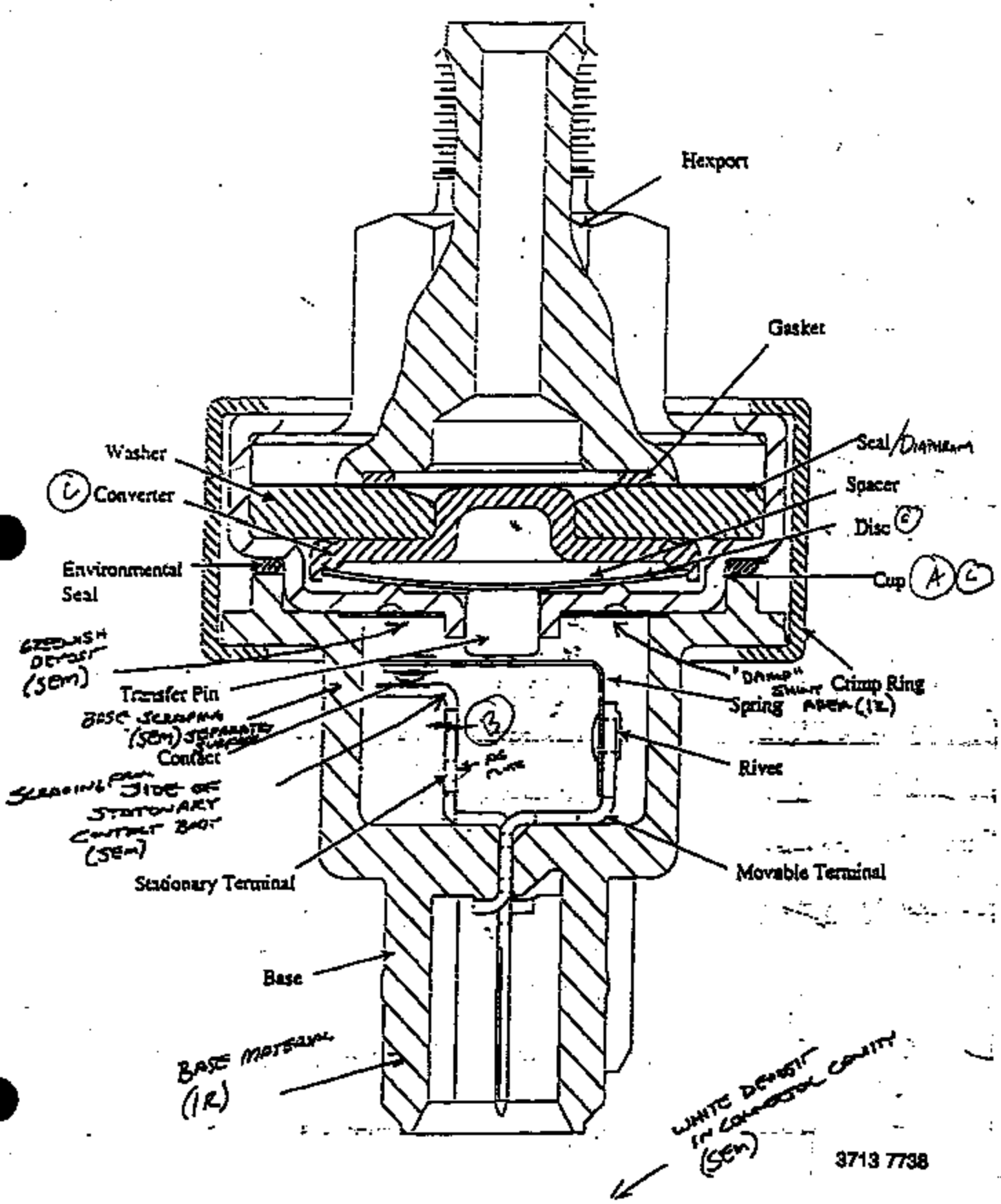
Auto ignition 606°F

F. Lash 312°F

Fused @ 15A ~ 180W

3713 7737

Hydraulic Pressure Switch Cross Section



in connection with the brake pressure switch.
WJIAA135 occurred at 51,500 miles.
VDUAA322 occurred at 56,802 miles.

Supplier: The pressure switch was manufactured by Texas Instruments. The switch was purchased in assembly with the brake proportioning valve bought from Surfaces.

Contacts: Surfaces - Mike Thomas (248)543-6520 HILITE Industries
TI - Rob Sharp (248)305-5729
TI - Russ Baumann (508)236-3314
TI - Charlie Douglas (508)236-3657

Function: The brake pressure switch is a redundant switch for turning off the speed control function.

X-Rays: Taken by Steve LaRouche, Norm LaPointe & Clark Thomas on 12/17/1998. Original photographs and part are in Steve LaRouche's possession.

ON-GOING ACTIVITY:

2 service parts have been ordered from Fairlane Ford for X-ray and other testing by Central Lab Services.

Meeting with representatives of TI is planned for 12/22/1998 to discuss intended operation of the switch. The meeting will be at the Central Laboratory Conference room off of the lobby.

QUESTIONS: (in no particular order)

1) What is the normal current in the brake pressure switch?

2) Was cruise control standard on Town Car in 1992 and 1993?

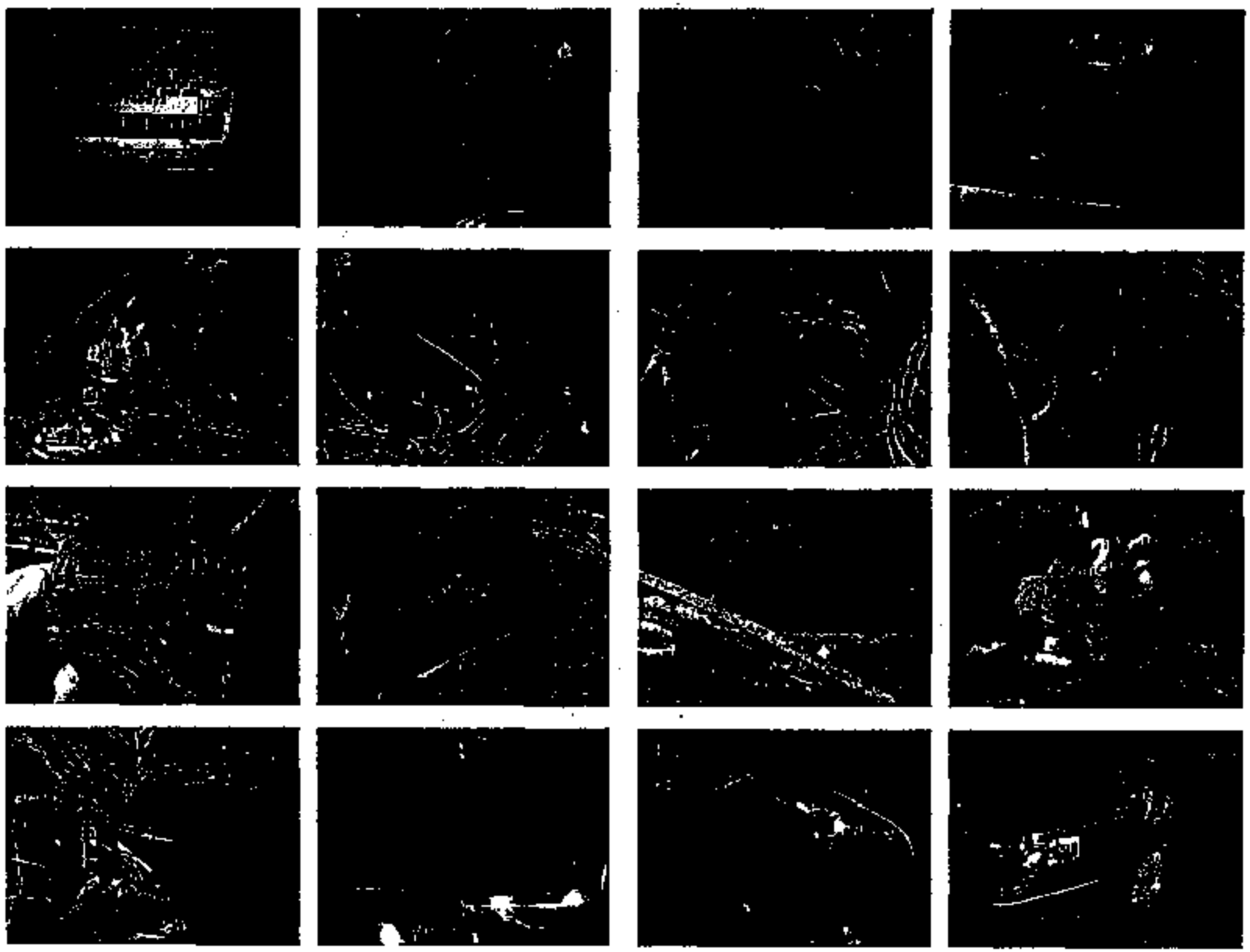
3) Under what circumstances is brake fluid flammable?

According to Clark Thomas & Mary Hage, brake fluid is flammable at approximately 300 degrees F.

4) What is the repair history for vehicles that have exhibited a problem? Repair history for the two CQIS vehicles are being gathered by Fred Porter.

5) What other vehicles use this brake pressure switch? What are their electrical configurations?

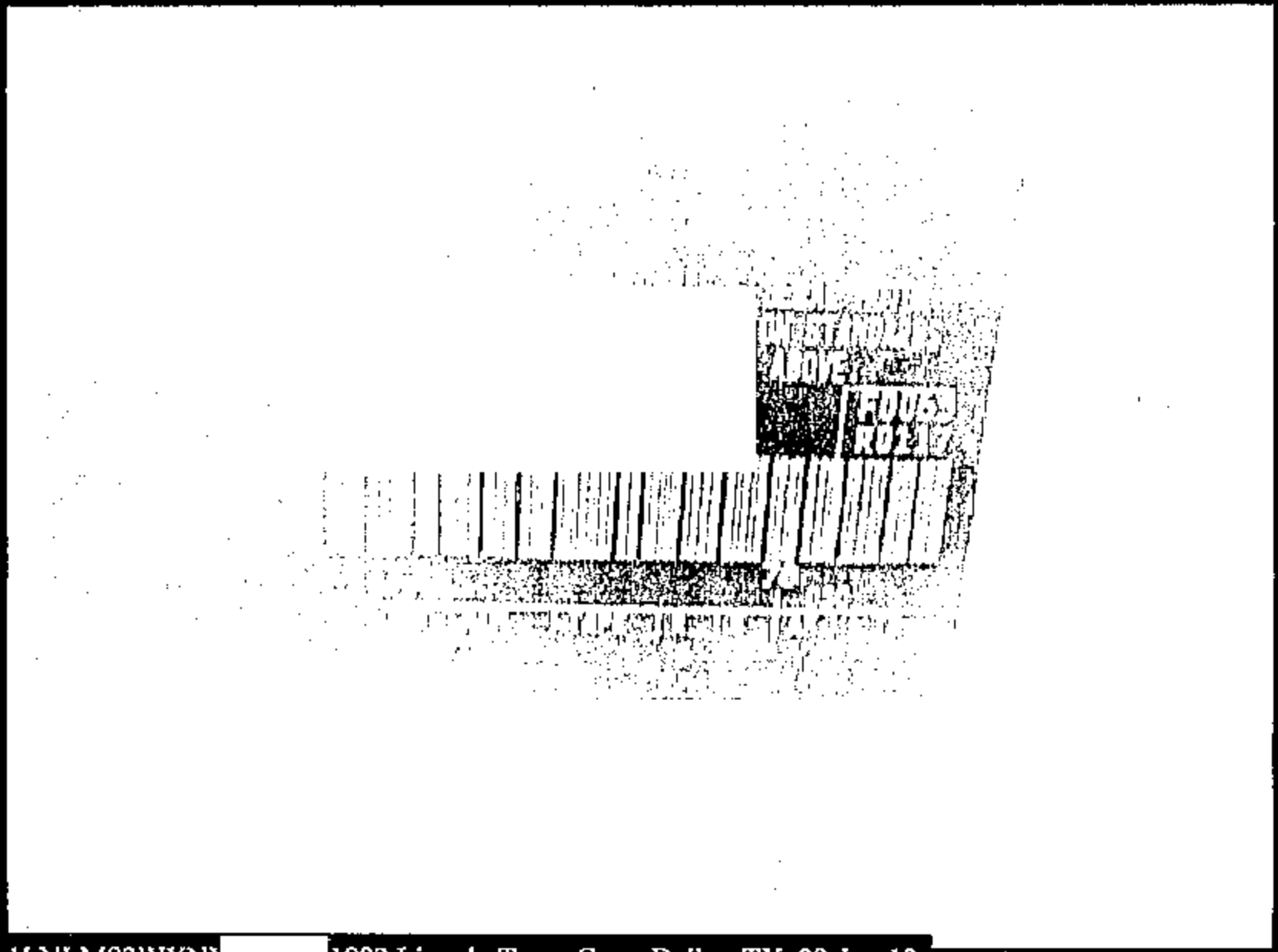
MODEL YEAR	92	93	94	95	96	97	98
Town Car	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	
Crown Vic	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	
Grand Marquis	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	
Econoline	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX
Club Wagon	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX
F-Series		XXXX	XXXX	XXXX	XXXX	XXXX	XXXX
Bronco		XXXX	XXXX	XXXX	XXXX		
Taurus SHO		XXXX	XXXX	----			
Capri			XXXX	XXXX	----		
Windstar			XXXX	XXXX	XXXX	XXXX	XXXX



ILNLM92WXNY749071 1992 Lincoln Town Car - Dallas, TX, 99-Jan-13

8713 7740

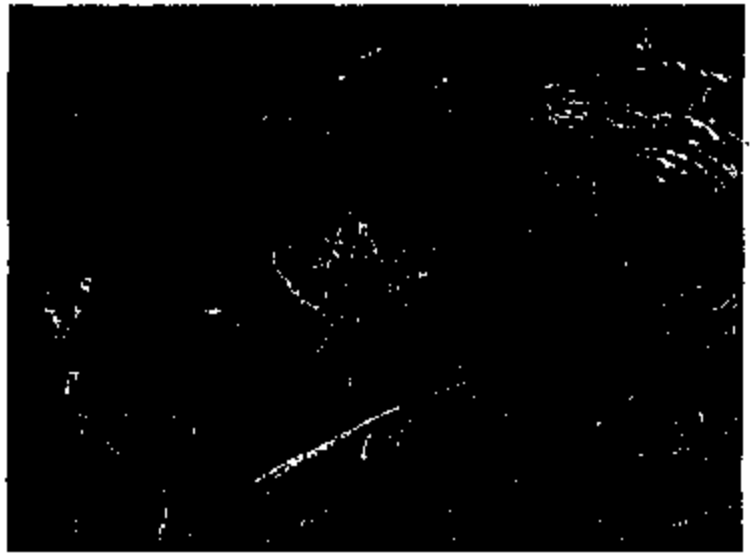
PE 98-055



8713 7741

1LNLM92WXNY [redacted] 1992 Lincoln Town Car - Dallas, TX, 99-Jan-13

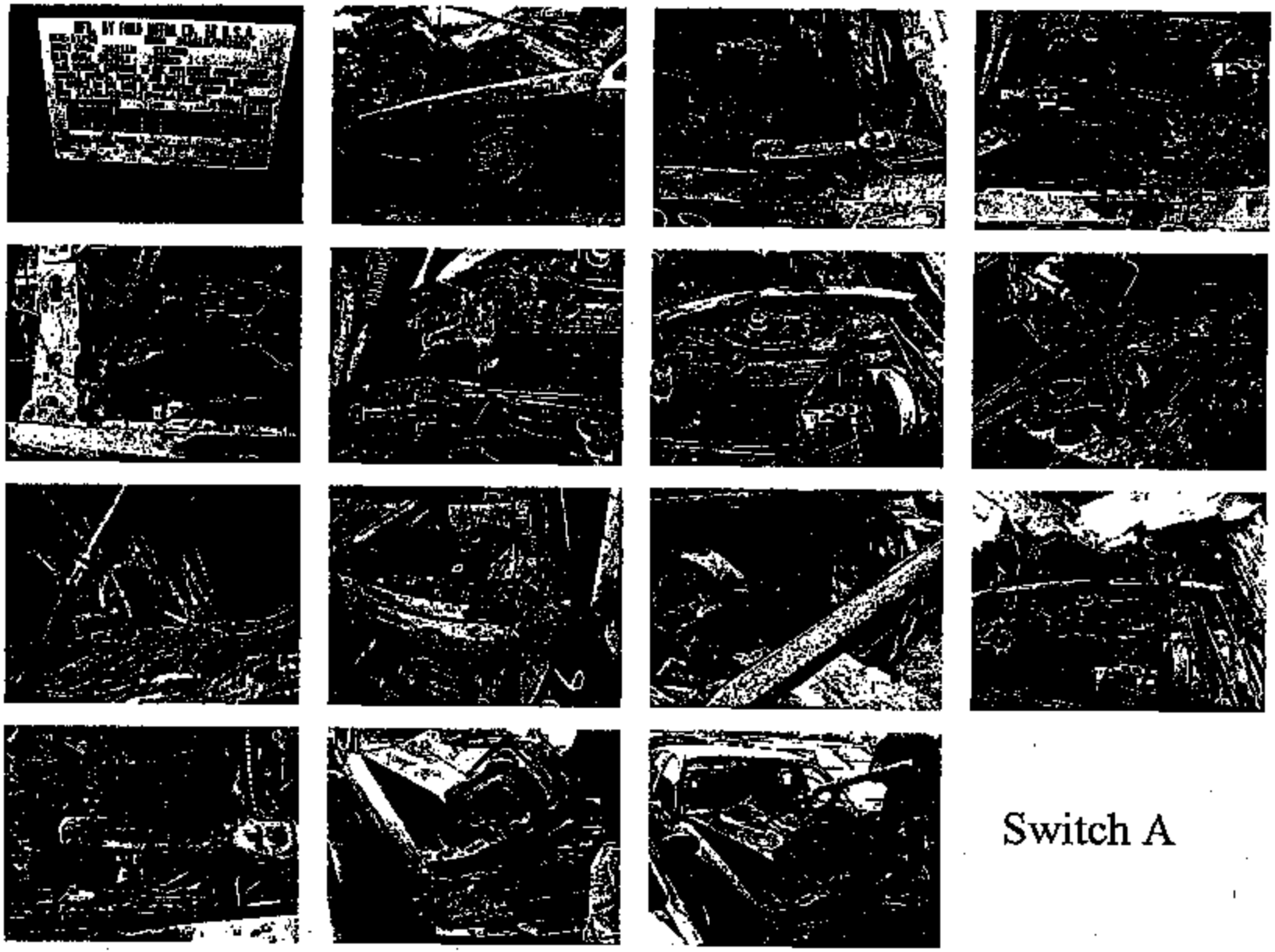
DE 98-055



3718 7742

1LNLM92WXNY[redacted]992 Lincoln Town Car - Dallas, TX, 99-Jan-13

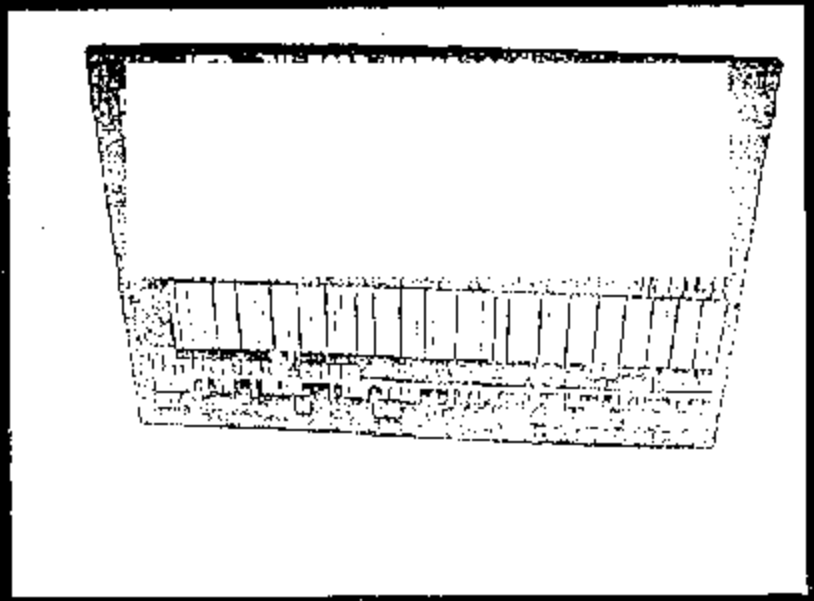
PE 98-055

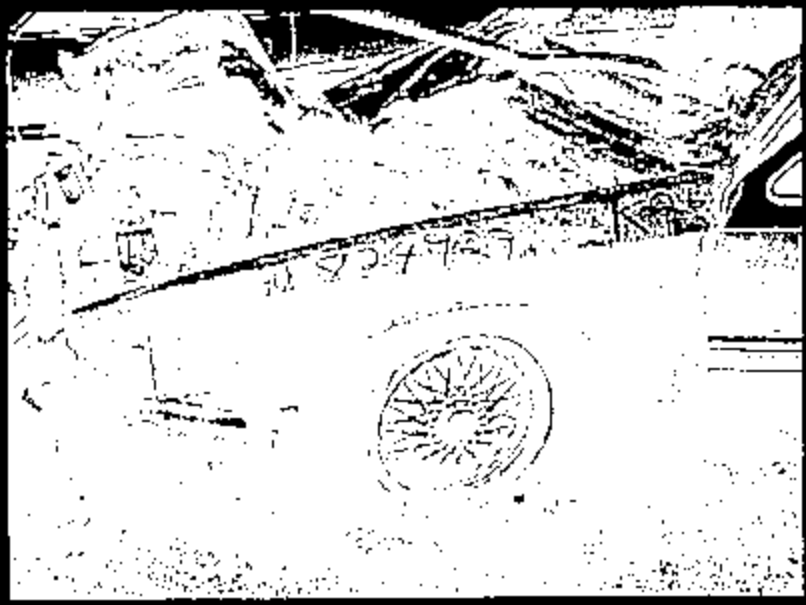


Switch A

3713 7743

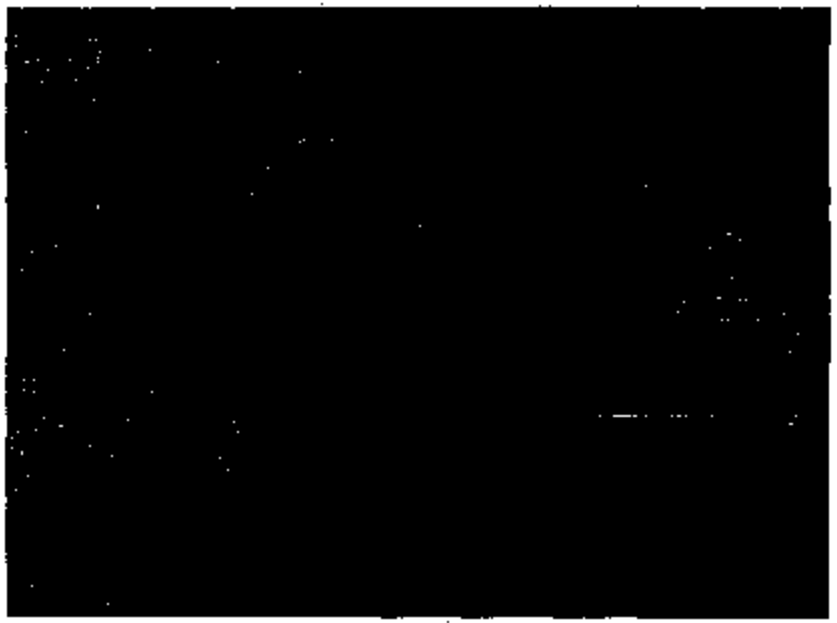
1LNLM92W1PY[redacted]1993 Lincoln Town Car - Houston, Tx 99-Jan-14 PE98-055

