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ON-SITE AOPS INVESTIGATION

CASE NUMBER - IN01-017
LOCATION - Indiana
VEHICLE - 2000 FORD TAURUS SE
CRASH DATE - June 2001

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The crash investigation process is an inexact science which requires that physical evidence such as skid marks, vehicular damage measurements, and occupant contact points be coupled with the investigator's expert knowledge and experience of vehicle dynamics and occupant kinematics in order to determine the pre-crash, crash, and post-crash movements of involved vehicles and occupants.

Because each crash is a unique sequence of events, generalized conclusions cannot be made concerning the crashworthiness performance of the involved vehicle(s) or their safety systems.

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16. <i>Abstract</i> This report covers an on-site investigation of an air bag deployment crash that involved a 2000 Ford Taurus SE (case vehicle), a 1992 Ford Ranger XLT (1st other vehicle), several fixed objects, and a 1994 Dodge Caravan (2nd other vehicle). This crash is of special interest because the case vehicle was equipped with multiple Advanced Occupant Protection Systems (AOPS) and the case vehicle's driver (29-year-old male) sustained moderate injuries. The case vehicle was traveling south at high speed in the inside, southbound lane of a three-lane, one-way city street. The Ford pickup was traveling south in the center lane of the same city street and intended to continue traveling southbound. The Dodge minivan was traveling ahead of the Ford pickup in the center lane of the same city street and intended to continue traveling southbound. The case vehicle's driver attempted to change lanes and the right side of the case vehicle sideswiped the left side of the Ford pickup. The case vehicle veered sharply to the left, striking the raised curb on the east side of the roadway. The case vehicle went airborne, impacting and uprooting a sign post and simultaneously landing and bottoming out. When the front undercarriage of the case vehicle impacted the ground, it most likely caused the case vehicle's driver and front right air bags to deploy. The case vehicle continued south and struck another sign post, a large tree and a stone wall. The tree impact sheared off the right front wheel assembly, which rolled into the street and struck the Dodge. The case vehicle's driver was not wearing his available, active, three-point, lap-and-shoulder safety belt system and sustained, according to the Police Crash Report, moderate injuries and was hospitalized as a result of the crash. Because the case vehicle driver declined to cooperate, his specific injuries and treatment status are not known.					
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This on-site investigation was brought to the NHTSA's attention on June 13, 2001 through a newspaper article. This crash involved a 2000 Ford Taurus SE (case vehicle), a 1992 Ford Ranger XLT (1st other vehicle), several fixed objects, and a 1994 Dodge Caravan (2nd other vehicle). The crash occurred in June, 2001, at 3:33 p.m., in Indiana, and was investigated by the applicable municipal police department. This crash is of special interest because the case vehicle was equipped with multiple Advanced Occupant Protection Systems (AOPS) and the case vehicle's driver (29-year-old male) sustained moderate injuries in the crash. This contractor inspected the scene and vehicles on 19-20 June, 2001. The case vehicle driver declined to cooperate with this investigation. This report is based on the Police Crash Report, interviews with an eyewitness and the investigating police officer, scene and vehicle inspections, occupant kinematic principles, and this contractor's evaluation of the evidence.

SUMMARY

The case vehicle was traveling south at high speed in the inside, southbound lane of a three-lane, one-way, city street and was attempting to change lanes into the center southbound lane. The Ford pickup was traveling south in the center lane of the same city street and intended to continue traveling southbound. The Dodge minivan was traveling ahead of the Ford pickup in the center lane of the same city street and intended to continue traveling southward. The case vehicle's driver steered into the center lane. It is unknown what if any avoidance maneuvers the case vehicle's driver may have attempted prior to the crash. The initial impact occurred in the center southbound lane of the roadway; see **CRASH DIAGRAM** below.

The right side of the case vehicle sideswiped the left side of the pickup. The case vehicle veered sharply to the left, striking the raised curb on the east side of the roadway with its left front tire. The case vehicle overrode the curb and went airborne off the east side of the roadway before impacting and uprooting a sign post (ONE-WAY sign), and simultaneously landing and bottoming out. When the front undercarriage of the case vehicle impacted the ground, it most likely caused the case vehicle's driver and front right passenger air bags to deploy. The case vehicle continued in a southerly direction along the sidewalk/tree lawn, across an alleyway and impacted and knocked over a second information sign (mounted on double posts), and then struck a large tree. Upon impact with the tree, the case vehicle's right front wheel assembly came off and rolled southwestwardly down the street, impacting the back of the Dodge minivan.

As a result of the case vehicle's impact with the tree, the case vehicle pitched upwards while rotating approximately 80 degrees clockwise. The case vehicle's left rear tire struck and went over a concrete knee wall that separated the outside edge of the sidewalk and a landscape area. The case vehicle came to rest straddling the sidewalk with its front pointing downward and its rear tires on and over the concrete knee wall that separated the sidewalk from the landscaped area. The case vehicle was heading west-southwest at final rest.

The case vehicle was a front wheel drive 2000 Ford Taurus SE, four-door, five passenger sedan (VIN: 1FAFP53UXYG-----). The case vehicle was equipped with anti-lock brakes and multiple advanced occupant protection systems. The case vehicle was towed due to damage.

