



U.S. Department
of Transportation


National Highway
Traffic Safety
Administration

Memorandum

Vehicle Research and Test Center P.O. Box B37
East Liberty, Ohio 43319
(937) 666-4511

Subject: FINAL REPORT: VRTC-DCD7106 "Investigation of
Instrument Panel Warpage That May Affect Passenger Airbag
Deployment"

Date:

From: 
Michael W. Monk
Director, Vehicle Research and Test Center

Reply to NVS-310
Attn. Of:

To: Kathleen DeMeter
Director, Office of Defects Investigation

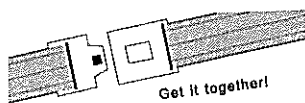
NVS-210

Attached are four (4) copies of the subject report. This completes the requirements for this program.

Attachment:
Final Report

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Investigation of Instrument Panel Warpage That May Affect Passenger Airbag Deployment



VEHICLE RESEARCH AND TEST CENTER
EAST LIBERTY OHIO 43319-0337

FINAL REPORT
November 2007



U.S Department of Transportation
National Highway Traffic Safety Administration

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16. Abstract <p>This test program was performed to investigate if alleged defects in the instrument panel in 1999-2000 Ford Contours and Mercury Mystiques affected safe operation of the vehicles.</p> <p>This testing was in response to a petition that the Office of Defects Investigation (ODI) had received requesting evaluation of the instrument panel warping on the subject vehicles. In August 2001, the petitioner received a letter from Ford regarding customer satisfaction program number 01B78. The program offered a no cost repair (regardless of mileage) to correct an instrument panel warpage condition. The program was in effect until August 31, 2002. When the petitioner received the letter, he was advised by his Lincoln-Mercury dealer that his vehicle was not in need of repair. By 2006, the condition on his vehicle worsened, and he was no longer covered by either the program or his original vehicle warranty. The petitioner alleges that "...Improperly retained instrument panel components can be detrimental to the desired performance of front [passenger side] air bag deployment as well as becoming projectiles during air bag deployments."</p> <p>The purpose of this investigation was to provide information to allow ODI to evaluate the petition for a grant or deny decision. Field surveys of complaint vehicle owners were conducted to evaluate the current extent of the problem. Comparative testing of vehicles with and without the alleged defect as well as peer vehicles was conducted. Comparative testing was conducted in the areas of forward field of view and windshield defrost rates. Additionally, vehicle owners sending in a Vehicle Owner's Questionnaire (VOQ) were contacted and a detailed disassembly inspection of the configuration of the passenger airbag assembly was conducted.</p> <p>Results showed negligible differences in forward visibility and similar overall defrost rates for vehicles with and without the alleged defects and peer vehicles. A survey of all vehicle owners sending in a VOQ in a tri-state area (IN-MI-OH) located only three vehicles that could be inspected. Most of these VOQs did express concern over defrost rates. The detailed inspection of the vehicle determined that the instrument panel warpage would not significantly affect airbag deployment due to the configuration of the instrument panel, its internal bracing, the location, and means of securing the airbag itself.</p>			
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1.0 INTRODUCTION

The Office of Defects Investigation (ODI) received a petition to investigate instrument panel warping on Model Year 1999-2000 Ford Contours and Mercury Mystiques. In August 2001, the petitioner received a letter from Ford Motor Company regarding customer satisfaction program number 01B78. The program offered a no cost repair (regardless of mileage) to correct an instrument panel warpage condition. The program was in effect until August 31, 2002. When the petitioner received the letter, he was advised by his Lincoln-Mercury dealer that his vehicle was not in need of repair. By 2006, the condition on his vehicle worsened, and he was no longer covered by either the program or his original vehicle warranty. The petitioner alleges that “...improperly retained instrument panel components can be detrimental to the desired performance of front air bag deployments as well as becoming projectiles during air bag deployments.” The ODI complaint database has many complaint reports alleging instrument panel warpage on the subject vehicles. The predominate complaint allegation in these reports was that the warpage may block air coming out of the defroster.

1.1 Objectives

The purpose of this investigation was to provide information to allow ODI to evaluate the petition for a grant or deny decision. The Vehicle Research and Test Center (VRTC) planned the following activities (steps) to discover how instrument panel warpage affected the vehicle operation:

1. Field surveys of complaint vehicles and owner interviews are to be conducted to evaluate the current extent of the problem.
2. Comparative tests are to be conducted that will provide an evaluation of a 1999-2000 Ford Contour or Mercury Mystique vehicle versus a 1999-2000 Ford Contour or Mercury Mystique with none of the alleged defects.
3. Additionally, peer vehicles are to be evaluated to compare their results with those of the complaint vehicle.¹
4. Comparative tests are to be conducted to determine forward field of view and windshield defrost rates for vehicles with and without the instrument panel warpage.
5. A detailed disassembly and inspection of the passenger airbag assembly and peripheral components is to be conducted.

¹ Hereafter vehicles with alleged problems, vehicles without alleged problems and other vehicles of similar size will be known as complaint, non-complaint, and peer vehicles respectively.

6. In addition, the potential effects of the instrument panel and adjacent structures on airbag deployment are to be evaluated.

2.0 TEST and ANALYTICAL APPROACH

The testing and evaluation performed on these vehicles was conducted to answer basic concerns about how the warpage of the instrument panel might affect the operation of the motor vehicle. Work performed included surveys and interviews of vehicle owners and inspections of complaint vehicles. Concerns about the vehicles included the possible diminishing of the forward field of view of the driver, the potential changes in the defrost rate of the front windshield, and the possibility of changes in the instrument panel affecting passenger airbag deployment.

2.1 Local Vehicle Owners Surveys

VRTC contacted persons who had filled out a Vehicle Owner Questionnaire (VOQ) to evaluate their level of concern and to locate vehicles with the alleged problem for further analysis. VOQs for complaint vehicles were evaluated for content and an attempt was made to contact all VOQ submitters in a tri-state area. Additionally, literature searches were made on the history of the problem as to what if any adverse effects occurred as a result of the alleged complaints.

2.2 Forward Visibility Tests

Tests of forward visibility for the Ford Contour complaint vehicle, a Ford Contour non-complaint subject vehicle, and peer vehicles were conducted at VRTC.² The test consisted of determining the distance from the vehicle front bumper at which the top of a centrally located 28-inch traffic cone could be detected (as shown in Figure 1). The 28-inch traffic cone approximates the height of a child less than one year old.³ An additional target of a 12-inch traffic cone⁴ was also used to achieve better resolution (more differentiation). Test subjects included a 4'9" woman and a 5'3" woman both closely approximating a 5th percentile female and a 6'1" man approximating a 95th percentile male.