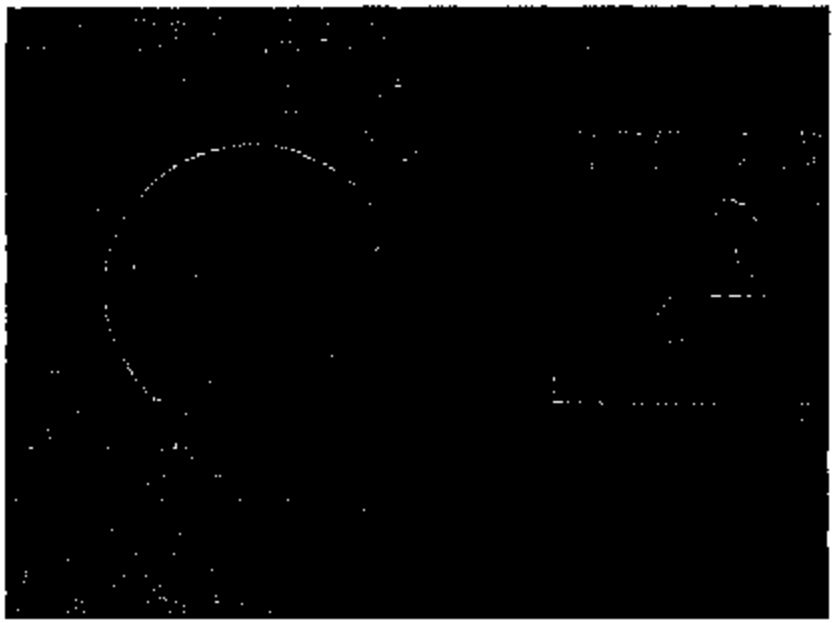




8713 7744

1LNLM92W1PY[redacted] 1993 Lincoln Town Car - Houston, Tx 99-Jan-14 PE98-055





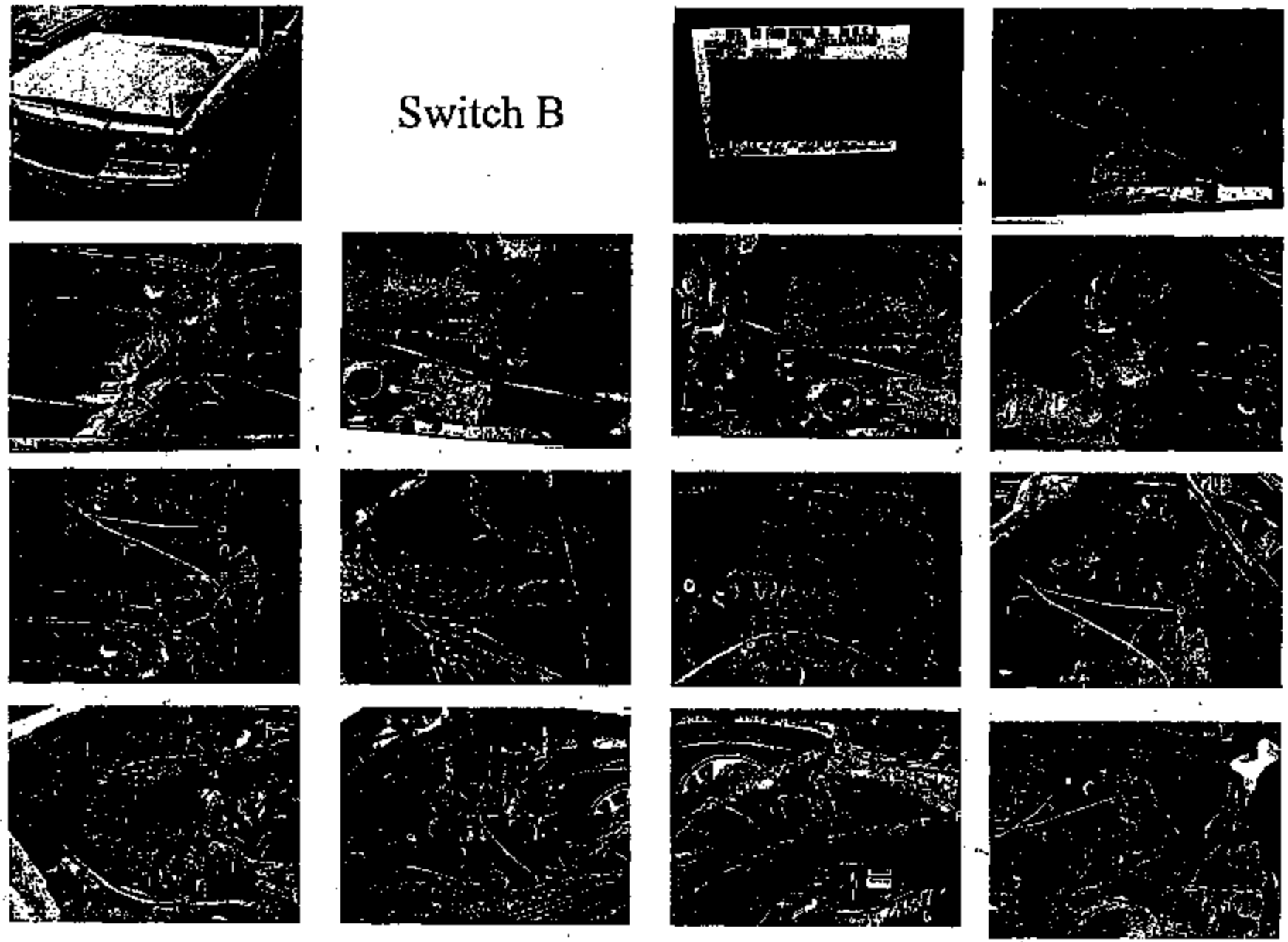
Switch A

F2VC-9F924-AB 2281

9713 7746

1LNLM92W1P[redacted] 1993 Lincoln Town Car - Houston, TX 99-Jan-14 PE98-055

Switch B

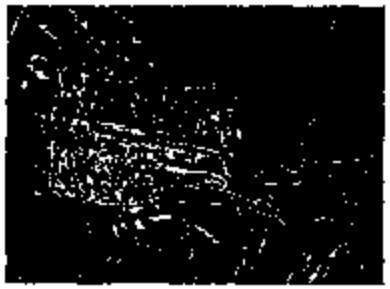


3713 7746

1LNLM83W5NY[redacted]992 Lincoln Town Car - Houston, TX 99-Jan-14 PE98-055

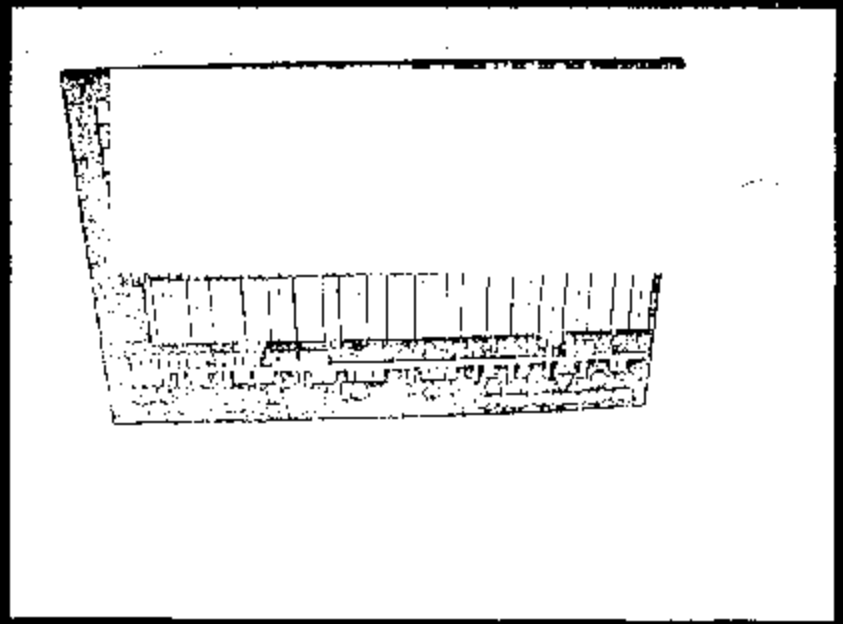


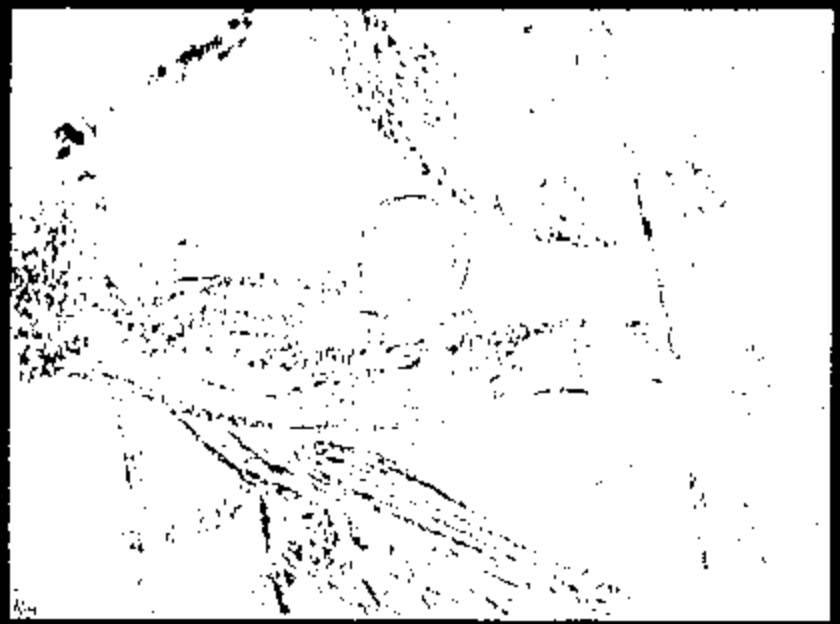


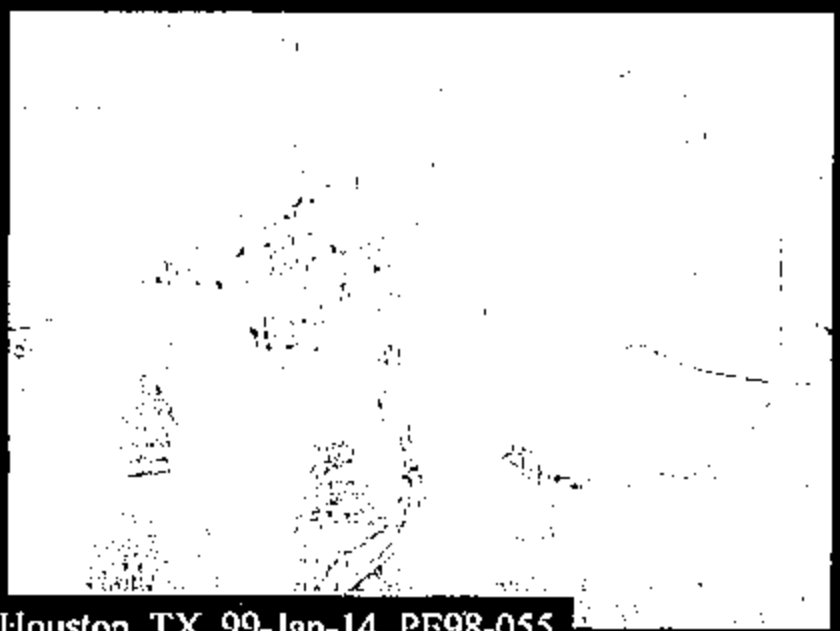


8713 7747

1LNLM83W5NY[redacted]1992 Lincoln Town Car - Houston, TX. 99-Jan-14 PE98-055







1LNLM83W5NY[redacted]992 Lincoln Town Car - Houston, TX 99-Jan-14 PE98-055

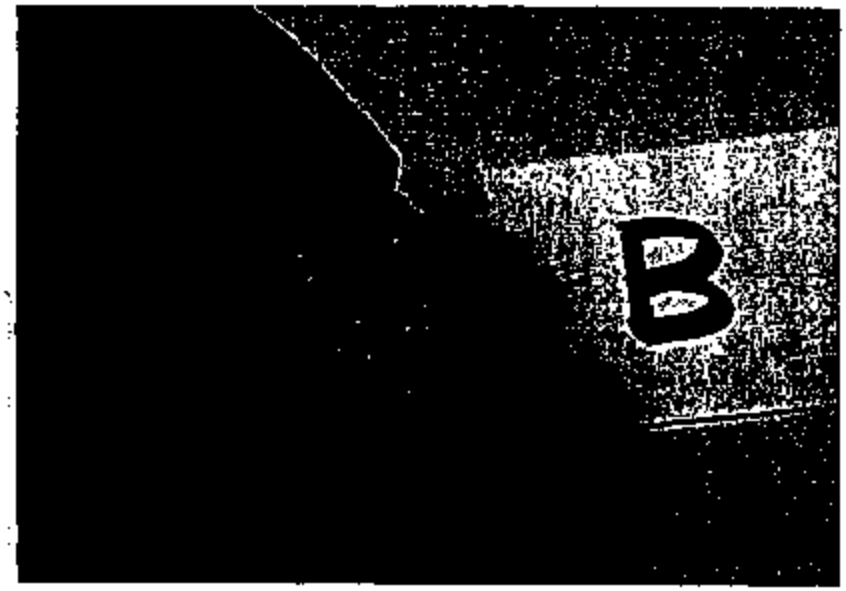
3713 7748

Switch B

F2VC-9F924-AB 2114

S718 7749

1LNLM83W5NY[redacted] 1992 Lincoln Town Car - Houston, TX 99-Jan-14 PE98-055

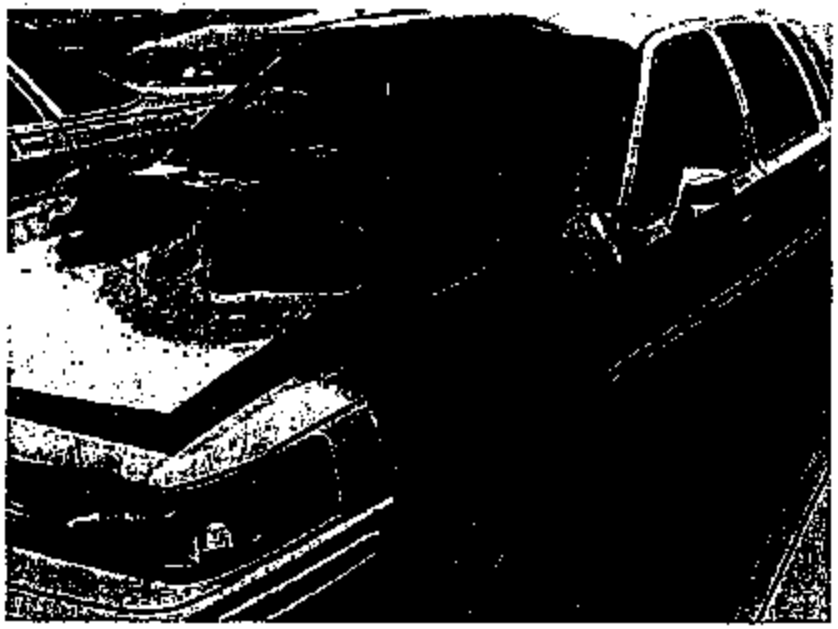


Switch B

F2VC-9F924-AB 2114

3713 7780

1LNLM83W5NY[redacted] 1992 Lincoln Town Car - Houston, TX 99-Jan-14 PE98-055



Switch C

3713 7781

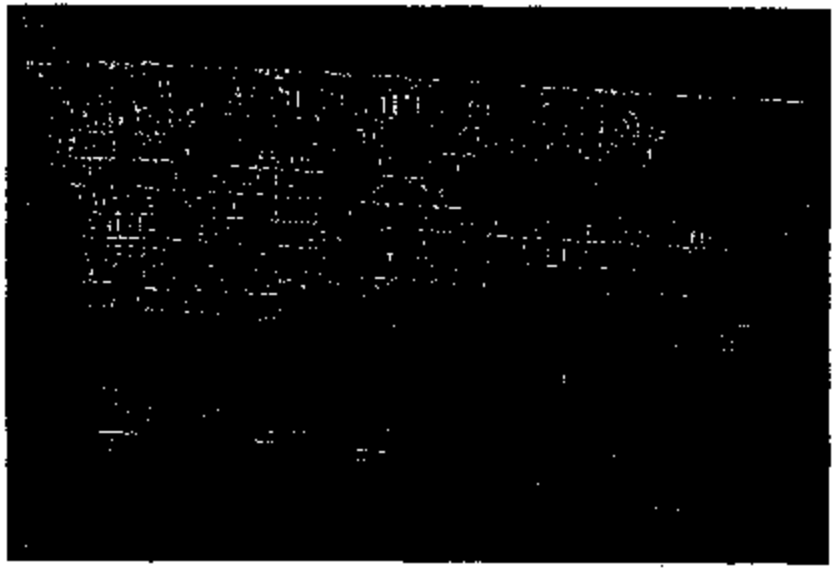
1LNLM81W2NY[redacted]1992 Lincoln Town Car - Houston, TX 99-Jan-14 PE98-055

Switch C

F2VC-9F924-AB 2003

3718 7752

1LNLM81W2NY[redacted]1992 Lincoln Town Car - Houston, TX 99-Jan-14 PE98-055



3718 7763

1LNLM82W7NY[redacted] 1992 Lincoln Town Car - Houston, TX 99-Jan-14)E98-015

1992-93 LINCOLN TOWN CAR
UNDERHOOD FIRES

PE98-055

NO.	OWNER NAME	ADDRESS	CITY	STATE	ZIP CODE	TELEPHONE NUMBER	VIN	MODEL YEAR	MODEL	BUILD DATE	SALE DATE	REPORT DATE	REPORT TYPE	MILEAGE	ISSUE REPORTED	POSSIBLE PROBLEM DESCRIPTION
1	[redacted]	N/A	Hugo	OK	N/A	N/A	N/A	1992	Town Car	02/13/92	03/02/92	08/17/94	CDIS/ MORS	84,883	Fire	Lines leaked on exhaust manifold and caused a fire.
2		N/A	Evergreen Park	IL	N/A	N/A		1992	Town Car	10/08/91	02/27/92	09/26/95	CDIS	220,249	Fire	Brakes.
3		N/A	Skokie	IL	N/A	N/A		1992	Town Car	12/19/91	01/03/92	07/30/93	CDIS	21,200	Melted	Brake lines.
4		N/A	Los Angeles	CA	N/A	N/A		1992	Town Car	01/15/92	03/02/92	09/20/95	CDIS	37,442	Fire	Brake lines.
5		N/A	Dearborn	MI	N/A	[redacted]		1992	Town Car	06/27/91	09/23/91	04/25/95	CDIS/ MORS	217,800	Fire	Alternator cooling duct burned.
6		N/A	Gainesville	FL	N/A	N/A		1992	Town Car	12/19/91	01/31/92	08/08/95	CDIS	48,772	Heat/Burned	Overheated, drive belt broke. A/C heated, burned.
7		N/A	Memphis	TN	N/A	N/A		1992	Town Car	09/10/92	02/08/93	10/06/99	CDIS	61,999	Fire	Brake lines.
8		N/A	Ft. Lauderdale	FL	N/A	N/A		1992	Town Car	04/07/92	10/02/92	04/21/97	CDIS	88,902	Smoke	Brake pressure switch caught on fire and burned the wiring.
9		N/A	Santa Monica	CA	N/A	N/A		1992	Town Car	07/25/92	08/23/93	12/27/94	CDIS	35,837	Melted wires	Overheated, melted wires.
10		N/A	Peekskill	NY	N/A	N/A		1992	Town Car	09/22/92	08/23/93	01/04/96	CDIS	48,118	Overheated	Spark plug wires melted.
11		N/A	Troy	OH	N/A	N/A		1993	Town Car	07/29/93	11/23/93	08/23/94	CDIS	14,922	Fire	Brakes.
12			Northbrook	IL				1993	Town Car	09/05/92	11/20/92	07/28/93	MORS	40,000	Burned	Electrical wiring.
13			Naperville	IL				1993	Town Car	09/27/92	09/15/92	09/14/99	MORS	83,806	Fire	Unknown.
14			Englewood	NJ				1993	Town Car	09/18/92	12/18/92	07/25/94	MORS	12,000	Fire	Unknown.
15			New Orleans	LA				1993	Town Car	09/25/92	07/19/93	08/25/95	MORS	9,506	Fire	Unknown.
16			Iron Station	NC				1993	Town Car	04/01/93	04/14/93	08/24/94	MORS	25,911	Fire	Unknown.
17			Pittsburgh	PA				1993	Town Car	12/04/92	01/20/93	03/23/99	MORS	12,999	Fire	Wiring harness.
18			Rochester	NY				1993	Town Car	05/19/92	08/02/92	09/30/95	MORS	39,000	Fire	Unknown.
19			Manalapan	FL				1993	Town Car	11/25/91	12/21/91	02/27/98	MORS	48,000	Fire	Unknown.
20			Melbourne	FL				1992	Town Car	07/30/92	09/16/92	01/26/97	MORS/ VDO	60,000	Fire	Unknown.
21			Baton Rouge	LA			N/A	1993	Unknown	Unknown	Unknown	09/16/99	MORS	84,000	Fire	Unknown.
22			Indianapolis	IN				1992	Town Car	05/11/92	07/30/92	09/23/95	MORS	85,000	Fire	Unknown.
23			Jackson	MS				1992	Town Car	06/25/92	09/21/92	07/31/98	MORS	88,800	Fire	Unknown.
24			St. Martinville	LA				1992	Town Car	05/13/92	01/21/93	09/11/97	MORS	86,000	Fire	Unknown.
25			Port St. Lucie	FL				1992	Town Car	07/31/92	10/09/92	01/08/98	MORS/ VDO	61,800	Fire	Unknown.
26			Stuart	FL				1992	Town Car	04/08/92	04/17/92	12/30/97	MORS	1	Fire	Unknown.