The case vehicle's contact with the Ford pickup (event 1) involved the right fender, with the CDC determined to be **12-RYES-1 (010)**. Direct damage began at the right front bumper corner and extended rearward to the right B-pillar. The exact direct damage width and maximum crush, although minimal, could not be determined because the damage was masked by the severe frontal impact with the tree. The case vehicle's curb impact (event 2) blew out the front left tire, with CDC **12-FLWN-3**. The case vehicle's third impact with the ONE-WAY regulatory sign involved the front right. The sign, which was located on the north side of the alleyway and faced east (i.e., for traffic exiting the alleyway), was supported by a U-channel steel post which, when struck, was uprooted and wrapped over the bumper and onto the hood, with the CDC determined to be **12-FREN-1 (360)**. The case vehicle's undercarriage impact with the ground (event 4) showed direct damage extending between the front wheels a measured distance of 121 centimeters [47.6 inches], with the CDC determined to be **00-UFDW-2**. The fifth impact involved an information sign that had two U-channel steel sign posts sunk in the ground with two U-channel extensions holding the sign and bolted to the anchored posts. The two upper posts and the sign broke away from the two lower posts. The case vehicle ran over the two lower posts while the upper posts and sign contacted the hood and windshield. It appears the sign pierced and holed the windshield near the left A-pillar. The CDC for the fifth event was determined to be **12-FLAN-6 (360)**.

The case vehicle's most severe impact (event 6, with the tree) involved the front right, with CDC **12-FREN-5 (010)**. The field L went from bumper corner to bumper corner a measured distance of 97 centimeters [38.2 inches]. Direct damage began 36 centimeters [14.2 inches] right of center and extended rightward 26 centimeters [10.2 inches]. Maximum crush was measured as 111 centimeters [43.7 inches] between C4 and C5. The wheelbase on the left side was extended 21 centimeters [8.3 inches] while the right side was shortened 61 centimeters [24.0 inches]. The front bumper, bumper fascia, grille, hood, radiator, front right headlight and turn signal assemblies, and right fender were directly damaged and crushed rearward. The WinSMASH reconstruction program, barrier algorithm, was used on the case vehicle's highest severity impact with the tree. Using the undeformed end width, the preliminary Total, Longitudinal, and Lateral Delta Vs are, respectively: 75.2 km.p.h. [46.7 m.p.h.], -74.1 km.p.h. [-46.0 m.p.h.], and -31.1 km.p.h. [-8.1 m.p.h.]. These results appear somewhat high but essentially reasonable. No reconstruction program was used on the case vehicle's deployment impact because the WinSMASH protocol requires a horizontal impact force, and the deployment impact was non-horizontal and out-of-scope.

The left rear tire was deflated from its impact with the concrete knee wall (event 7), with the CDC determined to be **10-LBWN-1**. The left front tire was restricted and deflated from the curb impact (2nd event) and the right front tire was torn off during the case vehicle's tree impact. Remote buckling was found on the right front roof, and on the right and left quarter panels.

Inspection of the case vehicle's interior revealed evidence of occupant contact on the driver's knee bolster, to the right of the steering column, and on the center instrument panel. There was blood on the driver's sun visor, the webbing of the driver's safety belt, and on the headrest of the driver's seat back, towards the outside. A post-crash fire in the area of the lower front right instrument panel occurred to the case vehicle's interior. The fire was noticed by passing motorists as the tow truck operator was hauling the case vehicle to the tow yard. The fire was extinguished

by the tow operator soon after his arrival at the tow yard. The fire caused the left side surface of the air bag's fabric (a 13 x 12 centimeter [5.1 x 4.7 inch] area) and the lower portion of the right instrument panel to melt. In addition, there was smoke residue to the bottom and right side of the front right air bag and smoke and heat residue on the windshield. There was also melting residue on the right sun visor.

The case vehicle's driver air bag was located in the steering wheel hub. The air bag module's cover flaps opened at the designated tear points and there was no evidence of damage to the air bag or the cover flaps. The driver's air bag was designed with two tethers, each 12 centimeters [4.7 inches] wide and positioned horizontally between the 11-1 and 5-7 o'clock areas. The driver's air bag had two vent ports, approximately 2.5 centimeters [1.0 inches] in diameter, located at the 11 and 1 o'clock areas. The deployed driver's air bag was round with a diameter of 56 centimeters [22.0 inches]. There was no contact evidence readily apparent on the air bag's surface. The driver's air bag had a substantial amount of blood covering the majority of the outer edges, with a small amount to the center surface.

The front right passenger's air bag was located in the top of the instrument panel. The cover flap opened at the designated tear points and there was no evidence of damage during the deployment to the cover flap. There was, however, a 34 centimeter [13.4 inch] snag with tearing to the top surface of the air bag fabric from the intruding and holed windshield. This line of tearing ran in an 8 o'clock to 2 o'clock direction. There were also scattered glass punctures to the front surface, from the cracked windshield's glazing. The front right passenger's air bag was designed without any tethers. It had two vent ports, approximately 5 centimeters [2.0 inches] in diameter, located at the 10 and 2 o'clock positions. The deployed front right air bag was rectangular with a height of approximately 30 centimeters [11.8 inches] and a width of approximately 60 centimeters [23.6 inches]. There was no contact evidence readily apparent on the front right air bag.