Various seat positions were specified as a function of drivers' size and available seat positions. Alternative vehicle configurations such as having the wipers up or wipers down were made during the tests (e.g. wipers down due to the height of wiper blades or arms might

² Testing was conducted on a grid located Building C, Transportation Research Center, 10820 SR347, East Liberty, OH 43319-0337

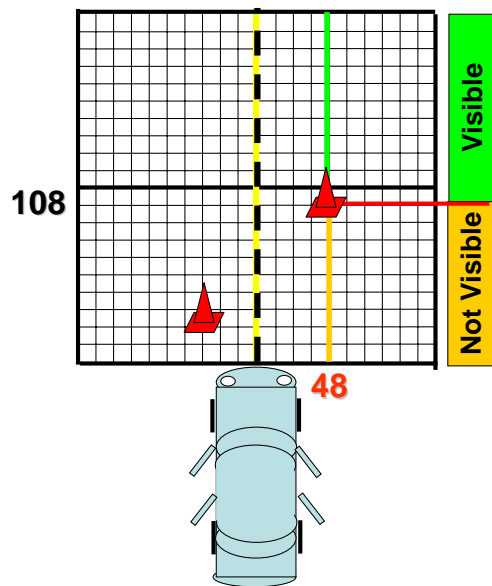
³ Centers for Disease Control, Clinical Growth Charts.

http://www.cdc.gov/nchs/about/major/nhanes/growthcharts/clinical_charts.htm#Clinpercent201 Accessed 01/23/07.

⁴ Exact height was 11.75 inch.

overshadow the effects of a warped instrument panel.). The cones were moved along lines parallel to the vehicle's centerline (as shown in Figure 1) until the target became visible to the driver.

A major concern is that any restrictions on a vehicle's forward visibility will increase the risk of hitting an object or a small child. However many things affect forward visibility. The driver's visibility of the roadway environment through the windshield varies greatly from vehicle to vehicle due to a number of factors not related to defects. This is due to unique vehicle features including vehicle height, front and rear suspension height, tire size, front and rear weight distribution (engine size), the driver's seating height, the position of the seat and seat back, location and configuration of windshield wipers, the size, and location of the A-Pillar, and the front windshield layout.



Numerical results show the closest distance at which the top of an object of a specified height (assume a twelve-inch cone) can be seen in front of the vehicle by the driver. Thus a blind "spot" 108 inches (9 feet) long would exist at 48 inches (4 feet) to the right of the centerline of the vehicle. Any object located at 48 inches to the right of the vehicle could not be seen unless it was at least 108 inches in front of the vehicle.

Figure 1 – Test Method of Moving a Target Cone on a Grid Until Visible

Additionally, the location and dimensions of the windshield wipers and windshield wiper arms, the length and contour of the vehicle hood, the shape and size of the instrument panel, the location of any top mounted gage clusters, and the minimum steering wheel height affect the forward view as well.

In front of a vehicle, there is an area or zone in which a driver cannot see. This can be referred to as a “blind zone.” The numbers discussed in this section are referred to as “blind spots.” This is because they only represent a single testing point (or spot) in front of the vehicle rather than the whole zone (Pictures of the overall test setup are shown in Figures 2 through 5.).



1999 Ford Contour non-complaint vehicle (good instrument panel) positioned on sight distance grid in preparation for testing.
Figure 2 – 1999 Ford Contour Forward Visibility Test



2000 Ford Contour complaint vehicle located on test grid. Note vehicle track width is within +3 ft and -3 ft.
Figure 3 – 2000 Ford Contour – Warped Instrument Panel Forward Visibility Test



2005 Saturn Ion peer vehicle positioned on sight distance grid in preparation for testing.

Figure 4 – 2005 Saturn Ion Visibility Test



1999 Volvo S80 peer vehicle positioned on sight distance grid in preparation for testing.

Figure 5 – 1999 Volvo S80 Visibility Test

2.3 Defroster Tests

Tests of defrost rates of the subject vehicles were made using ambient weather conditions available at VRTC during December 2006. Vehicles were cold soaked overnight. Natural frost, snow and a sprayed ice coating were all evaluated on various combinations of vehicles.

Under each of these conditions, the vehicles were simultaneously started and defroster and temperature settings were turned to maximum. Photographic evidence recorded the ability of the defroster systems to clear the windshields as a function of time.

2.4 Passenger Airbag Deployment Evaluation

With respect to airbag deployment, the entire instrument panel and passenger side air bag attachments and covers were disassembled and examined. Evaluations were made as to the potential effect of the warped instrument panel based on this inspection and method of airbag deployment. A detailed inspection of a non-complaint vehicle was made of the structure, layout, fabrication, assembly, and installation of the instrument panel, and passenger airbag assembly.

3.0 RESULTS

3.1 Local Vehicle Owner Surveys Results

ODI forwarded VOQs to VRTC originating in Indiana, Michigan, and Ohio. Of the twenty-one VOQs submitted from this tri-state area, only ten owners could be contacted.⁵ Only seven vehicles could be located. Of these, three were potential candidates for an onsite inspection. Two were inspected. The effects of this warpage on these two vehicles are shown in the photographs below.

Attempting to locate vehicles met with some difficulty. Some of these Vehicle Owner's Questionnaires dated⁶ as far back as the May 2003, and the many of the owners were unavailable at reference numbers and addresses or the vehicles were no longer in possession of the owners. For immediate inspection, one vehicle, a Model Year 2000 Ford Contour, was located in Hillsdale, Michigan. This vehicle had only a minimum amount of instrument panel warpage and only in front of the driver (Figures 6 and 7). A second vehicle to be inspected was a 2000 Ford Contour located in Lima, Ohio (Figures 8 and 9). It was owned by a Warsaw, Indiana driver.⁷ This vehicle had much more pronounced instrument panel warpage. A third vehicle was located in Detroit, Michigan, but the owner could not make the vehicle available for a near term inspection. The first two vehicles were inspected and subsequently, the second vehicle was leased for further evaluation. A third 1999 Ford Contour with no instrument panel warpage was obtained to be used as a non-complaint subject vehicle for comparison evaluations (Figures 10 and 11).