3713 7754

1992-93 LINCOLN TOWN CAR
UNDERHOOD FIRES

NO.	OWNER NAME	ADDRESS	CITY	STATE	ZIP CODE	TELEPHONE NUMBER	VIN	MODEL YEAR	MODEL	BUILD DATE	SALE DATE	REPORT DATE	REPORT TYPE	MILEAGE	ISSUE REPORTED	POSSIBLE PROBLEM DESCRIPTION
27	[redacted]		Baytown	TX	[redacted]		1LNLM82V2NY[redacted]	1992	Town Car	10/08/91	03/03/92	06/17/94	MORS	37,000	Fire	Unknown.
28			Beverly Hills	CA			1LNLM81V4NY	1992	Town Car	03/18/92	09/12/92	05/14/93	MORS	125	Fire	Unknown.
29			New Iberia	LA			1LNLM82W1NY	1992	Town Car	10/11/91	11/14/91	01/12/93	MORS	18,000	Fire	Unknown.
30			Brownsville	TX			1LNLM82W2NY	1992	Town Car	03/16/92	07/24/92	04/30/97	MORS	68,000	Fire	Underhood.
31			Naples	FL			1LNLM81W1NY	1992	Town Car	05/20/92	08/10/92	12/23/96	MORS	52,000	Fire	Engine compartment, gas lines.
32			Augusta	GA			1LNLM81W3NY	1992	Town Car	03/26/92	04/10/92	09/28/93	MORS	28,000	Fire	Unknown.
33			Wilmette	IL			1LNLM82W2NY	1992	Town Car	07/28/92	08/17/92	10/13/95	MORS	50,212	Fire	Brakes.
34			Bayside	NY			1LNLM82W1NY	1992	Town Car	03/20/92	04/10/92	07/06/93	MORS	11,000	Fire	Brakes.
35			Crosby	TX			1LNLM81W0NY	1992	Town Car	06/04/92	06/20/92	11/23/97	MORS	72,000	Fire	Unknown.
36			Victoria	TX			1LNLM81W8NY	1992	Town Car	05/08/92	06/22/92	06/01/97	MORS	64,000	Fire	Fire ruined above the air box tire.
37			Somerset	KY			1LNLM81W6NY	1992	Town Car	07/16/92	07/31/92	09/26/96	MORS	1	Fire	Engine compartment.
38			Greenwood	MS			1LNLM82W6NY	1992	Town Car	06/25/92	08/14/92	05/04/99	MORS/ VOQ	67,894	Fire	Wiring harness in engine compartment.
39			Hialeah	FL			1LNLM82W7NY	1992	Town Car	07/27/92	10/30/92	07/29/93	MORS	47,500	Fire	Motor.
40			Beaumont	TX			1LNLM82W7NY	1992	Town Car	05/05/92	08/21/92	12/07/98	MORS	120,000	Fire	Under the hood - solenoid, pressure sensor for the ABS.
41			Fernandina	FL			1LNLM81W0NY	1992	Town Car	03/19/92	04/16/92	09/09/96	MORS	1	Fire	Unknown.
42			E. Amherst	NY			1LNLM83W1PY	1993	Town Car	10/21/92	05/17/93	05/21/97	MORS	90,000	Fire	Under the hood.
43			Wilmington	NC			Unknown	1993	Unknown	Unknown	Unknown	12/08/97	MORS	56,000	Fire	Under the hood.
44			Isleral	FL			1LNLM81W0PY	1993	Town Car	11/1992	12/05/92	01/02/97	MORS	40,000	Fire	Under the car.
45			Boca Raton	FL			1LNLM82W1NY	1992	Town Car	07/23/92	09/14/92	12/03/97	MORS	47,000	Fire	Under the engine.
46			Forest Hills	NY			1LNLM83W5NY	1992	Town Car	12/04/91	12/04/91	03/13/96	MORS	1	Fire	Electrical short.
47			Clarkdale	AZ			1LNLM82W1NY	1992	Town Car	08/27/91	09/18/91	02/30/97	MORS	88,000	Fire	Front suspension.
48			Lebanon	OH			1LNLM81W8NY	1992	Town Car	04/14/92	08/11/92	11/01/98	MORS/ VOQ	100,000	Fire	Ignition or electrical system.
49			Dubois	GA			1LNLM81W2NY	1992	Town Car	02/21/92	03/10/92	04/29/96	MORS	62,037	Fire	Underhood.
50			Kansas City	MO			1LNLM81W2NY	1992	Town Car	05/07/91	05/19/92	10/05/95	MORS	72,000	Fire	Electrical system.
51			Houston	TX			1LNLM83W7NY	1992	Town Car	08/27/91	11/02/91	04/29/98	MORS	65,000	Fire	Electrical.
52			Lee's Summit	MO			1LNLM83W6NY	1992	Town Car	10/23/91	11/14/91	05/05/95	MORS	71,600	Fire	Brake system sensor.

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1992-93 LINCOLN TOWN CAR
UNDERHOOD FIRES

NO.	OWNER NAME	ADDRESS	CITY	STATE	ZIP CODE	TELEPHONE NUMBER	VIN	MODEL YEAR	MODEL	BUILD DATE	SALE DATE	REPORT DATE	REPORT TYPE	MILEAGE	ISSUE REPORTED	POSSIBLE PROBLEM DESCRIPTION
53	[redacted]		Jensen Beach	FL	[redacted]		[redacted]	1992	Town Car	12/11/91	01/14/92	03/13/98	MORS	70,000	Fire	Electrical.
54			Westlake	LA				1992	Town Car	04/28/92	07/11/92	01/13/98	MORS/ VOQ	98,700	Fire	Unknown.
55			Slidell	LA				1992	Town Car	06/18/92	08/02/92	12/30/97	MORS/ VOQ	80,000	Fire	Electrical short.
56			West Palm Beach	FL				1992	Town Car	01/22/92	02/11/92	10/14/97	MORS	78,000	Fire	Electrical.
57			Baytown	TX				1992	Town Car	05/16/92	04/01/92	09/29/97	MORS/ VOQ	67,000	Fire	Electrical system.
58			Austin	TX				1992	Town Car	05/05/92	08/01/92	09/29/97	MORS	53,000	Fire	Engine.
59			Lindsay	TX				1992	Town Car	12/17/91	04/23/92	09/18/97	MORS	105,000	Fire	Unknown.
60			Villa Park	IL				1992	Town Car	12/05/91	01/28/92	09/29/97	MORS	85,000	Fire	Left front tire.
61			Houston	TX				1992	Town Car	06/05/92	11/02/92	07/09/97	MORS	88,000	Fire	Unknown.
62			Clearwater	FL				1992	Town Car	05/20/92	06/29/92	09/29/97	MORS	98,000	Fire	Unknown.
63			Cocoa Beach	FL				1992	Town Car	05/14/91	06/30/91	06/18/97	MORS/ VOQ	78,000	Fire	Left front wheel area.
64			Dallas	TX				1992	Town Car	04/02/92	04/21/92	05/09/97	MORS	65,000	Fire	Engine.
65			Leesburg	VA				1992	Town Car	04/27/92	05/13/92	04/30/97	MORS	111,300	Fire	Unknown.
66			Houston	TX				1992	Town Car	04/16/92	05/01/92	03/17/97	MORS	100,000	Fire	Under the hood.
67			Lindale	VA				1992	Town Car	08/30/91	11/05/91	09/18/95	MORS	76,000	Fire	Unknown.
68			Memphis	TN			Unknown	1992	Unknown	Unknown	Unknown	02/12/97	MORS	1	Fire	Under the hood.
69			Unknown	NA				1992	Town Car	05/04/92	08/28/92	04/21/97	MORS	67,000	Fire	Electrical shot.
70			Metairie	LA				1992	Town Car	07/31/92	08/01/92	10/24/97	MORS	80,000	Fire	Electrical.
71			Mount Holly	NJ				1992	Town Car	10/15/92	12/29/92	09/08/97	MORS	66,000	Fire	Electrical.
72			West Columbia	SC			Unknown	1991	Unknown	Unknown	Unknown	03/08/94	MORS	9,000	Burned	Brakes.
73			Cumming	GA				1992	Town Car	02/28/92	03/11/92	04/21/97	MORS	84,000	Fire	Catalytic converter.
74			Dublin	OH				1992	Town Car	03/10/92	03/25/92	07/02/97	MORS/ VOQ	118,000	Fire	Spark plug wires.
75			Vero Beach	FL				1992	Gr Marq	04/02/92	05/08/92	05/11/98	COIS	90,000	Fire	Deactivator switch.
76			Unknown	NA				1992	Town Car	11/25/91	11/27/91	Unknown	VOQ	Unknown	Fire	Unknown.
77			Unknown	NA				1992	Town Car	05/20/92	08/03/92	Unknown	VOQ	Unknown	Fire	Unknown.
78			Unknown	NA				1992	Town Car	07/16/92	08/21/92	Unknown	VOQ	Unknown	Fire	Unknown.

1992-93 LINCOLN TOWN CAR
UNDERHOOD FIRES

NO.	OWNER NAME	ADDRESS	CITY	STATE	ZIP CODE	TELEPHONE NUMBER	VIN	MODEL YEAR	MODEL	BUILD DATE	SALE DATE	REPORT DATE	REPORT TYPE	MILEAGE	ISSUE REPORTED	POSSIBLE PROBLEM DESCRIPTION
7	[redacted]	[redacted]	Unknown	NA	NA	Unknown	1LNLM81W2NY	1992	Town Car	04/07/92	06/30/92	Unknown	VOQ	Unknown	Fire	Unknown.
8	[redacted]	[redacted]	Unknown	NA	NA	Unknown	1LNLM82W7NY	1992	Town Car	03/05/92	03/18/92	Unknown	VOQ	Unknown	Fire	Unknown.
8	[redacted]	[redacted]	Unknown	NA	NA	Unknown	1LNLM81W0NY	1992	Town Car	01/17/92	01/31/92	Unknown	VOQ	Unknown	Fire	Unknown.
8	[redacted]	[redacted]	Unknown	NA	NA	Unknown	1LNLM81W8NY	1992	Town Car	04/27/92	05/13/92	Unknown	VOQ	Unknown	Fire	Unknown.
8	[redacted]	[redacted]	Unknown	NA	NA	Unknown	1LNLM82W8NY	1992	Town Car	03/13/92	04/22/92	Unknown	VOQ	Unknown	Fire	Unknown.
8	[redacted]	[redacted]	Unknown	NA	NA	Unknown	1LNLM82W1NY	1992	Town Car	05/15/92	07/10/92	Unknown	VOQ	Unknown	Fire	Unknown.
8	[redacted]	[redacted]	Unknown	NA	NA	Unknown	1LNLM81WP2Y	1992	Town Car	09/26/91	09/29/91	Unknown	VOQ	Unknown	Fire	Unknown.
8	[redacted]	[redacted]	Unknown	NA	NA	Unknown	1LNLM81WBPY	1992	Town Car	04/30/92	05/15/92	Unknown	VOQ	Unknown	Fire	Unknown.
8	[redacted]	[redacted]	Unknown	NA	NA	Unknown	1LNLM81WXPY	1992	Town Car	10/28/92	11/05/92	Unknown	VOQ	Unknown	Fire	Unknown.
8	[redacted]	[redacted]	Unknown	FL	NA	Unknown	1LNLM83W4NY	1992	Town Car	09/03/92	09/11/92	09/01/98	VOQ	Unknown	Fire	Engine.
8	[redacted]	[redacted]	Unknown	MD	NA	Unknown	1LNLM81W8NY	1992	Town Car	03/13/92	06/03/92	10/01/98	VOQ	Unknown	Fire	Underhood.
8	[redacted]	[redacted]	Unknown	TX	NA	Unknown	1LNLM82W0NY	1992	Town Car	08/28/92	09/25/92	Unknown	VOQ	Unknown	Fire	Engine compartment.
8	[redacted]	[redacted]	Unknown	TX	NA	Unknown	1LNLM82W5NY	1992	Town Car	09/18/92	09/14/92	11/01/98	VOQ	Unknown	Fire	Engine compartment.
8	[redacted]	[redacted]	Unknown	TX	NA	Unknown	1LNLM82W1PY	1993	Town Car	11/26/92	12/07/92	11/01/98	VOQ	Unknown	Fire	Engine compartment.
8	[redacted]	[redacted]	Unknown	NY	NA	Unknown	1LNLM81W6PY	1993	Town Car	11/03/92	11/30/92	06/01/98	VOQ	Unknown	Fire	Engine compartment.
8	[redacted]	[redacted]	Unknown	CA	NA	Unknown	1LNLM81W2PY	1993	Town Car	10/13/92	10/29/92	02/01/99	VOQ	Unknown	Fire	Underhood.
8	[redacted]	[redacted]	Unknown	FL	NA	Unknown	1LNLL81W0N1	1992	Town Car	01/15/92	11/26/92	11/01/98	VOQ	Unknown	Fire	Underhood.
8	[redacted]	[redacted]	Unknown	MI	NA	Unknown	1LNLM81W0NY	1992	Town Car	02/24/92	03/03/92	10/01/98	VOQ	Unknown	Fire	Underhood.
8	[redacted]	[redacted]	Unknown	TX	NA	Unknown	1LNLM81W8NY	1992	Town Car	08/21/92	07/13/92	10/01/98	VOQ	Unknown	Fire	Engine compartment.
8	[redacted]	[redacted]	Unknown	NA	NA	Unknown	1LNLM81W3NY	1992	Town Car	03/19/92	03/27/92	09/01/98	VOQ	Unknown	Fire	Engine.
8	[redacted]	[redacted]	Unknown	NA	NA	Unknown	1LNLM81W8PY	1993	Town Car	08/05/92	08/08/92	08/01/98	VOQ	Unknown	Fire	Engine.
11	[redacted]	[redacted]	Unknown	NA	NA	Unknown	1LNLM82W3NY	1992	Town Car	06/15/92	07/28/92	01/01/98	VOQ	Unknown	Fire	Engine compartment.
14	[redacted]	[redacted]	Unknown	NA	NA	Unknown	1LNLM81W7NY	1992	Town Car	04/24/92	05/13/92	05/01/98	VOQ	Unknown	Fire	Left front fender area.
14	[redacted]	[redacted]	Unknown	TX	NA	Unknown	1LNLM82W3NY	1992	Town Car	11/21/91	03/03/92	05/01/98	VOQ	Unknown	Fire	Engine compartment.
14	[redacted]	[redacted]	Unknown	FL	NA	Unknown	1LNLM82W2NY	1992	Town Car	04/09/92	03/27/92	10/01/98	VOQ	Unknown	Fire	Engine compartment.
14	[redacted]	[redacted]	Unknown	NA	NA	Unknown	2MSCLT8BA4NC	1992	Grand	08/27/91	09/16/91	08/01/98	VOQ	Unknown	Fire	Brake booster.

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1992-93 LINCOLN TOWN CAR
UNDERHOOD FIRES

PE96-055

NO.	OWNER NAME	ADDRESS	CITY	STATE	ZIP CODE	TELEPHONE NUMBER	VIN	MODEL YEAR	MODEL	BUILD DATE	SALE DATE	REPORT DATE	REPORT TYPE	MILEAGE	ISSUE REPORTED	POSSIBLE PROBLEM DESCRIPTION
105	Unknown	Unknown	Unknown	FL	NA	Unknown	2LNBCM74WB[redacted]	1992	Gr Marq	03/03/92	06/22/92	09/01/99	VOQ	Unknown	Fire	Under hood.
106	Unknown	Unknown	Unknown	FL	NA	Unknown	1LNLM82W0YY[redacted]	1992	Town Car	05/04/92	10/20/92	09/01/99	VOQ	Unknown	Fire	Engine compartment.
107	Unknown	Unknown	Unknown	FL	NA	Unknown	1LNLM82W9NY[redacted]	1992	Town Car	04/28/92	05/12/92	07/01/97	VOQ	Unknown	Fire	Engine compartment.
108	Unknown	Unknown	Unknown	FL	NA	Unknown	1LNLM81W4NY[redacted]	1992	Town Car	03/20/92	04/16/92	12/01/97	VOQ	Unknown	Fire	Left edge of hood and fender
109	Unknown	Unknown	Unknown	NC	NA	Unknown	1LNLM82W6NY[redacted]	1992	Town Car	05/04/92	09/26/92	09/01/99	VOQ	Unknown	Fire	Under hood.
110	Unknown	Unknown	Unknown	FL	NA	Unknown	1LNLM81W6NY[redacted]	1992	Town Car	08/10/92	01/02/92	11/01/99	VOQ	Unknown	Fire	Under hood.
111	Unknown	Unknown	Unknown	FL	NA	Unknown	1LNLM81W9NY[redacted]	1992	Town Car	04/15/92	04/28/92	09/01/99	VOQ	Unknown	Fire	Under hood.

3713 7758

'92-'93 TC SUMMARIES BY FRIDAY-NOON draft

1992/93 Lincoln Town Car Parts Lists - NHTSA Inquiry PE98-055

To Concrn: _____ Alert: _____ |Func|Release

Sel C/F Part========== Acty CPSC== Seq Release========IS CIIS Date====

AVT LEADING ELECTRICAL
80 spd cbl wintel claims

Brake Booster/Master Cylinder Assy -

X _ F F1VC 2B195 AE XC00 060701 000 XC00E10391082000IR P IR 94/03/29
<BSTR.&.MSTR.CYL.ASY.BRK....> <.....>
- CR Description: notice issued to identify Mexican grand marquis chassis parts as balance out, since NAAO is responsible for this vehicle for the 1995 model year.

78 thermal

O _ F F1VC 2B195 BA NC00 060701 000 NC00E10041053000IR P IR 89/11/11
<BSTR.&.MSTR.CYL.ASY.BRK....> <.....>
- CR Description: release 200 tandem booster with passenger compartment a/c intake (pcai).

Part Name & Number
Description of change

_ F F1VC 2B195 B2 NC00 060701 000 NC00E10010977026IR P IR 89/05/22
<BSTR.&.MSTR.CYL.ASY.BRK....> <.....>
- CR Description: Initial release-abs booster & master cylinder

_ F F1VC 2B195 B2 NC00 060701 001 NC00E00444499092IR P IR 89/09/22
<BSTR.&.MSTR.CYL.ASY.BRK....> <.....>
- CR Description: Usage Change

O _ F F1VC 2B195 CA NC00 060701 000 NC00E10048319001IR P IR 90/02/14
<BSTR.&.MSTR.CYL.ASY.BRK....> <.....>
- CR Description: Release a booster and master cyl ass'y for abs vehicles with a bracket for attaching the 42 pin electrical connector Pin. This change was requested by b & a to eliminate one in plant part and save the labor for assemblying the bracket to the Booster. Release the bracket for service.

X _ F F1VC 2B195 CB NC00 060701 000 NC00E10057809001IR P IR 90/03/28
<BSTR.&.MSTR.CYL.ASY.BRK....> <.....>
- CR Description: Revise The Hole Pattern In Bracket F1vc-14536-Ba To Be - Compatible With Wiring Connector Changes. Revise The Abs Booster & Master Cylinder Assy. F1vc-2b195-Cb To Show The New Bracket. Revise The Bracket Attaching Point So That It Is Secured Under The Inboard Master Cylinder Attachment Nut

X _ F F1VC 2B195 CC NC00 060701 000 NC00E10070190000IR P IR 90/06/04
<BSTR.&.MSTR.CYL.ASY.BRK....> <.....>
- CR Description: Complaints of vehicle pull while braking exist for town car, en53, taurus/sable and continental. This is due to a master cylinder induced pressure differential in the two circuits of the brake system. This pressure difference can be be made nearly zero by using a "linked pistons" master cylinder design. This change is only applicable to cars with abs and is a $1.08 piece cost increase. This change will reduce town car and en53 warranty by 4c/1000 ($1.05/veh) and continental by 8c/1000 ($1.23/veh). Taurus/sable (12% abs) warranty will not be measureably affected. Release the following booster and master cylinder assys. Which all use the same master cylinder f1vc-2a032-aa. Town car and en53 use f1vc-2b195-cd, taurus/sable and continental use f1dc-2b195-ab, taurus also uses f1dc-2b195- bb.

X _ F F1VC 2B195 CD NC00 060701 000 NC00E10092919000IR P IR 90/10/03
<BSTR.&.MSTR.CYL.ASY.BRK....> <.....>
- CR Description: The low pressure brake fluid hose connecting the antilock brake master cylinder reservoir to the hydraulic control unit reservoir is too long. The routing of the hose will be improved by reducing the length from 500+/-5 to 475+/-5.

O _ F F1VC 2B195 CB NC00 060701 000 NC00E10084269000IR P IR 90/10/24
<BSTR.&.MSTR.CYL.ASY.BRK....> <.....>
- CR Description: modify connector terminals on brake fluid resivor cap. The modifications are reduce the gage thickness and increase The lead-in chamfer of the subject terminals. Pinvss not affected. The part which is being modified is a common part used on Both the dn-5 and fn-9 carlines also. There are no problems in changing these carlines as well. They get the improved Connector free.

X _ F F1VC 2B195 CF NC00 060701 000 NC00E10104848000IR P IR 90/11/28
<BSTR.&.MSTR.CYL.ASY.BRK....> <.....>
- CR Description: In ABS brake booster and master cylinder assembly, revise low pressure hose stowage position for shipping. Also delete the shipping cap from the check valve located in the booster to ease assembly operation and reduce cost. FMVSS is not affected.

To Concern: _____ Alert: _____ FunctRelease
Sel C/F Part==========Acty CPSC== Seq Release==========S CIS Date==

_ F F1VC 2B195 CG NC00 060701 000 NC00E10300678000IR P IR 93/05/20
<BSTR.&.MSTR.CYL.ASY.BRK....> <.....>
- CR Description: incorporate new bracket (f3ac 14536 aa) into booster master cylinder.