The case vehicle was equipped with multiple advanced occupant protection systems, including: adjustable foot controls; seat track position sensors; safety belt buckle pretensioners; torsion bar load limiters in the safety belt retractors; and dual-stage air bag inflators. The adjustable driver pedals were in the forward-most position. The driver's seat track was adjusted between the middle and rear most positions, and the front right seat was between the middle and forward most positions. Because the safety belts were not in use, the pretensioners did not actuate and the load limiters were not loaded. The case vehicle was equipped with a Restraints Control Module (RCM) that was successfully downloaded. The entire RCM report is presented as an attachment at the end of this document. The downloaded results indicate the maximum longitudinal delta V as -9.9 km.p.h. [-6.2 m.p.h.] at 78 milliseconds into the recorded crash event. The report indicates that the case vehicle's air bags did not deploy and it is not known if the second stage of the dual stage inflators ignited. This investigator believes the RCM recorded the case vehicle's curb impact (event 2) and stopped recording prior to the deployment, probably as a result of electrical system damage from the first pole impact (event 3).

The 1992 Ford Ranger XLT was a rear wheel drive, 4x2, two-door, super cab, pickup truck (VIN: 1FTCR14UXNP-----). Based on the vehicle inspection, the CDC was determined to

be: **06-LYES-2 (190)** [maximum crush was 12 centimeters [4.7 inches]]. The Ford pickup was towed due to damage.

The 1994 Dodge Caravan was a front wheel drive, three-door minivan (VIN: unknown). This vehicle was not inspected. The Dodge minivan was driven from the scene.

Immediately prior to the crash the case vehicle's driver (of unknown height and weight) was probably seated in an upright posture with his back against the seat back, his left foot on the floor, his right foot on the accelerator, and both hands on the steering wheel. His seat track was located between its middle and rearmost positions, the seat back was slightly reclined, and the tilt steering wheel was located between its middle and upmost positions.

The case vehicle's driver was not using his available, active, three-point, lap-and-shoulder, safety belt system. The inspection of the driver's seat belt webbing, D-ring, and latch plate showed no evidence of loading. The case vehicle's driver seat belt system was equipped with a pretensioner. The pretensioner did not actuate.

The case vehicle's driver made no known pre-crash avoidance maneuvers prior to sideswiping the Ford pickup. As a result and independent of the non-use of his available safety belts, his pre-impact body position did not change just prior to impact. The case vehicle's impact with the Ford pickup caused the driver to move slightly forward, toward the 10 degree direction of principal force as the case vehicle decelerated slightly. As the case vehicle veered to the left as a result of rebounding off of the Ford pickup and/or a left steering input by the case vehicle's driver, the driver most likely moved rightward. According to eyewitnesses, the case vehicle struck the curb causing it to go airborne which most likely resulted in the driver moving downward into his seat cushion, then upward as the vehicle came back down. The case vehicle's ground impact and near simultaneous first sign post impact resulted in the driver moving forward into his deploying air bag. The driver's air bag most likely pushed the driver backwards and to his right, into his seat back. The subsequent sign impact had little effect on his position. The tree impact caused the case vehicle's driver to move forward and upward, toward the case vehicle's 10 degree direction of principal force as the case vehicle decelerated. As a result, the driver loaded and most likely dissipated the residual inflation from deployed driver's air bag before loading the case vehicle's steering column with his chest and the knee bolster with his right knee. The case vehicle's sudden and rapid clockwise rotation, underneath the driver, resulted in the driver striking the center instrument panel with his face. The exact position of the driver at final rest is unknown, as is his capability to exit the case vehicle.

The driver was transported by ambulance to a hospital. According to the Police Crash Report and the investigating police officer, he sustained moderate injuries and was hospitalized. The specific injuries sustained by the case vehicle's driver are unknown.

The case vehicle was traveling south at high speed in the inside, southbound lane of a three-lane, one-way, city street (**Figure 1**) and was attempting to change lanes into the center southbound lane. The Ford pickup was traveling south in the center lane of the same city street and intended to continue traveling southbound. The Dodge minivan was traveling ahead of the Ford pickup in the center lane of the same city street, and intended to continue traveling southward. The case vehicle's driver steered into the center lane. It is not known if the case vehicle driver attempted any avoidance maneuvers. The initial impact occurred in the center southbound lane of the roadway; see **CRASH DIAGRAM** below.

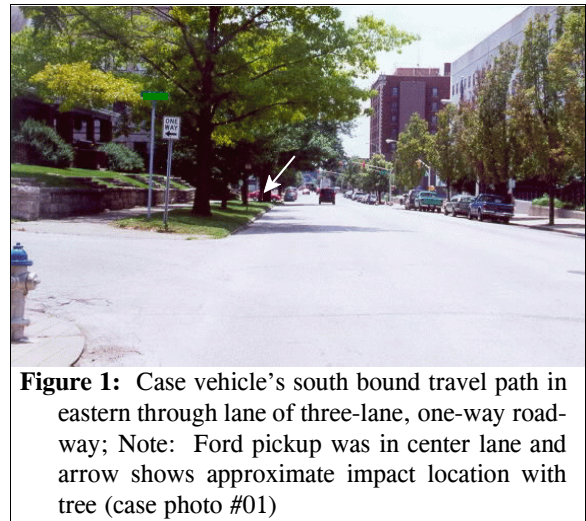


Figure 1: Case vehicle's south bound travel path in eastern through lane of three-lane, one-way roadway; Note: Ford pickup was in center lane and arrow shows approximate impact location with tree (case photo #01)