⁵ If the vehicle was listed in the CARFAX database as having an accident (accidents not related to complaint) the owner was not contacted due to potential effects of any damage on integrity of vehicle.

⁶ The oldest VOQ was received in May 2003, the newest in August 2006 and the average age after having been received was two years (as of January 2006).

⁷ The car was temporarily located in Lima Ohio; the owner's son was driving the vehicle and was attending school in Lima, Ohio (within 51 miles of VRTC).



Figure 6 – 2000 Ford Contour with Warped Instrument Panel (Hillsdale MI)



Arrow shows warpage on instrument panel on driver's side of vehicle.

Figure 7 – 2000 Ford Contour with Warped Instrument Panel, Close-up (Hillsdale MI)



Figure 8 – 2000 Ford Contour with Warped Instrument Panel (Lima OH)



Arrows show instrument panel warpage on driver's and passenger's sides of the vehicle.
Figure 9 – 2000 Ford Contour with Warped Instrument Panel Close-up (Lima OH)



Figure 10 – 1999 Ford Contour Non-Complaint Vehicle,
Good Instrument Panel



Figure 11 – 1999 Ford Contour Non-Complaint Vehicle,
Good Instrument Panel, Close-up

3.2 Forward Visibility Tests Results

As mentioned, four vehicles were evaluated with various tests. These vehicles were a 1999 Ford Contour non-complaint vehicle with a good instrument panel, a 2000 Ford Contour complaint vehicle with a warped instrument panel, a 2005 Saturn Ion peer vehicle, and a 1999 Volvo S80 peer vehicle. Various seat adjustments were available. The Ford Contours had no vertical seat adjustments. Vertical seat adjustments for the Saturn Ion spanned a range of 1-5/8 inches, and tests were run in both the full up and full down position. All tests with the Volvo S80 were run in a full up position. The Reference location for all vehicle measurements was the driver's door striker.⁸

Other options for testing included putting the wipers in an up position in 2000 Ford Contour Complaint vehicle. This caused forward visibility to be exclusively affected by the warped instrument panel. This also eliminated effects of wiper variability and avoided the effect of looking under wipers.^{9,10} For the Saturn Ion peer vehicle (2005) wipers were raised during some tests to minimize the effect of very high wiper arms and the effect of looking under wipers. Refer to Figures 12 through 15 for typical test activities.

⁸ Note: No vehicle fiducial marks were immediately available in the areas of interest. Therefore, the driver door striker was used as the main reference point for all driver location measurements.

⁹ Other differences between the 2000 Ford Contour Sport complaint vehicle and the 1999 Ford Contour peer vehicle included the following: For the 2000 Ford Contour Sport complaint vehicle the eye height was higher (~1 in) for the same driver and the suspension was stiffer (less sag in rear)

¹⁰ Additionally, variability in results was caused by the human subjects themselves. Unless otherwise noted, one set of results represents an average of their visual sightings for each position.



Typical set-up in TRC Building C for field of view test. Note 12-inch cone on grid on 1999 Contour centerline.

Figure 12 – Visibility Test - Typical Test Setup



Adjusting the 12-inch cone to measure forward field of view in the 2000 Contour complaint vehicle

Figure 13 – Visibility Test - Adjusting Cone



Typical Measurement location. Arrow shows tip of cone just entering field of view.

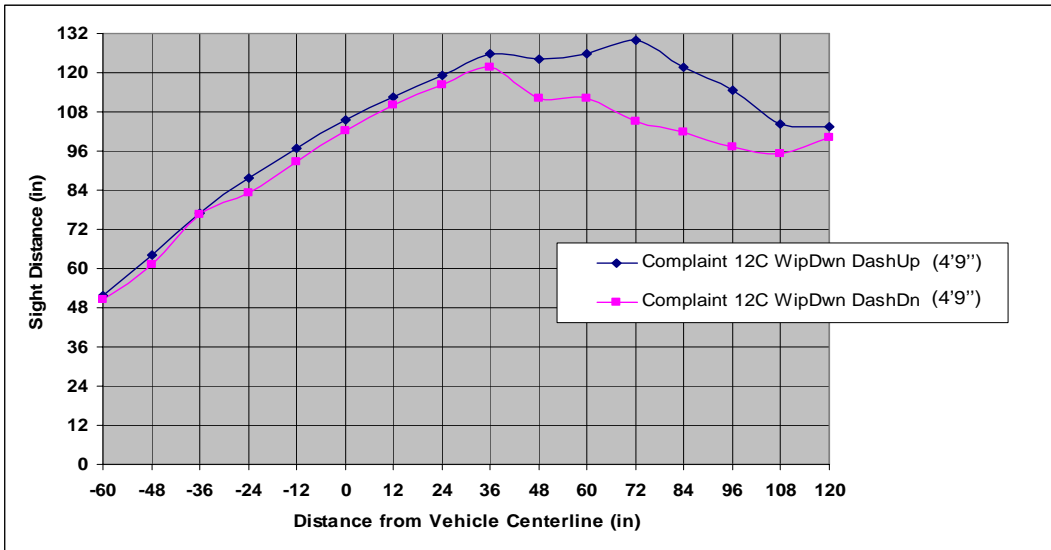
Figure 14 – Visibility Test - Cone Entering Field of View



Minimum distance of visibility of taillights in 2000 Ford Contour was at point of contact of vehicles.

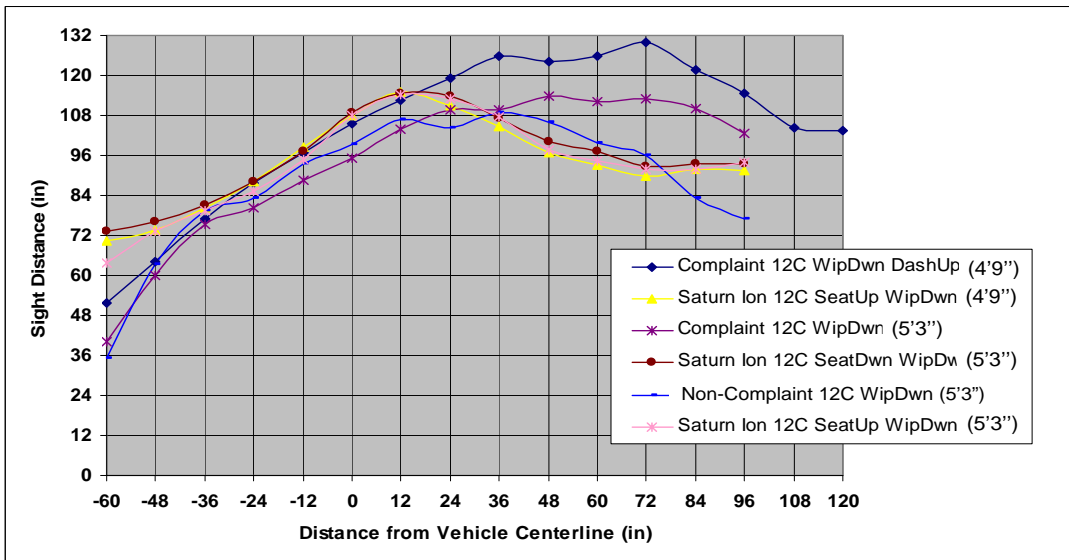
Figure 15 – Taillights Visible at 0 ft. by Complaint Vehicle