_ F F1VC 2B195 DA NC00 060701 000 NC00E10070190000IR P IR 90/06/04
<BSTR.&.MSTR.CYL.ASY-BRK....> <.....>
- CR Description: Complaints of vehicle pull while braking exist for town car, en53, taurus/sable and continental. This is due to a master cylinder induced pressure differential in the two circuits of the brake system. This pressure difference can be be made nearly zero by using a "linked piston" master cylinder design. This change is only applicable to cars with abs and is a $1.08 piece cost increase. This change will reduce town car and en53 warranty by 4r/1000 ($1.05/veh) and continental by 8r/1000 ($1.23/veh). Taurus/sable (12% abs) warranty will not be measurably affected. Release the following booster and master cylinder assys. Which all use the same master cylinder f1vc-2a032-aa. Town car and en53 use f1vc-2b195-cd, taurus/sable and continental use f1dc-2b195-ah, taurus sho uses f1dc-2b195- bb.

_ F F1VC 2B195 DB NC00 060701 000 NC00E10084269000IR P IR 90/10/24
<BSTR.&.MSTR.CYL.ASY-BRK....> <.....>
- CR Description: modify connector terminals on brake fluid resivor cap. The modifications are reduce the gage thickness and increase The lead-in chamfer of the subject terminals. Fmvss not affected. The part which is being modified is a common part used on Both the dn-5 and fn-9 carlines also. There are no problems in changing these carlines as well. They get the improved Connector free.

_ F F1VC 2B195 DC NC00 060701 000 NC00E10104848000IR P IR 90/11/28
<BSTR.&.MSTR.CYL.ASY-BRK....> <.....>
- CR Description: In ABS brake booster and master cylinder assembly, revise low pressure hose stowage position for shipping. Also delete the shipping cap from the check valve located in the booster to ease assembly operation and reduce cost. FMVSS is not affected.

_ F F1VC 2B195 DD NC00 060701 000 NC00E10079779020IR P IR 92/08/27
<BSTR.&.MSTR.CYL.ASY-BRK....> <.....>
- CR Description: 1992 April record change for brakes. 1. Es-f3lc-2b109-aa -- completed es-brake tube - initially released incomplete. 2. F3ac-90433-ab -- tolerances revised as manufactured,i.e. +/- 0.05 to +/- 0.5; i.d. 0.05 to +/- 0.12. 3. Remove item #3,revisions done on other notice 4. F1vc-2b195-cg/f1vc-2b195-dd/f1vc-2a032-aa/f3dc-2a032-aa: release supplier drawing showing master cylinder reduction-control valve. 5. F0ac-2780-ba -- revised drawing reflecting change in main rivet on parking brake control assembly. 6. F3ac-2c026-aa -- replace rear rotor file drawing with update (no change). 7. F3lc-2c287-cb -- brake fluid tube assembly - incorrect flare is shown at pt e20. Revise drawing to show no flare for pt e20. 8. Remove items #8 & #9. These revisions were completed on other notice. 9. 10. F3dc-2c334-aa & f3lc-2c333-aa -- change ecu mounting torque from 7 - 9 nm to 2.5 +/- 0.4 nm. 11. F3lc-2c296-be & f3lc-2c296-ae -- add 3.6mm dimension to last change: anti-rotation clip & revise wrench block stud hole hex dimensions to prevent plastic build up in stud threads. 12. F3ac-2c026-ab -- change in location of the part number stamp. 13. F3dc-2c299-ab & f3dc-2b664-ab -- added specification for vibration and a not specifying that certain dimensions are before coating.

_ C F1VC 2005 AA NC00 060701 000 NC00E10042672000IR P IR 89/11/17
<BSTR.ASY-BRK.....> <.....>
- CR Description: Revise booster check valve location from the 2:00 position to the 11:00 position. New part number for the booster and master cylinder assy. Will be f1vc-2b195-ab and the booster alone will be f1vc-2005-ab. These parts will also be used on en53 non-abs cars. Tooling cost is $1700, piece cost change is zero and there is no affect on r/1000-dr tgw/1000. Parts will be available for en53 vp build in jan. 1990. does not affect compliance with regulations --brake dept.--

_ C F1VC 2005 AB NC00 060701 000 NC00I10107234042IR P IR 93/05/20
<BSTR.ASY-BRK.....> <.....>
- CR Description: Initial release of brk rotors,shield & calipers

_ C F1VC 2005 AC NC00 060701 000 NC00E10079779040IR P IR 94/01/03
<BSTR.ASY-BRK.....> <NON.ABS.....>
- CR Description: Initial release of brk rotors,shield & calipers. 1. Ilf4zc-060600-04; add unique torque for cobra frt brk hs 2. F3dc-2c189-ac; add supplier info 3. Bl6dc-9a474-ba; redraw 4. F5oc-2078/2b557-ab; redraw 5. F6zc-2530/2531-ab; drawing revision 6. F4ac-2005-ac; drawing revisions 7. F4dc-2c204-bb; redraw to ford level of release 8. F0oc-2c205-ab:f3lc-2c190-ac:f4lc-2c190-aa revise to facilitate manufacturing 9. F4ac-1125-aa; drawing revision 10. F2ac-2005/2b195-ba:f1vc-2005-ac; redraw,revise labels 11. F1sc-1107-aa; show optional design 12. F4zc-2267/2268-ac:f4zc-2267/2268-bb; add wax to tube nut 13. F6zc-2c360-aa; revise drwg to facilitate manufacturing

_ C F1VC 2005 BA NC00 060701 001 NC00E10640585005IR P IR 98/09/03
- CR Description: Blanket concern to support wers clean-up actions.

To Concrn: _____ Alert: _____ |FuncRelease
Sel C/F Part=========== Acty CPSC= Seq Release=========IS CIS Date=====_
_ F F0VC 2005 AA NC00 060701 000 NC00E10032035000|R S IR 89/09/08
<BSTR.ASY-BRK.....> <SERVICE.ONLY.....>
- CR Description: Release booster & master ass'y using teves grease spec. # 446 06 au x 10636. Booster & master cyl. Ass'ys built with new grease to be identified with blue daub of paint in the 12:00 position on the booster front shell. For a min.of 60 days from start of production. Isr requirement-- material test of new grease only.

Master Cyclinder & Pressure Control Valve Assy -
_ C F1VC 2C156 AA NC00 060701 000 NC00E10348036000|R P IR 93/11/18
<CYL.&.PRESS.CONTR.VLV.ASY-BR> <NON.ABS:.....>
- CR Description: replace the f3ac-2b195-bb booster master cylinder assy with the f3ac-2b195-ba starting job #1 94. ending with job #1 95 also replace the f3ac-2a040-ba tube with f3ac-2a040-aa for job #1 94 ending with job #1 95. This will be the same as the 93 model year booster, master cylinder, brake tubes.

TUBE.ASY-FUEL.RETURN.&.BRAKE
_ F F1VC 9L291 AA NC00 100103 000 NC00E10019802001|R P IR 89/06/26
<TUBE.ASY-FUEL.RETURN.&.BRAKE> <.....>
- CR Description: the fuel and brake line bundles must be revised to accommodate the new rear brake tube (-2267-). The action required includes revising the rear end of the vapor tube 1/2 inch and shortening the inboard brake tube. Sys gen components removed..... 10/25/89 sys gen components removed..... 01/04/90

_ F F1VC 9L291 AB NC00 100103 000 NC00E10027703000|R P IR 89/09/06
<TUBE.ASY-FUEL.RETURN.&.BRAKE> <.....>
- CR Description: Hole location for the rear fuel line clip in the kick-up area is not feasible for the frame processing. Revise the design of the subject clip and relocate the frame hole location as required. The new location of the fuel line hole is as follows: x - 4382.0 y - z - 630.0 sys gen components removed..... 12/15/89 sys gen components removed..... 01/04/90 sys gen components removed..... 01/26/90

_ F F1VC 9L291 AC NC00 100103 000 NC00E10037380000|R P IR 89/11/27
<TUBE.ASY-FUEL.RETURN.&.BRAKE> <.....>
- CR Description: (1) the fuel line bundle clip in the rear kick-up area can contact the vehicle body on the 1991 fn-36 due to minimal clearance to the body flange. The subject hole should be moved to 4432.0 - x; 690.0 - z from 4382.5 - x; 630.0 - z on the f1vc-5085-dj frame assy. (2) add an additional nylon clip to the fuel line bundle (-91291-) in order to hold the lines clear during body decking. A new hole is required at 4895.0 - x and 548.0 - z. Sys gen components removed..... 90/03/30 sys gen components removed..... 90/05/15 (3) revise the rear routing of the fuel bundle to provide adequate clearance to the body and the fuel tank flange. (4) shorten the steel braided teflon tubing on supply and return lines by 20 mm. (5) revise routing to provide clearance to the (a) seat belt bolt, (b) rear engine mount, (c) front and rear torque box. (6) revise the -9s294- fuel vapor crossover & front brake tube to avoid contact with the knee brace (ref. Concern # c10023180). (7) design and release a new fuel vapor c/o and front brake bundle (-9s294) for the the non- abs 1991 fn-36. (8) release the f0vc-5a897-ab air line in the -91291- fuel line bundle. Sys gen components removed..... 90/05/17

_ F F1VC 9L291 AD NC00 100103 000 NC00E10048573000|R P IR 90/01/30
<TUBE.ASY-FUEL.RETURN.&.BRAKE> <.....>
- CR Description: Last Change: The following action is required for the -91291- and -9s294- fuel bundles to resolve clearance issues: 1. Revise fuel (ret & supp. -91291-) line and brake line routing in order to : a) improve clearance along center rail, torque box, and rear suspension (abs and non-abs). B) provide an adequate clearance window between the fuel lines and brake lines for installation of the shift cable and bracket assembly (abs and non-abs). C) eliminate contact and inadequate clearance between the brake lines from the master cylinder and the fuel lines (non-abs only). 2. Revise the -9s294 crossover vapor line routing to eliminate contact to the shift cable frame attachment clip (abs and non-abs). Sys gen components removed..... 90/07/10 also, to facilitate b&a assembly process, change the rear hole of the fuel filter bracket (-9b072-) to a slot at a $3200 tooling cost and no piece cost increase. Sys gen components removed..... 90/08/21 the clip f0vc-9a317-aa has been carried over and released for all 1991 fn-36 vehicles. The clip is no longer necessary for 1991 and should be deleted for a $.26 piece cost and b&a labor save on two clips per vehicle.

_ F F1VC 9L291 AE NC00 100103 000 NC00E10048573002|R P IR 90/02/21
<TUBE.ASY-FUEL.RETURN.&.BRAKE> <.....>
- CR Description: the -91291- and -9s294- fuel bundles released with the previous notice supplement #e10048573-000) were reviewed on an updated vehicle by fuel system engineering and it was discovered that additional clearance issues must be resolved. Therefore the follwing action is required: revise -91291- and -9s294- abs and non-abs fuel bundles to provide adequate clearance to rear seat belt bracket, the floor pan, center rail, and the rear frame. The 20k in tooling is for the addition of a new flat clip for the -91291- buttdle. Sys gen components removed..... 90/07/10 sys gen components removed..... 90/08/21.

To Concern: _____ Alert: _____ |Func|Release
Sel C/F Part========== Acty CPSC== Seq Release========IS CIS Date====

_ F F1VC 9L291 AF NC00 100103 000 NC00E100485730071R P IR 90/03/20
<TUBE.ASY-FUEL.RETURN.&.BRAKE> <.....>

- CR Description: The following action is required for the -91291- air line assembly. f1vc-5a897-aa will replace f0vc-5a897-ab which is pin to the fuel/brake tube bundle -91291-. This change will result in a $ 0.30 per piece cost increase and a tooling charge of $ 13,000.00 . This change is a result of the new lh fender apron requiring rerouting of the air suspension air line along the frame rail requiring the following changes: * add 76 mm's of air line tubing. * add 100 mm's of cvt protection tubing under the brake distribution valve, located on the lh frame side rail * add (1) f0vc-9279-aa clip and reposition two existing clips to accomidate new retention along the frame rail. Sys gen components removed..... 90/08/21 notice resolution * release new air line routing along lh frame rail and revise retention of the all line assembly. * delete air line assembly f0vc-5a897-ab from -91291- * add new air line assembly f1vc-5a897-aa to -91291- * -91291- becomes f1vc-91291-ag

_ F F1VC 9L291 AG NC00 100103 000 NC00E100669760001R P IR 90/03/30
<TUBE.ASY-FUEL.RETURN.&.BRAKE> <.....>

- CR Description: Re-routing of the fn-36 -91291- fuel/brake bundle will be accomplished as a cx change. The marked up parts list and prints show the changes; which are as follows: 1) f1vc-91291-ah will replace f1vc-91291-ag ; which involves re-routing of the fuel and brake lines to provide improved clearance to the steering shaft coupling. 2) deletion of one of the f1vc-9f276-ca. Note: one of the f1vc-9f276-ca is still required pin to the fuel/brake bundle at the rear. 3) a new metal clip is to be added pin to the -91291 toward the front of the bundle to electrically ground and provide support to the fuel supply and return lines. A m8 bolt will be used to secure the clip.

_ F F1VC 9L291 AH NC00 100103 000 NC00E100669760001R P IR 90/04/10
<TUBE.ASY-FUEL.RETURN.&.BRAKE> <.....>

- CR Description: 1991 fn-36 phase ii functional build revelled the following concerns with the fuel/brake bundle and the crossover tubes: sys gen components removed..... 90/08/21 -91291- fuel/ brake bundle 1) vapor tube/hose connection assembly problem. 2) clip location problem (bundy quality problem) 3) air line location problem (bundy qlty prblm) 4) air line clip insertion problem (bundy design) -9a294- vapor/brake crossover assy 1) vapor tube interfers with brake line connection on abs equiped car. 2) vapor tube to shifter cable clip close (3.2mm as designed). 3) frame change necessitates line change at clip b 4) push pin difficult to install corrective action on the afore mentioned concerns will be: -91291- * cx change to produce a f1vc-91291-aj bundle to replace the f1vc-91291-ah bundle. This bundle will have a rerouted fuel vapor tube and the details will call out the location of bundle straps to ensure air line location. * Bundy has been informed of the clip location quality problem. * bundy has been informed of the air line insertion concern and has been given direction to modify the clip design to produce similar insertion loads for the 91 fn36 and en53 clips as on current fn36. -9a294- cx change to produce a f1vc-9a294-af and a f1vc-9a294-bd in place of the current f1vc-9a294-ae and f1vc-9a294-bc. The following actions are needed on the new assembly: * reroute vapor tube to provide improved access to the abs brake line connection (-91291- to -9a294-) * reroute vapor and brake tubes to accomidate frame change. * investigate vapor tube to shifter cable clip clearance; a shorter vapor hose used to connect the -91291- to the -9a294- appears to be needed to avoid having the vapor hose from pushing the tubes into the shifter clip clearance zone. * release push pin 388577-s in place of the currently released push pin n805635-s to attach the center of the -9a294- to the #2 crossmember.

_ F F1VC 9L291 AJ NC00 100103 000 NC00E100698820001R P IR 90/04/23
<TUBE.ASY-FUEL.RETURN.&.BRAKE> <.....>

- CR Description: Add single tube airline clip, f0vc-9279-an, to suspension airline assy at 605 mm from end of airline. Move existing clip from 400 mm to 365 mm, from end of airline. 91 fn36 frame drawing to be revised to represent current frame production, including 7.0-7.25 mm dia. Hole which is on the top of the forward lh rail aft of the abs hydraulic unit. Revision to be accompolished on latest chassis monthly record change. Sys gen components removed..... 90/08/21

_ F F1VC 9L291 AK NC00 100103 000 NC00E100805560001R P IR 90/07/03
<TUBE.ASY-FUEL.RETURN.&.BRAKE> <.....>

- CR Description: 1991 fn-36 town car : -91291- fuel/brake bundle revisions concerns raised on the 5p2 build resulted in the following changes to the -91291- for job #1: 1) redesign of the fuel supply and return line routing at #4 crossmember to improve clearance to the shock absorber mounting washer. 2) redesign of the feul supply, return, and vapor line routing at the firewall to provide improved clearance to the body. 3) addition of a tube retaining clip to the fuel supply and return lines near the fuel rail to prevent possible nvh concern. 4) adjustment of the number and placement of tie straps for the air suspension air line to insure proper routing and prevent pinching of the air line on frame,body,or tubes.

_ F F1VC 9L291 AL NC00 100103 000 NC00E100805560001R P IR 90/07/03
<TUBE.ASY-FUEL.RETURN.&.BRAKE> <.....>

- CR Description: 1991 fn-36 town car : -91291- fuel/brake bundle revisions concerns raised on the 5p2 build resulted in the following changes to the -91291- for job #1: 1) redesign of the fuel supply and return line routing at #4 crossmember to improve clearance to the shock absorber mounting washer. 2) redesign of the feul supply, return, and vapor line routing at the firewall to provide improved clearance to the body. 3) addition of a tube retaining clip to the fuel supply and return lines near the fuel rail to prevent possible nvh concern. 4) adjustment of the number and placement of tie straps for the air suspension air line to insure proper routing and prevent pinching of the air line on frame,body,or tubes.

To Concern: _____ Alert: _____ |Funct|Release
Sel C/F Part========== Actv CPSC== Seq Release========S CIS Date====
_ F F1VC 9L291 AM NC00 100103 000 NC00E10086498000|R P |R 90/08/02
<TUBE.ASY-FUEL.RETURN.&.BRAKE> <.....>

- CR Description: revise fuel/brake bundle (91291) as follows: 1) replace air suspension air line f1vc-5a897-ab with f1vc-5a897-ac. The new air line changes the location of retaining clips and installation tape marks. 2) revise bundle straping of air line (5a897) to fuel/brake bundle (91291) by adding bundle strap and modifing the location of existing bundle straps. 3) revise fuel/brake bundle drawing to show air line routing around filter area and provide sections and notes as to specific strapping of air line to bundle. 4) revise location of fuel line clip on #4 crossmember in the p2-f1vc-91291-al. 5) add engineering spec delta en-f1ac-9327-aa to complete drawing.

_ F F1VC 9L291 AN NC00 100103 000 NC00E10086523000|R P |R 90/08/10
<TUBE.ASY-FUEL.RETURN.&.BRAKE> <.....>
- CR Description: the following action necessary to correct air susp air line to frame noise: for fn36: air line assembly f1vc-5a897-ad will replace f1vc-5a897-ac which is pla to fuel/brake tube bundle -91291- for en53: end item air line assembly f2ac-5a897-ab will replace f2ac-5a897-aa. This change is a result of rerouting the suspension air line and revising its retention along lh side of the #4 c/member requiring the following changes: delete tape wrap above "y" connector and replace with double tubing clip with optional construtions, to accommodate the new retention along the #4 c/member. B & a processing: fn36 & en53. Revise process sheets to ref reflect new air line routing and retention along the lh side of the #4 c/member. Fuel/brake bundle: delete air line asy f1vc-5a897-ac from 91291. Add new air line asy f1vc-5a897-ad to new fuel/brake bundle f1vc-91291-ac. Sys gen components removed.... 90/11/28 *** this change must be coordinated with frame change supplement.

_ F F1VC 9L291 AR NC00 100103 000 NC00E10078761000|R P |R 90/09/17
<TUBE.ASY-FUEL.RETURN.&.BRAKE> <.....>
- CR Description: increase in fuel supply and return line length at fuel sender to accomidate modified fuel sender. The increase in line length is to be achived by increasing the length of tieflex hose. Part numbers will have the suffix bumped from a? To c? And b? To d? For en-53 and a? To b? For fn-36; as follows: f2ac-91291-ca fuel/brake bundle non-abs en-53 f2ac-91291-da fuel/brake bundle abs en-53 ---- f1vc-91291-ba fuel/brake bundle fn-36 layouts and detail drawings are required.---- Note :this notice must be processed before notice nc00-e-10072777-000.

_ F F1VC 9L291 A3 NC00 100103 000 NC00|100109770191R P |R 89/05/05
<TUBE.ASY-FUEL.RETURN.&.BRAKE> <.....>
- CR Description: initial release-fuel lines & fuel filter assy sys gen components removed.... 10/25/89

_ F F1VC 9L291 BA NC00 100103 000 NC00E10091352000|R P |R 90/10/10
<TUBE.ASY-FUEL.RETURN.&.BRAKE> <.....>
- CR Description: revise air/line to add forth tape mark for installation. Revisions to drawing and layout pending new air line drawing (air line - 5a897-). Detailed drawings and layouts required. 90/09/28 drawing of air line in air suspension drafting; package issued. ********** the new -5a897- is to be added to the f1vc-91291-ba (not bb) and the suffix should be bumped to ca (ie f1vc-91291-ca is a f1vc-91291-ca).sys gen components removed.... 91/01/29

_ F F1VC 9L291 CA NC00 100103 000 NC00E10095356000|R P |R 90/10/19
<TUBE.ASY-FUEL.RETURN.&.BRAKE> <.....>
- CR Description: vehicle tryouts with a 4 inch protective sleeve added to the inboard air line routed along the #4 crossmember , proved positive in that the squeak noise previously heard on 4-p vehicles was eliminated. This tryout accepted as resolution from r. Ferguson wixom q-press sq/rd. Sys gen components removed.... 91/03/07 approval is requested to incorporate the following part changes. 1991 fn36 - delete air line assembly f1vc-5a897-ae and advance/release the new part number. - fuel/brake bundle: delete air line assembly f1vc-5a897-ae from -91291- bundle assembly. Add new air line assembly to -91291- assembly. - air line piece cost $ 0.06 tooling $ 3600.00 1992 en53 - delete end item air line assembly f2ac-5a897-ab and advance/release the new part number. - air line piece cost $ 0.06 tooling $ 3600.00 timing to incorporate running change at wixom is projected to be week of 901105. Fn36/en53 service not affected. Use/exhaust existing stock.

_ F F1VC 9L291 CB NC00 100103 000 NC00E10102784000|R P |R 90/11/16
<TUBE.ASY-FUEL.RETURN.&.BRAKE> <.....>
- CR Description: revise -91291- as follows: for cr c10102784: add a nylon 12 sleeve to the fuel return line between bends fr10 and fr11; the slit in the sleeve is to POINT upward. (5x tooling ; $0.40 piece cost c10102784) the above occurs on fn-36 and en-53 for cr c10100320: add a bundle strap to the brake lines, fuel vapor, and fuel supply lines. (0 tooling ; $0.10 piece cost c10100320) the above occurs on en-53 only.