The southbound city roadway was straight with a positive 2.1% slope at the area of the initial impact. The pavement was bituminous, and the width of the inside southbound lane was 3.3 meters [10.9 feet]. The width of the center southbound lane was 3.6 meters [11.9 feet]. The southbound roadway was bordered by 7.5 centimeter [3.0 inch] curb. Beyond the curb on the east side was a grass tree lawn with the west side having a concrete sidewalk. Pavement markings consisted of a painted, broken white, lane lines separating the three southbound through lanes. The estimated coefficient of friction was 0.70. Traffic controls consisted of several regulatory signs, including NO PARKING, ONE-WAY and an information sign. The posted speed limit was 56 km.p.h. [35 m.p.h.].



Figure 2: On-scene, looking south along case vehicle's path off east road edge; Note: left front tire mark on grassy roadside and location (arrow) of ONE-WAY sign (case photo #77)

The right side of the case vehicle sideswiped the left side of the Ford pickup (event #1). As a result of this initial impact, the case vehicle veered sharply to the left, striking the raised curb on the east side of the roadway (**Figure 2**) with its left front tire (event #2). The case vehicle overrode the curb and went airborne off the east side of the roadway before impacting and uprooting the first sign post (event #3) (ONE-WAY sign), and simultaneously landing and bottoming out (event #4). When the front undercarriage of the case

vehicle impacted the ground, it most likely caused the case vehicle's driver and front right passenger supplemental restraints (air bags) to deploy. The case vehicle continued in a southerly direction across an alleyway prior to impacting and knocking over a second information sign (event 5, mounted on double posts--**Figure 3**), followed by the tree impact (event 6). Upon impact with the tree, the case vehicle's right front wheel assembly came off and rolled southwestwardly down the street, impacting the back of the Dodge minivan (event 8).

As a result of the case vehicle's impact with the tree, the case vehicle pitched upwards while rotating approximately 80 degrees clockwise (**Figure 4**). The case vehicle's left rear tire struck and went over a concrete knee wall that separated the outside edge of the sidewalk and a landscape area (event 7). The case vehicle came to rest straddling the sidewalk with its front pointing downward and its rear tires on and over the knee wall. At final rest, the case vehicle was heading west-southwest (**Figure 5**).

CASE VEHICLE

The case vehicle was a 2000 Ford Taurus SE front wheel drive, four-door, five-passenger sedan (VIN: 1FAFP53UXYG-----) equipped with a 3.0 liter V6 engine and a four-speed automatic transmission. Braking was achieved by a power-assisted, front disc and rear drum anti-lock system. The case vehicle's wheelbase was 276 centimeters [108.7 inches] and the odometer showed 49,549 kilometers [30,788 miles]. The case vehicle was equipped with multiple advanced occupant protection systems.

Inspection of the case vehicle's interior revealed electronic adjustable outside side mirrors, cruise control, and an electronic adjustable driver seat. The front row was fitted with bucket seats and adjustable head restraints. There were continuous loop, three-point lap-and-shoulder safety belt systems at the two front seat and all three rear seat positions. The front safety belt systems were equipped with manually operated height adjusters for the D-rings. The vehicle was equipped with knee bolsters for the driver and front right passenger.



Figure 3: On-scene, case vehicle's path, showing soil thrown by undercarriage impact, sign posts (arrows), and final rest (case photo #72)

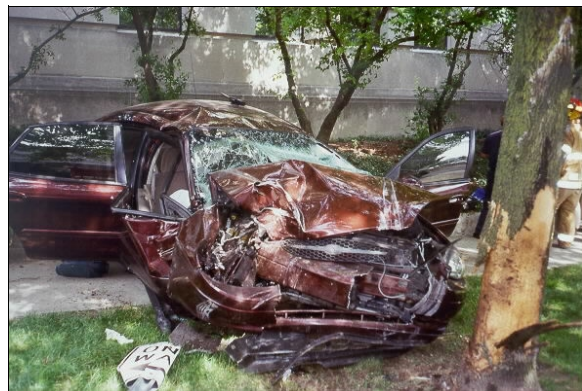


Figure 4: On-scene, looking east at case vehicle's final rest position (case photo #78)



Figure 5: On-scene view of case vehicle's final rest position, straddling sidewalk with rear tires up over concrete knee wall (case photo #75)

The case vehicle was equipped with multiple advanced occupant protection systems, including: adjustable foot controls; seat track position sensors; safety belt buckle pretensioners; torsion bar load limiters in the safety belt retractors; and dual-stage air bag inflators. The adjustable driver pedals were in the forward-most position. The driver's seat track was adjusted between the middle and rear most positions, and the front right seat was between the middle and forward most positions. Because the safety belts were not in use, the pretensioners did not actuate and the load limiters were not loaded. The case vehicle was equipped with a Restraints Control Module (RCM) that was successfully downloaded. The entire RCM report is presented as an attachment at the end of this document. The downloaded results indicate maximum longitudinal delta V as -9.9 km.p.h. [-6.2 m.p.h.] at 78 milliseconds into the recorded crash event. The report indicates that the case vehicle's air bags did not deploy and it is not known if the second stage of the dual stage inflators ignited. This investigator believes the RCM recorded the case vehicle's curb impact (event 2) and stopped recording prior to the deployment, probably as a result of electrical system damage from the first pole impact (event 3).