The results are summarized in the following graph (Figures 16 through 21):



Complaint vehicle with 4'9" height test subject with and without a warped instrument panel (warped instrument panel held down). Locations on the left side of the vehicle and any location directly in front of the vehicle show little difference in viewing distance.

Figure 16 – Complaint Vehicle without Effects of Instrument Panel Warpage¹¹

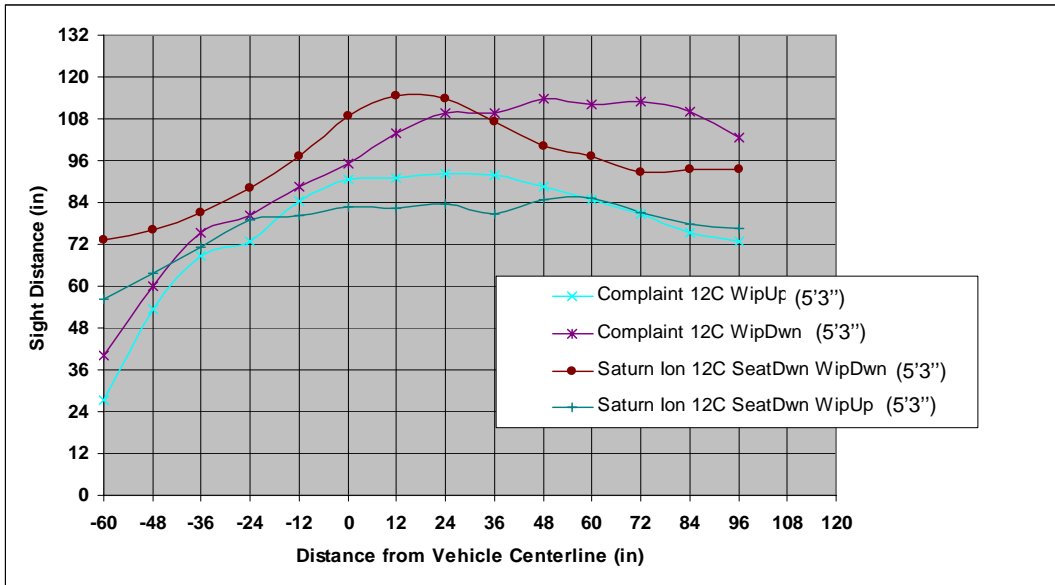


Comparison of Complaint Vehicle, Non-Complaint Vehicle, and Saturn with windshield wipers in down position for the 4'9" and 5'3" test subjects.

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Figure 17 – Complaint, Non-Complaint and Saturn Vehicles with Wipers Down

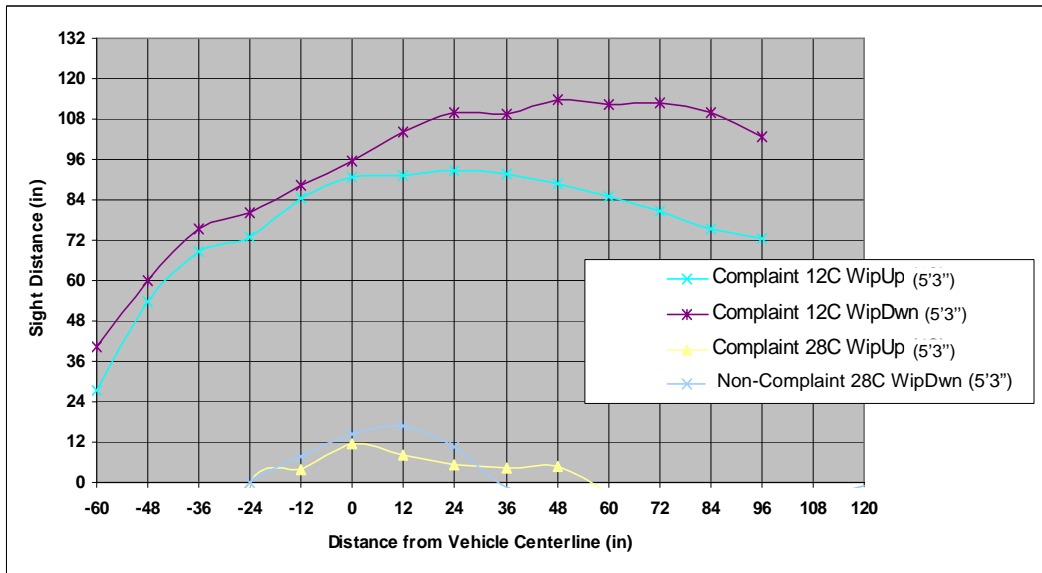
¹¹ 2000 Ford Contour is "Complaint," 1999 Ford Contour is "Non-Complaint," 28 inch cone is "28C," 12-inch cone is "12C," wipers in down position is "WipDwn," wipers in raised position off the windshield is "WipUp," warped instrument panel in deformed position is "DashUp," warped instrument panel secured in undeformed position is "DashDn," seat in full up position when adjustable is "SeatUp," and Seat in full down position when adjustable is "SeatDwn; heights refer to driver heights.