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_ F F1VC 9L291 CC NC00 100103 000 NC00E10122260000R P IR 91/01/16
<TUBE.ASY-FUEL.RETURN.&.BRAKE> <.....>

- CR Description: add the previously deleted rubber protective cover on the fuel lines at the fire wall. This cover consists of 4 inch slit rubber hose secured with two tie straps. The slit is to point to the side of the vehicle as installed. The rubber cover is to extend approx. 0.5 inches below bend number fs frt 5 & fr5 and 3.5 inches above these bends. Note: hose used for cover to be hypalon hose ese-m2d158-a (same covering used on tite-flex tube at fuel sender)

_ F F1VC 9L291 CD NC00 100103 000 NC00E10124098000R P IR 91/03/20
<TUBE.ASY-FUEL.RETURN.&.BRAKE> <.....>

- CR Description: add a rubber isolator sleeve to the fuel lines at the #4 crossmember and the body reinforcement. The sleeve is to be a slit rubber hose tie straped to the fuel lines. ***** cx drawings released for ********** the following fuel/brake bundles are affected: 1991 fn-36 F1vc-9f291-cd to become f1vc-9f291-ce 1992 en-53 f2ac-9f291-ce to become f2ac-9f291-cf f2ac-9f291-dd to become f2ac-9f291-de

_ F F1VC 9L291 CE NC00 100103 000 NC00E10124098002R P IR 91/05/31
<TUBE.ASY-FUEL.RETURN.&.BRAKE> <.....>

- CR Description: revise the "I" shaped clip to lower the fuel lines by 5.76 mm. Initial drawing has been completed by wright plastics. *** the "I" shaped clip is to be added to details without modifying the line location; however the layout should reflect the line movement caused by the clip and line location (see pco for direction) 91-05-20 **** bundy tubing was kicked off on clip 91-05-13 wixom tryout has shown the "I" shaped clip should be implimented as soon as feasible (manufacturing date of 91-07-29 has been give by the supplier for the clip completion) this notice must follow the cx notice for en-53nc00-e-10139122 cx'ed 91-05-21. **** the parts effected are as follows: fn-36 1991 and 1992 with current fuel rail: f1vc-9f291-ce will advance to f1vc-9f291-cf fn-36 1992 with new fuel rail due fall 91: F2vc-9f291-aa will advance to f2vc-9f291-ab *********This notice is to follow nc00-e-10139122-000.

_ F F1VC 9L291 CF NC00 100103 000 NC00E10128004005R P IR 91/07/26
<TUBE.ASY-FUEL.RETURN.&.BRAKE> <.....>

- CR Description: replace screw n800369-s56 with screw n610957-s56. Screw attaches clip-fuel line & brake (9f276) to valve asy-brake brake press control (2b091). Torque on the joint is to be 6.8-9.2 nm.

_ F F2VC 9L291 AA NC00 100103 000 NC00E10124098002R P IR 91/05/31
<TUBE.ASY-FUEL.RETURN.&.BRAKE> <.....>

- CR Description: CR Description: revise the "I" shaped clip to lower the fuel lines by 5.76 mm. Initial drawing has been completed by wright plastics. *** the "I" shaped clip is to be added to details without modifying the line location; however the layout should reflect the line movement caused by the clip and line location (see pco for direction) 91-05-20 **** bundy tubing was kicked off on clip 91-05-13 wixom tryout has shown the "I" shaped clip should be implimented as soon as feasible (manufacturing date of 91-07-29 has been give by the supplier for the clip completion) this notice must follow the cx notice for en-53nc00-e-10139122 cx'ed 91-05-21. **** the parts effected are as follows: fn-36 1991 and 1992 with current fuel rail: f1vc-9f291-ce will advance to f1vc-9f291-cf fn-36 1992 with new fuel rail due fall 91: F2vc-9f291-aa will advance to f2vc-9f291-ab *********This notice is to follow nc00-e-10139122-000.

F F2VC 9L291 AB NC00 100103 000 NC00E10128004000R P IR 91/07/15
<TUBE.ASY-FUEL.RETURN.&.BRAKE> <.....>

- CR Description: release a rnodified brake prop valve bracket and a clip pin to the fuel tubes. The clip attaches to the bracket with a m-6 self tapping bolt. The clip and bracket are to prevent bending of the fuel lines during assembly. ****91-06-25 reviewed bracket with brake valve supplier; they are working on both a temporary and permanent change. * 91-06-26 reviewed clip with fuel line supplier. Bundy is proceeding with tooling for the clip. Clip to be pin to fuel lines. Assembly drawings will be cx'ed asap.

_ F F2VC 9L291 AC NC00 100103 000 NC00E10165200000R P IR 91/11/16
<TUBE.ASY-FUEL.RETURN.&.BRAKE> <.....>

- CR Description: delete f1vc-9f276-ba and (1) n802191-s56 due to f2ac-9f276-aa acting as a ground for the fuel portion of the -9f291- bundle. F1vc-9f276-ba was incorporated to create a ground for the to fuel lines.

_ F F2VC 9L291 AD NC00 100103 000 NC00E10180678000R P IR 92/01/09
<TUBE.ASY-FUEL.RETURN.&.BRAKE> <.....>

- CR Description: incorporate the following design changes to improve air line retention to the # 4 crossmember.- Revise double clip above "y" to insure positive retention - add protective tubing to the air line loop above "y" conn fn36 air line: delete f1vc-5a897-af add f2vc-5a897-aa en53 air line: delete f2ac-5a897-ac add f2ac-5a897-ad clip-double tube: delete f0vc-9279-ba add f2ac-9279-aa ** fuel portion: 920106 For 1992 - replace f1vc-5a897-af with f2vc-5a897-aa in the f2vc-9f291-ad (fuel return and brake line bundle) For 1993 - replace f1vc-5a897-af with f2vc-5a897-aa in f3vc-9f291-ab (fuel return and brake line bundle

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_ F F2VC 9L291 AE NC00 100103 000 NC00E10180678001IR P IR 92/01/21
<TUBE.ASY-FUEL.RETURN.&.BRAKE> <.....>
- CR Description: this notice is to support a10180678 (add sheathing or convoluting to the airline (f1vc 5a97 af) just above the y connector for protection. Airline is pin to fuel & brake line bundle (91291). Also, revise clips on #4 cross member to provide better retention. The part number on the first line should be (f1vc 5a897 not (f1vc 5a97 af).

_ F F3VC 9L291 AA NC00 100103 000 NC00E10165200000IR P IR 91/11/16
<TUBE.ASY-FUEL.RETURN.&.BRAKE> <.....>
- CR Description: delete f1vc-9f276-ha and (1) a802191-s56 dac to f2ac-9f276-aa acting as a ground for the fuel portion of the -91291- bundle. F1vc-9f276-ha was incorporated to create a ground for the to fuel lines.

_ F F3VC 9L291 AB NC00 100103 000 NC00E10180678000IR P IR 92/01/09
<TUBE.ASY-FUEL.RETURN.&.BRAKE> <.....>
- CR Description: Incorporate the following design changes to improve air line retention to the # 4 crossmember. - revise double clip above "y" to insure positive retention - add protective tubing to the air line loop above "y" conn fn36 air line; delete f1vc-5a897-af add f2vc-5a897-aa en53 air line: delete f2ac-5a897-ac add f2ac-5a897-ad clip-double tube: delete fovc-9279-ba add f2ac-9279-aa **** for 1992 - replace f1vc-5a897-af with f2vc-5a897-aa in the f2vc-91291-ad (fuel return and brake line bundle)for 1993 - replace f1vc-5a897-af with f2vc-5a897-ac in f3vc-91291-ab (fuel return and brake line bundle

_ F F3VC 9L291 AC NC00 100103 000 NC00E10236663000IR P IR 92/09/04
<TUBE.ASY-FUEL.RETURN.&.BRAKE> <.....>
- CR Description: $$$$ must be coordinated with nc00 e 10221001 002, replaces part released by nc00 e 10221001 003 $$$$ - to reduce likelyhood of misbuilds, release new adaptor block which has two m12 outlet ports instead of one m10 and one m12. Additionally, release new fuel-brake line bundle for non-limo which has two m12 tube nuts to mate to adaptor (f3vc-91291-be). - change to adaptor block (f3vc-2c320-ba) is a no cost change. Change to fuel-brake line bundle (f3vc-91291-ba) costs are: piece cost $0.01; tooling cost $10,000. - current brake-fuel line bundle (f3vc-91291-ac) will continue to be used on the limo. The current prop valve (2b091) will continue to be used on the en53.

_ F F3VC 9L291 BA NC00 100103 000 NC00E10236663000IR P IR 92/09/04
<TUBE.ASY-FUEL.&.BRAKE.(LH)..> <.....>
- CR Description: $$$$ must be coordinated with nc00 e 10221001 002, replaces part released by nc00 e 10221001 003 $$$$ - to reduce likelyhood of misbuilds, release new adaptor block which has two m12 outlet ports instead of one m10 and one m12. Additionally, release new fuel-brake line bundle for non-limo which has two m12 tube nuts to mate to adaptor (f3vc-91291-be). - change to adaptor block (f3vc-2c320-ba) is a no cost change. Change to fuel-brake line bundle (f3vc-91291-ba) costs are: piece cost $0.01; tooling cost $10,000. - current brake-fuel line bundle (f3vc-91291-ac) will continue to be used on the limo. The current prop valve (2b091) will continue to be used on the en53.

TUBE.ASY-P/S.RETURN
C F1VC 3A563 EA NC00 110203 000 NC00E10108505001IR P IR 91/01/29
<TUBE.ASY-P/S.RETURN.....> <.....>
- CR Description: design activity: redesign p/s cooler package similar to 92 en-53 (fin pack type mounted to the lower r.h. corner of the radiator support assembly. Also, please update p/l and illustration sheets as req'd. ********** testing: new cooler passed gpm req'mts./veo 910108 (a). **********mentor: cost, weight, & timing tbd. "detail drawings req'd". **********sys gen components removed.... 91/06/26

_ C F1VC 3A563 FA NC00 110203 000 NC00E10074000000IR P IR 90/05/10
<TUBE.ASY-P/S.RETURN.....> <.....>
- CR Description: subject: 91 fn-36 4.6l efi all except trailer tow c/o into 92 en-53 all except trailer tow. Break down: job #1 req'mt. - express chg. (cx) p/n desc action suffix comments f1cv-3a565-aa t&h asy new ah new 3a563+c/o hose f1vc-3a563-fa tube asy new fb revise/modify f1vc-3a274-ha hose c/o ha carryover component piece cost: no change weight : no change tooling : $24,800 (e) (tbd) figure could be significantly less. if tooling can be modified. Supplier : form rite

_ C F1VC 3A563 FB NC00 110203 000 NC00E10145560002IR P IR 93/07/17
<TUBE.ASY-P/S.RETURN.....> <.....>
- CR Description: revise the finish on the en114/fn116 p/s return hose assemblies and gear end of the pressure hose to aluminum rich paint over gulfan and the pump end of the pressure hose to thick wall (.042" versus current .035") tubing. ---------- development of .042" wall is still ongoing. System pressure temperature and noise effects are being studied. Steering engineering approves for use in the fn116/en114 pending that.035" wall tube remains a fall back option.

To Concrn: _____ Alert: _____ [Func[Release

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_ C F3VC 3A563 A1 NC00 110203 000 NC00E10145560002IR P IR 93/07/17
<TUBE.ASY-P/S.RETURN.....> <.....>

- CR Description: revise the finish on the en114/fn116 p/s return hose assemblies and gear end of the pressure hose to aluminum rich paint over galfan and the pump end of the pressure hose to thick wall (.042" versus current .035") tubing. ---------- development of .042" wall is still ongoing. System pressure temperature and noise effects are being studied. Steering engineering approves for use in the fn116/en114 pending that.035" wall tube remains a fall back option.

_ F F0VC 3A563 JA NC00 110203 000 NC00E10057562000IR P IR 90/06/20
<TUBE.ASY-P/S.PUMP.RETURN....> <FCN=9BVA1104025.....>

- CR Description: new p/s line package req'd for trailer tow & police vehicles In order to route around the abs anti-lock relay module and module bracket. ********** memo: 92 base vehicle is c/o 1991 fn-36. Break down: ref> d.o. Dated 891106 - see attachment p/n desc action cost / wt tooling comments f2ac-3a274-ca rtn line delete $ 0.30/.20 $ 2.200 spent f2ac-3493-a1 rtn line new $ 1.18/.50 @$ 2.500 +$ 0.88 e f2ac-3a274-da rtn line delete $ 0.19/.13 $ 1,800 spent f2ac-3493-b1 rtn line new $ 0.34/nc #@$ 1,800 +$ 0.23 e Important: tooling & pc cost $ 4,300 +$ 1.11 e # memo: phase I builds used (f1ac-3493-a1) base any @ memo: new lines/routing require shielding for protection design Activity: please design & rel.components noted above also, please update p/l & illustration sheets as required. Break down: standard parts p/n desc action comments n605917-s56 bolt info only deleted on e 10057561/rwj 97242-s101 clamp info only deleted on e 10057561/rwj e8da-8287-aa clamp info only released on e 10057561/rwj e8ta-3c510-aa clamp rel. 91 fn-36 on e 10047814/tha 95873-s101 strap rel. Positive retention 3493 ********** sys gen components removed..... 91/01/29

_ F F0VC 3A563 JA NOSE 110203 000 NOSEE10065839000IR P IR 90/04/18
<TUBE.ASY-P/S.PUMP.RETURN....> <.....>

CR Description:

_ F F1VC 3A563 A1 NC00 110203 000 NC00I10011356002IR P IR 89/06/23
<TUBE.ASSY-P/S.PUMP.RETURN...> <.....>

- CR Description: 1991 fn36-requires all new p/s hydraulic distribution system for packaging & b&a dfa reasons. The p/s pressure line contacts front end stabilizer bar. Design activity: please design and release all new p/s hydraulic distribution system to avoid contact with the front end stabilizer bar, plus accommodate b&a dfa concerns. Also, please review p/l + illustration sheets and update accordingly. See marked up copies attached. Processing activity: please update process sheets as req'd.

_ F F1VC 3A563 BA NC00 110203 000 NC00E10057561002IR P IR 90/03/28
<TUBE.ASY-P/S.PUMP.RETURN....> <.....>

- CR Description: supplement required to delete p/s return tube asy omitted on Supplement 000.

_ F F1VC 3A563 B1 NC00 110203 000 NC00I10010977020IR P IR 89/07/07
<TUBE.ASSY-P/S.PUMP.RETURN...> <.....>

- CR Description: initial release of p/s hoses, cooler & mt. Parts. Sys gen components removed..... 01/04/90 sys gen components removed..... 01/26/90 sys gen components removed..... 90/03/30

PROP Valves:

_ C F2VC 2B091 CC NC00 060202 000 NC00E10129983000IR P IR 92/04/02
<VALVE.ASY.BRK.PRESS.CONTROL> <LIMO.....>

- CR Description: adding abs to limo must be coordinated change between nb00 (body), nd0w (axle), and nc00. Chassis cannot support job #1, 1993 timing, and requests affected parts be retimed for 94p93a. This notice releases abs brakes as standard on limo & body must modify usage to include f0vb-2c309-ad, f0vb-2c312-ac, and n801164-s43 for limo application. (these parts are currently released for non-limo only). The axle asy f3vw-4001-a1 (025-d tag #) must be coordinated with abs brakes parts. Chassis fuel systems must add limo usage to f3vc-9s294-aa and delete f3vc-9s294-ba. I will include an add/delete parts list for all brake parts with the notice package. The only new brake subsystem parts are for the 11" brake asy and prop valves. All other parts are usage changes or resurrections of 1990 parts. The total chassis costs are $293 v/c and $160000 tooling to add abs to the limousine package. *** as in today's non-abs limo, two prop valves will be released the first, which will be installed by wixom will look identical to the abs valve used on the base car although it will have a different performance. It will have a black sticker to identify it from production valves. The second will GO INTO A KIT FOR USE when/if the vehicle is modified. This will continue to have a green sticker for identification. ------ fmvss should be tested. B&A, schmanski & gentikas, insist on not changing tube nut to prevent mis-build. Brakes requests b&a concurrence they will process to prevent any mis build, i.e. black sticker valve on non limo, or unstickered valve on limo.

To Concrn: _____ Alert: _____ IFunc|Release
Sel C/F Part========== Acty CPSC== Seq Release========IS Cl8 Date====

_ F F2VC 2B091 AA NC00 060605 000 NC00E10128004001R P IR 91/07/11
<VALVE.ASY.BRK.PRESS.CONTROL.> <ANTI-SPIN.BRAKES.WITH.SPEED.CONTROL.FB/PP..>
- CR Description: for fn36 and en53 - with abs; release new prop valves(2b091) with modified bracket - extended for attachment of fuel line clip. For non-abs en53, release new adapter assys (2c320) With similarly modified bracket.

New part	replaces	usage
F2ac-2b091-aa	f1vc-2b091-ad	abs w/o new speed control
F2ac-2b091-ba	f2vc-2b091-aa	abs w/ new speed control
F2ac-2c320-bb	f2ac-2c320-ba	non-abs w/o new spd cntrl
F2ac-2c320-cb	f2ac-2c320-ca	non-abs w/ new spd cntrl

- until production tooled, istred parts are available, alert a10128004 authorizes use of pm parts.
- summary

(incremental)	piece cost	tooling	weight
Non abs (with & w/o spd cntl)	$1.00	$50,000	0.20 #
Abs (with & w/o spd cntl)	$0.35	$100,000	0.16 #

_ F F2VC 2B091 A1 NC00 060605 000 NC00I10014063008IR P IR 90/05/24
<VALVE.ASY.BRK.PRESS.CONTROL.> <.....>
- CR Description: initial release fn36 frames sys gen components removed.... 10/25/89

_ F F2VC 2B091 BA NC00 060605 000 NC00E00444499336IR P IR 91/01/18
<VALVE.ASY.BRK.PRESS.CONTROL.> <.....>
- CR Description: Initial release of proportioning valve & junction block with p.l.a. speed control deactivation switch

_ F F2VC 2B091 CA NC00 060605 000 NC00E10117988001IR P IR 91/02/28
<VALVE.ASY.BRK.PRESS.CONTROL.> <LIMO.....>
- CR Description: USAGE CHANGE

_ F F2VC 2B091 CB NC00 060605 000 NC00E10128004004IR P IR 91/07/25
<VALVE.ASY.BRK.PRESS.CONTROL.> <LIMO.....>
- CR Description: f2vc-2b382-ab released in error. Delete and cancel f2vc- 2b382-ab. Non-limousine--reinstate f2vc-2b382-aa as a component of f2vc-2b091-aa and f2vc-2b091-ba. Limousine--release f2vc-2b091-cb with f2vc-2b382-ba as a component. F2vc-2b091-cb replaces f2vc-2b091-ca.

_ F F2VC 2B091 CC NC00 060605 000 NC00B10184338000IR P IR 92/02/11
<VALVE.ASY.BRK.PRESS.CONTROL.> <LIMO.....>
- CR Description: until production tooled,istr'd parts are available use pm's

_ C F3VC 2B091 BA NC00 060202 000 NC00E10129983005R P IR 92/08/21
<VALVE.ASY.BRK.PRESS.CONTROL.> <LIMO.....>
- CR Description: adding abs to limo must be coordinated change between ab00 (body), nd0w (axle), and nc00. Chassis cannot support job #1, 1993 timing, and requests affected parts be retimed for j4p93a. This notice releases abs brakes as standard on limodk body must modify usage to include f0vb-2c309-ad, f0vb-2c312-ac, and n801164-s43 for limo application. (these parts are currently released for non-limo only). The axle asy f3vw-4001-a1 (025-d tag #) must be coordinated with abs brakes parts. Chassis fuel systems must add limo usage to f3vc-9s294-aa and delete f3vc-9s294-ba. I will include an add/delete parts list for all brake parts with the notice package. The only new brake subsystem parts are for the 11"brake asy and prop valves. All other parts are usage changes or resurrections of 1990 parts. The total chassis costs are $293 v/c and $160000 tooling to add abs to the limousine package. *****as in today's non-abs limo, two prop valves will be released the first, which will be installed by wixom will look identical to the abs valve used on the base car although it will have a different Performance. It will have a black sticker to identify it from production valves. The second will go into a kit for use when/if the vehicle is modified. This will continue to have a green sticker for identification. ---- fmvss should be tested. B&n, schmanski & genikas, insist on not changing tube nut to prevent mis-build. Brakes requests b&n concurrence they will process to prevent any mis build, i.e. black sticker valve on non limo, or unstickered valve on limo, ******clarify usage and effective points for the limo w/out abs and limo w/abs in 93 on the prop valve (2b091) and the limo brk conv kits (2a201).

To Concrn: _____ Alert: _____ IFunc/Release
Sel C/F Part==========Acty CPSC== Seq Release==========IS CDS Date====

_ F F3VC 2B091 AA NC00 060605 000 NC00E10129983005IR P IR 92/08/21
<VALVE.ASY.BRK.PRESS.CONTROL.> <LIMO.....>
- CR Description: adding abs to limo must be coordinated change between nb00 (body), nd0w (axle), and nc00. Chassis cannot support job #1, 1993 timing, and requests affected parts be retimed for j4p93a. This notice releases abs brakes as standard on limo& body must modify usage to include f0vb-2c309-ad, f0vb-2c312-ac, and n801164-s43 for limo application. (these parts are currently released for non-limo only). The axle asy f3vw-4001-s1 (025-d tag #) must be coordinated with abs brakes parts. Chassis fuel systems must add limo usage to f3vc-9a294-aa and delete f3vc-9a294-ba. I will include an add/delete parts list for all brake parts with the notice package. The only new brake subsystem parts are for the 11"brake asy and prop valves. All other parts are usage changes or resurrections of 1990 parts. The total chassis costs are $293 v/e and $160000 tooling to add abs to the limousine package. ******as in today's non-abs limo, two prop valves will be released the first, which will be installed by wixom will look identical to the abs valve used on the base car although it will have a different performance. It will have a black sticker to identify it from production valves. The second will go into a kit for use when/if the vehicle is modified. This will continue to have a green sticker for identification. --- fmvss should be tested. H&a, schmanski & genikas, insist on not changing tube nut to prevent mis-build. Brakes requests h&a concurrence they wil l process to prevent any mis build, i.e. black sticker valve on non limo, or unstickered valve on limo. *******clairify usage and effective points for the limo w/out abs and limo w/abs in 93 on the prop valve (2b091) and the limo brk conv kits (2a201).