Figure 6: Case vehicle's right side showing front deformation, right front wheel off, and side swipe damage (tape) (case photo #25)

CASE VEHICLE DAMAGE

The case vehicle's initial contact with the Ford pickup involved the right fender. Direct damage began at the right front bumper corner and extended rearward to the right B-pillar. The exact direct damage width and maximum crush, although minimal, could not be determined because the damage was masked by the severe frontal impact with the tree (**Figure 6**). The case vehicle's curb impact blew out the front left tire (**Figure 7**). The case vehicle's third impact with the ONE-WAY regulatory sign involved the front right. The sign, which was located on the north side of the alleyway and faced east (i.e., for traffic exiting the alleyway), was supported by a U-channel steel post which, when struck, was uprooted and wrapped over the bumper and onto the hood. The case vehicle's undercarriage impact (4th impact) with the ground showed direct damage extending between the front wheels (**Figure 8**) a measured distance of 121 centimeters [47.6 inches]. The fifth impact involved an information sign that had two U-channel steel sign posts sunk in the ground with two U-channel extensions holding the sign and bolted to the anchored posts. The two upper posts and the sign broke away from the two lower posts. The case vehicle ran over the two lower posts while the upper posts and sign contacted the hood and



Figure 7: Front left view of case vehicle's damage; Note: tape on bumper (arrow) indicates 2nd sign post impact; damaged left front wheel/tire; right front wheel/tire broken off (case photo #17)

windshield. It appears the sign pierced and holed the windshield near the left A-pillar. The direct damage width was 86 centimeters [33.9 inches] and started 20 centimeters [7.9 inches] left of center.

The case vehicle's most severe impact involved the front right (**Figures 7 and 9**). The field L went from bumper corner to bumper corner a measured distance of 97 centimeters [38.2 inches]. Direct damage began 36 centimeters [14.2 inches] right of center and extended rightward 26 centimeters [10.2 inches]. Maximum crush was measured as 111 centimeters [43.7 inches] between C₄ and C₅. The wheelbase on the case vehicle's left side was extended 21 centimeters [8.3 inches] while the right side was shortened 61 centimeters [24.0 inches]. The case vehicle's front bumper, bumper fascia, grille, hood, radiator, front right headlight and turn signal assemblies, and right fender were directly damaged and crushed rearward. The case vehicle's left front tire was restricted, deflated, and punctured from the curb impact (**Figure 7**), the left rear tire was punctured and deflated from its impact with the concrete border (7th impact), and the right front tire was torn off during the case vehicle's tree impact. Remote buckling was also found on the case vehicle's right front roof and right and left quarter panels.

Based on the vehicle inspection the CDCs for the case vehicle were determined to be: **12-RYES-1 (010)** (event 1), **12-FLWN-3** (event 2), **12-FREN-1 (360)** (event 3), **00-UFDW-2** (event 4, deployment impact), **12-FLAN-6 (360)** (event 5), **12-FREN-5 (010)** (event 6, most severe impact), and **10-LBWN-1** (event 7). The WinSMASH barrier algorithm was used on the case vehicle's highest severity impact, event 6. The Total, Longitudinal, and Lateral Delta Vs are, respectively: 75.2 km.p.h. [46.7 m.p.h.], -74.1 km.p.h. [-46.0 m.p.h.], and -13.1 km.p.h. [-8.1 m.p.h.]. These results appear high to this investigator. No reconstruction was performed for the case vehicle's deployment impact because was a non-horizontal impact force and out-of-scope. The case vehicle was towed due to damage.



Figure 8: Undercarriage view from front of direct contact to case vehicle's front frame members with embedded grass (case photo #30)

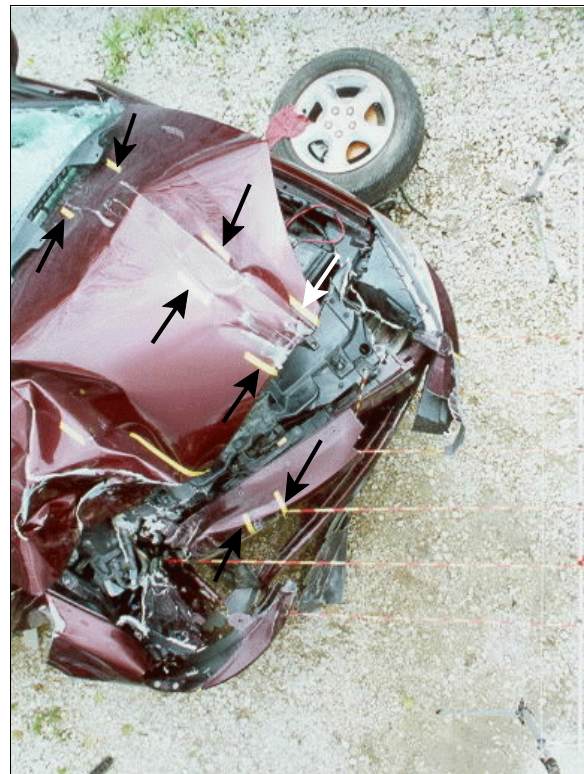


Figure 9: Overhead view of deformation to case vehicle's front; Note: imprint from informational sign's west post on left-center hood, imprint from ONE WAY sign post on right bumper, and right front wheel on ground (case photo #14)