Comparison of Complaint Vehicle and Saturn With Wipers Up and Wipers Down for the 5'3" Test Subjects

18

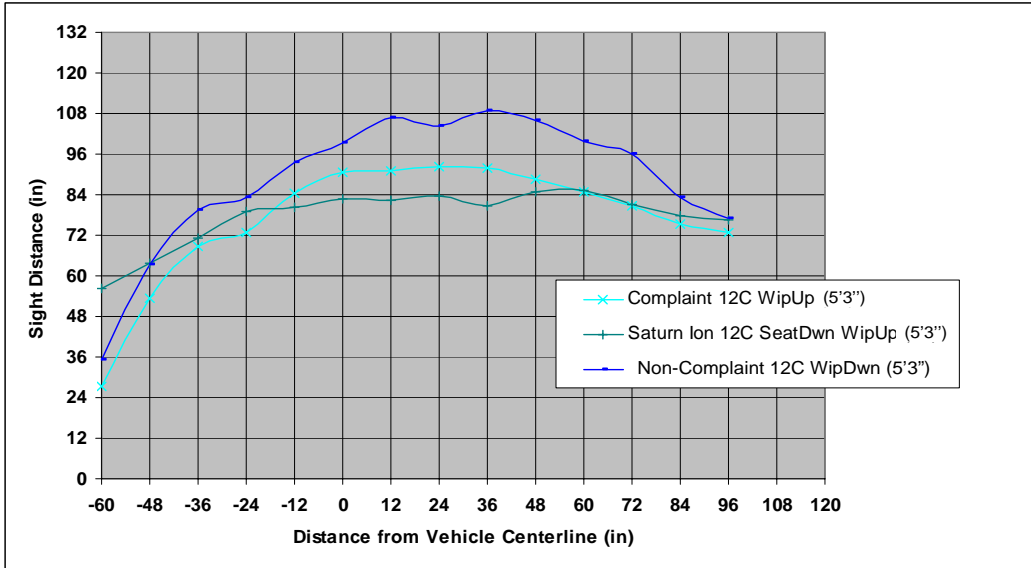
Figure 18 – Comparison of Complaint Vehicle and Saturn with Wipers Up and Down



Comparison of Contour Complaint Vehicle and Non-Complaint Contour with 28 inch cone and 12 inch cone for the 5'3" test subject.

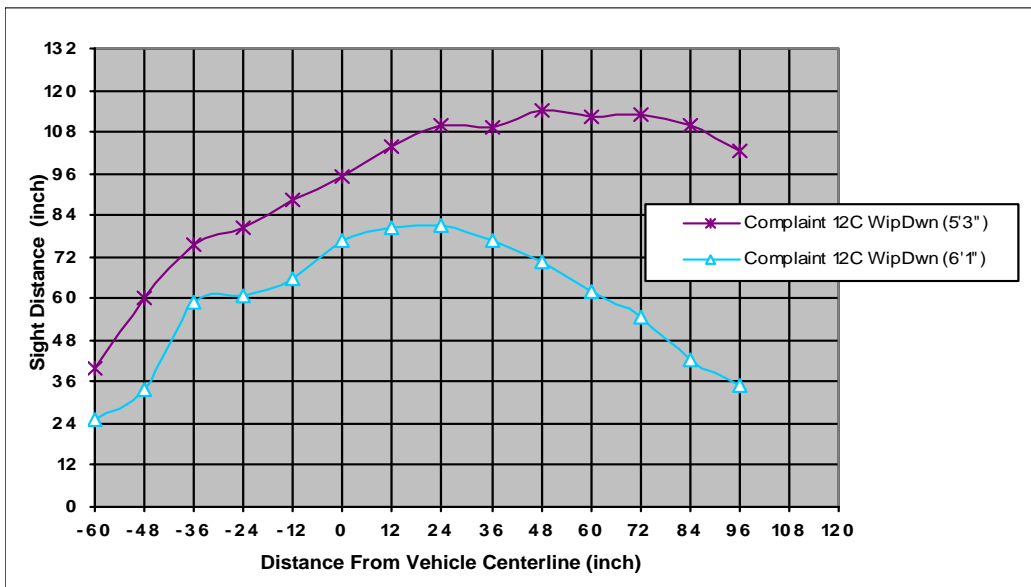
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Figure 19 – Comparison of 12-inch Cone and 28-inch Cone



Forward Sight Distance as a Function of Offset from Vehicle Centerline for a 5'3" test Subject Viewing a 12 inch Cone

Figure 20 – Forward Sight Distance for Various Seat Configurations



Forward sight distance comparison between a 6'1" test subject and a 5'3" test subject for the MY1999 Ford Contour complaint vehicle.

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Figure 21 – Comparison of 6'1" and 5'3" Test Subjects with 12-inch Cone

3.3 Defroster Tests Results

The 2000 Contour complaint vehicle, the Saturn peer vehicle, and the Volvo peer vehicle had all cold soaked overnight at a temperature that ranged from 30.6 deg F at 12 Midnight to 20.7 deg at 8 am.¹² The complaint vehicle and Volvo were started first. When these were finished, the Saturn was run independently. The Saturn vehicle was run under the same ambient conditions. Picture intervals were selected to show significant changes in clearing of the windshields.¹³

Table 1 – RESULTS OF VEHICLE DEFROSTER TESTS ON HARD FROST

VEHICLE	TYPE	TIME	TIME TO DEFROST	REMARKS
2000 Contour	Complaint	7:56-8:11 am	15+ min	Clearance with ~15% frost remaining
1999 Volvo S80	Peer	7:56-8:11 am	11 min	Fast front and rear defrost. Good defrost rate.
2005 Saturn Ion	Peer	8:19-8:33 am	12 min	Slow defrost start; with good side defrost with ~10% frost remaining.

This pictorial test data follows. See Figures 22 through 26 for results of the Ford Contour complaint vehicle test. See Figures 27 through 30 for results of the Volvo S80 peer vehicle test. See Figures 31 through 36 for results of the results of the Saturn Ion peer vehicle test.

¹² The 1999 Contour non-complaint vehicle was inside for other testing.

¹³ Due to dew point temperature, a layer of approximately 1/32 inch of heavy frost built up on all car surfaces. Note: the temperature continued to fall to 20.6 deg F at 8:30 am. The sun had risen (sunrise at 7:53 am Bellefontaine, OH) but no direct sun shown on the vehicles.



2000 Ford Contour complaint vehicle, Wednesday, December 20, 2006, 7:56:15 AM

Figure 22 – Complaint Defrost Test Start



2000 Ford Contour complaint vehicle, Wednesday, December 20, 2006, 8:03:01 AM

Figure 23 – Complaint Defrost Test – 7 min



2000 Ford Contour complaint vehicle, Wednesday, December 20, 2006, 8:05:33 AM

Figure 24 – Complaint Defrost Test – 9 min



2000 Ford Contour complaint vehicle, Wednesday, December 20, 2006, 8:10:29 AM

Figure 25 – Complaint Contour Defrost – 14 min



2000 Ford Contour complaint vehicle, Wednesday, December 20, 2006, 8:11:25 AM

Figure 26 – Complaint Contour Defrost - 15 min

Figures 22-26. Ford Contour Complaint Vehicle Defroster Test Results.