_ F F3VC 2B091 BA NC00 060605 000 NC00E00444499662IR P IR 92/09/16
<VALVE.ASY.BRK.PRESS.CONTROL.> <LIMO.....>
- CR Description: delete the abs info from the linc.usage

Air Suspension:

_ F F2VC 3B484 AA NC00 040501 000 NC00E10126577000IR P IR 91/05/28
<COMPR.&.DRYER.ASY-SUSP.AIR.S> <.....>
- CR Description: to eliminate compressor noise, the current mounting washer is to be replaced with a thicker (1.5mm vs 1.0mm), harder (38rc vs. 34 rb) washer. Part numbers are affected as follows

CAR LINE	PART NAME	CURRENT NUMBER	REVISED NUMBER
1992 FN36	COMP/DRYER ASSY	F2VC-3B484-AA	F2VC-3B484-AB
1992 FN36	COMPRESSOR ASSY	F2VC-2875-AA	F2VC-2875-AB
1992 EN53	COMP/DRYER ASSY	F2AC-3B484-AD	F2AC-3B484-AE
1992 EN53	COMPRESSOR ASSY	F2AC-2875-AD	F2AC-2875-AE

_ F F2VC 3B484 AB DE00 040500 000 DE00I102670190048R P IR 93/09/24
<COMPR.&.DRYER.ASY-SUSP.AIR.S> <.....>
- CR Description: supplement to effect out pn96 air suspension parts

_ F F2VC 3B484 AB NC00 040501 000 NC00E10170180000IR P IR 91/12/02
<COMPR.&.DRYER.ASY-SUSP.AIR.S> <.....>
- CR Description: Implement a redesigned compressor yoke gasket. The new gasket, which is 50% wider and 100% thicker, is more substantial and, therefore, easier to positively locate in the gasket retaining groove. The retaining groove on the compressor crank case will be enlarged to accommodate the revised gasket. Tokico has agreed to submersion test 15,000 fn36, and 15,000 en53 compressors with revised gaskets to verify the effectiveness of this corrective action.

_ F F2VC 3B484 AC NC00 040501 000 NC00E10221208000IR P IR 92/08/05
<COMPR.&.DRYER.ASY-SUSP.AIR.S> <.....>
- CR Description: revise compressor mounting bracket to provide sufficient clearance to the fender apron. Supplier has provided a proposal which increases clearance from zero to five mm. Timing - assuming $5,000 obsolescence cost for en53 brackets Wixom - to receive parts by sept 15, 1992 St. Thomas - to receive parts by jan 1993 part numbers will be affected as follows:

COMPONENT	CURRENT P/N	NEW P/N
FN36 COMPRESSOR & DRYER ASSY	F2VC-3B484-AC	F3VC-3B484-AA
FN36 COMPRESSOR ASSY SVC. ONLY	F2VC-2875-AC	F3VC-2875-AA
EN53 COMPRESSOR & DRYER ASSY.	F2AC-3B484-AA	F3AC-3B484-AA
EN53 COMPRESSOR ASSY SVC. ONLY	F2AC-2875-AF	F3AC-2875-AA

To Concern: _____ Alert: _____ FunctRelease
Sel C/F Part=========== Acty CPSC== Seq Release=========S CHS Date====
_F F3VC 3B484 AA NC00 040501 000 NC00E004444999915IR P IR 93/09/24
<COMPR.&.DRYER.ASY-SUSP.AIR.S> <.....>
- CR Description: this notice supplement supports alert a10336934 which releases air suspension air compressors minus the rubber air intake hose & mounting clip. Parts to be identified by a "pm" prefix. See referenced alert for further description.

ABS HCU: note in 1993... Towncar adopted Mark VIII ABS HCU as a complexity reduction (ABS or ABS/TC?)

X F F1VC 2C286 AA NC00 060903 000 NC00E10098043000IR P IR 90/10/11
<CONTROL.ASY-BRK.ANTI/LK.HYD-> <.....>
- CR Description: use 1991 fn36 abs without traction assist. Label the hydraulic control units and the shipping boxes that the unit arrive in for both fn36 & fn9. The labels should read "towncar" for the fn36 and "continental" for the fn9. The labbles on the boxes should be large so that a hi-lo driver can read them from the operators chair. This should continue until the fool-proof connectors become available as per ,components with fool-proof connectors release on c10053836 not c10090911 which was rejected in favor of this alert. Also, labels should continue to be used even after fool-proof connectors are available. It should be noted that body electrical still has not released the wiring harness change to incorporate the fool-proof connector.

F F3VC 2C286 AA NC00 060903 000 NC00E10185750000IR P IR 92/04/29
<CONTR.ASY-BRK.ANTI/LOCK.HYD.> <.....>
- CR Description: the unused christmas tree retainer on the 19-pin connector will be removed and 4 tie straps (one at each end of the 19-pin and 4-pin connectors) will be added to keep the wires within the convolute. Cost is $0.42 piece cost, $0 tooling. This is a 1992 running change for en53/fn36. **** In addition, this notice will release a different reservoir cap and replace the current rubber plugs in the tube ports with a single tape strip covering the ports. These are for contamination prevention during shipping, and are removed before assembly. This is a no cost change, and is being released on the dn5 and fn9 drawings as well as the en53/fn36. The dn5 and fn9 part numbers will not change. ***** this notice also releases f2vc-2c266-aa for service only. F2vc-2c266-aa is an abs valve block that will service 1991and part of the 1992 model year fn36 abs-only vehicles. This part has the disc/disc calibration and a black connector. F2ac-2c266-aa (already released) will continue to servic e the later part of the 1992 model year built with the grey connector. The release of f2vc-2c266-aa is done at no cost, no tooling.

F F3VC 2C286 AB NC00 060903 000 NC00E10249956000IR P IR 92/12/03
<CONTR.ASY-BRK.ANTI/LOCK.HYD.> <.....>
- CR Description: modify 19-way cannon conector with internal key-way to prevent 180 degree rotation by mistake. testing tbd. this is a one model year change. however, it involves safety concerns and should be incorporated.

F F3VC 2C286 AC NC00 060903 000 NC00E10249956000IR P IR 92/12/03
<CONTR.ASY-BRK.ANTI/LOCK.HYD.> <.....>
- CR Description: modify 19-way cannon conector with internal key-way to prevent 180 degree rotation by mistake. testing tbd. this is a one model year change. however, it involves safety concerns and should be incorporated.

X C F1VC 2C285 BB NC00 060903 001 NC00E10068739002IR P IR 90/04/18
<CONTR.ASY-BRK.A/LK.TRCTION.H> <.....>
- CR Description: to provide power tool access at the rear of the hcu/tc the inboard tube nut, revise the tube nut extension for the secondary circuit in the hcu/tc f2c285" to be the same as the primary circuit tube nut extension to conform with changes made on the tube bundle f2c296".

X C F1VC 2C285 BC NC00 060903 001 NC00E10068739002IR P IR 90/04/18
<CONTR.ASY-BRK.A/LK.TRCTION.H> <.....>
- CR Description: to provide power tool access at the rear of the hcu/tc the inboard tube nut, revise the tube nut extension for the secondary circuit in the hcu/tc f2c285" to be the same as the primary circuit tube nut extension to conform with changes made on the tube bundle f2c296".

X F F1VC 2C285 A1 NC00 060903 000 NC00E10018851001IR P IR 89/05/22
<CONTR.ASY-BRK.ANTI/LK.HYD...> <.....>
- CR Description: revise outlet porting of hydraulic control unit for manufacturing feasibility.

F F1VC 2C285 A1 NC00 060903 001 NC00E10018851001IR P IR 89/05/22
<CONTR.ASY-BRK.ANTI/LK.HYD...> <REMOVAL.RESULTING.FROM.DUAL.RELEASE.RECORDS>
- CR Description: revise outlet porting of hydraulic control unit for manufacuring feasibility.

To Concern: _____ Alert: _____ IFunctRelease
Sel C/F Part========== Acty CFSC== Seq Release========IS ClS Date===

X F F1VC 2C285 BA NC00 060903 000 NC00E100687390021R P IR 90/04/18
<CONTR.ASY-BRK.ANTI/LK.HYD..> <.....>
- CR Description: to provide power tool access at the rear of the hcu/tc the inboard tube nut, revise the tube nut extension for the secondary circuit in the hcu/tc y2c285" to be the same as the primary circuit tube nut extension to conform with changes made on the tube bundle y2c296".

_ F F1VC 2C285 BB NC00 060903 000 NC00E00444499323IR P IR 90/12/17
<CONTR.ASY-BRK.A/LK.TRCTION.H> <.....>
- CR Description: usage change: effective point revision to brake anti-lock hydraulic controls due to part availability.

X - F F1VC 2C285 BC NC00 060903 000 NC00E100687390031R P IR 90/05/24
<CONTR.ASY-BRK.A/LK.TRCTION.H> <.....>
- CR Description: to provide power tool access at the rear of the hcu/tc to the inboard tube nut: 1. Revert the abs hcu common extensions, for attaching of the brake tubes from the master cylinder , to one long and one short extension. This is a $0.48 piece cost save at $0.00 tool cost. 2. Increase the length of the secondary circuit brake tube 10.0, increase the length of the tube nut to compensate for the short extension at the hcu, and revise the tube nut to m12 from m10. This is a piece cost increase of $0.08 and a tool cost of $10000.00. These changes will maintain the tube nut hex in the current location, continuing to provide power tool access, at a net piece cost save of $0.40 and $10000.00 tool cost. Sys gen components removed..... 90/06/21

_ F F1VC 2C285 CA NC00 060903 000 NC00E10117341001R P IR 91/02/28
<CONTR.ASY-BRK.A/LK.TRCTION.H> <.....>
- CR Description: release f1vc-2c296-eb in place of f1vc-2b296-ec and/or pm-f1vc-2b296-ec. F1vc-2c296-eb has two m10 tube nuts to mate with the m10 fittings on the revised traction control hcu. Prvss is not affected. ---- incorporation in production of the brake tube bundle f1vc-2c296-eb must be coordinated with incorporation in production of the hcu -2c285- released on nc00-e10117341 000.

_ F F1VC 2C285 CB NC00 060903 000 NC00E10145527000IR P IR 91/09/22
<CONTR.ASY-BRK.A/LK.TRCTION.H> <.....>
- CR Description: change from spiral wrap to convolute tubing, add a "christmas tree" to the 19-pin connector pigtail, and add a hole to the 2c303 bracket to retain the pigtail for both en53 and fn36.

****
* Note printed by TBAZIL on 15 Jan 1999 at 09:12:36 *
****

From: JEVANS8 --DRBN005 Date and time 01/15/99 09:11:33
To: FCONDON --DRBN005 TBAZIL --DRBN005

FROM: Joe Evans USAET(UTC -05:00)
Subject: 9F924 Update (19981218)

Regards, Joe Evans
Brakes, Vacuum Distibution and Chassis Control Systems
Core Brake Control Systems Engineering
Phone 32-23832 Fax 32-31947
*** Forwarding note from FPORTER --DRBN007 12/18/98 17:04 ***
To: WABRAMCZ--DRBN005 BEGEN --DRBN007
RENGLIS1--DRBN005 JEVANS8 --DRBN005
DGOEL --DRBN005 JGREGOIR--DRBN005
KGRIBBLE--DRBN005 NLAPOINT--DRBN005
SLAROUCH--FORDNA1 JMCINERN--DRBN005
JNEMZ --DRBN005 RNEVI --DRBN005
GSTEVEN1--DRBN005 CTHOMAS5--DRBN005
HWELFER3--DRBN006

FROM: F. J. Porter USAET(UTC -05:00)
Subject: 9F924 Update (19981218)

1992-1993 Town Car F2VC-9F924-A Brake Pressure Switch Investigation

TEAM:

AVT EESE Chassis Electronics:	Fred Porter	x84-53722	fporter
AVT Chassis Engineering:	Joe Evans	x32-23832	jevans8
	Barry Egen	x32-39512	begen
AVT EESE EOS:	Rob English	x33-73225	renglis1
AVT Design Analysis:	Norm LaPointe	x59-42686	nlapoint
AVT EESE OPE:	Jim Gregoire	x33-79962	jgregoir
E&SE Prod. Veh. Safety:	William Abramczyk	x32-23284	wabramcz
	Ray Nevi	x59-47688	rnevi
Large Luxury VC Safety:	John McInerney	x32-20276	jmcinern
	Joe Nema	x39-09133	jnema
AVT Materials Engineering:	Greg Stevens	x32-36686	gsteven1
	Ken Gribble	x32-38650	kgribble
	Clark Thomas	x59-41313	cthomas5
Central Lab Services:	Steve LaRouche	x84-54876	slarouch

INFORMATION:

NHTSA letter: PE98-055

Vehicles identified: 21 initially identified.
20 additional vehicles reported since publication of the investigation.

Warranty: A total of 89 warranty claims are identified in AWS on the F2VY-9F924-A for 1992 and 1993 Town Cars.

Two CQIS reports (WJIAA135 & VDUAA322) mention underhood fire

WWRS5A6A R1264222 **List Part Function Replacement History** 99/01/15 09:54:53

REPLACES - REPLACED BY

Part: __F1VC ___2B091 _____ PT-VL: ___ EffPnt/Date: _____
Func Acty: ____ CPSC: _____ C/F: _ Class: _
History: _ Prel: _ Reg: _ Organizatn: _
Engineer: ____ ___ Color: E Print: _

	Part	Acty	CPSC	Seq	Release	C/F	Func S	Func CL	Release S	Release Date
_	**F1VC 2B091 AA**		**NC00**	**060605**	**000 NC00E10036524000**	**F**	**R**	**P**	**R**	**89/11/10**
	<VALVE.ASY.BRK.PRESS.CONTROL.><.....>									
R	F1VC 2B091 A1		NC00	060605	000 NC00I10010977022	F				
B	F1VC 2B091 AB		NC00	060605	000 NC00E10036524000	F				
_	**F1VC 2B091 AB**		**NC00**	**060605**	**000 NC00E10061037001**	**F**	**R**	**P**	**R**	**90/05/25**
	<VALVE.ASY.BRK.PRESS.CONTROL.><.....>									
R	F2AC 2B091 A1		NC00	060605	000 NC00I10043767000	F				
B	F1VC 2B091 AC		NC00	060605	000 NC00E10051375000	F				
B	F1VC 2B091 AD		NC00	060605	000 NC00E10061037001	F				
_	**F1VC 2B091 AC**		**NC00**	**060605**	**000 NC00E10061037000**	**F**	**R**	**P**	**R**	**90/04/04**
	<VALVE.ASY.BRK.PRESS.CONTROL.><ANTI/LK.....>									
R	F1VC 2B091 AB		NC00	060605	000 NC00E10051375000	F				
B	F1VC 2B091 AD		NC00	060605	000 NC00E10061037000	F				

SELECT=>> F=Function U=Usage N=Notice 4=UCC/Proc 5=DES/Funct 6=Service

MORE

3713 7772

WWRS5A6A R1264222 **List Part Function Replacement History** 99/01/15 09:54:59

REPLACES - REPLACED BY

Part: **F1VC 2B091** PT-VL: EffPnt/Date:
Func Acty: CPSC: C/F: Class:
History: Prel: Reg: Organizatn:
Engineer: Color: E Print:

	Part	Acty	CPSC	Seq	Release	C/F	Func S	Func CL	Release S	Release Date
_	**F1VC 2B091**	**AD**	**NC00**	**060605**	**000**	**NC00E10128004001**	**F**	**R**	**P**	**R 91/07/11**
	<VALVE.ASY.BRK.PRESS.CONTROL.><ANTI/LK.....>									
R	F1VC 2B091	AB	NC00	060605	000	NC00E10061037001	F			
B	F2AC 2B091	AA	NC00	060605	000	NC00E10128004001	F			
B	F2VC 2B091	AA	NC00	060605	000	NC00I10014063008	F			
B	F5AC 2B091	AA0	NC00	060605	000	NC00I10107232002	F			
_	**F1VC 2B091**	**A1**	**NC00**	**060605**	**000**	**NC00I10010977022**	**F**	**R**	**P**	**R 89/05/18**
	<VALVE.ASY.BRK.PRESS.CONTROL.><.....>									
R	F0VC 2B091	AB	NC00	060605	000	NC00I10010977014	F			
B	F1VC 2B091	AA	NC00	060605	000	NC00I10010977022	F			
B	F2AC 2B091	A1	NC00	060605	000	NC00I10010977014	F			
_	**F1VC 2B091**	**BA**	**NC00**	**060605**	**000**	**NC00I10010977048**	**F**	**R**	**P**	**R 90/01/12**
	<VALVE.ASY.BRK.PRESS.CONTROL.><.....>									
R	F1VC 2B091	BA	NC00	060701	000	NC00I10010977047	F			

SELECT=>> F=Function U=Usage N=Notice 4=UCC/Proc 5=DES/Funct 6=Service

MORE

3713 7773

WWRS5A6A R1264222 **List Part Function Replacement History** 99/01/15 09:55:05

REPLACES - REPLACED BY

Part: __F1VC ___2B091 _____ PT-VL: ___ EffPnt/Date: _____
Func Acty: ____ CPSC: _____ C/F: _ Class: _
History: _ Prel: _ Reg: _ Organizatn: _
Engineer: ____ ___ Color: **E** Print: _

	Part	Acty	CPSC	Seq	Release	C/F	Func S	Func CL	Release S	Release Date
_	**F1VC 2B091**	**BA**	**NC00**	**060701**	**000 NC00E00444499103**	**F**	**R**	**P**	**R**	**89/10/30**
	<VALVE.ASY.BRK.PRESS.CONTROL.><.....>									
_	**F1VC 2B091**	**BA**	**NC00**	**060701**	**001 NC00E10640585004**	**F**	**R**	**S**	**R**	**98/08/03**
	<VALVE.ASY.BRK.PRESS.CONTROL.><SERVICE.ONLY.....>									
R	NONE				NC00E10640585004	F				
B	NONE				NC00E10640585004	F				
_	**F1VC 2B091**	**CA**	**NC00**	**060605**	**000 NC00E10128004004**	**F**	**R**	**P**	**R**	**91/07/25**
	<VALVE.ASY.BRK.PRESS.CONTROL.><.....>									
R	F0VC 2B091	BA	NC00	060605	000 NC00E10111036000	F				
B	F2VC 2B091	CA	NC00	060605	000 NC00E10117988000	F				
B	P1F1VC 2B091	CA	NC00	060605	000 NC00E10128004004	F				

SELECT=>> F=Function U=Usage N=Notice 4=UCC/Proc 5=DES/Funct 6=Service

LAST

3713 7774

WWRS5A6A R1264222 **List Part Function Replacement History** 99/01/15 09:55:19

REPLACES - REPLACED BY

Part: **F2AC 2B091** PT-VL: EffPnt/Date:
Func Acty: CPSC: C/F: Class:
History: Prel: Reg: Organizatn:
Engineer: Color: **E** Print:

	Part	Acty	CPSC	Seq	Release	C/F	Func S	Func CL	Release S	Release Date
_	**F2AC 2B091**	**AA**	**NC00**	**060202**	**000**	**NC00E10129983006**	**C**	**R**	**P**	**R 92/08/31**
	<VALVE.ASY.BRK.PRESS.CONTROL.><ANTI/LK.....>									
_	**F2AC 2B091**	**BA**	**NC00**	**060202**	**000**	**NC00E10357590000**	**C**	**R**	**P**	**R 94/02/15**
	<VALVE.ASY.BRK.PRESS.CONTROL.><ANTI/LK.....>									
R	NONE					NC00E10129983006	C			
B	NONE					NC00E10129983006	C			
B	F5VC 2B091	AA	NC00	060202	000	NC00E10357590000	C			
_	**F2AC 2B091**	**AA**	**NC00**	**060605**	**000**	**NC00E10128004004**	**F**	**R**	**P**	**R 91/07/25**
	<VALVE.ASY.BRK.PRESS.CONTROL.><ANTI/LK.....>									
R	F1VC 2B091	AD	NC00	060605	000	NC00E10128004001	F			
B	PMF2AC 2B091	AA	NC00	060605	000	NC00E10128004004	F			
_	**F2AC 2B091**	**A1**	**NC00**	**060605**	**000**	**NC00I10043767000**	**F**	**R**	**P**	**R 89/12/13**
	<VALVE.ASY.BRK.PRESS.CONTROL.><.....>									
R	F1VC 2B091	A1	NC00	060605	000	NC00I10010977014	F			

SELECT=>> F=Function U=Usage N=Notice 4=UCC/Proc 5=DES/Funct 6=Service

MORE

3713 7775

WWRS5A6A R1264222 **List Part Function Replacement History** 99/01/15 09:55:28

REPLACES - REPLACED BY

Part: __F2AC ___2B091 _____ PT-VL: ___ EffPnt/Date: _____
Func Acty: ____ CPSC: _____ C/F: _ Class: _
History: _ Prel: _ Reg: _ Organizatn: _
Engineer: ____ ___ Color: E Print: _

	Part		Acty	CPSC	Seq	Release	C/F	Func S	Func CL	Release S	Release Date
_	**F2AC**	**2B091**	**A1**	**NC00**	**060605**	**000**	**NC00I10043767000**	**F**	**R**	**P**	**R 89/12/13**
	<VALVE.ASY.BRK.PRESS.CONTROL.>										
B	F1VC	2B091	AB	NC00	060605	000	NC00I10043767000	F			
B	F2VC	2B091	A1	NC00	060605	000	NC00I10014063001	F			
_	**F2AC**	**2B091**	**BA**	**NC00**	**060605**	**000**	**NC00E10221001004**	**F**	**R**	**P**	**R 92/08/21**
	<VALVE.ASY.BRK.PRESS.CONTROL.><ANTI-SPIN.BRAKES.WITH.SPEED.CONTROL.FB/FP...>										
R		NONE					NC00E00444499552	F			
R	F2VC	2B091	AA	NC00	060605	000	NC00E10128004001	F			
B		NONE					NC00E00444499552	F			
B	PMF2AC	2B091	BA	NC00	060605	000	NC00E10128004008	F			

SELECT=>> F=Function U=Usage N=Notice 4=UCC/Proc 5=DES/Funct 6=Service

LAST

3713 7776

WWRS5A6A R1264222 **List Part Function Replacement History** 99/01/15 09:55:38

REPLACES - REPLACED BY

Part: __F2VC ___2B091 _____ PT-VL: ___ EffPnt/Date: _____
Func Acty: _____ CPSC: _____ C/F: _ Class: _
History: _ Prel: _ Reg: _ Organizatn: _
Engineer: ____ ___ Color: E Print: _

	Part		Acty	CPSC	Seq	Release	C/F	Func S	Func CL	Release S	Release Date
_	**F2VC**	**2B091**	**CC**	**NC00**	**060202**	**000**	**NC00E10129983000**	**C**	**R**	**P**	**R 92/04/02**
	<VALVE.ASY.BRK.PRESS.CONTROL.><LIMO.....>										
R		NONE					NC00E10184338001	C			
B		NONE					NC00E10129983000	C			
_	**F2VC**	**2B091**	**AA**	**NC00**	**060605**	**000**	**NC00E10128004001**	**F**	**R**	**P**	**R 91/07/11**
	<VALVE.ASY.BRK.PRESS.CONTROL.><ANTI-SPIN.BRAKES.WITH.SPEED.CONTROL.FB/FP...>										
R	F2VC	2B091	A1	NC00	060605	000	NC00I10014063008	F			
B	F2AC	2B091	BA	NC00	060605	000	NC00E10128004001	F			
B	F2VC	2B091	BA	NC00	060605	000	NC00E10079844001	F			
B	F5AC	2B091	BA0	NC00	060605	000	NC00I10107232002	F			
_	**F2VC**	**2B091**	**A1**	**NC00**	**060605**	**000**	**NC00I10014063008**	**F**	**R**	**P**	**R 90/05/24**
	<VALVE.ASY.BRK.PRESS.CONTROL.><.....>										
R	F2AC	2B091	A1	NC00	060605	000	NC00I10014063001	F			
B	F2VC	2B091	AA	NC00	060605	000	NC00I10014063008	F			