Inspection of the case vehicle's interior revealed evidence of occupant contact on the driver's knee bolster, to the right of the steering column, and to the center instrument panel (**Figure 10**). There was blood on the driver's sun visor, the webbing of the driver's safety belt, and on the headrest of the driver's seat back, towards the outside. The shear capsule was completely separated and the steering column's breakaway coupling was separated. A post-crash fire in the area of the lower front right instrument panel occurred to the case vehicle's interior (**Figure 10**). The fire was noticed by passing motorists as the tow truck operator was hauling the case vehicle to the tow yard. The fire was extinguished by the tow operator soon after his arrival at the tow yard. The fire resulted in a melting to the left side surface of the air bag (13 x 12 centimeters [5.1 x 4.7 inches] area) as well as the lower portion of the right instrument panel. In addition, there was smoke residue to the bottom and right side of the front right air bag and smoke and heat residue on the windshield. There was melting residue on the right sun visor.

AUTOMATIC RESTRAINT SYSTEM

The case vehicle was equipped with a Supplemental Restraint System (SRS) that consisted of frontal air bags at the driver and front right passenger positions. Both air bags deployed as a result of the case vehicle's undercarriage impact. The case vehicle's driver air bag was located in the steering wheel hub (**Figure 11**). An inspection of the air bag module's cover flaps and air bag revealed that the cover flaps opened at the designated tear points, and there was no evidence of damage during the deployment to the air bag or the cover flaps. The driver's air bag was designed with two tethers, each 12 centimeter [4.7 inches] wide and located horizontally between the 11-1 and 5-7 o'clock positions. The driver's air bag had two vent ports, approximately 2.5 centimeters [1.0 inches] in diameter, located at the 11 and 1 o'clock positions. The deployed driver's air bag



Figure 10: Case vehicle's center and front right area showing intrusion, driver contact evidence on center instrument panel, cracked and holed windshield glazing, deployed front right air bag, and fire damage to right instrument panel area and below (case photo #46)



Figure 11: Case vehicle's driver seating area showing driver's deployed bloodstained air bag, cracked windshield glazing, and blood evidence on driver's sun visor (case photo #40)

was round with a diameter of 56 centimeters [22.0 inches]. There was no contact evidence readily apparent on the air bag's surface; although, the driver's air bag had a significant amount of blood covering the majority of the outer edges with a small amount to the center surface.

The front right passenger's air bag was located in the top of the instrument panel (**Figure 12**). An inspection of the front right air bag module's cover flap and air bag revealed that the cover flap opened at the designated tear points, and there was no evidence of damage during the deployment to the cover flap. There was however a 34 centimeter [13.4 inches] snag with tearing to the top surface of the air bag from the intruding and holed windshield. This line of tearing ran in an 8 o'clock to 2 o'clock direction. Furthermore, there were scattered glass punctures to the front surface, also from the cracked windshield's glazing. The front right passenger's air bag was designed without any tethers. The front right air bag had two vent ports, approximately 5 centimeters [2.0 inches] in diameter, located at the 10 and 2 o'clock positions. The deployed front right air bag was rectangular with a height of approximately 30 centimeters [11.8 inches] and a width of approximately 60 centimeters [23.6 inches]. There was no contact evidence readily apparent on the front right air bag.



Figure 12: Case vehicle's front right module cover flap and deployed air bag showing snagging and tears to top surface (case photo #55)

CASE VEHICLE DRIVER KINEMATICS

Immediately prior to the crash the case vehicle's driver (of unknown height and weight) was probably seated in an upright posture with his back against the seat back, his left foot on the floor, his right foot on the accelerator, and both hands on the steering wheel. His seat track was located between its middle and rearmost positions, the seat back was slightly reclined, and the tilt steering wheel was located between its middle and upmost positions.

The case vehicle's driver was not using his available, active, three-point, lap-and-shoulder, safety belt system. The inspection of the driver's seat belt webbing, D-ring, and latch plate showed no evidence of loading. The case vehicle's driver seat belt system was equipped with a pretensioner. The pretensioner did not actuate.

The case vehicle's driver made no known pre-crash avoidance maneuvers prior to sideswiping the Ford pickup. As a result and independent of the non-use of his available safety belts, his pre-impact body position did not change just prior to impact. The case vehicle's impact with the Ford pickup caused the driver to move slightly forward, toward the 10 degree direction of principal force. As the case vehicle veered to the left as a result of rebounding off of the Ford pickup and/or a left steering input by the case vehicle's driver, the driver most likely moved rightward. According to eyewitnesses, the case vehicle struck the curb causing it to go airborne which most likely resulted in the driver moving downward into his seat cushion, then upward as

the vehicle came back down. The case vehicle's ground impact and near simultaneous first sign post impact resulted in the driver moving forward into his deploying air bag. The driver's air bag most likely pushed the driver backwards and to his right into his seat back. The subsequent sign impact had little effect on the driver's position. The tree impact caused the driver to continue forward and upward toward the 10 degree direction of principal force as the case vehicle decelerated. As a result, the driver loaded and most likely dissipated the residual inflation from deployed driver's air bag before loading the case vehicle's steering column with his chest and the knee bolster with his right knee. The case vehicle's rapid clockwise rotation resulted in the driver striking the center instrument panel with his face. The exact position of the driver at final rest is unknown as is his capability to exit the case vehicle.