1999 Volvo S80 peer vehicle, Wednesday, December 20, 2006, 7:56:39 AM

Figure 27 – Volvo S80 Peer Vehicle, Defrost Test Start



1999 Volvo S80 peer vehicle, Wednesday, December 20, 2006, 8:03:19 AM

Figure 28 – Volvo S80 Defrost Test – 7 min



1999 Volvo S80 peer vehicle, Wednesday, December 20, 2006, 8:05:53 AM

Figure 29 – Volvo S80 Defrost Test – 9 min



1999 Volvo S80 peer vehicle, Wednesday, December 20, 2006, 8:09:35 AM

Figure 30 – Volvo S80 Defrost - 13 min

Figures 27-30. Volvo S80 Peer Vehicle Defroster Test Results



2005 Saturn Ion peer vehicle, Wednesday, December 20, 2006, 8:19:29 AM

Figure 31 – 2005 Saturn Ion Defrost - Start



2005 Saturn Ion peer vehicle, Wednesday, December 20, 2006, 8:23:01 AM

Figure 32 – Saturn Ion Defrost – 3 min



2005 Saturn Ion peer vehicle, Wednesday, December 20, 2006, 8:24:49 AM

Figure 33 – Saturn Ion Defrost – 5 min



2005 Saturn Ion peer vehicle, Wednesday, December 20, 2006, 8:25:37 AM

Figure 34 – Saturn Ion Defrost – 6 min



2005 Saturn Ion peer vehicle, Wednesday, December 20, 2006, 8:30:41 AM

Figure 35 – Saturn Ion Defrost – 11 min



2005 Saturn Ion peer vehicle, Wednesday, December 20, 2006, 8:32:05 AM

Figure 36 – Saturn Ion Defrost – 12 min

Figures 31-36. Saturn Ion Peer Vehicle Defroster Test Results

3.4 Passenger Airbag Deployment Evaluation Results

With respect to airbag deployment, a detailed inspection was made of the structure, layout, fabrication, and assembly of the passenger air bag area of a non-complaint vehicle (reference Figures 37 through 50). The instrument panel warpage involves the skin of the instrument panel. The inspection showed that the Supplemental Restraint System (SRS) passenger airbag cover was a metal plate that was bolted at its rear (closest to the front of the vehicle) to a metal support plate imbedded in the instrument panel.¹⁴ The SRS Passenger Side Airbag itself is bolted to the frame of the vehicle and its aim is not affected by the warpage. The SRS airbag cover also has two plastic fasteners in front (closest to the passenger) which will release when the airbag is deployed (see Figure 42). If the airbag deployed, the front of the plate had plastic tie downs that would release and the plate would deform, allowing the airbag to deploy.



1999 Contour non-complaint vehicle, good instrument panel cover.

Figure 37 – 1999 Contour Passenger SRS Inspection

¹⁴ to allow both the instrument panel and SRS Airbag Cover to be removed together



Details of passenger side airbag location on 1999 Contour non-complaint vehicle with good instrument panel.

Figure 38 – 1999 Contour Passenger SRS Inspection – View 2



Passenger side airbag SRS location and cover on 1999 Contour non-complaint vehicle with good instrument panel.

Figure 39 – 1999 Contour Passenger SRS Inspection – View 3



1999 Contour non-complaint vehicle with good instrument panel and with passenger side airbag SRS cover removed. Note mounting points for the SRS Cover.

Figure 40 – SRS Inspection, Cover Removed



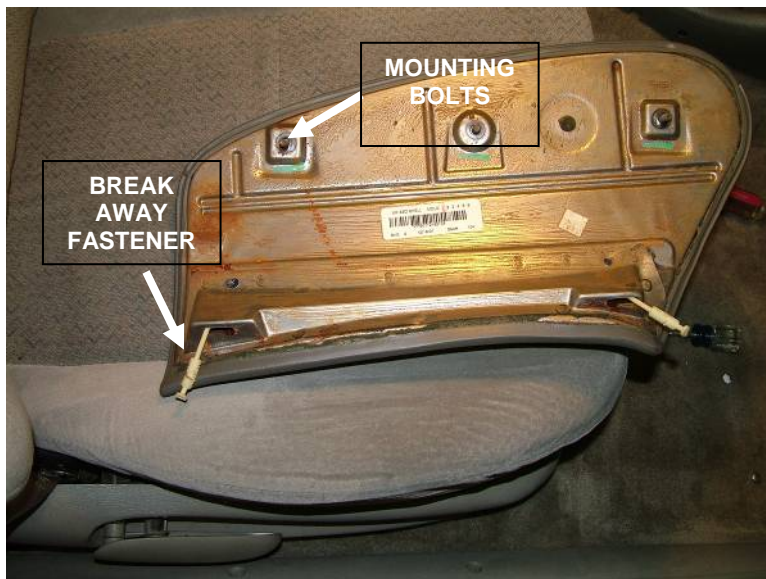
1999 Contour non-complaint vehicle with good instrument panel with SRS cover and airbag removed.

Figure 41 – SRS Inspection, Airbag Removed



1999 Contour non-complaint vehicle with good instrument panel, passenger side airbag SRS location with cover, and airbag removed – close-up.

Figure 42 – SRS Inspection, Airbag Removed – View 2



1999 Contour, bottom view of SRS cover with mounting bolts for the forward side of the cover and breakaway fasteners for the rear (closest to the passenger).

Figure 43 – SRS Cover, Bottom View



1999 Contour, bottom view of SRS cover in place attached to instrument panel frame. Note details of bolts attaching the cover to the frame cross member.

Figure 44 – SRS Cover as Attached to Frame



1999 Contour non-complaint vehicle, Passenger Side Airbag

Figure 45 – SRS Inspection Airbag Assembly



1999 Contour non-complaint vehicle with good instrument panel, with entire instrument panel assembly removed.
Figure 46 – SRS Inspection View of Frame with instrument panel Removed.