SELECT=>> F=Function U=Usage N=Notice 4=UCC/Proc 5=DES/Funct 6=Service

MORE

3713 7777

WWRS5A6A R1264222 **List Part Function Replacement History** 99/01/15 09:55:43

REPLACES - REPLACED BY

Part: __F2VC ___2B091 _____ PT-VL: ___ EffPnt/Date: _____
Func Acty: ____ CPSC: _____ C/F: _ Class: _
History: _ Prel: _ Reg: _ Organizatn: _
Engineer: ____ ___ Color: E Print: _

	Part		Acty	CPSC	Seq	Release	C/F	Func S	Func CL	Release S	Release Date
_	**F2VC**	**2B091 BA**		**NC00**	**060605**	**000 NC00E00444499336**	**F**	**R**	**P**	**R**	**91/01/18**
	<VALVE.ASY.BRK.PRESS.CONTROL.><										
R	F2VC	2B091 AA		NC00	060605	000 NC00E10079844001	F				
_	**F2VC**	**2B091 CA**		**NC00**	**060605**	**000 NC00E10117988001**	**F**	**R**	**P**	**R**	**91/02/28**
	<VALVE.ASY.BRK.PRESS.CONTROL.><LIMO										
R	F1VC	2B091 CA		NC00	060605	000 NC00E10117988000	F				
B	F2VC	2B091 CB		NC00	060605	000 NC00E10117988001	F				
_	**F2VC**	**2B091 CB**		**NC00**	**060605**	**000 NC00E10128004004**	**F**	**R**	**P**	**R**	**91/07/25**
	<VALVE.ASY.BRK.PRESS.CONTROL.><LIMO										
R	F2VC	2B091 CA		NC00	060605	000 NC00E10117988001	F				
B	F2VC	2B091 CC		NC00	060605	000 NC00E10128004002	F				
B	F5VC	2B091 AA0		NC00	060605	000 NC00I10107232002	F				

SELECT=>> F=Function U=Usage N=Notice 4=UCC/Proc 5=DES/Funct 6=Service

MORE

WWRS5A6A R1264222 **List Part Function Replacement History** 99/01/15 09:55:50

REPLACES - REPLACED BY

Part: F2VC 2B091 PT-VL: EffPnt/Date:
Func Acty: CPSC: C/F: Class:
History: Prel: Reg: Organizatn:
Engineer: Color: E Print:

	Part	Acty	CPSC	Seq	Release	C/F	Func S	Func CL	Release S	Release Date
_	F2VC 2B091	CC		060605	000 NC00E10184338000	F	R	P	R	92/02/11
	<VALVE.ASY.BRK.PRESS.CONTROL.><LIMO.....									>
R	F2VC 2B091	CB		060605	000 NC00E10128004002	F				
B	F3VC 2B091	AA		060605	000 NC00E10184338000	F				
B	PMF2VC 2B091	CC		060605	000 NC00E10128004008	F				

SELECT=>> F=Function U=Usage N=Notice 4=UCC/Proc 5=DES/Funct 6=Service

LAST

3713 7779

WWRS5A6A R1264222 **List Part Function Replacement History** 99/01/15 09:56:01

REPLACES - REPLACED BY

Part: __F3VC ___2B091 _____ PT-VL: ___ EffPnt/Date: _____
Func Acty: ____ CPSC: _____ C/F: _ Class: _
History: _ Prel: _ Reg: _ Organizatn: _
Engineer: ____ ___ Color: E Print: _

	Part	Acty	CPSC	Seq	Release	C/F	Func S	Func CL	Release S	Release Date
_	**F3VC 2B091**	**BA**	**NC00**	**060202**	**000**	**NC00E10129983005**	**C**	**R**	**P**	**R 92/08/21**
	<VALVE.ASY.BRK.PRESS.CONTROL.><LIMO.....>									
B	NONE					NC00E10129983000	C			
_	**F3VC 2B091**	**AA**	**NC00**	**060605**	**000**	**NC00E10129983005**	**F**	**R**	**P**	**R 92/08/21**
	<VALVE.ASY.BRK.PRESS.CONTROL.><LIMO.....>									
R	NONE					NC00E10129983001	F			
R	F2VC 2B091	CC	NC00	060605	000	NC00E10184338000	F			
B	NONE					NC00E10129983001	F			
B	NONE					NC00E10184338000	F			
_	**F3VC 2B091**	**BA**	**NC00**	**060605**	**000**	**NC00E00444499662**	**F**	**R**	**P**	**R 92/09/16**
	<VALVE.ASY.BRK.PRESS.CONTROL.><LIMO.....>									
R	NONE					NC00E00444499662	F			
R	NONE					NC00E10129983005	F			
B	NONE					NC00E00444499662	F			

SELECT=>> F=Function U=Usage N=Notice 4=UCC/Proc 5=DES/Funct 6=Service

MORE

3713 7780

WWRS5A6A R1264222 **List Part Function Replacement History** 99/01/15 09:56:07

REPLACES - REPLACED BY

Part: F3VC 2B091 PT-VL: EffPnt/Date:
Func Acty: CPSC: C/F: Class:
History: Prel: Reg: Organizatn:
Engineer: Color: E Print:

	Part	Acty	CPSC	Seq	Release	C/F	Func S CL	Release S Date
_	F3VC 2B091	BA	NC00	060605	000 NC00E00444499662	F	R P	R 92/09/16
	<VALVE.ASY.BRK.PRESS.CONTROL.><LIMO.....>							
B	NONE				NC00E10129983005	F		

SELECT=>> P=Function U=Usage N=Notice 4=UCC/Proc 5=DES/Funct 6=Service

LAST

3713 7781

WWRS5A6A R136694C **List Part Function Replacement History** 99/01/14 19:53:04

REPLACES - REPLACED BY

Part: __F3AC ___2C219 _____ PT-VL: ___ EffPnt/Date: _____
Func Acty: ____ CPSC: _____ C/F: _ Class: _
History: _ Prel: _ Reg: _ Organizatn: _
Engineer: ____ ___ Color: E Print: _

	Part==========		Acty	CPSC==	Seq	Release=========	C/F	Func S	Func CL	Release S	Release Date====
_	F3AC	2C219	BA	NOSE	060903	000 NOSEE10384500000	F	R	P	R	94/03/10
	<MODULE.ASY-BRK.A/LK.CNTRL.EL><										>
B		NONE				NOSEE10333831000	F				
_	F3AC	2C219	CA	NC00	060903	000 NC00E10384500000	F	R	P	R	94/03/09
	<MODULE.ASY-BRK.A/LK.CNTRL.EL><										>
R		NONE				NC00E00444499936	F				
R		NONE				NC00E10278548000	F				
R		NONE				NC00E10384500000	F				
B		NONE				NC00E10278548000	F				
B		NONE				NC00E10384500000	F				

SELECT=>> F=Function U=Usage N=Notice 4=UCC/Proc 5=DES/Funct 6=Service
LAST

3713 7782

```
WWRS5A6A R136694C   List Part Function Replacement History  99/01/14  19:53:22
                          REPLACES - REPLACED BY
 Part:       __F3AC ___2C219 _______ PT-VL: ___ EffPnt/Date: _________________
 Func Acty: ____      CPSC:  _____  C/F:  _   Class:        _
 History:   _         Prel:  _      Reg:  _   Organizatn:  _
 Engineer:  ____ ___  Color: E      Print: _
                                                            |Func|Release
   Part=========== Acty CPSC== Seq Release======== C/F|S CL|S Date===
_    F3AC    2C219 AA       NC00 060903 000 NC00E10278548000  F |R P |R 93/06/25
   <MODULE.ASY-BRK.A/LK.CNTRL.EL><.....................................>
R    F1VC    2C219 AB       NC00 060903 000 NC00E10240197000  F
B             NONE                        NC00E10240197000  F
B    F3AC    2C219 BA       NC00 060903 000 NC00E10257885000  F
_    F3AC    2C219 BA       NC00 060903 000 NC00E10348673000  F |R P |R 93/11/19
   <MODULE.ASY-BRK.A/LK.CNTRL.EL><.....................................>
R    F3AC    2C219 AA       NC00 060903 000 NC00E10257885000  F
R    F3AC    2C219 CA       NC00 060903 000 NC00E10348673000  F
B             NONE                        NC00E10257885000  F
B             NONE                        NC00E10348673000  F
_    F3AC    2C219 BA       NOSE 060903 000 NOSEE10384500000  F |R P |R 94/03/10
   <MODULE.ASY-BRK.A/LK.CNTRL.EL><.....................................>
R             NONE                        NOSEE10333831000  F
SELECT=>>  F=Function  U=Usage  N=Notice  4=UCC/Proc  5=DES/Funct  6=Service
                                                                      MORE
```

3713 7783

WWRS5A6A R136694C **List Part Function Replacement History** 99/01/14 19:54:12

REPLACES - REPLACED BY

Part: __F1VC ___2C219 _____ PT-VL: ___ EffPnt/Date: _____
Func Acty: ____ CPSC: _____ C/F: _ Class: _
History: _ Prel: _ Reg: _ Organizatn: _
Engineer: ____ ___ Color: E Print: _

	Part==========	Acty	CPSC==	Seq	Release========	C/F	Func S CL	Release S Date====
_	**F1VC 2C219**	**AA**	**NC00**	**060903**	**000 NC00E10257885000**	**F**	**R P**	**R 92/12/14**
	<MODULE.ASY-BRK.A/LK.CNTRL.EL><.....>							
R	NONE				NC00E10257885000	F		
B	NONE				NC00E10257885000	F		
_	**F1VC 2C219**	**AB**	**NC00**	**060903**	**000 NC00E10240197000**	**F**	**R P**	**R 92/09/30**
	<MODULE.ASY-BRK.A/LK.CNTRL.EL><.....>							
R	NONE				NC00I10107213008	F		
R	F1VC 2C219	AA	NC00	060903	000 NC00E10060056000	F		
B	F3AC 2C219	AA	NC00	060903	000 NC00E10240197000	F		
_	**F1VC 2C219**	**A1**	**NC00**	**060903**	**000 NC00I10010977024**	**F**	**R P**	**R 89/06/08**
	<MODULE.ASY-BRK.A/LOCK.CONTRO><.....>							
R	F0VC 2C219	AC	NC00	060903	000 NC00I10010977014	F		
B	F1VC 2C219	AA	NC00	060903	000 NC00I10010977024	F		

SELECT=>> F=Function U=Usage N=Notice 4=UCC/Proc 5=DES/Funct 6=Service

MORE

WWRS5A6A R136694C List Part Function Replacement History 99/01/14 19:54:23

REPLACES - REPLACED BY

Part: F1VC 2C219 PT-VL: EffPnt/Date:
Func Acty: CPSC: C/F: Class:
History: Prel: Reg: Organizatn:
Engineer: Color: E Print:

	Part	Acty	CPSC	Seq	Release	C/F	Func S	Func CL	Release S	Release Date
_	F1VC 2C219	BA	EC00	060903	000 NC00E10250073000	F	R	P	R	92/10/16
	<MOD.ASY-BRK.ANTI/LK.CONTRL.E><MON.T/C.....>									
R	NONE				NC00E10129983001	F				
R	NONE				NC00E10129983004	F				
B	NONE				NC00E10129983001	F				
B	NONE				NC00E10129983004	F				

SELECT=>> F=Function U=Usage N=Notice 4=UCC/Proc 5=DES/Funct 6=Service

LAST

3713 7785

WWRS5A6A R136694C **List Part Function Replacement History** 99/01/14 18:36:27

REPLACES - REPLACED BY

Part: F1VC 2B195 CG PT-VL: EffPnt/Date:
Func Acty: CPSC: C/F: Class:
History: Prel: Reg: Organizatn:
Engineer: Color: E Print:

	Part	Acty	CPSC	Seq	Release	C/F	Func S	Func CL	Release S	Release Date
_	**F1VC 2B195 CG**		**NC00**	**060701**	**000**	**NC00E10300678000**	**F**	**R**	**P**	**R 93/05/20**
	<BSTR.&.MSTR.CYL.ASY.BRK.....>									
R	NONE					NC00E00444499608	F			
R	NONE					NC00E00444499705	F			
R	NONE					NC00E00444499718	F			
R	NONE					NC00E10129983001	F			
R	F1VC	2B195 CF	NC00	060701	000	NC00E10104848000	F			
B	F2AC	2B195 BA	NC00	060701	000	NC00E10171561000	F			
B	F3AC	2B195 CA	NC00	060701	000	NC00E10300678000	F			
B	F5AC	2B195 AA0	NC00	060701	000	NC00I10107232032	F			

SELECT=>> F=Function U=Usage N=Notice 4=UCC/Proc 5=DES/Funct 6=Service

LAST

3713 7786

WWRS5A6A R136694C List Part Function Replacement History 99/01/14 19:35:43

REPLACES - REPLACED BY

Part: F1VC 2B195 CG PT-VL: EffPnt/Date:
Func Acty: CPSC: C/F: Class:
History: Prel: Reg: Organizatn:
Engineer: Color: E Print:

	Part			Acty	CPSC	Seq	Release	C/F	Func S	Func CL	Release S	Release Date
_	F1VC	2B195	CG	NC00	060701	000	NC00E10300678000	F	R	P	R	93/05/20
	<BSTR.&.MSTR.CYL.ASY.BRK.....>						<.....					>
R		NONE					NC00E00444499608	F				
R		NONE					NC00E00444499705	F				
R		NONE					NC00E00444499718	F				
R		NONE					NC00E10129983001	F				
R	F1VC	2B195	CF	NC00	060701	000	NC00E10104848000	F				
B	F2AC	2B195	BA	NC00	060701	000	NC00E10171561000	F				
B	F3AC	2B195	CA	NC00	060701	000	NC00E10300678000	F				
B	F5AC	2B195	AA0	NC00	060701	000	NC00I10107232032	F				

SELECT=>> F=Function U=Usage N=Notice 4=UCC/Proc 5=DES/Funct 6=Service

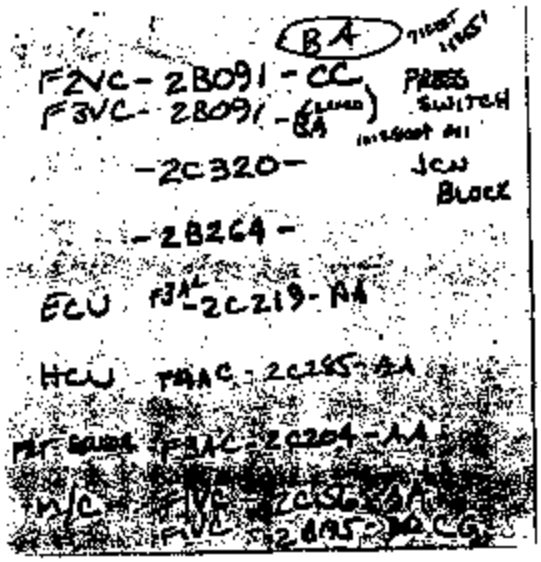
LAST

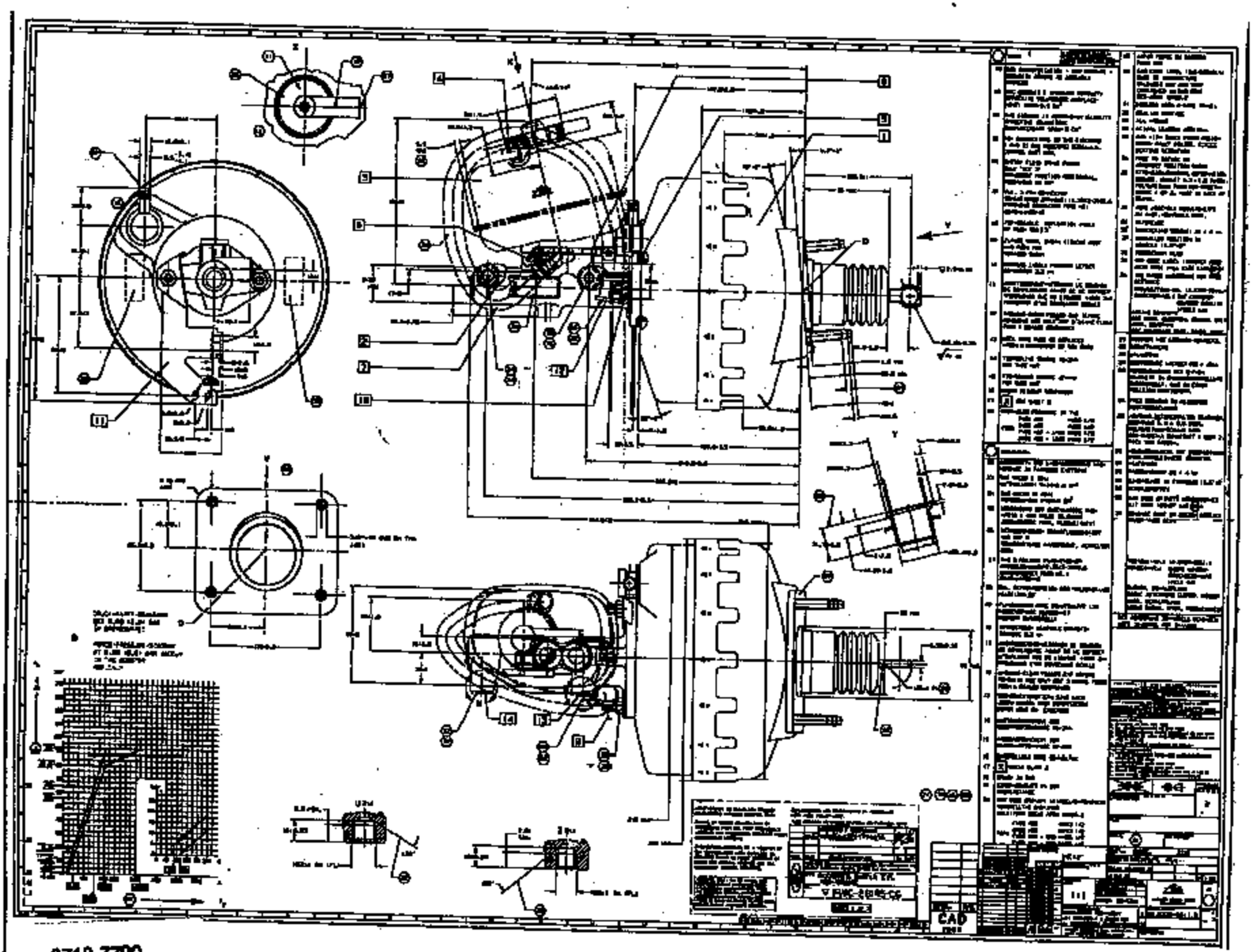
3713 7767

WWRS744A R136694C **Next Assembly Reference Maintenance** 99/01/14 19:24:57
Function : **F** Last Change: **94/02/15 MAH9217**
Part Number : **F2AC 2B091 BA**
Function=====> Acty: **MC00** CPSC: **060202** Seq: **000** C/FA: **C** Status: **R**
Release======> Acty: **MC00** Type: **E** Base: **10357590** Supp: **000** Status: **R**

S	Next Assembly Part No.	Quantity	UM	A	Effective In	Effective Out	Act
_	**F3VC 2A201 BA**	**1**	**EA**	**P**	**XS4P93A**	**XS4P94A**	
					MC00E10218420001	**MC00E10218420002**	
_	**F4VC 2A201 AA**	**1**	**EA**	**P**	**XS4P94A**	**S4P95A**	**R**
					MC00E10218420002	**MC0GE10357590000**	
_							
_							
_							
_							
_							

Select: D-Delete W-Wght P-Procure F-Fa/Derived Usage L-Loc Codes G-Pgm Id
F1=Updt F2=Part Verify F3=Proc F4=CofA F5=Prev Page F6=Rebuild N/A
Function status is invalid for update **LAST**


BA
F2VC-2B091-CC
F3VC-2B091-GA
PRESS SWITCH
-2C320-
JCU BLOCK
-2B264-
ECU F3AC-2C219-AA
HCU F4AC-2C285-AA
F4VC-2C204-AA
F4VC-2C536-AA
F4VC-2B495-BC



3713 7790

Falcon	]	]	]	]xxxx]	xxxx]	xxxx]	xxxx]
Explorer	]	]	]	]	]----]	xxxx]	xxxx]
Ranger	]	]	]	]	]----]	xxxx]	xxxx]
Expedition	]	]	]	]	]	]xxxx]	xxxx]
Navigator	]	]	]	]	]	]	]xxxx]

xxxx = used in model year
---- = may have been used in model year

6) Is this switch still in use? If not, why not? If so, what design changes have been implemented since 1992/1993?

Charlie Douglas of TI is investigating the design changes that may have been implemented on the brake pressure switch beginning in 1992.

7) What fault codes are stored if the brake pressure switch fails?

Regards,

Fred Porter OV - fporter fporter@ford.com
Chassis E/E Systems Applications (313)845-3722
Bldg 5 - Mail Drop 5030 - Cubicle 3E004 fax: 390-4145

MODEL YEAR	VEHICLE	APPLICATION	SPEED CONTROL
1992	Town Car Crown Vic Grand Marquis	Non ABS	PIA to Junction block -2c320- on frame rail (T.I.)
1992	Town Car Crown Vic Grand Marquis	ABS ABS/TC	PIA TO PROP VALVE MOUNTED ON FRAME RAIL (T.I.)
1993	Town Car Crown Vic Grand Marquis	Non ABS	PIA to Junction block on frame rail (T.I.)
1993	Town Car Crown Vic Grand Marquis	ABS ABS/TC	SAME AS 92
1994	Town Car Crown Vic Grand Marquis	Non ABS/ABS	PIA to Junction block on frame rail (T.I.)
1994	Town Car Crown Vic Grand Marquis	ABS/TC	SAME AS 92,93
1995	Town Car Crown Vic Grand Marquis	Non ABS/ABS	PIA to Junction block on frame rail (T.I.)
1995	Town Car Crown Vic Grand Marquis	ABS/TC	PIA to prop valve mounted to bracket s/a to master cylinder (T.I.)
1996	Town Car Crown Vic Grand Marquis	Non ABS/ABS	PIA to Junction block on frame rail (T.I.)
1996	Town Car Crown Vic Grand Marquis	ABS/TC	PIA to master cylinder (T.I.)
1997	Town Car Crown Vic Grand Marquis	Non ABS/ABS	PIA to Junction block on frame rail (T.I.)
1997	Town Car Crown Vic Grand Marquis	ABS/TC	PIA to master cylinder (T.I.)
1998	Town Car Crown Vic Grand Marquis	All	Plunger type in pedal box

3713 7792

NHTSA People Saving People

Vehicle Owner's Questionnaire

Office of Defects Investigation

Please provide your name, address, and phone number, as well as specific details about your vehicle and the problems you encountered with it. You may want to have your owner's manual handy as you proceed through the several screens of the questionnaire. Required information is marked with *.