CASE VEHICLE DRIVER INJURIES

The driver was transported by ambulance to a hospital. He sustained, according to the Police Crash Report and the investigating police officer, moderate injuries and was hospitalized. The specific injuries sustained by the case vehicle's driver are unknown.

1ST OTHER VEHICLE

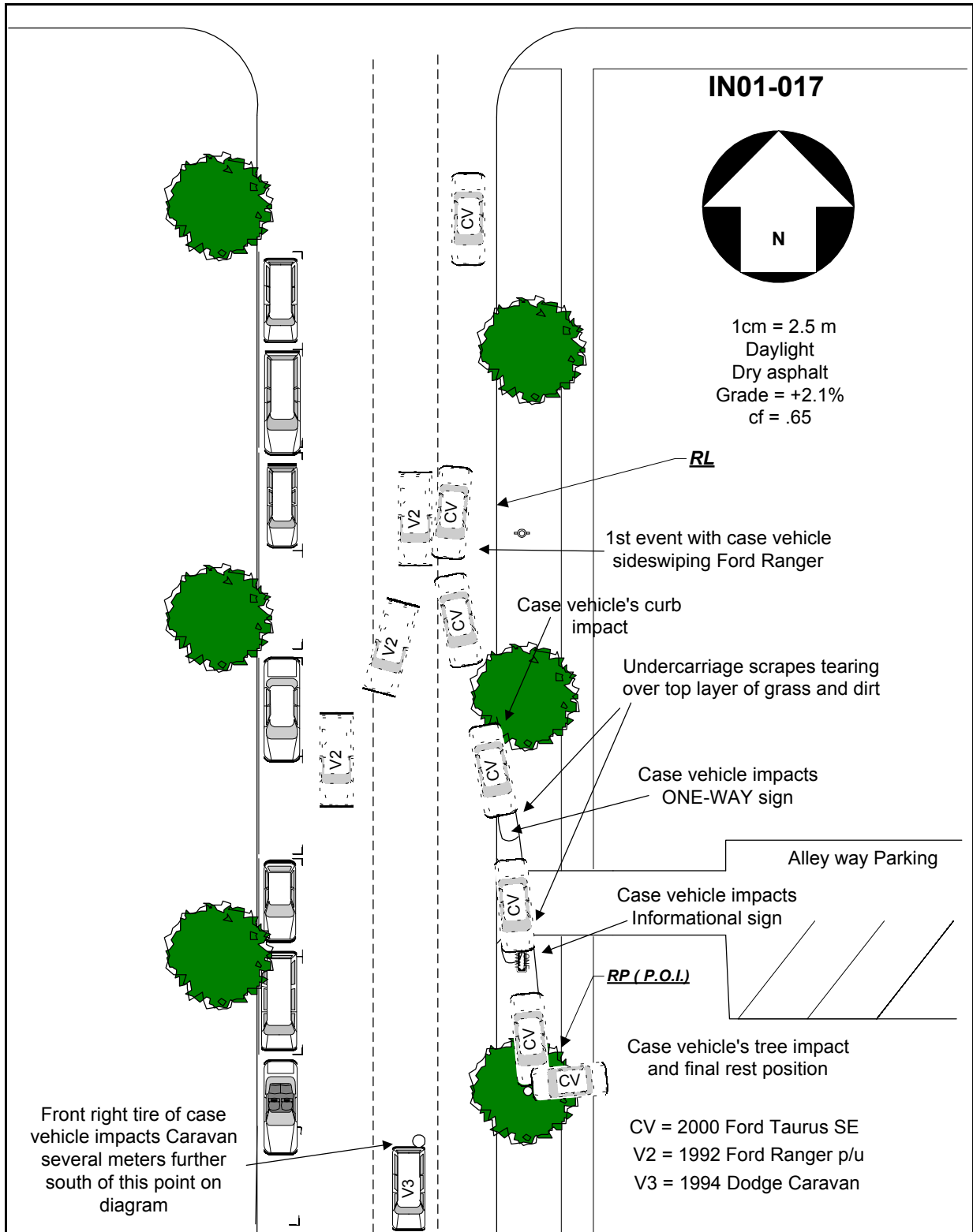
The 1992 Ford Ranger XLT was a rear wheel drive, 4x2, two-door, super cab pickup truck (VIN: 1F7CR14UXNP-----). Based on the vehicle inspection, the CDC was determined to be: **06-LYES-2 (190)** (maximum crush was 12 centimeters [4.7 inches]). No reconstruction program was used on the Ranger's left side sideswipe type impact (**Figure 13**) because the impact was out-of-scope. The Ford pickup was towed due to damage.



Figure 13: Sideswipe damage to Ford Ranger pickup's left side (case photo #65)

2ND OTHER VEHICLE

The 1994 Dodge Caravan was a front wheel drive, three-door minivan (VIN: unknown). This vehicle did not contact with the case vehicle and was not inspected. According to the Police Crash Report, the case vehicle's front right wheel came off, rolled into the street and stuck the back of the minivan. The Dodge minivan was driven from the scene.