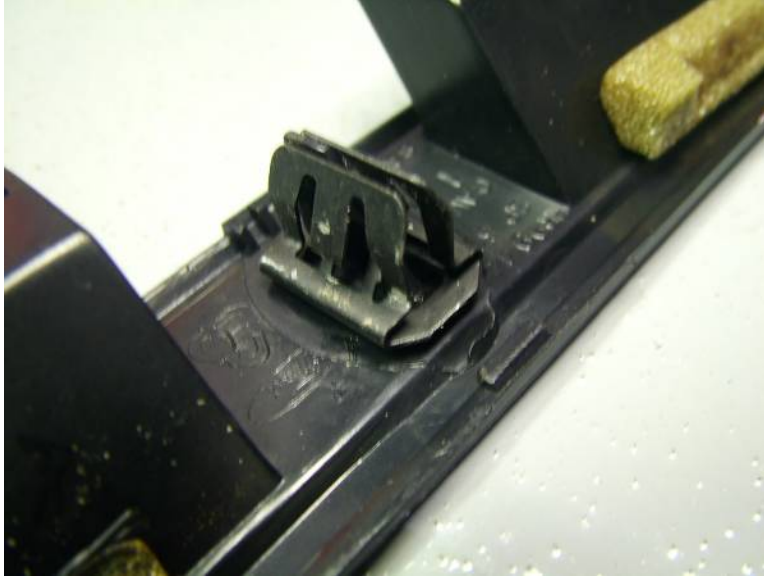
1999 Contour non-complaint vehicle showing position of defroster register with respect to SRS location.
Figure 47 – SRS Inspection Showing Register In instrument panel



1999 Contour non-complaint vehicle instrument panel with register after removal from vehicle. Register was set in place.
Figure 48 – SRS Inspection Showing Register In instrument panel, View 2



1999 Contour non-complaint vehicle defroster register underside after removal from the vehicle.
Figure 49 – SRS Inspection, Bottom View of Register



1999 Contour non-complaint vehicle defroster register underside close-up of attachment clip.

Figure 50 – SRS Inspection, Detail View of Register Clip.

4.0 FINDINGS

The findings of these surveys and tests are as follows:

4.1 Local Vehicle Owner Surveys

As mentioned, of 21 VOQs submitted in a tri-state area, only seven complaint vehicles could be located.¹⁵ Of these, three were potential candidates for an onsite inspection. No accidents were reported as having been caused by this alleged defect. For Indiana, Michigan and Ohio there were only four, seven, and ten VOQs respectively. From this sample, five VOQs were received in 2003, four in 2004, nine in 2005 and only three in 2006. The newest VOQ was dated August 14, 2006. Of the 21 VOQs complaining about a warped dash (instrument panel), only six mentioned possible visibility problems and ten mention the possibility of defroster problems.¹⁶

4.2 Forward Visibility Tests

Test of forward visibility for a variety of driver, vehicle configurations, and visibility targets showed similar forward “blind spots” for all the vehicles tested. The windshield wipers (raised out of position or lowered in position) and differences in car models sometimes had a greater effect on forward visibility than the effects of warped instrument panel (test run with the instrument panel secured back into position).

The maximum blind spot even in the complaint vehicle with a 28-inch cone was only 12 inches for a 5’3” test subject. Because the 5’3” test subject’s result with the 28-inch cone showed minimal loss of vision (see Figure 19), no further tests were run with this cone after the initial complaint and non-complaint vehicle tests. For the 12-inch cone, the 6’1” test subject’s forward visibility was on average 35 inches better than the 5’3” test subject (see Figure 21). Therefore, we can conclude that there would be almost no loss of forward visibility for the 6’1” test subject with the 28-inch cone.

For a 12-inch cone,¹⁷ the average increase in the blind spot for a 4’9” test subject from 3 ft left of the vehicle centerline to 3 ft right of the vehicle centerline was 3 inches. The average increase in the blind spot for a 4’9” test subject from 3 ft right of the vehicle centerline to 10

¹⁵ One additional complaint vehicle was found that had been repaired.

¹⁶ Based on owner interviews or the VOQ description if the owner could not be contacted.

¹⁷ As mentioned, a much smaller cone (12-inch) had to be used to show differentiation.

ft right of the vehicle centerline was 14 inches and the maximum increase was 25 inches (reference Figure 16 -- Complaint Vehicle without Effects of Instrument Panel Warpage).

4.3 Defroster Tests

Tests of defrost rates of the subject vehicles showed similar windshield clearing rates for frost for the Ford Contours with instrument panel warpage, the 1999 Volvo S80, and the 2005 Saturn Ion.

4.4 Passenger Airbag Deployment

Based on the inspection, the instrument panel warpage was not in the path of the airbag deployment.

APPENDIX A – ACRONYMS and DEFINITIONS

A1 Acronym List

Table A1 - ACRONYM LIST

ACRONYM	DESCRIPTION
A	Ampere
A	Audits
CL	Centerline
DA	Defects Analysis
DCD	Defects and Crashworthiness (category) Defects
DOT	Department of Transportation
DP	Defect Petition ¹⁸
EA	Engineering Analysis
FMVSS	Federal Motor Vehicle Safety Standards
IPC	Instrument Panel Cover
MY	Model Year
NHSTA	National Highway Traffic Safety Administration
ODI	Office of Defects Investigation
OE	Original Equipment
OEM	Original Equipment Manufacturer
OVSC	Office of Vehicle Safety Compliance
PE	Preliminary Evaluation
SAE	Society of Automotive Engineers
SRS	Supplemental Restraint System (airbag)
TBD	To Be Determined
TIS	Technical Information Services
TRC	Transportation Research Center
V	Volt
VIN	Vehicle Identification Number
VOQ	Vehicle Owner's Questionnaire
VRTC	Vehicle Research and Test Center

A2 Definitions

Table A2 - DEFINITIONS

TERM	DEFINITION
Blind Spot	A specific test point in a defined location about a vehicle at which the driver cannot see a specified target.
Blind Zone	An area in a defined location about the vehicle in which the driver cannot see a specified object.
Register	Combination grille and damper assembly covering an air opening or the end of an air duct.
Striker	The mating part of door lock or hood latch mechanism that is secured to the body; the striker itself has no mechanism and provides only the anchor for the door or hood latch; typical strikers are stud or U-shaped. ¹⁹
Vehicle Fiducial Mark	These are holes, surfaces, marks, or indentations on the vehicle body as described by the manufacturer. Their location is specified in the three-dimensional reference system by X, Y, Z coordinates and to ground with the vehicle at a specified Vehicle Weight.