Action Code PE98055

slightly less '93 cars than '92

Owner Information

* First Name: MI:
* Last Name:
Organization:
* Address 1:
Address 2:
* City: * State: AK * Zip:

* Home Phone:
Work Phone: Ext:
Fax Number:
Email Address:

The Privacy Act prevents release of owner information without prior authorization.

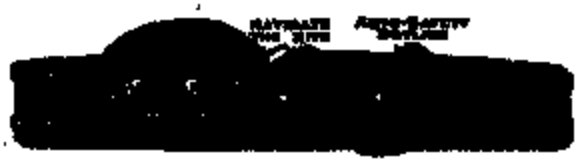
Do you wish to request a mailed signature form, which will authorize NHTSA to provide a copy of the owner information along with the vehicle information contained in this report to the manufacturer of your vehicle? Yes

Vehicle Information

17 digit Vehicle Identification Number (VIN):
(Located under windshield on driver's side dashboard)

Proceed to Next Section

Reset



3713 7783

Send mail to the Web Master

GOT A COPY.

MPR
1998 Dec 11

3713 7794

Page: 01 CQIS DETAIL REPORT 12/07/98 18:14:14

CQIS Report Number: WJIAA135 Program Type: Q Orig Rpt #: 225951-98
Report Source: MSS - FCSD - QSPS Report Date: 10/09/1998

REPORT SUMMARY

VEHICLE: 1993 TOWN CAR,SIGN ,SEDAN VIN : 1LNLM82W0PY[redacted]
Engine : 4.6L ROMEO BASE EFI Odometer: 51,500 MILES
Operating Environ: WCC : 5D05
Vehicle Use : Rsp. Act:

SYMPTOM: 3 01 0 00 CHASSIS SERVICE BRAKE SYSTEM
OTHER (CODE NOT AVAILABLE) OTHER (CODE NOT AVAILABLE)
Additional Symptom:
Other Veh. With Concern: Severity Rating - Customer: Engineering:

Causal Component: 28264 SWITCH BRK PRES WRN L
Causal Factor: Feature: Loc:
Causal Condition: Photo: Images: 0
Component Test Status: ---- Return Loc:
Vehicle Fixed?: YES . Customer satisfied?: Repair Effectiveness (%): 100

COMMENTS

--TYPE--	---------- COMMENT TEXT ----------
CONCERN	INITIALLY THE CUSTOMERS CONCERN WAS THAT THE VEHICLE WOULD NOT COME OUT OF PARK. WHILE IN THE DEALERSHIP, AN UNDERHOOD FIRE STARTED, CAUSED BY A LEAKING BRAKE FLUID THROUGH THE SWITCH INTO THE CONNECTOR.
REPAIR	REPLACED THE SPEED CONTROL SWITCH AND CONNECTOR. REPLACED THE STOP LAMP SWITCH FOR THE ORIGINAL CUSTOMERS CONCERN. PER TECHNICIAN, THIS IS THE THIRD UNIT THAT HAD AN UNDERHOOD FIRE THAT APPEARED TO ORIGINATE FROM THIS AREA. THE OTHER TWO WERE TOO DAMAGED TO DETERMINE THE SPECIFIC LOCATION OF THE POINT OF THE ORIGIN. THE SWITCH AND CONNECTOR ARE PRESENTLY IN MY POSSESSION IN THE MEMPHIS REGIONAL OFFICE.
AUDIT	10/14/1998 09:56AM BRENDA WENDEL MSS - FCSD - QSPS
	DEALER ID 68523 CHANGED TO 12098 BY BWENDEL

CONCERN DETAILS

DIAGNOSTIC INFORMATION

Symp. Verif?: Base of Diagnosis: Level of Assistance:
Comp. Timing: Base Timing : MIL light on? :
Test Stand . : Road Test : SD Number:
Prior Repair Attempts: Repair Prior to Call: NO
DTCs KOEO: KOEC:
KOER: CS:

Equipment/Procedure Used	Effective?	Equipment/Procedure Used	Effective?

SERVICE ACTIONS

Repair Type	Component Number	Number Type	Description	Causal Comp.
RPL	28264	SERVICE	SWITCH BRK PRES WRN L	YES

VEHICLE DETAILS

Vehicle Build Date: 09/10/1992 Warranty Start Date: 02/08/1993
Date of Sale: 02/08/1993 Selling Dlr (Mkt,Dlr,Sub): 12098
Dealer Special Order: Gross Vehicle Weight:
LH/RH Drive:

- - - ENGINE - - -

Engine: 4.6L ROMEO BASE EFI Tag: 3G 812 AA
Bld Dt: Calb: 318JR1D A Serial #: W

REDACTED

3713 7795M

CQIS Report Number: NJIAA135 Program Type: Q Orig Rpt #: 225951-98
Report Source: MSS - FCSD - QSF5 Report Date: 10/09/1998

--- T R A N S M I S S I O N ---
Trans: ADD-E 4SP ELEC O/D Part #:
Bld Dt: Serial #:
Model: Plt: Shft:

--- A X L E ---
Axle: 8.8 3.08 CONVENTIONAL Id Tag Code: Bld Dt:
Serial #: Plt:

--- A D D I T I O N A L ---
Tire : P215/70R15 WSW Brand :
Radio : ELETR PREMIUM AM/FM STRO/CSTE A/C : RTC AIR CONDITIONER
Paint : BLUE EXTERIOR PAINT FAMILY ---------- AQUAMARINE FROST C/C

---------- A F T E R M A R K E T M O D I F I C A T I O N S ----------

NO AFTER MARKET MODIFICATIONS DATA AVAILABLE FOR THIS VEHICLE

-------- REPORT ORIGINATOR - REPAIR FACILITY - CUSTOMER INFORMATION ----------
Orig/Caller : KENNETH DYTRT Title: OTHER

Rpair Dlr: 12098 - SCHILLING L-H/MENDENHALL INC Phn:(901) 794-4000
City: Memphis State : Tennessee
Country: UNITED STATES Region : Memphis - 23

Claim #/Date : LICS777 07/19/1998

Customer Name : [redacted]

NO CQIS VIN HISTORY AVAILABLE FOR THIS VEHICLE

--- S U P P L E M E N T A L S U R V E Y: NONE ---

---------- VEHICLE'S WARRANTY HISTORY (365 days only) ----------

NO VEHICLE WARRANTY HISTORY AVAILABLE FOR THIS VEHICLE

CQIS Report Number: VDUAA322 Program Type: Q Orig Rpt #: 134596-97
Report Source: MSS - FCSD - QSFS Report Date: 04/21/1997

REPORT SUMMARY

VEHICLE: 1992 TOWN CAR,STAND ,SEDAN VIN : 1LNLM81W8NY714787
Engine : 4.6L ROMEO BASE EFI Odometer: 56,802 MILES
Operating Environ: MCC : 5FD7
Vehicle Use : Rep. Act:

SYMPTOM: 7 04 2 45 UNKNOWN SOURCE CONCERNS FIRE/SMOKE
SMOKE UNDERHOOD
Additional Symptom:
Other Veh. With Concern: Severity Rating - Customer: Engineering:

Causal Component: 2A574 SWITCH ASY LOW AIR P
Causal Factor: Feature: Loc:
Causal Condition: Photo: Images: 0
Component Test Status: --- Return Loc:
Vehicle Fixed?: YES Customer satisfied?: Repair Effectiveness (%): 100

COMMENTS

TYPE	COMMENT TEXT
CONCER	THERE WAS SMOKE FROM UNDER THE HOOD.
REPAIR	THE BRAKE PRESSURE SWITCH CAUGHT ON FIRE AND BURNT THE WIRING WITH THE KEY OFF. PREVIOUS VEHICLES WITH FIRES STARTING IN THIS AREA WERE BURNT TO THE DEGREE THAT WE COULD ONLY GUESS WHAT CAUSED THE FIRE. THIS VEHICLE FIRE STOPPED SOON ENOUGH. WE REPLACED THE BRAKE PRESSURE SWITCH.
AUDIT	04/23/1997 10:28AM DATA ENTRY5 MSS - FCSD - QSFS
	SYMPTOM 3 01 0 00 CHANGED TO 7 04 2 45 BY MBAKER6

CONCERN DETAILS

DIAGNOSTIC INFORMATION

Symp. Verif?: Ease of Diagnosis: Level of Assistance:
Comp. Timing: Base Timing : MIL light on? :
Test Stand : Road Test : SD Number:
Prior Repair Attempts: Repair Prior to Call: NO
DTCs KOEO: KOEC:
KOER: CB:

Equipment/Procedure Used	Effective?	Equipment/Procedure Used	Effective?

SERVICE ACTIONS

Repair Type	Component Number	Number Type	Description	Causal Comp.
RPL	2A574	SERVICE	SWITCH ASY LOW AIR P	YES

VEHICLE DETAILS

Vehicle Build Date: 04/07/1992 Warranty Start Date: 10/02/1992
Date of Sale: 10/02/1992 Selling Dlr (Mkt,Dlr,Sub): 11627
Dealer Special Order: Gross Vehicle Weight:
LH/RH Drive:

- - - ENGINE - - -

Engine: 4.6L ROMEO BASE EFI Tag: 2G 812 BA
Bld Dt: Calb: 218JR05 A Serial #: W

- - - TRANSMISSION - - -

Trans: AOD-E 4SP ELEC O/D Part #:
Bld Dt: Serial #:
Model: Plt: Shft:

CQIS Report Number: VDUAA322 Program Type: Q Orig Rpt #: 134596-97
Report Source: MSS - PCED - QSFS Report Date: 04/21/1997

--- A X L E ---
Axle: 8.8 3.08 CONVENTIONAL Id Tag Code: Bld Dt:
Serial #: Plt:

--- A D D I T I O N A L ---
Tire : P215/70R15 WSW Brand :
Radio : ELETR PREMIUM AM/FM STRO/CSTE A/C : ATC AIR CONDITIONER
Paint : BLUE EXTERIOR PAINT FAMILY ---------- CLEAR CRYSTAL BLUE FROST C/C

---------- A F T E R M A R K E T M O D I F I C A T I O N S ----------

NO AFTER MARKET MODIFICATIONS DATA AVAILABLE FOR THIS VEHICLE

--------- REPORT ORIGINATOR - REPAIR FACILITY - CUSTOMER INFORMATION ---------
Orig/Caller : GEORGE TAYLOR Title: OTHER

Rpair Dlr: 11627 - Ft Lauderdale L-M Inc Ph#:(954) 779-2080
City: Ft Lauderdale State : Florida
Country: UNITED STATES Region : Orlando - 24

Claim #/Date : 129844

Customer name : [redacted] City :

---------- C Q I S V I N H I S T O R Y ----------

Date	CQIS Report #	Prog Type	Symp Cat	Causal Part Description	Dealer Id
04/22/1997	VDVAA116	EDSR	ELECT.	VALVE-FRT DISC BRK P	11627

--- S U P P L E M E N T A L S U R V E Y: NONE ---

---------- VEHICLE'S WARRANTY HISTORY (365 days only) ----------

Dealer ID	Repair Date	Repair Order	Odometer (Miles)	Rpr Cond.	Causl	Service Pfx	Part Number Base	Sfx	Labor Operation
11627	04/21/1997		56802						

3713 7788

*** TOTAL PAGE.04 ***
*** TOTAL PAGE.05 ***

Central Laboratory
15000 Century Drive
Dearborn, MI 48120-1267
FAX (313) 322-1614
FAX (313) 322-1614

Report 9901571
9900607
9900226
Multiple
December 22, 1999

To:	G. Stevens	(313) 32-36886	(313) 39-0724 FAX
From:	S. LaRouche	(313) 84-54676	

Subject: Speed Control Cut-off Switch
Part Number: F2VY-9F924-A
Specification: See Engineering Drawing
Supplier: Texas Instruments

Received: Forty nine switches, identified in Appendix A, were received during the period of January, 1999 through May 1999. The switches were received from dealership, storage yard, and field surveys. The switches were received under three Central Laboratory work requests: 9900226, 9900607, and 9901571. The results from a previous investigation (Central Laboratory Report 9804105) will be included in this report for comparison. The components of the switches are identified in Appendix B.

Object: Evaluate the switches to assist in determining the cause of underhood fires.

Conclusion: See Table 1.

Data and Analysis:

Test Protocol

The switches received under laboratory work request 9900226 (identified as A, B, C, D, E(#11), and F), were disassembled and documented (Figures 1 through 81) in the presence of personnel from Texas Instruments. Any fluid, deposits, or residues found in the switches were analyzed using Fourier Transform Infrared Analysis (FTIR) and Scanning Electron Microscopy (SEM) with Energy Dispersive X-ray Spectroscopy (EDS). The Kapton seals were examined for cracks and leak paths, visually and with SEM. The results are summarized in Table 1. Results from the previous investigation (9804105, Reddick) are included in this table for comparison.

The switches received under laboratory work requests 9900607 and 9901571 were documented as-received, functionally tested (if applicable), and evaluated using the test protocol[1] listed in Appendix C. Switches were selected for disassembly and evaluation based on their performance during the functional tests. The interior components, fluids, deposits, and residues of the selected switches were analyzed using the same techniques used for laboratory work requests 9804105 and 9900226. The results are summarized in Table 1. The switches are documented in Figures 82 through 219.

[1] The test protocol was developed by S. Reimers and N. LaPointe of Ford Motor Company, and Aziz Rahman of Texas Instruments. The protocol is based on the tests and results from laboratory work requests 9804105 and 9900226.

Concur: David Klaas Jr
P. Klaas, Supervisor
Metallurgy Section

By: Steven LaRouche (SLAROUCH)

Note: Table 1, Figures 1 through 219, and Appendices A through C were delivered to G. Stevens and S. Reimers on December 22, 1999.

SL/sl

3713 7799

8628 SL

All blocked areas must be filled in to process your request

Ford

Request for Central Laboratory Service

Administrative Use Only	
Laboratory Number	Date
9901571	5-12-99 SL

15080 Century Dr., Dearborn MI 48120-1267 Phone [313] 33-21676 FAX [313] 33-21614

Your Name [Send report to]	Telephone	PROFS ID	FAX
G. Stevens	313 323 6680	GSTEVENA	313 390 7724
Secondary Contact	**Telephone**	**PROFS ID**	**FAX**
N. LaPointe	313 594 7680	NLAPOINT	313 337 8256

Send Report To / **Bill To**

Room No./Mail Drop/PO Box	Department/Activity	Building	Location Code	Dept. #	Work Task # [For 5100 Loc. Only]
MD 9100/26065	BVE MATLS	Bldg #5	5100	T713	X96464

Sample

Total # of Samples	Sample Handling	TOX/CAS#	Source	Supplier Code
17	X Return after test ___ Dispose after test ___ Dispose after 30 days			

Part/Material Name	Sample Identification [Continue below if needed]	Part Number [If any]	Material Specification [If any]	CPSC Code	Supplier
Stereo Control	See Attached	F2XF-18849-A	NA		TEXAS INSTRUMENTS
Current Switch	Sheet				

Investigation

Nature of Investigation/Specific Tests Required [Check all that apply]		Requester Info. Box [For requester use]
___ Production/Plant problem	X Perform Tests as in Lab No. 9901571	
X Failure Analysis	___ Photograph [Describe below]	
___ Legal	___ Use Specification _____ as a guide	
___ Specification Compliance	___ Other [Describe below]	

Stop testing upon failure?	Does this support CAE testing? [If "Yes", what is the expected outcome?]	Do you need to know your CL contact test timing?
___ No ___ Yes	X No ___ Yes	___ Yes

Additional Sample Information/Testing Requirements

Perform tests as in 9901571 to assist in determining cause of possible leakage/fires. Additional switches may follow.

C.C: Steve Reimers
Power Supply & EMC Tech
3E 008/ 5082
Bldg #5

Report

Date you would like report	7-1-99
Date you must have report	7-1-99

Format [Check all that apply]

___ FAX preliminary results	___ FAX hand written	X Mail typed report
___ FAX typed report	___ Mail hand written	___ Electronically transfer report
		___ Phone preliminary results

For information about services or assistance in completing this form please refer to the Central Laboratory WEB page. [www.gm.ford.com/central/home.htm]
Laboratory number and date cannot be assigned without receipt of samples.
Samples will be disposed of after 30 days unless otherwise indicated above.

CL-Form #CLF07_01

3713 7800

8514 SL

Request for Central Laboratory Service

All shaded areas must be filled in to process your request

Administrative Use Only

Laboratory Number	Date
99006077	2-22-99 SL

15000 Century Dr., Dearborn MI 48120-1267 Phone (313) 22-21676 FAX (313) 33-21614

Your Name [Send report to]	Telephone	PROFS ID	FAX
STEVEN GREEN	313 323 6688	GSTEVEN1	313 390 7775
Secondary Contact	**Telephone**	**PROFS ID**	**FAX**
NORM LAPLANTE	313 594-2686	NLAPLANT	313 337 8256

Send Report To | Bill To

Room No./Mail Drop/PO Box	Department/Activity	Building	Location Code	Dept. #	Work Task # [For 3180 Lss. Only]
MD5008 26045	AVT MATERIALS	#5	5142	T113	XQ6024

Sample

Total # of Samples	Sample Handling	TOX/CASe	Source	Supplier Code
21	X Return after test ___ Dispose after test ___ Dispose after 30 days			

Part/Material Name	Sample Identification [Continue below if needed]	Part Number [If any]	Material Specification [If any]	CPSC Code	Supplier
SPEED CONTROL	SEE ATTACHED SHEET	F2VY 9F924 A	NA		ITEMS
CUTOFF SWITCH					

Investigation

Nature of Investigation/Specific Tests Required [Check all that apply]

- ___ Production/Plant problem
- X Failure Analysis
- ___ Legal
- ___ Specification Compliance
- ___ Perform Tests as in Lab No. _____
- ___ Photograph [Describe below]
- ___ Use Specification _____ as a guide
- ___ Other [Describe below]

Requester Info. Box [For requester use]

Stop testing upon failure? ___ No ___ Yes

Does this support CAE testing? [If "Yes", what is the expected outcome?] ___ No ___ Yes

Do you need to know your CL contact and dating? ___ Yes

Additional Sample Information/Testing Requirements

ENGINE, DISCARD ALL ANALYSIS SWITCHES AS POSITIVE
ESTABLISH WITH NORM LAPLANTE TO ASSIST IN DETERMINING CAUSE
OF PUMPING SWITCH FAILURE IN LEGACY.

SWITCHES ARE FOR FUEL SYSTEM. NEED SWITCHES BACK
ASAP.

Report

Date you would like report 4-1-99

Date you must have report 4-1-99

Format [Check all that apply]

- ___ FAX preliminary results
- ___ FAX typed report
- ___ FAX hand written
- ___ Mail hand written
- X Mail typed report
- ___ Electronically transfer report
- ___ Phone preliminary results

For information about services or assistance in completing this form please refer to the Central Laboratory WEB page. [www.qic.ford.com/centrallabcms.html]
Laboratory number and date cannot be assigned without receipt of samples.
Samples will be disposed of after 30 days unless otherwise indicated above.

CL-Form #CLF07_01

3713 7801

All shaded areas must be filled in to process your request

Administrative Use Only

Laboratory Number	Date
9900226	1-26-99 SL

Request for Central Laboratory Service

15000 Commy Dr., Dearborn, MI 48120-1257 Phone [313] 32-21676 FAX [313] 32-21614

Your Name [Send report to]	Telephone	PROFS ID	FAX
G. STEVENS	366880	GSTEVEN1	366880
Secondary Contact	**Telephone**	**PROFS ID**	**FAX**
N. LA POINTE	42688	NLAPOINTE	

Send Report To / **Bill To**

Room No./Mail Drop/PO Box	Department/Activity	Building	Location Code	Dept. #	Work Task # [For 5400 Loc. Only]
MD 5006	MATERIALS ANT	BLDG #3	5100	7113	XQG464

Samples

Total # of Samples	Sample Handling	TOX/CAS#	Source	Supplier Code
	X Return after use ___ Dispose after use ___ Dispose after 30 days			

Part/Material Name	Sample Identification [Continue below if needed]	Part Number [If any]	Material Specification [If any]	CPSC Code	Supplier
SPEED CONTROL CUTOFF SWITCH	A, B, C, D, 11(E), AND F	F2YY 9A524 A	N/A	--.--.--	TEMS INCORPORATED
				--.--.--	
				--.--.--	
				--.--.--	

Investigation

Nature of Investigation/Specific Tests Required [Check all that apply]	Requester Initls. Box [For requester use]
___ Production/Plant problem X Failure Analysis X Legal ___ Specification Compliance ___ Perform Tests as in Lab No. _____ ___ Paragraph [Describe below] ___ Use Specification _____ as a guide ___ Other [Describe below]	
Stop testing upon failure? ___ No ___ Yes	**Does this support CAE testing?** [If "Yes", what is the expected outcome?] X No ___ Yes
	Do you need to know your CL contact and timing? ___ Yes

Additional Sample Information/Testing Requirements

DISASSEMBLE SWITCHES IN ASSEMBLY AND RETURN FOR TEMS INSPECTION.

REQUEST ANALYSIS TO ASSIST IN DETERMINING CAUSE OF FAILURE SUSPECT FAILURE ON LANYARD

Report

Format [Check all that apply]	
Date you would like report 2-11-99	___ FAX preliminary results ___ FAX hand written X Mail typed report
Date you must have report 2-11-99	___ FAX typed report ___ Mail hand written ___ Electronically transfer report ___ Phone preliminary results

For information about services or assistance in completing this form please refer to the Central Laboratory WEB page. (www.go.ford.com/centrallabs.htm)
Laboratory number and date cannot be assigned without receipt of samples.
Samples will be disposed of after 30 days unless otherwise indicated above.

CL-Form #CLF07_01

3713 7802

Central Laboratory

Reports 9900226
9900607
9901571

Table 1
Appendices A, B, and C

3713 7803