2000 Taurus/Sable EDR Report - Summary Page



Investigation Data

File Name:	IN01-017Dump.hex	File Save Date:	21-Jun-2001
File Read-out Date:	N/A	Report Date:	22-Jun-2001
Report Version:	1.6		

EDR Control Module Data

Data Validity Check:	Valid	EDR Model Version:	141
Time From Side Safing Decision to Left (Driver) Side Bag Deployment:	Not Deployed		
Time From Side Safing Decision to Right (Passenger) Side Bag Deployment:	Not Deployed		
Passenger Airbag Switch Position During Event:	N/A		
Diagnostic Codes Active When Event Occurred:	0		

Algorithm Times

Actual initiation depends on restraint system status (below).

	ms
Time From Algorithm Wakeup to Pretensioner:	0
Time From Algorithm Wakeup to First Stage - Unbelted:	0
Time From Algorithm Wakeup to First Stage - Belted:	0
Time From Algorithm Wakeup to Second Stage:	0

Restraint System Status

Driver Seat Belt Buckle:	Not Engaged
Passenger Seat Belt Buckle:	Not Engaged
Driver Seat Track In Forward Position:	No
Passenger Seat Weight Switch Position:	N/A

Deployment Initiation Attempt Times

	Driver	Passenger
Time From Algorithm Wakeup to Pretensioner Deployment Attempt:	Not Deployed	Not Deployed
Time From Algorithm Wakeup to First Stage Deployment Attempt:	Not Deployed	Not Deployed
Time From Algorithm Wakeup to Second Stage Deployment Attempt:	Not Deployed	Not Deployed

Notes

1. Read-out date is set by the PC interface tool.
2. Features and data parameters which are not available on the module are marked "N/A".
3. CFC 60 is a Butterworth 4-pole phaseless digital filter. (See SAE J211 Part 1 Appendix C dated March 1995.)
4. Total and maximum Delta-V results are not available from truncated/incomplete crash pulses.
5. Algorithm wakeup (0 ms) is not the first moment of vehicle contact or impact.
6. The Excel "Analysis ToolPak" Add-in must be enabled for this spreadsheet to operate properly.
7. Acceleration data and plots are only valid for frontal impact event recordings.

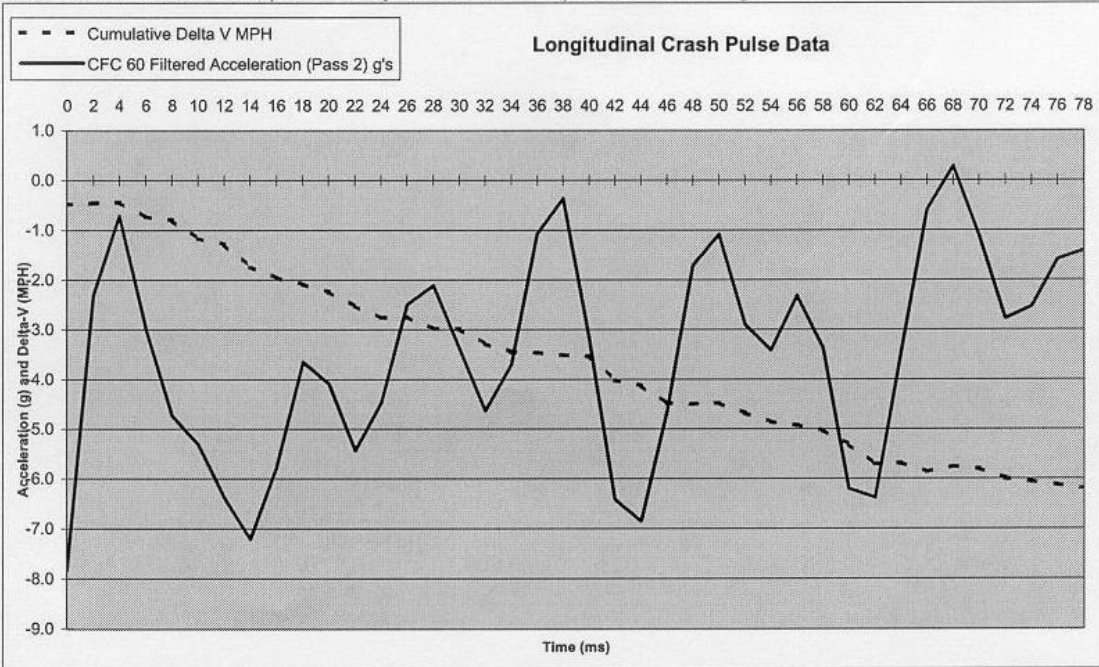
Note: Default reporting for side air bags indicates "Not Deployed", but the case vehicle was not equipped with side air bags.

2000 Taurus/Sable EDR Report - Charts

Longitudinal Cumulative Delta-V

Time (ms)	0	10	20	30	40	50	60	70	78
Delta-V (MPH)	-0.5	-1.2	-2.2	-3.0	-3.5	-4.5	-5.3	-5.8	-6.2

Note: Acceleration data and plots are only valid for frontal impact event recordings.



Lateral Cumulative Delta-V

Time (ms)	0	10	20	30	40	50	60	70	78
Delta-V (MPH)	0.0	0.0	0.2	0.9	0.7	0.2	0.1	-0.4	-0.2

Note: Acceleration data and plots are only valid for frontal impact event recordings.