¹⁸ NHTSA Technical Information Services (TIS) <http://www.nhtsa.dot.gov/cars/problems/trd/?name=#DEFECT> (Accessed 01/23/2007)

¹⁹ Motor Era, <http://www.motorera.com/dictionary/car-dics.htm> (Accessed 01/22/2007)

APPENDIX B – REPORTS REFERENCED

B1 Report References

Table B1 - REPORTS REFERENCED

Number	Report Name
NA	NA

B2 Report Cited

Table B2 - REPORTS CITED

Number	Report Name
SAE J833 Revised 1989-05	Human Physical Dimensions
SAE J941 Revised 2002-09	Motor Vehicle Drivers' Eye Locations
SAE J1100 Revised JUN1998	Motor Vehicle Dimensions

APPENDIX C – TEST ARTICLES

Test Articles


The following test articles were used in this evaluation:

Table C1 - SUMMARY OF TEST ARTICLES

No.	Color	MY	Make	Model	VIN	Remarks
1	Blue	1999	Ford	Contour	1FAFP653XXKXXXXXX	Non-Complaint Vehicle
2	Black	2000	Ford	Contour	1FAFP66L7YKXXXXXX	Complaint Vehicle
3	Turquoise	2005	Saturn	Ion	1G8AL54F45ZXXXXXX	peer vehicle
4	White	1999	Volvo	S80	YV1TS97D3X1XXXXXX	peer vehicle

APPENDIX D – REPORTS, MEMOS, and OTHER DATA

The letter²⁰ for the original recall is as follows:

	
A.R. O'Neill Director Vehicle Service and Programs 48121 Ford Customer Service Division	Ford Motor Company P. O. Box 1904 Dearborn, Michigan
May 2002	
TO:	All Ford and Lincoln Mercury Dealers
SUBJECT:	Owner Notification Program 01B78 - Supplement #2 - All 1999 and 2000 Model Year Contour and Mystique Vehicles - Instrument Panel Cover Warpage: <ol style="list-style-type: none">1. Revised Repair and Technical Instructions2. Availability of New Repair Components3. New Labor Times for Revised Repair Procedure
OASIS :	Yes (OASIS will be reactivated the week of June 10, 2002 for this program)
OWNER LIST:	Yes
PARTS RETURN:	No
PROGRAM TERMS:	This program will be in effect until August 31, 2002, regardless of mileage. This program will be temporarily suspended on Tuesday May 28, 2002 and will be reinstated the week of June 10, 2002 to allow time to roll out the revised repair kit. All repairs after June 10, 2002 must be completed per Attachment III of this supplement.
REFERENCE:	Owner Notification Program 01B78, dated August, 2001 and 01B78 Supplement #1 dated December 2001: All 1999 and 2000 Model Year Contour and Mystique Vehicles - Instrument Panel Cover Warpage
NOTE:	Owner Notification Program 01B78 is being republished in its entirety. 01B78 Supplement #2 supersedes 01B78 and 01B78 Supplement #1. <u>Please discard all previous copies and replace them with this supplement.</u>
<u>REASON FOR THIS SUPPLEMENT</u>	
The instrument panel repair procedure has been enhanced to address some of the dealer-identified issues regarding appearance and repair complexity. These concerns have led to both dealer dissatisfaction and a high instrument panel replacement rate. Since the repair procedure has been revised, please note that the labor time for the new repair procedure has been revised as well. The revised repair procedure requires the use of a new repair kit that includes a new defroster grille cover that is placed on top of the defroster grille.	
<u>AFFECTED VEHICLES</u>	
All 1999 and 2000 MY Contour and Mystique vehicles built from the beginning of production for the 1999 model year to the end of production for the 2000 model year. All vehicles that have not had 01B78 or 01B78 S1 completed, regardless of whether the warpage is visible or not, should be serviced as soon as possible before expiration of this program.	

²⁰ ALLDATA Online, 1999 Ford Contour L4-122 2.0L CNG DOHC VIN Z SFI : Vehicle Level Instrument Panel, Gauges and Warning Indicators Technical Service Bulletins Recalls Campaign - Instrument Panel Cover Warpage, Revised <http://www.alldatapro.com/> (accessed 01/31/2007)

REASON FOR PROGRAM

Some of the original affected vehicles may experience warpage of the instrument panel cover at the front edge of the instrument panel cover near the windshield, above the instrument cluster and around the glove compartment. The warpage is accelerated in warmer climates and may not yet be apparent on vehicles operated in cooler climates. The warpage does not prevent normal function, but results in objectionable appearance.

SERVICE ACTION

Dealers must install instrument panel repair kits on all vehicles that have not had the repair performed per Owner Notification Program 01B78 or 01B78 Supplement #1. This repair must be performed even if visible warpage is not yet present.

Note: Instrument panel replacement is no longer covered under this program. Claims for instrument panel replacement with a repair date after May 28, 2002 will not be accepted for payment.

Note: Vehicles that were repaired previously by either 01B78 or 01B78 Supplement #1 were repaired with a validated repair kit and do not require any further repair.

IMPORTANT FACTS


- Since all instrument panels on affected vehicles are expected to warp, we highly recommended that OASIS be accessed to determine eligibility, and dealers should repair any in-stock units or vehicles currently at dealership for repair or maintenance.
- This program duration will not be extended nor will customers be notified again.
- This program expires August 31, 2002.
- This program does not cover instrument panel replacement. Instrument panel replacement can be requested using the following provisions:
 1. **Contact Dealers** - Your Ford Field Service Engineer must grant an approval after inspection of the instrument panel and deems the instrument panel "not repairable" for warpage. This program does not cover cosmetic issues such as foam voids or bubbles, damage or discoloration with the instrument panel.
 2. **Select Dealers** - Must call the Special Service Support Center at 1-800-325-5621 for prior approval. Failure to obtain approval will result in denial of the warranty claim. Replaced instrument panels will be requested for inspection on a random basis.

ATTACHMENTS

Attachment I: Administrative Information
Attachment II: Labor Allowances and Parts Ordering Information
Attachment III: Technical Information
Owner Notification Letter: Previously Sent to all 1999-2000 Contour and Mystique Owners

QUESTIONS?

Claims Information:.....1-800-423-8851

Sincerely,

Ann O'Neill
Director
Vehicle Service and Programs



U.S Department of Transportation
National Highway Traffic Safety Administration

